U.S. Department of the Interior
Bureau of Land Management

Environmental Impact Statement

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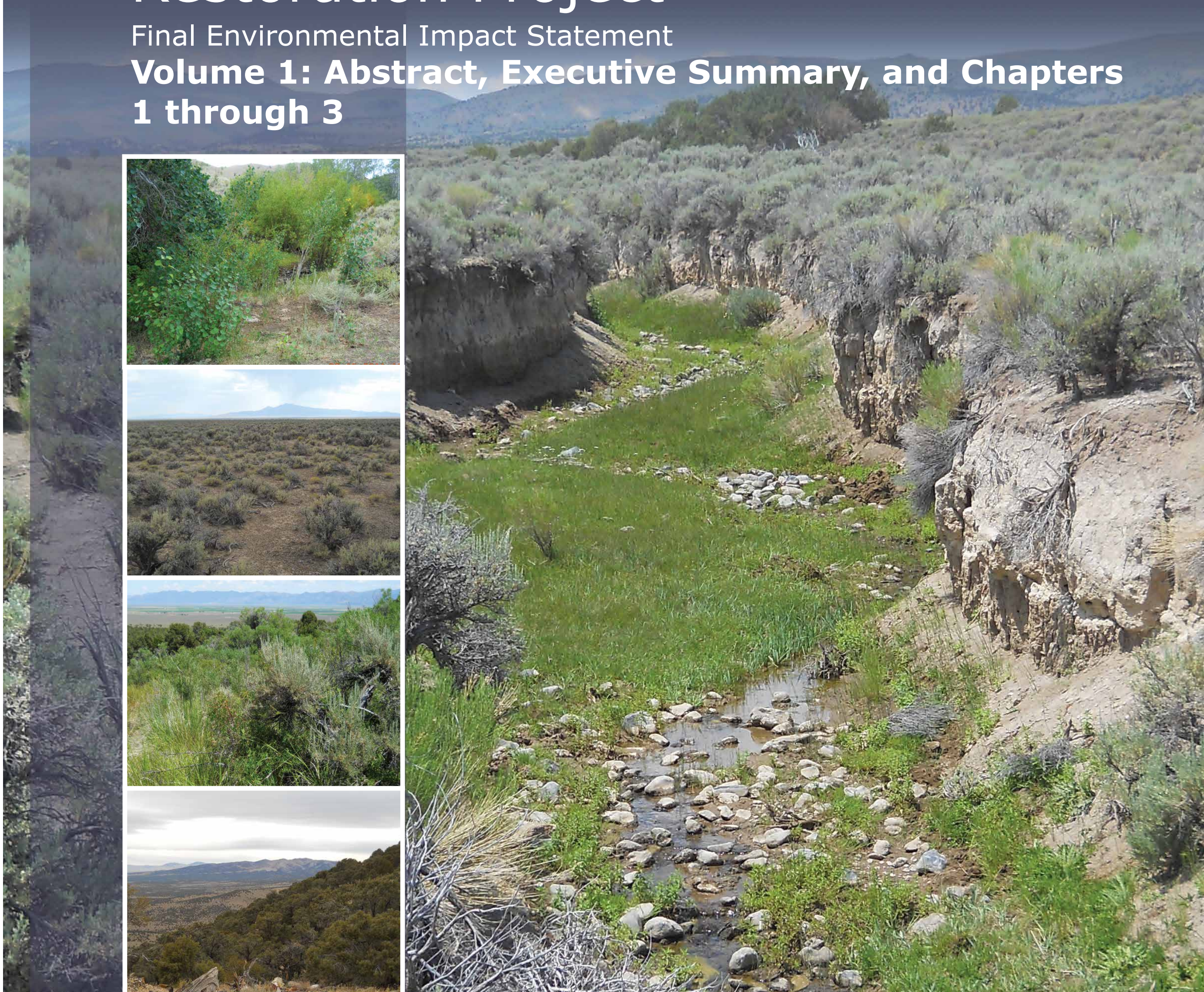
3 Bars Ecosystem and Landscape Restoration Project

Final Environmental Impact Statement

Volume 1: Abstract, Executive Summary, and Chapters 1 through 3



October 2016

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BLM

3 Bars Ecosystem and Landscape Restoration Project

Final Environmental Impact Statement

Volume 1:

Abstract

Executive Summary

Chapters 1 through 3

DOI
BLM
October
2016

FINAL

3 BARS ECOSYSTEM AND LANDSCAPE RESTORATION PROJECT ENVIRONMENTAL IMPACT STATEMENT

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LEAD AGENCY: U.S. Department of the Interior
Bureau of Land Management
Mount Lewis Field Office

PROJECT LOCATION: Eureka County, Nevada

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ABSTRACT

This Environmental Impact Statement (EIS) analyzes the potential direct, indirect, and cumulative impacts associated with the Bureau of Land Management's (BLM's) proposed land restoration treatments on the approximately 749,810-acre 3 Bars ecosystem. The BLM evaluated three action alternatives and the No Action Alternative. Alternative A is the BLM's Preferred Alternative. Under this alternative, the BLM would treat about 127,000 acres during the life of the project using manual and mechanical methods, fire (both prescribed and wildland fire for resource benefit), and biological control (use of livestock and classic biological control [nematodes, fungi, mites, and insects], primarily to control noxious weeds and other invasive non-native vegetation). Alternative B differs from Alternative A in that the BLM would not use prescribed fire and wildland fire for resource benefit, and the BLM would treat only about 63,500 acres. Under Alternative C, the BLM would only treat vegetation within treatment areas using manual methods and classical biological control; use of livestock for biological control would not be allowed. The BLM would also not be able to use mechanical methods or fire, and would treat only about 31,750 acres. The focus of treatments under all three action alternatives would be to restore riparian, aspen, and sagebrush habitats; slow singleleaf pinyon pine and Utah juniper encroachment into and infilling within these habitats; and thin historic pinyon-juniper communities to promote woodland health. Under Alternative D, the No Action Alternative, no new treatments would be authorized as a result of this project. However, the BLM would continue to conduct treatments approved under earlier NEPA authorizations.

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

Introduction

The 3 Bars ecosystem is approximately 749,810 acres in central Eureka County, northwest of Eureka, Nevada. The ecosystem is administered by the U.S. Department of the Interior (USDOI), Bureau of Land Management (BLM), Mount Lewis Field Office. It is a shrub-steppe ecosystem with important resource values, ranging from habitat for a diversity of plants and animals, to providing traditional use areas for several Native American tribes. The 3 Bars ecosystem provides important habitat for Greater sage-grouse[1], mule deer, Lahontan cutthroat trout, and numerous other fish and wildlife species, including migratory birds, and for wild horses. The 3 Bars ecosystem is also an important recreation resource for Nevada residents and visitors. Resource conditions on several areas within the ecosystem, however, have deteriorated due to past land use activities, causing the BLM to target this area for restoration. Although 3 Bars ecosystem health is in decline, the ecosystem has characteristics that suggest its health can be substantially improved through land restoration activities. Given the opportunity to improve 3 Bars ecosystem health, the 3 Bars Ecosystem and Landscape Restoration Project (3 Bars Project) is being proposed by the BLM to develop the 3 Bars ecosystem into a sustainable, healthy, and resilient landscape.

The 3 Bars ecosystem provides habitat for Greater sage-grouse, which has been declared a special status species in the September 2015 BLM *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision* (ARMPA). To ensure that treatments benefit Greater sage-grouse, sagebrush restoration treatments would adhere to ARMPA Required Design Features (RDFs). These include avoiding treatments near Greater sage-grouse leks and avoiding treatments in breeding, brood-rearing, and wintering habitats during those times of the year when Greater sage-grouse are using these habitats. The BLM will ensure proper livestock management is in place prior to treatments when necessary in order to meet project goals and objectives, which would benefit Greater sage-grouse habitat.

In order to ensure long-term success, treatments would not be conducted in areas with moderate to severe forage utilization until mitigation measures associated with livestock management, as discussed in Section 3.18.4, are implemented through agreements or decisions subsequent to the 3 Bars Project Record of Decision to ensure proper livestock management. The BLM would work with permittees on a permit by permit basis to address any changes in livestock management prior to treatment implementation. In all instances, proper changes in livestock management through agreements or decisions would be finalized prior to treatment implementation.

Project funding would come from funds allocated by Congress to the BLM for resource management. To reduce the cost of treatments to the taxpayer, the BLM would seek outside funding partnerships with other resource agencies, non-governmental organizations, or private industries that are interested in resource management within the 3 Bars ecosystem. Additionally, it is anticipated that habitat enhancement activities authorized with the 3 Bars Project decision would provide opportunities to utilize off-site mitigation account funds associated with various development activities within or near the 3 Bars Project area.

[1] Common and scientific names of plant and animals given in this Environmental Impact Statement are provided in **Appendix A**.

Proposed Action

The BLM proposes to treat vegetation using manual, mechanical, and biological control methods, and fire (both prescribed and wildland fire for resource benefit). Treatments would address multiple resource issues and aid in restoring functionality to key elements of the 3 Bars ecosystem.

The BLM has identified site-specific treatment projects that it proposes to implement over the life of the project to restore and manage the 3 Bars ecosystem. Treatment projects were identified through an iterative process involving the BLM and other federal and state cooperating agencies. Treatments would focus on four priority vegetation management concerns—riparian, quaking aspen (aspen), singleleaf pinyon pine and Utah juniper (pinyon-juniper), and sagebrush, with an emphasis on improving Greater sage-grouse habitat.

Purposes for the Project

Using the information from the *Assessment of Existing and Current Conditions for the Proposed 3 Bars Ecosystem and Landscape Restoration Project Environmental Impact Statement* prepared for the project, and field studies, the BLM identified several purposes for the 3 Bars Project. Purposes are consistent with the 1986 *Shoshone-Eureka Resource Management Plan Record of Decision* as amended, and the 2015 ARMPA, which guides land management activities in the 3 Bars ecosystem. Purposes for the 3 Bars Project include:

- Improve woodland, rangeland, and riparian health, productivity, and functionality.
- Increase stream flows and restore channel morphology in degraded streams.
- Improve stream habitat for fish and wildlife by implementing physical treatments that include installing large woody debris, rock clusters, and check dams, and using temporary fencing to exclude livestock and wild horses.
- Improve the health of aspen, mountain mahogany, and other mountain tree and shrub stands to benefit wildlife, and Native Americans that use these plants for medicinal and other purposes.
- Manage pinyon-juniper woodlands to promote healthy, diverse stands within persistent woodlands.
- Slow the expansion of pinyon-juniper into sagebrush and riparian plant communities.
- Slow the spread of noxious weeds and other invasive non-native vegetation, including cheatgrass.
- Protect and enhance habitat for fish and wildlife, including species of concern such as raptors, Greater sage-grouse, and Lahontan cutthroat trout.

The BLM has also identified project purposes that are specific to fire use and improving ecosystem management through the use of fire. These include:

- Restore fire as an integral part of the ecosystem; reduce the risk of large-scale wildfire; reduce extreme, very high, and high wildfire risks to moderate risk or less; and develop fuel breaks within the treatment areas.
- Protect life, property, and community infrastructure, and protect fish and wildlife habitat from devastating wildfire effects.

Treatment purposes would be met by implementing land restoration treatments in areas where resource management goals are not being met, and the likelihood of treatments improving resource conditions is great. The proposed treatments would range from several acres to several thousand acres, depending on specific treatment and management goals and desired outcomes for each resource area.

Need for the Project

The 3 Bars ecosystem has long been recognized as an area with numerous resource values and uses. Some of these resources and uses include mineral exploration and development, livestock grazing, woodland product harvest, recreation, wilderness activities, and habitat for wild horses, fish, and wildlife, including sensitive and game fish and wildlife species such as Lahontan cutthroat trout, Greater sage-grouse, mule deer, and pronghorn antelope.

Factors affecting land uses and health in the ecosystem include the effects of past grazing practices, changes to the natural fire regime, establishment and spread of noxious weeds and other invasive non-native vegetation, and expansion and densification of pinyon-juniper woodlands. Collectively, these have caused substantial changes in the native vegetation community and loss of important ecosystem components. Based on these changes, the BLM has determined that there is a need to improve rangeland health.

Scope of Analysis and Decisions to be Made

The National Environmental Policy Act (NEPA) mandates that every federal agency prepare a detailed statement of the effects, or Environmental Impact Statement (EIS), of "major federal actions significantly affecting the quality of the human environment" (42 United States Code § 4321 et sequentia; USDOI BLM 2008a). An EIS is intended to provide decision-makers and the public with a complete and objective evaluation of significant environmental impacts, beneficial and adverse, resulting from the proposed action and several reasonable alternatives. Given the magnitude of treatments and the resulting potential for significant cumulative effects from the 3 Bars Project, the BLM has determined that an EIS is required to evaluate impacts from the 3 Bars Project.

This EIS analyzes the effects of using a variety of treatments to improve ecosystem health on the 3 Bars ecosystem. Decisions expected to be made through this EIS process include:

- Determine which areas within the 3 Bars ecosystem would be treated.
- Determine which treatment methods would be used to accomplish management objectives.
- Determine which management actions would be taken to facilitate restoration of public lands.
- Identify criteria to guide future restoration activities within the 3 Bars ecosystem.

At least 30 days after the U.S. Environmental Protection Agency (USEPA) publishes the Notice of Availability of the Final EIS, the BLM decision-maker will prepare a Record of Decision (ROD). The decision may be to select one of the alternatives in its entirety, or to combine features from several alternatives that fall within the range of alternatives analyzed in this EIS. The ROD will address significant impacts, alternatives, mitigation measures, and relevant economic and technical considerations.

Alternative Proposals

Four alternatives are evaluated in this EIS—the All Treatment Methods Alternative (Alternative A; Preferred Alternative); the No Fire Use Alternative (Alternative B); the Minimal Land Disturbance Alternative (Alternative C); and the No Action Alternative (Alternative D; Continue Current Management). Alternative actions are those that could be taken to feasibly attain the BLM's objectives for improving the health of, and reducing risks to, the 3 Bars ecosystem. The alternatives differ primarily in the types of treatment methods allowed and the amount of acreage that can reasonably be treated over the life of the project.

Alternative A — All Treatment Methods Alternative (Preferred Alternative)

Alternative A is the BLM's Preferred Alternative. The BLM proposes to treat about 127,000 acres during the life of the project, using manual and mechanical methods, fire (both prescribed and wildland fire for resource benefit), and biological control (primarily to control noxious weeds and other invasive non-native vegetation using livestock and classic biological control [use of nematodes, fungi, mites, and insects]). Treatments would focus on protecting landscapes and treatment projects would usually address multiple resource issues. Treatments would focus on four priority vegetation management concerns:

- Riparian—treatments in riparian habitats would focus on restoring functionality in areas where stream structural integrity (incised channels, headcuts, knickpoints, developments, and diversions) and/or appropriate plant species composition are compromised.
- Aspen—treatments in aspen habitat would focus on improving the health of aspen stands by stimulating aspen stand suckering and sucker survival.
- Pinyon-juniper—treatments in pinyon-juniper habitats would focus on thinning historic pinyon-juniper communities to promote woodland health and removing pinyon-juniper where it encroaches into riparian areas and upland habitats, including sagebrush habitat.
- Sagebrush—treatments in sagebrush habitats would focus on restoring the sagebrush community by removing encroaching pinyon-juniper, promoting the reestablishment of native forbs and grasses in sagebrush communities, and promoting the development of sagebrush in areas where it should occur based on ecological site description.

About 95 percent of acres treated would be to manage pinyon-juniper and improve sagebrush habitat. Human-related activities allowed under the Federal Land Policy and Management Act, such as livestock grazing and off-highway vehicle use would continue to be allowed. The BLM would follow planning processes, apply Standard Operating Procedures (SOPs), and implement appropriate mitigation, monitoring and maintenance treatments to ensure that vegetation treatments are successful (see **Appendix C**).

Alternative B — No Fire Use Alternative

Alternative B is similar to Alternative A in that the BLM would focus treatments on the four priority management concerns—riparian, aspen, pinyon-juniper, and sagebrush—and would focus on the treatment areas identified under Alternative A. Alternative B differs from Alternative A in that the BLM would not use prescribed fire and wildland fire for resource benefit. Under Alternative B, the BLM would treat vegetation using manual, mechanical, and biological control (livestock and classical biological control) methods. This alternative was developed to address public concerns raised during scoping about the impacts to the landscape from fire, including the potential for erosion and spread of noxious weeds and other invasive non-native vegetation from fire treatments.

The BLM would conduct projects identified under Alternative A, but proposes to treat only about half as many acres (63,500 acres) as areas identified for treatment using fire would not be treated and because costs for manual and mechanical treatments are more expensive than costs for fire treatments. The planning process, treatment goals and objectives, funding mechanisms, and use of SOPs would be similar to those under Alternative A.

Alternative C — Minimal Land Disturbance Alternative

Alternative C is similar to Alternative A in that the BLM would focus treatments on the four priority management concerns—riparian, aspen, pinyon-juniper, and sagebrush—and would focus on the treatment areas identified under Alternative A. Alternative C differs from Alternative A in that the BLM would only treat vegetation within treatment areas using manual methods and classical biological control (use of nematodes, fungi, and insects); use of livestock for biological control would not be allowed. The BLM also would not be able to use mechanical methods or fire.

This alternative was developed in response to the proposed "passive restoration and use only treatments having minimal land disturbance alternative," which was submitted during public scoping. Under this alternative, the BLM would only use manual methods to treat vegetation, as these methods would cause little land disturbance.

The BLM would conduct projects identified under Alternative A, but proposes to treat only about one-fourth as many acres (31,750 acres) and treatments would generally be small in acreage. The planning process, treatment goals and objectives, funding mechanisms, and use of SOPs under this alternative would be similar to those under Alternative A.

Alternative D — Continue Current Management (No Action Alternative)

Under the No Action Alternative, no new treatments would be authorized as a result of this project. However, the BLM would continue to conduct treatments approved under earlier NEPA authorizations. The BLM would have to conduct the appropriate level of NEPA analysis for future projects before they could be approved for implementation. Should this alternative be chosen by the decision-maker, and if the BLM decides to conduct new treatments in the 3 Bars ecosystem in the future, decisions would have to be made at that time regarding the type of environmental analysis that must be conducted before treatments would be allowed within the ecosystem. There are approximately 15,000 acres of treatments that could occur within the ecosystem that have been authorized by the BLM, or may be authorized in the future, during the life of the project. Previously approved treatments are discussed in Chapter 3 under Cumulative Effects (Section 3.3.2).

Summary of Impacts

The direct and indirect effects of the proposed treatment alternatives on natural and socioeconomic resources are evaluated in this EIS. The cumulative effects that result from the incremental impact of treatment actions when added to the effects of other past, present, and reasonably foreseeable future actions are also evaluated for proposed treatments. Standard Operating Procedures would be used to reduce impacts, and mitigation measures have been proposed to reduce potentially significant adverse impacts to more reasonable levels.

Direct and Indirect Impacts

In general, potential direct and indirect adverse impacts and benefits would be greatest under Alternative A and least under Alternative D. Fewer acres would be treated, and fewer treatments methods used, under Alternatives B and C, so the adverse and beneficial effects under Alternatives B and C would be less than under Alternative A. In general, fire and mechanical treatments would have the greatest adverse effects on resources, while manual and biological control methods would generally have negligible effects.

The effects of treatments on local and regional air quality and global climate change would be negligible for all alternatives. None of the treatments would result in emissions that exceed Prevention of Significant Deterioration thresholds or national or state ambient air quality standards.

The effects of treatments on mineral resources would be negligible. The BLM would ensure that treatment activities do not limit access to mining claims. Most treatments would occur at or above the soil surface, thus risks to paleontological resources would be negligible. Paleontological resources have been found in rock outcrops, but the BLM does not propose treatments near these areas.

Treatments would result in short-term adverse effects to soil, primarily from loss of vegetative cover and from soil disturbance that would lead to soil erosion and loss of soil productivity. Treatments would benefit soil long-term by restoring the health and resiliency of native vegetation, restoring natural fire regimes and reducing the risk of catastrophic wildfire, reducing runoff and increasing water infiltration, and slowing the spread of noxious weeds and other invasive non-native vegetation, which should reduce soil erosion and improve soil productivity.

Treatments could lead to short-term increased runoff and erosion that could affect water flows and quality. It is possible that lubricants and fuel from equipment used in treatments could also affect water quality. Long-term, treatments would improve watershed function and water quality, increase the amount of water infiltrating into the ground and reaching streams and the groundwater, and extend the period when water flows in streams. Treatments that improve vegetation health and resiliency, and reduce catastrophic wildfire risk, would also benefit water resources.

Treatments pose short-term risks to terrestrial and aquatic vegetation. All treatments would remove or harm vegetation, and could cause vegetation communities to return to an early successional stage. Long-term, treatments would improve the health and resiliency of native vegetation. Treatments would help to control noxious weeds and other invasive non-native vegetation, to the benefit of native vegetation. By thinning and removing pinyon-juniper, BLM treatments would benefit riparian, aspen, and sagebrush communities where pinyon-juniper is crowding out these vegetation types. Restoring natural fire regimes, using fire and other methods to thin and remove decadent and unhealthy pinyon-juniper, and using all methods to control large cheatgrass infestations, would reduce the risk of future catastrophic wildfire.

Treatments pose short-term risks to fish and wildlife. Accidental spills of fuels and lubricants, and soil disturbance and erosion associated with treatments, especially mechanical and fire treatments, could harm aquatic organisms, including game fish and Lahontan cutthroat trout, a federally listed threatened species. Noise and other disturbances could cause wildlife to avoid treatment areas during implementation, and fish and wildlife could be directly harmed by treatments. Removal of vegetation would reduce the amount of forage available for wildlife in the short-term. Removal of pinyon-juniper could have long-term adverse effects to species that favor pinyon-juniper. The BLM would conduct pre-treatment surveys to ensure that risks to migratory birds and other sensitive wildlife are minimized or avoided. Long-term, fish and wildlife would benefit from proposed treatments. Many treatments are focused on improving habitat for Lahontan cutthroat trout through improvements to stream channel and riparian habitats. Aspen treatments would benefit species that use these trees, including northern goshawk. Thinning and removal of pinyon-juniper could aid in wildlife movements, enhance sagebrush habitat, and promote understory development of native forbs and grasses. Overseeding using native seeds in sagebrush treatment areas would benefit Greater sage-grouse, pygmy rabbit, and other sagebrush obligate species by promoting understory development. Treatments would improve the health and resiliency of vegetation and help to control noxious weeds and other invasive non-native vegetation to the benefit of fish and wildlife. Treatments would also reduce the risk of catastrophic wildfire and its effects on fish and wildlife habitat.

Livestock and wild horses could be affected by treatments through noise and disturbance, loss of forage and water, and from reduced water quality. However, the BLM would take actions, where possible, to minimize these risks by conducting several treatments within the same area at the same time or conducting treatments when livestock are not using the treatment area. Long-term, treatments that restore the health and resiliency of native vegetation, remove noxious weeds and other invasive non-native vegetation, promote the development of forbs and grasses, and reduce the risk of catastrophic wildfire would benefit livestock and wild horse forage and water availability and abundance and better distribute livestock and wild horses across the rangeland.

While treatments could affect cultural resources near or on the surface, they would be more likely to affect traditional cultural practices of gathering plants by Native peoples. Cultural resources could be impacted by equipment and fire, but the BLM would conduct pre-treatment cultural resource surveys to mitigate this risk. Treatments could result in the loss of vegetation used by Native peoples, including pinyon pine nuts and juniper berries, but the BLM would consult with local tribes to identify areas of concern and conduct treatments in a manner that minimizes or avoids the loss of vegetation resources used by Native peoples. Long-term, treatments would improve the health and resiliency of native vegetation, and reduce the risk of catastrophic wildfire, which should ensure the long-term health and availability of vegetation used by Native peoples.

Treatments could affect visual, wilderness, and recreation resources. Treatments would remove and discolor vegetation, making it less visually appealing in the short-term. Over the long-term, landscapes should be more appealing as native vegetation is restored. Treatments in Wilderness Study Areas and near the Pony Express National Historic Trail may detract from the “naturalness” of the area. Although use of mechanical equipment would not occur in Wilderness Study Areas, its use nearby would create noise and reduce the wilderness experience. Recreationists could be exposed to treatments, experience less visually-appealing landscapes, or find fish and game less plentiful as a short-term result of treatments. In addition, recreational areas could be closed for short periods of time during and/or immediately following implementation of treatments to ensure treatment success and protect the health of visitors. Long-term, treatments should improve the health and resiliency of native vegetation, reduce the occurrence of noxious weeds and other invasive non-native vegetation, and reduce the risk of wildfire to the benefit of visual, wilderness, and recreational resources.

Social effects would be negligible at the scale addressed in this EIS. There would be benefits to communities that supply workers, materials, or services in support of treatment activities. Some businesses, such as recreation-based businesses and ranching operations, could be adversely affected in the short-term if treatments closed areas used for recreation or by domestic livestock. Long-term, treatments should improve the health and functionality of the 3 Bars ecosystem to the benefit of the local community and other users of the 3 Bars ecosystem.

Risk to humans from treatments would be negligible. Workers conducting the treatments could be at risk for adverse effects from walking on uneven ground, on broken terrain, and in dense vegetation. Other potential adverse effects associated with the proposed treatments would vary by treatment method, as there are human health risks unique to each method. Treatments that remove noxious weeds and other invasive non-native vegetation near public use sites and facilities would benefit public health and welfare. Treatments that reduce the risk of catastrophic wildfire on public lands would have similar benefits to human health and safety.

Cumulative Impacts

Numerous past and present actions on and near the 3 Bars Project area have contributed to current conditions on the 3 Bars Project area. These include actions by entities with an interest in vegetation management, including nearby federal land management agencies, State of Nevada, Eureka County and other local governments, and private landowners including ranchers, farmers, and private developers. Past and present actions of importance to the 3 Bars Project include noxious weeds and other invasive non-native vegetation treatments; agriculture; use and harvest of woodland products; utility infrastructure and distribution networks; wildland fires, fuels management, and reseeding; habitat stabilization and rehabilitation; livestock and wild horse management activities; recreation; land development; mineral development and exploration; and oil, gas, and geothermal leasing and development. Short-term, treatments may adversely affect conditions within the 3 Bars Project area, but long-term would provide benefits to natural and social resources that would help to offset the adverse effects from past, present, and reasonably foreseeable future actions within the project area. As with direct and indirect effects, cumulative effects, both adverse and beneficial, would be greatest under Alternative A and least under Alternative D.

Treatments would contribute only minor amounts of pollutants to the air. Fire use would increase particulate matter in the air, but the amount of pollutants generated by fire use, and their effects on human health, should be less than those from wildfire, resulting in fewer pollutants accumulating than would occur without treatments. Treatments would lead to short-term cumulative loss of soil from the removal of vegetation and erosion, but improvement in vegetative abundance, diversity, health, and resiliency should slow soil loss on public lands. Erosion has led to poor water quality on portions of public lands. Treatments that slow erosion would also benefit water quality and slow the cumulative loss of water quality. Pinyon-juniper removal and thinning has the potential to increase water infiltration and stream flows within the 3 Bars Project area. Treatments would improve wetland and riparian area functions and values and slow erosion. With improvement in these areas, habitat for fish and other aquatic organisms would also improve.

Fire exclusion, pinyon-juniper expansion, and the spread of noxious weeds and other invasive non-native vegetation have degraded vegetation function and quality on the 3 Bars Project and nearby areas and have led to a cumulative loss of vegetative productivity, health, and resilience. Treatments would restore ecosystem processes and slow this loss. Improvement in vegetation characteristics would benefit wildlife. Some species that have adapted to degraded ecosystems could lose habitat as native vegetation is restored, but most species would benefit.

Factors that have led to the loss of native vegetation and ecosystem health have adversely impacted rangelands used by domestic livestock and wild horses, and reasonably foreseeable future actions, such as the Mount Hope Project, could further reduce the amount of rangeland available to livestock and wild horses. Treatments should improve rangelands for these animals, and ensure that project lands can support viable populations of wild horses and a healthy ranching industry. The BLM would evaluate proposed treatment areas, prior to treatment, to ensure proper livestock management is in place in order to maintain the long-term success of the proposed treatments. The BLM would also continue to manage wild horses in accordance with existing laws, policy and guidance.

Treatments may add to the cumulative loss of paleontological and cultural resources. The BLM has developed a Programmatic Agreement with the State Historic Preservation Office to ensure protection of cultural resources, and consults regularly with local tribes to ensure that Native people's resources are protected, and enhanced long-term.

Treatments may result in some short-term and temporary loss of visual, recreational, wilderness, and other special area values due to the removal or discoloration of vegetation that could be additive to loss of these resources from past, present, and reasonably foreseeable future actions. In some cases, areas might be closed to visitors during and after treatments; however, these impacts would be short-term and any values affected would be restored within 2 growing seasons in most cases.

Treatments would benefit local communities by providing jobs and income, and by reducing the risk of catastrophic wildfire that could harm people and destroy property. These gains would be negligible in the context of the local economy, especially considering ongoing and reasonably foreseeable future mining actions, but would still be a cumulative benefit for many rural communities.

Some treatments may pose a health risk to workers and the public. Most treatments, however, would pose few risks to workers and even fewer risks to the public, especially when compared to the mining and agriculture industries. If treatments restore natural fire regimes, reduce the risk of catastrophic wildfire, and slow the spread of noxious weeds and other invasive non-native vegetation, human health would benefit.

Significance of Effects of the Alternatives

Based on criteria used in the EIS, none of the actions taken under the alternatives would have a significant long-term effect on the natural and social resources of the 3 Bars ecosystem. This assumes, however, that the BLM would follow SOPs outlined in **Appendix C**. Livestock grazing could have a significant cumulative effect on treatment success, thus the BLM would not implement treatments until proper livestock management is in place.

Although proposed actions would not have a significant long-term effect on 3 Bars ecosystem resources, reduced levels of treatment activity associated with Alternatives B and C, and in particular Alternative D, in comparison to Alternative A, could have long-term effects on 3 Bars ecosystem resources. By not using all available methods and not treating the maximum number of acres, factors that contribute to loss of native and non-invasive vegetation health and resiliency would remain. These include the spread of noxious weeds and other invasive non-native vegetation, pinyon-juniper encroachment, and wildfire, and would be greater under Alternatives B, C, and D than under Alternative A. In addition, the BLM would do little to move plant communities toward their desired state under Alternatives B, C, and D. No treatments would be authorized under Alternative D. Given that resource conditions on several areas within the ecosystem have deteriorated due to past land use activities, it is unlikely that conditions would improve under Alternative D.

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Acronyms

3 Bars Project	3 Bars Ecosystem and Landscape Restoration Project
17-States PEIS	*Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement*
17-States PER	*Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Report*
A.A.	Associate of Arts
AAQS	Ambient Air Quality Standard
AECC	*Assessment of Existing and Current Conditions for the Proposed 3 Bars Ecosystem and Landscape Restoration Project Environmental Impact Statement*
AML	Appropriate Management Level
amsl	above mean sea level
AQMA	Air Quality Management Area
AQRV	Air Quality Related Values
ARMPA	Approved Resource Management Plan (referring to the September 2015 *BLM Record of Decision and Approved Resource Management Plan Amendment for the Great Basin Region, Including the Greater Sage-Grouse Sub-Regions of Idaho and Southwestern Montana, Nevada, and Northeastern California, Oregon, and Utah)*
AUM	Animal Unit Month
B.A.	Bachelor of Arts
BAPC	Bureau of Air Pollution Control
BLM	Bureau of Land Management
BMP	Best Management Practice
BP	Before Present
B.S.	Bachelor of Science
ca.	Circa
CALPUFF	California Puff
CEQ	Council on Environmental Quality
CESA	Cumulative effects study area
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	Carbon monoxide
CO_2	Carbon dioxide
COC&PP	Central Overland California and Pikes Peak
Cont.	Continued
e.g.	for example
EIS	Environmental Impact Statement
E&PRR	Eureka & Palisade Railroad
ESD	Ecological Site Description
et. al.	and others
et. seq.	et sequentia
°F	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency

FMU	Fire Management Unit
FRCC	Fire Regime Condition Class
gpm	gallons per minute
HMA	Herd Management Area
H_2SO_4	Sulfuric acid
i.e.	in otherwords
IMPLAN	Impact Analysis for Planning
Inc.	Incorporated
km	kilometer
KMA	Key Management Areas
LCT	Lahontan Cutthroat Trout
LLC	Limited Liability Corporation
M.A.	Master of Arts
M.Ed.	Master of Education
mg/L	milligrams per liter
M.P.A.	Master of Public Administration
M.S.	Master of Science
n	Sample size, number
NA	Not applicable
NAAQS	National Ambient Air Quality Standard
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NNHP	Nevada Natural Heritage Program
NRHP	National Register of Historic Places
NO_2	Nitrogen dioxide
NO_x	Nitrous oxide
NS	Not surveyed
NV	Nevada
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PEIS	Programmatic Environmental Impact Statement
PER	Programmatic Environmental Report
PFYC	Potential Fossil Yield Classification
$PM_{2.5}$	Particulate matter less than 2.5 microns in size
PM_{10}	Particulate matter less than 10 microns in size
PNC	Potential Natural Community
Ppm	parts per million
PSD	Prevention of Significant Deterioration
Q/D	Annual emissions divided by distance to nearest PSD Class I area
Ph.D.	Doctorate of Philosophy
RMP	Resource Management Plan
ROD	Record of Decision

Scoping Report	*Scoping Comment Summary Report for the 3 Bars Ecosystem and Landscape Restoration Project EIS*
SHPO	State Historic Preservation Office
SO_2	Sulfur dioxide
SOP	Standard Operating Procedure
tpy	tons per year
URL	Uniform Resource Locator
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFS	Volunteer Fire Service
VOC	Volatile organic compounds
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WSA	Wilderness Study Area
2,4-D	Dichlorophenoxyacetic acid
§	Section
$\mu g/m^3$	micrograms per cubic meter
%	percent

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CHAPTER 1

PROPOSED ACTION AND PURPOSE AND NEED

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CHAPTER 1

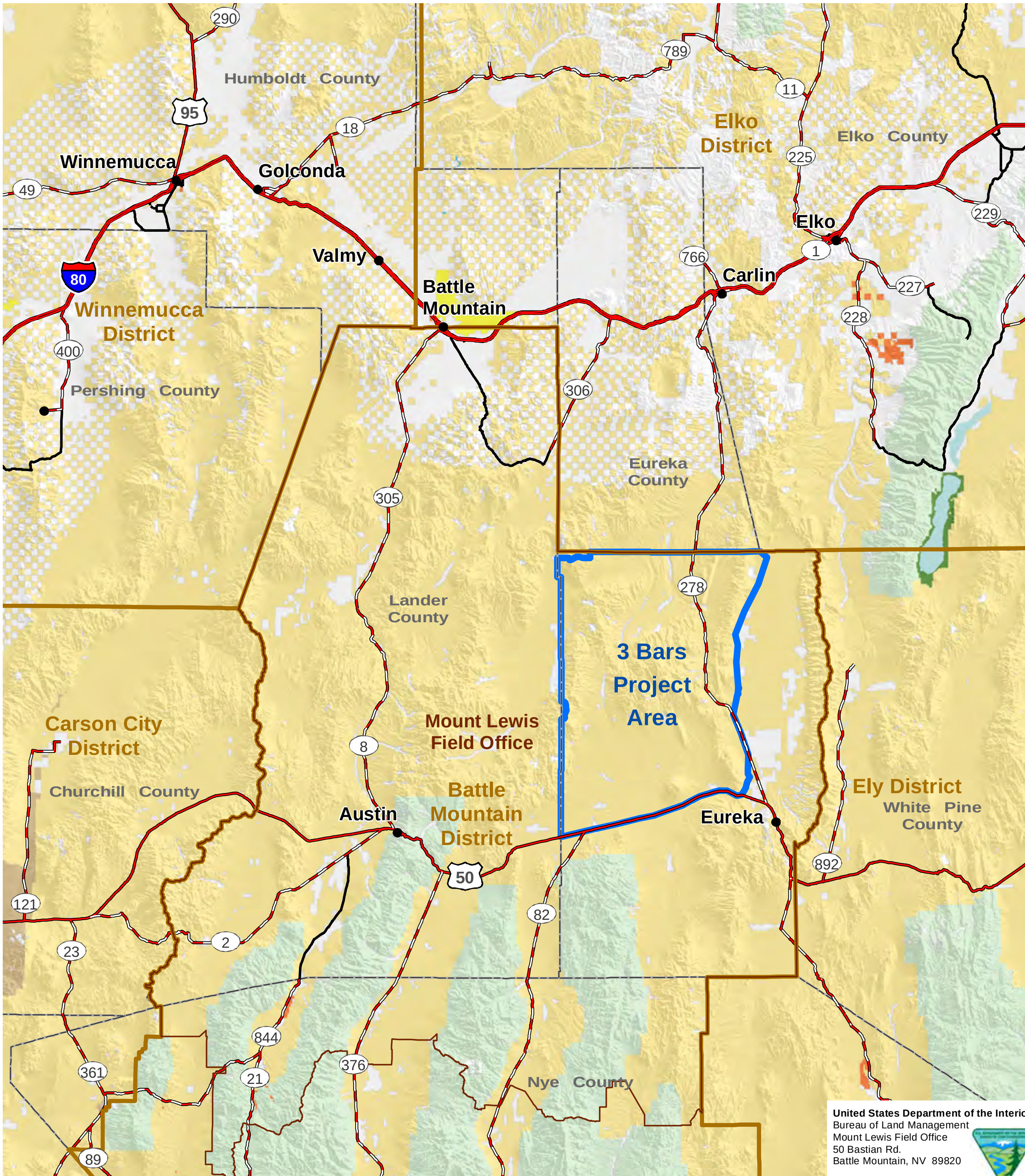
PROPOSED ACTION AND PURPOSE AND NEED

1.1 Introduction

The 3 Bars ecosystem is approximately 749,810 acres in central Eureka County, northwest of Eureka, Nevada (**Figure 1-1**). The ecosystem is administered by the U.S. Department of the Interior (USDOI), Bureau of Land Management (BLM), Mount Lewis Field Office. It is a shrub steppe ecosystem with important resource values, ranging from habitat for a diversity of plants and animals, to providing traditional use areas for several Native American tribes; the 3 Bars ecosystem is also an important recreation resource for Nevada residents. Resource conditions on several areas within the ecosystem, however, have deteriorated due to past land use activities, causing the BLM to target this area for restoration. Although 3 Bars ecosystem health is in decline in some areas, the ecosystem has characteristics that suggest its health can be substantially improved through land restoration activities. Given the opportunity to improve 3 Bars ecosystem health, the 3 Bars Ecosystem and Landscape Restoration Project (3 Bars Project) is being proposed by the BLM to develop the 3 Bars ecosystem into a sustainable, healthy, and resilient landscape.

The 3 Bars ecosystem provides habitat for Greater sage-grouse, a BLM special status species. The BLM is fully in conformance with the September 2015 *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision* (ARMPA). To ensure that treatments benefit Greater sage-grouse, sagebrush restoration treatments would adhere to ARMPA Required Design Features (RDFs). These include avoiding treatments near Greater sage-grouse leks and avoiding treatments in breeding, brood-rearing, and wintering habitats during those times of the year when Greater sage-grouse are using these habitats. The BLM will ensure proper livestock management is in place prior to treatments when necessary in order to meet project goals and objectives, which would benefit Greater sage-grouse habitat.

In order to ensure long-term success, treatments would not be conducted in areas with moderate to severe forage utilization until mitigation measures associated with livestock management, as discussed in Section 3.18.4, are implemented through agreements or decisions subsequent to the 3 Bars Project Record of Decision to ensure proper livestock management. The BLM would work with permittees on a permit by permit basis to address any changes in livestock management prior to treatment implementation. In all instances, proper changes in livestock management through agreements or decisions would be finalized prior to treatment implementation.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 08/14/13)

Legend

Land Status

- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Native American Reservation
- U.S. Fish & Wildlife Service
- U.S. Forest Service
- Nevada State
- Private
- Water

- City or Town
- Interstate Highway
- U.S. Highway
- State Highway
- Major Road
- BLM Field Office
- County Boundary
- 3 Bars Project Area

Source: BLM 2012a.

3 Bars Ecosystem and Landscape Restoration Project

Figure 1-1

General Vicinity Map

0 5 10 15 30 Miles
0 10 20 40 Kilometers

N

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.
Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
This product was developed through digital means and may be updated without notice.

Project funding would come from funds allocated by Congress to the BLM for resource management. To reduce the cost of treatments to the taxpayer, the BLM would seek outside funding partnerships with other resource agencies, non-governmental organizations, or private industries that are interested in resource management within the 3 Bars ecosystem. Additionally, it is anticipated that habitat enhancement activities authorized with the 3 Bars Project decision would provide opportunities to utilize off-site mitigation account funds associated with various development activities within or adjacent to the 3 Bars Project area.

1.2 Summary of Major Changes between the Draft and Final EIS

Several major changes were made to the 3 Bars Project Draft Environmental Impact Statement (EIS) and incorporated into this chapter of the Final EIS based on public comments on the Draft EIS. These are (and Section where change is made):

1. Conformance with the 2015 BLM ARMPA and ROD and its associated Required Design Features and other requirements regarding fire management, including no sagebrush thinning would be conducted in sagebrush habitat (Section 1.1).

2. Provide information on the Draft EIS public review process (Section 1.13.2).

1.3 Background

In order to better understand conditions on the 3 Bars ecosystem, in 2009 the BLM prepared an *Assessment of Existing and Current Conditions for the Proposed 3 Bars Ecosystem and Landscape Restoration Project Environmental Impact Statement* (AECC; USDOI BLM 2009a). This document summarized baseline data available to the BLM for the 3 Bars ecosystem,

Terminology

Desired Plant Community is the one of the several plant communities that may occupy a site that has been identified through a management plan to best meet the plan's objectives for the site.

Encroachment can be defined as natural succession resulting in densification or interspace in-filling by vegetation, causing an understory or previously dominant plant species to decline. It also includes expansion areas.

Infilling can be defined as increase in the density and competition as a result of pinyon and juniper establishment within woodland communities at a rate that exceeds the natural stand replacement.

Expansion occurs when vegetation, such as pinyon-juniper, expands into new areas where it was not found historically.

Hazardous fuels in the context of wildfire include living and dead and decaying vegetation that form a special threat of ignition and resistance to control.

Herbicide is a chemical pesticide used to injure or kill vegetation.

Invasive plants are plants that are not part of (if exotic), or are a minor component of (if native), the original plant community or communities and are not designated as noxious under federal or state statute.

Native species are species that historically occurred, or currently occur, in a particular ecosystem and were not introduced.

Noxious weeds are plants designated by federal or state statute that interfere with management objectives for a given area at a given point in time.

Potential Natural Community is the plant community that would become established if all successional sequences were completed without interference by man under current environmental conditions.

Prescribed fires are any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and National Environmental Policy Act requirements (where applicable) must be met, prior to ignition.

Restoration is the implementation of a set of actions that promotes plant community diversity and structure that allows plant communities to be more resilient to disturbance and invasive species over the long-term.

Resilience is the ability to recover from, or adjust easily to, change.

Undesirable plants are species classified as noxious, invasive, harmful, exotic, injurious, poisonous, or otherwise undesirable under state or federal law, but not including species listed as endangered by the Endangered Species Act, or species indigenous to the planning area.

including the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service ecological site descriptions, studies of proper functioning condition and multiple indicator monitoring for wetland and riparian areas, rangeland health assessments, and ecological site inventories.

In 2010 and 2011, the BLM and its contractors conducted several studies to obtain additional information on rangeland and woodland health on the 3 Bars ecosystem. Based on these studies, several reports were prepared: 1) a *3 Bars Ecosystem and Landscape Restoration Project Pinyon-juniper Assessment* that provided the results from an assessment of singleleaf pinyon pine and Utah juniper (pinyon-juniper) stands within the 3 Bars ecosystem (AECOM 2011a); 2) a *3 Bars Ecosystem and Landscape Restoration Project Cheatgrass Assessment* that summarized the results from an assessment of the occurrence and distribution of cheatgrass and other noxious weeds and invasive non-native vegetation within the 3 Bars ecosystem (AECOM 2011b); and 3) a *Landscape Restoration Project Rangeland Health Report* that provided the results of an evaluation of rangeland health on approximately 532,000 acres within the 3 Bars ecosystem (Eastern Nevada Landscape Coalition and AECOM 2012).

The AECC and resource studies identified specific elements for each resource component that are in need of improvement or change, and served as the framework for developing potential treatments for further consideration and analysis in this EIS. The following discusses in more detail why there is a need for change for key resource areas.

1.3.1 Vegetation

The 3 Bars ecosystem includes diverse upland vegetation community types. Key concerns identified in the AECC for range resources are that one or more key perennial grass species are absent; the composition and/or production of key species are below the potential for the natural community; noxious weeds and other invasive non-native species are dominant in certain areas; and some streams, springs, and meadows are functioning at less than their proper condition.

Other key vegetation concerns identified in the AECC included the expansion of the pinyon-juniper plant community onto adjacent range sites and encroachment into the interspaces within woodland sites; deterioration in the condition of native plant communities in some areas; degradation of range conditions; decrease in pine nut production and tree vigor; decrease in the occurrence and health of traditional, edible, and medicinal plants used by Native Americans; decline in woodland species and health; and excessive buildup of hazardous fuels.

Weeds categorized by the State of Nevada as noxious and invasive, and non-native annual grasses, occur sporadically throughout the 3 Bars ecosystem, particularly on wildfire burn scars, near roads and streams, and on disturbed areas. The key concern from the AECC for noxious weeds and other undesirable invasive non-native species is the potential for the establishment and spread of cheatgrass monocultures resulting from past wildfires and in areas of high soil disturbance. The focus of treatments would be to control the spread of noxious weeds and invasive non-native annual grasses found within the 3 Bars ecosystem and to encourage the establishment of native species.

1.3.2 Wetlands and Riparian Zones and Water Quality and Quantity

The key concern for wetland and riparian areas and water quality and quantity is the loss of wetland and stream functionality. Some streams and associated meadows are being threatened by knickpoints and headcuts, channel incision, and streambank erosion. Key stream components, such as stream channel sinuosity, streambank stability, and occurrence of woody and rock debris in stream channels that help to dissipate flood energy, are lacking in many streams. Pinyon-juniper woodlands have encroached into wetland and riparian areas. Wetland and riparian habitat is declining and plant vigor and density are deteriorating. In addition, upland perennial deep-rooted herbaceous species are being lost, resulting in decreased infiltration rates and increased run-off and surface erosion and thus contributing to reduced water quality.

1.3.3 Fish and Wildlife

Surveys and monitoring have shown that some sagebrush-steppe, wetland, riparian, and mountain shrub habitats in the 3 Bars ecosystem are deteriorating, while pinyon-juniper woodlands are expanding and encroaching into these habitats. Key concerns from the AECC include less than optimal fish and wildlife habitat; expansion of pinyon-juniper into important habitats; reduction in key habitats due to degraded range conditions in some areas; invasion of undesirable plant species into habitats; decline in the health of native plant communities; and high, very high, or extreme risk of catastrophic wildfire in Greater sage-grouse habitats.

1.3.4 Native American Tradition and Cultural Values, Practices, and Resources

Various tribes and bands of the Western Shoshone have stated that federal projects and land actions can have widespread effects on their culture and traditional practices. Numerous traditional/cultural/spiritual use sites are found on the 3 Bars Project area. The BLM will coordinate with affected tribes prior to implementation of individual treatments. The BLM will attempt to both identify locations that have traditional/cultural importance, and to reduce or eliminate any negative impacts to identified Native American traditional/cultural/spiritual values and practices from proposed treatment actions.

Key concerns identified in the AECC for Native American traditional/cultural/spiritual values and practices included a decline in the distribution and abundance of traditional, edible, and medicinal plants, a decrease in pine nut production and tree vigor, and a decline in abundance of wild game species.

1.3.5 Wild Horses

The key concern from the AECC for wild horses is rangeland degradation from multiple factors, as indicated by limited key plant species abundance and recruitment within the understory.

1.3.6 Livestock

Key concerns identified in the AECC for range resources are that one or more key perennial grass species are scarce; the composition and/or production of key species are below the potential for the natural community; invasive non-native vegetation is dominant in certain areas; and some streams, springs, and meadows are functioning at less than their proper functioning condition.

1.3.7 Fire Management

Key concerns from the AECC for fire include excessive hazardous fuel loads, and declining ecosystem health in some areas, which are contributing to high wildfire potential and threats to resource values.

1.4 Proposed Action

The BLM proposes to treat vegetation using manual and mechanical methods, biological controls, and fire (both prescribed and wildland fire for resource benefit). Treatments would address multiple resource issues and aid in restoring functionality to key elements of the 3 Bars ecosystem.

The BLM has identified site-specific treatments that it proposes to implement to restore and manage the 3 Bars ecosystem. Treatments were identified through an iterative process involving the BLM and other federal and state agencies. Treatments would focus on four priority vegetation management concerns:

- Riparian—treatments in riparian habitats would focus on restoring functionality in areas where stream structural integrity (incised channel, headcuts, knickpoints, developments, and diversions) and/or appropriate plant species composition are compromised.
- Aspen—treatments in quaking aspen (aspen) habitats would focus on improving the health of aspen stands by stimulating aspen stand suckering and sucker survival.
- Pinyon-juniper—treatments in pinyon-juniper habitats would focus on thinning historic pinyon-juniper communities to promote woodland health and removing pinyon-juniper where it encroaches into riparian zones and upland habitats, including sagebrush habitats.
- Sagebrush—treatments in sagebrush habitats would focus on restoring the sagebrush community by removing encroaching pinyon-juniper, promoting the reestablishment of native forbs and grasses in sagebrush communities, and promoting the development of sagebrush in areas where it should occur based on ecological site description.

1.5 Purposes for the Project

Using the information from the AECC and field studies, the BLM identified several purposes for the 3 Bars Project. Purposes are consistent with the *Shoshone-Eureka Resource Management Plan Environmental Impact Statement Final* (Shoshone-Eureka RMP), as amended, and the *Shoshone-Eureka Resource Area Record of Decision* (Shoshone-Eureka ROD), as amended, which guide land management activities in the 3 Bars ecosystem (USDOI BLM 1984, 1986a, 1987a); as well as the September 2015 *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision* (ARMPA). Purposes for the 3 Bars Project include:

- Improve woodland, rangeland, and riparian health, productivity, and functionality.
- Increase stream flows and restore channel morphology in degraded streams.
- Improve stream habitat for fish and wildlife by implementing physical treatments that include installing large woody debris, rock clusters, and check dams in stream channels, and other measures that support regrowth of riparian vegetation.
- Improve the health of aspen, mountain mahogany, and other mountain tree and shrub stands to benefit wildlife, and Native Americans that use these plants for medicinal purposes.
- Manage pinyon-juniper woodlands to promote healthy, diverse stands within persistent woodlands.

- Slow the expansion of pinyon-juniper into sagebrush and riparian plant communities.
- Slow the spread of noxious weeds and other invasive non-native vegetation, including cheatgrass.
- Protect and enhance habitat for fish and wildlife, including species of concern such as raptors, Greater sage-grouse, and Lahontan cutthroat trout.

The BLM has also identified project purposes that are specific to fire use and improving ecosystem management through the use of fire. These include:

- Restore fire as an integral part of the ecosystem; reduce the risk of catastrophic wildfire; reduce extreme, very high, and high wildfire risks to moderate risk or less; and develop fuel breaks within the treatment areas.
- Protect life, property, and community infrastructure, and protect fish and wildlife habitat from devastating wildfire effects.

Treatment purposes would be met by implementing land restoration treatments in areas where resource management goals are not being met, and the likelihood of treatments improving resource conditions is great. The proposed treatments would range from several acres to several thousand acres, depending on specific treatment and management goals and desired outcomes for each resource area.

1.6 Need for the Project

The 3 Bars ecosystem has long been recognized as an area with numerous resource values and uses. Some of these resources and uses include mineral exploration and development, livestock grazing, woodland product harvest, recreation, wilderness activities, and habitat for wild horses, fish, and wildlife, including sensitive and game fish and wildlife species such as Lahontan cutthroat trout, Greater sage-grouse, mule deer, and pronghorn antelope.

Factors affecting land uses and health in the ecosystem include the effects of past grazing practices, changes to the natural fire regime, establishment and spread of noxious weeds and other invasive non-native vegetation, and expansion and densification of pinyon-juniper woodlands. Collectively, these have caused substantial changes in the native vegetation community and loss of important ecosystem components. Based on these changes, the BLM has determined that there is a need to improve rangeland health.

The 3 Bars Project needs identified by the BLM are also based on restoration needs identified in the Healthy Lands Initiative (USDOI 2007a, USDOI BLM 2010a); the Shoshone-Eureka RMP, as amended (USDOI BLM 1986a, 1987a); and the September 2015 *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision* (ARMPA). The ARMPA specifies Required Design Features (RDFs) for different uses and management activities, including fire management. ARMPA strategies for Greater sage-grouse (GRSG) conservation include:

- the avoidance and minimization of surface disturbance
- the improvement of GRSG habitat conditions
- the reduction of threats from wildfires:
    - identify and prioritize areas that are vulnerable to wildfires and prescribe actions important to GRSG protection

- restrict the use of prescribed fire for fuel treatments (this plan will not use prescribed fire in sagebrush habitat)
- prioritize post-fire treatments in sagebrush focal areas (SFA), other Priority Habitat Management Areas (PHMA), and General Habitat Management Areas (GHMA)

- the use of monitoring, evaluation and adaptive management techniques to improve GRSG habitat.

1.6.1 Healthy Lands Initiative

In recognition of the degradation of the diversity and integrity of plant communities in the western United States (U.S.), the USDOI launched the Healthy Lands Initiative in 2007 to accelerate land restoration, increase land productivity, and improve the health of public lands in the western U.S. (USDOI 2007a). The goal of the Healthy Lands Initiative is to preserve the diversity and productivity of public and private lands across the landscape. The Healthy Lands Initiative enables and encourages local land managers to set land restoration priorities across a broad scale, and to mitigate adverse impacts to an array of natural resources, in ways not previously available to them (USDOI BLM 2010a).

The Healthy Lands Initiative identified seven regions in need of treatment, including the Oregon-Idaho-Nevada shrub-steppe restoration area. The goals for this area include accelerating implementation of habitat restoration projects identified in state and local Greater sage-grouse conservation plans, and selecting and implementing land treatments to maintain and restore the upland and riparian components of the shrub-steppe (USDOI BLM 2010b).

Under the Healthy Lands Initiative, the BLM developed the Cooperative Shrub-Steppe Restoration Partnership for Oregon, Washington, and Nevada. The Partnership is a coordinated, landscape-level program involving multiple partners working together to maintain the health of existing shrub-steppe habitat and to strategically restore shrub-steppe habitat in areas important to wildlife. The Partnership area encompasses 53.5 million acres, roughly 50 percent of the remaining sagebrush-steppe habitat in the Great Basin. The diversity and integrity of the plant communities in this area support habitat for large populations of Greater sage-grouse, mule deer, pronghorn antelope, and numerous other sagebrush-dependent species. The highest priority of the Partnership is to maintain sagebrush-steppe habitat, followed by strategically restoring fragmented habitat. Specific Partnership goals include:

- Join local Greater sage-grouse working groups, federal agencies, and the scientific community in efforts to accelerate implementation of habitat restoration projects identified in state and local Greater sage-grouse conservation plans.
- Engage tribes, conservation organizations, and state and federal agencies to strategically select and implement land treatments to maintain and restore the upland and riparian components of shrub-steppe habitat.
- Build upon existing programs and initiatives, such as the BLM's Great Basin Restoration Initiative (USDOI BLM 2000a, b), to implement a landscape-restoration strategy.
- Leverage funds to build on current successes to maximize the positive benefits of restoration at the largest scale.

The 3 Bars Project meets the Healthy Lands Initiative and Cooperative Shrub-Steppe Restoration Partnership goals and priorities.

1.6.2 Shoshone-Eureka Resource Management Plan

While numerous national BLM plans identify broad objectives for the management of vegetation on public land, treatment activities at the regional and local levels are guided by the goals, standards, and objectives of land use plans developed for each BLM district office. Policies established at the national level help direct local efforts.

Land use plans, usually in the form of RMPs, ensure that public lands are managed in accordance with the intent of Congress, as stated in the Federal Land Policy and Management Act (43 United States Code [USC] § 1701 et sequentia [et. seq.]), under the principles of multiple use and sustained yield. Land use plans guide land use, vegetation, and other resource management decisions within the geographic area they cover, and provide specific goals, standards, objectives, and expected outcomes that apply to vegetation treatment projects and other restoration activities. These plans identify important local resources to be protected; identify historic, current, and future desired conditions for vegetation and other resources; and describe land use activities and levels that are appropriate to maintain a healthy ecosystem.

The Shoshone-Eureka RMP and associated ROD and amendments form the land use plan that guides resource management on public lands within the Shoshone-Eureka Resource Area of north-central Nevada, including the 3 Bars ecosystem. The RMP provides for multiple-use management through the protection of fragile and unique resources, such as riparian and stream habitat, while not overly restricting the potential for the production of commodities from other resources. The RMP offers solutions to eight resource management issues identified by the public and the BLM—wilderness designations, land tenure adjustments, utility corridors, woodland products, livestock grazing, wild horse use, wildlife habitat management, and riparian and aquatic habitat. The RMP outlines objectives, short-term and long-term management actions, Standard Operating Procedures (SOPs), and implementation measures for each of these management issues. The primary RMP objectives that would apply to the 3 Bars Project are shown in **Table 1-1**.

1.6.3 Nevada and Northern California Greater Sage-Grouse Approved Resource Management Plan Amendment (ARMPA)

The ARMPA lists a key component of the Greater sage-grouse (GRSG) conservation strategy as "Reducing threats of rangeland fire to GRSG and sagebrush habitat". Citing a Conservation Objectives Team (COT) report, the ARMPA emphasizes that "rangeland fire (both lightning-caused and human-caused fire) in sagebrush ecosystems is one of the primary risks to the greater sage-grouse, especially as part of the positive feedback loop between exotic invasive annual grasses and fire frequency"… For this reason, the ARMPAs seek to improve efforts to strategically develop fuel breaks, in collaboration with GRSG biologists… However, prescribed fire will not be used in sagebrush steppe."[1]

With fire listed as one of the threats to GRSG and its habitat, the corresponding "Key Management Response" would be:

- Identify and prioritize areas that are vulnerable to wildfires and prescribe actions important for GRSG protection.
- Restrict the use of prescribed fire for fuel treatments.
- Prioritize post-fire treatments in SFAs, other PHMAs, and GHMAs.

[1] ROD and ARMPAs for the Great Basin GRSG Sub-Regions, pp 1-26 – 1-27.

1.7 Project Goals and Objectives

Based on the desired future conditions and key concerns for resources on the 3 Bars ecosystem, the BLM identified specific objectives for the four treatment groups (**Table 1-2**). These objectives were used to identify potential treatments that could be used to achieve the desired conditions. Treatments proposed by the BLM are discussed in Chapter 2.

1.8 Scope of Analysis and Decisions to be Made

The National Environmental Policy Act (NEPA) mandates that every federal agency prepare a detailed statement of the effects, or EIS, of "major federal actions significantly affecting the quality of the human environment" (42 USC § 4321 et seq.; USDOI BLM 2008a). An EIS is intended to provide decision-makers and the public with a complete and objective evaluation of significant environmental impacts, beneficial and adverse, resulting from the proposed action and several reasonable alternatives. Given the magnitude of treatments and the resulting potential for significant cumulative effects from the 3 Bars Project, the BLM has determined that an EIS is warranted to evaluate impacts from the 3 Bars Project.

This EIS analyzes the effects of using a variety of treatments to improve ecosystem health on the 3 Bars ecosystem. Decisions expected to be made through this EIS process include:

- Determine which areas within the 3 Bars ecosystem would be treated.
- Determine which treatment methods would be used to accomplish management objectives.
- Determine which management actions would be taken to facilitate restoration of public lands.
- Identify criteria to guide future restoration activities within the 3 Bars ecosystem.

At least 30 days after the U.S. Environmental Protection Agency (USEPA) publishes the Notice of Availability of the Final EIS, the BLM decision-maker will prepare a ROD. The decision may be to select one of the alternatives in its entirety, or to combine features from several alternatives that fall within the range of alternatives analyzed in this EIS. The ROD will address significant impacts, alternatives, mitigation measures, and relevant economic and technical considerations.

This EIS does not evaluate vegetation management that is primarily focused on commercial timber or other woodland product enhancement or use activities that are not related to improving woodland or rangeland health or work authorized under the Healthy Forests Restoration Act of 2003.

Commercial timber activities conducted with the primary purpose of providing a sustained yield of timber volume to commercial industries are not included in this EIS. Rather, they represent a manner of vegetation harvest (in otherwords [i.e.], the species [product] is removed and replanted for future harvest). As part of the 3 Bars Project, however, the BLM would designate some treatment areas for small-scale commercial harvest to help meet restoration goals. Commercial timber allocations and sustainable harvest were previously analyzed in the Shoshone-Eureka RMP.

TABLE 1-1

Primary Resource Management Plan Objectives for the Shoshone-Eureka Resource Area

Riparian and Aquatic Habitat Management	• Improve priority riparian and stream habitat to "good" or "better" condition and prevent the decline of remaining areas. • Improve and maintain habitat for state-listed sensitive species and federally listed threatened and endangered species.
Woodland Products	• Manage suitable woodlands for optimum production of woodland products on a sustained-yield basis, while protecting sensitive resources. • Maintain, where necessary for management, those access routes currently servicing pinyon-juniper harvest areas. • Set aside certain historical pinyon-juniper woodland areas for non-commercial pine nut gathering by Nevada Native Americans and all other members of the public.
Wildlife Habitat Management	• Maintain and improve wildlife habitat while providing for other appropriate resource uses. • Provide habitat sufficient to allow big game populations to achieve reasonable numbers in the long-term. • Improve and maintain habitat for state-listed sensitive species and federally listed threatened and endangered species.
Wild Horse Use	• Manage viable herds of sound, healthy, wild horses in a wild and free-roaming state. • Initially manage wild horse populations at existing numbers based on 1982 aerial counts and determine if this level of use can be maintained. • Manage wild horses within the areas that constituted their habitat when the Wild and Free-roaming Horse and Burro Act became law in 1971.
Livestock Grazing	• Initially manage livestock at existing levels and determine if such use can be maintained. • Establish a grazing management program designed to provide key forage plants with adequate rest from grazing during critical growth periods. • Achieve, through management of the livestock and wild horses, utilization levels consistent with those recommended by the 1981 Nevada Range Studies Task Group to allow more plants to complete growth cycles and to increase storage of reserves for future growth. • Increase vegetation production while protecting sensitive resources.

TABLE 1-2

Restoration Goals for the 3 Bars Ecosystem

Riparian Treatment Units	• Improve the extent and vigor of riparian plant communities. • Protect riparian community infrastructure. • Provide for vegetative and ecological diversity. • Improve riparian area resilience to wildfire effects and flood events. • Provide links with natural fuel breaks in adjacent areas. • Improve the physical and ecological processes of streams, meadows, springs, and seeps by mitigating disruptions to the soil, plant, and/or hydrologic components. • Improve wetland and riparian function by improving road locations or implementing best management practices in areas where roads inhibit function. • Improve water retention, infiltration, and residence time by reducing historic watershed changes that have increased overland flow rates and reduced infiltration rates. • Ensure water quality parameters are in compliance with State of Nevada water quality standards. • Ensure conditions and trends are progressing towards desired conditions for a given site. • Improve in-stream habitat conditions for Lahontan cutthroat trout and other aquatic species by enhancing in-stream characteristics within existing and potential Lahontan cutthroat trout habitat: o Ensure stable dimension, pattern, and profile of steam channels. o Spawning beds should be well oxygenated and relatively silt-free. o Develop habitat conditions needed by fish and wildlife, including Lahontan cutthroat trout.
Aspen Treatment Units	• Promote and maintain healthy aspen communities. • Stimulate aspen stand suckering through selective removal of aspen trees. • Establish a minimum of three distinct age classes within stands.
Pinyon-juniper Treatment Units	• Reduce the severity of future wildfires in the project area by reducing hazardous fuels and provide for a safer fire suppression environment. • Reduce the likelihood for loss of life and property and natural resources due to catastrophic wildfire. • Provide links with natural fuel breaks in adjacent areas. • Improve pinyon-juniper woodland health. • Reduce pinyon-juniper encroachment onto sagebrush communities. • Improve wildlife habitat in the long-term. • Protect Greater sage-grouse habitat from impacts of catastrophic wildfire. • Improve and maintain Greater sage-grouse habitat connectivity. • Establish and maintain resistance and resilient sagebrush vegetation communities to reduce Greater sage-grouse habitat fragmentation. • Protect community infrastructure. • Provide for vegetative and ecological diversity. • Provide forest products for commercial use. • Maintain areas of Fire Regime Condition Class I in order to maintain ecosystem health and keep catastrophic wildfire risk from exceeding a “moderate” rating. • Improve ecosystem health and reduce catastrophic wildfire potential by improving Fire Regime Condition Class from III and II to Class I. See Section 3.14.2.3 for a discussion of Fire Regime Condition Classes. • Improve stand health of aspen and mountain mahogany by removing competition. • Downgrade fire risk rating by at least 1 step by reducing above-ground biomass (all burnable vegetation) in identified areas by 50 to 95 percent.

TABLE 1-2 (Cont.)

Restoration Goals for the 3 Bars Ecosystem

Sagebrush Treatment Units	• Promote and maintain healthy native plant communities. • Increase plant community diversity and health by improving the regeneration and vigor of desirable species. • Improve rangeland conditions by encouraging understory species and desired plant communities. • Improve the frequency and production of desired plant species at rangeland sites where the desired dominant and/or co-dominant species are missing. • Improve and maintain Greater sage-grouse habitat connectivity. • Establish and maintain resistance and resilient sagebrush vegetation communities to reduce Greater sage-grouse habitat fragmentation. • Reduce or remove pinyon-juniper from sagebrush vegetative communities providing Greater sage-grouse habitat. • Provide for vegetative structure and ecological diversity. • Reach the potential of any given site based on the Ecological Site Description (ESD) and associated State and Transition Model (STM). • Manage for the best of the current state if one or more of the following factors is present: 1) there is no restoration path with current knowledge or technology based on STM; 2) Cost is too high to justify; 3) Likelihood of success is low; or 4) Higher resource management priorities. • Increase the distribution and abundance of traditional, edible, and medicinal plants by improving the relative abundance of desirable plant species in previously identified locations (obtained through Native American consultation). Sustain the regeneration and recruitment of desirable species such as aspen, bitterbrush, and mountain mahogany.

Human-related activities and natural processes have inherent risks and threats to the health of the land, which can lead to the decline of plant communities and ecosystems. Although this EIS refers to activities consistent with the authorities under the Federal Land Policy and Management Act and other statutes that may contribute, in some cases, to short-term land and resource impacts, its focus is on proactive treatments to maintain and restore ecosystem health in the long-term. The focus of the EIS is not to restrict, limit, or eliminate Federal Land Policy and Management Act-authorized activities as a means to restore ecosystem health. These types of management actions are defined and considered under land use planning regulations (43 Code of Federal Regulations [CFR] § 1610) and are outside the scope of this EIS.

The BLM is currently authorized to use herbicides using ground-based equipment to control local occurrences of noxious weeds and other invasive non-native vegetation, and using fixed-wing aircraft and helicopters to control cheatgrass, as authorized by the *Record of Decision Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (17-States PEIS ROD; USDOI BLM 2007a), and the *Environmental Assessment Integrated Weed Management Plan Battle Mountain District Nevada Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b). Thus, this EIS does not propose new herbicide treatments.

This EIS does not evaluate policies and programs associated with Emergency Stabilization and Burned Area Rehabilitation, which mitigates the adverse effects of fire on the soil and vegetation in a cost-effective and expeditious manner and to minimize the possibility of wildfire recurrence or invasion of weeds. The terms rehabilitation and restoration are often used synonymously. Rehabilitation is the repair of a wildfire area utilizing native and/or non-native plant species to obtain a stable plant community that will protect the burned area from erosion and invasion of weeds. Restoration is defined as the process of returning ecosystems or habitats to their original structure and species composition.

1.9 Documents that Influence the Scope of the EIS

Much of the scope of this EIS is based on BLM Handbook H-1740-2, *Integrated Vegetation Management* (USDOI BLM 2008b), and *Integrated Weed Management Plan Battle Mountain District Nevada Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b). These documents provide expectations for a more consistent and unified approach to managing vegetation on public lands and clarify multi-program goals, objectives, and priorities relative to maintaining and restoring ecologically diverse, resilient, and productive native plant communities.

The Shoshone-Eureka RMP and associated ROD and amendments form the land use plan that guides resource management on public lands within the Shoshone-Eureka Resource Area, including the 3 Bars ecosystem. The RMP provides for multiple-use management through protection of fragile and unique resource values, such as riparian and stream habitat, while not overly restricting the ability of the other resources to provide for the production of commodity values on public lands.

The September 2015 *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision* (ARMPA) lists Required Design Features in association with fire management and the protection of sagebrush habitat for the GRSG.

This EIS tiers to the *Record of Decision Vegetation Treatments on BLM Lands in 13 Western States* (13-States EIS), 17-States PEIS, and *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Report* (17-States PER; USDOI BLM 1991a, 2007b, c). The 17-States PEIS addressed the cumulative effects from all treatment methods, and the 13-States EIS and 17-States PER addressed the BLM's use of non-herbicide vegetation treatment methods, including the use of prescribed fire and manual, mechanical, and biological control methods, on BLM-administered lands in the western U.S., including Nevada. Where appropriate, information in these documents that is relevant to analysis of the current proposal is cited and incorporated by reference.

Other documents and policies that influence the scope of this EIS include:

- *National Fire Plan* (USDOI and USDA 2001).
- Chapter 1 *(Interagency Burned Area Emergency Stabilization and Rehabilitation)* in USDOI Department Manual 620 (*Wildland Fire Management*; USDOI 2004).
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan* (USDOI and USDA 2006a).
- *Protecting People and Sustaining Resources in Fire Adapted Ecosystems: A Cohesive Strategy* (USDOI and USDA 2006b).
- *Healthy Lands Initiative of 2007* (USDOI 2010a).

These documents provide policy and guidance for hazardous fuels reduction and land restoration activities to reduce the risk of wildfires and restore fire-adapted ecosystems, and to rehabilitate and restore lands damaged by wildfires.

In addition, the *Partners Against Weeds - An Action Plan for the BLM* (USDOI BLM 1996), and *Meeting the Invasive Species Challenge Management Plan* (National Invasive Species Council 2001), were consulted to identify appropriate actions to control noxious weeds and other invasive non-native vegetation on public lands. The *Great Basin Restoration Initiative* provides goals and methods to maintain or restore the Great Basin's native plant communities that in turn provide habitat for livestock, wildlife, and wild horses (USDOI BLM 2010a, b). The Nevada Northeastern Great Basin Resource Advisory Council's *Standards and Guidelines for Grazing and Wild Horses and Burros* outlines guidelines for maintaining healthy wild horse and burro herds on herd management areas administered by the BLM within the designated geographic area of the Northeastern Great Basin (USDOI 2007b). BLM Manual 6280, *Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation*, provides guidance on management of the Pony Express National Historic Trail.

1.10 Relationship to Statutes, Regulations, and Policies

1.10.1 Federal Laws, Regulations, and Policies that Influence Restoration Treatments

Several federal laws, regulations, and policies guide BLM management activities on public lands. The Federal Land Policy and Management Act of 1976 directs the BLM to manage public lands "in a manner that will protect the quality of scientific, scenic, historic, ecological, environmental, air and atmospheric, water resources and archeological values" and to develop RMPs consistent with land use plans of state and local governments to the extent that BLM programs also comply with federal laws and regulations (USDOI BLM 1976). The Taylor Grazing Act of 1934 introduced federal protection and management of public lands by regulating grazing on public lands. The Public Rangelands Improvement Act of 1978 requires the BLM to manage, maintain, and improve the condition of the public rangelands so that they become as productive as feasible.

Numerous other laws, regulations, and policies pertain to the protection of resources found in the 3 Bars ecosystem. These are discussed in Chapter 3 under the resources to which they apply.

1.10.2 NEPA Requirements of the Project

The intent of this EIS is to comply with the NEPA by assessing the program impacts of proposed treatments on lands within the 3 Bars ecosystem. Additional guidance for NEPA compliance and for assessing impacts is provided in the Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of NEPA* (40 CFR §§ 1500-1508), and the BLM *National Environmental Policy Act Handbook* H-1790-1 (USDOI BLM 2008a).

In general, the NEPA process may be done at multiple scales depending on the scope of the proposal. The broadest level is a national-level programmatic study. This level of study contains broad and regional descriptions of resources, provides a broad environmental impact analysis, including cumulative impacts, and focuses on general policies. Additionally, it provides an umbrella Endangered Species Act Section 7 consultation for the broad range of activities described in the EIS. The 17-States PEIS, which provided Bureau-wide decisions on herbicide use for vegetation management, represents an example of a national-level programmatic study.

The next scale of analysis represents a regional level of analysis, and may be prepared for regional or statewide programs. A regional level of analysis would typically focus on methods to be used, regional or statewide issues, and provide an Endangered Species Act Section 7 consultation focused on regional issues. The *Great Basin Restoration Initiative* and the Cooperative Shrub-Steppe Restoration Partnership represent examples of these types of analyses and programs.

Below the regional scale of analysis there is the option to prepare a district or field office level of analysis. The Shoshone-Eureka RMP represents the district or field office level of analysis. This level of analysis may be prepared for district or field office-wide programs. The analysis is tiered to either or both of the two higher scales of analysis and focuses on impacts of methods and options for local projects.

The local scale provides project level analysis and is prepared for site-specific proposals. The analysis may be tiered to any or all of the above scales of analysis. The analysis focuses on site-specific impacts of implementing a single management proposal as identified through local planning. Examples include, but are not limited to, noxious weed control, prescribed fire, hazardous fuel reduction, and wildland-urban interface projects. This EIS for the 3 Bars Project is an example of project level analysis.

Tiering allows local offices to prepare more specific environmental documents without duplicating relevant portions of other NEPA documents. Analyses done by local BLM offices will be prepared in accordance with NEPA guidance and will include public involvement as regulated by the CEQ, as well as follow USDOI and BLM manual and handbook guidance and pertinent instruction memoranda. To the extent practicable, existing environmental analyses were used in analyzing impacts associated with the 3 Bars Project, including information contained in documents listed in a previous section, Documents that Influence the Scope of the EIS.

1.11 Interrelationship and Coordination with Agencies

In its role as manager of approximately 4.4 million acres in central Nevada, the BLM Mount Lewis Field Office has developed numerous relationships at the federal, tribal, state, and local levels, as well as with conservation and environmental groups with an interest in resource management, and members of the public that use public lands or are affected by activities on public lands. The lands administered by the Mount Lewis Field Office are depicted on **Figure 1-2**.

1.11.1 Cooperating Agencies

Federal, state, and local regulatory agencies with jurisdiction by law or special expertise relevant to the 3 Bars Project were solicited at the beginning of the NEPA process to determine their interest in participating as a cooperating agency. The cooperating agency role derives from the NEPA, which called on federal, state, and local governments to cooperate with the goal of achieving “productive harmony” between humans and their environment. The CEQ’s regulations implementing NEPA allow federal agencies (as lead agencies) to invite tribal, state, and local governments, as well as other federal agencies, to serve as cooperating agencies in the preparation of environmental impact statements. Agencies that have been granted cooperating agency status for preparation of this EIS are:

- National Park Service, National Trails Intermountain Region
- Nevada Department of Wildlife (NDOW)
- Eureka County Board of Commissioners

In 2005, the BLM amended its planning regulations to ensure that staffs at all levels—state office or field office—engage their governmental partners consistently and effectively through the cooperating agency relationship whenever land use plans are prepared or revised. The BLM was the first federal agency to promulgate regulations that establish a consistent, permanent role for cooperating agencies. The BLM believes that by working closely with state, local, tribal, and federal government partners, the agency will improve communication and understanding, identify common goals and objectives, and enhance the quality of our management of the public lands.

1.11.2 Other Governmental Agencies

Several federal, state, and local agencies that are not participating as cooperating agencies administer laws that govern activities on public lands. The U.S. Fish and Wildlife Service (USFWS), Advisory Council on Historic Preservation, Agricultural Research Service, USDA Natural Resources Conservation Service, USEPA, and U.S. Geological Survey (USGS) also have an interest in the project. State agencies, such as the Nevada Department of Agriculture, Nevada Division of Environmental Protection, Nevada Division of Forestry, Nevada State Historic Preservation Office (SHPO), University of Nevada Cooperative Extension, and Nevada State Clearinghouse, play vital roles in coordination with national, tribal, state, county, and private interests through their oversight and coordination responsibilities. Local agencies, such as the Eureka County Department of Natural Resources, have an interest in resources of interest to local residents.

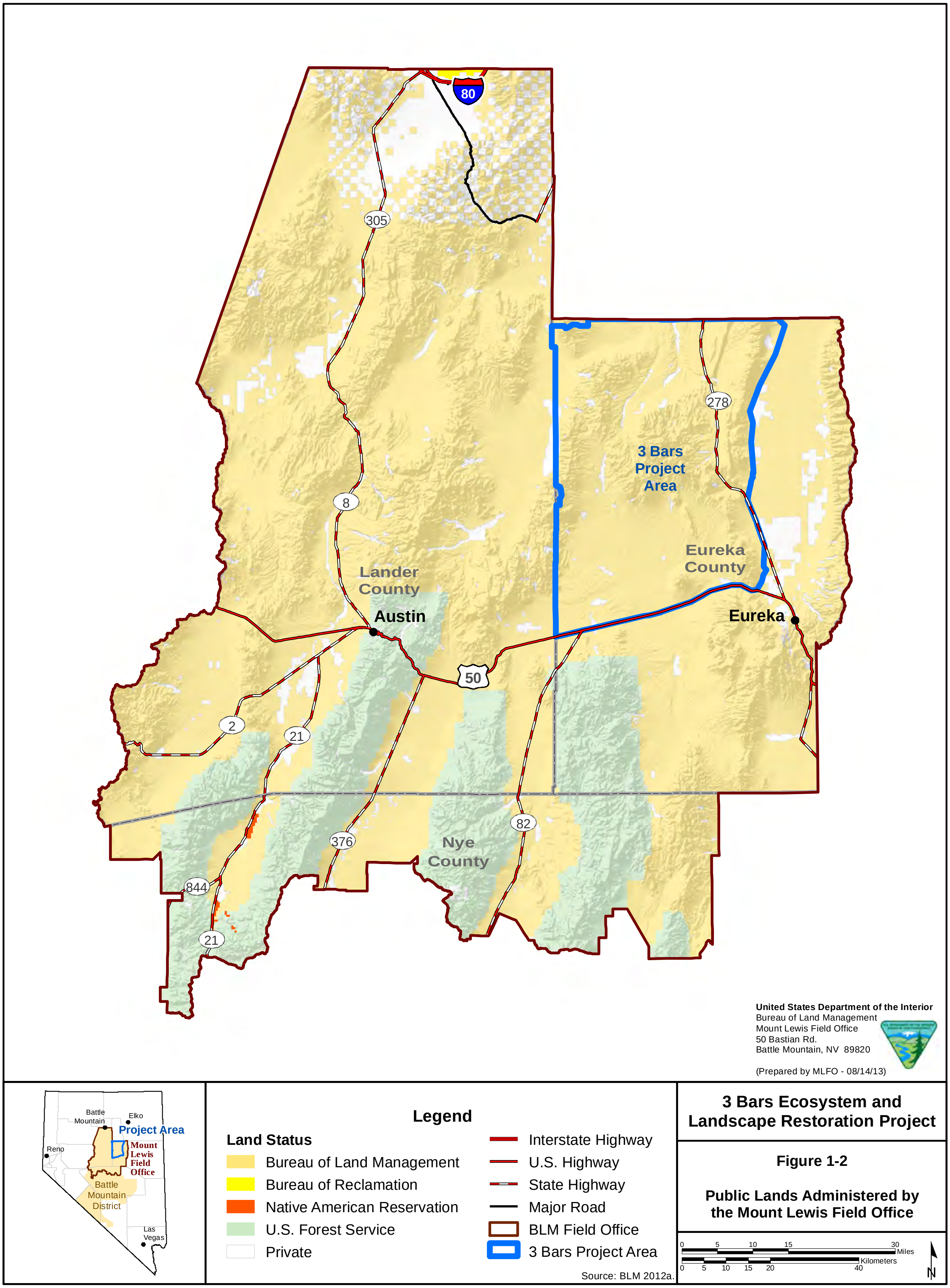
These agencies and the BLM regularly coordinate on resource management and control efforts to benefit all federally administered lands. Other local coordination includes the sharing of equipment, training, and financial resources, and developing resource management plans that cross administrative boundaries.

1.11.3 Non-governmental Organizations

The BLM coordinates at the national and local levels with several resource advisory groups and non-governmental organizations, including BLM Resource Advisory Councils, Western Governors' Association, National Association of Counties, Western Area Power Administration, National Cattlemen's Beef Association, National Wool Growers Association, Society of American Foresters, and American Forest and Paper Association. The BLM also solicits input from national and local conservation and environmental groups with an interest in land management activities on public lands, such as The Nature Conservancy, Eastern Nevada Landscape Coalition, Western Watersheds Project, Center for Biological Diversity, and National Mustang Association. These groups provide information on strategies for noxious weed and other invasive non-native establishment and spread prevention and treatment methods, use of domestic animals to control noxious weeds and other invasive non-native vegetation, landscape-level planning, vegetation monitoring, techniques to restore land health, and methods to ensure that prescribed burning does not impact the safe operation of power transmission lines.

1.12 Consultation and Coordination

As part of this EIS, the BLM consulted with the USFWS as required under Section 7 of the Endangered Species Act. The BLM prepared a formal initiation package that included: 1) a description of the program, listed threatened and endangered species, species proposed for listing, and critical habitats that may be affected by the program; and 2) a *Biological Assessment for the 3 Bars Ecosystem and Landscape Restoration Project* (Biological Assessment; USDOI BLM 2013a, 2014). The Biological Assessment evaluated the likely impacts to listed species, species proposed for



3 Bars Ecosystem and Landscape Restoration Project

Figure 1-2

Public Lands Administered by the Mount Lewis Field Office

listing, and critical habitats from the 3 Bars Project and identified management practices to minimize impacts to these species and habitats. Consultation is ongoing and will be completed before publication of the ROD.

The BLM consulted with the Advisory Council on Historic Preservation, and Nevada SHPO, as part of Section 106 consultation under the National Historic Preservation Act to determine how proposed treatment actions could impact cultural resources. Consultation is ongoing and will be completed in accordance to the programmatic agreement specific to the 3 Bars Project. Coordination and consultations with Native American tribes may be required during implementation of projects at the local level (**Appendix B**).

The BLM consults with federally recognized tribes before making decisions or undertaking activities that may have an effect on federally recognized tribes, or their assets, rights, services, or programs. The BLM initiated consultation with various tribes and bands of the Western Shoshone to identify their cultural values, religious beliefs, traditional practices, and legal rights that could be affected by BLM actions. This included sending out letters to the tribes and groups that could be directly affected by vegetation treatment activities, requesting information on how the proposed activities could impact Native American interests, including the use of vegetation and wildlife for subsistence, religious, and ceremonial purposes, and conducting meetings and site visits with the interested tribes by the BLM's Native American Coordinator. The results of the meetings and trips are summarized in the *3 Bars Ecosystem and Land Restoration Project: Native American Contacts Review* (Bengston Consulting 2012). Tribes consulted for the project are:

- Te-Moak Tribe of Western Shoshone and constituent bands:
  - Battle Mountain Band
  - South Fork Band
  - Elko Band
- Duckwater Shoshone Tribe
- Ely Shoshone Tribe
- Yomba Shoshone Tribe

1.13 Public Involvement and Analysis of Issues

1.13.1 Public Scoping

The purpose of public scoping is to focus the analysis in an EIS on the significant issues and reasonable alternatives in order to eliminate extraneous discussion and to reduce the length of an EIS. Scoping is an ongoing process that involves the public in developing an EIS.

On January 25, 2010, the BLM published a Notice of Intent notifying the public that the BLM had formed an interdisciplinary team to prepare an EIS for proposed restoration activities for the 3 Bars Project (USDOI BLM 2010c). The Notice of Intent initiated the formal public scoping period for the project. The Notice of Intent stated that comments on issues could be submitted in writing until February 24, 2010, in order to be considered in the development of the Draft EIS for the 3 Bars Project. However, the BLM stated at the public scoping meetings that it would consider all comments received prior to the close of the scoping period or 15 days after the last public meeting, whichever was later, during development of the Draft EIS. The last scoping meeting was on February 23, 2010, and scoping comments were accepted through March 10, 2010.

1.13.1.1 Public Scoping Meetings

Two public scoping meetings were held, one in Battle Mountain, Nevada, on February 22, and one in Eureka, Nevada, on February 23, 2010. These meetings were conducted in an open-house style where BLM resource specialists were able to answer questions from the public about the 3 Bars Project. Informational displays were provided at the meeting, and handouts describing the project, the NEPA process, and issues and alternatives were given to the public. A formal presentation was given to the public with additional information on 3 Bars Project goals and objectives. In addition to BLM and EIS contractor personnel, 6 individuals attended the meeting in Battle Mountain, and 18 individuals attended the meeting in Eureka.

The BLM received 24 scoping comment letters on the proposed 3 Bars Project. In addition, comments were recorded during informal discussions with the public at the public scoping meetings. However, not all individuals commenting orally at the meeting were able to be identified, making it difficult to determine the exact number of individuals presenting comments at the meetings. Based on written and oral comments given during the scoping period, 637 catalogued individual comments were recorded during scoping for the 3 Bars Project EIS. **Table 1-3** lists the agencies and organizations that provided comments during public scoping.

A *Scoping Comment Summary Report for the 3 Bars Ecosystem and Landscape Restoration Project EIS* (Scoping Report; AECOM 2010) was prepared that summarized the issues and alternatives identified during scoping. This document was made available to the public in February 2012 on the 3 Bars Project website on the BLM NEPA register.

1.13.1.2 Scoping Issues and Concerns

Table 1-4 lists the number of comments received by subject areas in this EIS. Vegetation treatment planning and management and vegetation treatment methods were the two most important topics to the public. A wide range of issues was identified during scoping. Issues accounting for over 80 percent of the comments received during scoping are listed in **Table 1-5**. A list of all issues identified during scoping can be found in the Scoping Report.

The primary issue of controversy identified through scoping was the BLM's proposed treatment approaches for the restoration of the 3 Bars ecosystem. Respondents were concerned with the impacts that treatment actions would have on the spread of invasive species, the viability of wild horses and livestock, preservation of old growth woodlands, and protection of habitat for wildlife and special status species. The public was also concerned about SOPs that would be applied during treatments to reduce their effects on natural, cultural, and social resources (see **Appendix C**, Standard Operating Procedures). All relevant issues identified through public scoping, however, have been analyzed in this EIS to the extent practicable.

1.13.1.3 Development of the Alternatives

The public scoping comments influenced the development of several 3 Bars Project ecosystem resource management alternatives. Numerous respondents suggested that the BLM avoid using fire and herbicide treatment methods, or only use manual methods, including the use of hand tools such as chainsaws and weed whackers. Based on these comments and NEPA-review requirements, four alternatives addressing restoration and management of the 3 Bars ecosystem are evaluated in this EIS. These alternatives are discussed in detail in Chapter 2, Alternatives.

1.13.1.4 Issues Not Addressed in the EIS

Less than 4 percent of comments received were not addressed in the EIS because they were beyond the scope of the document or were not relevant to the basic purpose and need of the project. The following represent the comments not addressed in the EIS:

- Complete a new inventory of public lands and associated RMP.
- Provide a new Appropriate Management Level for wild horses that examines the relative impacts of horses versus livestock and remove livestock competition and set new Appropriate Management Levels based on the findings. This request included detailed mapping that shows where and how livestock facilities have proliferated into, and disrupted, wild horse Herd Management Areas.
- Provide an analysis of all demands on, and alteration of, the aquifer including the effects of all the mining activity near Cortez-Beowawe and other areas, and the proposed Mount Hope molybdenum mine.
- Establish a series of Areas of Critical Environmental Concern or reserves as part of this process and act to leave large areas undisturbed.
- Include the use of federal fire funds to purchase grazing permits and permanently remove livestock from degraded lands.
- Prepare a full analysis of the worst case scenario for mining and energy development in the project area.

1.13.2 Public Review and Comment on the Draft EIS

The Notice of Availability of the *Draft Environmental Impact Statement for the 3 Bars Ecosystem and Landscape Restoration Project in Eureka County, NV* was published in the Federal Register on September 27, 2013 (Federal Register, Volume 78, Number 188, Pages 59712-59713). The public comment period was originally scheduled from September 27 through November 12, 2013; however, due to a government shutdown, a notice extending the public comment period to November 29, 2013, was published in the Federal Register on November 12, 2013 (Federal Register, Volume 78, Number 218, Pages 67392-67393). The BLM issued a news release on September 27, 2013, notifying the public that the Draft EIS was available for public review, and listing the schedule for public comment hearings. The BLM also issued a news release on October 22, 2013, notifying the public that the comment period had been extended due to the government shutdown. Information on the Draft EIS was also posted on the BLM website. The public was able to access the website to download a copy of the Draft EIS and the stand-alone Summary.

A public meeting was held in Eureka, Nevada, on November 7, 2013. This meeting allowed the BLM to provide an overview of the alternatives and discuss the project with the public. Three individuals attended the meeting, in addition to BLM and contractor staff.

The BLM accepted all comments received from September 27 through November 29, 2013. Over 6,800 comment submissions were received on the Draft EIS; nearly all (99 percent) of these were from a non-government organization mass mailing. Comments included letters and electronic mail. **Appendix D** of this Final EIS contains a summary of the issues and includes agency responses to specific comments.

TABLE 1-3

Agencies/Organizations/Individuals Providing Written Comments during Public Scoping

Individual/Organization	Number of Individual Comments Provided
Center for Biological Diversity	29
Eureka County Natural Resources Advisory Commission	57
National Mustang Association, Inc.	2
Nevada State Clearinghouse	2
Paiute Pipeline Company	1
State of Nevada Department of Wildlife	25
University of Nevada Cooperative Extension	11
U.S. Environmental Protection Agency	2
Western Watersheds Project	345
Individuals	123

TABLE 1-4

Comment Subject Breakdown

Comment Subject	Number of Comments[1]	Percent of Total
Proposed Action and Purpose and Need for Action		
Proposed Action	4	0.6
Purpose and Need for Proposed Action	2	0.3
Scope of Analysis and Decisions to be Made	1	0.2
Relationship to Statutes, Regulations, and Policies	9	1.4
Interrelationships and Coordination with Agencies	13	2.0
Public Involvement and Analysis of Issues	9	1.4
Alternatives Including the Proposed Action		
Vegetation Treatment Planning and Management	53	8.2
Description of Treatment Methods	45	6.9
Description of Action Alternatives	6	0.9
Proposed Action – Alternative A	3	0.5
No Action Alternative – Alternative D	2	0.3
Other Possible Alternatives	13	2.0
Alternatives Considered but Eliminated from Analysis	3	0.5
Treatment Standard Operating Procedures	24	3.7
Special Precautions	1	0.2
Studies and Monitoring	33	5.1
Coordination and Education	5	0.8
Mitigation	3	0.5
Affected Environment		
Affected Environment – General	2	0.3
Introduction and Study Area	4	0.6

TABLE 1-4 (Cont.)

Comment Subject Breakdown

Comment Subject	Number of Comments[1]	Percent of Total
Land Use	6	0.9
Climate and Air Quality	1	0.2
Soil Resources	5	0.8
Water Resources (Quantity and Quality)	23	3.5
Wetlands, Floodplains, and Riparian Zones	6	0.9
Vegetation Resources	72	11.1
Fish and other Aquatic Resources	6	0.9
Wildlife Resources	39	6.0
Livestock Grazing	32	4.9
Wild Horses	20	3.1
Wilderness and other Special Areas	2	0.3
Cultural Resources	3	0.5
Social and Economic Values	5	0.8
Environmental Consequences		
Environmental Consequences – General	6	0.9
Assumptions for Analysis	10	1.5
Land Use	9	1.4
Climate and Air Quality	6	0.9
Topography, Geology, and Minerals	4	0.6
Soil Resources	2	0.3
Water Resources (Quantity and Quality)	6	0.9
Wetlands, Floodplains, and Riparian Zones	3	0.5
Vegetation Resources	53	8.2
Fish and other Aquatic Resources	2	0.3
Wildlife Resources	10	1.5
Special Status Species	4	0.6
Livestock Grazing	6	0.9
Wild Horses	21	3.2
Wilderness and other Special Areas	4	0.6
Cultural Resources	2	0.3
Recreation	5	0.8
Social and Economic Values	13	2.0
Human Health and Safety	1	0.2
Cumulative Effects Analysis	19	2.9
Other Comments		
References	4	0.6
Glossary, Acronyms, and Abbreviations	3	0.5
Comments not Evaluated in this EIS	2	0.3
Total Comments	650	100

[1] Total number of comments is greater than actual number of comments provided because a few comments were referenced under more than one comment subject.

TABLE 1-5

Key Issues (and Number of Comments) Identified during Scoping

Issues	Number of Comments
Program Purpose and Need	
Evaluate land use (grazing, fire suppression, and mining) on ecosystem health, and provide baseline studies	44
Focus on the recovery and viability of listed, rare, and imperiled species, and provide baseline assessments	27
Work closely with agencies, conservation groups, and private landowners on restoration activities	15
Address how the EIS will impact RMPs and other planning; update RMP	13
Focus on long-term ecosystem sustainability and biological diversity, and clearly define restoration objectives	8
Provide an explanation of the rationale for why these lands need treatment	8
Provide an evaluation and assessment of past treatments on District lands	8
Focus on addressing the causes rather than treating the symptoms	7
Provide assessment of areas that are functioning well	5
Proposed Action	
Ensure viable wild horse herds, and provide historic and current conditions of herds	30
Do not thin re-forested/persistent woodlands, protect old growth, and cut only younger age class trees	26
Ensure compliance with existing statutes, regulations, and policies	12
Treatments should be less invasive/more “passive,” and avoid additional disturbances due to treatments	9
Consider all treatment methods, and allow for innovative solutions	7
Describe where acres will be treated and by what methods, and treat areas uniquely	6
Maintain grazing permits and avoid livestock limitations	6
Use selective hand-cutting/drilling and avoid mechanical removal	5
Determine appropriate forage allocations, and distinguish between livestock, wild horses, and big game	5
Other Potential Alternatives	
Fuels reduction should only occur in wildland urban interface or where there is a threat of significant wildfire	5
Develop a prescription grazing alternative	5
Restoration Goals and Best Management Practices	
Monitor success of treatments and establish performance measures to determine treatment success	35
Use current and consistent ecological concepts, terminology, and theory, and provide methods	31
Restrict grazing during treatments and on un-impacted lands, and provide rest periods following treatments	22
Restoration efforts should focus on restoring native vegetation, and focus on areas seeded to exotics	20
Preserve sagebrush and sagebrush habitat	14
Use native plants and certified native seed, where practical, for revegetation	9
Expand/adjust the boundaries of the project, use natural boundaries, and focus on human-interface areas	5
Focus restoration efforts on restoring natural disturbance regimes, ecosystem processes, and functions	4
Environmental Consequences	
Address how treatments would affect the local and regional economy	20
Address the impacts of project activities on available habitat and habitat fragmentation	11
Evaluate the effects of herbicide treatments on non-target species, on water supplies, and on human health	9
Address the impacts of past and future land uses on anticipated success of vegetation treatments	6
Evaluate the potential for return of invasive species following treatment	6
Address the role of grazing in contributing to or controlling weeds, invasive vegetation, and hazardous fuels	6
Address the impacts of treatments on fire/historical range of variation	6
Address the impacts of multiple treatments and application of multiple chemicals in a single area	5
Address economic and habitat value of pinyon pine	5
Evaluate the impacts of project activities on climate change and air quality	5
Address the impacts of roads and off-road vehicle use on vegetation conditions and treatments	4
Evaluate the impacts of treatments on the Pony Express Trail and Wilderness Study Areas	4

1.14 Limitations of this EIS

The analyses of impacts of the 3 Bars Project treatments proposed in this EIS are based on the best and most recent information available. As is always the case when developing management direction for a wide range of resources, not all information that might be desired is available. Council on Environmental Quality regulations provide direction on how to proceed with the preparation of an EIS when information is incomplete or unavailable:

"If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement: 1) a statement that such information is incomplete or unavailable; 2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; 3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and 4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes "impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason" (40 CFR § 1502.22 b).

For this EIS, the primary effect of unavailable information is the inability to quantify certain impacts. Where quantification was not possible, impacts have been described in qualitative terms. Existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable adverse impacts on the natural, human, and socioeconomic environment and support the BLM's evaluation of such impacts have been included in Chapter 3, in the appendices that accompany this EIS, and in supporting documents that were prepared for this EIS, and are available on the 3 Bars Project website on the BLM NEPA Register.

If changes in the proposed project activities and levels occur in the future, they would be reviewed to determine whether additional environmental documentation is needed, including an Environmental Assessment or EIS. This EIS would serve as a source document that would be used to support any additional documentation that may be required. Any new or additional actions would also be evaluated for compliance with federal, state, and local laws and regulations prior to implementation, and the public would be informed of any major actions that may be considered for implementation by the BLM as part of the NEPA compliance process.

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CHAPTER 2

ALTERNATIVES

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CHAPTER 2

ALTERNATIVES

2.1 Introduction

This chapter discusses the proposed and alternative actions that have been identified to promote a sustainable, healthy, and resilient landscape on the 3 Bars ecosystem. The proposed and alternative actions are those that could be taken to feasibly attain the BLM's objectives of improving the health of the 3 Bars ecosystem and reducing the risk factors that are contributing to its decline. Alternatives were developed in response to the various issues and alternative proposals raised during public scoping, and during public review of the Draft EIS, and still meet the project's purpose and need as described in Chapter 1. Alternatives were also developed to ensure BLM compliance with federal, tribal, state, and local regulations, and the Shoshone-Eureka RMP.

As described in the Scoping Report (AECOM 2010), alternative treatment proposals were generated during public scoping and focused primarily on the types of restoration treatments that would be used by the BLM. The proposals centered on limiting treatment acres, limiting livestock grazing, limiting the use of herbicides and prescribed fire, using only passive treatment methods, and restoring land using only native vegetation. Several of these proposals were also made during the Draft EIS comment period.

To help the reader better understand the alternative proposals, this chapter describes the action alternatives and the project components that are part of the action alternatives, including the proposed treatment areas, and methods. This is followed by a description of the No Action Alternative, and a description of alternatives considered but not evaluated in the EIS. Finally, the chapter provides a summary of environmental, cultural, and socioeconomic impacts that would result from implementation of the alternatives.

Four alternatives are evaluated in this EIS—the All Treatment Methods Alternative (Alternative A; Preferred Alternative); the No Fire Use Alternative (Alternative B); the Minimal Land Disturbance Alternative (Alternative C); and the No Action Alternative (Alternative D; Continue Current Management). Alternative actions are those that could be taken to feasibly attain the BLM's objectives for improving the health of, and reducing risks to, the 3 Bars ecosystem. The alternatives differ primarily in the types of treatment methods allowed and the amount of acreage that can reasonably be treated over the life of the project.

2.2 Summary of Major Changes between the Draft and Final EIS

Several major changes were made to the 3 Bars Project Draft EIS and incorporated into this chapter of the Final EIS based on public comments on the Draft EIS. These changes (and Section where change is made) are as follows:

1. No range improvements (such as livestock troughs, permanent fencing, etc.) would be included as part of restoration treatments (Section 2.3).

2. All treatment units would be surveyed for cheatgrass prior to treatment, and treated as needed to ensure success of the treatments (Section 2.3).

3. No chaining would be implemented within the 3 Bars Project area (Section 2.3.1).

4. Vegetation treatment goals and objectives have been expanded upon for treatment types (riparian, aspen, pinyon-juniper, and sagebrush; Section 2.3.1).

5. Chainsaw hand thinning would be the preferred method for tree cutting in riparian and aspen treatment units, and in Phase I pinyon-juniper stands in pinyon-juniper and sagebrush treatment units. Chainsaw hand thinning would also be the preferred method in Phase II and III stands in sagebrush treatment areas. Other methods would be considered, however, on a case-by-case basis (Sections 2.3.1).

6. Mechanical equipment would not be used within the Willow Creek stream channel, but would be used to place erosion control features within the channel or to improve stream condition (Section 2.3.1.1).

7. Only existing permanent fencing, or small, temporary exclosures (let-down fencing constructed of barbed wire and posts that can be let-down easily to allow animals to pass, or electric wire fencing), would be used to exclude livestock, wild horses, and other wild ungulates from treatment units until seeded and planted areas become established (Sections 2.3.1.1, 2.3.1.2).

8. Prescribed fire, or wildland fire for resource benefit, would not be used as a primary treatment method in riparian, aspen, or sagebrush treatment units, but could be used in Phase II and III pinyon-juniper stands in pinyon-juniper treatment units and to remove non-native vegetation on the Rocky Hills and West Simpson Park sagebrush treatment unit (Section 2.3.1; see discussion of pinyon-juniper phases in Section 2.3.1.3).

9. Treatment areas would be surveyed for mountain mahogany, pinyon-juniper, and limber pine old-growth trees before conducting treatments. Areas containing mountain mahogany, old-growth limber pine, or old-growth pinyon-juniper trees would be avoided (Section 2.3.1.3).

10. Fuel breaks would be constructed along existing roads and two-tracks where possible using narrow and small-scale green-stripping. Fuel breaks would not be constructed where they could adversely impact important cultural or natural resources (Section 2.3.1.3).

11. No sagebrush would be removed within sagebrush treatment units (Section 2.3.1.4).

12. If authorized, livestock could be used to remove cheatgrass within all treatment units (Section 2.3.1.4).

13. Only seeds of native plant species would be used to seed treatment units. Non-native seedings may be used 1) to create fuel breaks, 2) in areas that have previously burned and are beyond use of Emergency Stabilization and Rehabilitation techniques, 3) to create green strips; and 4) for soil stabilization in low precipitation zones. (Section 2.5.3.5).

14. Treatment design would allow for up to 100 cords of fuel wood (greenwood and deadwood combined) to be removed for commercial sale annually, per unit, where removal of pinyon-juniper is an objective (Section 2.5.3.6).

15. Included is a summary of mitigation measures proposed for each resource area in Table 2-2, Summary and Comparison of Effects on Resources by Alternative.

16. Prior to implementing any seeding treatment, livestock management will be reviewed to insure proper grazing management and AML will be achieved within the associated HMA(s). (Table 2-2, Summary of Effects on Livestock and Rangeland Conditions, Cumulative Effects).

17. The number of acres treated using fire has been reduced by about 40 percent from amounts given in the Draft EIS (various sections).

18. Analysis and justification for use of fire in Greater sage-grouse habitat: MD FIRE 23: If Prescribed fire is used in GRSG habitat, the NEPA analysis for the Burn Plan will address:

    - Why alternate techniques were not selected as a viable option
    - How GRSG goals and objectives will be met by its use
    - How the COT report objectives will be addressed and met
    - A risk assessment to address how potential threats to GRSG habitat will be minimized

    These four requirements are addressed in Appendix E: ARMPA - MD FIRE 23 Documentation.

2.3 Description of the Action Alternatives (Alternatives A, B, and C)

2.3.1 Alternative A — All Treatment Methods Alternative (Preferred Alternative)

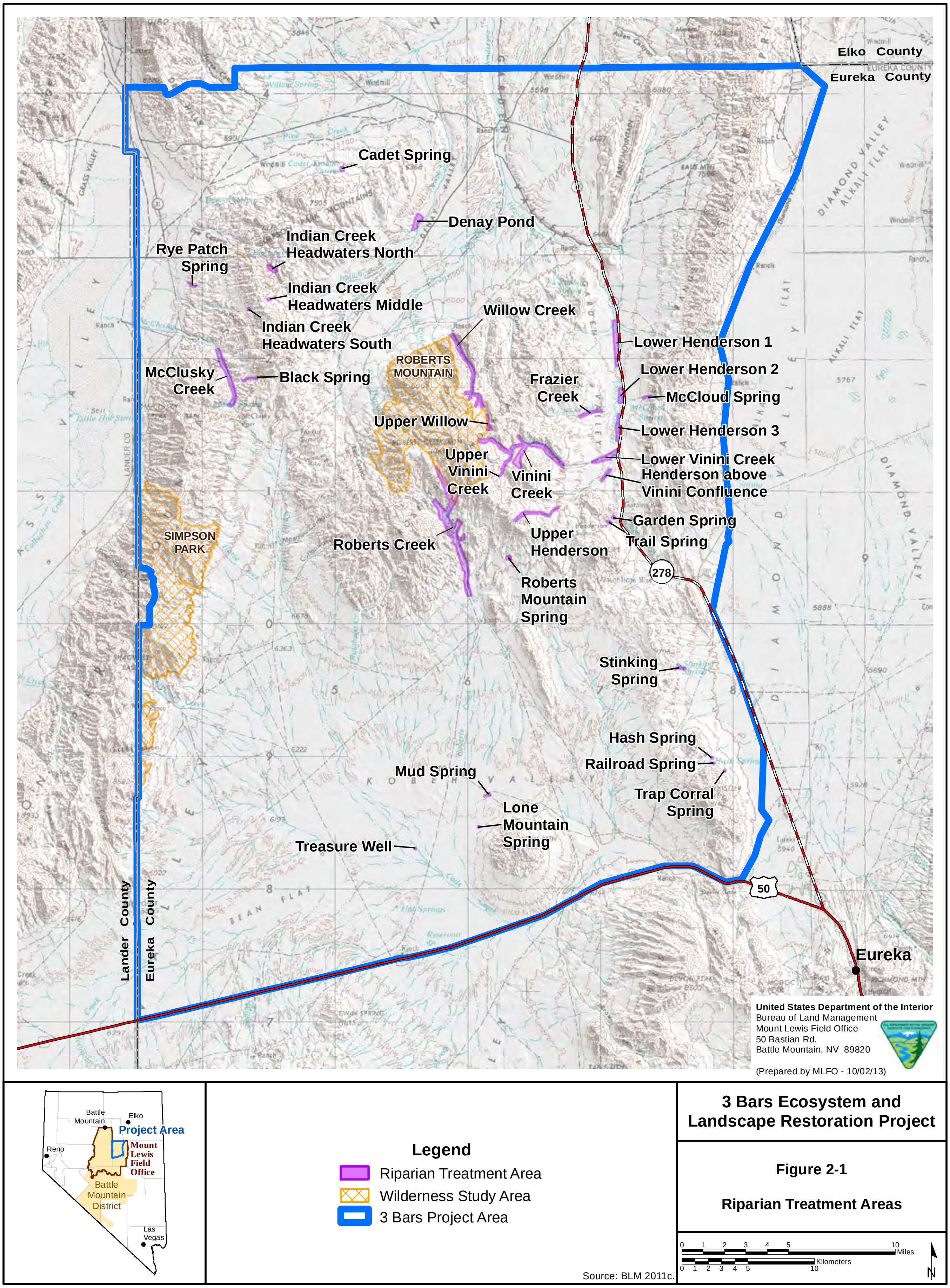
Alternative A is the BLM's Preferred Alternative. Under this alternative, the BLM would treat about 127,000 acres during the life of the project, or about 12,700 acres annually, using manual and mechanical methods, fire (both prescribed and wildland fire for resource benefit), and biological controls (primarily to control noxious weeds and other invasive non-native vegetation using livestock and classical biological [nematodes, fungi, mites, and insects]). Treatments would focus on protecting landscapes and treatment projects would usually address multiple resource issues.

The BLM has identified site-specific treatments to be implemented under this alternative in order to improve the health of the 3 Bars ecosystem. Treatments would focus on four priority vegetation management concerns—riparian, aspen, pinyon-juniper, and sagebrush.

2.3.1.1 Riparian Treatment Units

The BLM has identified about 3,885 acres of riparian zone treatments (**Figure 2-1**). These areas were selected by the BLM because they exhibited riparian structural issues such as incised channels, headcuts, and knickpoints; did not meet Proper Functioning Condition standards (see Section 3.11 for a discussion of Proper Functioning Condition standards); or required treatment to improve habitat for Lahontan cutthroat trout. Treatments to address stream structural issues include headcut abatement, to address a headcut at a specific point in a stream; headcut incision abatement, to address stream segments where the channel is still actively downcutting and where a headcut is present; and incision abatement, where the stream segment has an incised channel but not a headcut. In addition, pinyon-juniper encroachment into some riparian zones is compromising riparian health. Riparian treatment objectives include:

- Remove non-riparian trees within the historic floodplain, and thin non-riparian trees to 30-feet spacing outside of the historic floodplain and within 200 feet of the stream channel.
- Manage activity fuels using one or more of the Activity Fuel Disposal methods outlined in this chapter.
- Achieve an increase of occurrence of key riparian species by at least 30 percent in the short term (3-5 years post treatment).
- Reduce the number of headcuts and headcut incisions.



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Streams, ponds and springs would be treated within the Grass Valley, JD, Lucky C, Roberts Mountains, and Romano allotments, which are within the Simpson Park Range and Kobeh and Denay Valleys. These include treatment units associated with the Black Spring Group, Garden Spring Group, and Denay Pond, Lone Spring, and Treasure Well.

Greater treatments are proposed on 402 acres associated with several streams, ponds, and springs—Black Spring Group (Black Spring, Cadet Spring, Indian Creek Headwaters North, Middle, and South, Mud Spring, McClusky Creek, and Rye Patch Spring units). Treatment methods include manual and mechanical methods. The Black Spring Group includes the following units:

- Black Spring (15 acres)
- Cadet Spring (18 acres)
- Indian Creek Headwaters North (50 acres)
- Indian Creek Headwaters Middle (6 acres)
- Indian Creek Headwaters South (4 acres)
- Mud Spring (8 acres)
- McClusky Creek (292 acres)
- Rye Patch Spring (9 acres)

For the Black Spring Group, the BLM would:

1. Treat stream segments and springs where Multiple Indicator Monitoring and Proper Functioning Condition data indicate that structural treatments are needed. Various methods of treatment may be utilized to address identified headcuts and stream incision. These include grade stabilization structures, streambank bioengineering, and vegetation planting to initiate stream restoration. Equipment involved would range from a track-hoe or back-hoe and dump truck for hauling rock or dirt work, to a pick-up and trailer for hauling fencing and planting materials. Existing fencing, or small temporary exclosures (let-down fencing using barbed wire and posts that can be let-down easily to allow animals to pass, or electric wire fencing), would be used to exclude livestock, wild horses, and other wild ungulates from treatment units until seeded and planted areas become established. No use of barbed wire or let-down fencing will be allowed within HMA boundaries, and let-down fencing will not be used where wild horses are present and may become entrapped in the fence.

2. Maintenance of fencing would be determined on a project-by-project basis and would be reflected in the individual cooperative agreements for each project.

The BLM would conduct treatments similar to those identified in the previous paragraph on about 78 acres at the Hash Spring, Garden Spring, McCloud Spring, Railroad Spring, Roberts Mountains Spring, Stinking Spring, Trail Spring, and Trap Corral Spring units (Garden Spring Group). Treatment methods include manual and mechanical methods. The BLM would also remove pinyon-juniper from riparian habitats using manual and mechanical methods as needed. The Garden Spring Group includes the following units:

- Hash Spring (3 acres)
- Garden Spring (7 acres)
- McCloud Spring (15 acres)
- Railroad Spring (3 acres)
- Roberts Mountains Spring (18 acres)
- Stinking Spring (17 acres)
- Trail Spring (12 acres)
- Trap Corral Spring (3 acres)

For the Garden Spring Group, the BLM would:

1. Treat stream segments and springs where Multiple Indicator Monitoring and Proper Functioning Condition data indicate that structural treatments are needed. Various methods of treatment may be utilized to address identified headcuts and stream incision. These include grade stabilization structures, streambank bioengineering, and vegetation planting to initiate stream restoration. Equipment involved would range from a track-hoe or back-hoe and dump truck for hauling rock or dirt work, to a pick-up and trailer for hauling fencing and planting materials. Existing fencing, or small temporary exclosures (let-down fencing using barbed wire and posts that can be let-down easily to allow animals to pass, or electric wire fencing), would be used to exclude livestock, wild horses, and other wild ungulates from treatment units until seeded and planted areas become established. No use of barbed wire or let-down fencing will be allowed within HMA boundaries, and let-down fencing will not be used where wild horses are present and may become entrapped in the fence. Maintenance of fencing would be determined on a project-by-project basis and would be reflected in the individual cooperative agreements for each project.

2. Remove Phase I and selected Phase II pinyon-juniper from riparian habitats. The BLM would primarily use hand-thinning to remove trees around springs and in Phase I pinyon-juniper stands, and a combination of manual and mechanical treatment methods in Phase II stands.

At Denay Pond, Lone Spring, and Treasure Well, the BLM would use protective fencing, but no other treatments, to restore riparian habitats. These areas total about 97 acres and mechanical and manual methods would be used for treatments.

The BLM would treat approximately 3,208 acres and 28 miles of riparian habitat associated with units in the Henderson above Vinini Confluence Group and Frazier Creek Group that are found along Frazier, Henderson, Roberts, Vinini, and Willow Creeks. Treatment objectives are to achieve Proper Functioning Condition (both groups), and to remove 70 to 90 percent of pinyon-juniper from within riparian areas (Frazier Creek Group only). Mechanical and manual methods would be used to treat vegetation. For treatments along Willow Creek, mechanical equipment would not be used within the stream wherever possible, but would be used to place items or structures within the stream to address identified issues.

In addition to treatment goals discussed earlier, treatment goals for both groups include enhancing habitat for Lahontan cutthroat trout in historically occupied streams and Lahontan cutthroat trout recovery streams, and in streams occupied by game fish. Treatments would help meet the goals and objectives of the *Recovery Plan for the Lahontan Cutthroat Trout* (Coffin and Cowan 1995). An additional goal for the Frazier Creek Group is to reduce pinyon-juniper encroachment onto riparian sites.

The Henderson above Vinini Confluence Group includes the following units:

- Henderson above Vinini Confluence (35 acres, 1 mile)
- Lower Henderson 1 (289 acres, 2 miles)
- Lower Henderson 2 (79 acres, 0. 5 mile)
- Lower Henderson 3 (94 acres, 1 mile)
- Lower Vinini (151 acres, 1 mile)
- Upper Vinini (64 acres, 1 mile)
- Upper Willow (46 acres, 0. 5 mile)

For the Henderson above Vinini Confluence Group, the BLM would:

1. Treat stream segments where Multiple Indicator Monitoring and Proper Functioning Condition data indicate structural treatments are needed. Various methods of treatment may be utilized to address identified headcuts and stream incision. These include grade stabilization structures, stream bank bioengineering, and vegetation planting to initiate stream restoration. Equipment involved would range from a track-hoe or back-hoe and dump truck for hauling rock or dirt work, to a pick-up and trailer for hauling fencing and planting materials. Only existing permanent fencing, or small temporary exclosures (let-down fencing using barbed wire and posts that can be let-down easily to allow animals to pass, or electric wire fencing), would be used to exclude livestock, wild horses, and other wild ungulates from treatment units until seeded and planted areas become established. No use of barbed wire or let-down fencing will be allowed within HMA boundaries, and let-down fencing will not be used where wild horses are present and may become entrapped in the fence. Maintenance of fencing would be determined on a project-by-project basis and would be reflected in the individual cooperative agreements for each project.

The Frazier Creek Group includes the following units:

- Frazier Creek (59 acres, 1 mile)
- Roberts Creek (1,390 acres, 7 miles)
- Upper Henderson (129 acres, 1 mile)
- Vinini Creek (644 acres, 7 miles)
- Willow Creek (328 acres, 5 miles)

For the Frazier Creek Group, the BLM would:

1. Treat stream segments where Multiple Indicator Monitoring and Proper Functioning Condition data indicate that structural treatments are needed. Various methods of treatment may be utilized to address identified headcuts and stream incision. These include grade stabilization structures, streambank bioengineering, and vegetation planting to initiate stream restoration. Equipment involved would range from a track-hoe or back-hoe and dump truck for hauling rock or dirt work, to a pick-up and trailer for hauling fencing and planting materials. Only existing permanent fencing, or small temporary exclosures (let-down fencing using barbed wire and posts that can be let-down easily to allow animals to pass, or electric wire fencing), would be used to exclude livestock, wild horses, and other wild ungulates from treatment units until seeded and planted areas become established. No use of barbed wire or let-down fencing will be allowed within HMA boundaries, and let-down fencing will not be used where wild horses are present and may become entrapped in the fence. Maintenance of fencing would be determined on a project-by-project basis and would be reflected in the individual cooperative agreements for each project.

2. Remove Phase I and selected Phase II pinyon-juniper from riparian habitats with a combination of mechanical and manual treatment methods. Hand-thinning would be the preferred method of tree removal in Phase I pinyon-juniper stands.

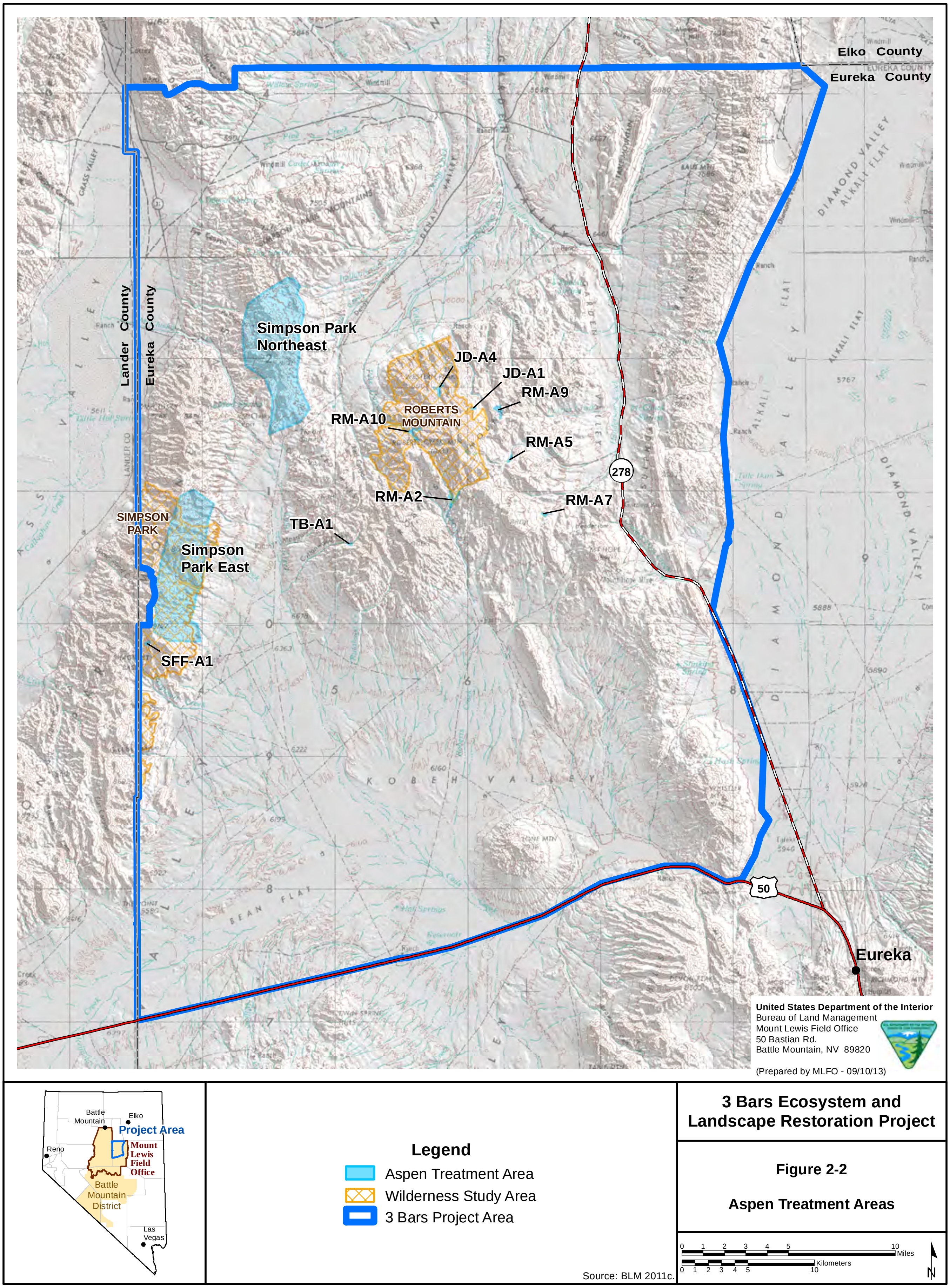
No range improvements, such as livestock troughs and permanent fencing, would be included as part of riparian treatments. Chainsaw hand thinning would be the preferred method for tree cutting in riparian treatment areas, especially near springs and in areas with Phase I pinyon-juniper, but all other treatment methods would be considered during project planning. Felled trees from pinyon-juniper removal would be disposed of by using trees for posts and as mulch, placing logs and larger wood in streams to slow water flow, selling trees for public or commercial use, burning piled or slashed trees, or leaving downed trees on-site for wildlife habitat. All units would be inventoried for noxious weeds and invasive non-native vegetation and treated, if necessary, before treatment implementation. Units would be monitored for up to 3 years following implementation and if noxious weeds or invasive non-native vegetation are found, they would be treated with an appropriate and approved treatment method in accordance with the *Integrated Weed Management Plan Battle Mountain District Nevada Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b).

2.3.1.2 Aspen Treatment Units

The BLM has identified about 451 acres of aspen habitat that would be treated within the Roberts Mountains (RM-A2, A5, A7, A9 and A10 units), JD (JD-A1 and A4 units), 3 Bars (TB-A1 Unit), and Santa Fe/Ferguson (SFF-A1 unit) allotments (**Figure 2-2**). The BLM has determined that an insufficient number of aspen suckers are surviving to maturity in these areas. In addition to these units, the BLM has also identified the Simpson Park East (8,055 acres) and Simpson Park Northeast (8,991 acres) units as areas where aspen treatments could occur in the future. Treatments would not occur in these two areas until after site-specific aspen inventories are completed and funding for treatments becomes available. Aspen treatment objectives include:

- Achieve an increase of aspen stems per acre, a minimum of 10 percent in the short term (3-5 years post treatment).

- Achieve an increase of sapling aspen stems per acre, a minimum of 10 percent in the short term (3-5 years post treatment).



Source: BLM 2011c.

3 Bars Ecosystem and Landscape Restoration Project

Figure 2-2

Aspen Treatment Areas

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- Remove 100 percent of pinyon-juniper in and within 200 feet of aspen stands.
- Manage activity fuels using one or more of the Activity Fuel Disposal methods outlined in this chapter.

The BLM would treat approximately 203 acres associated with the JD-A1 Group, 189 acres associated with the RM-A2 Group, and 59 acres associated with the JD-A4 Group. Treatment goals are to 1) protect and improve aspen stand health; 2) reduce pinyon-juniper encroachment onto aspen sites; 3) protect and improve wildlife habitat in the long-term; 4) provide for vegetative and ecological diversity; and 5) conduct inventories of aspen stands to establish current stand health.

The JD-A4 Group includes the following units:

- JD-A4 (23 acres)
- RM-A10 (28 acres)
- SFF-A1 (8 acres)

The BLM would treat these three units using manual treatment methods to improve aspen stand health.

The RM-A2 Group includes the following units:

- RM-A2 (39 acres)
- Simpson Park East (150 acres)

The BLM would treat these two units using mechanical and manual treatment methods. No mechanical treatments would be used within Wilderness Study Area (WSA) boundaries. The Simpson Park East Unit is an area where aspen treatments could occur in the future. Treatments would not occur on this unit until after site-specific aspen inventories are completed and funding for treatments becomes available.

The JD-A1 Group includes the following units:

- JD-A1 (3 acres)
- RM-A5 (4 acres)
- RM-A7 (6 acres)
- RM-A9 (36 acres)
- Simpson Park Northeast (150 acres)
- TB-A1 (4 acres)

The BLM would treat these six units using prescribed fire (pile burning only), mechanical, and manual treatment methods. The Simpson Park Northeast Unit is an area where aspen treatments could occur in the future. Treatments would not occur on this unit until after site-specific aspen inventories are completed and funding for treatments becomes available.

No range improvements, such as livestock troughs and permanent fencing, would be included as part of aspen treatments. Treatments would be conducted using manual and mechanical methods and prescribed fire to selectively remove trees. Chainsaw hand thinning is the preferred method for tree cutting, however, other methods may be considered on a case-by-case basis. Existing fencing or small, temporary exclosures may be used to protect aspen restoration areas from livestock, wild horses, and other wild ungulates and would be similar to those described under Riparian Treatments. Treatments would improve the health of aspen stands by stimulating aspen stand suckering and sucker survival.

Slash from removal of pinyon-juniper would be left in place to promote aspen suckering and seedling establishment. Removal of pinyon-juniper may extend up to 200 feet from aspen stands, and some treatments may occur near roads to improve their effectiveness as fuel breaks. Pinyon-juniper slash would be left in place to act as deadfall, to limit ungulate access to the treatment area, and to minimize other site disturbances. If there is the potential for wildfire due to extensive slash material, trees having the potential for use as fence posts or for firewood would be gathered up and offered for sale to the public; any remaining material would be pile burned. The BLM would follow non-impairment standards for treatments in the Roberts Mountains and Simpson Park WSAs.

2.3.1.3 Pinyon-juniper Treatment Units

Up to 94,000 acres of treatments involving the thinning and removal of pinyon-juniper would be conducted on Lone Mountain, Roberts Mountains, and other areas within the 3 Bars ecosystem (**Figure 2-3**).

In most instances, pinyon-juniper treatments would occur where stands are in the Phase I and II stage of development, and where soils are characteristic of those found in sagebrush communities. Phases are based on stand characteristics that differentiate between three transitional phases of woodland succession based on tree canopy, leader growth (of dominant and understory trees), crown structure, potential berry production, tree recruitment, and shrub and herbaceous vegetation canopy cover. Pinyon-juniper stands on the 3 Bars Project area were characterized by phases and mapped in 2010 and 2011, and this information was used when developing pinyon-juniper treatments (AECOM 2011a). These phases, as described by Miller et al. (2008), are as follows:

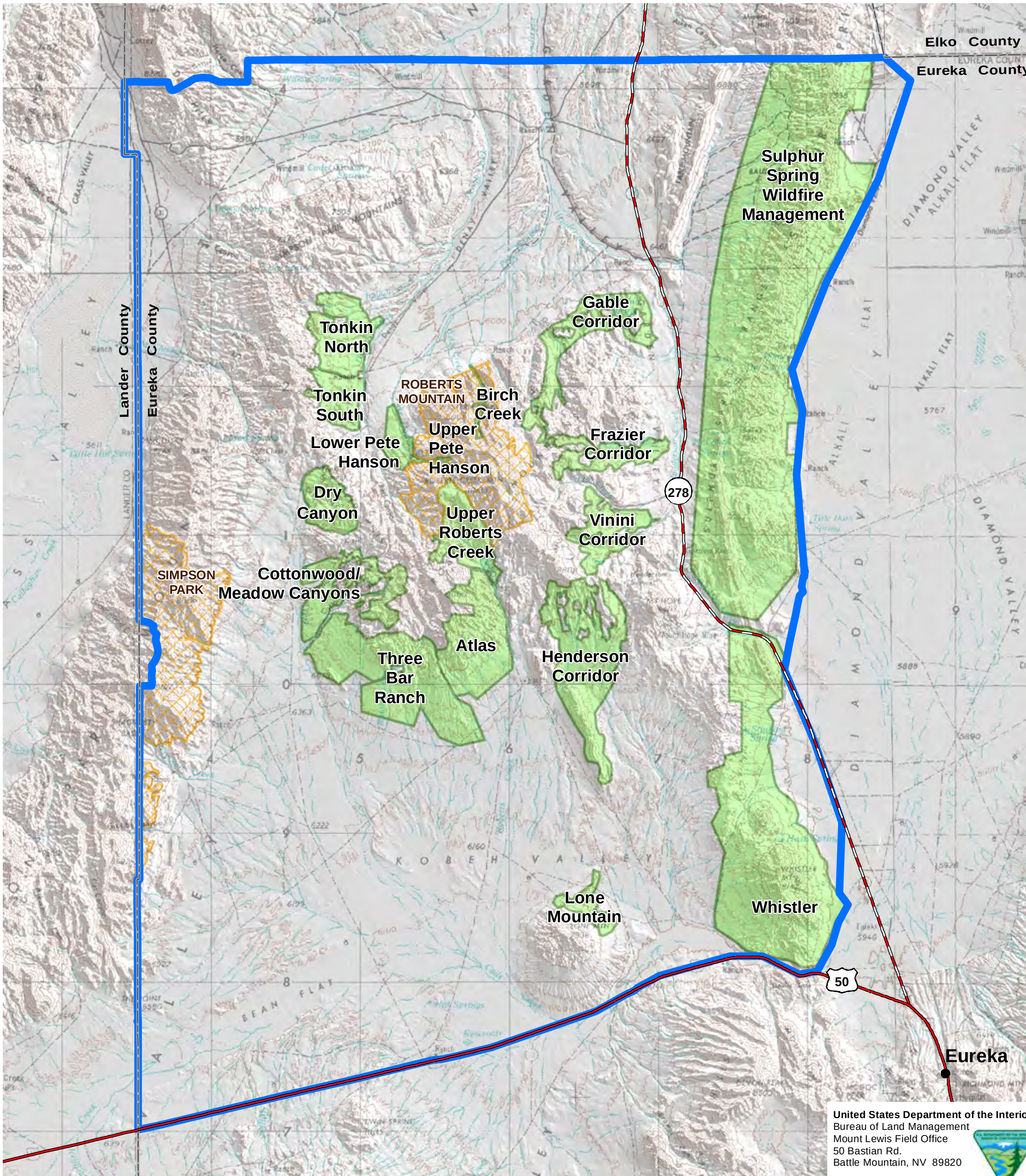
Phase I (early) – trees are present, but shrubs and herbs are the dominant vegetation that influence ecological processes on the site.

Phase II (mid) – trees are co-dominant with shrubs and herbs, and all three vegetation layers influence ecological processes on the site.

Phase III (late) – trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site.

This scheme is useful for identifying the successional stage in expansion communities that may potentially be targeted for treatment. Phase III woodlands have the greatest tree density, and the greatest amount of canopy fuels, which puts them at increased risk for loss from high intensity fires (Tausch 1999 *in* Miller et al. 2008). However, according to Miller et al., treatments in Phase I and II expansion woodlands to halt their succession to Phase III woodlands may be more successful and cost-effective than treatments in Phase III woodlands.

Manual and mechanical treatments would be primarily utilized to disrupt the continuity of fuels and reduce the risk of catastrophic fire as well as to improve woodland health. Treatments would involve multiple tree removal options including the use of chainsaws, hand thinning, ripping, feller-buncher, tree-shearer, prescribed fire, and wildland fire



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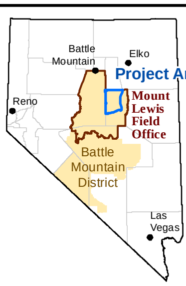

Legend

- Pinyon-juniper Treatment Area
- Wilderness Study Area
- 3 Bars Project Area

Source: BLM 2011c.

3 Bars Ecosystem and Landscape Restoration Project

Figure 2-3

Pinyon-juniper Treatment Areas

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

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for resource benefit. Prior to conducting treatments, treatment areas would be surveyed for mountain mahogany, and old-growth pinyon-juniper and limber pine trees. Areas with mountain mahogany and/or old-growth limber pine and/or pinyon-juniper trees would be avoided. Most pinyon-juniper trees in Phase I stands would be removed, and only hand thinning using chainsaws would be allowed in Phase I stands. The density of trees in woodlands in the Phase II and III states would be reduced by a minimum of 50 percent within areas targeted for treatment. Biological control methods using livestock would only be used to treat cheatgrass. Fuel breaks would be constructed along existing roads and two-tracks wherever possible, unless needed to protect important cultural or natural resources. Treatment design would allow for up to 100 cords of fuel wood (greenwood and deadwood combined) to be removed for commercial sale annually, per unit. No range improvements, such as livestock troughs or permanent fencing, would be included as part of pinyon-juniper treatments. Pinyon-juniper treatment objectives include:

- Decrease crown fire potential by increasing canopy spacing to an average of 30 feet and/or create multiple-canopy openings totaling 30 to 45 percent of a given contiguous stand in treatment areas (an average canopy spacing of 30 feet is roughly 30 to 40 mature trees per acre and is not capable of sustaining crown fires).
- Reduce fuel loading to 1 to 2 tons per acre in shrub fuel types and to 1 to 5 tons per acre in pinyon-juniper fuel types.
- Reduce hazardous fuel loads of pinyon-juniper within fuel breaks to 10 tons or less per acre.
- Conduct treatments when fuel loads are greater than 2 tons per acre in shrub fuel types and loadings, or 10 tons per acre in pinyon-juniper fuel types and loadings, or more than 500 pounds per acre of fine fuels.
- Remove Phase I pinyon-juniper and selected Phase II pinyon-juniper stands within historic sagebrush habitats.
- Reduce crown closure in Phase II and III pinyon-juniper stands to less than 40 percent to improve stand health in areas managed for pinyon-juniper woodlands.
- Reduce stocking levels in Phase II and III pinyon-juniper stands to less than 200 stems per acre to improve stand health in areas managed for pinyon-juniper woodlands.

The BLM would treat pinyon-juniper to enhance habitats that are important to Greater sage-grouse in several drainages on Roberts Mountains and Lone Mountain (Atlas Group) using manual, mechanical, and fire treatments. Treatment units include the Lone Mountain, Atlas, Frazier, Gable, Henderson, Upper Roberts Creek, and Vinini Corridor units. These areas serve as important Greater sage-grouse habitat and travel corridors between lower elevation wintering and lekking habitats and upper elevation nesting and brood-rearing habitats. Treatments would be completed in phases, with up to 22,887 acres treated to meet Greater sage-grouse habitat enhancement objectives. Treatments would involve removing pinyon-juniper from areas historically occupied by sagebrush and riparian plant species, and promoting development of native grasses, forbs, and shrubs through removal of pinyon-juniper. The BLM would also create a series of fuel breaks to moderate fire behavior in the treated areas and reduce the risk of loss of habitat from wildfire. Activity fuels generated through the treatment of pinyon-juniper would be disposed of by using one or more of the Activity Fuels Disposal Methods (see Section 2.5.3.8, Activity Fuels Disposal). Specifically, the BLM would conduct the following treatments at these units:

Lone Mountain (1,387 acres):

- Treat up to 100 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat up to 1,387 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Atlas (7,085 acres):

- Treat up to 1,000 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat 20 to 50 percent of the unit (1,400 to 3,543 acres) in 100- to 500-acre increments using prescribed fire.
- Treat up to 1,000 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Frazier Corridor (2,725 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat up to 1,900 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Gable Corridor (5,012 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat up to 3,000 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Henderson Corridor (9,348 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat 10 to 30 percent of the unit (935 to 2,800 acres) in 200- to 600-acre increments using prescribed fire.
- Treat up to 3,500 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Upper Roberts Creek (3,894 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.

- Treat 20 to 50 percent of the unit (780 to 1,947 acres) in 500- to 1,000-acre increments using prescribed fire.
- Treat up to 500 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.
- No mechanical treatments would be used within WSA boundaries.

Vinini Corridor (3,277 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual methods.
- Treat up to 400 acres of the unit using prescribed fire.
- Treat up to 1,600 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

The BLM would create a series of fuel breaks to moderate fire behavior in treated areas, and reduce the risk of loss of habitat from wildfire in habitats critical to Lahontan cutthroat trout, in the Birch Creek and Upper Pete Hanson Creek drainages on Roberts Mountain. Treatments would encompass about 460 acres and would be developed in consultation with the USFWS and coordinated with the NDOW. Thinning and disposal methods for trees would be similar to those used at the Atlas Group, and would include placing larger diameter pieces of wood in streams to slow water flow. Treatments would adhere to the BLM's non-impairment standard for the Roberts Mountains WSA. Specifically, the BLM would conduct the following treatments in these drainages:

Birch Creek Unit (218 acres)

- Treat up to 218 acres of the unit to create fuel breaks using manual treatment methods.

Upper Pete Hanson Creek Unit (243 acres)

- Treat up to 243 acres of the unit to create fuel breaks using manual treatment methods.

The BLM would reduce hazardous fuels on up to 55,700 acres on the Cottonwood/Meadow Canyon, Dry Canyon, Three Bars Ranch, Lower Pete Hanson, Tonkin North, Tonkin South, and Whistler units (Cottonwood/Meadow Canyon Unit Group). Fuels treatments would be done in phases with approximately 1,000 to 2,000 acres of treatments conducted annually. The BLM would 1) reduce the amount of hazardous fuels and wildfire risk by thinning pinyon-juniper stands in 800- to 2,000-acre increments using manual and mechanical methods; 2) use manual and mechanical methods to create fuel breaks; and 3) slow pinyon-juniper expansion into sagebrush and other plant communities on 10 to 70 percent of the units through the use of manual and mechanical methods and prescribed fire. Specifically, the BLM would conduct the following treatments at these units:

Cottonwood/Meadow Canyon (4,577 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat 13 to 40 percent of the unit (600 to 1,800 acres) in 200- to 600-acre increments using prescribed fire.

- Treat up to 2,000 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Dry Canyon (2,838 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat 30 to 70 percent of the unit (851 to 1,987 acres) in 100- to 500-acre increments using prescribed fire.

Lower Pete Hanson (1,580 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat up to 800 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Three Bars Ranch (11,900 acres):

- Treat up to 1,000 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat 20 to 30 percent of the unit (2,380 to 3,570 acres) in 500- to 1,000-acre increments using prescribed fire.
- Treat up to 2,000 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

Tonkin North (4,389 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.
- Treat pinyon-juniper on 10 to 37 percent of the unit (500 to 1,600 acres) in 500- to 1,000-acre increments using prescribed fire.
- Treat up to 500 acres of the unit in 5- to 20-acre increments by removing pinyon-juniper stands infested with pathogens and/or pests to prevent/or limit the spread of the pathogens and/or pests using a combination of mechanical and manual treatment methods.

Tonkin South (2,458 acres):

- Treat up to 500 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.

- Treat up to 50 percent of the unit (1,229 acres) in 5- to 20-acre increments by removing pinyon-juniper stands infested with pathogens and/or pests to prevent/or limit the spread of the pathogens and/or pests using a combination of mechanical and manual treatment methods.

Whistler (26,970 acres):

- Treat up to 1,000 acres of the unit to create fuel breaks using a combination of mechanical and manual treatment methods.

- Treat pinyon-juniper on 30 to 70 percent of the unit (8,091 to 18,879 acres) in 500- to 1,000-acre increments using prescribed fire.

- Treat up to 2,000 acres of pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.

The BLM would treat 20 to 40 percent of the Sulphur Spring Wildfire Management Unit using wildland fire for resource benefit to benefit a variety of resources and to reduce hazardous fuels. An estimated 12,482 to 24,694 acres would be treated on the unit in increments of up to 1,000 to 2,000 acres annually.

2.3.1.4 Sagebrush Treatment Units

The Mount Lewis Field Office proposes to enhance Greater sage-grouse habitat within the 3 Bars ecosystem by treating approximately 31,300 acres of public lands on the 3 Bars, Flynn Parman, Grass Valley, JD, Lucky C, Roberts Mountain, and Santa Fe/Ferguson allotments (**Figure 2-4)**.

These areas were selected for treatments primarily to benefit Greater sage-grouse habitat and improve rangeland health. In most areas, plant communities diverge from the expected reference state vegetation based on ecological site descriptions. Treatments would be completed in phases and implemented incrementally based on monitoring, funding, and BLM priorities. Treatment objectives include:

- Remove all Phase I and most Phase II pinyon-juniper trees. See Section 3.12.2.2.9 for a discussion of phase classes.

- Increase plant density of key perennial species an average of one plant per three feet squared above existing conditions in the short term (3-5 years post treatment).

- Increase production of key perennial herbaceous plants by a minimum of 10 percent above existing condition in the short term (3-5 years post treatment).

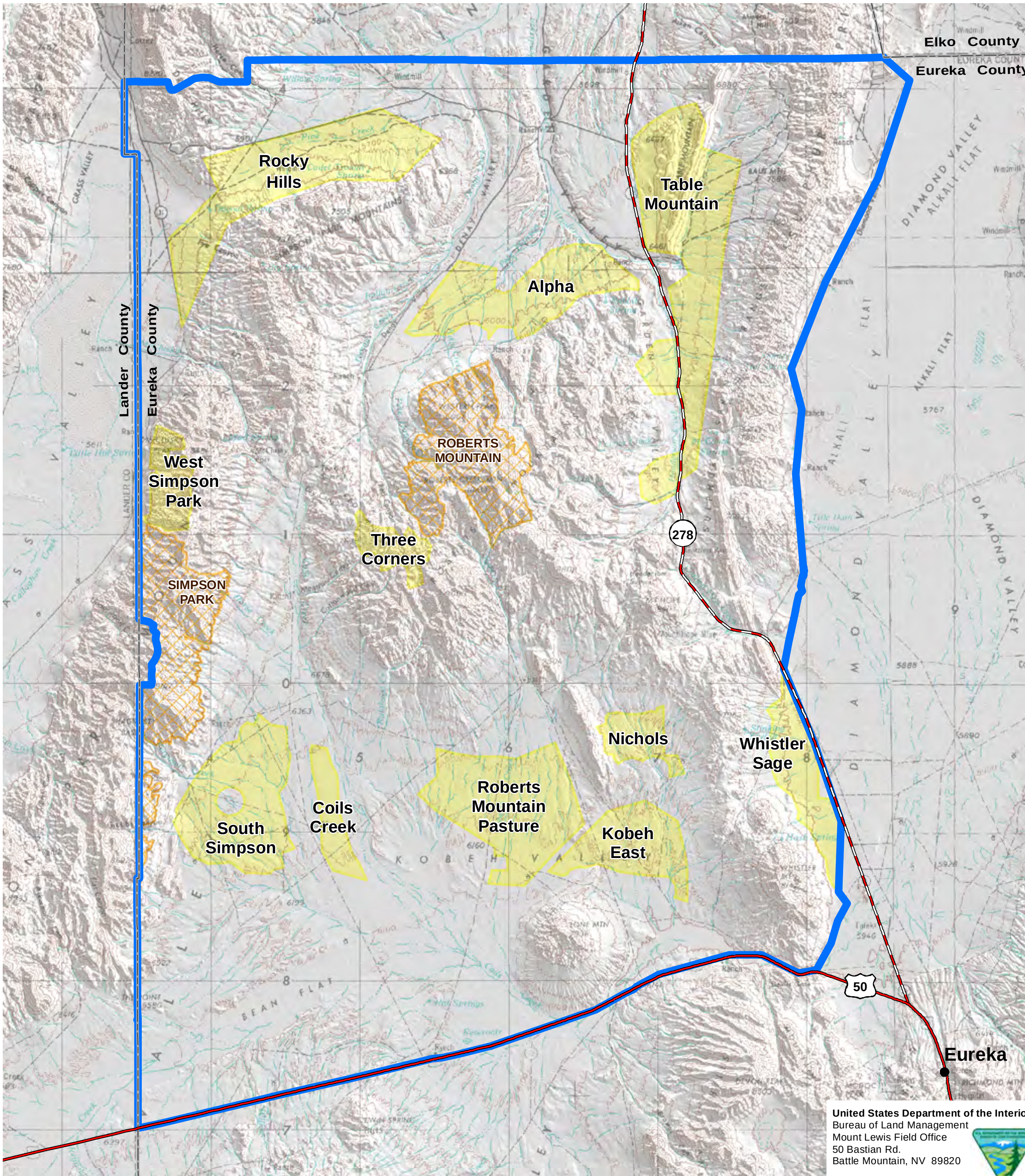
- Eliminate noxious weeds and other invasive non-native species.

- Limit noxious weeds and undesirable native and non-native species to the following acreages:

    - 0 acres of Category A State of Nevada noxious weeds.

    - Less than 500 acres of Category B State of Nevada noxious weeds.

    - Less than 1,500 acres of Category C State of Nevada noxious weeds.



Legend

- Sagebrush Treatment Area
- Wilderness Study Area
- 3 Bars Project Area

Source: BLM 2011c.

3 Bars Ecosystem and Landscape Restoration Project

Figure 2-4

Sagebrush Treatment Areas

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.
Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
This product was developed through digital means and may be updated without notice.

- Cheatgrass monocultures at less than 25 percent in any given fire scar.

Native species would be used for overseeding and overplanting in sagebrush treatment units when appropriate. Non-native species could only be used where seedings with native species would be unsuccessful as informed by ESD and STM and available science. Where pinyon-juniper is felled, chainsaw hand thinning would be required for Phase I stands and chainsaw hand thinning would be the preferred method of tree cutting in Phase II and III stands; however, other methods may be considered on a case-by-case basis within sagebrush units. Trees would be disposed of by using trees for posts or as mulch, by placing logs and larger wood in streams to slow water flow, by selling trees for public or commercial use, by burning piled or slashed trees, or by leaving downed trees on site as wildlife habitat. On the Alpha, Coils Creek, Kobeh East, Nichols, Roberts Mountain Pasture, South Simpson, Table Mountain, Three Corners, and Whistler Sage units (Alpha Unit Group), up to 29,400 acres would be treated and treatments would focus on using manual and mechanical methods, thin Phase I and II pinyon-juniper and seed and plant to promote the growth of forbs and grasses. Specifically, the BLM would conduct the following treatments on these units:

Alpha (12,330 acres):

- Treat up to 6,100 acres within the unit using seeding and planting treatment methods.

Coils Creek (3,267 acres):

- Treat up to 1,600 acres within the unit using seeding and planting treatment methods.

Kobeh East (7,591 acres):

- Treat up to 3,800 acres within the unit using seeding and planting treatment methods.

Nichols (3,305 acres):

- Treat up to 1,600 acres within the unit using seeding and planting treatment methods.

Roberts Mountain Pasture (15,190 acres):

- Treat up to 1,600 acres within the unit using seeding and planting treatment methods.

South Simpson (13,400 acres):

- Treat up to 6,700 acres within the unit using seeding and planting treatment methods.

Table Mountain (24,100 acres):

- Treat up to 5,000 acres of Phase I and II pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.
- Treat up to 12,000 acres within the unit using seeding and planting treatment methods.
- Utilize biological control to aid in brush increase and during times of other treatment closures

Three Corners (2,915 acres):

- Treat up to 500 acres of Phase I and II pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.
- Treat up to 1,500 acres within the unit using seeding and planting treatment methods.

Whistler Sage (6,782 acres):

- Treat up to 1,500 acres of Phase I and II pinyon-juniper within the unit using a combination of mechanical and manual treatment methods.
- Treat up to 3,400 acres within the unit using seeding and planting treatment methods.

On the West Simpson Park Unit, the BLM would treat up to 1,963 acres of cheatgrass with a combination of prescribed fire, mechanical methods, and seeding and plantings to reduce cheatgrass and to promote the establishment of a native sagebrush community.

On the Rocky Hills and the Table Mountain Units the BLM could use livestock to remove cheatgrass, crested wheatgrass, and forage kochia to promote the establishment of a native sagebrush community. For all other sagebrush treatment units, the BLM would only use livestock to remove cheatgrass. This would be done when determined the best time to reduce competition between cheatgrass and sagebrush seedlings to help ensure that broadcast seeding would be successful.

2.3.2 Alternative B — No Fire Use Alternative

Alternative B is similar to Alternative A in that the BLM would focus treatments on the four priority management concerns—riparian, aspen, pinyon-juniper, and sagebrush—and would focus on the treatment areas shown in **Figures 2-1** to **2-4**. Alternative B differs from Alternative A in that the BLM would not use prescribed fire and wildland fire for resource benefit. Under Alternative B, the BLM would treat vegetation using manual, mechanical, and biological control (livestock and classical biological control) methods. This alternative was developed to address public concerns raised during scoping about the impacts to the landscape from fire, including the potential for erosion and spread of noxious weeds and other invasive non-native vegetation from fire treatments.

The BLM would conduct projects identified under Alternative A, but would be able to treat only about half as many acres (63,500 acres), as about half of the acreage treated under Alternative A would be treated using fire, and because costs for manual and mechanical treatments are more expensive than costs for fire treatments.

2.3.3 Alternative C — Minimal Land Disturbance Alternative

Alternative C is similar to Alternative A in that the BLM would focus treatments on the four priority treatment types—riparian, aspen, pinyon-juniper, and sagebrush—and would focus on the treatment areas shown in **Figures 2-1 to 2-4**. Alternative C differs from Alternative A in that the BLM would only treat vegetation within treatment areas using manual methods and classical biological control (use of nematodes, fungi, mites, and insects); use of livestock for biological control would not be allowed. The BLM also would not be able to use mechanical methods or fire.

This alternative was developed in response to the proposed "passive restoration and use only treatments having minimal land disturbance alternative," which was submitted during public scoping and is discussed below under Alternatives Considered but Not Further Analyzed.

The BLM would conduct projects identified under Alternative A, but would be able to only treat about one-fourth as many acres (31,750 acres) as compared to Alternative A. Treatments would generally be small in acreage.

2.4 Description of the No Action Alternative - Alternative D - Continue Current Management

Under the No Action Alternative, no new treatments would be authorized as a result of this project. However, as with all of the alternatives, the BLM would continue to conduct treatments approved under earlier NEPA authorizations. The BLM would have to conduct the appropriate level of NEPA analysis for future projects before they could be approved for implementation. Should this alternative be chosen by the decision-maker, and the BLM decides to conduct new treatments in the 3 Bars ecosystem in the future, decisions would have to be made at that time regarding the type of environmental analysis that must be conducted before treatments would be allowed within the ecosystem. There are approximately 15,000 acres of treatments that could occur within the ecosystem that have been previously authorized by the BLM, or that are reasonably foreseeable in the future, during the life of the project. These treatments are discussed in Chapter 3 under Cumulative Effects (Section 3.3.2).

2.5 Development of the Action Alternatives

2.5.1 Treatment Area Selection

An interdisciplinary team of BLM resource specialists met in August 2010, and in February, November, and December 2011, to identify priority treatment areas within the 3 Bars ecosystem, and to develop specific projects to improve ecosystem health, based on project purposes. Treatment areas were based on four priority vegetation treatment types identified by the interdisciplinary team—aspen, riparian, pinyon-juniper, and sagebrush. For each of these treatment types, the BLM identified goals and objectives, methods, and SOPs that would apply to each treatment area.

2.5.2 Site-specific Project Selection

Once treatment types were identified, the BLM identified site-specific projects that could occur for each vegetation management concern. In addition to considering the current and desired health of the landscape, the team also considered several other factors when developing site-specific projects, including: 1) how the projects would comply with statutory guidance; 2) BLM program guidance, including the Healthy Lands Initiative and the Great Basin Restoration Initiative; 3) land use of the project area; 4) likelihood of success; 5) effectiveness and cost of the treatments; 6) proximity of the treatment area to sensitive areas, such as wetlands, streams, or habitat for plant or animal species of concern; 7) potential impacts to humans and fish and wildlife, including non-game species; and 8) need for subsequent revegetation and/or restoration.

Once the BLM refined the site-specific projects, the Mount Lewis Field Office met with the tribes, NDOW, Eureka County, and non-government organizations to discuss the approach, identify project priorities, and seek advice on the development of individual site-specific projects.

2.5.3 Treatment Methods

Manual, mechanical, and biological control methods, and prescribed fire and wildland fire for resource benefit, could be used by the BLM to restore the 3 Bars ecosystem. The methods available to the BLM would depend upon the alternative chosen by the decision-maker. The types of tools used with these methods and the benefits and adverse impacts from using these treatments are discussed in more detail in the 17-States PEIS and PER (USDOI BLM 2007b, c), BLM Handbook H-1740-2, *Integrated Vegetation Management* (USDOI BLM 2008b), and *Environmental Assessment Integrated Weed Management Plan Battle Mountain District Nevada Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b). In addition, the BLM has identified other treatment activities that would be done as part of the project, and could entail multiple treatment methods. These include seeding, fencing, firewood cutting, and activity fuels disposal. Some treatment methods would not be available for use depending upon the alternative that is selected. For example, fire treatment methods could not be used under Alternatives B and C.

2.5.3.1 Manual Treatments

Manual treatment involves the use of hand tools and hand-operated power tools (including chainsaws and weed whackers) to clear, cut, or prune herbaceous and woody species. Treatments include cutting undesired plants above the ground level; pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and regrowth; cutting at the ground level or removing competing plants around desired species; or placing mulch around desired vegetation to limit competitive growth (USDOI BLM 2007c).

All manual treatment methods would be available as treatment options under Alternatives A, B, and C in units where it is identified as a treatment option.

Manual techniques can be used in many areas and usually with minimal environmental impacts. Although they have limited value for vegetation control over a large area, manual techniques can be highly selective. Manual treatments can be used in sensitive habitats such as riparian zones, areas where burning would not be appropriate, and in areas that are inaccessible to ground vehicles.

Selective cutting using chainsaws may occur in specific areas and would range from a single tree to multiple acres of trees. Selective cutting may include dead, diseased, or healthy trees depending on site evaluation and treatment objectives. It may be necessary to cut healthy trees where there are no dead or diseased trees that can be removed to meet resource objectives. Cut trees may be removed, chipped, lopped and scattered, or piled and burned if prescribed fire is permitted, based on the site evaluation and restoration objectives.

Other manual treatments that may be used by the BLM in the 3 Bars ecosystem include hand cutting or removal of noxious weeds and other invasive non-native vegetation and hand planting of vegetation. In addition, the BLM could build wood and rock structures in streams to help trap sediments and construct small, temporary fence exclosures around treatment areas by hand.

2.5.3.2 Mechanical Treatments

Mechanical treatment involves the use of vehicles such as wheeled tractors and crawler-type tractors; specially designed vehicles with attached implements designed to cut, uproot, or chop existing vegetation; and bulldozers, dump trucks, pickup trucks, and trailers for moving and hauling materials. The selection of a particular mechanical method is based on the characteristics of the vegetation, seedbed preparation and revegetation needs, topography and terrain, soil characteristics, climatic conditions, and an analysis of the improvement cost compared to the expected productivity (USDOI BLM 2007c:2-14).

All mechanical treatment methods would be available as treatment options in Alternatives A and B in units where it is identified as a treatment option.

Mechanical methods are effective for removing thick stands of vegetation. Some mechanical equipment can also mulch or lop and scatter vegetation debris, so debris disposal is taken care of while the vegetation is removed. Mechanical methods are appropriate where a high level of control over vegetation removal is needed, such as in sensitive wildlife habitats or near homesites, and are often used instead of prescribed fire or herbicide treatments for vegetation control in the wildland-urban interface.

Mowing

Mowing tools, such as rotary mowers or straight-edged cutter bar mowers, can be used to cut herbaceous and woody vegetation above the ground surface at varying heights. Mowing is often done along highway rights-of-way to reduce fire hazards, improve visibility, prevent snow buildup, or improve the appearance of the area. Mowing is also used to create a mosaic of uneven aged stands to enhance wildlife habitat. Mowing is most effective on annual and biennial plants.

Mulching/Shredding

Mulching/shredding is a selective approach to tree removal. The BLM would mulch/shred trees on site. Sites with suitable understory vegetation and that require little or no seeding are appropriate for mulching/shredding. The mulching/shredding equipment is mounted onto tracked or wheeled vehicles and may include such equipment as a bull-hog, hydro axe, or any other machine designed for the mulching/shredding of tree species. Wood chips and branch/leaf mulch would be dispersed on site, not to exceed 3 inches deep. Mulching/shredding equipment is limited to slopes of 30 percent or less. Mulching/shredding efforts may be conducted in coordination with seeding operations, which would allow mulch and wood chips to cover the seed.

Tilling

Tilling involves the use of angled disks (disk tilling) or pointed metal-toothed implements (chisel plowing) to uproot, chop, and mulch vegetation. This technique is best used in situations where the complete removal of vegetation or thinning is desired, and in conjunction with seeding operations. Tilling leaves mulched vegetation near the soil surface, which encourages the growth of newly planted seeds. Tilling is usually done with a brushland plow, a single axle with an arrangement of angle disks that covers about 10-foot-wide swaths. An offset disk plow, which consists of multiple rows of disks set at different angles to each other, is pulled by a crawler-type tractor or a large rubber tire tractor. This method is often used for removal of shrubs, or to reduce annual competition from noxious weeds and other invasive non-native vegetation such as cheatgrass, and works best on areas with smooth terrain, and deep, rock-free soils. Chisel plowing can be used to break up soils such as hardpan.

Roller Chopping

Roller chopping tools are heavy bladed drums that cut and crush vegetation up to 5 inches in diameter with a rolling action. The drums are pulled by crawler-type tractors, farm tractors, or a special type of self-propelled vehicle designed for wooded areas or range improvement projects. The drums can be offset to vary the mortality of target species.

Feller-buncher

Feller-bunchers are machines that grab trees, cut them at the base, pick them up, and move them into a pile or onto the bed of a truck. Feller-bunchers are used in woodland thinning to remove potential hazardous fuels. Large chippers, or “tub-grinders,” are often used to chip the limbs, bark, and wood of trees to generate mulch or for forest products utilization.

Tree Shearer

A tree shearer is an implement that attaches to a tractor and can be used to cut down (clip) trees up to about 14 inches in diameter with a single pass. The units can cut trees on a vertical or horizontal plane, and can be used to hold and move cut trees.

2.5.3.3 Biological Control Treatments

Biological control involves the intentional use of domestic animals, insects, nematodes, mites, or pathogens that weaken or destroy vegetation (USDOI BLM 2007c). Biological control is used to reduce the targeted vegetation to an acceptable level by removing vegetation, stressing target plants, or reducing competition with desirable plant species.

The BLM is proposing to use targeted grazing to control cheatgrass in pinyon-juniper and sagebrush treatment units, and to control cheatgrass, crested wheatgrass, and forage kochia on the Rocky Hills Unit, and Table Mountain Unit (see Section 2.3.1.4). The BLM does not currently use classical biological control, but could do so in the future if effective control agents are found to control cheatgrass and other noxious weeds and invasive non-native vegetation.

All biological treatment methods, including livestock grazing, would be available as treatment options under Alternatives A and B in units where it is identified as a treatment option.

Targeted Grazing

Targeted grazing is the purposeful application of a specific kind of livestock at a determined season, duration, and intensity, to accomplish defined vegetation or landscape goals (American Sheep Industry 2006, Launchbaugh and Walker 2006). Targeted grazing would be conducted on the 3 Bars Project area to control cheatgrass and other non-native species. The goal of targeted grazing is to give desired plant species a competitive advantage over cheatgrass and other non-native species. A successful grazing prescription should: 1) cause significant damage to the target species; 2) limit damage to the surrounding vegetation; and 3) be integrated with other control methods as part of an overall landscape management strategy. Targeted grazing would be authorized under existing grazing permits terms and conditions.

Classical Biological Control

Classical biological control involves the intentional use of insects, nematodes, mites, or pathogens (agents such as bacteria or fungi that can cause diseases in plants) that weaken or destroy vegetation. Biological control is used to reduce the targeted weed population to an acceptable level by stressing target plants and reducing competition with desirable plant species.

Plant-eating insects, nematodes, mites, or pathogens affect plants directly, by destroying vital plant tissues and functions, and indirectly, by increasing stress on the plant, which may reduce their ability to compete with other plants. Often, several biological control agents are used together to reduce the density of undesired vegetation to an acceptable level.

Biological control agents used by the BLM have been tested by the USDA Agricultural Research Service and reviewed and permitted for release by the USDA Animal Plant Health Inspection Service to ensure that they are host-specific and will feed only on the target plant and not on crops, native flora, or endangered or threatened plant species (USDOI BLM 2007c:2-16).

2.5.3.4 Fire

Fire includes the use of prescribed fire and wildland fire for resource benefit. Prescribed fire and wildland fire for resource benefit may be used to control vegetation; enhance the growth, reproduction, or vigor of certain plant species; manage fuel loads; and maintain vegetation community types that meet multiple-use management objectives (USDOI BLM 2007c:2-13). To ensure treatment success, the BLM would follow guidance in the 2004 *Battle Mountain District Fire Management Plan* (USDOI BLM 2004a).

Fire treatment methods would be available as a treatment option under Alternative A as either a primary treatment or for activity fuel disposal as identified in this Chapter.

Prescribed Fire

Prescribed fire is the intentional application of fire to wildland fuels under specified conditions of fuels, weather, and other variables. The intent is for the fire to stay within a predetermined area to achieve site-specific resource management objectives. Prescribed fire treatments include broadcast burning and the burning of hand stacked piles. Broadcast burning treatments would occur in areas where slope is the limiting factor for mechanical treatments. Prescribed fire would reduce hazardous fuels loads on a project site and assist in preparation of the site for seeding.

Prescribed burning would generally be completed during the spring months (February through June) or fall (September through December). For spring burns, the start date would be as early as possible after snowmelt to burn trees with minimal impacts to the soil and understory herbaceous vegetation. Fall burns would be scheduled based on prescriptions outlined in the burn plans for each specific treatment area.

When used in combination with the manual and mechanical treatments, pile burning may be an appropriate action to remove fuels from the site. Piles would be constructed using the debris and dead material left on site after the implementation of a mechanical treatment. Piles would be burned based on environmental conditions and in coordination with a developed burn plan.

Management of Wildland Fire for Resource Benefit

In areas where there is no threat to human life or property, naturally ignited wildfires can be used to meet resource objectives to maintain ecosystems that are functioning within their normal fire regime or to help return ecosystems to a more natural fire regime. These fires must meet specific environmental prescriptions, and be thoroughly evaluated for potential risk before being managed to benefit the resource. They are utilized only in pre-planned areas and when there are adequate fire management personnel and equipment available to achieve defined resource objectives.

Natural ignitions within the project areas could be managed to achieve desired resource objectives if the environmental conditions allow for attainment of those objectives. Each wildland fire is evaluated at the time of ignition though the use of the Wildland Fire Decision Support System to determine whether the fire should be allowed to burn, or if suppression activities are required to put out the fire.

2.5.3.5 Seeding and Planting

All treatments could involve seeding or hand planting. Seeding would occur on disturbed sites when it has been determined that native vegetation growth and on-site seed source are inadequate to ensure successful revegetation of the site. If areas of the 3 Bars ecosystem have been impacted by wildfire and the site has not revegetated with desirable vegetation, seeding may be needed. Sagebrush treatment units could be overseeded to improve the composition and density of forbs, grasses, and shrubs found on the unit. Only native species would be used in sagebrush treatment units. Non-native seedings would be used to support fuels projects in areas with low moisture and that have previously burned, in old fire scar areas that are beyond use of Emergency Stabilization and Rehabilitation techniques, or for fuel breaks. Species selection would be based on site potential and objectives. A variety of seeding methods may be used. Depending on the terrain, soil type, soil moisture, and seed species, one or more of the following seeding methods may be used.

Hand Seeding

Hand seeding includes scattering seed by hand without the use of tools, or by using hand-held broadcast spreaders. Small areas may be planted with seedlings of key species such as sagebrush, cliffrose, or at higher elevations, bitterbrush. Seedlings would be planted in the early spring while soil moisture is adequate to allow for seedling establishment.

Broadcast Seeding

Broadcast seeding is the application of seed by tractor, or all-terrain vehicle.

Drill Seeding

Drill seeding is the application of seed by Rangeland or Truax seed drills pulled behind a tractor, truck, or other vehicle. Seed drills operate on the principle of inserting (or drilling) the seed into the soil, thereby ensuring appropriate seeding depth and ground-to-seed contact.

Often, drill seeding is conducted along with tilling. The seed drills, which consist of a series of furrow openers, seed metering devices, seed hoppers, and seed covering devices, are either towed by or mounted on a tractor. The seed drill opens a furrow in the seedbed, deposits a measured amount of seed into the furrow, and closes the furrow to cover the seed.

Harrow Seeding

Harrow seeding is the application of seed using a broadcast method, followed by pulling a series of spikes (usually attached in rows to a metal frame) along the ground to cover the seed and smooth the soil. This action improves the ground-to-seed contact.

Aerial Broadcast Seeding

Aerial broadcast seeding is the application of seed using airplanes or helicopters, with the seed falling through the air and landing randomly within the application area.

Planting

Plantings would be done by hand and would utilize container stock, bare root stock, or cuttings and would involve digging holes and burying root material.

2.5.3.6 Firewood Cutting

Many of the proposed treatment areas would be opened to green and dead firewood cutting for commercial and non-commercial uses. The authorization of green and dead firewood cutting within the proposed treatment areas would allow the public to utilize the pinyon and juniper that are proposed for removal. Treatment design would allow for up to 100 cords of fuel wood (greenwood and deadwood combined) to be removed for commercial sale annually, per unit.

2.5.3.7 Streambank Stabilization and Channel Restoration

As discussed in Chapter 1, natural and anthropogenic factors on the 3 Bars ecosystem have led to streams and associated meadows that are being threatened by knickpoints and headcuts, channel incision, and streambank erosion. Key stream components, such as stream channel sinuosity, streambank stability, and occurrence of woody and rock debris in stream channels, help to dissipate flood energy, but are lacking in many streams on the 3 Bars Project area.

The BLM proposes to restore streams by removing, or reducing the effects of, causative factors that have led to stream degradation, and implementing bioengineering and other streambank stabilization methods to restore stream functionality. Several approaches would be used to restore streams.

Stream Restoration Terminology

Baffle is a deflector of various configurations and materials, used to create lateral erosion of a streambank in order to widen the channel and alter the meander geometry. A baffle functions by concentrating stream velocity along the opposite bank while decreasing velocity along the adjacent bank. The result is accelerated erosion of the opposite bank with a commensurate increase in sediment deposition along the adjacent bank, causing point bar formation. As the point bar becomes colonized by riparian vegetation, it becomes increasingly resistant to erosion and more effective at deflecting flow towards the opposite bank. In order to achieve the desired meander pattern, baffles must be properly sized and spaced.

Culvert retrofit is a method of stabilization which consists of raising the effective invert elevation of an existing culvert without replacing the existing installed pipe. Bed control can be achieved without the cost of a new culvert installation.

Hardened rock crossing is a form of low water crossing with utilizes rock to reduce the impact of vehicle and animal traffic on a stream crossing.

Log and fabric step fall is a structure used to control headcuts advancing through wet soil areas such as wet meadows and spring seeps. The erosive action can be stopped if a healthy mat of wet soil vegetation can become established to hold the lip of the headwall in place.

Rock channel liner is a long, narrow one rock dam, much longer than it is wide, built in a recently incised gully bottom and used to armor the bed and/or reconnect bankfull flow with the recently abandoned floodplain.

Step pools and rock rundowns are stabilization structures that repairs a high energy headcut by laying back the headcut at a less steep gradient by building a series of step pools to gradually dissipate the energy of the falling water. Several structures of different types applied in sequence are often required to stabilize a headcut.

Vane is a type of deflector that utilizes an upstream-point-barb to divert high velocity flow away from a cutbank or the outboard side of a meander bend. A vane can also be used to direct flow into the opposite bank, initiating bank erosion and causing the channel to widen in that direction.

Vegetation manipulation is the selective planting or removal of protective streambank vegetation to increase or decrease the rate of erosion or deposition of material within a stream channel.

Weir is a structure of various material content, which spans the bankfull width of a channel and is used to control the slope, or grade, of a stream.

Zuni bowl is a headcut control structure which uses the principle of the natural cascade or step pool. Rather than spill water directly over a high falls, the cascade is used to build a series of smaller steps and pools thus keeping the velocity within a manageable range.

Because a large number of the incised gully type channels in the project area need to erode further before they can form new floodplains, the BLM would use techniques to induce meandering (Zeedyk and Clothier 2009). These include the use of deflectors and vanes to create lateral erosion of a streambank in order to widen the channel and alter the meander geometry along the opposite bank while decreasing velocity along the adjacent bank. The result would be accelerated erosion on the opposite bank, with an increase in sedimentation along the adjacent bank, causing the formation of a point bar that becomes colonized by riparian vegetation that helps to reduce erosion.

A rock channel liner, which is a long, narrow, one-rock dam, and much longer than it is wide, could be built into a recently incised gully bottom and used to armor the bed and/or reconnect bankfull flow with the recently abandoned floodplain.

The BLM could improve stream functionality through channel fill (i.e., roughened channel bed) to raise the bed, and installation of large wood, boulder clusters, or other roughness elements that promote predictable patterns of scour, deposition, and local energy dissipation.

Weirs can be used to control the grade of a stream, while log and fabric step falls, step pools and rock rundowns, and Zuni bowls could be used to control and repair headcut advance, dissipate the energy of the falling water, and modify streamflow. Several of these structures may be needed to stabilize the headcut. The BLM may also stabilize channels by raising the elevation of an existing culvert to achieve streambed stabilization, and hardening road or animal crossings to reduce the impacts of vehicles and hooved animals on the stream channel.

The BLM would also use bioengineering to restore stream functionality. Bioengineering integrates living woody and herbaceous materials with organic and inorganic materials to increase the strength and structure of the soil. In particular, this would be accomplished through the use of native plantings that would result in a dense matrix of roots to hold the soil together. The above-ground vegetation would increase the resistance to water flow and reduce flow velocities by dissipating energy. The biomass also acts as a buffer against the abrasive effect of water-transported materials and allows for sediment deposition due to low shear stress near the bank (Bentrup and Hoag 1998).

2.5.3.8 Activity Fuels Disposal

Manual and mechanical methods may result in fuels that need to be removed from the treatment site. Woody debris and dead material left on site after treatment (activity fuels) would be disposed of through various methods. All of the following methods would be available under Alternative A, however, under Alternatives B and C, available methods to dispose of activity fuels would depend on the specific authorizations allowed under each alternative. Pile and slash burning would be based on environmental conditions and guidance in a developed burn plan.

Forest Products Utilization

Pinyon and juniper activity fuels larger than 3 inches in diameter could be made available for firewood, fence posts, pellets, etc. Coarse and large wood could be placed in-stream to reduce vertical incisement and shear stresses in riparian restoration projects. Additionally, activity fuel could be removed by commercial entities through contracts.

Pile Burning

Activity fuels would be selectively piled on site and burned under appropriate conditions. Piles should not exceed 10 feet long by 10 feet wide by 6 feet high. Burn piles would be piled with fine fuels and slash in the interior and larger fuels on the exterior. Burn piles may be covered with wax paper or other similar material (no plastic) to promote burning. Piles would generally be burned during the spring, fall, or winter.

Slash Burning

Activity fuels would be scattered on the treatment site to create a slash Fire Behavior Fuel Model. Slash units should not exceed 100 acres in size. Slash would be burned during the spring, fall, or winter.

Chipping

Activity fuels would be turned into wood chips with the use of a mechanized chipper. This activity could take place on-site or material could be transported off-site to a staging area for chipping.

Broadcast Burning

Activity fuels could be scattered within the treatment area and incinerated using the broadcast burning method. This would be done in areas where impacts to shrubby vegetation would be minimal.

Leave on Site

Material generated from treatment activities would be left on-site in small piles as wildlife habitat.

2.5.4 Standard Operating Procedures and other Resource Protections

Standard Operating Procedures would be followed by the BLM under all alternatives to ensure that risks to human health and the environment from treatment actions would be kept to a minimum. Standard Operating Procedures are the management controls and performance standards required for vegetation management treatments and streambank stabilization. These practices are intended to protect and enhance natural resources that could be affected by future treatments.

The BLM will comply with SOPs identified in the 17-States PEIS (USDOI BLM 2007b:2-22 to 2-38), and PER (USDOI BLM 2007c:2-31 to 2-44). These SOPs have been identified to reduce adverse effects to environmental and human resources from vegetation treatment activities based on guidance in BLM manuals and handbooks, regulations, and standard agency and industry practices. In addition to these SOPs, the Mount Lewis Field Office has identified additional SOPs that would apply to the 3 Bars Project. Standard Operating Procedures that would be used for the 3 Bars Project are provided in **Appendix C**.

2.5.5 Monitoring

Monitoring ensures that resource management is an adaptive process that builds upon past successes and learns from past mistakes. The regulations of 43 CFR § 1610.4-9 require that BLM land use plans establish intervals and standards for monitoring and evaluating land management actions. During preparation of implementation plans for a specific project, treatment objectives, standards, and guidelines are stated in measurable terms, where feasible, so that treatment outcomes can be measured, evaluated, and used to guide future treatment actions. This approach ensures that restoration treatment processes are effective, adaptive, and based on prior experience. It also helps to ensure that project objectives are met (USDOI BLM 2007b:2-35).

Two types of monitoring of vegetation treatments may be pursued by the BLM. One type is implementation monitoring, which answers the question, "Did we do what we said we would do?" The second type is effectiveness monitoring, which answers the question, "Were treatment and restoration projects effective?" Implementation monitoring is usually done at the land use planning level or through annual work plan accomplishment reporting. Effectiveness monitoring is usually done at the local project implementation level.

Implementation monitoring for vegetation treatments is accomplished through site visits during the growing season of the target species to determine whether treatments were implemented correctly and to identify the best time for follow-up treatments. Monitoring would be used to phase in treatments over time to ensure objectives are being met.

The diversity of plant communities on the 3 Bars Project area calls for a diversity of monitoring approaches. Monitoring strategies may vary in time and space depending on the target species. Sampling designs and techniques vary depending on the type of vegetation. Guidance on monitoring methodologies can be found in such BLM documents as *Measuring and Monitoring Plant Populations* (BLM Technical Reference 1730-1; Elzinga et al. 1998), which was developed in cooperation with The Nature Conservancy. Other guidance documents include *Sampling Vegetation Attributes* (USDA and USDOI 1999), developed in cooperation with the Forest Service, the Natural Resources Conservation Service, and the Cooperative Extension Service; and *Ecological Site Inventory* (BLM Inventory and Monitoring Technical Reference 1734-7; Habich 2001). These documents, as well as numerous other guidance documents for specific plant communities, can be found on the National Science and Technology Center website at Uniform Resource Locator (URL): http://www. blm. gov/nstc. These documents, plus any regionally specific documents developed to meet management objectives, allow the flexibility needed to monitor the variety of vegetation found on public lands.

Within Greater sage-grouse habitat, effectiveness monitoring would be performed to assess if treatments are meeting specific habitat objectives as outlined within Table 2-2 in the *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment* (USDOI BLM 2015).

Post-restoration monitoring of stream stabilizing treatments would be performed for at least 5 years to identify maintenance needs, evaluate performance of structures and channel response, provide a basis to modify treatments that are not performing as planned (if needed), measure effects on ecologic, hydrologic, and geomorphic processes, and meet reporting and Clean Water Act 404/401 permitting requirements. Photo monitoring would be used to document general changes that take place between retakes. Vegetation would be monitored to detect changes in plant species composition, cover, density, vigor, reproduction, age class distribution, decadence, and mortality. When a treatment objective is to improve wildlife or aquatic habitat, the BLM would conduct surveys to detect and measure change in ecological conditions favoring different classes or species of animals. Geomorphological monitoring would be used to detect and measure changes in dimension, plan, and profile of the project stream reach. This would consist of transects or complete 3-dimensional modeling for entire stream reaches. Hydrologic monitoring, through the use of piezometers, would be utilized when the primary objective of treatment for the site is to increase base flows. Structural design, implementation, and monitoring for stream restoration within the 3 Bars Project Area would follow guidelines provided by Zeedyk and Clothier (2009).

The BLM has prepared numerous guidance and strategy documents, as listed in the 17-States PEIS, to aid field personnel in developing and implementing monitoring plans and strategies. This list can be accessed at URL: http://www. blm. gov/wo/st/en/prog/more/veg_eis. html. Numerous other technical references for inventory, monitoring, and assessment are found at URL: http://www. blm. gov/nstc/library/techref. htm. The results of monitoring would be made available to interested parties upon request.

2.5.6 Coordination and Education

As demonstrated at public scoping meetings for the EIS, the public is deeply interested in BLM treatment activities. This is especially true of individuals who live in close proximity to public lands, who have commercial operations dependent on vegetation on or adjacent to public lands including grazing permittees, or who use public lands for recreation. The BLM strives to keep the public informed about its treatment activities through regular coordination and communication. The BLM also encourages the public to participate in the environmental review process during the development and analysis of local vegetation management programs.

Several laws and Executive Orders set forth public involvement requirements, including involving the public in the environmental analysis and land use planning to address local, regional, and national interests. The NEPA process ensures that the public is allowed input into management actions on public lands. For treatment projects requiring an EIS or Environmental Assessment, the BLM must notify the public of the proposed project and give the public the opportunity to comment on the site-specific analysis done for the project. Treatment actions may be modified in response to comments posed by the public. The public may also be invited to observe treatment activities and participate in project monitoring.

The BLM is ultimately responsible for land use decisions, including decisions about vegetation management, on public lands. The BLM has found, however, that collaborative relationships with stakeholders, including individuals, communities, tribes, and local governments, improves communication, provides a greater understanding of different perspectives, and helps to find solutions to issues and problems. Input from the public, tribes, and government agencies has been critical during development of this EIS.

3 Bars Project lands are commingled with private lands, and lands under the jurisdiction of tribal, state, or local governments or other federal agencies are nearby. Multijurisdictional planning assists land use planning efforts when there is a mix of land ownership and government authorities, and there are opportunities to develop complementary decisions across jurisdictional boundaries. Human-related activities allowed under the Federal Land Policy and Management Act, such as livestock grazing and off-highway vehicle use, would continue to be allowed on the 3 Bars ecosystem.

2.6 Summary of Alternatives Analyzed in this EIS

Table 2-1 shows how each of the alternatives respond to the project purposes. Information contained in these tables is discussed in more detail in Chapter 3 (Affected Environment and Environmental Consequences).

2.7 Alternatives Considered but not Further Analyzed

Several other alternatives were identified during public scoping and reviewed by the BLM interdisciplinary team. These alternatives would not fulfill the purpose and need for the project, are inconsistent with BLM or other federal, state, or local policies or regulations, or are not practical based on likely funding for vegetation treatments. The alternatives that were considered, but not further analyzed are:

- **Passive restoration and use only treatments having minimal land disturbance alternative**. Under this alternative, the BLM could reduce or eliminate human-related activities, an important objective of passive restoration, and use only treatments having minimal land disturbance, to reduce the effects of activities on

TABLE 2-1

Responses of the Alternatives to the Project Purposes

Analysis Element	Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Improve woodland and rangeland health, productivity, and functionality.				
Approximate total acreage treated during life of project[1, 2]	127,000	63,500	31,750	0[3]
Treatment methods used to improve ecosystem health	Manual, mechanical, biological control, and fire	Manual, mechanical, and biological control	Manual and classical biological control	NA
Number of resources typically benefitting from projects	Numerous resources	Numerous resources	Numerous resources	No resources
Grazing restrictions in treated areas	Yes, but can vary with treatment objectives	Same as Alternative A	Same as Alternative A	NA
Increase stream flows and restore channel morphology in degraded streams.				
Approximate acreage of wetland and riparian habitat treated annually[2]	400	200	100	0[3]
Treatment methods used	Manual, mechanical, and fire	Manual and mechanical	Manual	NA
Possible use of fencing to restrict livestock and horse access to riparian areas?	Yes	Yes	Yes	NA
Improve stream habitat for fish and wildlife by implementing physical treatments that include installing large woody debris, rock clusters, check dams, plantings, and using fencing to minimize use by large herbivores.				
Approximate miles of stream restored/ enhanced annually[2]	31	31	8	0[3]
Improve the health of aspen, mountain mahogany, and other mountain tree and shrub stands to benefit wildlife, and Native Americans that use these plants for medicinal purposes.				
Approximate acres of mountain tree and shrub stands treated annually[2]	6,000-9,000	3,000-4,500	750-1,125	0[3]

TABLE 2-1 (Cont.)

Responses of the Alternatives to the Project Purposes

Analysis Element	Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Manage pinyon-juniper woodlands to promote healthy, diverse stands within persistent woodlands.				
Approximate acreage of pinyon-juniper woodlands treated annually[2]	6,000-9,000	3,000-4,500	750-1,125	0[3]
Treatment methods used	Manual, mechanical, and fire	Manual and mechanical	Manual	NA
Phase classes targeted for treatment[4]	Phases I, II, and III	Phases I and II	Phase I and limited acreage of Phase II	NA
Slow the expansion of pinyon/juniper into sagebrush and riparian plant communities.				
Approximate acreage of pinyon-juniper encroachment treated annually[2]	7,700-11,600	3,900-5,800	1,925-2,900	0[3]
Treatment methods used	Manual, mechanical, and fire	Manual and mechanical	Manual	NA
Phase classes targeted for treatment[4]	Phases I and II, and some Phase III	Phases I and II	Phase I and limited amount of Phase II	NA
Improve sagebrush habitat and restore sagebrush to areas of historic occurrence by removing trees in sagebrush habitats and improving the diversity of sagebrush communities.				
Approximate acreage of sagebrush habitat treated annually[2]	7,600-11,500	Same as Alternative A	1,900-5,700	0[3]
Acres of historic sagebrush habitat restored annually[2]	7,600-11,500	Same as Alternative A	2,400-3,600	0[3]
Treatment methods used	Manual, mechanical, biological control, and fire	Manual, mechanical, and biological control	Manual and classical biological control	NA
Slow the spread of noxious weeds and invasive non-native vegetation, including cheatgrass.				
Approximate acreage of noxious weeds and other invasive species treated annually[2]	100-250	Same as Alternative A	Same as Alternative A	0[3]
Treatment methods used	Manual, mechanical, biological control, and fire	Manual, mechanical, and biological control	Manual and classical biological control	NA

TABLE 2-1 (Cont.)

Responses of the Alternatives to the Project Purposes

Analysis Element	Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Protect and enhance habitat for fish and wildlife, including species of concern such as raptors, Greater sage-grouse, and Lahontan cutthroat trout.				
Approximate acres of sagebrush habitat treated annually[2]	3,100	Same as Alternative A	300-500	0[3]
Approximate acres of key habitat treated annually to improve species diversity[2]	2,000-3,500	1,500-2,600	200-350	0[3]
Approximate acres of key habitat improved annually through thinning and removal of pinyon-juniper in expansion areas[2]	7,700-11,600	Same as Alternative A	1,925-2,900	0[3]
Approximate miles of stream restored for Lahontan cutthroat trout and other aquatic organisms[2]	31	Same as Alternative A	8	0[3]
Restore fire as an integral part of the ecosystem; reduce the risk of a large-scale wildfire; reduce extreme, very high, and high wildfire risks to moderate risk or less; create fuel breaks; and protect life, property, community infrastructure, and fish and wildlife habitat from wildfire.				
Approximate acreage treated annually to reduce hazardous fuels[2]	12,700	6,350	3,175	0[3]
Approximate acreage converted annually from Fire Regime Condition Classes III and II, to Classes II and I[2]	9,525	750-1,500	375-750	0[3]

[1] Total acres treated based on maximum number of acres that could be treated in each project unit.
[2] Acres and miles treated contingent upon funding and staff resource availability.
[3] No new treatments would be authorized under Alternative D. Only projects that are currently authorized by the Mount Lewis Field Office, or that would be authorized in the future under new NEPA analysis and decisions, would occur on the 3 Bars Project area. Currently authorized projects are discussed in Chapter 3 under Cumulative Effects (Section 3.3.2).
[4] Phases are based on stand characteristics that differentiate between three transitional phases of woodland succession based on tree canopy, leader growth (of dominant and understory trees), crown lift, potential berry production, tree recruitment, and the shrub layer.
Phase I (early) – trees are present, but shrubs and herbs are the dominant vegetation that influence ecological processes on the site.
Phase II (mid) – trees are co-dominant with shrubs and herbs, and all three vegetation layers influence ecological processes on the site.
Phase III (late) – trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site.
NA = Not applicable.

the landscape that contribute to resource impacts, such as grazing, timber harvest, and mining. In addition, the BLM would only use vegetation treatment methods that cause little site disturbance, primarily manual methods. The BLM would be allowed to continue Emergency Stabilization and Rehabilitation activities, including seeding (manual and mechanical) and hand planting of vegetation. This alternative was eliminated because it would not control the spread of unwanted vegetation or improve the health of the 3 Bars ecosystem, and is not consistent with the Federal Land Policy and Management Act. The use of treatment methods that would result in minimal disturbance to the landscape are being evaluated under Alternative C (Minimal Land Disturbance Alternative).

- **Revegetate solely with native vegetation.** Under this alternative, only native vegetation would be used to restore fire-impacted and other degraded public lands. This alternative was eliminated because the use of only native vegetation to restore degraded lands would not meet some of the project purposes discussed in Chapter 1. However, the use of native vegetation to restore degraded lands has been incorporated into Alternatives A, B, and C to the extent practical, as discussed in Section 2.5.3.5 (Seeding and Planting).
- **Exclude logging, grazing, off-highway vehicle use, and energy and mineral development on public lands.** This alternative was eliminated because the Federal Land Policy and Management Act requires that the BLM manage public lands for multiple uses, including those listed, and because it is not consistent with the Shoshone-Eureka RMP.

2.8 Mitigation

As defined by CEQ regulation 1508.20, mitigation includes: 1) avoiding the impact altogether by not taking a certain action or parts of an action; 2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; 3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; 4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and 5) compensating for the impact by replacing or providing substitute resources or environments (CEQ 2012).

Mitigation measures for livestock grazing are discussed in Section 3.18.4 (Livestock Grazing, Mitigation), however, these are not mitigation measures but, actions that may be made prior to treatment implantation.

2.9 Summary of Impacts by Alternative

Table 2-2 summarizes the likely effects of restoration and resource management activities for each alternative. Information contained in this table is discussed in more detail in Chapter 3 (Affected Environment and Environmental Consequences).

TABLE 2-2

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
SUMMARY OF EFFECTS ON GLOBAL CLIMATE			
Direct and Indirect Effects: The use of equipment and fire treatment methods would release carbon dioxide (CO_2), a greenhouse gas, to the environment. About 19,115 tons of CO_2 would be emitted to the atmosphere annually, but effects on global climate change would be negligible. Treatments to reduce the incidence of wildfire, and associated CO_2 emissions, would be greatest under this alternative.	**Direct and Indirect Effects:** There would be no CO_2 emissions from prescribed fire and wildland fire for resource benefit under this alternative. Mechanical, manual, and biological control treatments would emit about 5,600 tons of CO_2 to the environment annually, and effects on global climate change would be negligible. Treatments would reduce the incidence of wildfire, but not to the same extent as under Alternative A.	**Direct and Indirect Effects:** The only CO_2 emissions would be from use of manual equipment and worker transport. Only about 2 tons of CO_2 emissions would occur annually, and their effects on global climate change would be negligible. Treatments would do less to reduce wildfire risk and smoke emissions than under Alternatives A and B.	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no emissions of CO_2 or other emissions that could contribute to global warming. CO_2 emissions from wildfire would likely be greater under this alternative than the action alternatives.
Cumulative Effects: Effects of future fire regimes and CO_2 emissions are hard to predict. CO_2 emissions in the cumulative effects study area (CESA) would occur from development and other projects, but wildfires would still be the primary contributor of CO_2 to the atmosphere. 3 Bars Project treatments would contribute about 0.000003 percent to the national greenhouse gas emissions annually and have a negligible cumulative effect.	**Cumulative Effects:** CO_2 emissions from treatment activities under Alternative B would be about one-fourth those under Alternative A, but would have a negligible cumulative effect on regional and national greenhouse gas emissions.	**Cumulative Effects:** CO_2 emissions from treatment activities under Alternative C would be about 0.01 percent of those under Alternative A, and would have a negligible cumulative effect on regional and national greenhouse gas emissions.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects. CO_2 emissions from wildfires within the CESA would likely be greatest under this alternative.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON AIR QUALITY			
Direct and Indirect Effects: Air quality would be affected from use of vehicles and other equipment, dust from roads and treatment activities, and from fire use. None of the predicted annual emissions by pollutant would exceed national or state	**Direct and Indirect Effects:** Air quality would be affected from use of vehicles and other equipment, and dust from roads and treatment activities. There would be no fire treatments and smoke production. None of the predicted annual emissions by	**Direct and Indirect Effects:** Air quality would be affected from use of vehicles and manual equipment; there would be no emissions associated with mechanical and fire treatments. None of the predicted annual emissions by pollutant would	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no air emissions. However, the BLM would do little to reduce the risk of wildfire, so air pollutant emissions could be greater under

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
air quality standards. Particulate matter concentrations from treatments are expected to be negligible based on modeling. Treatments to reduce wildfire occurrence would benefit air quality, as wildfire impacts on air quality are generally greater than those from prescribed fire.	pollutant would exceed national or state air quality standards. Particulate matter concentrations from treatments are expected to be negligible based on modeling, and less than those under Alternative A. Treatments to reduce wildfire occurrence would benefit air quality, but benefits would be less under Alternative B than under Alternative A.	exceed national or state air quality standards. Particulate matter concentrations from treatments are expected to be negligible and less than those under Alternatives A and B. Treatments to reduce wildfire occurrence would benefit air quality, but benefits would be less under Alternative C than under Alternatives A and B.	this alternative than the other alternatives.
Cumulative Effects: Land development and associated infrastructure would have adverse air quality effects. Given that 3 Bars Project treatments would affect only 1 percent of the CESA annually, treatment effects on regional air quality would be negligible. Treatments would reduce the likelihood of wildfire, which is an important contributor to air quality impacts in the CESA.	**Cumulative Effects:** 3 Bars Project treatments under Alternative B would affect only half as much acreage as treated under Alternative A, and the BLM would not use fire treatments. Thus, particulate matter and other air emissions from treatments would be substantially less under Alternative B than under Alternative A and would have a negligible cumulative effect on regional air quality. Treatments would reduce the likelihood of wildfire, but not to the same extent as would occur under Alternative A.	**Cumulative Effects:** 3 Bars Project treatments under Alternative C would be substantially less than under Alternatives A and B, as manual and biological control treatments have few air emissions. Thus, particulate matter and other air emissions from treatments would have a negligible cumulative effect on regional air quality. Treatments would reduce the likelihood of wildfire, but not to the same extent as would occur under Alternatives A and B.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative air quality effects. Air quality effects from wildfires within the CESA would likely be greatest under this alternative.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON GEOLOGY AND MINERALS			
Direct and Indirect Effects: Geology resources would not be affected. Mineral resources may be needed for stream restoration, but gravel and rock resources in the project area are abundant and treatments would have negligible effects on minerals. Treatments could hinder mineral exploration and development.	**Direct and Indirect Effects:** Geology resources would not be affected. Effects on local gravel and rock resources would be similar to those under Alternative A. Potential conflicts over access to and use of mineral resources should occur about half as often as compared to Alternative A.	**Direct and Indirect Effects:** Geology resources would not be affected. Effects on local gravel and rock resources would be about one-fourth those under Alternative A. Potential conflicts over access to and use of mineral resources should occur about one-fourth as often as compared to Alternative A.	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no effects to geology and mineral resources.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Cumulative Effects: Geology resources would not be affected. In the context of other ongoing and proposed development, including mining, in the CESA, cumulative effects to mineral resources would be negligible under Alternative A.	**Cumulative Effects:** Geology resources would not be affected. In the context of other ongoing and proposed development, including mining, in the CESA, cumulative effects to mineral resources would be similar to those under Alternative A.	**Cumulative Effects:** Geology resources would not be affected. In the context of other ongoing and proposed development, including mining, in the CESA, cumulative effects to mineral resources would be negligible under Alternative C and about one-fourth less than those under Alternatives A and B.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects to geology or mineral resources.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON PALEONTOLOGICAL RESOURCES			
Direct and Indirect Effects: Treatments that disturb the soil to depths greater than 6 inches, or bedrock, have the potential to disturb paleontological resources. Mechanical treatments in riparian zones, and use of prescribed fire near bedrock, have the greatest potential to affect paleontological resources. However, most treatments under Alternative A would occur above or only within the first few inches of soil. Overall, potential effects to paleontological resources from treatments would be negligible.	**Direct and Indirect Effects:** The BLM would use mechanical equipment near streams and to till soil. Because the BLM would not use fire under this alternative, the BLM may use mechanical treatments instead of fire treatments in some treatment areas. Still, potential effects to paleontological resources would be less under Alternative B than under Alternative A.	**Direct and Indirect Effects:** The BLM would not use mechanical equipment or fire, thus potential effects to paleontological resources would be substantially less under Alternative C than under Alternatives A and B. The BLM would treat only a few miles of stream, thus there could be future loss of paleontological resources from stream degradation.	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no adverse effects to paleontological resources.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Cumulative Effects: Surface-disturbing activities, including mining and drilling, could affect paleontological resources in the CESA. Less than 2 percent of the CESA would be disturbed annually by 3 Bars Project activities, and most treatments would disturb only the upper few inches of soil. Thus, cumulative effects to paleontological resources from project actions would be negligible.	**Cumulative Effects:** Although the BLM may conduct more mechanical treatments under Alternative B than under the other alternatives, treatment effects would generally be limited to the upper few inches of soil. In addition, only about half as many acres would be treated under Alternative B than under Alternative A. Thus, cumulative effects to paleontological resources from project actions would be negligible.	**Cumulative Effects:** The BLM would not use equipment or fire for restoration treatments, and would treat only one-fourth as many acres as under Alternative A. Thus, potential cumulative effects to paleontological resources from the 3 Bars Project would be negligible.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects to paleontological resources.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON SOIL RESOURCES			
Direct and Indirect Effects: Restoration treatments could lead to short-term erosion, and reduced rates of water infiltration, from soil disturbance and compaction. Effects may be greater for stream restoration projects, and where heavy equipment or fire are used. Risks would be greatest in areas with erosion-prone soils and on hillslopes, and areas with high fire damage susceptibility. Adverse effects would be greatest under Alternative A as about 90 percent of treatments are in pinyon-juniper, which are often found on slopes, and which could be burned under this alternative. However, treatments would improve the health and resiliency of native vegetation, reduce the risk of wildfire, and control noxious weeds and other invasive non-	**Direct and Indirect Effects:** Short-term **s**oil erosion and compaction, and loss of soil productivity, would occur under Alternative B, but not to the extent that would occur under Alternative A. The BLM would not treat vegetation using fire, thus there would be less risk of loss of soil organic matter and potential formation of water-repellent surface layers from fire use. However, in place of fire, the BLM may conduct more mechanical treatments that could disturb the soil and possibly cause erosion to a greater extent than fire use. Because the BLM would not use fire, it would less able to improve the health of pinyon-juniper stands and create fuel breaks than would occur under Alternative A. The BLM would also treat only about half as many acres under	**Direct and Indirect Effects:** Short-term loss of soil to erosion and soil compaction, and potential for soil disturbance to lead to an increase in noxious weeds and invasive non-native vegetation, would be less under this alternative than under Alternatives A and B as the BLM would only use manual and classical biological control treatments, and would only treat about 3,200 acres annually. However, long-term benefits to soil health and productivity would be less under this alternative because the BLM would be able to do little to improve soil fertility, increase infiltration, reduce erosion, and implement actions to reduce the risk of wildfire.	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no effects to soil resources. However, the BLM would do little to improve the health of the landscape, reduce the occurrence and spread of noxious weeds and invasive non-native vegetation, or reduce the risk of wildfire. Thus, long-term loss of soil and soil productivity could be greater under this alternative than the other alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
native vegetation, to the benefit of soil productivity and reduction of loss of soil due to erosion. Treatments should also improve soil infiltration, biodiversity, and moisture. Since the BLM would treat about 12,700 acres annually, adverse and beneficial effects of treatments would be greatest under Alternative A.	Alternative B than under Alternative A. Thus, the risk of wildfire, and its effects on soil, would be greater under this alternative than under Alternative A.		
Cumulative Effects: Numerous factors have contributed to soil degradation and productivity, including historic overgrazing, large wildfires, introduction of cheatgrass, and mining and other land development. To help improve soil function and productivity, the BLM would treat about 14,200 acres (12,700 for 3 Bars Project treatments, and 1,500 for other authorized treatments) annually within the CESA, or less than 1 percent of the CESA, and restore about 31 miles of stream, using all treatment methods. Treatments would have negligible short-term cumulative effects, but long-term, treatments under Alternative A would help to reduce the risk of wildfire, a major contributor to soil loss and function, and would help to offset the effects from loss of soil function and productivity elsewhere in the CESA.	**Cumulative Effects:** Short-term cumulative effects from treatments under Alternative B would be similar to those under Alternative A. Although fire would not be used under this alternative, the BLM may have to conduct more mechanical treatments to achieve treatment goals. Still, the BLM would only treat about 7,800 acres (6,300 for 3 Bars Project treatments, and 1,500 for other authorized treatments) annually within the CESA, and would not conduct fire treatments in pinyon-juniper stands on hillslopes, to the short-term benefit of soil resources. The BLM would not be able to use fire to improve ecosystem health. Thus, risks to soil from deterioration in ecosystem health and from wildfire would be greater under this alternative than under Alternative A.	**Cumulative Effects:** Because the BLM would treat only about 4,700 acres (3,200 acres for 3 Bars Project treatments, and 1,500 for other authorized treatments) annually within the CESA, and would not use mechanical treatments and fire, short-term effects associated with these methods would not occur within the CESA. Without these methods, though, improvements to the soil would be less, and risk of wildfire would be greater, within the project area and CESA than under Alternative A and B, and loss of soil function and health would accumulate with losses elsewhere in the CESA.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects to soil resources from treatments. Treatments under Alternative D would do little to offset effects to soils from other reasonably foreseeable future actions in the CESA. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial applications of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of large-scale wildland fire under current and reasonably foreseeable future authorized actions, but only on about 1,500 acres annually. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing wildfires in pinyon-juniper would likely increase. As a result, soil resources would continue to deteriorate under this alternative.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON WATER RESOURCES			
Direct and Indirect Effects: Short-term, there could be restrictions on water access along portions of streams. Removal of vegetation and disturbance of the soil could lead to increases in water runoff and soil erosion and decrease in infiltration, groundwater recharge, stream flows, and flow duration. Treatments could lead to impacts to streambeds and banks due to removal of undesirable riparian vegetation, and from in-channel earthwork, which could cause erosion and affect water quality. Long-term, hydrologic functions would improve due to stream restoration, including stabilization or reduction of drainageway erosion features such as knickpoints, headcuts, gullies, and bank caving, and from reconnecting hydrologic pathways. Treatments would improve infiltration, base streams flows, and the amount of time water flows in streams. Treatments would help to stabilize soils and reduce the risk of wind and water erosion. Removal of hazardous fuels from public lands and improvements to vegetation resiliency would result in a long-term benefit to surface water quality by reducing the risk of a future high-severity wildfire on the treatment site.	**Direct and Indirect Effects:** Excluding prescribed burns would avoid the increases in runoff and erosion common to burned areas. Reduced soil infiltration, due to resinous sealing after intense burning that can occur in high fire susceptibility risk areas, would not occur as a result of prescribed burns. Long-term, the BLM would have fewer options, and treat only half as many acres, under Alternative B as compared to Alternative A to improve pinyon-juniper and other vegetation health and resiliency and to stabilize soils and reduce the risk of wind and water erosion. Less work would be done in Phase II and III pinyon-juniper stands, to the detriment of base water flows, than under Alternative A. This could lead to greater risk of wildfire, and its effects on water quality and quantity, than under Alternative A. If mechanical methods are used instead of fire, they could result in more soil disturbance than the use of fire, which could lead to water impacts in areas with high water erosion risk.	**Direct and Indirect Effects:** The risk of localized soil compaction and short-term accelerated erosion from treatments, and its contribution to water quality impacts, would be less under Alternative C than the other action alternatives, as there would be little ground disturbance under Alternative C and only one-fourth as many acres would be treated as compared to Alternative A. By not being able to use mechanical methods and fire to reduce hazardous fuels, including noxious weeds and invasive non-native vegetation and decadent pinyon-juniper, and create fire and fuel breaks, the risk of wildfire and its impacts on water resources would be greater under this alternative than under the other action alternatives.	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. However, the BLM would do little to improve the health of the landscape, reduce the occurrence and spread of noxious weeds and invasive non-native vegetation, or reduce the risk of wildfire. Thus, long-term adverse effects to water quantity and quality could be greater under this alternative than the other alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Cumulative Effects: Numerous factors have degraded water resource quantity and quality on the project area, including historic overgrazing, large wildfires, introduction of cheatgrass, and land development. The Mount Hope Project could impact groundwater levels and streamflows on the 3 Bars Project area. Hazardous fuels reduction, habitat improvement, and noxious weeds and invasive non-native species control projects would occur on approximately 142,000 acres, or 8 percent of the CESA (about 1 percent of the CESA annually), using all treatment methods. The BLM would also restore about 31 miles of stream. Treatments would have negligible short-term cumulative effects, but long-term, there would be benefits to water quality and possibly to water flows. Treatments would also help to reduce the risk of wildfire, a major contributor to water degradation, and would help to offset the effects from degradation elsewhere in the CESA.	**Cumulative Effects:** Short-term cumulative effects to water resources from treatments under Alternative B would be similar to those for Alternative A. Although fire would not be used under this alternative, the BLM may have to conduct more mechanical treatments to achieve treatment goals. The BLM would not conduct fire treatments in pinyon-juniper stands on hillslopes, to the short-term benefit of water resources. Under Alternative B, annual hazardous fuels reduction and habitat improvement projects could occur on about 6,300 acres within the 3 Bars Project area, and on an additional 1,500 acres within the CESA, or less than 1 percent of acreage within the CESA. The BLM would not be able to use fire to improve ecosystem health. Thus, risks to water resources from deterioration in ecosystem health and from wildfire would be greater under this alternative than under Alternative A.	**Cumulative Effects:** Because the BLM would not use mechanical treatments and fire, short-term effects associated with these methods would not occur within the CESA. Without these methods, though, improvements to water resources would be less, and risk of wildfire would be greater, within the project area under this alternative than under Alternatives A and B, and loss of water resource functionality would accumulate with losses elsewhere in the CESA.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects to water resources from treatments. The BLM would be able to conduct treatments on a limited acreage, as discussed above under Soil Resources, but treatments under Alternative D would do little to offset effects to water resources from other reasonably foreseeable future actions in the CESA.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON WETLANDS, FLOODPLAINS, AND RIPARIAN ZONES			
Direct and Indirect Effects: Short-term, removal of vegetation and soil disturbance associated with treatments could lead to increased soil erosion and surface water runoff, which could lead to channel alteration and sedimentation in wetlands	**Direct and Indirect Effects:** Under this alternative, the BLM would likely be able to restore a similar amount of Non-functioning and Functioning-at-risk wetlands and riparian zones to Proper Functioning Condition as under	**Direct and Indirect Effects:** Under Alternative C, the BLM would only treat about 8 stream miles and one-fourth as much riparian zone habitat as under Alternative A. By treating fewer acres, and not using fire and mechanical	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no effects to wetlands, floodplains, and riparian zones. However, the BLM would do little to improve the health of the landscape,

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
and riparian zones. Siltation could reduce the acreage of wetland and riparian habitat. Removal of vegetation could also decrease the amount of rainfall captured by plants, detritus, and soil, potentially leading to increased stormwater flows and runoff velocity in streams. Increased light and disturbance tend to favor early successional species, including noxious weeds and other invasive non-native vegetation. Removal of vegetation may decrease resistance to overland flow. It would also decrease canopy interception of precipitation and evapotranspiration, which would increase the amount of free water. Long-term, vegetation treatments would help restore treated wetlands and riparian zones to Proper Functioning Condition and increase stream flows along about 31 miles of stream. Removal of pinyon-juniper may improve water flows in streams and water yields at spring sources and in near-surface aquifers. By restoring streams to stable channel types, reducing runoff, and increasing infiltration, water should stay on the land longer to the benefit of deep-rooted riparian/wetland vegetation, resulting in expanded riparian zones and more stable streams. Hand-planting native species would benefit wetland and riparian zones by providing vegetation that would help prevent erosion and protect streambanks.	Alternative A, although the level of benefit could be reduced in certain locations. Without the use of fire, there would be no short-term increase in erosion and stream sedimentation, and the spread of noxious weeds and other invasive non-native vegetation, from fire treatments. The inability to use fire could reduce the effectiveness of pinyon-juniper removal in some areas, and long-term benefits to spring and stream flows. Risks to wetlands, floodplains, and riparian zones from wildfire would be greater under Alternative B than under Alternative A. In general, prescribed fires would have fewer impacts than wildfires, however, as they are of low severity and can be controlled to occur in one particular area.	treatment methods, the BLM would restore less Non-functioning and Functioning-at-risk wetlands and riparian zones to Proper Functioning Condition as compared to Alternatives A and B. By not using heavy equipment, however, there would be less soil compaction, particularly in areas of moist soils, which could increase surface runoff from the treated areas, reduce soil porosity, and limit water infiltration. While an improvement in wetland/riparian function would be expected across all treated areas, the level of improvement would likely be less under Alternative C than under Alternatives A and B. Benefits associated with improvements to upland community types would be less under Alternative C than under Alternatives A and B, since a much smaller portion of the project area would be treated, and the reduction in wildfire risk would also likely be lower.	reduce the occurrence and spread of noxious weeds and invasive non-native vegetation, or reduce the risk of wildfire. Thus, long-term adverse effects to wetland, floodplain, and riparian zone functionality could be greater under this alternative than under the other alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Cumulative Effects: Past land uses in the CESA have resulted in the degradation of wetlands, riparian zones, and floodplains and reduced their functions. In particular, the BLM has indicated that roads, historic grazing regimes, wildfire, spread of noxious weeds and other invasive non-native vegetation, and pinyon-juniper encroachment have negatively affected riparian and wetland functions and values, water quantity, quality, and availability. Hazardous fuels reduction and habitat improvement projects on the 3 Bars Project and other areas within the CESA would occur on approximately 14,200 acres annually, or on less than 1 percent of the CESA. These treatments would lead to short-term increases in soil erosion and surface water runoff, but long-term benefits to water quality and possibly water flows. Long-term, 3 Bars Project actions should make a substantial contribution toward improving wetland, floodplain, and riparian zone conditions within the CESA and help to offset adverse effects to these resources from other reasonably foreseeable future actions under Alternative A.	**Cumulative Effects:** By not using fire on the 3 Bars Project area, there would be no effects to wetland and stream water quantity and quality from fire on several thousand acres annually within the CESA. The amount of wetland, floodplain, and riparian habitat treated under Alternative B would be similar to that under Alternative A. The BLM would conduct hazardous fuels reduction and habitat improvement projects using manual and mechanical methods on about half as many acres within the 3 Bars Project area compared to Alternative A, thus the risk of future wildfires, and their effects on wetlands, floodplains, and riparian zones within the CESA, would be greater under Alternative B than under Alternative A.	**Cumulative Effects:** Short-term effects to wetlands, riparian zones, and floodplains associated with the use of fire and mechanized equipment would not occur under Alternative C. By not being able to use mechanical methods and fire to reduce hazardous fuels and create fire and fuel breaks, the risk of wildfire and its effects on wetlands, floodplains, and riparian zones would be greater under Alternative C than under Alternatives A and B. Only about 100 acres of wetland and riparian habitat, and 1 mile of stream habitat, would be restored annually on the 3 Bars Project area. Wetland, riparian, and floodplain habitat should improve within the 3 Bars Project area and within the CESA, although not to the extent as would occur under Alternatives A and B.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects to water resources from treatments. The BLM would be able to conduct treatments on a limited acreage, as discussed above under Soil Resources. These treatments under Alternative D would do little to offset effects to water resources from other reasonably foreseeable future actions in the CESA.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
SUMMARY OF EFFECTS ON NATIVE AND NON-INVASIVE VEGETATION RESOURCES			
Direct and Indirect Effects: Short-term, vegetation removal treatments would result in a temporary loss of some desirable or more mature vegetation through inadvertent removal of non-target vegetation. Removal of pinyon-juniper could reduce the amount of pine nuts, wood, and other woodland products available for commercial and individual harvest. Thinning and removal of pinyon-juniper also would result in dead wood and slash material that, if not removed, mulched, or burned, could provide fuel for a wildfire. Long-term, treatments would enhance native plant (re)establishment, and therefore would be expected to have a beneficial impact on native vegetation by increasing the extent of native plant communities in the project area. Treatments that benefit native plant communities could potentially provide habitat that is more suitable for rare and sensitive plant species. Treatments would result in improved health and vigor of riparian, aspen, and sagebrush communities. As treatments restore the functionality of the ecosystem, the system would become more resistant to invasion by noxious weeds and other invasive non-native vegetation, drought, and wildfire. Treatments that reduce the buildup of hazardous fuels would help reduce the risk	**Direct and Indirect Effects:** Under this alternative, the total acreage treated would be approximately half that of Alternative A. By not using fire, there would be less risk of loss of non-target native vegetation, and establishment and spread of noxious weeds and other invasive non-native vegetation. It would be difficult for the BLM to conduct pinyon-juniper treatments on hillslopes, or over large acreages, using mechanical methods, where fire use treatments would be effective. Loss of pinyon-juniper and associated increase in sagebrush would be less than under Alternative A, as less acreage would be treated. The acreage of persistent woodlands and sagebrush habitats benefiting from treatments would be less than under Alternative A. Since treatment of Phase III woodlands would be minimal, these areas, which have the greatest risk for loss from high intensity wildfires, would remain at a high risk under this alternative. It is likely that the amount of area meeting Potential Natural Community objectives would be less under Alternative B than under Alternative A.	**Direct and Indirect Effects:** Given that fire, mechanical methods, and livestock would not be used under this alternative, risks to non-target native vegetation would be low. However, the BLM would have the fewest options for its treatment programs, and these programs would likely not be as effective as those under the other action alternatives. Mechanical methods and fire would not be available to promote aspen suckering. The BLM would be unable to combine treatment methods for optimal control of certain species and for enhancement of native plant communities. Additionally, removal of fuel hazards would be least under this alternative, and the risk of catastrophic wildfire would be greatest. Seeding and planting of native and non-native vegetation may have limited success without mechanical equipment. The BLM would not be able to use mechanical methods to create fuel breaks along roads or existing linear disturbances. Additionally, the BLM would not be able to slash and pile burn following treatments to reduce the short-term fire hazard, although programs to use felled trees for posts, mulch, and other uses would help minimize the fire risk. The amount of area meeting Potential Natural Community objectives would be less than would occur	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no effects to native and non-invasive vegetation. However, the BLM would do little to improve the health of the landscape, reduce the occurrence and spread of noxious weeds and other invasive non-native vegetation, or reduce the risk of wildfire. Thus, long-term benefits to native vegetation health and resiliency would be less under this alternative than under the other alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
of wildfire on the 3 Bars Project area.		under Alternatives A and B.	
Cumulative Effects: Historic overgrazing, introduction of cheatgrass, large wildfires, and other natural and human-caused factors have contributed to the departure of the plant communities from the Potential Natural Community across the 3 Bars ecosystem. Hazardous fuels and other habitat improvement treatments would occur on about 142,000 acres within the 3 Bars Project area, or about 8 percent of the CESA. These treatments would help to reduce the risk of wildfire within the CESA. Overall, there would be a net beneficial accumulation of effects from BLM treatments and treated areas would move toward their Potential Natural Community. These benefits would be greatest under Alternative A.	**Cumulative Effects:** Under Alternative B, the inability to use prescribed and wildland fire for resource benefit would restrict the BLM's ability to reduce wildfire risk, restore natural fire regimes, and influence vegetation communities on a large scale within the 3 Bars Project area. Prescribed fire use would be limited to a few hundred acres annually in other portions of the CESA outside the 3 Bars Project area based on previous authorizations. Hazardous fuels and other habitat improvement treatments would occur on about 78,000 acres within the 3 Bars Project area, or about 4 percent of the CESA, and would help to reduce the risk of wildfire within the CESA. Overall, there would be a net beneficial accumulation of effects from BLM treatments and treated areas would move toward their Potential Natural Community. However, because the BLM would treat fewer acres, and would not be able to use fire, benefits to vegetation would be less under Alternative B than under Alternative A.	**Cumulative Effects:** Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation. As a result, the BLM anticipates treating about one-fourth as many acres under Alternative C as under Alternative A. These methods would cause less vegetation and soil disturbance and give the BLM greater control of the types and amount of vegetation that would be removed than under Alternatives A and B. By not being able to use mechanical methods and fire to improve the health and resiliency of native vegetation, reduce hazardous fuels, create fire and fuel breaks, and remove downed wood and slash, the risk of wildfire and its impacts on vegetation would likely increase on the 3 Bars Project area. Hazardous fuels reduction and habitat improvement projects could occur on about 47,000 acres within the 3 Bars Project area. Collectively, about 3 percent of the CESA would be treated by the BLM. There would still be a net benefit from BLM treatments and treated areas would move toward their Potential Natural Community on portions of the project area. As the BLM would not be able to use fire and mechanical treatments, however, fewer acres would be treated, and benefits to vegetation under	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects from noxious weeds and invasive non-native vegetation associated with 3 Bars Project treatments. However, factors that contribute to the loss of native and non-invasive vegetation health and resiliency would remain, and would likely be greatest under this alternative.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
		Alternative C would be less than under Alternatives A and B.	
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON NOXIOUS WEEDS AND INVASIVE NON-NATIVE VEGETATION			
Direct and Indirect Effects: Short-term, treatments that cause disturbance or remove plants from an area could lead to a competitive advantage for many noxious weeds and other invasive non-native vegetation, particularly if a seed source is present on the site. There is also some potential for noxious weeds and other invasive non-native vegetation seeds to be transported onto treatment sites on workers' shoes and clothing, with the plant materials used in rehabilitation projects, and on vehicles. Long-term, treatments designed to control noxious weeds and other invasive non-native species would be expected to have a beneficial impact by reducing populations of these species. The reduction of fuel loads would decrease the risk of severe or repeat wildfires, thereby reducing the risk of spread of cheatgrass and other noxious weeds and other fire-dependent invasive non-native species. By removing these species, overall ecosystem health and functionality would improve. By restoring rangeland health, native species would be better able to compete with noxious weeds and other invasive non-native species.	**Direct and Indirect Effects:** Prescribed fire could increase the dominance of cheatgrass and other introduced annual grasses in areas where these species are present pre-burn. Because only mechanical and manual methods would be used, however, it would be difficult for the BLM to conduct hazardous fuels reduction, and noxious weeds and other invasive non-native vegetation treatments on steep hillslopes, or over large acreages. Grazing can contribute to the spread of noxious weeds and other invasive non-native vegetation. The BLM would not be able to use fire to remove the mat of dead vegetation in cheatgrass-dominated areas, or to promote the health and resiliency of native vegetation. Thus, wildfire risk would be greater under this alternative than under Alternative A, as would the potential for establishment and spread of noxious weeds and other invasive non-native vegetation after a wildfire.	**Direct and Indirect Effects:** The effects of not using fire would be similar to those under Alternative B. By not using machinery, there would be less risk of inadvertent removal of native vegetation, and potential to spread the seeds of noxious weeds and other invasive non-native vegetation. Mechanical equipment can also damage or crush desirable riparian and wetland vegetation or bring propagules of non-native species into treatment areas and create sites for noxious weeds and other invasive non-native vegetation establishment. These effects would be greatest in treatment areas with the largest acreage and that employ the most extensive mechanical treatments (project groups that include streambank earthwork as well as pinyon-juniper removal). By not using fire and mechanical equipment, however, it is unlikely that the BLM would slow the spread of noxious weeds and other invasive non-native vegetation, including cheatgrass; restore fire as an integral part of ecosystem; or reduce extreme, very high, and high wildfire risks to moderate risk or less. Thus, wildfire risk would be greater under this alternative than under	**Direct and Indirect Effects:** No treatments would be authorized under this alternative. There would be no effects to noxious weeds and other invasive non-native vegetation. However, the BLM would do little to improve the health of the landscape, reduce the occurrence and spread of noxious weeds and other invasive non-native vegetation, or reduce the risk of wildfire. Thus, long-term adverse effects to ecosystem health and resiliency could be greater under this alternative than under the other alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
		Alternatives A and B, as would the potential for establishment and spread of noxious weeds and invasive non-native vegetation.	
Cumulative Effects: Past land uses in the CESA have resulted in the degradation of public and private lands and reduced their functions. In particular, the BLM has indicated that roads, historic grazing regimes, wild horse overpopulation, and wildfire have contributed to the establishment and spread of noxious weeds and invasive non-native vegetation within the CESA. Hazardous fuels reduction, habitat improvement, and noxious weed and other invasive non-native vegetation control projects would occur on up to 142,000 acres, or 8 percent of the CESA. These treatments would help to reduce the risk of wildfire within the CESA, which often leads to the establishment and spread of noxious weeds and other invasive non-native vegetation.	**Cumulative Effects:** The BLM would treat about half as many acres under Alternative B as under Alternative A, and less effort would be spent by the BLM on treatments to reduce wildfire risk and its impacts on vegetation, including use of fire to restore natural fire regimes. The use of mechanical treatments would give the BLM greater latitude to control various types of vegetation compared to fire treatments, but efforts to control cheatgrass and other noxious weeds and other invasive non-native vegetation would be difficult on steep slopes and over large acreages. Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on about 15,000 acres within other portions of the CESA, or about 4 percent of acreage within the CESA. Thus, the BLM would be less successful in controlling noxious weeds and other invasive non-native vegetation on the project area and CESA under Alternative B than under Alternative A.	**Cumulative Effects:** By not being able to use fire, and mechanical methods such as mowing, chopping, tilling, disking, harrowing, and drill seeding, the BLM would do little to reduce hazardous fuels, create fire and fuel breaks, treat areas with noxious weeds and other invasive non-native vegetation, plant and seed native vegetation, or remove downed wood and slash. Thus, the risk of wildfire and spread of noxious weeds and other invasive non-native vegetation would remain high on the 3 Bars Project area and within the CESA. Only about 47,000 acres, or about 2 percent of the CESA, would be treated. These treatments would benefit the 3 Bars ecosystem, but not to the extent as under Alternatives A and B.	**Cumulative Effects:** No treatments would be authorized under this alternative and there would be no cumulative effects from noxious weeds and other invasive non-native vegetation associated with 3 Bars Project treatments. However, factors that contribute to the spread of noxious weeds and other invasive non-native vegetation would remain, and would likely be greatest under this alternative.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
SUMMARY OF EFFECTS ON WILDLAND FIRE			
Direct and Indirect Effects: Proposed treatments would have few adverse impacts on wildfire risk. It is possible that the use of vehicles to transport workers to treatment sites, or use of chainsaws or other gas-powered equipment, could cause a spark that results in a wildland fire. Slash from manual and mechanical treatments could create a short-term fire hazard. Long-term, the BLM would restore fire as an integral part of the ecosystem and reduce hazardous fuels. Treatments that remove hazardous fuels from public lands would be expected to benefit the health of plant communities in which natural fire cycles have been altered. These include treatments that control populations of noxious weeds and other invasive non-native species. Enhancing fuel breaks in pinyon-juniper stands would break up the continuity of fuel, moderate fire behavior, and reduce the risk of loss of habitat and other resources from a catastrophic wildfire. Treatments would help to reduce the Fire Regime Condition Class (FRCC), and meet Fire Management Unit (FMU) objectives, over portions of the 3 Bars Project area.	**Direct and Indirect Effects:** The risk of treatments causing a wildland fire that spreads beyond treatment boundaries would be less under this alternative than Alternative A. Miles traveled by vehicles, the number of acres treated using manual and mechanical equipment, the amount of downed trees and slash material created, and the miles of fire and fuel breaks created would be similar between this alternative and Alternative A. Because the BLM would not use prescribed fire to treat vegetation under this alternative, there would be no risk of a prescribed fire spreading beyond treatment boundaries. Without the use of prescribed fire and fire for resource benefit, the BLM would be unable to restore fire as an integral part of the ecosystem, reduce the risk of a large-scale wildfire, or reduce extreme, very high, and high wildfire risks to moderate risk or less. About half as much acreage would be treated under Alternative B than under Alternative A to reduce hazardous fuels and reduce the FRCC. Prescribed fire and fire for resource benefit are identified as important treatment options under the Fire Management Plan for all FMUs, except the Big Smoky FMU, but would be unavailable to the BLM as a management tool under this alternative. It is unlikely the trend toward large-sized	**Direct and Indirect Effects:** There would be no wildland fire risks associated with the use of prescribed fire. The BLM would not use mechanical equipment (other than vehicles to transport work crews to treatment sites), so there would be no risk of a wildland fire being started by tractors, mowers, and other mechanical treatment equipment. However, workers still would use chainsaws and other hand-held power equipment that could cause a spark and start a wildland fire. Large numbers of workers and their vehicles would be needed to accomplish proposed treatments under this alternative. Vehicle miles traveled would likely be greatest under this alternative. Downed trees and slash material from treatments would be difficult to remove without mechanical equipment or pile/slash burning. The number of miles of fire and fuel breaks created under this alternative would be less than under Alternatives A and B, as the BLM would not be able to use mechanical equipment, such as bulldozers, mowers and shredders, and prescribed fire, to create fire and fuel breaks. Alternative C would not restore fire as an integral part of the ecosystem, reduce the risk of large-scale wildfire, or reduce extreme, very high, and high wildfire risks to moderate risk or less. Only about 500 to	**Direct and Indirect Effects:** There would be no direct effects from wildland fire from 3 Bars Project treatments as no treatments would be authorized under this alternative. Under this alternative, the BLM would not meet the fire use purposes to 1) restore fire as an integral part of ecosystem, 2) reduce the risk of large-scale wildland fire, 3) reduce extreme, very high, and high wildland fire risks to moderate risk or less, and 4) develop fuel breaks within treatment and adjacent areas. There would be little or no improvement in the FRCC on the 3 Bars Project area and the BLM would not meet FMU objectives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
	fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse in the long-term, and the BLM would still need an aggressive wildland fire prevention and control program for the long-term.	1,000 acres would be treated annually to reduce hazardous fuels, and the BLM estimates that the FRCC would be reduced on only about 3,750 to 7,500 acres over the next 10 to 15 years, fewer acres than would be reduced under Alternatives A and B. The BLM would not meet FMU objectives under the Fire Management Plan.	
Cumulative Effects: Historic overgrazing, introduction and spread of cheatgrass, large wildfires, and other natural and human-caused factors have contributed to the departure of the plant communities from the Potential Natural Community across the 3 Bars ecosystem. These actions have made rangeland and woodland habitats less fire resilient and increased the potential for spread of wildfire. Hazardous fuels treatments would occur on about 142,000 acres (8 percent) of lands within the CESA. Although this would still be a small portion of lands within the CESA, treatments would be targeted toward public lands with high to very high wildfire risk. Given that over 90 percent of acres impacted by future actions are focused on hazardous fuels reduction and resource management, actions would reduce wildfire risk long-term. At fire management treatment levels projected to occur in the CESA during the next 25	**Cumulative Effects:** Because the BLM would not use fire to treat vegetation on the 3 Bars Project area, the risk of a prescribed fire spreading beyond treatment boundaries and burning other portions of the CESA would be less under this alternative than under the other action alternatives. However, the BLM would be less able to restore fire as an integral part of the ecosystem, reduce the risk of a large-scale wildland fire, or reduce extreme, very high, and high wildfire risks to moderate risk or less within the CESA under this alternative than under the other action alternatives. About 78,000 acres of vegetation would be treated to reduce hazardous fuels and improve rangeland health within the CESA, or about 4 percent of the CESA. Acres treated to reduce the FRCC under this alternative would be half that treated under Alternative A, and it is also less likely that the BLM would meet FMU objectives under this alternative than under	**Cumulative Effects:** The BLM anticipates treating about one-fourth as many acres under Alternative C as under Alternative A, mostly due to the higher costs associated with manual and classical biological control methods. The risk of treatments causing a wildland fire would be less under this alternative than Alternative A. Miles traveled by vehicles, and amount of downed trees and slash material created, but not removed, by pile/slash burning or other methods would be greater under this alternative than under Alternatives A and B. By not being able to use fire, and mechanical methods such as mowing, chopping, tilling, disking, harrowing, and drill seeding, the BLM would do little to reduce hazardous fuels, create fire and fuel breaks, treat areas with noxious weeds and other invasive non-native vegetation, seed and plant native vegetation, or remove downed wood and slash. Under Alternative C, the BLM would conduct fire management	**Cumulative Effects:** There would be no cumulative effects on wildland fire from 3 Bars Project treatments as no treatments would be authorized under this alternative. Based on historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually on the CESA to reduce hazardous fuel levels and improve ecosystem health. The BLM would do little to reduce the FRCC, and it is also unlikely that the BLM would meet FMU objectives under the Fire Management Plan. Given the large number of utilities and infrastructure, mineral, oil, gas, geothermal, and other land developments that are reasonably foreseeable in the CESA, the need for an aggressive wildland fire prevention and control program to protect natural resources and public health and infrastructure would likely increase from current levels.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
years under Alternative A, the BLM should meet the FMU objectives for most FMUs.	Alternative A on the 3 Bars Project area.	treatments on only about 2 percent of the CESA. It is less likely that the BLM would meet FMU objectives under the Fire Management Plan under this alternative than under Alternatives A and B on the 3 Bars Project area.	
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON FISH AND OTHER AQUATIC RESOURCES			
Direct and Indirect Effects: Short-term, proposed treatments would disturb aquatic habitat if equipment or vehicles enter streams or other waterbodies, could cause soil disturbance and erosion, and there could be a spill of fuel or lubricants into water bodies. Removal of vegetation could adversely affect aquatic habitat and ecological requirements for aquatic species, and cause a temporary increase in bank erosion. Increases in sediment entering a stream could adversely affect fish health and stream quality. Prescribed fire and mechanical treatments could result in erosion and runoff from burned areas and sediment could enter streams if the disturbance area is within a few hundred feet of streams. Long-term, treatments that restore channel morphology and stream function, remove noxious weeds and other invasive non-native vegetation, improve the health and resiliency of riparian vegetation, and reduce the risk of catastrophic wildfire would benefit water quality and aquatic	**Direct and Indirect Effects:** Under Alternative B, the number of acres of riparian treatments (4,000 acres) and miles of stream improved to restore channel morphology and function (31 miles) would be similar to Alternative A. Because the BLM would have to rely more on mechanical treatments to reduce hazardous fuels and improve woodland health, improve the health of aspen stands, and control non-native vegetation, short-term soil disturbance and erosion could be similar to that under Alternative A, even though fewer acres would be treated. However, fire-related effects on water quality and aquatic habitat would not occur under Alternative B. Although this would be beneficial to fish and other aquatic organisms in the short-term, in the long-term there would be a higher risk of wildfire as a result of the potential buildup of hazardous fuel materials that could have been removed through the use of prescribed fire and wildfire for resource benefit. Treatment benefits to fish and	**Direct and Indirect Effects:** Only about one-fourth as many total acres, acres of wetland, floodplain, and riparian habitat, and miles of stream restoration would be treated under Alternative C than under Alternative A. Short-term soil disturbance and erosion would occur in watersheds as a result of manual and classical biological treatments, but adverse effects would be substantially less under this alternative than under the other action alternatives because fewer acres would be treated, and because manual and biological treatments cause less soil disturbance compared to mechanical and fire treatments. The BLM would have limited success in restoring channel morphology and function in degraded streams to benefit Lahontan cutthroat trout and other aquatic organisms. The BLM would be able to hand place rocks, logs, and other material in streams to slow water flows, and may be able to make minor changes to the stream morphology using hand tools, but these improvements would be minor.	**Direct and Indirect Effects:** There would be no direct effects to fish or other aquatic resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. Alternative D poses the greatest threat to Lahontan cutthroat trout and other aquatic species through long-term habitat loss and degradation.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
organisms. Treatments would focus on streams used by Lahontan cutthroat trout, a federally listed threatened species. Stream enhancements could involve the creation or expansion of pool habitat, improvements in the riffle to pool ratio, and addition of instream cover for fish. Replacing invasive plant species with native vegetation would improve food availability for insectivorous fish species, as native plants typically support a more diverse native insect community. The BLM would place logs and other woody debris from felled pinyon-juniper into streams to slow water flow and create fish habitat. Protective temporary exclosure fencing would restrict access to treated areas by domestic livestock, wild horses, and other wild ungulates. The removal of pinyon-juniper vegetation in riparian zones could increase stream flows and improve aquatic habitat as a result of reduced water uptake by vegetation. Prescribed fire treatments could benefit aquatic species by reducing hazardous fuel loads, and therefore the risk of a destructive high-intensity wildfire.	other aquatic organisms under Alternative B would be less than under Alternative A, but not substantially less, as fire would be used sparingly to improve habitat for fish under Alternative A. However, risks to fish from wildfire would be greater under this alternative than under Alternative A.	Pinyon-juniper would be removed using chainsaws. Phase I woodlands and a limited acreage of Phase II woodlands would be targeted for treatments. Most treatments would occur near streams and roads to promote their use as fire breaks, to the benefit of aquatic resources. However, the BLM would not be able to conduct fire treatments to reduce fuels, or use mechanical equipment to create fire and fuel breaks, and thus the risks of wildfire and its effects on fish and other aquatic resources would be greater under this alternative than under the other action alternatives.	
Cumulative Effects: Historic livestock use has contributed to soil erosion and water quality impacts, especially in riparian zones and near streams occupied, or potentially occupied, by Lahontan cutthroat trout and other fish. Recreation,	**Cumulative Effects:** Acres and types of wetland and riparian habitat treated under this alternative would be similar to Alternative B. However, less effort would be spent by the BLM on treatments to reduce wildfire risk and its associated	**Cumulative Effects:** Adverse, short-term effects to fish and other aquatic resources associated with the use of fire and mechanized equipment would not occur under Alternative C. However, fire use and mechanized equipment would be used	**Cumulative Effects:** There would be no cumulative effects on fish and other aquatic organisms from 3 Bars Project treatments as no treatments would be authorized under this alternative. Based on historic treatments in the 3 Bars Project

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
land and mineral development, and oil, gas, and geothermal exploration and development have also affected fish and other aquatic resources. 3 Bars Project treatments would have short-term adverse effects on about 4,000 acres of riparian habitat, 8 miles of occupied Lahontan cutthroat trout streams, and 34 miles of potential Lahontan cutthroat trout streams. In addition, treatments under Alternative A could affect aquatic organisms found in almost 1,000 miles of perennial and intermittent and ephemeral streams on the 3 Bars Project area. Because stream restoration and enhancement treatments on the 3 Bars Project area under Alternative A would affect less than 0. 2 percent of the acreage on the CESA, these cumulative effects would be negligible. About 17 percent of the 3 Bars Project area and 8 percent of the CESA would be treated to reduce hazardous fuels. A reduction in wildfire risk on the CESA would benefit aquatic organisms, and would be greatest under Alternative A.	impacts to aquatic habitat from soil erosion, including the use of fire to restore natural fire regimes. By not using prescribed fire and wildland fire for resource benefit, there would be no risks to fish and other aquatic resources or their habitat from fire on several thousand acres annually within the 3 Bars Project area. However, the use of fire could occur on several hundred acres annually on other portions of the CESA. Hazardous fuels reduction and habitat improvement projects could occur on about 78,000 acres within the CESA, or about 4 percent of acreage within the CESA. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper should slow, but treatments to reduce this risk on the CESA would be less under Alternative B than under Alternative A.	in other portions of the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire. By not being able to use mechanical methods and fire, the risk of wildfire and its impacts on water resources would likely increase on the 3 Bars Project area, to the potential detriment of fish and other resources that depend upon water in the CESA. Only about 8 miles of stream and 100 acres of riparian habitat would be restored to benefit fish and other aquatic organisms. Treatments in the CESA would affect about 42,000 acres, or about 2 percent of the CESA; less than 0. 2 percent of acreage on the CESA would be affected annually. 3 Bars Project restoration treatments would have short-term adverse and long-term beneficial effects on fish and other aquatic resources, but these effects would be negligible in the context of the acreage within the CESA and other types of activities that have effects on water resources, such as the Mount Hope Project.	area, only about 1,500 acres would be treated annually in the CESA to reduce hazardous fuel levels and improve ecosystem health under this alternative. The BLM would conduct stream bioengineering and riparian habitat enhancements only on a limited acreage and these projects would have to be authorized through separate decisions. Thus, stream channels and riparian habitat would remain degraded and contribute to water quality concerns. Hazardous fuel levels would likely increase, and only a limited number of miles of fuel and fire breaks would be constructed under this alternative compared to the action alternatives. The trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would likely increase. These effects would be detrimental to fish and other aquatic organisms.
Mitigation: 1) If instream disturbance is required as part of treatment, activities would be scheduled to avoid spawning periods of game fish species or Lahontan cutthroat trout. The measure would be effective in protecting spawning periods of game or special status fish species. 2) If water is required for fire control, perennial	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
streams with game or special status species or springs with connections to these perennial streams would not be used as water sources. This measure would be effective in avoiding flow reductions in streams with important aquatic species by restricting their use as water sources for fire control. 3) The BLM would consult with the NDOW before conducting prescribed fire and other treatments that could adversely impact Lahontan cutthroat trout when working near Lahontan cutthroat trout occupied or potential habitat. The measure would be effective in protecting stream habitat for Lahontan cutthroat trout.			
SUMMARY OF EFFECTS ON WILDLIFE RESOURCES			
Direct and Indirect Effects: Short-term adverse effects to wildlife include injury and loss of life, noise and other disruptions associated with treatment applications, and habitat effects. Treatment work at streams, ponds, and springs would involve using heavy equipment, which could pose a risk of injury or death by crushing animals or their breeding sites; amphibians would be most susceptible to harm or injury. Removal of Phase II and III pinyon-juniper would reduce the amount of habitat available to pinyon-juniper dependent species. Prescribed fire treatments pose a risk of death to animals,	**Direct and Indirect Effects:** Because the BLM would not be able to use fire, there would be no harm to or loss of wildlife from prescribed fire and wildland fire for resource benefit. The few wildlife that use dense stands of pinyon-juniper would not experience habitat loss under this alternative, and may even see habitat gains as more pinyon-juniper habitat shows Phase II or III characteristics. Acres and types of wetland and riparian habitat and miles of streams treated would be similar to Alternative A. However, less effort would be spent by the BLM on slowing pinyon-juniper encroachment into sagebrush and riparian communities,	**Direct and Indirect Effects:** Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. There would be fewer direct impacts to wildlife from treatments under this alternative than the other alternatives, because adverse impacts, such as harm to or death of wildlife and noise and other disturbances, would be much less with manual methods than the other methods. Since fewer acres would be treated, there would be fewer benefits to wildlife under this alternative than under Alternatives A and B. Manual treatments would be small	**Direct and Indirect Effects:** There would be no direct effects to wildlife resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. Because no habitat would be restored, Alternative D poses the greatest threat to wildlife through long-term habitat loss and degradation. Species at risk from habitat degradation include Greater sage-grouse, pygmy rabbit, northern goshawk, cavity nesting birds, and migratory birds through densification of pinyon-juniper, loss of aspen habitat, and pinyon-juniper encroachment.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
especially smaller mammals, reptiles, and amphibians that may not be able to flee the area or enter burrows during a burn. Long-term, proposed treatments would target areas with declining habitat quantity and quality, and would facilitate wildlife movement across the landscape. Loss of habitat at the landscape level would be addressed by reducing levels of pinyon-juniper encroachment into other habitats, reducing the spread of noxious weeds and other invasive non-native vegetation, and reducing the risk of catastrophic wildfire. Treatments aimed at restoring natural fire cycles would improve vegetation resilience and increase plant diversity across the landscape, to the benefit of wildlife. Treatments would allow more desirable vegetation, such as forbs and grasses, to better compete and thrive. Treatments that restore native vegetation in disturbed areas should reduce fragmentation and restore connectivity among blocks of similar habitat, allowing wildlife to move more easily across the landscape.	reducing the amount of Phase II and III pinyon-juniper treated using stand-replacement fires, restoring historic sagebrush habitat, and treating priority habitat to improve species diversity, especially through cheatgrass control. Because fire would not be available to reduce hazardous fuel loads, Alternative B may pose a greater long-term risk for wildfire due to the accumulation of fuels. The BLM would also not be able to promote more fire resilient and diverse habitat on the 3 Bars Project area.	in scale and mostly targeted to pinyon-juniper stands. Benefits to special status species and migratory birds would primarily be limited to those species that use the pinyon-juniper and sagebrush interface; sage-grouse, pygmy rabbit, and other sagebrush dependent wildlife would see few benefits.	
Cumulative Effects: Historic livestock use, land development, and other natural and human-caused factors have contributed to wildlife habitat loss and fragmentation, especially in riparian zones. In addition, habitat for Greater sage-grouse, pygmy rabbit, and other	**Cumulative Effects:** Long-term benefits from prescribed fire and wildland fire for resource benefit, including improving pinyon-juniper health, slowing pinyon-juniper encroachment, making vegetation more fire resilient, creating openings in pinyon-juniper habitat to promote shrub,	**Cumulative Effects:** Because fire and mechanical treatments would not be used, the BLM would not be able to use these methods to stimulate aspen suckering on about 450 acres. The BLM would be less able to reduce the risk of pinyon-juniper encroachment into aspen stands, and thin	**Cumulative Effects:** There would be no cumulative effects on wildlife resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would be able to conduct treatments on a limited acreage, as discussed above under Soil Resources,

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
wildlife will be lost due to the Mount Hope Project and future development in the CESA. Proposed BLM restoration projects would have short-term adverse and long-term beneficial effects on about 142,000 acres of wildlife habitat within the CESA during the life of the project. About 17 percent of the 3 Bars Project Area and 8 percent of the CESA would be treated to reduce hazardous fuels and improve ecosystem health and resiliency. Habitat improvement and a reduction in wildfire risk on the CESA would benefit wildlife and help offset some of the adverse effects to wildlife from other reasonably foreseeable future actions in the CESA, and would be greatest under Alternative A.	forb, and grass development, and reducing the risk of catastrophic wildfire, would occur on only a few hundred acres annually within the CESA under previous and future authorizations under this alternative and provide limited benefits for wildlife. About 4 percent of the CESA would be treated to reduce hazardous fuels, improve ecosystem health and resiliency, and reduce wildfire risk. Treatments within the CESA would benefit wildlife and their habitats, but not to the extent as for treatments under Alternative A.	and remove pinyon-juniper to create and enhance fire and fuel breaks to reduce the risk of wildfire destroying aspens. There is concern, however, that unless the BLM protects aspen stands from livestock, wild horses, and other wild ungulates, and is successful in stimulating aspen suckering using manual methods, that aspen stands could be lost on the 3 Bars Project area. There would be no risk of injury or death to wildlife, noise and other disturbances, fuel spills, and short-term habitat loss associated with use of mechanical equipment. The BLM would have less success, however, in opening up pinyon-juniper to promote development of shrubs, grasses and forbs; reducing hazardous fuels; removing cheatgrass and other non-native species; creating a mosaic of habitats; creating fire and fuel breaks; restoring stream habitat; and reseeding and replanting vegetation to restore wildlife habitat compared to Alternatives A and B. Under Alternative C, proposed restoration projects would have adverse and beneficial effects to about 47,000 acres of wildlife habitat within the CESA during the life of the project. Wildlife species diversity and numbers, and habitat quality, would show little improvement under Alternative C, primarily because only about 2 percent of the CESA would be treated, and the BLM would be limited	but this alternative would do little to slow the loss of wildlife habitat within the CESA.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
		in the types of treatments it could conduct to reduce the risk of wildfire and improve wildlife habitat.	
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON WILD HORSES			
Direct and Indirect Effects: Restoration activities could have short-term effects on wild horses by exposing them to treatments that interfere with their health, interfere with their movements, cause changes in vegetation that could alter the carrying capacity of the herd management areas (HMAs), or limit their access to water, which could ultimately affect their genetic health. Wild horses could experience short-term disturbances associated with mechanical noise and the presence of humans. However, since animals could leave the area during treatments, effects would be minor. Treatments could reduce the capability of the treatment site to support wild horses by removing native forbs and grasses, leading to the spread of noxious weeds and other invasive non-native vegetation and loss of forage. Wild horses are accustomed to migrating in search of food and shelter in response to climatic variation and natural disturbances that alter food supplies, however, and the amount of area treated annually would comprise only a small portion of the HMAs. The BLM could remove crested	**Direct and Indirect Effects:** Because the BLM would not use fire, there would be no adverse effects associated with prescribed fire and wildland fire for resource benefit. In particular, prescribed fire would not contribute to impacts to wild horse habitat that could result from soil erosion, loss of forage, and spread of noxious weeds and other invasive non-native vegetation in burned areas. However, with greater reliance on mechanical methods, there may be greater disturbance to wild horses from use of mechanical equipment than would occur under Alternative A. Acres and types of wetland and riparian habitat treated would be similar to Alternative A, and the BLM would use temporary exclosure fencing to protect treatment areas. Because fire would not be available to reduce hazardous fuel loads, there may be a greater long-term risk for catastrophic wildfire due to the accumulation of fuels under Alternative B than under Alternative A. The BLM would be limited in promoting more fire resilient and diverse vegetation on the 3 Bars Project area. Prescribed fire would not be used to	**Direct and Indirect Effects:** The consequences of not using fire under Alternative C would be the same as those discussed under Alternative B. Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. Noise and other disturbance would be less with manual methods than the other methods. Manual and biological control methods result in less land disturbance than mechanical methods and, as a result, short-term adverse effects to water quality from soil erosion and loss of non-target vegetation would be less under this alternative than under Alternatives A and B. Without the use of mechanical equipment, the BLM would not conduct stream engineering and restoration, except on a limited basis on only a few stream miles. Fewer acres of noxious weeds and other invasive non-native vegetation would be controlled and fewer acres of pinyon-juniper and sagebrush thinning and removal would be conducted to promote understory development, except on very small areas where this vegetation	**Direct and Indirect Effects:** There would be no direct or indirect effects to wild horses from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would be able to conduct treatments on a limited acreage, as discussed above under Soil Resources. This alternative, however, would do little to return the 3 Bars ecosystem to its Potential Natural Community and improve the distribution and genetic health of wild horses.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
wheatgrass and forage kochia on the Rocky Hills Unit to enhance sagebrush cover, which could reduce forage for wild horses. While up to 50 percent of the unit could be treated, crested wheatgrass provides more forage for wild horses than would native vegetation. Long-term, wild horses would benefit from treatments that encourage growth of native forbs and grasses. Treatments would also help to move the associated ecological sites toward their Potential Natural Community, since most of the acreage within the HMAs is early- to mid-seral status. If the forage amount was increased within a given HMA, horses would likely be better distributed within the HMA. By stabilizing stream channels, revegetating treatment sites, and creating access to water sources, the BLM would reduce erosion and return riparian systems to a Proper Functioning Condition for the benefit of wild horses. Through these treatments, water quality, quantity, and duration would be improved within HMAs, with water availability improved during times of drought. Treatments that reduce the risk of future catastrophic wildfire through fuels reduction, including removal of noxious weeds and other invasive non-native vegetation, would also benefit wild horses.	remove downed wood and other hazardous fuels associated with thinning and removal of pinyon-juniper, thus increasing the risk of wildfire in pinyon-juniper treatment areas. These effects would not be beneficial to wild horses.	can be hand pulled or controlled using hand tools. Reseeding and replanting of restoration sites would be limited to small areas where shrubs and other vegetation would be planted by hand. Few fire and fuel breaks would be created. There would be little reduction in the risk of a catastrophic wildfire. Wild horse movement patterns and distribution, and availability and quality of forage and water, would be less under this alternative than the other action alternatives. These effects would be most noticeable during drought periods, harsh winters, or during periods of wild horse overpopulation. Thus, there would be negligible improvement in wild horse genetic diversity.	

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Cumulative Effects: Historic overgrazing and other natural- and human-caused factors have contributed to an increase in wildfire occurrence and intensity and to a decrease in native plant diversity, specifically in the understory of the sagebrush community. In addition, livestock congregation and concentrated use by overpopulation of wild horses near streams, springs, and wetlands has contributed to the loss of riparian habitat and forage, and degradation of stream channels and their ability to function appropriately and provide abundant and high quality water for wild horses. The Mount Hope Project would have an impact on wild horses in the CESA by removing approximately 14,200 acres of wild horse habitat and prohibiting wild horse access to natural watering sources and forage. Long-term, hazardous fuels reduction, habitat improvement, and noxious weeds and other invasive non-native vegetation control projects would occur on about 66,000 acres within the HMAs, or about 26 percent of HMA acreage within the CESA. Although the cumulative effects of human disturbance, mining and other development, and wildfire in the CESA would impact wild horse forage and water quality and quantity, treatments to improve forage and water quantity and quality, livestock	**Cumulative Effects:** Under Alternative B, about half as many acres would be treated to reduce wildfire risk and its impacts on wild horse forage and water quality, including use of prescribed fire and wildland fire for resource benefit to restore natural fire regimes, than under Alternative A. By not using fire on the 3 Bars Project area, there would be no risks to vegetation and wild horse forage from fire on several thousand acres annually. However, long-term benefits to wild horses that could be derived from prescribed fire and wildland fire for resource benefit would not occur under this alternative, including improving pinyon-juniper health, creating a mosaic of habitat, slowing pinyon-juniper encroachment, making vegetation more fire resilient, creating openings in pinyon-juniper habitat to promote shrub, forb, and grass development, and reducing the risk of catastrophic wildfire. Hazardous fuels reduction and habitat improvement projects and other land uses would occur on about 37,000 acres within HMAs, or about 18 percent of HMA acreage within the CESA (1 percent annually). Although 3 Bars Project treatments would improve the physical and genetic health of wild horses and help to better distribute wild horses across the 3 Bars Project area, these benefits would be less than under	**Cumulative Effects:** Adverse, short-term effects to vegetation associated with the use of fire and mechanized equipment would not occur under Alternative C. The risk of wildfire and its impacts on the water and vegetation used by wild horses would likely increase on the 3 Bars Project area under this alternative. The BLM would not be able to use mechanical methods and fire to reduce hazardous fuels, create fire and fuel breaks, thin and remove pinyon-juniper to promote more fire resilient vegetation, and remove downed wood and slash. Restoration treatments would impact about 22,000 acres within HMAs, or about 9 percent of the HMA acreage in the CESA; less than 1 percent of the acreage on the CESA would be affected annually. These treatments would help to restore plant communities back to their Potential Natural Community and would improve the physical and genetic health of wild horses, but not to the extent that would occur under Alternatives A and B.	**Cumulative Effects:** There would be no cumulative effects on wild horses from 3 Bars Project treatments as no treatments would be authorized under this alternative. Based on historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually in the CESA to reduce hazardous fuel levels and improve ecosystem health, and only about a third of these treatments would occur on HMAs, under current and reasonably foreseeable future authorized actions. The BLM would restore little riparian habitat. Thus, water quality would remain degraded and water availability could be limiting, especially during droughts, for wild horses. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing wildfires in pinyon-juniper would likely increase. There would be few benefits to wild horse habitat, and their physical and genetic health, and comprehensive improvement to habitat components or movement patterns would not occur long-term.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
adjustments, wild horse gathers, and reduction of hazardous fuels would help offset the effects, and improve wild horse habitat quantity and quality as well as the physical and genetic health of the populations long-term and lead to a better distribution of wild horses across the HMAs within the CESA. Long-term benefits from treatments would be greater under this alternative than the other alternatives.	Alternative A, particularly in light of the cumulative impacts to wild horse habitat loss that could be realized from implementation of the Mount Hope Project.		
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON LIVESTOCK AND RANGELAND CONDITIONS			
Direct and Indirect Effects: Short-term, some treatment methods could result in a temporary loss of forage for livestock. Livestock injury or death could occur as a result of project activities, most likely from a vehicle-livestock collision. Temporary exclosure fencing could interfere with livestock use of treatment areas and with the movement patterns of livestock. Treatments could result in short-term water quality impacts from soil erosion and sedimentation of streams. Long-term, treatments that improve woodland, rangeland, and riparian health, productivity, and functionality would benefit livestock and their health. Riparian treatments should help several streams achieve Proper Functioning Condition and improve water flows and quality to the benefit of livestock. Removal of pinyon-	**Direct and Indirect Effects:** Because the BLM would not be able to use fire, there would be none of the adverse effects associated with fire. In particular, there would be no loss of forage, impacts to water quality from soil erosion, and potential spread of noxious weeds and other invasive non-native vegetation in burned areas. With no use of fire proposed by the BLM, permittees would likely have more flexibility in managing their herds as treatment areas would generally be smaller. Many treatments would take longer to complete, such as those where pinyon-juniper, and noxious weeds and other invasive non-native species, are controlled using mechanical or manual treatments instead of fire, or where stream channel and riparian habitat restoration are proposed. Thus, the time that permittees	**Direct and Indirect Effects:** The consequences of not using fire under Alternative C would be the same as those discussed under Alternative B. Under Alternative C, many treatments would take longer to complete, such as those where pinyon-juniper and noxious weeds and other invasive non-native species are controlled using manual treatments instead of fire and mechanical methods, or where stream channel and riparian habitat restoration are proposed. Thus, the time that permittees would have to adjust their grazing plans could be longer than under Alternative A. Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. Noise and other disturbance would be less with	**Direct and Indirect Effects:** There would be no direct or indirect effects to livestock from 3 Bars Project treatments as no treatments would be authorized under this alternative. Thus, this alternative would not return the 3 Bars ecosystem to its Potential Natural Community and improve rangeland conditions for livestock.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
juniper near streams could increase stream flows. Treatments to reduce hazardous fuels, remove noxious weeds and other invasive non-native vegetation, and restore native, fire resilient vegetation would reduce the risk of wildfire and its adverse impacts on forage and water quality and quantity to the benefit of livestock. Removal of pinyon-juniper in several drainages on Roberts Mountains would provide forage for livestock in areas once dominated by pinyon-juniper, and may facilitate livestock movements between valley and mountain use areas. On the Rocky Hills Unit, the BLM would remove crested wheatgrass and re-seed or re-plant the area with sagebrush. This could result in the loss of forage for livestock, and may require that the BLM temporarily suspend animal unit months (AUMs) during the treatment.	would have to adjust their grazing plans could be longer than under Alternative A. Acres and types of wetland and riparian habitat treated would be similar to Alternative A, and the BLM could use temporary exclosure fencing to protect treatment areas. However, less effort would be spent by the BLM on slowing pinyon-juniper encroachment into sagebrush and riparian communities, reducing the amount of Phase II and III pinyon-juniper treated using stand-replacement fires, reducing the amount of historic sagebrush habitat restored, and reducing the acres of priority habitat treated to improve species diversity, especially through cheatgrass control. Thus, there would be fewer gains in forage production outside of riparian zones, and greater risk of habitat loss from catastrophic wildfire, under this alternative than Alternative A. Because fire would not be available to reduce hazardous fuel loads, Alternative B may pose a greater long-term risk for wildfire due to the accumulation of fuels. Thus, overall benefits to livestock from treatment actions would be less under this alternative than under Alternative A.	manual methods than the other methods. Because land disturbance would be greater using mechanical methods and fire than it would be with manual and classical biological control methods, short-term adverse effects to livestock drinking water quality from soil erosion, and loss of non-target vegetation, would be less under this alternative than under Alternatives A and B. By not being able to use mechanical equipment, however, the BLM would also not be able to conduct stream engineering and restoration, except on a limited basis on only a few stream miles; control noxious weeds and other invasive non-native vegetation, except on very small areas where this vegetation can be hand pulled or controlled using hand tools; reseed and replant restoration sites, except for small areas where shrubs and other vegetation would be planted by hand or mowed to promote development of desirable forbs and grasses; or create fire and fuel breaks to reduce the risk of fire spread. As a result, there would be less improvement in forage and water quantity and quality, and more risk of catastrophic wildfire than under the other action alternatives. Overall benefits to livestock from treatment actions would be less under this alternative than under Alternatives A and B.	

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Cumulative Effects: Rangeland health studies have shown a need to improve the quantity and quality of forage within allotments. In addition, livestock often congregate near streams, springs, and wetlands, causing degradation of riparian habitat and forage, and impacts to stream channels and their ability to function appropriately and provide abundant and high quality water for livestock. A total of 813 AUMs in the Romano and Roberts Mountain Allotments would be lost for 70 years or more as a result of the 14,300-acre Mount Hope Project. The BLM would treat about 127,000 acres in the 3 Bars Project area, and an additional 15,000 acres under existing and future authorizations, over the next 10 to 15 years within the CESA, or about 11 percent of the CESA. Short-term, there would be disturbance to and loss of vegetation, particularly pinyon-juniper and non-native vegetation, and there could be an increase in noxious weeds and other invasive non-native vegetation, from treatments. Long-term, these treatments should result in vegetation that is healthier, more fire resilient, abundant, and diverse, and that is similar to the Potential Natural Community. The BLM would conduct stream bioengineering and plantings on about 31 miles of stream to slow stream flow and create pools and wet	**Cumulative Effects:** By not using fire on the 3 Bars Project area, there would be no risks to livestock forage from fire on several thousand acres annually within the 3 Bars Project area. Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or about 6 percent of the CESA. Overall, there would be a net beneficial accumulation of effects from BLM treatments long-term that would help to offset adverse effects to livestock from other reasonably foreseeable future actions, but not to the extent as would occur under Alternative A.	**Cumulative Effects:** By not being able to use mechanical methods, fire, and livestock to reduce hazardous fuels, create fire and fuel breaks, and remove downed wood and slash, the risk of wildfire and its impacts on vegetation and water used by livestock would likely increase on the 3 Bars Project area. Hazardous fuels reduction and habitat improvement projects would occur on about 32,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or about 4 percent of the acreage within the CESA. Overall, there would be a net beneficial accumulation of effects from BLM treatments long-term that would help to offset adverse effects to livestock from other reasonably foreseeable future actions, but not to the extent as would occur under Alternatives A and B.	**Cumulative Effects:** There would be no cumulative effects on livestock from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would be able to conduct treatments on a limited acreage, as discussed above under Soil Resources, to benefit livestock within the CESA. BLM treatments would help to offset some of the effects to livestock from non-3 Bars Project actions, but not to the extent as would occur under the action alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
meadows to improve wetland and riparian habitat and water flows and quality. In addition, the BLM would thin and remove pinyon-juniper and noxious weed and other invasive non-native vegetation, and create fire and fuel breaks to reduce this risk of catastrophic wildfire and its spread. These beneficial effects would help to offset some of the adverse effects to livestock from other reasonably foreseeable future actions in the CESA.			
Mitigation: *Riparian Treatments Monitoring and Mitigation*: 1) Prior to implementation of a treatment, the BLM will review the current livestock grazing management and resource conditions, such as the season of use and Proper Functioning Condition rating, and determine if changes in the current terms and conditions of the grazing permit will be required to maintain the long-term success of the proposed treatment. Changes to the permitted use will be completed through the issuance of subsequent grazing decisions in accordance with 43 CFR §§ 4110.3, 4130.3-3, and 4160.2). To ensure treatment success, the following modifications may be made to the Terms and Conditions of the grazing permit: a) Timing and Duration of Grazing: The season of use may shifted to avoid hot season grazing (July – September) or the	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
duration of grazing may be shortened to give the riparian vegetation time to recover; b) Average stubble height of at least 4 to 6 inches will be maintained for herbaceous riparian vegetation with consideration for habitat. If stubble height limits are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely; c) Streambank alteration rates would be set to a level appropriate to the particular stream in accordance with Guidelines for Establishing Allowable Levels of Streambank Alteration (Cowley 2002). Based on the characteristics of the streams and the presence of Lahontan cutthroat trout, the streambank alteration rates would range from 10 to 20 percent. If designated streambank alteration rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely; d) Utilization rates will not exceed 35 percent for woody species. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely (Wyman et al. 2006); and e) Existing non-functioning water developments and fences may be required to be repaired prior to implementation of the treatment if contributing to			

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
unacceptable use patterns by livestock. 3) Season of use may be modified to exclude hot season grazing from July 1 to September 30 annually. *Aspen Treatments Monitoring and Mitigation*: 1) Temporary fences may be used to exclude wildlife and livestock grazing within the treatment area until the following criteria are met, and then they will be removed: a) A mean sucker height of 7 feet with a minimum of 10,000 stems per acre within the treatment area (Kay 2002). 2) To ensure proposed treatment success, the following stipulations may be added to the Terms and Conditions of the grazing permit: a) The season of use may be shifted to late season (beginning of September; Jones 2010); b) If the season of use is not shifted to late season, then utilization of terminal leader browse on branches and suckers will be less than or equal to 20 percent. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely; and c) Existing non-functioning water developments and fences may be required to be repaired prior to implementation of the treatment if contributing to unacceptable use patterns by livestock.			

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Pinyon-juniper and Sagebrush Treatments Monitoring and Mitigation: 1) Prior to implementation of any seeding treatment, the BLM will ensure proper livestock management. 2) If changes to the permitted use are necessary, those changes will be completed through the issuance of subsequent grazing decisions in accordance with 43 CFR §§ 4110.3, 4130.3-3, and 4160. 3) To ensure treatment success, the following modifications may be made to the Terms and Conditions of the grazing permit: a) Timing and Duration of Grazing: The season of use may be shifted or the duration of grazing may be shortened to give the vegetation time to recover from grazing; b) In mountain big sagebrush communities, utilization rates will not exceed 45 percent for upland herbaceous species and 35 percent for upland shrub species. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely as outlined in *Range Management, Principles and Practices* (Holechek et al. 1998); c) In Wyoming and basin big sagebrush communities, utilization rates will not exceed 35 percent for upland herbaceous species and 35 percent for upland shrub species. If utilization rates are reached, the permittee will have 5 days to move			

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
livestock to the next pasture in the rotation or from the allotment entirely as outlined in Holechek et al. (1998); d) In black sagebrush communities, utilization rates will not exceed 45 percent for upland herbaceous species and 35 percent for upland shrub species. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely as outlined in Holechek et al. (1998); and e) Existing non-functioning water developments and fences may be required to be repaired prior to implementation of the treatment if contributing to unacceptable use patterns by livestock. 4) Season of grazing use may be modified to provide growing season deferment and dormant season grazing.			
SUMMARY OF EFFECTS ON VISUAL RESOURCES			
Direct and Indirect Effects: In the short-term, removal of vegetation would affect the visual qualities of treatment sites by creating hard-edged openings and other vegetation-free areas that provide a noticeable visual contrast to the surrounding areas. Treatments could create visually distinct areas of discolored vegetation, which could contrast markedly from surrounding areas of healthy vegetation. Impacts would last for the longest amount of time in pinyon-juniper stands where large trees and shrubs are	**Direct and Indirect Effects:** Without the use of fire, there would be no localized deterioration of air quality and reduced visibility caused by smoke, no blackened appearance of treated areas and blackened stumps and snags that would create a color contrast, and no spread of noxious weeds and other invasive non-native vegetation in burned areas. However, long-term improvements in pinyon-juniper stand health, replacement of pinyon-juniper stands with sagebrush, forbs, and grasses, and removal of encroaching pinyon-	**Direct and Indirect Effects:** By not being able to use fire and mechanical equipment, there would be no adverse visual effects associated with burned vegetation; creating openings in pinyon-juniper stands from removal of vegetation; creating long linear features for fire and fuel breaks; or causing surface disturbance from disking/tilling/harrowing to restore areas invaded by cheatgrass. The BLM would also leave less dead plant material on the ground to turn brown. Under Alternative C, the BLM would not be able	**Direct and Indirect Effects:** There would be no direct effects to visual resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. This alternative would also do little to return the 3 Bars ecosystem to its Potential Natural Community and restore Proper Functioning Condition to wetlands and riparian zones, to the benefit of visual resources on the project area.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
removed. Long-term, treatments would result in plant communities that are dominated by native species. Native-dominated communities tend to be more diverse, and thus more visually appealing, than plant communities that have been overtaken by the surrounding monoculture (such as pinyon-juniper encroaching on riparian zones). Treatments that reduce the risk of wildfire should reduce the visual impacts associated with large expanses of burned vegetation. Efforts to restore native, fire-resilient vegetation would make these areas more visually appealing, and would reduce the risk of future wildfires.	juniper using prescribed fire and wildland fire for resource benefit, and the resultant improvement in the visual qualities of the landscape, would not occur over several thousand acres annually. Without the use of fire to reduce hazardous fuel loads, Alternative B could pose a greater long-term risk for wildfire due to the accumulation of fuels. The BLM would not be able to promote more fire resilient and diverse habitat on the 3 Bars Project area. An increase in wildfire risk under Alternative B than under Alternative A could lead to a long-term reduction in the visual qualities of the landscape. Although short-term impacts to visual resources would be less under this alternative than Alternative A, there would be less long-term improvement in the scenic quality of the 3 Bars Project area under Alternative B than under Alternative A.	to conduct stream engineering and restoration to improve native riparian habitat, except on a limited basis on only a few stream miles; control noxious weeds and other invasive non-native vegetation, except on very small areas where this vegetation can be hand pulled or controlled using hand tools; reseed and replant restoration sites, except for small areas where shrubs and other vegetation would be planted by hand; or create fire and fuel breaks to reduce the risk of wildfire spread. The BLM would only be able conduct hazardous fuels treatments and remove downed woody material from treatments on a limited acreage. Thus, the risk of catastrophic wildfire, and its effects on the visual landscape, would be greater under Alternative C than under the other action alternatives. Overall, there would be less improvement in the visual quality of the 3 Bars Project area under this alternatives than under Alternatives A and B.	
Cumulative Effects: Past and present actions discussed above for soil resources have affected visual resources within the CESA. In addition, the Mount Hope Project would disturb about 8,300 acres. There would be a moderate to strong contrast in form, line, and color between the existing landscape and the post-mining landscape associated with the	**Cumulative Effects:** Under Alternative B, less effort would be spent by the BLM on treatments to reduce wildfire risk and its impacts on visual resources. By not using fire, there would be no visual effects associated with fire on several thousand acres annually within the 3 Bars Project area. This includes the effects of smoke, dead and dying vegetation, and a charred	**Cumulative Effects:** Adverse, short-term effects to scenic resources, primarily vegetation, associated with the use of fire and mechanized equipment would not occur under Alternative C. Fire and mechanized equipment could be used in other portions of the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire under current	**Cumulative Effects:** There would be no cumulative effects on visual resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. As discussed above under soil resources, existing and future authorizations would improve ecosystem functionality on a limited acreage, to the benefit of visual resources. Based on

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Mount Hope Project. Most of the area encompassed by the mine project is Visual Resource Management (VRM) Class IV; however, the changes in the landscape would conform to VRM objectives. Proposed hazardous fuels reduction and habitat improvement treatments would occur on about 127,000 acres for the 3 Bars Project, and on about 15,000 acres in other portions of the CESA under current and future authorizations, or collectively on about 5 percent of the CESA. Treatments would help to offset some of the adverse effects to visual resources from other reasonably foreseeable future actions in the CESA, and to a greater extent than would occur under the other alternatives.	landscape. However, the use of fire could occur on a few hundred acres annually outside the 3 Bars Project treatment areas. Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or only about 3 percent of the acreage within the CESA. Still, there would be a long-term net benefit from BLM treatments that would help to offset some of the adverse effects to visual resources from other reasonably foreseeable future actions, but not to the extent as would occur under Alternative A.	and future authorizations. By not being able to use mechanical methods, disking, plowing, shredding, and mulching would not occur that would cause a visual contrast with untreated areas. The BLM, however, would not be able to use fire and mechanical methods to restore riparian, aspen, pinyon-juniper, and sagebrush habitats, restore areas dominated by cheatgrass and other noxious weeds and invasive non-native vegetation, or restore degraded stream channels and riparian zones, to the detriment of the scenery on the 3 Bars Project area. The BLM would also be less able to reduce hazardous fuels and construct fire and fuel breaks, and reduce the risk of catastrophic wildfire and its effects on the scenery. Hazardous fuels reduction and habitat improvement projects could occur on about 32,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or only about 2 percent of the acreage within the CESA. There would be a long-term net benefit from BLM treatments that would help to offset some of the adverse effects to visual resources from other reasonably foreseeable future actions, but not to the extent as would occur under Alternatives A and B.	historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually in the CESA. Thus, the BLM would not move rangelands toward their Potential Natural Community or restore Proper Functioning Condition in wetlands and riparian zones. The trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would likely increase. As a result, visual resource conditions would likely continue to deteriorate within the CESA.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON LAND USE AND ACCESS			
Direct and Indirect Effects: Adverse	**Direct and Indirect Effects:** Because fire	**Direct and Indirect Effects:** Because fire	**Direct and Indirect Effects:** There would

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
effects to land use include short-term access limitations to land uses and current land use authorizations. Treatments that reduce the risk of future catastrophic wildfire through fuels reduction would reduce the risk of loss of life, property, constructed facilities on public land, and resources on the 3 Bars Project area. Treatments would not result in long-term, substantial conflicts with existing land uses, changes in land use designations, or reduction in opportunities for rights-of-way authorizations and development activities. Additionally, there would not be a substantial reduction in opportunities for land tenure adjustments. The BLM would have the ability to issue new authorizations needed to implement treatments, including restricting access to an area and closing treatment areas to livestock and humans for periods of time needed to ensure treatment success.	would not be available to reduce hazardous fuel loads and improve habitat, Alternative B may pose a greater long-term risk for wildfire than Alternative A due to the accumulation of fuels that could lead to loss of life and property. Without the use of prescribed fire, treatments could take longer, especially those needed to thin and remove Phase II and III pinyon-juniper stands, and the public may be restricted from accessing treatment sites for longer periods than if fire could be used. There could be temporary access restrictions from treatments, but treatments would not preclude future land use authorizations within the project area, and would not conflict with county and BLM land use objectives.	and mechanical methods would not be available to reduce hazardous fuel loads and improve habitat, Alternative C would pose a greater long-term risk for wildfire than the other action alternatives due to the accumulation of fuels that could lead to loss of life and property. Without the use of fire and mechanical methods, treatments would take longer, especially those needed to thin and remove Phase II and III pinyon-juniper stands, restore lands dominated by cheatgrass and other noxious weeds and other invasive non-native vegetation, or to restore stream channels. Thus, the public may be restricted from accessing treatment sites for longer periods than if fire and mechanical methods could be used. There could be temporary access restrictions from treatments. Treatments would not preclude future land use authorizations within the project area, and would not conflict with county and BLM land use objectives.	be no direct effects to land use and access from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not take actions to reduce wildfire risk, so there would be no short-term access restrictions.
Cumulative Effects: Permanent features or exclusion areas associated with the Mount Hope Project and future land development actions, in combination with 3 Bars Project activities, could impact future rights-of-way authorizations, development activities, and land tenure adjustments, and conflict with Eureka County and BLM land use objectives.	**Cumulative Effects:** By not using fire on the 3 Bars Project area, there would be no land access restrictions associated with use of prescribed fire and wildland fire for resource benefit on several thousand acres annually within the 3 Bars Project area. However, by not conducting fire treatments to reduce the risk of wildfire, the potential for wildfire to adversely	**Cumulative Effects:** By not being able to use mechanical methods and fire, the BLM would treat fewer acres to reduce hazardous fuels, create fire and fuel breaks, remove downed wood and slash, control noxious weeds and other invasive non-native vegetation, and improve vegetation health and condition to make it more resilient to wildfire. Thus, the	**Cumulative Effects:** There would be no cumulative effects on land use and access from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but only on about 1,500 acres annually. 3 Bars Project

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
These effects would be greatest under Alternative A. Wildfires could adversely affect life and property, access, and resource use, on or near the 3 Bars Project area. The BLM is proposing to treat about 127,000 acres on the 3 Bars Project area, and about 15,000 acres elsewhere in the CESA under current and reasonably foreseeable future authorizations to restore ecosystem health. 3 Bars Project treatments, and potential short-term access restrictions, could occur on about 17 percent of the CESA under Alternative A. There would be no permanent features or exclusion areas associated with 3 Bars Project actions.	affect life and property, access, and resource use on or near the 3 Bars Project area would be greater than under Alternative A. 3 Bars Project treatments, and potential short-term access restrictions, would occur on about 78,000 acres, or about 8 percent of the CESA under Alternative B. There would be no permanent features or exclusion areas associated with 3 Bars Project actions.	potential for wildfire to adversely affect life and property, access, and resource use, on or near the 3 Bars Project area, would be greater than under Alternatives A and B. 3 Bars Project treatments, and potential short-term access restrictions, would occur on about 47,000 acres, or 4 percent of the CESA under Alternative C. There would be no permanent features or exclusion areas associated with project actions.	treatments, and potential short-term access restrictions, would occur on about 2 percent of the CESA under Alternative D. There would be no permanent features or exclusion areas associated with 3 Bars Project actions.
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON RECREATION			
Direct and Indirect Effects: There would be some short-term scenic impacts, as well as distractions to users (e.g. , noise from machinery), from treatments. Some areas would be off-limits to recreational activities as a result of treatments, for periods ranging from a few hours to days, or even 1 full growing season or longer, depending on the treatment. There could be temporary displacement of wildlife for both consumptive (e.g., hunting, fishing) and non-consumptive (e.g., wildlife viewing, photography) users. Users of the Pony Express National Historic Trail could potentially be impacted by treatment	**Direct and Indirect Effects:** Because the BLM would not be able to use fire, there would be none of the adverse effects associated with this treatment type. However, with greater reliance on mechanical methods, there may be greater disturbance to the public from the use of mechanical equipment than would occur under Alternative A. There would be fewer gains in wildlife forage production outside of riparian zones, and greater risk of habitat loss from catastrophic wildfire, under this alternative than under Alternative A. Some treatments to improve historic pinyon-juniper	**Direct and Indirect Effects:** The consequences of not using fire under Alternative C would be the same as those discussed under Alternative B. Effects to visitors from noise and disturbance associated with mechanical treatment equipment would not occur under this alternative. By not being able to use mechanical equipment, however, there would be less improvement in vegetation and water quantity and quality, and more risk of catastrophic wildfire, than under Alternatives A and B. Under Alternative C, the BLM would not substantially improve the native vegetation community	**Direct and Indirect Effects:** There would be no direct or indirect effects on recreation from 3 Bars Project treatments as no treatments would be authorized under this alternative. Thus, long-term loss of recreational opportunities and deterioration in the visitor experience would be greatest under Alternative D.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
activity and noise during implementation of the treatments and the visual aspects of the recreational experience of the trail may be affected in the short-term until vegetation recovers to the point where it no longer appears that it has been manipulated. Long-term, improved fish and game habitat and populations should provide additional and/or improved hunting and fishing opportunities. Improved habitat should enhance the overall scenic quality of the area, while removal of noxious weeds and invasive non-native vegetation would reduce the likelihood of visitors being harmed or inconvenienced by these plants, and could influence the visitor experience. Riparian projects would be beneficial to anglers if they lead to improved fish populations. Prescribed burns would require the closure of burn areas to visitors during burn activities. People recreating in nearby areas would be able to see and perhaps smell smoke. The potential for smoke inhalation could result in some health risks to these users, A reduction in wildfire risk, however, should lead to fewer temporary closures to protect human safety (i.e., fewer public access constraints from fires). As a result of thinning and removal treatments, the number of pinyon pine and juniper trees within woodland products harvest areas would be reduced.	communities would occur, which could benefit future pine nut harvest in these areas long-term, but the acreage benefiting from these treatments would be substantially less than under Alternative A.	nor stop the loss of important ecosystem components. As a result, the visitor use experience could decline long-term.	

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Cumulative Effects: In general, while there are locally important recreation resources in the CESA, the types of dispersed recreation resources available in the area are not of regional or national significance except for the Pony Express National Historic Trail, which has been Congressionally designated as a recreational resource. Recreational use within the CESA is likely to increase proportionally to changes in the regional population. To reduce the risk of catastrophic wildfire and to restore the health and resiliency of native vegetation, the BLM would treat up to 127,000 acres to reduce hazardous fuels. The BLM also proposes to treat hazardous fuels on an additional 15,000 acres under current and reasonably foreseeable future authorizations in high to very high fire risk areas within other portions of the CESA. Recreational access to treatment areas could be restricted during the treatment period, and it is likely that the treated area would have few recreation values for several years after treatments. Over time, this reduction in fuels, however, would allow for more natural forage within the analysis area, benefiting game populations and hunting opportunities and improving the health of pinyon-juniper stands, which could benefit nut production. In addition, treatments would reduce the risk of	**Cumulative Effects:** By not using fire, the amount of area disturbed by treatments would generally be smaller, and have less impact on fish and wildlife resources and scenery, than other treatment methods. However, fewer acres would also be treated to restore landscape health and habitat for fish and game, and reduce the risk of catastrophic wildfire, and would not likely offset the increased potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area. About 63,000 acres of vegetation, and 31 miles of stream, would be disturbed from the 3 Bars Project, or only about 2 percent of the CESA. Treatments would result in localized effects and would not substantially alter the availability of dispersed recreation opportunities in the CESA or larger region. Still, there would be a long-term net benefit from BLM treatments that would help to offset some of the adverse effects to recreation resources from other reasonably foreseeable future actions. Actions would provide more recreation opportunities for a growing population, but not to the extent as would occur under Alternative A.	**Cumulative Effects:** By not being able to use fire and mechanical methods there would be less disturbance to public from treatments compared to Alternatives A and B. Without the use of fire and mechanical methods, however, the BLM would do little to improve ecosystem health. The risk of wildfire and its effects on recreation would likely increase, while there would be few benefits to fish and game, under this alternative compared to Alternatives A and B. About 32,000 acres of vegetation, and 8 miles of stream, would be disturbed from the 3 Bars Project, or only about 1 percent of the CESA. Treatments would result in localized effects and would not substantially alter the availability of dispersed recreation opportunities in the CESA or larger region. Still, there would be a minor long-term net benefit from BLM treatments that would help to offset some of the adverse effects to recreational resources from other reasonably foreseeable future actions. Actions would provide more recreational opportunities for a growing population, but not to the extent as would occur under Alternatives A and B.	**Cumulative Effects:** There would be no cumulative effects on recreation from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but only on about 1,500 acres annually. Thus, benefits to the recreating public would be substantially less under this alternative than under the action alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
catastrophic wildfire, which would benefit native plant communities and fish and game within the CESA. 3 Bars Project treatments would occur on only about 5 percent of the CESA. Treatments would result in localized effects and would not substantially alter the availability of dispersed recreation opportunities in the CESA or larger region.			
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON WILDERNESS STUDY AREAS AND OTHER SPECIAL MANAGEMENT AREAS			
Direct and Indirect Effects: Treatments within the Roberts Mountains and Simpson Park WSAs could temporarily impair the wilderness characteristics of solitude, naturalness, and primitive and unconfined recreation within and adjacent to these areas. The overall effect of treatments on the WSAs would depend on whether the end condition of the treatment site (considering both long-term benefits and short-term effects) was an improvement in wilderness characteristics. In many cases (e.g., an eradication of a small population of an incipient pest, a prescribed fire that mimicked historical fire), communities in the treatment area would quickly recover, and the overall effect would be positive. Manual treatments would be the least obtrusive method to use in WSAs and the most appropriate. Manual treatment methods	**Direct and Indirect Effects:** The BLM anticipates treating about half as many acres (about 200 acres) within WSAs under Alternative B as under Alternative A. Without the use of fire, there would be no localized deterioration of air quality and reduced visibility caused by smoke, no disturbance, and no blackened appearance that could affect the naturalness of treatment areas. As noted under Alternative A, though, only a few acres, if any, would be treated using fire in WSAs so the adverse and beneficial effects of not using fire would be negligible under this alternative. As noted under Alternative A, users of the Pony Express National Historic Trail may detect activity and noise during project implementation and the effects of the treatments may be visible from the trail in the short-term until the vegetation no	**Direct and Indirect Effects:** Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation. Fire and mechanical treatments would seldom be used under Alternatives A and B, so the cumulative effects associated with WSA treatments among the alternatives would show few differences. As noted under Alternative A, users of the Pony Express National Historic Trail may detect activity and noise during project implementation and the effects of the treatments may be visible from the trail in the short-term until the vegetation no longer shows signs of manipulation.	**Direct and Indirect Effects:** There would be no direct or indirect effects on WSAs and the Pony Express National Historic Trail from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but on only about 1,500 acres annually. Little, if any, acreage would be treated within WSAs.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
are typically focused on small areas, which would have localized impacts on naturalness, solitude, and primitive and unconfined recreation. Although an appropriate buffer would be applied to minimize impacts to the Pony Express National Historic Trail, users of the trail may still detect activity and noise during project implementation and the effects of the treatments may be visible from the trail in the short-term until the vegetation no longer shows signs of manipulation.	longer shows signs of manipulation.		
Cumulative Effects: Historic livestock grazing practices, wild horse use, and other natural- and human-caused factors have led to impacts to riparian and aspen habitat, establishment and spread of noxious weeds and other invasive non-native vegetation, and the expansion of pinyon-juniper beyond its historical ranges in portions of the WSAs. To reduce wildfire risk and improve ecosystem health, approximately 127,000 acres would be treated annually on the 3 Bars Project area, and an additional 15,000 acres could be treated under current and future authorizations within the CESA, or about 16 percent of the CESA, but only on about 1 percent of WSAs. Although the acreage treated within WSAs would be small, treatments elsewhere in the CESA would help to reduce hazardous fuels and improve ecosystem health, and reduce the	**Cumulative Effects:** Because fire would be used sparingly within WSAs under Alternative A, its lack of use under Alternative B would be insignificant. Without being able to use fire on other portions of the CESA, the BLM would be less successful in reducing the risk of catastrophic wildfire within the CESA, and would not likely offset the increased potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area compared to Alternative A. As demonstrated by wildfires in 1999, wildfires can have substantial effects on WSAs and could also affect the scenery on and near the Pony Express National Historic Trail.	**Cumulative Effects:** Adverse, short-term effects to wilderness characteristics, primarily solitude and visual qualities, associated with the use of fire and mechanized equipment would not occur under Alternative C. However, fire and mechanical treatments would seldom be used in WSAs under Alternatives A and B, so the cumulative effects associated with WSA treatments among the alternatives would show few differences. The BLM would treat only about 10 acres annually in the WSAs, and about 47,000 acres within the remainder of the CESA, or about 4 percent of the CESA under Alternative C. The risk of wildfire and its adverse impacts on WSAs and lands near the Pony Express National Historic Trail would likely be greater on the 3 Bars Project area than under Alternatives A and	**Cumulative Effects:** There would be no cumulative effects on WSAs or the Pony Express National Historic Trail from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but only on about 1,500 acres annually. Thus, benefits to the WSAs and the Pony Express National Historic Trail would be less under this alternative than under the action alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
potential for wildfire that could have substantial adverse affects on WSAs and lands on and near to the Pony Express National Historic Trail.		B.	
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON CULTURAL RESOURCES			
Direct and Indirect Effects: Manual methods would result in general surface disturbance that could disrupt the spatial context of archaeological constituents, mulching with organic materials would compromise radiometric dating, and the use of hard-edged tools could damage artifacts. There is also the potential for unauthorized collection of artifacts by workers. The use of a track hoe or back hoe for stream channel restoration, and mechanical treatments on upland sites, could damage surface and subsurface cultural resources if the sites are not avoided. Mechanical treatments could also result in surface and shallow subsurface disturbance that would likely introduce organic materials to lower soil layers, thereby contaminating any surface or shallow subsurface cultural resources. Archaeological materials may be	**Direct and Indirect Effects:** Mechanical and fire treatments have the greatest potential for harming cultural resources. Prescribed fire and wildland fire for resource benefits would not be used on several thousand acres annually, as they would under Alternative A. Fire has the potential to cause inadvertent effects to cultural sites. Under Alternative B, the BLM would be unable to restore fire as an integral part of ecosystem restoration. It is unlikely that the BLM would be able to slow the spread of noxious weeds and other invasive non-native vegetation, including cheatgrass. Cheatgrass is a major contributor to providing fuel for wildfire. It is unlikely that the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse in the long-term, which	**Direct and Indirect Effects:** Given that mechanical and fire treatments, and to a lesser extent biological treatments using livestock, have the greatest potential to harm cultural sites, these risks would be eliminated under this alternative. However, large numbers of workers and their vehicles would be needed to accomplish proposed treatments under this alternative. Vehicle miles traveled would likely be greatest under this alternative and vehicles could crush cultural materials. Increased number of workers could increase the potential for looting. Downed trees and slash material from treatments would be difficult to remove without mechanical equipment or pile burning. Some downed wood and slash could be sold, used for biomass, or made available to the public as firewood, but the demand for this wood is unknown. The	**Direct and Indirect Effects:** There would be no direct or indirect effects on cultural resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The long-term threat to historic resources from wildfire would be greatest under Alternative D.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
damaged, destroyed, or remain essentially unaffected by prescribed fire. Wooden structures or wooden parts of stone structures (such as those within the Roberts Creek Unit) are very susceptible to fire. Long-term, stabilization and restoration of riparian systems would reduce streambank erosion and ensure that cultural and paleontological resources buried near streams remained intact. Uncontrolled wildfire, similar to prescribed fire, has the potential to significantly impact cultural resources. By improving ecosystem health and resiliency and reducing hazardous fuels, the risk of an uncontrolled catastrophic wildfire that could adversely affect historic properties would be reduced under this alternative.	would continue to be a threat to historic properties and this threat would be greater under Alternative B than under Alternative A.	number of miles of fire and fuel breaks created under this alternative would be substantially less than for Alternatives A and B as the BLM would not be able to use mechanical equipment to create fire and fuel breaks. Under Alternative C, it is unlikely the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse long-term, and wildfire would continue to be a threat to historic properties.	
Cumulative Effects: Past and present actions discussed above for Soil Resources have affected cultural resources within the CESA. In addition, the Mount Hope Project would disturb about 8,300 acres, which includes 80 prehistoric and 142 historic sites, and an additional 352 sites within the larger area of potential effects, which includes a portion of the 3 Bars Project area. Implementation of the Mount Hope Project would result in adverse impacts to 83 eligible sites, and these impacts would be considered significant. Under the 3 Bars Project and previous and reasonably foreseeable future	**Cumulative Effects:** Although use of fire would not occur within the 3 Bars Project area, the use of fire could occur on several hundred acres annually in the remainder of the CESA. By not using fire to reduce hazardous fuels and improve vegetation resiliency to fire, there would be a greater potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area under this alternative compared to Alternative A. Because 3 Bars Project actions would affect only about 6,350 acres annually, or 1 percent of the CESA, and treatment areas would be surveyed prior to treatment	**Cumulative Effects:** Adverse, short-term effects to cultural resources associated with the use of fire and mechanized equipment would not occur under Alternative C. However, fire and mechanized equipment could be used on about 1,500 acres annually on other portions of the CESA and outside of 3 Bars Project areas to improve habitat, remove hazardous fuels, and reduce the risk of wildfire, and could affect cultural resources in those areas. Because 3 Bars Project actions would affect only about 3,200 acres annually (less than 0. 5 percent of the CESA), and the BLM	**Cumulative Effects:** There would be no cumulative effects on cultural resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but only on about 1,500 acres annually. Thus, benefits to cultural resources would be less under this alternative than under the action alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
authorizations, the BLM would treat about 142,000 acres within the CESA, totaling about 11 percent of the CESA. The BLM would conduct surveys prior to treatments to determine whether there are additional cultural sites on these areas which could be impacted by treatment actions. Existing and newly found sites would be mitigated in accordance with the 2012 *Programmatic Agreement between the Mount Lewis Field Office of the Bureau of Land Management and the Nevada State Historic Preservation Officer regarding National Historic Preservation Act Compliance for the 3 Bars Ecosystem and Landscape Restoration Project, Eureka County, Nevada*. The Agreement was signed on September 5, 2012. Long-term, the 3 Bars Project and other restoration treatments should result in a landscape that is more fire resilient and similar to the Potential Natural Community. These activities would help to reduce the potential for streambank erosion and catastrophic wildfire and potential loss of cultural materials.	to avoid or reduce impacts to cultural sites, there would be a negligible cumulative effect to cultural resources from 3 Bars Project actions.	would conduct pre-treatment surveys for cultural resources to reduce the potential for effects to eligible sites, effects to cultural resources within the CESA would be negligible.	
Mitigation: 1) Consult with local Tribes in accordance with Stipulation III (A) of the *Programmatic Agreement between the Mount Lewis Field Office of the Bureau of Land Management and the Nevada State Historic Preservation Officer regarding National Historic Preservation Act*	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
Compliance for the 3Bars Ecosystem and Landscape Restoration Project, Eureka County, Nevada (**Appendix B**). 2) For each phase of the undertaking, the BLM shall evaluate cultural resources for National Register of Historic Properties (NRHP) eligibility, and consult with local Tribes or tribal members regarding areas of cultural or traditional religious importance, and consult with the State Historic Preservation Office and local Tribes regarding the NRHP determinations per Stipulation III(B) of the Programmatic Agreement. 3) Develop and implement appropriate treatment measures to mitigate adverse effects to historic properties, i.e., those resources determined eligible for inclusion in the NRHP, in accordance with Stipulation III(C) of the Programmatic Agreement. 4) Monitor treatment implementation according to the protocols outlined in Stipulation VII of the Programmatic Agreement, to insure that there are no inadvertent impacts to plant and wildlife of importance to traditional lifeways. 5) Human remains and burial items are sacred to the local Native American tribes. Therefore, the BLM shall provide training to all BLM and contract personnel to insure compliance with the Archaeological Resource Protection Act of 1979 (16 USC § 470), as amended, and			

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
insure that the remains and associated grave goods are treated with respect and are handled according to the provisions.			
SUMMARY OF EFFECTS ON NATIVE AMERICAN TRADITIONAL/CULTURAL VALUES, PRACTICES, AND RESOURCES			
Direct and Indirect Effects: Treatment activities that remove vegetation or alter the distribution, health, and welfare of plants and animals used by Native peoples would have the greatest potential to harm natural resources with associated traditional values. Manual treatment is highly selective and would have less of an effect on plants with traditional lifeway values than other treatment methods. Concerns have been expressed by local tribes regarding traditional pine nut harvesting in general and the removal of pinyon pine. Some seed-bearing trees would be destroyed or removed by mechanical or hand treatments and fire, and prescribed and wildland fires would require the construction of fuel breaks, which could also compromise plant species of importance to Native American lifeways. Fire may top-kill some plants used by Native Americans, but fire has been shown to enhance their long-term health and development. Treatments to enhance riparian vegetation and increase the number of miles of BLM-administered streams that are classified as "Proper Functioning," would provide good habitat for fish that are harvested by Native	**Direct and Indirect Effects:** Because the BLM would not be able to use fire, there would be none of the adverse or beneficial impacts associated with this treatment method. In particular, there would be no harm to or loss of native vegetation or fish and wildlife habitat from prescribed fire and wildland fire for resource benefit. There would also be no risk of a prescribed fire spreading beyond treatment boundaries and impacting native plants and fauna of interest to the Native American community, which could be the case under Alternative A. The few native plants and wildlife that are found in dense stands of pinyon-juniper may not experience habitat loss under this alternative. By not using fire, risks to non-target vegetation, including plants used by local tribes, from treatments would be negligible. Long-term, however, native vegetation and fish and game species would experience fewer of the benefits associated both with creating openings in dense pinyon-juniper habitat and creating a mosaic of pinyon-juniper and sagebrush habitat. Because fire would not be available to reduce hazardous fuel loads, Alternative B may pose a greater long-	**Direct and Indirect Effects:** Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. There would be fewer direct impacts to plants and animals used by Native Americans from treatments under this alternative than the other alternatives, because adverse impacts, such as harm to, or death of, plants and wildlife, and noise and other disturbance, would be much less with manual methods than with the other methods. Manual treatments would be small in scale and mostly targeted to pinyon-juniper stands. Under Alternative C, riparian restoration treatments would primarily be limited to manual treatments (placing logs and rocks in streams to slow water flows; using temporary exclosure fencing to exclude livestock, wild horses, and other wild ungulates; and stimulating aspen regeneration), which would help to create wet meadows and enhance riparian vegetation and fish and wildlife habitat. Under Alternative C, the BLM would not substantially improve the native vegetation community nor stop the loss of important ecosystem components,	**Direct and Indirect Effects:** There would be no direct or indirect effects on Native American traditional/cultural values, practices, and resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. Under Alternative D, the BLM would not improve the native vegetation community nor stop the loss of important ecosystem components, including native vegetation and fish and wildlife habitat. As a result, Native American traditional/cultural values, practices, and resources would not see benefits under this alternative.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
peoples. Because water is scarce on the 3 Bars Project area, stream and riparian restoration projects would improve water availability for fish and wildlife. Improvements in habitat quality would increase the carrying capacity of the landscape and allow it to support larger and healthier wildlife populations. Treatments that remove hazardous fuels from public lands would be expected to benefit the health of plant and animal communities in which natural fire cycles have been altered, and to improve accessibility for tribal cultural practices.	term risk for wildfire due to the accumulation of fuels. Under Alternative B, Native American traditional/cultural values, practices, and resources would benefit from treatments, but not to the extent that would occur under Alternative A.	including native vegetation and fish and wildlife habitat. As a result, the health and abundance of Native American traditional/cultural resources would be expected to decline from current levels.	
Cumulative Effects: Historic livestock grazing practices, wild horse overpopulation, land uses, and wildfire have contributed to impacts to vegetation and loss of fish and wildlife used by Native Americans on Roberts Mountains and elsewhere in the CESA. Of most interest to local tribes would be the removal of vegetation that is used by the tribes for traditional purposes, and the harvest of fish and game on public lands within the CESA. Approximately 142,000 acres could be treated on the 3 Bars Project area and elsewhere in the CESA (4 percent of the CESA) under existing or reasonably foreseeable authorizations to reduce hazardous fuels and restore ecosystem health. Most of these treatments would occur within pinyon-	**Cumulative Effects:** By not using fire to reduce hazardous fuels and improve vegetation resiliency to fire, there would be greater potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area under this alternative compared to Alternative A. This could lead to loss of vegetation and fish and wildlife habitat of importance to local tribes. 3 Bars Project actions would only affect about 63,500 acres, or 2 percent of the CESA. These effects would be less than for Alternative A, but greater than for Alternative C.	**Cumulative Effects:** By not being able to use mechanical methods and fire to reduce hazardous fuels, improve vegetation resiliency to fire, create fire and fuel breaks, and remove downed wood and slash, the risk of wildfire and its impacts on Native American traditional/cultural values, practices, and resources would likely increase on the 3 Bars Project area, to the potential detriment of vegetation, and fish and wildlife and their habitats, within the CESA. About 3,200 acres would be treated annually in the 3 Bars Project area and another 1,500 acres annually in other portions of the CESA to reduce hazardous fuels and to improve ecosystem health, or only about 1 percent of the CESA. There should be negligible cumulative effects to these resources from	**Cumulative Effects:** There would be no cumulative effects on Native American traditional/cultural values, practices, and resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but only on about 1,500 acres annually. Thus, benefits to Native American traditional/cultural values, practices, and resources would be negligible and least among the alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
juniper and sagebrush treatment areas, including on the Roberts Mountains and Sulphur Spring Range, areas with ethnographic significance to the Western Shoshone. Treatments would have short-term effects on vegetation and wildlife habitat and displace game species. The BLM would consult with local tribes, and treatment areas would be surveyed prior to treatment, to avoid or reduce impacts to Native American traditional/cultural values, practices, and resources. Thus, there should be negligible cumulative effects to these resources from 3 Bars Project actions. Within a few years conditions within treatment areas should improve vegetation and fish and wildlife habitat. The beneficial effects of treatments would be greatest under Alternative A.		3 Bars Project actions and effects would be less than under Alternatives A and B.	
Mitigation: See Mitigation under Summary of Effects on Cultural Resources.	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.	**Mitigation**: See Alternative A.
SUMMARY OF EFFECTS ON SOCIAL AND ECONOMIC VALUES AND ENVIRONMENTAL JUSTICE			
Direct and Indirect Effects: Because the 3 Bars Project area is rural and largely undeveloped, potential adverse social effects related to restoration would be indirect and largely intangible, and would most likely affect general degrees of satisfaction or dissatisfaction of individuals, families, and various stakeholders. There could be short-term	**Direct and Indirect Effects:** The cost per acre of treatment would be greater under Alternative B than under Alternative A. This reflects, in part, the higher expenditures associated with manual and mechanical treatments, which generally cost about 2 times or more to implement than do fire treatments. Such outlays could increase the annual level of expenditures	**Direct and Indirect Effects:** The cost per acre of treatment would be greater under Alternative C than under Alternatives A and B. This reflects, in part, the higher expenditures associated with manual and classical biological control treatments, which generally cost 3 to 5 times or more to implement than do fire and mechanical treatments. Due to the reduction in acres	**Direct and Indirect Effects:** There would be no direct or indirect effects on social and economic values from 3 Bars Project treatments as no treatments would be authorized under this alternative. Treatments to improve 3 Bars ecosystem health, and increase or improve the amount and quality of commercial and casual uses of public lands, improve or

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
reductions in authorized grazing levels and subsequent loss or reduction of ranch income as a result of grazing restrictions and increases in the required amount of livestock management. The BLM would experience short-term, and possibly long-term, reductions in annual grazing fees as a result of reductions in the level of authorized grazing use during and following treatments. Social effects on ranchers, outfitters, individual recreationists, some business owners, and others would manifest themselves in terms of concerns for social and economic well-being, increased satisfaction or dissatisfaction with public lands management by the Mount Lewis Field Office, and quality of life in general. The project would generate a short-term temporary local economic stimulus associated with BLM and contractor efforts and jobs. Locally, these benefits would accrue primarily to residents and businesses in southern Eureka County. Pinyon-juniper trees with potential for use as fence posts or for firewood could be gathered up and offered for sale to the public, providing additional benefits to residents, local businesses, and landowners, including farmers and ranchers. Restoration treatments would reduce the risk of wildfire and improve ecosystem health. The reduction in	and the associated short-term employment and income and business revenue benefits associated with landscape restoration. Grazing permittees would experience short-term reductions in income in conjunction with the proposed treatments, particularly with pinyon-juniper treatments. Temporary and long-term social effects under Alternative B would be similar to those for Alternative A, although some individuals and stakeholder groups would be more or less satisfied by the preclusion of use of fire as a treatment method.	treated, the temporary reductions in grazing use associated with treatments would be lower, and the potential for other reductions due to declining rangeland health would persist. Over the long-term, treatments would do little to slow the declines in rangeland health and promote a stabilization of future grazing levels and support for rural lifestyles. Treatments would do little to improve habitat for fish and wildlife, conditions of woodlands to the benefit of pine nut production and other woodland products, and aesthetic qualities of the landscape for the recreational and commercial resource users.	maintain market and non-market values of public land resources, and reduce the cost of operations on public lands, would not occur under this alternative.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
wildfire would benefit nearby private property owners and facilities constructed on public land, including facilities for mining and infrastructure, reducing the risk of property damage and interference with operations.			
Cumulative Effects: Agriculture, land development, and mineral, oil, gas, and hydrothermal exploration and development could affect lands within the CESA in the reasonably foreseeable future, including land sales, new croplands, roads, and rights-of-way for power and telephone lines. These actions would provide economic benefits to the local community, but would also result in loss of fish and wildlife habitat, and possibly recreational opportunities. The Mount Hope Project would directly disturb approximately 8,300 acres over the long-term and another 6,000 acres would be fenced to exclude the public and livestock. The proposed mine project would have economic costs and benefits. Economic costs would include the loss of 32 AUMs in perpetuity due to construction of the mine pit. In addition, another 781 AUMs would be lost for approximately 70 years due to the mine project. Annual mine payroll is projected to be $33.4 million at full production, about half of which is projected to accrue to Eureka County residents. The increase	**Cumulative Effects:** The BLM would conduct treatments on approximately 63,000 acres on the 3 Bars Project area, and about another 15,000 acres on other portions of the CESA, or collectively about 4 percent of the CESA, to reduce hazardous fuels and improve fish and wildlife habitat. The types of risks and benefits to social and economic resources under Alternative B would be about half those for Alternative A within the CESA. 3 Bars Project and other BLM actions within the CESA would have negligible effect on the social and economic conditions within the CESA. The growth in economic activity, and stakeholder perceptions and concerns regarding various issues related to rangeland health, including grazing use, and the allocation of forage for wildlife, wild horses, and grazing, would generally be less under Alternative B than under Alternative A.	**Cumulative Effects:** The BLM would conduct treatments on approximately 32,000 acres on the 3 Bars Project area, and on about 15,000 acres under existing and reasonably foreseeable future actions on other portions of the CESA, or collectively about 2 percent of the CESA, to reduce hazardous fuels and improve fish and wildlife habitat. The types of risks and benefits to social and economic resources under Alternative C would be about one-fourth those for Alternative A within the CESA. 3 Bars Project and other BLM actions within the CESA would have negligible effect on the social and economic conditions within the CESA. The growth in economic activity, and stakeholder perceptions and concerns regarding various issues related to rangeland health, including grazing use, the allocation of forage for wildlife, wild horses, and grazing, would generally be less under Alternative C than under Alternatives A and B.	**Cumulative Effects:** There would be no cumulative effects on social and economic values from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but only on about 1,500 acres annually. Thus, benefits to social and economic values would be negligible and least among the alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
in income would be equal to about 28 percent of the income realized by local residents in 2008. 3 Bars Project and other BLM actions within the CESA would have little effect on the social and economic conditions within the CESA. The growth in economic activity, and stakeholder perceptions and concerns regarding various issues related to rangeland health, including grazing use, and the allocation of forage for wildlife, wild horses, and grazing, would generally be greatest under Alternative A.			
Mitigation: None.	**Mitigation**: None.	**Mitigation**: None.	**Mitigation**: None.
SUMMARY OF EFFECTS ON HUMAN HEALTH AND SAFETY			
Direct and Indirect Effects: The greatest health and safety risks associated with treatments would be to workers conducting the treatments, rather than to the public. These risks include injuries associated with use of heavy equipment, contact with sharp cutting blades, exposure to rocks and other flying debris, loss of control of equipment, high noise levels, vehicle exhaust, and smoke inhalation. Fires can affect public safety by reducing visibility and create hazardous driving conditions on nearby roads. Long-term, treatments would help reduce the risks to human health from wildfire smoke and fire.	**Direct and Indirect Effects:** The human health and safety risks associated with exposure to smoke from prescribed fire would not be present under this alternative. The acreage of land treated using mechanical methods, and the associated level of risk to worker safety associated with this treatment method, would be similar or somewhat greater to that under Alternative A. The effectiveness of treatments at reducing catastrophic wildfire potential would likely be less than under Alternative A. While mechanical treatments can be used to remove fuels, in some instances a combination of treatments (mechanical plus fire) might produce better results. Therefore, wildfire risk reduction and	**Direct and Indirect Effects:** Workers and the public would not be at risk for exposure to smoke, or for accidents associated with operation of heavy equipment. Risks associated with manual methods and classical biological control would be minimal. Out of all the action alternatives, short-term health and safety risks associated with project treatments would be lowest under Alternative C. However the long-term health and safety benefits associated with reducing catastrophic wildfire risk would be lower under Alternative C than under the other action alternatives because the least amount of hazardous fuel removal would occur.	**Direct and Indirect Effects:** There would be no direct effects on human health and safety from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could take actions under existing and future authorizations to benefit ecosystem health, as discussed above under Soil Resources, but only on about 1,500 acres annually. The BLM would not reduce the risk of large-scale wildfire that could be detrimental to human health and safety.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
	associated health and safety benefits would likely be less under this alternative than under Alternative A.		
Cumulative Effects: Agriculture, mining, land development, utilities construction and operation, and other land uses have associated occupational and public health and safety risks during the construction phase, and some would have associated risks during the operational phase. Members of the public who visit or drive through the 3 Bars Project area may also visit or drive through areas where other projects are occurring. Additionally, workers who implement the BLM's 3 Bars treatment projects may live in the vicinity of other projects, may visit or drive through areas where other projects are occurring, or may be hired to implement other projects that have been identified within the CESA. Therefore, it is likely that both workers and members of the public who would potentially be exposed to 3 Bars project treatments would also be exposed to human health and safety risks associated with other reasonably foreseeable future actions, resulting in cumulative health and safety risks. The BLM would treat about 142,000 acres (127,000 on the 3 Bars Project area, and 15,000 on other areas within the CESA), or about 8 percent of the CESA, to restore natural fire regimes and	**Cumulative Effects:** Because fire would not be used on the project area, risks associated with exposure to fire and smoke would not contribute to cumulative health effects. Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on up to 15,000 acres within the CESA, or about 4 percent of acreage within the CESA. The cumulative risks to workers from these treatments could be greater from manual and mechanical methods than from fire treatments. Over the long-term, cumulative effects to health and safety associated with wildfire would be greater than under Alternative A, since the acreage treated for fuels reduction would be less and treatments would likely not be as effective.	**Cumulative Effects:** Adverse, short-term effects to human health and safety with the use of fire and mechanized equipment would not occur under Alternative C. About 47,000 acres would be treated in the CESA to reduce hazardous fuels, of which about 32,000 acres would be treated on the 3 Bars Project area. This would be less than 2 percent of the land within the CESA and within the 3 Bars Project area. Under Alternative C, the acreage treated would be less than under Alternatives A and B, and only manual and classical biological would be used. Therefore, short-term cumulative health and safety risks would likely be lower under Alternative C than under the other action alternatives. Over the long-term, cumulative effects to human health and safety associated with wildfire would be greater than under the other action alternatives, as the least amount of hazardous fuel removal would occur under Alternative C.	**Cumulative Effects:** There would be no cumulative effects on human health and safety from 3 Bars Project treatments as no treatments would be authorized under this alternative. Thus, benefits to human health and safety would be negligible and least among the alternatives.

TABLE 2-2 (Cont.)

Summary and Comparison of Effects on Resources by Alternative

Alternative A (Preferred Alternative/All Available Methods)	Alternative B (No Fire Use)	Alternative C (Minimal Land Disturbance)	Alternative D (No Action Alternative)
encourage the growth of native vegetation that is more resilient to wildfire, reducing the risk of wildfire. If plant community structure, species composition, and disturbance regimes return to near historical ranges, then disturbances should have effects that would be less severe, and result in less wildfire danger and risks to the public, than at present.			
Mitigation: None.	**Mitigation:** None.	**Mitigation:** None.	**Mitigation:** None.

CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the natural, cultural, and social environment of public lands in the 3 Bars Project area that would be affected by the alternatives under consideration. These descriptions are followed by an examination of how vegetation treatment and other activities may affect these natural, cultural, and social resources. The focus of the analysis is on the alternative proposals for treating public lands within the 3 Bars ecosystem. The analysis is useful in understanding the consequences of the proposed action and alternatives.

Supplemental authorities that are subject to requirements specified by statute or executive order must be considered in all BLM environmental documents. The 17 elements associated with the supplemental authorities listed in the BLM Instruction Memorandum NV-2009-030 (USDOI BLM 2009c) are listed in **Table 3-1**. The table lists the elements and their status in the project area as well as the rationale used to determine whether an element present in the project area would be affected by the proposed action or any of the alternatives. Supplemental authorities that may be affected by the proposed action or any of the alternatives are discussed in this chapter under each element. Those elements listed under the supplemental authorities that do not occur in the project area and would not be affected are not discussed further in this EIS. The elimination of non-relevant issues follows CEQ policy, as stated at 40 CFR § 1500.4.

In addition to the elements listed under supplemental authorities, the BLM considers other resources and uses that occur on public lands and the effects on these resources and uses that may result from the implementation of the proposed action or any of the alternatives. Other resources or uses of the human environment that have been considered for this EIS are listed in **Table 3-2**.

3.2 Summary of Major Changes between the Draft and Final EIS

Several major changes were made to the 3 Bars Project Draft EIS and incorporated into this chapter of the Final EIS based on public comments on the Draft EIS. These changes (and Section where change was made) are as follows:

1. Text revised throughout Chapter 3 to reflect changes to the restoration treatments and methods that were identified in Section 2.2.

2. Added a discussion of the need to reduce effects of livestock, wild horses, and other wild ungulates on vegetation in response to greater stress being placed upon vegetation due to climate change (Section 3.5.2.2).

3. Added a discussion of the role of using prescribed fire to reduce forest carbon emissions and improve long-term carbon sequestration (Section 3.5.3.2.2).

TABLE 3-1

Elements Associated with Supplemental Authorities and Rationale for Detailed Analysis for the Proposed Action and other Alternatives

Supplemental Authority Element (*Authority*)	**Not Present**	**Present/Not Affected**	**Present/May be Affected**	**Reference Section**
Air Quality			●	3.6
Areas of Critical Environmental Concern			●	3.22
Cultural Resources			●	3.23
Environmental Justice		●		3.25
Farm Lands (Prime and Unique)		●		3.12
Fish Habitat			●	3.15
Floodplains			●	3.11
Forests and Rangelands (Healthy Forest Restoration Act only)			●	3.12
Human Health and Safety			●	3.26
Migratory Birds			●	3.16
Native American Religious Concerns			●	3.24
Threatened or Endangered Species			●	3.12, 3.15, 3.16
Wastes (Hazardous and Solid)	●			
Water Quality			●	3.10
Wetlands and Riparian Zones			●	3.11
Wild and Scenic Rivers	●			
Wilderness	●			
Lands with Wilderness Character	●			

4. Added a discussion of the effects of dioxins on human health and the amount of dioxins produced by prescribed fire, wildland fire for resource benefit, and wildfire (Section 3.6.3.3.1).

5. Additional discussion of biological soil crusts, their functions, and their use as indicators of ecological health (Section 3.9.2.2.8).

6. The BLM has decided not to use chaining on the 3 Bars Project area based on comments from the public on the Draft EIS. Removed discussion of chaining and chaining susceptibility in Soil Resources section (Section 3.9.2.3.3) and effects of chaining throughout the document.

7. Added list of key issues of concern for soil resources that were considered during evaluation of the Environmental Consequences (Section 3.9.3.1).

TABLE 3-2

Resources or Uses other than the Elements Associated with Supplemental Authorities and Rationale for Detailed Analysis for the Proposed Action and Other Alternatives

Resources or Uses	Present/Not Affected	Present/May be Affected	Reference Section
Forest/Woodland Products		●	3.12
Geology and Minerals		●	3.7
Historic Trails		●	3, 21, 3.22, 3.23
Land Use and Access		●	3.20
Noxious Weeds and other Invasive Non-native Vegetation		●	3.13
Paleontology		●	3.8
Recreation		●	3.21
Socioeconomic Values		●	3.25
Soil Resources		●	3.9
Transportation	●		
Vegetation		●	3.12, 3.13
Visual Resources		●	3.19
Water Resources		●	3.10
Wilderness Study Areas		●	3.22
Wild Horses		●	3.17
Wildlife		●	3.16

8. Added a discussion of the effects of mechanical treatments on biological soil crusts in treatment areas (Section 3.9.3.3.2).

9. Included information on pinyon-juniper fire cycles and factors that may have contributed to the expansion and contraction of pinyon-juniper stands, including climate, livestock grazing, fire prevention, and woodcutting (Section 3.12.2.2.9).

10. Provided additional information on the history of woodcutting in the 3 Bars Project area (Section 3.12.2.6),

11. The BLM would only seed with native plant species, except as follows: Non-native seedings may be used 1) to create fuel breaks, 2) in areas that have previously burned and are beyond use of Emergency Stabilization and Rehabilitation techniques, 3) to create green strips; and 4) for soil stabilization in low precipitation zones. (Section 3.12.3.3).

12. Provided additional information on natural fire regimes and fire risk (Section 3.14.2.3).

13. Provided updated information on the status of cheatgrass infestations resulting from the Red Hills hazardous fuels reduction project (Section 3.14.3.3.2).

14. The BLM would not conduct sagebrush thinning or other sagebrush control projects on sagebrush treatment areas, or on Greater sage-grouse breeding and winter habitats. References to thinning and burning of sagebrush to control sagebrush have been deleted in the Final EIS. (Section 3.16.3.3).

15. Corrected statement in Section 3.21.3.3.1 to note that the Pony Express National Historic Trail is a recreational resource of national significance.

16. No fire treatments would be conducted in Wilderness Study Areas (Section 3.22.3.3.3).

3.3 How the Effects of the Alternatives Were Evaluated

Within each resource area, applicable direct and indirect effects of treatments are evaluated. Cumulative effects, unavoidable adverse commitments, and resource commitments that are lost or cannot be reversed are also evaluated for all treatment activities in the EIS. These effects are defined as follows:

- Direct effects – Those effects that are caused by the action and occur at the same time and in the same general location as the action.
- Indirect effects – Those effects that occur at a different time or in a different location than the action to which the effects are related.
- Cumulative effects – Those effects on the environment that result from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.
- Unavoidable adverse commitments – Those effects that could occur as a result of implementing any of the action alternatives. Some of these effects would be short-term, while others would be long-term.
- Irreversible commitments – Those commitments that cannot be reversed, except perhaps in the extreme long-term. This term applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to factors, such as soil productivity, that are renewable only over long periods of time.
- Irretrievable commitments – Those commitments that are lost for a period of time. For example, timber production is lost while an area is mined. The production lost is irretrievable, but the action is not irreversible. If the site is reclaimed, it is possible to resume timber production.

This chapter should be read together with Chapter 1 (Proposed Action and Purpose and Need), which explains why the BLM is proposing to conduct treatments, and Chapter 2 (Alternatives), which explains the alternative proposals the BLM is considering to restore the health and functionality of the 3 Bars ecosystem. The analyses of the affected environment and environmental consequences in this chapter build upon and relate to information presented in these earlier chapters to describe which resources may be impacted and how and where impacts might occur.

3.3.1 Direct and Indirect Effects

To the extent practicable, existing environmental analyses were used in analyzing impacts associated with the proposed action and alternatives. Within each resource area, applicable direct and indirect effects are evaluated. Key factors considered in the analysis include treatment methods and their risks, acreage treated, effectiveness of SOPs, and mitigation measures.

This EIS focuses on treatments that the Mount Lewis Field Office proposes to conduct during the life of the project. For analysis purposes, however, it was assumed that projects would occur within a 10 to 15 year period. It is expected that similar types of treatments would occur after this period that would still be covered by the analysis in this EIS. The analysis in this EIS builds upon analyses in earlier EISs, Environmental Assessments, and environmental reports, including the 17-States PEIS and PER, *Mount Hope Project Final Environmental Impact Statement* (Mount Hope Project EIS), and AECC (USDOI BLM 2007b, c, 2009a, 2012b).

Information from the 17-States PER was used to assess the effects on the environment from using non-herbicide treatment methods, including fire use, and mechanical, manual, and biological control methods, to treat hazardous fuels, invasive species, and other unwanted or competing vegetation (USDOI BLM 2007c). Risk is defined as the likelihood that an effect (injury, disease, death, or environmental damage) may result from a specific set of circumstances (USDOI BLM 2007b).

3.3.2 Cumulative Effects

The NEPA and its implementing guidelines require an assessment of the proposed project and other projects that have occurred in the past, are occurring in the present, or are likely to occur in the future, which together may have cumulative impacts that go beyond the impacts of the proposed project itself. According to 40 CFR §§1508.7 and 1508.25[a][2]) (CEQ 2012):

> "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In addition, to determine the scope of Environmental Impact Statements, agencies shall consider cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement."

The purpose of the cumulative effects analysis is to determine if the effects of BLM vegetation treatments have the potential to interact or accumulate over time and space, either through repetition or when combined with other effects, and under what circumstances and to what degree they might accumulate.

3.3.2.1 Structure of the Cumulative Effects Analysis

For this EIS, the analysis of cumulative impacts is a four-step process that follows guidance provided in *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997):

- Specify the class of actions for which effects are to be analyzed.
- Designate the appropriate time and space domain in which the relevant actions occur.
- Identify and characterize the set of receptors to be assessed.
- Determine the magnitude of effects on the receptors and whether those effects are accumulating.

3.3.2.2 Class of Actions to be Analyzed

This analysis addresses site-specific and local-scale trends and issues that require integrated management across landscapes. It also addresses trends and changes in the social and economic needs of people. Restoration treatment methods used by the BLM are considered in the analysis. These include manual, mechanical, and biological control methods, and the use of fire, as identified in Chapter 2 (Alternatives).

For this EIS, potential cumulative effects include those that were assessed for all land ownerships, including lands administered by other federal agencies and non-federal lands, particularly effects to air quality, aquatic and terrestrial species, and subsistence resources. The analysis and disclosure of cumulative effects alerts decision-makers and the public to the context within which effects are occurring, and to the environmental implications of the interactions of known and likely management activities.

3.3.2.3 Appropriate Temporal and Spatial Domain

3.3.2.3.1 Temporal Domain

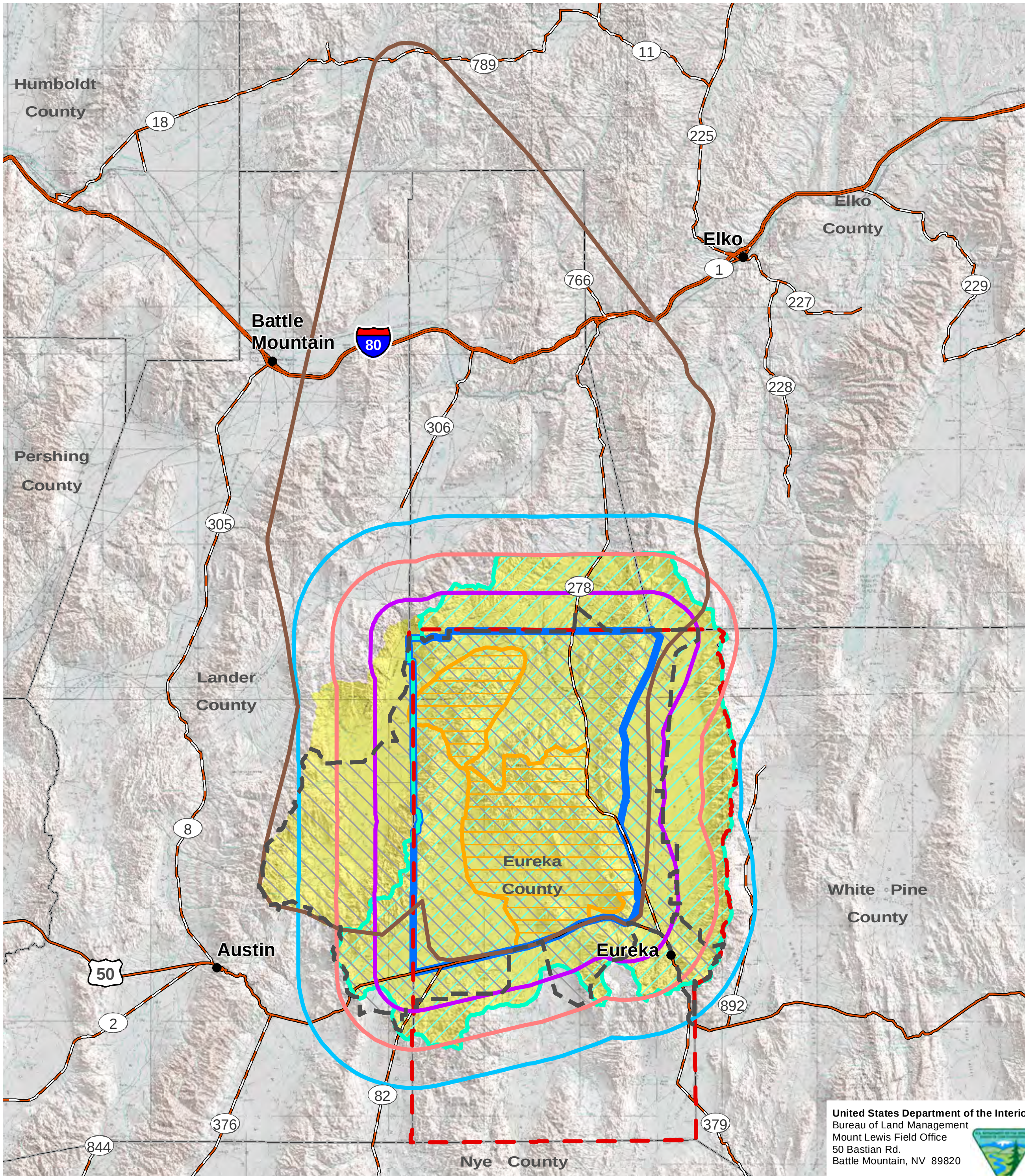
The analysis period covered by the cumulative effects analysis begins in 2015 and continues through 2040. The timeline outlined in this EIS (about 10 to 15 years) is based on when treatments would occur, and the time needed to realize the results of the treatments in terms of meeting management objectives and desired vegetative conditions (about 10 years). The timeline is also based on the difficulty of predicting advances in technology, approved treatment practices, and the types and amounts of vegetation treatments needed, very far into the future. Thus, a reasonable analysis period, and one on which most of the cumulative effects analysis is focused, is 25 years into the future. In accordance with CEQ guidance on June 24, 2005 (CEQ 2005), past actions associated with the 3 Bars ecosystem are addressed through their current aggregate effects and have not been provided as a list of individual projects. A brief discussion of past and present actions in the vicinity of the 3 Bars Project area is provided in Section 3.3.2.3.3; a more detailed discussion can be found in Section 4.3 of the Mount Hope Project EIS (USDOI BLM 2012b).

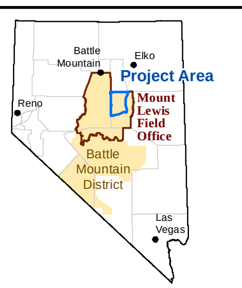
3.3.2.3.2 Spatial Domain

For some resources and uses, the project area may be where the effect can be felt (known as the "footprint"), but for others, the footprint may extend well beyond that space. For example, air quality effects to humans can extend miles beyond the footprint of the proposed action. The spatial domain, or cumulative effects study area (CESA), for past, present, and reasonably foreseeable future activities for each resource is identified under the discussion of the analysis area for each resource, and is shown in **Figure 3-1**. The rationale used to develop the spatial domain is also provided under the descriptions of the resources that follow.

For the purposes of this analysis, non-federal lands include land owned and/or managed by individuals, corporations, Native American tribes, states, counties, or other agencies. The BLM does not have the authority to regulate any activities or their timing on lands other than those the BLM administers. However, when an action takes place on public land, it may cause direct or indirect effects on non-federal lands. For example, a wildfire that begins on public land may burn to adjacent private land, or noxious weeds and other invasive non-native vegetation infestations that begin on public land may infest adjacent private land.

This EIS also considers the likely effects on public lands from reasonably foreseeable actions occurring on non-federal lands. For example, agricultural use of non-federal lands may potentially have direct impacts on terrestrial wildlife species that move between federal and non-federal lands during the year or during their life cycle. The role of





Legend

- Air Quality CESA
- Cultural CESA (5 mi. buffer)
- Grazing Allotment CESA
- Herd Management Area CESA
- Native American CESA
- Socioeconomic CESA
- Water Resources, Wildfire, Soils, and Vegetation CESA
- Visual Resources and Recreation CESA (15 mi. buffer)
- Wildlife CESA (10 mi. buffer)
- 3 Bars Project Area

Source: BLM 2012d, 2013b.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-1

Cumulative Effects Study Areas

0 2 4 6 8 10 20 Miles

0 2 4 6 8 10 20 Kilometers

N

the management of non-federal lands was considered in the analysis on these species and their associated ecosystems. Localized actions on non-federal lands often affect local environmental conditions on nearby federal lands and may also affect federal management decisions.

3.3.2.3.3 Past, Present, and Reasonably Foreseeable Future Actions

Numerous past and present actions on and near the 3 Bars Project area have contributed to existing conditions on the 3 Bars Project area. These include actions by entities with an interest in vegetation management, including nearby federal land management agencies, the State of Nevada, Eureka County and other local governments, and private landowners including ranchers and farmers, and private developers. Past and present actions considered in the cumulative effects analysis include noxious weeds and other invasive non-native vegetation treatments and the use of herbicides; grazing, agriculture, and the use and harvest of woodland products; utility infrastructure and distribution networks; wildfires, fuels management, and reseeding; habitat stabilization and rehabilitation; livestock and wild horse management activities; recreation; land development; mineral development and exploration; and oil, gas, and geothermal leasing and development.

In addition, the BLM identified reasonably foreseeable future actions that could affect conditions on the 3 Bars Project area and that should be addressed in the cumulative effects analysis. These projects and activities have the potential to impact the environmental resources of concern within all or portions of the various CESAs. The following summarizes past, present, and reasonably foreseeable future actions that have or could occur in one or more of the 3 Bars Project CESAs.

Grazing and Grazing Management, Range Improvement, and Allotment Management

Past land uses on lands in the CESA and throughout the western U.S. have resulted in changes in the vegetation community from its historic ecological site characteristics. Much of the change that has occurred within the 3 Bars ecosystem has been attributed to historic livestock grazing and other land disturbances that have led to the establishment and spread of noxious weeds and other invasive non-native vegetation, and expansion of pinyon-juniper woodland beyond historic ranges. Livestock often congregate near streams, springs, and wetlands and have impacted riparian habitat and forage, and have influenced stream channels and their ability to function properly. Humans have also been a major factor in influencing vegetation, including actions that have altered fire regimes and caused the spread of noxious weeds and other invasive non-native vegetation.

Livestock grazing has been, and continues to be, a dominant land use in Eureka County and the adjoining portions of Elko, Lander, White Pine, and Nye Counties. Multiple grazing allotments have been permitted and administered by the BLM during the past half century. The carrying capacity of these allotments has been adjusted over the years in response to mineral development, drought, wildfires, and rangeland condition.

Surface water sources that support livestock grazing and agriculture within the CESAs include reservoirs, perennial creeks, springs, and seeps. Improved water sources include developed springs, stock wells, stock ponds, water pipelines, and troughs. Cow-calf pairs, heifers, steers, bulls, and sheep graze on residual forage in alfalfa fields, irrigated pastures, and rangeland within Eureka County and the adjoining portions of Elko, Lander, White Pine, and Nye Counties. In addition, a substantial amount of four-strand wire fencing has been constructed within the CESAs. Past and present range and habitat improvement projects have resulted in changes to vegetation communities. The actual acreage for this has not been quantified; however, some of these projects are range improvements that include fences, cattle guards, noxious weeds and other invasive non-native vegetation control, water troughs, spring improvements, wells, reservoirs, windmills and tanks, and pipelines.

Open range livestock operations are expected to continue on public lands within the CESA at management levels that have been established through allotment-specific grazing decisions. Fenced feeding operations occur on fenced private lands within the CESAs and are expected to continue as well (**Figure 3-2**). Short-term (typically 2 to 4 years) temporary suspensions to Animal Unit Months (AUMs) would be expected in response to broadcast prescribed fires and the resultant temporary loss of forage, to allow for vegetation establishment and stabilization. The BLM would continue to monitor resource conditions to ensure proper livestock management and the long-term success of treatments. Any changes to the permitted use would be completed through the issuance of subsequent grazing decisions in accordance with 43 CFR §§ 4110.3, 4130.3-3, and 4160.

Range improvement projects are also proposed as part of ongoing livestock management programs at the BLM Mount Lewis Field Office and could include:

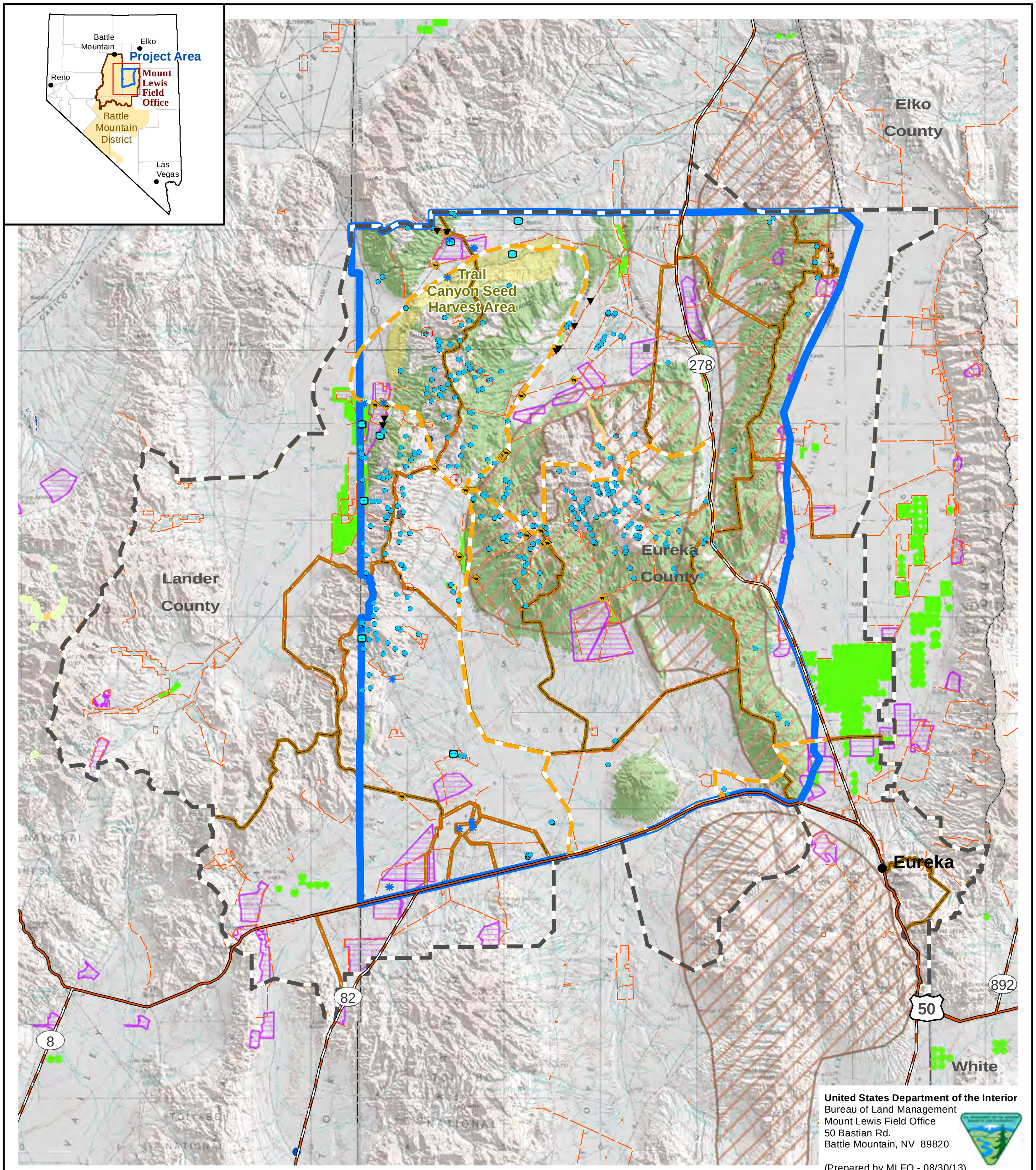
- allotment/pasture fences, exclosure fences, and drift fence construction
- seeding and seeding maintenance
- vegetation manipulation
- noxious weeds and other invasive non-native vegetation population control
- fence relocation
- water hauls
- maintenance of wells and troughs
- spring developments

In order to ensure long-term success, restoration projects would not be implemented until proper grazing management is in place, as discussed in Section 3.18.4. This would occur through agreements or decisions subsequent to the 3 Bars Project ROD. The BLM would work with permittees on a permit-by-permit basis to address any changes in livestock management due to treatment implementation. In all instances, appropriate changes in livestock management through agreements or decisions would be finalized prior to project implementation.

The BLM would also manage livestock to meet Greater sage-grouse habitat objectives, in accordance with current policy and guidance.

Noxious Weeds and other Invasive Non-native Vegetation

Noxious weeds and other invasive non-native vegetation are found on the 3 Bars Project area and adjacent lands (**Figure 3-2**). The BLM uses an integrated vegetation management approach to prevent, control, or contain noxious weeds and other invasive non-native vegetation, using, but not limited to, manual, mechanical, biological, fire, and chemical methods. In an integrated vegetation management program, each management option is considered and/or used in combination with another, recognizing that no one management option is a stand-alone option and that each has its strengths and weaknesses. No individual method will eradicate undesirable vegetation in a single treatment; multiple treatments may be required. The effects of these treatment methods were analyzed for 17 western states, including Nevada, in the 17-States PEIS and PER (USDOI BLM 2007b, c).



Legend

Range Improvements
- Cattle Guard
- Corral
- Gate
- Reservoir
- Spring
- Stock Tank/Trough/Waterhaul
- Windmill/Well
- Other Water Development
- Fence

Noxious Weed Treatments
- Canada thistle
- Musk thistle
- Perennial pepperweed
- Russian knapweed
- Scotch thistle
- Tamarisk
- Whitetop/Hoary cress
- Allotment Boundaries
- Irrigated Cropland

- Range Improvement Treatment
- Commercial Pine Nut Sale Area
- Private Fuelwood and Christmas Tree Harvest Area
- Seed Harvest Area
- Grazing Allotment CESA
- Herd Management Area CESA
- 3 Bars Project Area

Source: USGS 2004; AECOM 2011a; BLM 2012d,e, 2013b,c,d,e.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-2

Cumulative Impacts from Grazing, Agriculture, and Forest Product Activities

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

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The BLM treats about 250 acres of noxious weeds and other invasive non-native vegetation annually on the 3 Bars Project area using herbicides. Key species targeted for treatments include cheatgrass, hoary cress, musk and Scotch thistles, and Russian knapweed. Treatments within the CESAs are also conducted by the Diamond Valley Weed Control District and by private landowners. The BLM and other landowners within the CESA would continue noxious weeds and other invasive non-native vegetation inventory, treatment, and monitoring.

Historically, the BLM has used ground-based methods, including hand-held sprayers, truck mounted sprayers, and all-terrain vehicles to control local occurrences of noxious weeds and other invasive non-native vegetation as authorized by the *Environmental Assessment Integrated Weed Management Plan Battle Mountain District Nevada Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b). The BLM can also use herbicides on areas burned by wildfires under Burned Area Emergency Stabilization and Rehabilitation authorizations. Most treatments in the future would also be conducted using ground-based methods.

The BLM is authorized to use the 18 herbicide active ingredients authorized in the 17-States PEIS. Pesticide Use Proposals have been developed by the Battle Mountain District BLM for 11 herbicides—2,4-D (2,4-dichlorophenoxyacetic acid), clopyralid, chlorsulfuron, dicamba, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr.

During 2011, only five herbicide active ingredients were used on the 3 Bars Project area—2,4-D, glyphosate, imazapyr, metsulfuron methyl, and picloram. Imazapyr was used as a stand-alone herbicide, while 2,4-D was tank mixed with metsulfuron methyl and with picloram, and glyphosate and metsulfuron methyl were tank mixed together. About 80 percent of treatments involved the use of 2,4-D in a tank mix with metsulfuron methyl. Specific herbicide characteristics and approved use areas are discussed in the 17-State PEIS (USDOI BLM 2007b:2-9 to 2-16).

The BLM has applied herbicides aerially in the past to treat noxious weeds and other invasive non-native vegetation, and may use helicopters or fixed-wing aircraft to apply herbicides in the future. Should aerial spraying occur in the future, the BLM anticipates only using 2,4-D, glyphosate, imazapic, imazapyr, and metsulfuron methyl, all of which are labeled for this specific application method. Operation of helicopters is more expensive than operation of fixed-wing aircraft, but helicopters are more maneuverable and more effective in areas with irregular terrain. Helicopters are also more effective for treating targeted vegetation in areas with multiple vegetation types.

Ground-based herbicide treatments would continue as the primary treatment method in riparian areas, while aerial herbicide applications would primarily occur in larger, more expansive areas to treat cheatgrass. However, treatments could occur anywhere in the CESA where Nevada-listed noxious weeds and other invasive non-native vegetation are found.

Irrigated Crops and Irrigation Facilities on Private Lands

Approximately 24,357 acres are under irrigation in Diamond Valley, and 280 acres were under irrigation in Kobeh Valley in 2011. Agricultural development in Pine Valley was approximately 5,100 acres in 2007 (USDOI BLM 2012b).

Irrigation facilities and irrigation of crops are only permitted on private lands, with the exception of ditches that require a right-of-way. Continued agricultural activities in Diamond Valley, Kobeh Valley, and Pine Valley are reasonably expected to occur in the form of flood and pivot irrigation (USDOI BLM 2012b). Irrigated croplands near the 3 Bars Project area are shown on **Figure 3-2**.

Woodland Products

Private fuelwood, Christmas tree, and pine nut harvest areas are found within the CESAs (**Figure 3-2**). Commercial pine nut harvesting occurs under permits issued by the Mount Lewis Field Office. Yearly commercial pine nut harvesting is very sporadic, based on the tree production of cones and nuts. Other woodland product harvesting activities include the commercial and personal cutting of pinyon pine and Utah juniper for firewood, the personal cutting of pinyon pine for Christmas trees, the greenwood cutting of primarily juniper for fence posts, and commercial and personal harvesting of pine nuts (USDOI BLM 2012b).

Personal use of woodland products would occur in the future in the CESAs. Public and tribal pine nut and woodland products harvesting would continue based on the trees' production of cones and nuts. Commercial firewood and pine nut harvesting could occur on the Sulphur Spring Range, Roberts Mountains, and Whistler Mountains in the 3 Bars Project area, and on the Fish Creek Range in Eureka County.

Wild Horse Management Activities

Wild horse gathers to achieve the Appropriate Management Level (AML) were conducted in the Roberts Mountain Herd Management Area (HMA) in 1987, 1995, 2001, and 2008. Drought-stressed wild horses were gathered from the Whistler Mountain HMA in 2001, in conjunction with the Roberts Mountain gather. The Whistler Mountain HMA was gathered with the Roberts Mountain HMA in 2008. The Kobeh Valley area outside the Fish Creek HMA was gathered in 1994 and 2008. The Rocky Hills HMA was gathered in 1997, 1999, 2009, and 2010, and fertility control was implemented during the last two gathers.

The objectives of BLM wild horse gathers has been to remove wild horses from outside of designated HMA boundaries, achieve and maintain the established AMLs, and in recent years, treat and/or re-treat mares for fertility control to reduce population growth rates. During gathers, the BLM does not remove all wild horses within an HMA. Either a portion of the population remains uncaptured or the BLM selects wild horses to release back to the range. This helps to achieve the low range of the AML and allows the population to increase for about 3 to 4 years before another gather would be required. To date, approximately 1,200 wild horses have been removed from the Roberts Mountain Complex, which includes the Roberts Mountain, Whistler Mountain, and Fish Creek North HMAs, and 650 wild horses from the Rocky Hills HMA.

Future wild horse management activities within these HMAs could include AML reviews and adjustments, adjustments to HMA boundaries, fence removal, enhancement of existing water sources and development of new water sources, and implementation of range improvement projects. Methods used to control wild horse populations would primarily involve gathers to remove excess animals to control populations, and fertility control through injections of immunocontraceptives. These activities would help to maintain herd numbers near sustainable levels and to distribute wild horses more evenly across the rangeland. The BLM is also guided by the Nevada Northeastern Great Basin Resource Advisory Council to promote healthy rangelands through implementation of standards and guidelines for maintaining healthy wild horse herds on HMAs.

Fuels Management and Habitat Improvement Projects

The BLM is conducting ongoing, previously authorized, and fuels treatments on approximately 17,378 acres in the CESA. These include: Eureka-South Diamond Valley Wildland Urban Interface Treatments (2,087 total acres, 247 acres still to be treated; USDOI BLM 2003a, 2006); Red Hills (3,671 total acres, 859 acres still to be treated; USDOI BLM 2005a); Sulphur Spring Hazardous Fuels Reduction Treatments (8,620 total acres, 6,420 acres still to be treated;

USDOI BLM 2009d); Tonkin (1,000 total acres, 650 acres still to be treated; USDOI BLM 2005b); and Roberts Mountains Habitat Enhancement Project (2,000 total acres, 500 still to be treated; USDOI BLM 2007d). Of the 8,676 acres still to be treated, about 8,021 acres would be treated using manual and mechanical methods, and 655 acres would be treated using prescribed fire. In addition, the BLM would seed or plant many of the acres after treatment to restore native vegetation, and would continue to monitor past treatments, and treat as necessary, to mitigate any noxious weeds and other invasive non-native vegetation that may establish in treatment areas and to ensure that treatments meet established goals.

In addition to these projects, the BLM would continue to conduct projects to slow the spread of noxious weeds and other invasive non-native vegetation, and restore lands degraded by wildfire, which are allowed under previously approved authorizations. If the No Action Alternative (Alternative D) is selected, it is likely that the BLM would authorize additional treatments within the 3 Bars ecosystem to meet the goals in the Shoshone-Eureka RMP, including hazardous fuels reduction, stream restoration, and fish and wildlife habitat improvement projects. These projects may be similar to those proposed under the action alternatives, but under Alternative D, these projects would have to be analyzed individually under separate NEPA analyses. These projects would likely be similar to those described in the previous paragraph, but would be smaller in size and would take longer to implement than would be the case for treatments under the action alternatives. It is estimated that the BLM would conduct about 1,500 acres of treatments annually under current and future authorizations under the No Action Alternative, not including treatments that would be conducted as part of rehabilitation of lands burned by wildfires.

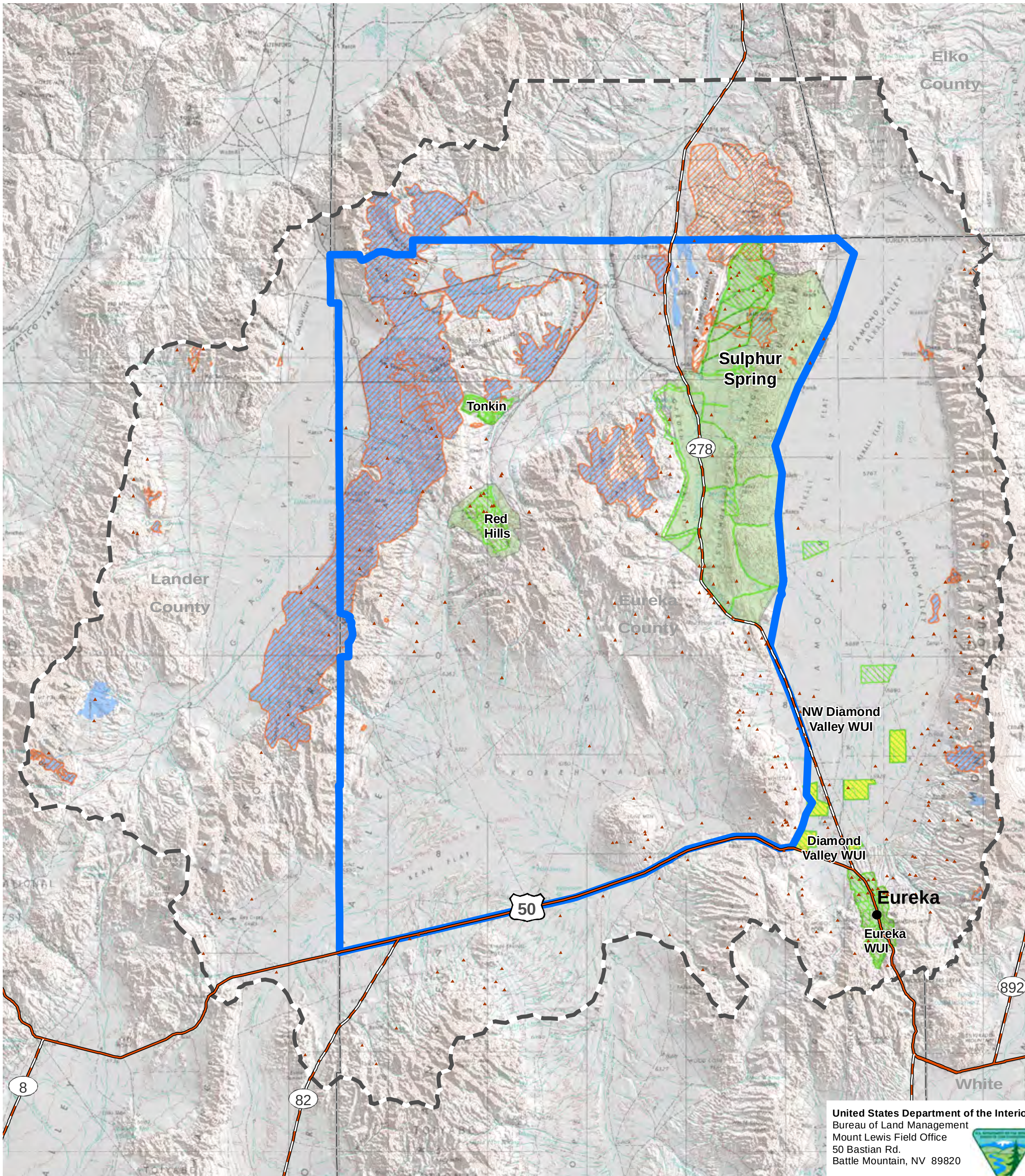
While the acreage burned by wildfires in a given year is sporadic and highly variable, since 1985 wildfires have burned an average of 4,200 acres annually within the 3 Bars Project area and an average of 6,900 acres annually within watersheds that are wholly or partially within the CESAs, and several large fires have occurred within the CESA since 1985 (**Figure 3-3**). The BLM and local fire districts would continue to conduct fire suppression activities when wildfires occur within the CESAs. The scale and scope of those activities would be proportional to the size of the wildfire and its proximity to structures.

Recreation

Dispersed recreation opportunities include sightseeing, pleasure driving, rock collecting, photography, winter sports, off-highway vehicle use, mountain biking, picnicking, camping, fishing, hunting, hiking, and Pony Express Trail re-rides. This wide range of opportunities is possible because virtually all of the public lands in the CESAs are accessible to the public and offer a variety of settings suitable for different recreational activities. Numerous roads provide access to off-highway vehicle users within the CESA (**Figure 3-4**). Recreational use within the CESA is likely to increase proportionally to changes in population, with dispersed outdoor recreational activities being the predominant type of recreation.

Utilities and Infrastructure

Past utility and distribution actions include the development of roads, powerlines, and telecommunications, as well as public water supply and wastewater systems. Roads have been developed by the federal government and the State of Nevada (U.S. Highway 50, State Route 278, and State Route 892), Eureka County and adjoining counties, the BLM, and the Forest Service. The town of Eureka is in southeastern Eureka County. Individual ranches and farms comprise the remainder of the inhabited areas in southern Eureka County and the surrounding counties of Lander, Nye, White Pine, and Elko.



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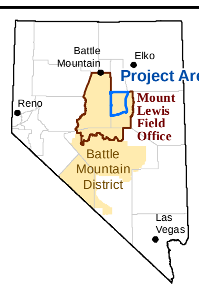


Legend

- Fire Starts (1985 - 2008)
- Large Fire Perimeter (1985 - 2012)
- Fuels Reduction Unit
- Fire and Fuels CESA
- Fire Reseeding

Fire Defense System Assessment

- Shrub/Grass
- Sagebrush/Pinyon-juniper
- 3 Bars Project Area

Source: BLM 2012d,f,g, 2013f.

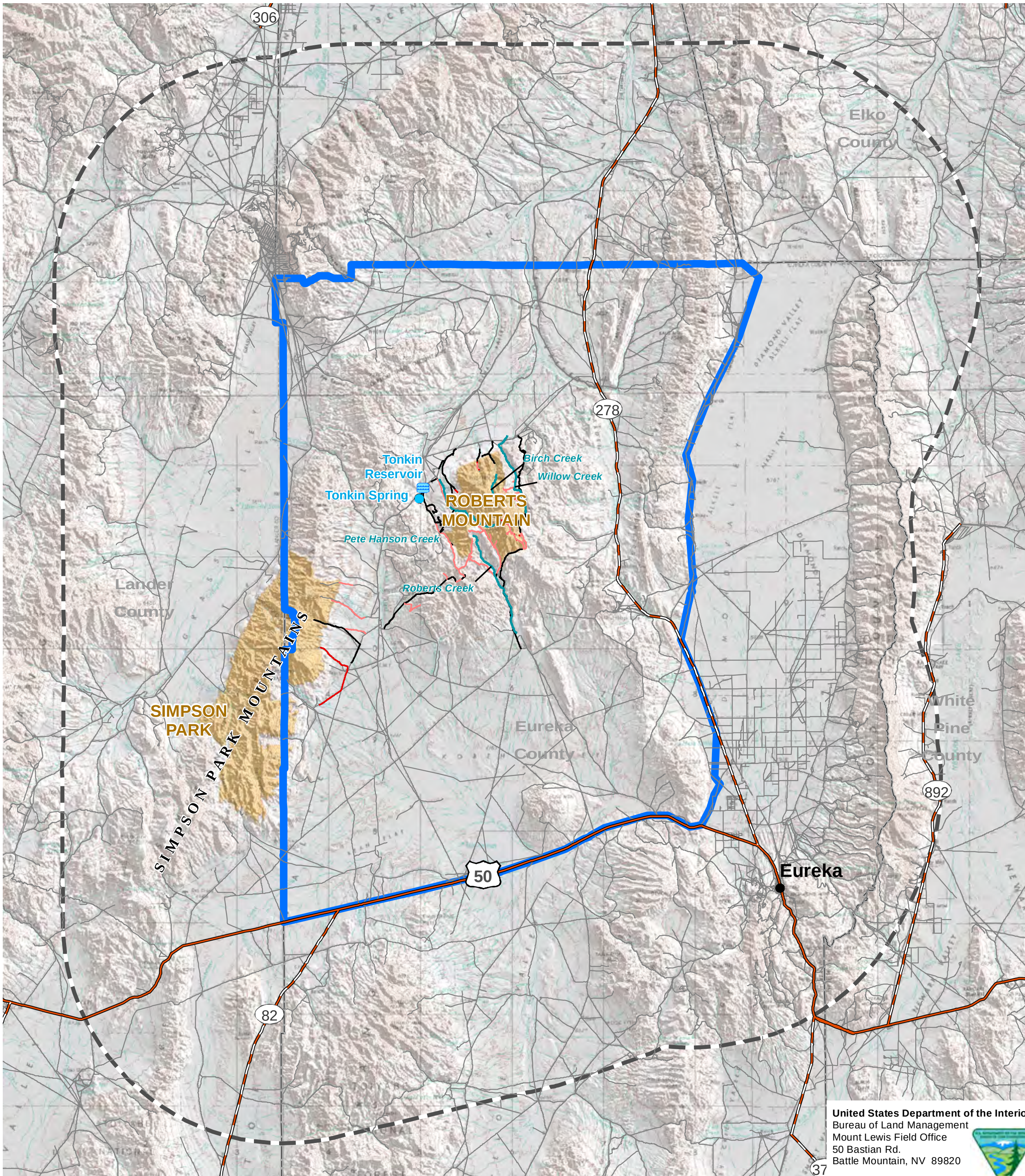
3 Bars Ecosystem and Landscape Restoration Project

Figure 3-3

Cumulative Impacts from Wildland Fires, Fuels Management, and Reseeding

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N



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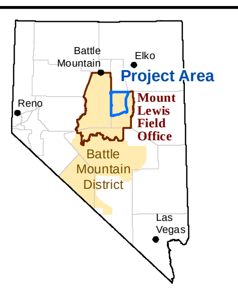

Legend

Travel Route Accessible to:

- All Vehicles
- High Clearance Vehicles
- 4 Wheel Drive Vehicles
- All-terrain Vehicles (ATV)
- Spring
- Reservoir
- Fishing Stream
- Wilderness Study Area
- Visual and Recreation CESA
- 3 Bars Project Area

Source: U.S. Census 2009, 2010a,b, 2011da BLM 2012d,g; USGS 2012a.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-4

Cumulative Impacts from Recreation and Wilderness

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

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Three general types of roads have been developed within Eureka County and the adjoining counties—paved roads, gravel surface roads, and dirt roads. There are two major travel routes within the CESAs—U.S. Highway 50 and State Route 278.

Development of additional roads is probable; however, most of these roads may be unauthorized dirt roads created during motorized recreational use of public lands in the CESAs, and paved or unpaved roads associated with development in or near the town of Eureka. It is reasonable to expect that traffic would increase in volume on the two major travel routes (U.S. Highway 50 and State Route 278) in the CESAs, as well as on the other county roads in proportion to an expected increase in economic activity and population growth, although no estimate was made on the miles of new roads and railroads and acres of disturbance in the reasonably foreseeable future (**Figure 3-5**).

Two major transmission powerlines are in Eureka County, distributing power in the State of Nevada as part of the power grid. One is the Falcon-Gonder line that travels from north of Beowawe, Nevada, through the project area to U.S. Highway 50 and then east to Ely, Nevada. The other main transmission line is an east-west line that parallels U.S. Highway 50. In addition, there are power distribution lines in Diamond Valley and the town of Eureka and to most of the remote ranches and mining operations within the CESA boundaries.

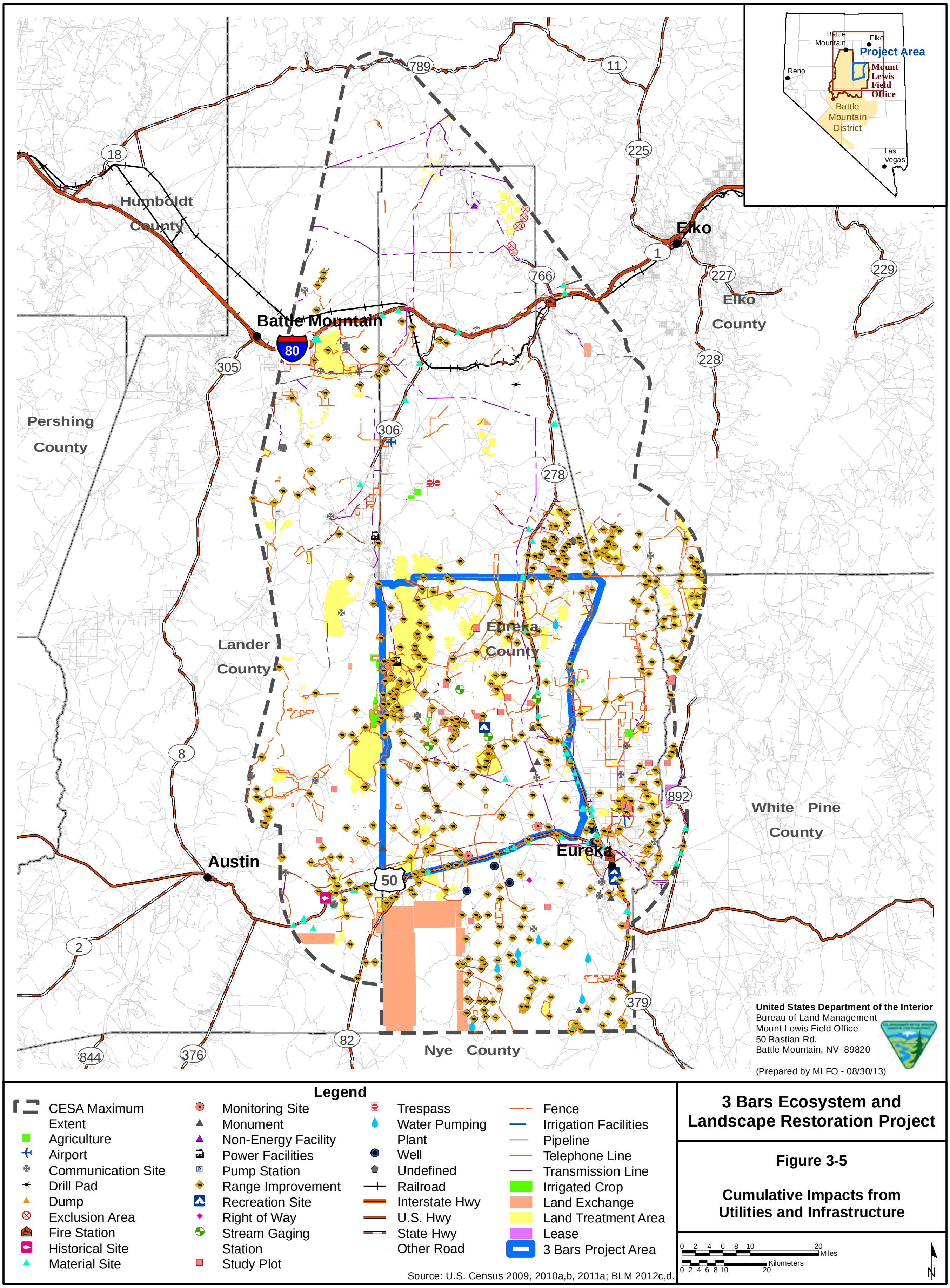
The town of Eureka and the Devils Gate General Improvement District in Diamond Valley have a community water supply system, which is supplied primarily from ground water wells in Diamond Valley, as well as springs in the Pinto Summit area (USDOI BLM 2012b).

The town of Eureka is planning to expand beyond its current limits of development and will require additional infrastructure to support the needs of the community. The need for new transmission lines within this portion of the Nevada is not anticipated, however, as existing rights-of ways can accommodate additional transmission line development and it is reasonable to expect that additional utility distribution and telephone lines would be constructed.

Mineral Development and Exploration

There are ten historic mining districts that occur within the geology and minerals CESA in Eureka County—Alpha, Antelope, Diamond, Eureka, Fish Creek, Lone Mountain, Mineral Hill, Mount Hope, Roberts, and Union. The Alpha District is in the Sulphur Spring Range. The Antelope District is on the western flank of Roberts Mountains. The Diamond District is north of the town of Eureka on the west flank of the Diamond Mountains. The Eureka District, is in the vicinity of the town of Eureka. The Fish Creek District is southwest of the town of Eureka in the Fish Creek Range. The Lone Mountain District is on the north flank of Lone Mountain in Kobeh Valley. The Mineral Hill District is on the northwest flank of the Sulphur Spring Range. The Mount Hope District is on the southeast flank of Mount Hope and is where the Mount Hope Project is being constructed. The Roberts District is on the west flank of the Simpson Park Mountains. The Union District is on the north flank of the Sulphur Spring Range. Surface disturbance associated with these operations has not been quantified, however, it is likely in the range of several hundred to a few thousand acres.

From the mid-1960s to the present, mineral resource development within the CESA has principally been gold production from four mining operations: Gold Bar, Windfall, Tonkin Springs, and Ruby Hill. The Gold Bar Mine is found in the Antelope District in the southern Roberts Mountains and closed in the 1990s. The Ruby Hill Mine is active and is in the Eureka District. The Windfall-Rustler and Lookout Mountain (Ratto Canyon) mines are in



3 Bars Ecosystem and Landscape Restoration Project

Figure 3-5

Cumulative Impacts from Utilities and Infrastructure

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the southern portion of the Eureka District and exploration is ongoing. The Tonkin Springs Mine is currently in closure.

Activities associated with mining, exploration, and extraction would continue to occur in the CESA and would be likely to occur in the 3 Bars Project area (**Figure 3-6**). There are no active mines within the 3 Bars Project area, although the 8,318 acre Mount Hope Project is within the 3 Bars Project boundary. A portion of the mine site was cleared in 2013, but no dates have been set for completion of construction. Although much of the Mount Hope Project site was cleared in 2013, it is uncertain when construction and operation of the mine would occur. McEwen Mining recently purchased the Gold Bar facilities from U.S. Gold Corporation and is conducting baseline work in anticipation of reinitiating mining on the property. Exploration is also occurring in the Red Hills area and at the north end of Rocky Hills. The Gibellini vanadium mine, south of the town of Eureka, has submitted a Plan of Operations to the BLM and preparation of an EIS has begun. There are about 385 acres of sand and gravel materials sites within the Mining Operations and Geothermal, Oil, and Gas CESA. Of these, about 55 acres are within the 3 Bars Project area.

Oil, Gas, and Geothermal Leasing and Development

There are oil and gas leases throughout the CESAs (**Figure 3-6**). Four oil fields have been developed in Pine Valley. These oil fields are in Eureka County and are administered by the BLM Elko District.

There are two geothermal projects within the Mining Operations and Geothermal, Oil, and Gas CESA. The McGinness Hills geothermal project is in Grass Valley, Lander County, and is west of the 3 Bars Project area. The Beowawe geothermal project is in Whirlwind Valley, northern Eureka County, and is north of the 3 Bars Project area. Both projects are in operation. As energy demands increase and advancements in exploration and drilling technology lead to development of previously unexplored resources, oil, natural gas, and geothermal leasing and exploration are likely to increase. Increased economic incentive may also lead to an increase in exploration and development as oil prices rise, although no exploration or development permit applications for projects in the CESAs have recently been submitted to the BLM. There would be additional disturbance associated with oil and gas and geothermal exploration and development as projects are proposed.

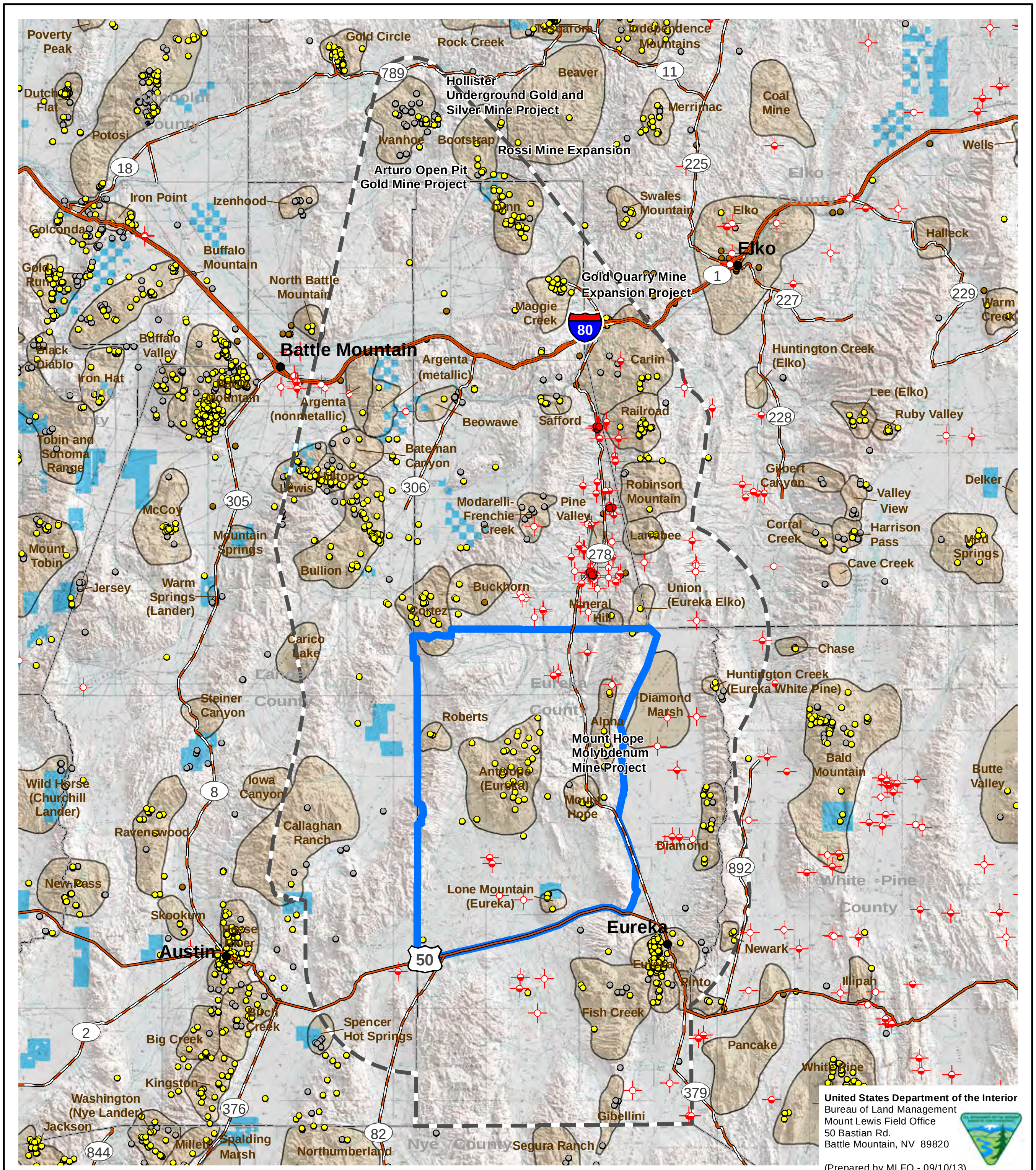
All future proposed actions within the CESAs would be analyzed when a lessee submits plans for the action. The BLM would have the ability to limit discretionary activities on public lands, such as oil, natural gas, and geothermal leasing, because of the potential for listing of the Greater sage-grouse as threatened or endangered under the Endangered Species Act, and possibility that leasing actions could adversely impact Greater sage-grouse.

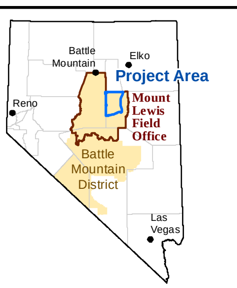
Land Development

The town of Eureka comprises approximately 880 acres. The majority of the town area lies along U.S. Highway 50. In addition, approximately 700 acres have been identified for residential or commercial development in the Diamond Valley area. The town of Eureka and the Diamond Valley community consist of roads, residences, commercial and public buildings, powerlines, fences, and other related development.

There has been little industrial activity within the CESAs except for mineral development activities discussed above. There are also cement batch plants in the town of Eureka and Diamond Valley (USDOI BLM 2012b).

Approximately 23,000 acres within Diamond Valley and within the project area have been identified for disposal in the Shoshone-Eureka RMP. Public land sales are considered possible under reasonably foreseeable future actions. The BLM is evaluating a proposed 150-acre land sale associated with the Ruby Hill Mine. Other potential land sales could





Legend

Oil and Gas Wells through 2006
- Active Production Well
- Abandoned Well with Evidence of Oil and/or Gas Encountered while Drilling
- Abandoned Well with No Evidence of Oil or Gas Encountered while Drilling
- Geothermal Lease

Mineral Resources
- Precious Metals
- Base Metals
- Sand and Gravel
- Mining District
- CESA Maximum Extent
- 3 Bars Project Area

Source: Tingley, J.V. 1998; Garside and Hess 2007; BLM 2011c, 2012d; USGS 2012a.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-6

Cumulative Impacts from Mining Operations and Oil and Gas Production

0 2 4 6 8 10 20 Miles
0 2 4 6 8 10 20 Kilometers
N

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include lands associated with community development or specific resource development projects. Any future land sales that were not within disposal areas identified in the Shoshone-Eureka RMP would be subject to congressional requirements in the implementing legislation. Public lands converted to private ownership would be subject to all applicable state environmental laws.

If a land sale involved community development land, there would likely be a future change in use from wildlife habitat to residential or commercial development. If a land sale involved an ongoing resource development project, current resource activities would likely continue into the future with possible expansion. After the resource activity has been completed, the land could be restored to uses such as livestock grazing and wildlife habitat, which would be the use if the land remained under BLM management, or could be converted to other uses. Long-term use of privatized land would be subject to any covenants agreed to at the time of sale. Information on areas identified for disposal can be found in the 1986 *Shoshone-Eureka Resource Area ROD* (USDOI BLM 1986a:5) on the BLM Battle Mountain District Office website at URL: http://www.blm.gov/nv/st/en/fo/battle_mountain_field/blm_programs/planning/resource_management.html.

3.3.2.4 Set of Receptors to be Assessed

The set of receptors assessed in the cumulative effects analysis are the natural, cultural, and social resources discussed in this chapter.

3.3.2.5 Magnitude of Effects and whether Those Effects are Accumulating

The potential extent of the total cumulative effects (e.g., number of animals and habitat affected), and how long the effects might last (e.g., population recovery time) are estimated to determine the magnitude of effects that could accumulate for each resource. Where possible, the assessment of effects on a resource is based on quantitative analysis (e.g., acres affected by treatment activity). However, many effects are difficult to quantify (e.g., animal behaviors; human perceptions) and a qualitative assessment of effects is made.

As suggested by the CEQ, this EIS considers the following basic types of effects that might occur:

- Additive – total loss of sensitive resources from more than one incident.
- Countervailing – negative effects are compensated for by beneficial effects.
- Synergistic – total effect is greater than the sum of the effects taken independently.

The cumulative effects analysis assumes that maintenance of past treatments has occurred, and that the BLM would make an investment in maintaining the condition achieved or the objectives of the project, rather than implementing stand-alone, one-time treatments. The analysis also assumes that the BLM would determine the need for the action based on past monitoring, and that additional monitoring would occur after the project to ascertain if effects are still accumulating or if the treatment has been effective in achieving the resource objective.

3.3.3 Unavoidable Adverse Commitments

Unavoidable adverse commitments are those commitments that could occur as a result of implementing any of the action alternatives. Some of these effects would be short-term, while others would be long-term.

3.3.4 Irreversible and Irretrievable Commitments

Irreversible commitments are those commitments that cannot be reversed, except perhaps in the extreme long-term. This term applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to factors, such as soil productivity, that are renewable only over long periods of time.

Irretrievable commitments are those commitments that are lost for a period of time. For example, timber production is lost while an area is mined. The production lost is irretrievable, but the action is not irreversible. If the site is reclaimed, it is possible to resume timber production.

3.3.5 Resource Protection Measures Considered in the Effects Analysis

The impacts assessment assumes that SOPs, monitoring measures, and mitigation developed by the BLM for the alternatives would be adopted to protect environmental and socioeconomic resources on public lands (**Appendix C**).

In addition, a number of federal, state, local, and tribal resource management and monitoring programs have been established to protect environmental resources and, in cases where there is existing environmental impairment, to effect restoration. The assessment of cumulative impacts recognizes the existence of these programs and assumes that the mandate under which each program was established will continue. The effects analysis assumes that these programs effectively avoid or mitigate the environmental impacts that they are designed to address. The programs are discussed in the sections that follow.

3.3.6 Incomplete and Unavailable Information

This EIS discusses the baseline environment that exists today, and impacts from treatments that the Mount Lewis Field Office proposes to conduct during life of the project. It is assumed that baseline conditions would change little during the expected life of this EIS (about 10 to 15 years). Still, treatments could occur during the life of this EIS that are substantially different from those evaluated in this EIS. If so, the Mount Lewis Field Office would conduct additional NEPA analysis to assess those projects' effects.

The analysis of impacts of the treatments in this EIS is based on the best and most recent information available. As is always the case when developing management direction for a wide range of resources, not all information that might be desired is available. The CEQ regulations provide direction on how to proceed with the preparation of an EIS when information is incomplete or unavailable:

> "If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement: 1) a statement that such information is incomplete or unavailable; 2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; 3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and 4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes "impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by

credible scientific evidence, is not based on pure conjecture, and is within the rule of reason" (40 CFR § 1502.22b).

For this EIS, the primary effect of unavailable information is the inability to quantify certain impacts. Where quantification was not possible, impacts have been described in qualitative terms. A summary of existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable adverse impacts on the human and socioeconomic environment and supports the BLM's evaluation of such impacts has been included in Chapter 3, in the appendices that accompany this EIS, and in supporting documents that were prepared for this EIS.

There are also uncertainties associated with the assessment process used to determine the effects from the use of the treatment methods. Our knowledge of risks to the environment from treatment methods continually evolves. Our knowledge is, and always will be, incomplete regarding many aspects of terrestrial and aquatic species; ecology of the lands administered by the BLM; the economy; society; the types of vegetative threats the Field Office will face in future years; funding; and changes in government policy. To reduce the level of uncertainty, the best available information was used, and it was assumed that future treatment actions, funding, and government policies, as they apply to BLM-administered lands, would be similar to actions and policies that have occurred in recent years. Should these conditions change and as the best available science emerges such that assumptions made in this EIS are no longer valid, the Mount Lewis Field Office would conduct additional NEPA analysis to better understand risks from their treatments.

3.4 General Setting

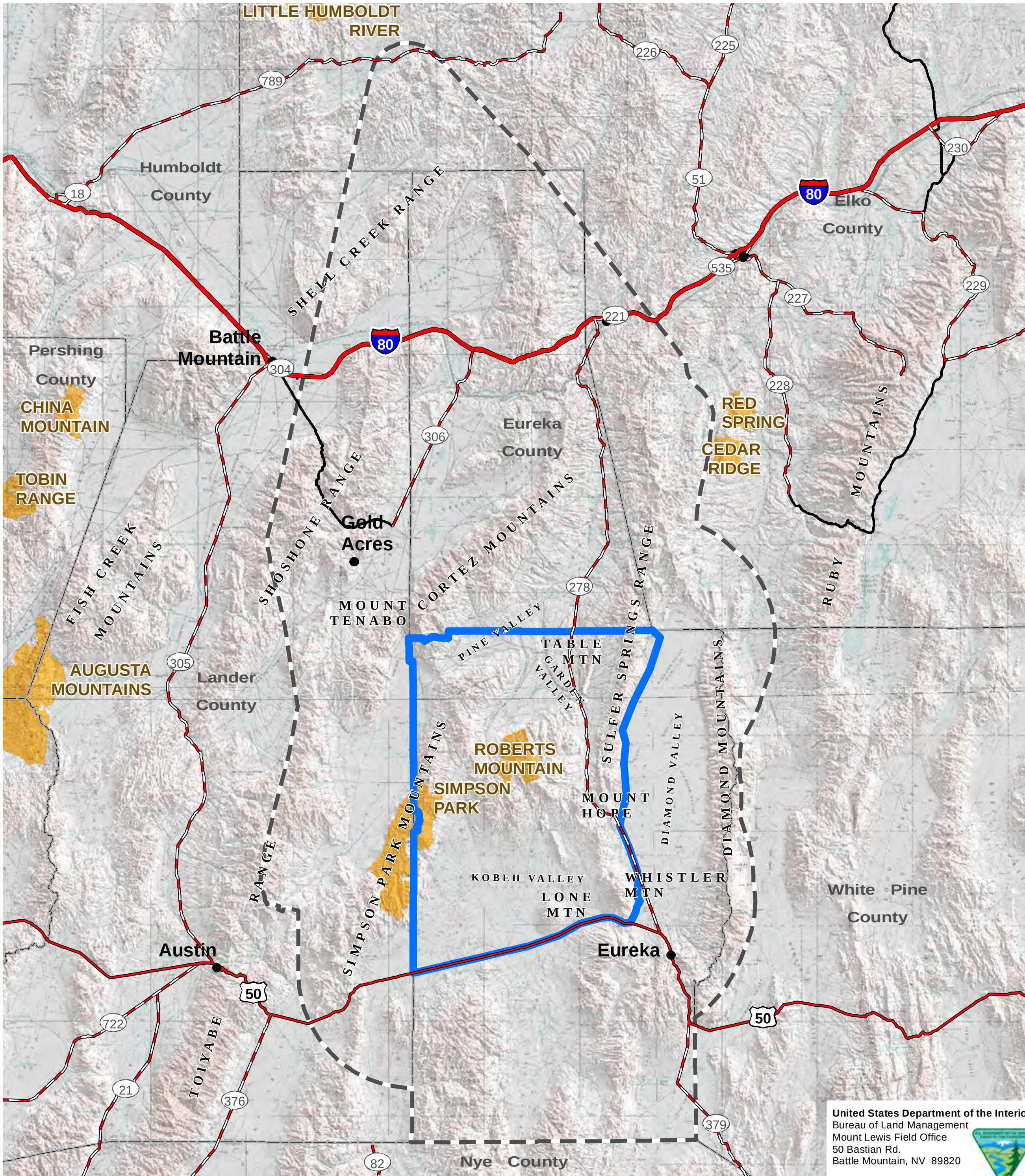
3.4.1 Project Area

The 3 Bars Project area is in northern Eureka County, Nevada (**Figure 3-7**). The project area spans about 750,000 acres and includes three major mountain ranges (Roberts Mountains, Simpson Park Mountains, and the Sulphur Spring Range).

The project area is located in the central portion of the Basin and Range physiographic province. Within the project area, surface elevations range from approximately 10,100 feet above mean sea level (amsl) at the peak of Roberts Mountains in the middle of the project area, to approximately 5,450 feet amsl along Pine Creek at the northern edge of the project area. Other high elevation areas within the project include the Simpson Park Mountains (ranging generally from 7,600 to 8,200 feet amsl) along the western part of the project area, and Table Mountain and the Sulphur Spring Range (the latter ranging generally from 7,400 to 7,800 feet amsl) in the northeast. Lower elevations are approximately 6,070 feet amsl along U.S. Highway 50; approximately 5,830 feet amsl in Diamond Valley, approximately 5,640 feet amsl in the northwest corner of the project area, and approximately 5,480 feet amsl along Henderson Creek in Garden Valley in the northern part of the project area. Block faulting in the area has resulted in generally north-south trending mountain ranges. Structural deformation has resulted in a series of valleys separated by mountain ranges. The three valleys of interest that are within the ecosystem are Diamond, Kobeh, and Pine Valleys (**Figure 3-7)**.

3.4.2 Ecoregions

There are nine ecoregions within the project area (**Figure 3-8**; Bryce et al. 2003**)**. Ecoregions are geographic areas that are delineated and defined by similar climatic conditions, geomorphology, and soils (Bailey 1997, 2002 *cited in* USDOI BLM 2007c). Since these factors are relatively constant over time and strongly influence the ecology of



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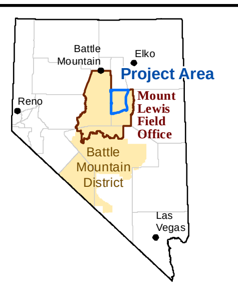

Legend

- Interstate Highway
- U.S. Highway
- State Highway
- Major Road
- City or Town
- CESA Maximum Extent
- Wilderness Study Area
- 3 Bars Project Area

Source: BLM 2012d,g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-7

Study Area

0 2 4 6 8 10 20 Miles
0 2 4 6 8 10 20 Kilometers

N

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vegetative communities, ecoregions may have similar potentials and responses to disturbance (Clarke and Bryce 1997, Jensen et al. 1997). Ecoregions, therefore, provide a useful framework for organizing, interpreting, and predicting changes to vegetation following management treatments. These ecoregions are discussed below.

Several ecological sites occur within each respective ecoregion. Finer scale descriptions of the soils, vegetation, and associated plant community dynamics can be obtained from the ecological site descriptions for the ecological sites correlated to specific soils within the project area. A list of the dominant ecological sites can be found in Section 3.12.2.2 based on ecological site descriptions. Rangeland landscapes are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site, as defined for rangeland, is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. The ecological site descriptions are based on physiographic, climatic, vegetative, and soil factors for each soil association.

3.4.2.1 Lahontan and Tonopah Playas

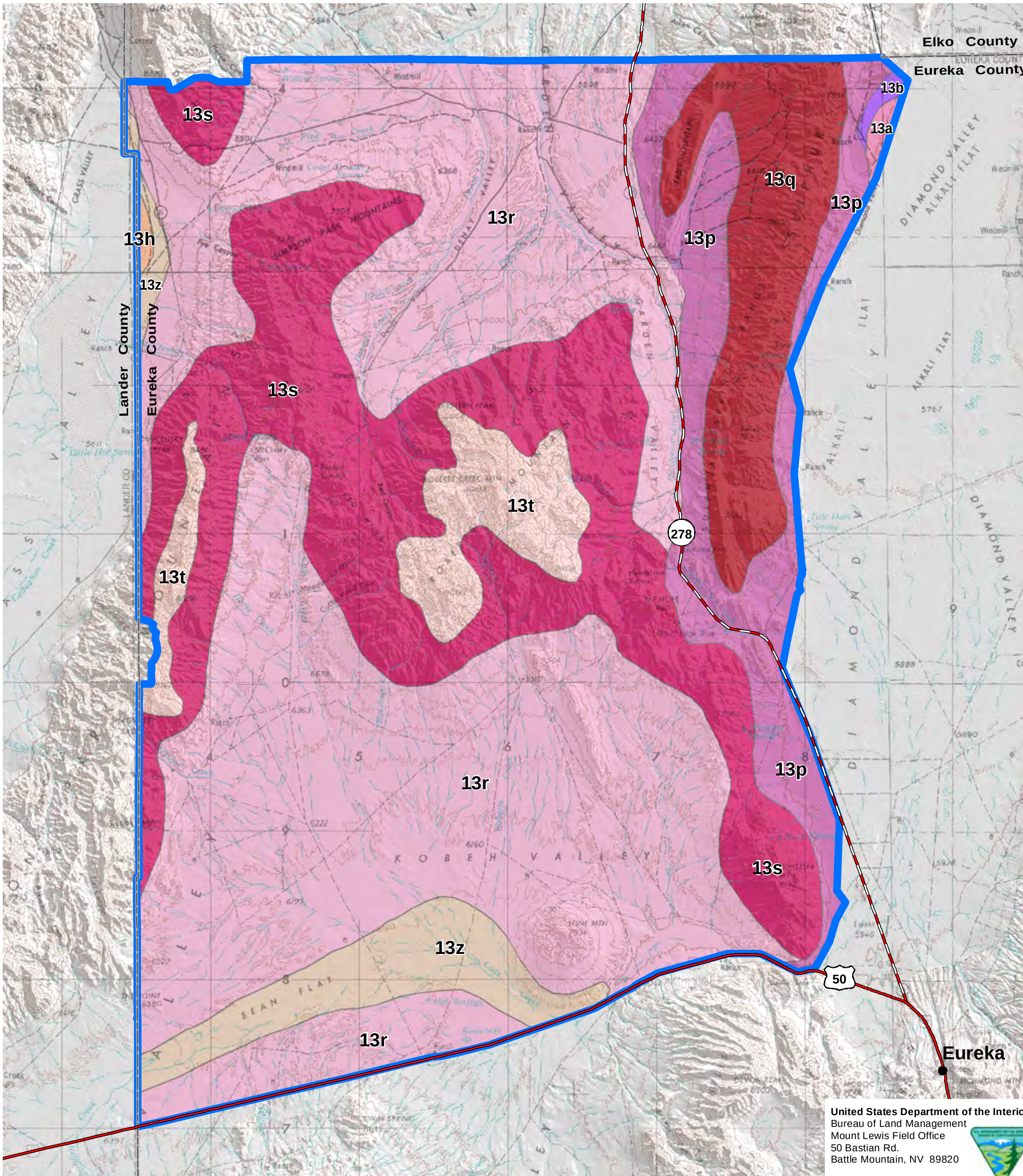
The nearly level and often barren Lahontan and Tonopah Playas ecoregion contains mud flats, alkali flats, and intermittent saline lakes, such as the Black Rock Desert, Carson Sink, and Sarcobatus Flat. Marshes, remnant lakes, and playas are all that remain of Pleistocene Lake Lahontan, which was once the size of Lake Erie. Playas occur at the lowest elevations in the Lahontan Basin and represent the terminus or “sink” of rivers flowing east off the Sierra Nevada. They fill with seasonal runoff from surrounding mountain ranges during winter, providing habitat for migratory birds. Black greasewood or four-winged saltbush may grow around the perimeter in the transition to the salt shrub community, where they often stabilize areas of low sand dunes. This ecoregion has very limited grazing potential. Windblown salt dust from exposed playas may affect upland soils and vegetation. The Lahontan and Tonopah Playas ecoregion is important as wildlife habitat and for some recreational and military uses.

3.4.2.2 Carbonate Sagebrush Valleys

The basins and semi-arid uplands of the Carbonate Sagebrush Valleys ecoregion surround the carbonate ranges of eastern Nevada. Like the ranges, the Carbonate Sagebrush Valleys ecoregion is also largely underlain by limestone or dolomite. The combination of summer moisture and a limestone or dolomite substrate affects regional vegetation, particularly in terms of species dominance and elevational distribution. The substrate favors shrubs, such as black sagebrush and winterfat, which can tolerate shallow soil. Even in alluvial soils, root growth may be limited by a hard pan or caliche layer formed by carbonates leaching through the soil and accumulating. As a result, shrub cover is sparse in contrast to other sagebrush-covered ecoregions in Nevada, including the Central Nevada High Valleys ecoregion. The grass understory grades from a dominance of cool season grasses, such as bluebunch wheatgrass, in the north, to warm season grasses, such as blue grama (an indicator of summer rainfall), in the south.

3.4.2.3 Carbonate Woodland Zone

In the Carbonate Woodland Zone ecoregion the singleleaf pinyon pine and Utah juniper woodland canopy overtops and spans the existing sagebrush and mountain brush communities. The pinyon-juniper woodland has a broader elevational range in the carbonate areas of eastern Nevada than elsewhere in the region, even extending onto the floors of the higher basins, partially because of greater summer precipitation. Both pinyon and juniper decline north of this ecoregion. Historically, miners cut pinyon and juniper for mine timbers and charcoal. Since the beginning of fire suppression early in the last century, pinyon-juniper woodland has increased in density and expanded into lower sagebrush zones. The woodland understory is diverse due to the influence of carbonate substrates and summer



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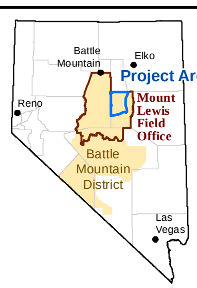

Legend

13 Central Basin and Range

- 13a Salt Deserts
- 13b Shadscale-dominated Saline Basins
- 13h Lahontan and Tonopah Playas
- 13p Carbonate Sagebrush Valleys
- 13q Carbonate Woodland Zone
- 13r Central Nevada High Valleys
- 13s Central Nevada Mid-slope Woodland and Brushland
- 13t Central Nevada Bald Mountains
- 13z Upper Lahontan Basin
- 3 Bars Project Area

Source: USEPA 2012a.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-8

Ecoregions of the 3 Bars Project Area

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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rainfall. There are more springs and streams in this ecoregion than in western non-carbonate woodlands (e.g., Central Nevada Mid-Slope Woodland and Brushland ecoregion) because the carbonate substrate is soluble and porous, allowing rapid infiltration.

3.4.2.4 Central Nevada High Valleys

The Central Nevada High Valleys ecoregion contains sagebrush-covered rolling valleys that are generally over 5,000 feet amsl in elevation. Alluvial fans spilling from surrounding mountain ranges fill the valleys, often leaving little intervening flat ground. Wyoming big sagebrush and associated grasses are common on the flatter areas, and black sagebrush dominates on the volcanic hills and alluvial fans. This ecoregion tends to have a lower species diversity than many other sagebrush-dominated ecoregions (including the Carbonate Sagebrush Valleys ecoregion) because of its aridity and its isolation from more species-rich areas. Saline playas may occur on available flats. Less shadscale and fewer associated shrubs surround these playas compared to other lower, more arid ecoregions to the west. Valleys with permanent water support endemic fish species, such as the Monitor Valley speckled dace.

3.4.2.5 Central Nevada Mid-slope Woodland and Brushland

The Central Nevada Mid-slope Woodland and Brushland ecoregion at 6,500 to 8,000 feet amsl is analogous in altitudinal range to other woodland areas in Nevada. However, continuous woodland is not as prevalent on the mountains of central Nevada as in other woodland ecoregions. Pinyon–juniper grows only sparsely through the shrub layer due to the combined effects of past fire, logging, and local climate factors, including lack of summer rain and the pattern of winter cold air inversions. Where extensive woodlands do exist, understory diversity tends to be very low, especially in closed canopy areas. Areas of black and Wyoming big sagebrush grade upward into mountain big sagebrush and curl-leaf mountain mahogany, which straddles the transition between this mid-elevation brushland and the mountain brush zone of the higher Central Nevada Bald Mountains ecoregion.

3.4.2.6 Central Nevada Bald Mountains

The Central Nevada Bald Mountains ecoregion is dry and mostly treeless. Although they rise only a hundred miles east of the Sierra Nevada, they lack Sierra Nevada species because of the dry conditions. These barren-looking mountains are covered instead by dense mountain brush that is dominated by mountain big sagebrush, western serviceberry, snowberry, and low sagebrush. In moister microsites, scattered groves of curl-leaf mountain mahogany and aspen grow above the shrub layer. A few scattered limber pines grow on ranges that exceed 10,000 feet amsl. The Toiyabe Range, which is a few miles to the east of the project area, is high enough to have an alpine zone, but it lacks a suitable substrate to retain snowmelt moisture. The isolation of these “sky islands” has led to the evolution of many rare and endemic plant species.

3.4.2.7 Upper Lahontan Basin

The Upper Lahontan Basin ecoregion lies outside of the rain shadow cast by the Sierra Nevada and records somewhat higher rainfall and cooler temperatures than other portions of the Lahontan Basin. It is characterized by the shadscale and greasewood plant community, with Thurber’s needlegrass common in the understory. This ecoregion has a shorter growing season than the rest of the Lahontan Basin.

3.4.2.8 Salt Deserts

The Salt Deserts ecoregion is composed of nearly level playas, salt flats, mud flats, and saline lakes. These features are characteristic of those in the Bonneville Basin; they have a higher salt content than the Lahontan and Tonopah Playas. Water levels and salinity fluctuate from year to year; during dry periods salt encrustation and wind erosion occur. Vegetation is mostly absent although scattered salt-tolerant plants, such as pickleweed, iodine bush, black greasewood, and inland saltgrass, occur. Soils are not arable, and there is very limited grazing potential. The salt deserts provide wildlife habitat, and serve some recreational, military, and industrial uses.

3.4.2.9 Shadscale-dominated Saline Basins

The Shadscale-dominated Saline Basins ecoregion is arid, internally drained, and gently sloping to nearly flat. These basins are higher in elevation and colder in winter than the Lahontan Salt Shrub Basin to the west. Light-colored soils with high salt and alkali content occur and are dry for extended periods. The saltbush vegetation common to Shadscale-dominated Saline Basins Ecoregion has a higher tolerance for extremes in temperature, aridity, and salinity than big sagebrush, which dominates the Sagebrush Basins and Slopes ecoregion at somewhat higher elevations. The basins in Nevada, in contrast to those in Utah, are more constricted in area and more influenced by nearby carbonate mountain ranges, which provide water by percolation through the limestone substrate to valley springs. Isolated valley drainages support endemic fish, such as the Newark Valley tui chub.

3.5 Meteorology and Climate Change

3.5.1 Regulatory Framework

On October 30, 2009, the USEPA published a rule for the mandatory reporting of greenhouse gases (40 CFR § 98) from large greenhouse gas emissions sources in the U.S. Implementation of 40 CFR § 98 is referred to as the Greenhouse Gas Reporting Program. 40 CFR § 98 applies to direct greenhouse gas emitters, fossil fuel suppliers, and industrial gas suppliers. This comprehensive, nationwide emissions data will provide a better understanding of where greenhouse gases are coming from and will guide development of the policies and programs to reduce emissions. The publicly available data will allow greenhouse gas emitters to track their own emissions and compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. In general, the threshold for reporting is 25,000 metric tons or more of carbon dioxide (CO_2) equivalent per year. Reporting is at the facility level, except for certain suppliers of fossil fuels and industrial greenhouse gases. An estimated 85 to 90 percent of the total U.S. greenhouse gas emissions from approximately 10,000 facilities are covered by this final rule. Most small businesses and mining operations would fall below the 25,000 metric ton threshold and are not required to report greenhouse gas emissions to the USEPA.

3.5.2 Affected Environment

3.5.2.1 Meteorology

Limited meteorological data have been collected in the 3 Bars Project area. Baseline meteorological conditions representative of the project area were assessed using data from nearby monitoring stations in north-central Nevada. Meteorological data from the Elko, Nevada airport, 70 miles north of the project area, was utilized for climate characterization. The Elko monitoring station measures ambient temperature, wind speed, wind direction, and precipitation at an elevation of approximately 5,080 feet amsl. Meteorological data from the Mercury-Desert Rock monitoring station was also used because the Nevada Bureau of Air Pollution Control (Nevada BAPC) determined that the meteorological data at that site are most representative for the project area.

Local climatic factors include the occurrence of cold air inversions during winter and scarce summer rain. Average maximum temperatures are 86 degrees Fahrenheit (°F) in July, while average minimum temperatures are 17 °F in January.

Mean annual precipitation varies directly with elevation, ranging from approximately 8 inches per year in the lower valley floors, up to approximately 18 inches per year at the highest elevations in the Roberts Mountains (USDA Natural Resources Conservation Service 1998). Most of the study area receives between 10 and 16 inches of precipitation in an average year. Nearby long-term regional climate stations are at Eureka (station elevation 6,540 feet amsl) and at a USDA site to the north in Diamond Valley (station elevation 5,970 feet amsl). For the Eureka station, averages are indicated in **Table 3-3** (Western Regional Climate Center 2012).

The precipitation climate in the project area is classified as arid, with elevations below 6,500 amsl feet receiving the least amount of precipitation (5 to 9 inches per year), while the mountainous areas are significantly wetter, receiving 11 to over 16 inches of precipitation annually (Western Regional Climate Center 2012). An arid climate is characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges. Net evaporation exceeds precipitation in the project area.

Most precipitation accumulates as snow on the mountain ranges. During the spring snowmelt period, water flows from the mountain ranges into the basin fill deposits. As water flows from areas of bedrock outcrop in the mountains toward the valley, it rapidly infiltrates into the basin fill deposits along the range fronts. Thus, most recharge into the basin fill deposits occurs along the margins of the valleys or at higher elevations and not in the central portion of the valleys. However, some streams may flow into the central valley during times of high runoff, causing water to accumulate in the playas (Western Regional Climate Center 2012).

The BLM operated 3 flow-recording stations and 20 bulk precipitation collection stations in the Coils Creek watershed, a 50-square mile area in the northwestern part of Kobeh Valley, from 1963 to 1980 (Houng-Ming et al. 1983 *cited in* USDOI BLM 2012b). The average annual precipitation was 11.4 inches during the period, but they did not find an increase in precipitation with altitude, which is uncommon in the Great Basin, where orographic lift effects usually produce a well-defined elevation-to-precipitation relationship. Orographic lift occurs when an air mass is forced from a low elevation to a higher elevation as it moves over rising terrain, and often generates clouds and precipitation. The precipitation data from the Coils Creek watershed may indicate unusual storm tracks, a lack of orographic lift effect, or potentially a data problem that cannot be resolved with existing information (Montgomery and Associates 2010).

3.5.2.2 Climate Change

Ongoing scientific research has identified the potential impacts of man-made greenhouse gas emissions and changes in biological carbon sequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these greenhouse gas emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although greenhouse gas levels have varied for millennia, recent industrialization and burning of fossil fuels have caused carbon dioxide (CO_2; a greenhouse gas) concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change (2007) concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."

Several activities contribute to the phenomena of climate change, including emissions of greenhouse gasses (especially CO_2 and methane) from fossil fuel development, large wildfires, and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity from the earth's surface (albedo). It is important to note that greenhouse gasses would have a sustained climatic impact over different temporal scales. For example, recent emissions of CO_2 can influence climate for more than 100 years (Intergovernmental Panel on Climate Change 2007).

Global mean surface temperatures have increased nearly 1.8 °F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° North) have exhibited temperature increases of nearly 2.1 °F since 1900, with nearly a 1.8 °F increase since 1970. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of greenhouse gasses are likely to accelerate the rate of climate change.

TABLE 3-3

Monthly Climate Summary for Eureka, Nevada (1888 through 2012)

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Precipitation (inches)	1.07	1.05	1.34	1.34	1.42	0.84	0.68	0.78	0.77	0.89	0.78	0.89	11.85
Total Snowfall (inches)	9.4	9.8	10.2	7.0	3.7	0.4	0.1	0.0	0.6	2.4	6.1	9.4	59.0
Average Maximum Temperature (°F)	38.3	41.2	48.3	57.0	66.0	77.2	86.4	84.3	74.9	63.3	48.8	39.7	60.4
Average Minimum Temperature (°F)	17.1	19.2	23.9	28.9	36.4	44.1	52.9	52.0	43.7	34.6	24.5	18.3	33.0

Source: Western Regional Climate Center (2012).

In 2001, the Intergovernmental Panel on Climate Change indicated that by the year 2100 global average surface temperatures would increase 2.5 to 10.4 °F above 1990 levels. The National Academy of Sciences (2010) agreed with these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature would not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere and reduce soil moisture, which would increase generalized drought conditions and enhance heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

Karl et al. (2009) assessed the effects of global climate change impacts in the U.S. They noted that the average temperature in the Southwestern U.S. has increased about 1.5 °F compared to the 1960-1979 baseline, and is predicted to increase 4 to 10 °F above the historical baseline by the end of the century. Although the Southwest experiences frequent droughts, recent warming in the Southwest is among the most rapid in the nation. This is causing declines in spring snowpack and water in some areas in the Southwest has become limited. Climate change is projected to cause substantial reductions in rain and snowfall in the spring months, when precipitation is most needed to fill reservoirs. Despite the greater likelihood of drought, however, the incidence of flooding is expected to increase as the precipitation rate exceeds the infiltration rate, with a trend toward both more frequent extremely dry and extremely wet winters. With warmer temperatures, more precipitation will fall as rain than as snowfall. The increase in rain on snow events will also cause rapid runoff and flooding.

Because of temperature increases, pinyon-juniper woodlands in portions of the Southwest are dying off, and area burned by wildfires is expected to increase. However, where fire is limited by the availability of fine fuels, such as occurs in the 3 Bars Project area, fire frequency is expected to decrease. Temperature increase is projected to increase the amount of grassland acreage, and acreage dominated by invasive vegetation, such as red brome, that do well in high temperatures (Karl et al. 2009). There is concern that as climate change places greater stress upon vegetation, soil, water, and other resources on public lands, that it will be necessary to reduce the effects of other stressors, including livestock, wild horses, and other ungulates by reducing their numbers or spreading out their use in areas where they are abundant (Reisner 2010, Beschta et al. 2013). At the least, it will require that the BLM monitor the effects of livestock and other ungulates on the health of public lands, including the 3 Bars Project area, as the climate warms.

Climate change is predicted to increase water temperature in most regions including the arid Southwest (Meyer et al. 1999). The effect of increased water temperature on aquatic habitat and species could include changes in water quality (e.g., dissolved oxygen) and biological conditions such as direct mortality from acute temperature stress, sublethal stress on physiological functions, and shifts in species distributions. In North America, the Intergovernmental Panel on Climate Change predicted that coldwater fisheries would likely be adversely affected, warmwater fish species generally would be positively affected, and cool water fisheries would have a mixture of positive and negative changes in terms of habitat conditions and species distribution and diversity. In general, climatic warming would result in a general shift in species distributions northward, with extinctions of cool-water species at lower altitudes and range expansion of warmwater and cool-water species into higher altitudes (Meyer et al. 1999).

As a means of assessing the vulnerability of species to climate change, NatureServe initiated a collaborative effort to develop a Climate Change Vulnerability Index (Young et al. 2009). The Index was applied to a selection of test species in Nevada, where it will be used to modify the State Wildlife Action Plan by incorporating climate change species information. Based on this initial case study (Young et al. 2009) and subsequent analyses by the Nevada Natural Heritage Program (2011), vulnerability index ratings for aquatic species provide some indication of potential effects of climate change in Nevada. The index score was moderately vulnerable for Lahontan cutthroat trout, a federally listed threatened species under the Endangered Species Act that is found on the 3 Bars Project area. The analysis also predicted that the abundance and/or range extent of this species within the geographical area assessed likely would decrease by 2050.

3.5.3 Environmental Consequences

3.5.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, a number of concerns specific to meteorology and climate were identified and are discussed in the previous section and this section. These include:

- Concern that big fire years are a result of climate change, and are beyond agency control.
- The potential adverse effects of climate change and increasing temperatures, including on noxious weeds and other invasive non-native vegetation problems, alterations in runoff, reduction in perennial flows, and changes to upland conditions.
- Whether 3 Bars Project actions may promote desertification, global warming, and climate change processes.
- The current degree of desertification that exists across the District and on adjacent lands and how climate change may exacerbate the effects of deforestation and/or sagebrush removal or eradication effects.
- Effects of global warming and climate change, and increased risk of site desertification and noxious weeds and other invasive non-native vegetation invasion following treatment, grazing, or other and overlapping disturbances.

3.5.3.2 Direct and Indirect Effects

3.5.3.2.1 Direct and Indirect Effects Common to All Action Alternatives

The combustion of fossil fuels would release CO_2 to the atmosphere. The use of chainsaws, and vehicles to transport workers, would be the primary sources of CO_2 emissions common to all alternatives. These emissions would have a negligible effect on global climate change. Treatments would help to improve ecosystem health and reduce the risk of wildfire and associated smoke emissions, to the benefit of the global climate.

3.5.3.2.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Prescribed fire and wildland fire for resource benefit, and use of equipment for mechanical treatments and to transport workers, would be the primary sources of CO_2 emissions. ENSR (2005a) modeled annual CO_2 emissions for BLM vegetation treatments for the 17-States PEIS and PER (USDOI BLM 2007b, c). Based on modeling done for Nevada, the acreage treated on the 3 Bars Project area would comprise about 4 percent of acres treated by the BLM annually in Nevada and would contribute about 19,115 tons of CO_2 to the atmosphere annually. The actual amount of emissions could vary from estimates from modeling based on differences in the acres and types of vegetation treated under each method. However, in the context of CO_2 emissions from BLM treatments in Nevada, and from other sources of CO_2 emissions in the region, CO_2 emissions for the 3 Bars Project would be negligible.

Based on a modeling study by Wiedinmyer and Hurteau (2010) that evaluated the use of prescribed fire as a means of reducing forest carbon emissions, they found that carbon dioxide fire emissions could be reduced by 18 to 25 percent in the western U.S., and by as much as 60 percent in some forest systems, by using prescribed fire as prescribed burns typically release substantially less CO_2 emissions than wildfires of the same size. The Association for Fire Ecology and others (2013) noted that prescribed fires can be used to reduce the risk of wildfire and help to promote a stable and resilient ecosystem and long-term carbon sequestration. Treatments to improve the health and resiliency of native vegetation, thin and remove pinyon-juniper, create fire and fuel breaks, and control cheatgrass and other noxious weeds and other invasive non-native vegetation should help to reduce the occurrence and spread of wildfire and associated CO_2 emissions from wildfire smoke.

3.5.3.2.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, the BLM would not use prescribed fire and wildland fire for resource benefit and thus CO_2 emissions from those sources would not occur under this alternative. Mechanical treatments contribute negligible amounts of CO_2 emissions. Based on modeling, the 3 Bars Project would contribute about 5,600 tons of CO_2 to the atmosphere annually under Alternative B. The actual amount of emissions could vary from estimates from modeling based on differences in the acres and types of vegetation treated under each method. Because prescribed fire and wildland fire for resource benefit would not be used under this alternative to thin and remove pinyon-juniper and improve the health and resiliency of native vegetation, the occurrence of wildfire and associated smoke production may be greater under this alternative than under Alternative A.

3.5.3.2.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

The BLM would only use manual and classical biological treatments under Alternative C. Based on modeling, these methods would contribute only about 2 tons of CO_2 emissions annually. Because these treatments would do little to improve ecosystem health and reduce wildfire risk, smoke emissions from wildfire would likely be greater under this alternative than under Alternatives A and B.

3.5.3.2.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct CO_2 emissions under this alternative as no treatments would be authorized. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Thus, the 3 Bars Project area would be subject to large-scale wildfires with potentially uncontrolled dense smoke emissions. Carbon dioxide emissions from wildfires would likely be greater under Alternative D than under the action alternatives.

3.5.3.3 Cumulative Effects

The effects of changing climate on future fire regimes and CO_2 emissions are difficult to predict, not only due to uncertainties associated with future climate, but because of interactive effects between climate change, biological factors, and vegetation treatment activities, and politics.

Cumulative impacts to climate change could result from CO_2 emissions from a number of sources within the CESA that are associated with reasonably foreseeable land development and utility and infrastructure projects. Mechanical equipment would be used during construction of utility and infrastructure projects, and construction workers and users of the facilities would travel by vehicle to project sites. Wildfires will continue to be the primary contributors to CO_2 emissions in the CESA. Technology, however, will continue to play an important role in reducing CO_2 emissions from engine operations. Increasing carbon storage and reducing the amount of CO_2 released to the atmosphere can also be achieved by reducing the rate of logging and by preserving older trees (DellaSala 2009).

3.5.3.4 Significance of the Effects under the Alternatives

A significant effect on climate is not likely to be caused by BLM restoration activities. Treatments that improve ecosystem health and reduce hazardous fuels buildup, thereby reducing the risk of wildfire, should provide long-term benefits to local and regional air quality and climate (USDOI BLM 2007c:4-9). Nationally, there were about 7,385 million tons of greenhouse gas emissions in 2011 (USEPA 2012b). The Mount Hope Project would be a contributor to greenhouse gases, and based on modeling, would emit up to approximately 604,000 tons per year of greenhouse gases, or approximately 0.00008 percent of the national annual emissions. Other developments in the CESA would contribute negligible amounts of greenhouse gases. The 3 Bars Project would contribute about 0.000003 percent to the national annual greenhouse gas emissions under Alternative A, and even less under the other alternatives.

3.6 Air Quality

Air quality is defined by the concentration of various pollutants and their interactions in the atmosphere. Pollution effects on receptors have been used to establish a definition of air quality. Measurement of pollutants in the atmosphere is expressed in units of parts per million (ppm) or $\mu g/m^3$. Both long-term climatic factors and short-term weather fluctuations are considered part of the air quality resource because they control dispersion and affect concentrations. Physical effects of air quality depend on the characteristics of the receptors and the type, amount, and duration of exposure. Air quality standards specify acceptable upper limits of pollutant concentrations and duration of exposure. Air pollutant concentrations within the standards generally are not considered to be detrimental to public health and welfare (USEPA 2012).

3.6.1 Regulatory Framework

Ambient air quality and the emission of air pollutants are regulated under both federal and state laws and regulations. Regulations potentially applicable to the proposed action and alternatives include the following: Federal Clean Air Act (Clean Air Act) and National Ambient Air Quality Standards (NAAQS), Nevada AAQS, Prevention of Significant Deterioration (PSD), New Source Performance Standards, Federal Operating Permit Program (Title V), and State of Nevada air quality regulations (Nevada Administrative Code 445B).

3.6.1.1 Federal Clean Air Act and National Ambient Air Quality Standards

The Clean Air Act and the subsequent Clean Air Act amendments of 1990 require the USEPA to identify NAAQS to protect the public health and welfare. The Clean Air Act and amendments establish NAAQS for seven pollutants, known as "criteria" pollutants because the ambient standards set for these pollutants satisfy "criteria" specified in the Clean Air Act. The criteria pollutants regulated by the Clean Air Act and their applicable NAAQS set by the USEPA are listed in **Table 3-4**. The list of criteria pollutants is amended by the USEPA as needed to protect public health and welfare. The most recent revisions include amendments to standards for the following pollutants (dates represent publication in the Federal Register): particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) and particulate matter less than ten micrometers in aerodynamic diameter (PM_{10}; October 2006), ozone (O_3; March 2008), lead (Pb; November 2008), nitrogen dioxide (NO_2; February 2010), and sulfur dioxide (SO_2; June 2010).

TABLE 3-4

National and Nevada Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards[1]	National Standards[1]	
			Primary	Secondary
Ozone (O_3)	1-Hour	235	235	235
	8-Hour	NA	157	157
Carbon monoxide (CO)	1-Hour	40,500	40,000	40,000
CO less than 5,000 feet amsl	8-Hour	10,500	10,000	10,000
CO at or greater than 5,000 feet amsl	8-Hour	7,000		
Sulfur dioxide (SO_2)	1-Hour	NA	197	NA
	3-Hour	1,300	N/A	1,300
	24-Hour	365	NA	NA
	Annual Average	80	NA	NA
Nitrogen dioxide (NO_2)	1-Hour[2]	NA	189	NA
	Annual Average	100	100	100
Particulate matter with aerodynamic diameter of 10 microns or less (PM_{10})	24-Hour	150	150	150
	Annual Average	50	NA	NA
Particulate matter with aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$)	24-Hour	35	35	35
	Annual Average	12	12	12

[1] Micrograms per cubic meter (μg/m^3).
[2] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitoring site within an area must not exceed 189 μg/m^3 (0.100 parts per million [ppm]).
N/A = Not applicable.
Sources: Nevada Division of Environmental Protection (2012) and USEPA (2012b).

3.6.1.2 Nevada State Ambient Air Quality Standards

The Nevada Administrative Code 445B.22097 includes AAQS for the State of Nevada (**Table 3-4**). The Nevada AAQS are generally identical to the NAAQS, with the exception of the following:

- Nevada has not formally adopted the 8-hour O_3 standard adopted by the USEPA in 2008.
- Nevada has not formally adopted the recently promulgated 1-hour NAAQS standards for NO_2 and SO_2.
- Nevada retains the state standard for PM_{10} (annual arithmetic mean) where the comparable NAAQS standard was revoked by the USEPA in 2006.
- Nevada has not formally adopted the 24-hour and annual NAAQS standards for $PM_{2.5}$ promulgated by USEPA in 2006.
- Nevada has an additional state standard for carbon monoxide (CO) in areas with an elevation in excess of 5,000 feet amsl.

3.6.1.3 Attainment and Non-attainment Areas and Prevention of Significant Deterioration

Pursuant to the Clean Air Act, the USEPA has developed classifications for distinct geographic regions known as air quality management areas. Under these classifications, for each federal criteria pollutant, each air basin (or portion of an air quality management area [AQMA or "planning area"]) is classified as "in attainment" if the AQMA has "attained" compliance with (i.e., not exceeded) the adopted NAAQS for that pollutant; is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant; or is classified as "maintenance" if the monitored pollutants have fallen from non-attainment levels to attainment levels. Air quality management areas for which sufficient ambient monitoring data are not available are designated as "attainment unclassifiable" for those particular pollutants until actual monitoring data support formal "attainment" or "non-attainment" classification.

In addition to the designations relative to attainment of conformance with the NAAQS, the Clean Air Act requires the USEPA to place each planning area within the U.S. into one of three PSD classes, which are designed to limit the deterioration of air quality when it is "better than" the NAAQS. "Class I" is the most restrictive air quality category and was created by Congress to prevent further deterioration of air quality in National Parks and Wilderness Areas of a given size which were in existence prior to 1977, or those additional areas that have since been designated Class I under federal regulations (40 CFR § 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II planning areas, which allow a relatively greater deterioration of air quality. For future re-designation purposes, Congress defined as Class III any existing Class II area for which a state may desire to promote a higher level of industrial development (and emissions growth). Thus, Class III areas are allowed to have the greatest amount of pollutant increase of the three area classes while still achieving the NAAQS. There have been no Class III re-designations to date. Regardless of the class of the planning area, the air quality cannot exceed the NAAQS. The nearest Class I planning area to the project, the Jarbridge Wilderness Area, is approximately 130 miles northeast of the project area. There are no Class I airsheds within 60 miles of the project area.

Federal PSD applicability regulations limit the maximum allowable increase in ambient particulate matter in a Class I planning area, resulting from a major or minor stationary source, to 4 $\mu g/m^3$ (annual geometric mean) and 8 $\mu g /m^3$ (24-hour average). For Class II planning areas, the maximum allowable increase is 17 $\mu g/m^3$ (annual geometric mean) and 30 $\mu g/ m^3$ (24-hour average). Specific types of facilities that emit, or have the potential to emit, 100 tons per year (tpy) or more of PM_{10} or other criteria air pollutants, or any facility that emits, or has the potential to emit, 250 tpy or more of PM_{10} or other criteria air pollutants, is considered a major stationary source. A stationary source that emits less than 100 tpy of criteria pollutants and less than 10 tpy of individual hazardous air pollutants, and less than 25 tpy of hazardous air pollutants in the aggregate, would be considered a minor source. The proposed 3 Bars Project would be classified as a minor source.

Fugitive emissions are not included as part of the calculation to determine if a proposed source is a major source of emissions for PSD purposes. Permit applicants for proposed major stationary sources or major modification to a source are required to notify federal land managers of Class I planning areas within 60 miles of the new or modified major stationary source. There are no Class I planning areas within 60 miles of the project area. Air pollutant emission sources under the proposed action and alternatives, including from prescribed burning, are minor stationary sources that are not subject to PSD regulatory requirements.

Since the proposed 3 Bars Project would not be a PSD source, there is no air quality permit requirement to assess impacts to Class I areas; however, Class I areas are protected by federal land managers who manage air quality related values (AQRVs) such as visibility and atmospheric deposition. Though not a regulatory program under PSD, federal land managers review the issuance of a PSD permit for any impacts that exceed guideline thresholds for visibility, atmospheric deposition, and changes in the acid neutralizing capacity of sensitive lakes. The federal land managers consider a source greater than 30 miles from a Class I area to have negligible impacts with respect to Class I AQRVs if the total SO_2, nitrous oxides (NO_x), PM_{10}, and sulfuric acid (H_2SO_4) annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in kilometers [km]) from the Class I area (Q/D), is 10 or less. In general, the Federal Land Managers' Air Quality Related Values Work Group recommends that an applicant apply the Q/D test for proposed sources greater than 50 km (30 miles) from a Class I area to determine whether or not any further AQRV analysis is necessary (USDA Forest Service et al. 2010). Federal agencies would not request any further Class I AQRV impact analyses from sources with a Q/D ratio that is 10 or less.

3.6.1.4 Nevada Air Quality Operating Permit

The Clean Air Act delegates primary responsibility for air pollution control to state governments, which in turn often delegate this responsibility to local or regional organizations. The State Implementation Plan was originally the mechanism by which a state set emission limits and allocated pollution control responsibility to meet the NAAQS. The function of a State Implementation Plan broadened after passage of the Clean Air Act and now includes the implementation of specific technology based emission standards, permitting of sources, collection of fees, coordination of air quality planning, and PSD of air quality within regional planning areas and statewide. Section 176 of the Clean Air Act, as amended, requires that federal agencies must not engage in, approve, or support in any way any action that does not conform to a State Implementation Plan for the purpose of attaining ambient air quality standards.

The Nevada Bureau of Air Pollution Control (BAPC) is the agency in the State of Nevada with the responsibility for implementing a State Implementation Plan (excluding Washoe and Clark Counties, which have their own State Implementation Plans). Included in a State Implementation Plan are the State of Nevada air quality permit programs (Nevada Administrative Code 445B.001 through 445B.3485, inclusive) and the Nevada State AAQS (**Table 3-4**). In addition to establishing the Nevada State AAQS, the Nevada BAPC is responsible for permit and enforcement activities throughout the State of Nevada (except in Clark and Washoe Counties).

The 3 Bars Project is in Eureka County, Nevada. The applicable permitting authority for the county is the Nevada BAPC. Before any construction of a potential source of air pollution can occur, an air quality operating permit application must be submitted to the Nevada BAPC in order to obtain an Air Quality Operating Permit.

3.6.1.5 Burn Management

The *Battle Mountain District Fire Management Plan* (Fire Management Plan) was approved in 2004 and provides program guidance based on the *Land-use Plan Amendment for Fire Management for the Shoshone-Eureka RMP* (USDOI BLM 2004a). Fire management in the 3 Bars Project area is discussed in more detail in Section 3.14, Wildland Fire.

The Eureka County Master Plan discusses air quality and makes these recommendations regarding air quality within the County (Eureka County 2010). These include:

- Prevent significant deterioration of the superior air quality found in Eureka County.
- Review best management practices as necessary to assure applicability and compliance.

3.6.2 Affected Environment

3.6.2.1 Study Methods and Study Area

No air quality data have been collected in the 3 Bars Project area. Baseline air quality conditions representative of the project area were assessed using data from nearby monitoring stations in north-central Nevada. Meteorological data from the Elko, Nevada, airport (WBO262573), 70 miles north of the project area, were used for climate characterization (**Figure 3-1**). Upper air meteorological data from the Mercury-Desert Rock monitoring station, about 200 miles south of the project area, were used for air dispersion modeling. The Mercury-Desert Rock monitoring station was used because the Nevada BAPC determined that the meteorological data at that site are most representative for the project area.

The study area for direct and indirect impacts to air quality is the 3 Bars Project area and local airshed. The cumulative effects study area includes the Hydrologic Unit Code 10 watersheds that are all or partially included in the 3 Bars Project area.

3.6.2.2 Air Quality

The air quality within the study area is typical of the largely undeveloped regions of the western U.S. For the purposes of statewide regulatory planning, the area has been designated as in attainment for all pollutants that have an AAQS.

Important sources of air pollutants in the area include several precious metals mines that are sources for PM_{10} and $PM_{2.5}$. No areas in Nevada are currently designated as nonattainment of the $PM_{2.5}$ standard. There is a lack of sufficient data to develop a comprehensive emissions inventory for $PM_{2.5}$ from mine sources; nevertheless, an acceptable approach for assessing $PM_{2.5}$ emissions from fugitive dust sources is to use a percentage of the PM_{10} emissions.

Three important meteorological factors influence the dispersion of pollutants in the atmosphere—mixing height, wind (speed and direction), and stability. Mixing height is the height above ground within which rising warm air from the surface would mix by convection and turbulence. Local atmospheric conditions, terrain configuration, and pollutant source location determine dilution of pollutants in this mixed layer. Mixing heights vary diurnally, with the passage of weather systems, and with season. For the study area, the mean annual morning mixing height is estimated to be approximately 1,000 feet amsl; however, during the winter months the mean morning mixing height is approximately 80 feet above ground (Holzworth 1972). The mean annual afternoon mixing height exceeds 7,400 feet amsl.

Wind speed has an important effect on area ventilation and the dilution of pollutants. Light winds, in conjunction with large source emissions, may lead to an accumulation of pollutants that can stagnate or move slowly to downwind areas. During stable conditions, downwind usually means down valley or toward lower elevations. Climate data from Elko indicate that the potential for air pollution episodes to last 5 or more days is nearly zero (Holzworth 1972). A potential air pollution episode is defined as a period of time with wind speeds less than 4 miles per hour and mixing heights less than 3,300 feet amsl.

Morning atmospheric conditions tend to be stable because of the rapid cooling of the layers of air nearest the ground. Afternoon conditions, especially during the warmer months, tend to be neutral to unstable because of the rapid heating of the surface under clear skies. During the winter, periods of stable afternoon conditions may persist for several days in the absence of the synoptic (continental scale) storm systems that can generate higher winds with more turbulence and mixing. A high frequency of inversions at lower elevations during the winter can be attributed to the nighttime cooling and sinking air flowing from higher elevations to the low-lying areas in the basins. Although winter inversions are generally not very deep, they tend to be more stable because of reduced surface heating (Holzworth 1972).

Because of the typically dry atmosphere, bright sunny days and clear nights frequently occur. This in turn allows rapid heating of the ground surface during daylight hours and rapid cooling at night. Since heated air rises, and cooled air sinks, winds tend to blow uphill during the daytime and down slope at night. This upslope and down slope cycle generally occurs in all the geographical features, including mountain range slopes and river courses. The volume of air affected depends on the area of the feature; the larger the horizontal extent of the feature, the greater the volume of air that moves in the cycle. The complexity of terrain features causes complex movements in the cyclic air patterns, with thin layers of moving air embedded within the larger scale motions. The lower level, thermally driven winds also are embedded within larger-scale upper wind (synoptic) systems. Synoptic winds in the region are predominantly west to east, characterized by daily weather variations that enhance or diminish the boundary layer winds, and significantly channeled by regional and local topography (Western Regional Climate Center 2012).

3.6.3 Environmental Consequences

3.6.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, one commenter asked that the current air quality be assessed and the impacts to air from multiple or overlapping treatments be assessed.

3.6.3.2 Significance Criteria

Impacts to air quality would be considered significant if BLM actions resulted in a:

- Violation of any regulatory requirement of the Nevada BAPC.
- Violation of any state or federal ambient air quality standard.
- Substantial contribution to an existing or projected air quality violation.
- Exposure of sensitive receptors to substantial pollutant concentrations.

A substantial contribution to an existing or projected air quality violation could occur if the contribution of project-related pollutants results in a violation of the NAAQS, or if the pollutant is among the top percentage contributors to the ambient concentrations of pollutants from multiple sources.

and other pollutants. Extra care must be taken when dealing with contaminants and pollutants in close proximity to

3.6.3.3 Direct and Indirect Effects

3.6.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

Air quality would be affected by vegetation treatment activities, including dust and combustion engine exhaust from manual treatments. However, effects would be small in scale, temporary, and quickly dispersed throughout the treatment area. Provided SOPs are followed, and site-specific plans are developed and reviewed before a treatment activity occurs, federal, state, and local air quality regulations would not be violated.

Primary sources of PM_{10} and $PM_{2.5}$ emissions include road dust from unpaved roads and wind erosion on disturbed land. Emissions also include engine exhaust, tire and brake wear, and fugitive dust generated from travel on paved roads. These emissions would have an incremental but insignificant impact on the air quality in the vicinity of roads throughout the project area.

Treatment methods would have minor air quality impacts that would be temporary, transitory, and limited to the immediate vicinity of the specific activity. Combustion of diesel in transport trucks and mobile equipment, such as loaders, dozers, pickups, etc., would produce emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from volatile organic compound emissions). Hazardous air pollutant emissions would result from the combustion of hydrocarbon fuels, and the handling and use of various chemicals. Diesel fuel combustion emissions contain a number of hazardous air pollutants including benzene, toluene, ethylbenzene, and xylene.

The USEPA’s guideline air quality California Puff (CALPUFF) air pollutant dispersion model (referenced in Appendix W of 40 CFR § 51) was used to provide example predictions of potential particulate matter (total suspended particles, PM_{10}, and $PM_{2.5}$) impacts that could result from five vegetation management methods at receptors located between approximately 1 and 100 km (0.6 and 62 miles) from the assumed center of the modeled treatment areas. The nearest receptors were placed 0.5 km (0.3 miles) from the edge of the modeled treatment area in each case. Both 24-hour and annual impacts were predicted. CALPUFF “lite” version 5.5 was selected because of its ability to screen potential air quality impacts within, as well as beyond, 50 km (31 miles) and its ability to simulate plume trajectory over several hours of transport based on limited meteorological data. In Nevada, sources that were modeled included fire, unpaved roads used by transportation and ignition vehicles, and fugitive dust occurring from pre/post-treatment fuel-break blading (ENSR 2005b).

This modeling is consistent with general modeling practices described in 40 CFR § 51, Appendix W, and with CALPUFF screening procedures outlined by the USEPA. The maximum potential impacts found through modeling for each treatment method are summarized here and more details concerning the modeling are available in the 17-States PEIS and PER (USDOI BLM 2007b, c), and ENSR (2005b).

Beneficial Effects

Carefully planned and implemented restoration treatments that reduce hazardous fuel accumulations can reduce the risk of wildfire and smoke effects. Manual methods would be an important treatment option in Phase I and Phase II pinyon-juniper stands or near sensitive areas where the use of other treatment methods is limited. Restoration of vegetation in areas that currently consists of bare ground would help to reduce dust emissions.

Prescribed fire and wildland fire for resource benefit would release dioxins, which are a by-product of biomass combustion from wildfire and prescribed fire (Gullett and Touati 2003). Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer. More than 90 percent of human exposure is through food, mainly meat and dairy products, fish and shellfish (World Health Organization 2014). The American Chemistry Council (2005) and U.S. Environmental Protection Agency (2013) found that wildfires are the largest source of dioxin emissions in the U.S. In fact, in the past few years, forest fires probably emitted nearly as much dioxin to the environment as did all USEPA-quantified sources combined. Dioxin emissions from industrial sources have declined steadily over the past several decades. As emissions from these sources are further curtailed through regulation and technology, wildfires should continue to be viewed as a major source of dioxins to the environment.

3.6.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Adverse Effects

For the 17-States PEIS and PER, the BLM modeled concentration estimates of particulate matter for typical, but hypothetical ("example") emission scenarios for each of the treatment methods at six representative locations throughout the western United States (ENSR 2005a, b, USDOI BLM 2007c:4-9). Winnemucca, Nevada, is the closest modeling location to the 3 Bars Project area.

For analysis of air quality impacts in the 17-States PER, it was assumed for manual treatments that the BLM would treat up to 5 acres per day using chainsaws or other hand-held equipment, and would drive to and from the work site. **Table 3-5** shows the modeling results for manual treatments. Total suspended particles, PM_{10}, and $PM_{2.5}$, from manual treatments on the 3 Bars Project area would be negligible and would not exceed ambient air quality standards.

It was assumed that mechanical treatments consisted of 50 acres of mowing and 6 acres of brush blading and piling each day. For prescribed fire, it was assumed that 700 acres were treated each day on 6 separate days with prescribed fire, that the fire began at 9 a.m. and was extinguished at 6 p.m., and that the fuel combustion rate was 50 percent. All treatment scenarios assume that workers and their equipment are transported to the site each day (ENSR 2005b).

Tables 3-6 and **3-7** show the modeling results for mechanical and prescribed fire treatments based on assumptions used in modeling. Modeling indicates that no proposed treatment method would result in significant air quality impacts. Total concentrations of particulates are virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts are less than 1 $\mu g/m^3$. The acreage treated daily for the 3 Bars Project would be substantially less than the acreage used to model impacts to air quality from treatment methods. Thus, adverse effects on air quality from riparian treatments would be substantially less than those reported in **Tables 3-5** to **3-7** and would be negligible.

Fire treatments could expose bare soil and could lead to particulate matter impacts due to wind-blown dust.

Beneficial Effects

Restoration of riparian, wetland, and spring habitats in areas that currently consist of bare ground would help to reduce dust emissions. Fire treatments would be used on only a few acres annually, if at all, and would help to reduce hazardous fuels and restore natural fire regimes in riparian zones. Carefully planned and implemented prescribed fire should produce far less smoke impact to air quality than uncontrolled wildfires. The BLM would use burn models to determine when to burn during periods with good air dispersion (USDOI BLM 2007c:4-10).

TABLE 3-5

State and National Ambient Air Quality Standards Compliance Analysis for Manual Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration ($\mu g/m^3$)[1,2]	Background Concentration ($\mu g/m^3$)[2]	Total Concentration ($\mu g/m^3$)	AAQS Standard ($\mu g/m^3$)[3]
Total Suspended Particles	24-hour	3.583E-02	40	40.04	150
	Annual	1.007E-04	11	11.00	50
PM_{10}	24-hour	3.32E-02	30	30.03	150
	Annual	9.16E-05	8	8.00	50
$PM_{2.5}$	24-hour	3.25E-02	30	30.03	35
	Annual	8.92E-05	8	8.00	12

[1] Values given using exponential notation. For example, 3.58E-02 = 0.0358.
[2] PM_{10} concentrations are also conservatively used as background concentrations for $PM_{2.5}$.
[3] There are no Nevada AAQS for total suspended particles or for annual PM_{10}. Values based on 0.33 of 24-hour standard.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
$\mu g/m^3$ = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

Aspen Treatments

Adverse Effects

Modeling indicates that no proposed treatment method for any project groups would result in significant air quality impacts. Total concentrations of particulates would be virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts would be less than 1 $\mu g/m^3$. Only about 15 acres would be treated annually to restore aspen habitat under the proposed action. The acreage treated daily would be substantially less than the acreage used to model impacts to air quality from treatment methods. Thus, adverse effects on air quality from aspen treatments would be substantially less than those reported in **Tables 3-5** to **3-7** and would be negligible.

Beneficial Effects

Creating and enhancing fuel breaks in pinyon-juniper stands would break up of the continuity of fuels and moderate fire behavior, and reduce the potential for catastrophic wildfire and the associated smoke impacts. Restoration of aspen and other vegetation in areas that currently consists of bare ground would help to reduce dust emissions.

TABLE 3-6

State and National Ambient Air Quality Standards Compliance Analysis for Mechanical Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration (μg/m³) [1]	Background Concentration (μg/m³) [2]	Total Concentration (μg/m³)	AAQS Standard (μg/m³) [3]
Total Suspended Particles	24-hour	3.53E-02	40	40.04	150
	Annual	9.69E-05	11	11.00	50
PM_{10}	24-hour	1.40E-02	30	30.01	150
	Annual	3.84E-05	8	8.00	50
$PM_{2.5}$	24-hour	9.68E-03	30	30.01	35
	Annual	2.65E-05	8	8.00	12

[1, 2, 3] See Table 3-5.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
μg/m³ = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

TABLE 3-7

State and National Ambient Air Quality Standards Compliance Analysis for Prescribed Fire Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration (μg/m³) [1]	Background Concentration (μg/m³) [2]	Total Concentration (μg/m³)	AAQS Standard (μg/m³) [3]
Total Suspended Particles	24-hour	3.19E-01	40	40.32	150
	Annual	8.85E-04	11	11.00	50
PM_{10}	24-hour	3.19E-01	30	30.32	150
	Annual	8.86E-04	8	8.00	50
$PM_{2.5}$	24-hour	2.91E-01	30	30.29	35
	Annual	8.08E-04	8	8.00	12

[1, 2, 3] See Table 3-5.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
μg/m³ = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

Pinyon-juniper Treatments

Adverse Effects

Prescribed fire treatments in pinyon-juniper treatment units could total several thousand acres annually, while wildland fire for resource benefit treatments on the Sulphur Spring Wildfire Management Unit could be used on up to 1,000 acres per treatment and up to 2,000 acres annually. Nonetheless, the adverse impacts from individual prescribed fire treatments would be similar to those modeled (700 acres per day, 4,200 total acres per treatment) and shown in **Table 3-7**.

Modeling indicates that no proposed treatment method would result in significant air quality impacts. Total concentrations of particulates would be virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts would be less than 1 $\mu g/m^3$. Although many acres would be treated under pinyon-juniper treatments, the acreage treated daily should still be less than the acreage used to model impacts to air quality from treatment methods. Thus, adverse effects on air quality from pinyon-juniper treatments would likely be less than those reported in **Tables 3-5** to **3-7** and would be negligible. Fire treatments could expose bare soil and could lead to particulate matter impacts due to wind-blown dust.

Beneficial Effects

Manual, mechanical, and fire treatments in pinyon-juniper treatment areas would provide several benefits. Creating and enhancing fuel breaks in pinyon-juniper stands would break up of the continuity of fuels and moderate fire behavior, and reduce the potential for catastrophic wildfire and the associated smoke impacts. Thinning and removal of pinyon-juniper in Phase II and III stands should encourage revegetation of bare ground in these stands and reduce dust emissions.

In general, wildfire impacts on air quality would likely be greater than emissions from prescribed burning. Alternative A would have greater long-term benefits than the other alternatives since the proposed treatments are intended to minimize uncontrolled wildfires and reduce the potential for widespread wildfires in future years, with much less potential for widespread dense smoke from these fires to affect nearby receptors. Unlike wildfire, the impacts of smoke from prescribed fire are managed. Where smoke impacts from prescribed fire are of concern, fuel accumulations can be reduced through manual or mechanical treatments prior to, or instead of, prescribed burning. Smoke impacts can also be reduced through scheduling burning for times when the wind is blowing away from smoke-sensitive areas and during good dispersion conditions. Scheduling prescribed burns before new fuels accumulate can reduce the amount of emissions produced. Fire managers can also reduce the amount of area burned, increase the combustion efficiency of a burn, and increase the plume height in order to reduce smoke impacts to air quality (USDOI BLM 2007c:4-10).

The 17-States PER did not analyze the long-term effects on air quality from implementing a vegetation treatment management program similar to that proposed under Alternative A. However, an analysis of a similar vegetation management program in the Interior Columbia Basin showed that effects from wildfire on air quality and visibility could be significantly greater in magnitude than effects from prescribed burning and other treatment methods. As discussed in the 17-States PER, and as shown in the Interior Columbia Basin study, particulate matter emissions associated with prescribed burning and other treatment methods, when considered alone, should not cause widespread regional-scale exceedances of NAAQS. The same would not be true for wildfires. Thus, vegetation treatment actions that improve ecosystem health and reduce hazardous fuels buildup, thereby reducing the risk of wildfire, should provide long-term benefits to local and regional air quality (USDOI BLM 2007c:4-10).

Sagebrush Treatments

Adverse Effects

Modeling indicates that manual, mechanical, and prescribed fire treatments proposed for sagebrush areas would not result in significant air quality impacts. Total concentrations of particulates would be virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts would be less than 1 μg/m^3 (**Tables 3-5** to **3-7**). Adverse effects on air quality from sagebrush habitat treatments would likely be less than those reported in **Tables 3-5** to **3-7** and would be negligible.

The BLM may use livestock to control cheatgrass and other non-native vegetation and to increase the effectiveness of other treatment methods. Livestock can reduce cheatgrass dominance and can be used to remove some cheatgrass before the unit is treated using other methods and seeded. For air quality modeling, it was assumed that vegetation could be treated using goats or insects (ENSR 2005b). It was also assumed that 10 acres would be treated per day using goats, over a 30-day period, while 100 acres per day would be treated using a hand release of insects. Travel to and from the worksite by workers was assumed under both scenarios. Modeled impacts from biological treatment are listed in **Table 3-8**. Adverse effects on air quality from sagebrush habitat treatments would likely be less than those reported in **Table 3-8** and would be negligible.

Beneficial Effects

At sites dominated by herbaceous or invasive species, such as West Simpson Park Unit, up to 50 percent of the area could be treated with mechanical methods, and herbicides under existing authorizations. The West Simpson Unit has substantial cheatgrass cover and is in an area rated as high to very high for risk of a catastrophic wildfire. Cheatgrass is quite flammable during the summer, and efforts to eliminate it or slow its spread would help to reduce the risk of wildfire and smoke production.

TABLE 3-8

State and National Ambient Air Quality Standards Compliance Analysis for Biological Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration (μg/m^3) [1]	Background Concentration (μg/m^3) [2]	Total Concentration (μg/m^3)	AAQS Standard (μg/m^3) [3]
Total Suspended Particles	24-hour	7.93E-03	40	40.01	150
	Annual	6.01E-05	11	11.00	50
PM_{10}	24-hour	1.86E-03	30	30.00	150
	Annual	1.42E-05	8	8.00	50
$PM_{2.5}$	24-hour	2.59E-04	30	30.00	35
	Annual	1.98E-06	8	8.00	12

[1, 2, 3] See Table 3-5.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
μg/m^3 = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

3.6.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, the BLM would treat approximately half as many acres as under Alternative A, and would not be able to use prescribed fire or wildland fire for resource benefit. This alternative would have fewer particulate emissions and no smoke emissions compared to Alternative A. Modeling indicates that treatments would not result in significant air quality impacts. Total concentrations of particulates would be virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts would be less than 1 $\mu g/m^3$. Adverse effects on air quality from treatments would likely be less than those reported in **Tables 3-5** to **3-8** and would be negligible.

As about half as many acres would be treated annually to reduce hazardous fuels under this alternative than under Alternative A. There would be more wildfire risk and resultant smoke impacts could be greater under this alternative than Alternative A long-term, since wildfires would generate more smoke than a prescribed burn. It is unlikely that the BLM would be able to slow the spread of large infestations of noxious weeds and other invasive non-native vegetation, including cheatgrass, using manual, mechanical, and biological control methods, which would contribute to greater risk for a large-scale wildfire.

Under Alternative B, the BLM would treat fewer acres and conduct fewer treatments in areas with high risk for catastrophic fire than under Alternative A due to the reduction in methods available and increase in costs and time from using manual and mechanical methods. The BLM would be less able to slow pinyon-juniper encroachment and the densification and deterioration in tree health, slow the spread of noxious weeds and other invasive non-native vegetation, and decrease the fire cycle over much of the 3 Bars Project area. Thus, wildfire smoke production and impacts to air quality would be greater under this alternative than under Alternative A.

3.6.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would treat approximately one-fourth as many acres as under Alternative A, and would not be able to use mechanical methods, prescribed fire, or wildland fire for resource benefit. This alternative would result in fewer particulate emissions than Alternatives A and B, and modeling indicates that treatments would not result in significant air quality impacts. Total concentrations of particulates would be virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts would be less than 1 $\mu g/m^3$. Adverse effects on air quality from treatments would likely be less than those reported in **Tables 3-5** to **3-8** and would be negligible.

In addition to the effects discussed under Alternative B, the BLM would not be able to use mechanical methods to slow pinyon-juniper encroachment, create fire and fuel breaks, thin pinyon-juniper, remove downed wood and slash, and remove noxious weeds and other invasive/non-native vegetation. Only about 500 to 1,000 acres would be treated annually to reduce hazardous fuels, so it is unlikely the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse long-term. Thus, there would be more wildfire risk and resultant smoke impacts under Alternative C than under Alternatives A and B. Because of the heightened risk of wildfire, adverse effects to air quality would be greater under this alternative than under Alternatives A and B.

3.6.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct or indirect impacts to air quality under this alternative as no treatments would be authorized. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Thus, the 3 Bars Project area would be subject to large scale wildfires with potentially uncontrolled dense smoke emissions from these fires and air quality impacts from wildfires would likely be greater under Alternative D than under the action alternatives.

3.6.3.4 Cumulative Effects

The CESA for air quality is approximately 1,524,879 acres and generally follows the boundary developed for soil, water, and vegetation resources (all or portions of Hydrologic Unit Code 10 watersheds within the 3 Bars Project area), but also includes additional area to the northwest of the 3 Bars Project area (**Figure 3-1**). This boundary was developed by BLM fire management staff and is based on their observations of where smoke from prescribed and wildland fires on the project area drifts, their interactions with federal and state agencies responsible for air quality, and their knowledge of dominant weather patterns in the project area. Approximately 92 percent of the CESA is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service.

3.6.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Cumulative impacts to air quality could result from the emissions from a number of sources within the CESA that are associated with reasonably foreseeable land development and utility and infrastructure projects. Mechanical equipment would be used during construction of utility and infrastructure projects, and construction workers and users of the facilities would travel by vehicle to project sites. Technology, however, will continue to play an important role in reducing air emissions from engine operations.

The BLM could continue use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. These treatments would contribute particulate matter and chemicals associated with the herbicides to the atmosphere, but these effects on air quality would be localized and negligible. These treatments would help to reduce hazardous fuels, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites on a few hundred acres annually.

Population growth in Eureka County would lead to additional land development, and construction and use of businesses, homes, and related infrastructure and associated production of pollutants. Air quality impacts could result from generation of fugitive dust and from the burning of fossil fuels. Some of these emissions would be localized and subject to air quality permits.

The 8,300 acre Mount Hope Project, under construction in the southeastern portion of the 3 Bars Project area, would be a large contributor of dust and other pollutants in the CESA. Emissions of PM_{10}, $PM_{2.5}$, and lead would be generated by numerous processes as a result of the mine project, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. Combustion of diesel in haul trucks and mobile equipment, such as loaders, dozers, etc., the combustion of propane in processing units such as boilers, and the combustion of fuel oil or diesel in units such as the roaster, can produce elevated ambient levels of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from volatile organic compound emissions). Modeling done for the Mount Hope Project and Ruby Hill Mine showed that these emissions, however, would not exceed the Nevada State AAQS or national AAQS, even with the addition of the background values.

Short-term adverse and long-term beneficial effects from 3 Bars Project treatments would accumulate with those outside the project area. Fuels reduction and habitat improvement projects would occur on about 1 percent of the CESA annually (about 12,700 acres within the 3 Bars Project area, and about 1,500 acres within the remainder of the CESA) to reduce hazardous fuels and restore ecosystem health. Treatments would impact air quality, as discussed under direct and indirect effects, but the effects on air quality would be negligible. Treatments should help to reduce the risk of wildfire. Based on long-term averages, approximately 6,900 acres would burn annually from wildfires in the CESA. In general, air quality impacts from wildfires would be greater than air quality impacts from prescribed fire on a per acre basis.

3.6.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on air quality would be similar to those described under Alternative A. Under Alternative B, the BLM would treat approximately 6,300 acres annually within the 3 Bars Project area, and the short-term adverse and long-term beneficial effects from 3 Bars Project treatments would accumulate with those from treatments (about 1,500 acres annually) elsewhere in the CESA. The amount of pollutants generated under Alternative B would be less than half those generated under Alternative A, due to fewer acres being treated and lack of use of prescribed fire and wildland fire for resource benefit. Pollutants generated from 3 Bars Project treatments would be low in the context of emissions from other sources in the CESA, and cumulatively would not result in an exceedance of Nevada AAQS or national AAQS. Treatments would help to reduce the risk of wildfire within the CESA, and resultant smoke emissions, but not to extent as would occur under Alternative A.

3.6.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on air quality would be similar to those described under Alternative A. Under Alternative C, the BLM would treat about 3,200 acres annually on the 3 Bars Project area, and another 1,500 acres on other public lands within the CESA. Because of the limited number of acres treated, and lack of use of mechanical equipment and fire, particulate and other air emissions would be less under this alternative than under the other action alternatives. Pollutants generated from 3 Bars Project treatments would be negligible in the context of emissions from other sources in the CESA, and cumulatively would not result in an exceedance of Nevada AAQS or national AAQS. Treatments would help to reduce the risk of wildfire within the CESA, and resultant smoke emissions, but not to extent as would occur under Alternatives A and B.

3.6.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on air quality would be similar to those described under Alternative A. There would be no cumulative effects to air quality from this alternative as no treatments would be authorized under this alternative. This alternative would not reduce the risk of wildfire, thus air quality effects from wildfire within the CESA would likely be highest under this alternative.

3.6.3.5 Unavoidable Adverse Effects

Use of prescribed fires would result in smoke emissions that contain particulates and gaseous constituents (i.e., PM_{10}, $PM_{2.5}$, CO, and hazardous air pollutants). Emissions of PM_{10} and $PM_{2.5}$, and gaseous materials, would be generated by numerous processes as a result of the proposed action, including the re-suspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the treatment methods. Combustion of diesel in trucks and mobile equipment, such as loaders, dozers, pickups, etc., can produce emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from volatile organic compound emissions). These activities are inherent to the operational activities and would be ongoing throughout the life of the 3 Bars Project.

3.6.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Vegetation treatments would cause short-term degradation of air quality, with most degradation associated with fire use. As discussed earlier, much of the focus of treatments is on restoring ecosystem function including natural fire regimes and reducing the incidence and severity of wildfires. In general, wildfire impacts on air quality would likely be greater than emissions from prescribed burning, since techniques to minimize emissions would be implemented during prescribed burns and smoke management plans would permit prescribed fires only when meteorological conditions are favorable to smoke dispersion.

In addition, state smoke management meteorologists would consider the cumulative effects of emissions from other sources (such as road dust, other federal, state, and local vegetation management activities, and agricultural dust and burning) during the development of daily smoke management instructions. State smoke management program managers would also consider these sources during development of smoke management plans submitted for approval (as a component of the state smoke implementation plan) to the USEPA (USDOI BLM 2007b:4-246).

3.6.3.7 Irreversible and Irretrievable Commitment of Resources

Air quality would be affected by all treatment methods, with fire use contributing the most to degradation of air quality. These effects would occur only during the period of the treatment activity and there would be no irreversible or irretrievable effects on air quality.

3.6.3.8 Significance of the Effects under the Alternatives

There would be negligible direct, indirect, and cumulative effects to air quality from 3 Bars Project actions under all alternatives. The treatment methods under each action alternative would not result in significant direct, indirect, or cumulative impacts on air quality in the 3 Bars Project area or CESA since:

- There would be no violation of any regulatory requirement of the Nevada BAPC.
- No state or federal AAQS would be violated.
- Treatments would not contribute substantially to an existing or projected air quality violation.
- No sensitive receptors would be exposed to substantial pollutant concentrations.

3.6.4 Mitigation

No mitigation measures are proposed for air quality.

3.7 Geology and Minerals

3.7.1 Regulatory Framework

3.7.1.1 Geological Resources

Regulations pertaining to geological resources are concerned with either the preservation of unique geological features or with designing structures or infrastructure to mitigate geological hazards such as earthquakes and landslides. Unique geological features are protected as National Natural Landmarks. The National Registry of Natural Landmarks (16 USC §§ 461 to 467) set up the National Natural Landmarks program in 1962, which is administered under the Historic Sites Act of 1935.

3.7.1.2 Mineral Resources

Most of the mineral estate in the 3 Bars Project area is administered by the federal government. Publicly owned minerals are available for exploration, development, and production, while subject to existing regulations, standard terms and conditions, and stipulations. Federally administered minerals in the public domain are classified into specific categories and these categories only apply to minerals in the federal mineral estate. These categories are locatable, leasable, and salable minerals.

Locatable minerals include precious and base metallic ores and nonmetallic minerals such as bentonite, gypsum, chemical grade limestone, and chemical grade silica sand. Uncommon varieties of sand, gravel, building stone, pumice, rock, and cinders are also managed as locatable minerals. Locatable minerals are acquired by a company or individual under the General Mining Law of 1872, as amended, and Surface Use and Occupancy Act of July 23, 1955 (American Geological Institute1997). The BLM has been charged by the U.S. Congress with the management of activities on public lands under the General Mining Law of 1872.

A mining claim gives the holder the right to mine on federal land, while a patent gives the holder outright ownership of mineral-rich land that belongs to the federal government. An individual or company must first possess a claim before applying for a patent. The Mining Law of 1872 and amendments have provided a process for the filing of mining claims and assessment of fees to facilitate the exploration and development of valuable minerals as described above. Ultimately, claims could be patentable whereby the government would assign title of the claim to an individual or entity and the claim becomes private land. However, since 1994, the BLM has not been able to accept patent applications under a moratorium instituted by various acts of Congress.

Leasable minerals are those minerals that are leased to individuals for exploration and development. The leasable minerals have been subdivided into two classes, fluids and solid. Fluid minerals include oil and gas, geothermal resources and associated by-products, and oil shale, native asphalt, oil impregnated sands, and any other material in which oil is recoverable only by special treatment after the deposit is mined or quarried. Solid leasable minerals are specific minerals such as coal and phosphates. These minerals are associated with the following laws: the Mineral Leasing Act of 1920, as amended and supplemented; the Mineral Leasing Act for Acquired Lands of 1947, as amended; and the Geothermal Steam Act of 1970, as amended (American Geological Institute 1997). Leasable minerals are acquired by applying to the federal government for a lease to explore and develop the minerals.

Salable minerals are all other common mineral materials that were not designated as leasable or locatable, and include sand, gravel, roadbed, ballast, and common clay. These are sold by contract with the federal government. These minerals are regulated under the Mineral Material Act of July 23, 1947, as amended, and the Surface Use and Occupancy Act of July 23, 1955 (American Geological Institute 1997).

3.7.2 Affected Environment

3.7.2.1 Study Methods and Study Area

Information on the geology and mineral resources of the 3 Bars Project area was derived from maps and publications by the Nevada Bureau of Mines and Geology, the USDOI USGS, and Mount Hope Project EIS and references cited therein (USDOI BLM 2012b). The study area for direct, indirect, and cumulative effects to geology and minerals is the 3 Bars Project area.

3.7.2.2 Geology

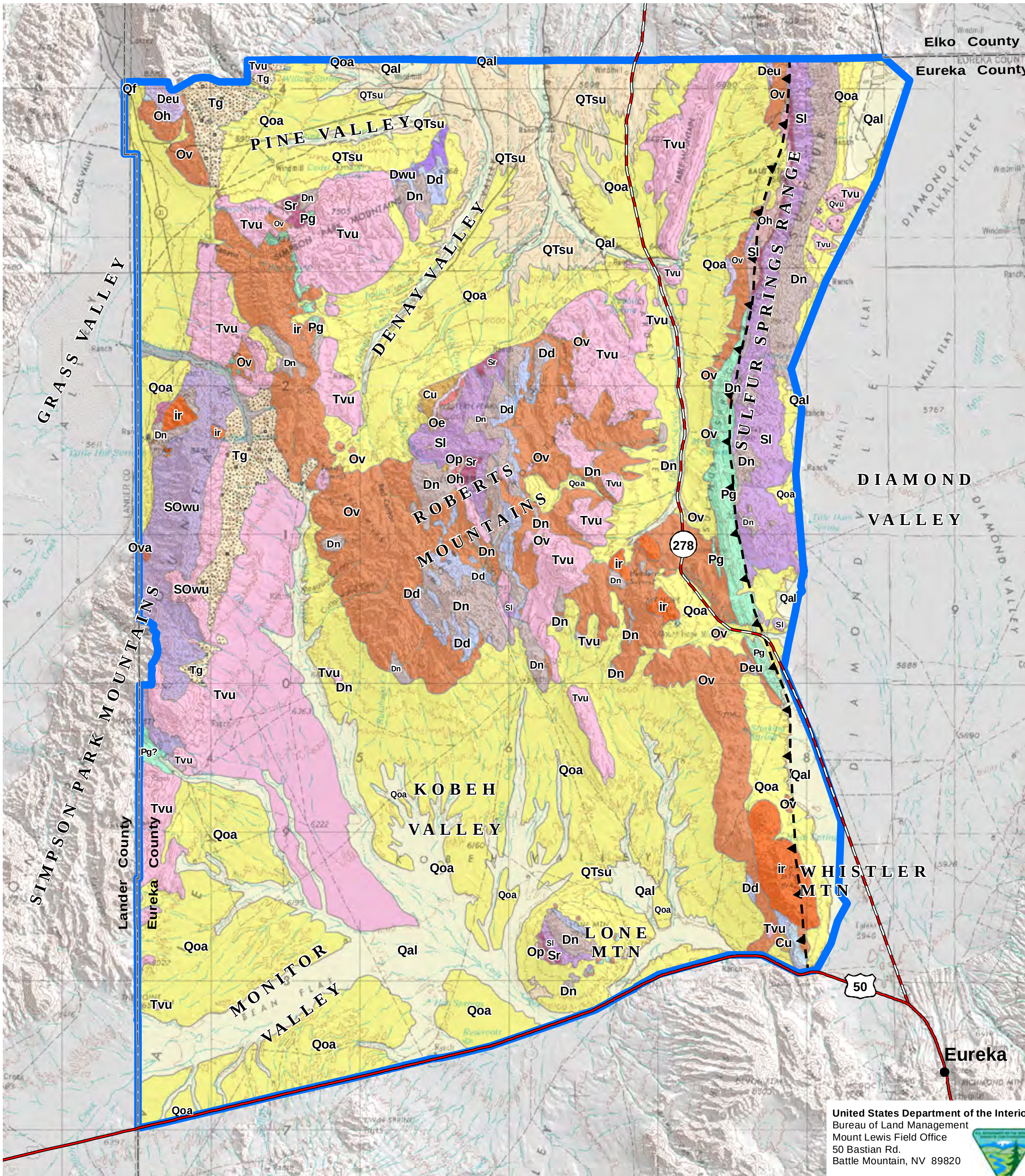
The following is a general description of the geology of the study area. A more detailed description is in the Mount Hope Final Project EIS (USDOI BLM 2012b).

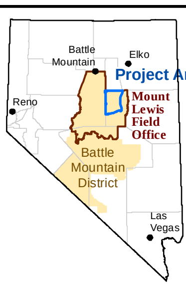
The study area is located along the leading edge of the Roberts Mountains thrust. The Roberts Mountains thrust was formed when a mix of sedimentary and volcanic rock (the "Western" assemblage) was thrust on top of similarly aged carbonate rocks (the "Eastern" assemblage) about 340 to 370 million years ago, during the Devonian-Mississippian Antler orogeny, or process of mountain building (Roberts et al. 1967). The Western assemblage includes the Vinini and Valmy formations, which are largely composed of mudstones, cherts, sandy limestones, sandstones, and conglomerates and are exposed on the Roberts Mountains and the Simpson Park Mountains (**Figure 3-9**). The Western assemblage also contains minor amounts of limestone and andesitic volcanic rocks.

Eastern assemblage rocks, including the Silurian Lone Mountain Dolomite and Devonian Nevada Formation, are exposed along the eastern side of the Sulphur Spring Range and in the Fish Creek Range on the southeastern corner of the study area (Roberts et al. 1967). The Eastern assemblage in Eureka County is composed of Cambrian to Ordovician rocks that were originally deposited in a shallow water shelf, and consist primarily of limestone, dolomite, and lesser amounts shale and quartzite.

During the Antler orogeny, an elongate foreland basin formed at the toe of the mass of rock that had been moved. This basin was filled with a post-orogenic coarse clastic (rocks that are derived from fragments of other rocks due to erosion and weathering and then the rock fragments are transported and deposited to form new rocks; this is a class of sedimentary rocks) "Overlap" assemblage representing detritus eroded off the Antler highlands. Intermittent orogenic movement during the late Paleozoic and Mesozoic resulted in folding and thrust faulting of the Overlap assemblage and underlying formations.

In addition to the Paleozoic rocks that belong to the assemblages described above, Tertiary volcanic and intrusive rocks are present. The volcanic rocks are exposed in the Simpson Park Mountains and Roberts Mountains and are composed of flows and tuffs. Igneous intrusive rocks are associated with the Mount Hope igneous complex (Roberts et al. 1967, USDOI BLM 2012b).





Roberts Mountains Thrust

- Qal-Alluvium
- Qa-Valley Alluvium and Stream Deposits
- Qf-Alluvial Fan Deposits
- Qs-Sinter Deposits
- Qoa-Older Alluvium
- Qvu-Volcanic Rocks, Undivided
- QTsu-Sedimentary Deposits, Undivided
- Tg-Gravels
- Tvu-Volcanic Rocks, Undivided
- ir-Intrusive Rocks
- Kn-Newark Canyon Formation
- Pg-Garden Valley Formation
- Mu-Sedimentary Rocks, Undivided
- Dd-Devils Gate Limestone
- Dwu-Sedimentary Rocks, Undivided
- Deu-Sedimentary Rocks, Undivided
- Dn-Nevada Formation
- DSwu-Sedimentary Rocks, Undivided
- Sr-Roberts Mountains Formation
- Sl-Lone Mountain Dolomite
- SOwu-Sedimentary Rocks, Undivided
- Oh-Hanson Creek Formation
- Ova-Valmy Formation
- Ov-Vinini Formation
- Oe-Eureka Quartzite
- Ou-Sedimentary Rocks, Undivided
- Op-Pogonip Group
- Cu-Sedimentary Rocks, Undivided
- Undetermined
- 3 Bars Project Area

Source: Roberts et al. 1967.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-9

Geologic Formations

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

3.7.2.3 Minerals

3.7.2.3.1 Locatable Minerals

The most important locatable mineral commodities in the study area are precious and base metal resources including antimony, gold, lead, manganese, mercury, molybdenum, nickel, silver, vanadium, and zinc (Roberts et al. 1967). The Eureka-Battle Mountain trend crosses the study area from northwest to southeast and mines within the trend produced over 100,000 ounces of gold in 2009 (Price et al. 2010).

Major mines in Eureka County include the Betze-Post Mine (Barrick Goldstrike Mines, Inc.), Eastern Nevada Operations (Newmont Mining Corporation), and the Ruby Hill Mine (Barrick Gold Corp.), which have produced a total of 81,382 ounces of gold and 43,276 ounces of silver through 2010 (Driesner and Coyner 2011). The Mount Hope Project is under construction, and there are several historical mining districts within the study area including the Roberts, Antelope, Lone Mountain, and Mount Hope Districts (**Figure 3-10**; Roberts et al. 1967).

A Record of Decision for the Mount Hope Project was issued in 2012 and construction for the project began in 2013. The Project is currently on hold and no date has been set for resumption of construction activities (USDOI BLM 2012b). Molybdenum was discovered at the site through exploratory drilling in the 1970s and 1980s (General Moly 2012) and the deposit is estimated to have 1.3 billion pounds of molybdenum reserves.

3.7.2.3.2 Leasable Minerals

Oil and Gas

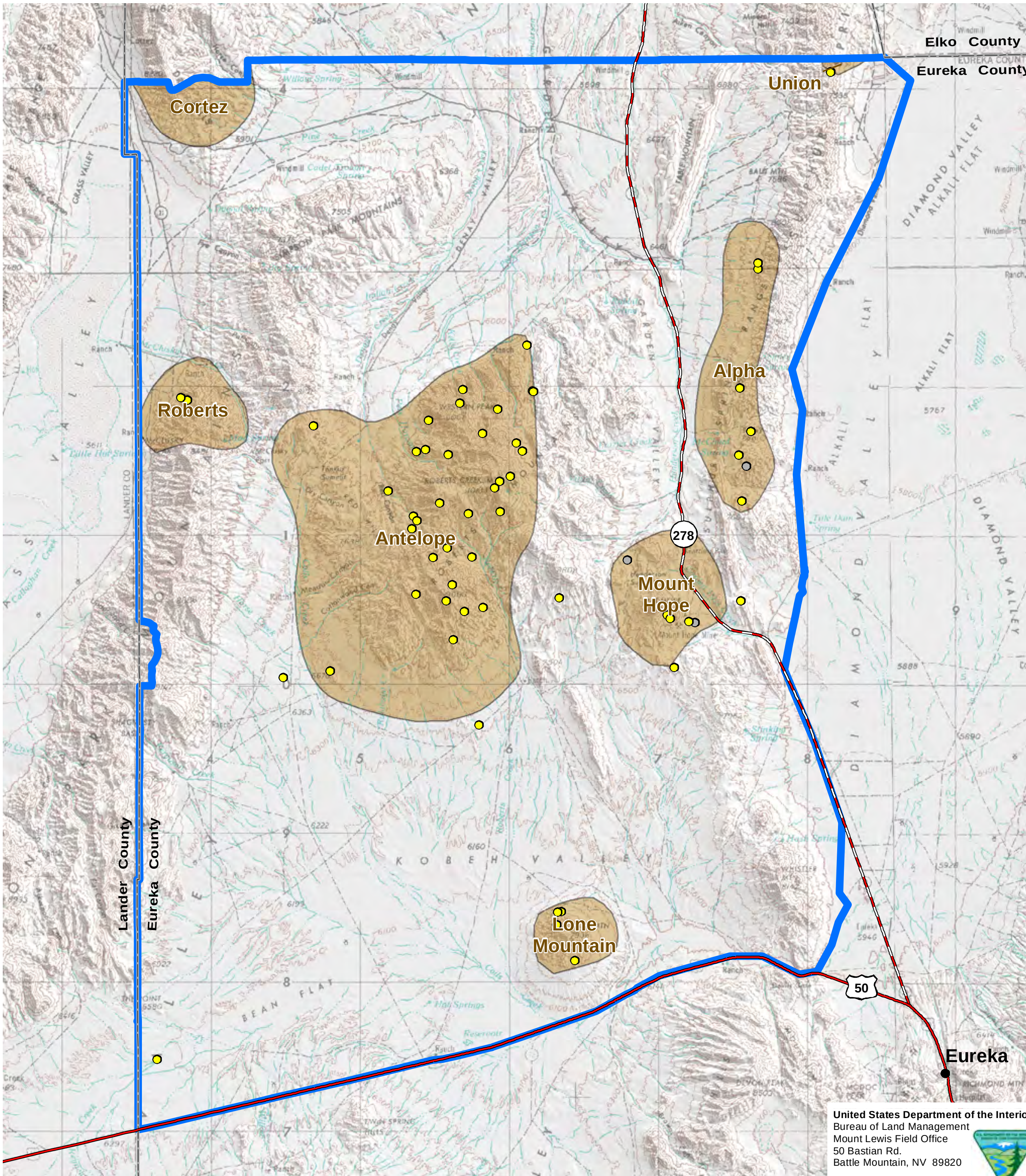
A few oil and gas test holes have been drilled in the study area, but no commercial production has been established (**Figure 3-11**; Garside and Hess 2011). Pine Valley is considered an area of high petroleum potential and a small portion of the southern part of the valley extends into the project area.

Geothermal

Geothermal energy is a potential leasable mineral resource in the study area. Geothermal energy is used for power generation at Beowawe, Nevada, in northern Eureka County, and at the McGinness Hills geothermal project in Grass Valley, Lander County, and west of the 3 Bars Project area. The likelihood of geothermal development on the 3 Bars Project area is low (Zehner et al. 2009).

3.7.2.3.3 Saleable Minerals

Alluvial fan deposits along the mountain fronts in Eureka County provide a large potential source of sand and gravel (Lumos and Associates 2007). There are about 24 saleable minerals sites covering about 55 acres within the 3 Bars Project area. Annual production is about 100,000 tons of material.



Legend

Mineral Resources

- Precious Metals
- Base Metals
- Mining District
- 3 Bars Project Area

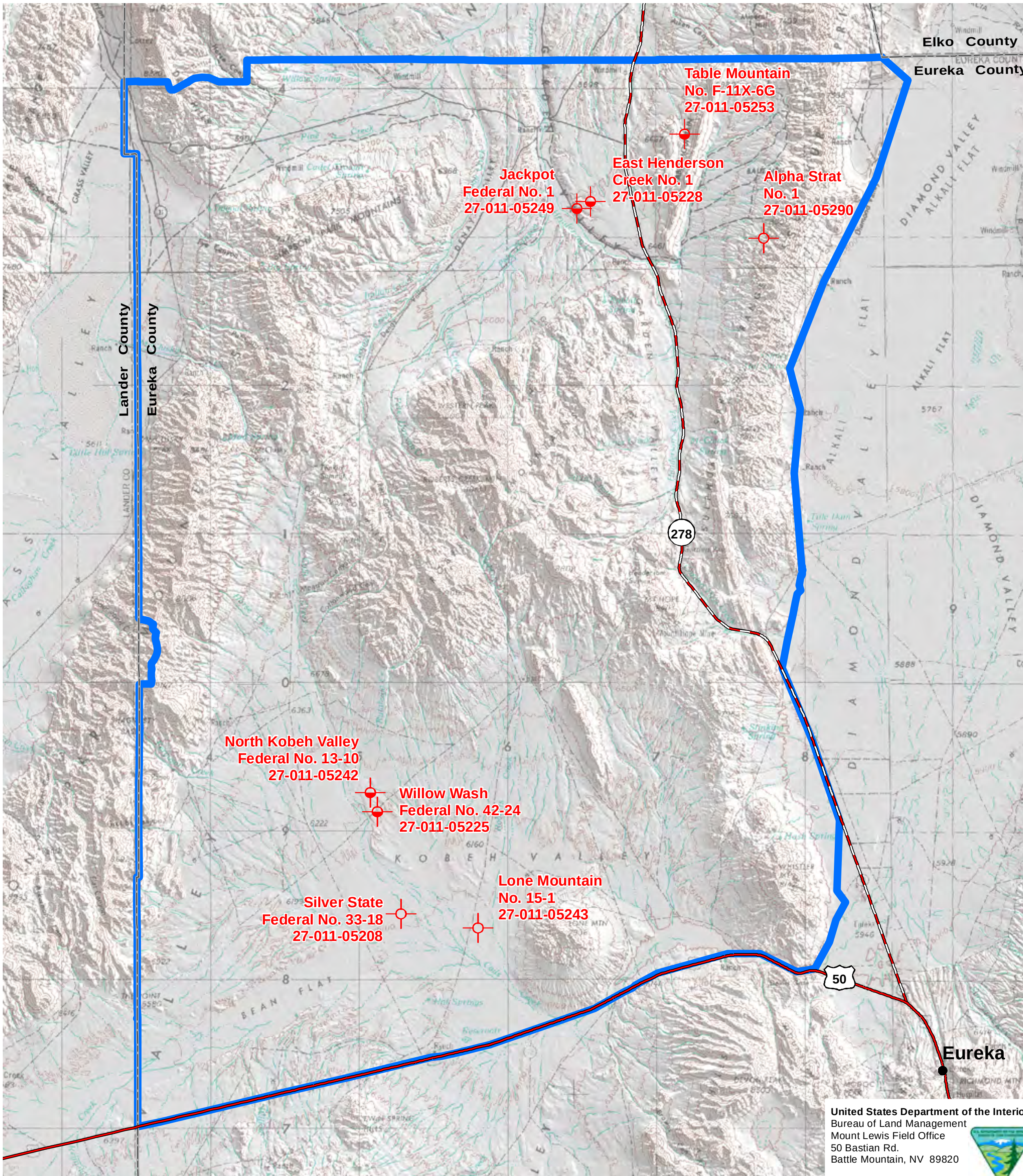
Source: Lumos & Associates 2007.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-10

Mineral Resources

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.
Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
This product was developed through digital means and may be updated without notice.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 08/14/13)

Legend

- Abandoned Well with Evidence of Oil and/or Gas Encountered while Drilling
- Abandoned Well with No Evidence of Oil or Gas Encountered while Drilling
- 3 Bars Project Area

Source: Garside & Hess 2007.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-11

Oil and Gas Resources (through 2006)

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

3.7.3 Environmental Consequences

3.7.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, key issues of concern for geology and minerals are the potential for restoration treatments to interfere with existing or proposed mineral extraction operations and the ability to access the underlying minerals.

3.7.3.2 Significance Criteria

Effects to geology or minerals would be considered significant if BLM actions resulted in a prolonged or permanent restriction on use of, or access to, mineral resources.

3.7.3.3 Direct and Indirect Effects

3.7.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

There is potential that restoration treatments could affect or be effected by mineral exploration and development, as an area could be restored and later affected by mineral exploration or development that could cause the loss of restoration benefits; or restoration treatments could interfere with staking and maintenance of mineral claims. Conflicts (and subsequent potential effects) between mineral exploration and development and land restoration would be minimized by the implementation of General Standard Operating Procedure 4 (**Appendix C**), whereby the location of mineral claims and other mineral activity would be determined prior to the start of treatments. By reviewing the Legacy Rehost (LR) 2000 database, the BLM would be able to identify areas with current and possibly future mineral activity, such as current fluid minerals leases. The presence of mining claims or fluid mineral leases would not preclude restoration work, but these sites would require more coordination with affected interests.

Restoration treatments would not be expected to interfere with current ongoing mineral extraction operations. However, areas disturbed by ongoing mineral development (leach pads, waste rock dumps, roads, and mine facilities) would be precluded from treatment, as restoration of these areas would be handled under federal mining laws and Nevada State regulations. Eventual reclamation of these areas would be consistent with BLM land management goals and objectives.

3.7.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

The use of minerals would be greater for riparian treatments than for other treatment types. Gravel and crushed rock resources would be needed for streambank restoration and grade stabilization. This effect on local gravel and rock resources would be negligible as valley fill deposits provide an abundance of gravel and rock resources, but the BLM may have to develop pits near Roberts Mountains and other treatment areas to provide mineral resources. Riparian treatments would have little effect on mineral access or potential for conflict with mineral exploration and development because of the limited extent of the riparian treatment areas.

Aspen Treatments

Aspen treatments would have no effect on mineral use because aspen treatments do not involve the use of gravel or crushed rock. Aspen treatments would have little effect on mineral access or potential for conflict with mineral exploration and development because of the limited extent of the aspen treatment areas.

Pinyon-juniper Treatments

Pinyon-juniper treatments would have no effect on mineral use because pinyon-juniper treatments would not involve the use of gravel or crushed rock. Pinyon-juniper treatments could affect mineral access and contribute to potential conflicts with mineral exploration and development because of the large area being treated to control pinyon-juniper and the potential for treatment areas to overlap with future mineral resource development areas.

Sagebrush Treatments

Sagebrush treatments would have no effect on mineral use because sagebrush treatments would not involve the use of gravel or crushed rock. Sagebrush treatments would have little effect on mineral access or potential conflicts for conflict with mineral exploration and development because of the limited area being treated and the limited potential for treatment areas to overlap with mineral resource areas.

3.7.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Direct and indirect effects to local gravel and rock resources under Alternative B would be similar to those for Alternative A. Potential conflicts over access to and use of mineral resources would be about 50 percent less under this alternative than under Alternative A.

3.7.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Direct and indirect effects to local gravel and rock resources under Alternative C would be about one-fourth those for Alternative A. Potential conflicts over access to and use of mineral resources would one-fourth that of Alternative A.

3.7.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to geology and minerals from this alternative as no treatments would be authorized under this alternative.

3.7.3.4 Cumulative Effects

The CESA for geology and mineral resources is the 3 Bars Project area (**Figure 3-1**).

3.7.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Alternative A would have a negligible contribution to the cumulative effects on mineral resources. About 12,700 acres would be treated annually on the 3 Bars Project area, and another 1,500 acres annually on other public lands within the CESA, to restore riparian, aspen, pinyon-juniper, and sagebrush habitat and reduce hazardous fuels. Approximately 31 miles of stream would be restored, and restoration activities would require gravel and crushed rock. However, in the context of road and other land development and mining within the CESA, gravel and crushed rock needs for the 3 Bars Project would be negligible. Potential conflicts over access to and use of mineral resources would also be negligible.

3.7.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on geology and mineral resources would be similar to those described under Alternative A. Alternative B would have a negligible contribution to the cumulative effects on mineral resources. About 6,300 acres would be treated annually on the 3 Bars Project area, and another 1,500 acres annually on other public lands within the CESA, to restore habitat and reduce hazardous fuels. Approximately 31 miles of stream would be restored, and restoration activities would require gravel and crushed rock. However, in the context of road and other land development and mining within the CESA, gravel and crushed rock needs for the 3 Bars Project would be negligible. Potential conflicts over access to and use of mineral resources would also be negligible.

3.7.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on geology and mineral resources would be similar to those described under Alternative A. Alternative C would have a negligible contribution to the cumulative effects on mineral resources. About 3,200 acres would be treated annually on the 3 Bars Project area, and another 1,500 acres annually on other public lands within the CESA, to restore habitat and reduce hazardous fuels. Only about 8 miles of stream would be restored, one-fourth the miles of stream restored under Alternatives A and B. In the context of road and other land development and mining within the CESA, gravel and crushed rock needs for the 3 Bars Project would be negligible, as less than 1 percent of the CESA would be affected annually. Potential conflicts over access to and use of mineral resources would be negligible.

3.7.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on geology and mineral resources would be similar to those described under Alternative A. There would be no cumulative impacts to geology and mineral resources from this alternative as no treatments would be authorized under this alternative.

3.7.3.5 Unavoidable Adverse Effects

There would be a loss of gravel and rock from mine quarries for stream bioengineering activities under Alternatives A, B, and C.

3.7.3.6 Relationship between Local Short-term Uses and Long-term Productivity

There would be a long-term loss of mineral resources from quarries to provide gravel and rock resources for stream bioengineering. However, these resources would have a long-term benefit to riparian and stream habitat.

3.7.3.7 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of geological or mineral resources. Gravel and rock used for stream bioengineering would be moved from one location (mine quarry) to another (stream), but not lost.

3.7.3.8 Significance of the Effects under the Alternatives

There would be negligible direct, indirect, and cumulative effects to geology or mineral resources from the alternatives and these effects would not be significant. Demand for gravel and crushed stone to support mining activities in the CESA would far exceed the amounts of material that would be needed for 3 Bars Project treatments.

None of the alternatives are expected to result in a prolonged or permanent restriction on use of or access to mineral resources within the 3 Bars Project area or CESA.

3.7.4 Mitigation

No mitigation measures are proposed for geology or minerals.

3.8 Paleontological Resources

3.8.1 Regulatory Framework

Federal legislative protection for paleontological resources stems from the Antiquities Act of 1906 (Public Law-59-209; 16 USC § 431 et seq; 34 Statute 225), which calls for protection of historic and prehistoric structures and other objects of historic or scientific interests on federally administered lands. Federal protection for scientifically important paleontological resources applies to construction or other related project impacts that occur on federally administered lands.

The Paleontological Resource Protection Act of 2009 (Public Law 111-011) requires the Secretaries of the Department of Interior and Department of Agriculture to manage and protect paleontological resources on federal land using scientific principles and expertise. The Act includes specific provisions addressing management of these resources by the BLM and other federal agencies.

The BLM manages paleontological resources under a number of other federal laws including the Federal Land Policy and Management Act (Sections 310 and 302[b]), which directs the BLM to manage public lands to protect the quality of scientific and other values; 43 CFR § 8365:1-5, which prohibits the willful disturbance, removal, and destruction of scientific resources or natural objects; 43 CFR § 3622, which regulates the amount of petrified wood that can be collected for personal noncommercial purposes without a permit; and 43 CFR § 3809.420 (b)(8), which stipulates that a mining operator "shall not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains or any historical or archaeological site, structure, building or object on federal lands."

The BLM has adopted the Potential Fossil Yield Classification (PFYC) system to identify and classify fossil resources on federal lands (**Table 3-9**; USDOI BLM 2007e). Paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability of finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

The PFYC system is a way of classifying geologic units based on the relative abundance of vertebrate or scientifically significant fossils (plants, vertebrates, and invertebrates) and their sensitivity to adverse impacts. A higher class number indicates higher potential for presence. The PFYC system is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class. Instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions. The BLM intends for the PFYC System to be used as a guideline rather than as a rigorous definition.

TABLE 3-9

Potential Fossil Yield Classification

Class	Description	Basis
1	Igneous and metamorphic (tuffs are excluded from this category) geologic units or units representing heavily disturbed preservation environments that are not likely to contain recognizable fossil remains.	• Fossils of any kind known not to occur except in the rarest of circumstances. • Igneous or metamorphic origin. • Landslides and glacial deposits.
2	Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant invertebrate fossils.	• Vertebrate fossils known to occur very rarely or not at all. • Age greater than Devonian. • Age younger than 10,000 years before present. • Deep marine origin. • Aeolian origin. • Diagenetic alteration.
3	Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Also sedimentary units of unknown fossil potential.	• Units with sporadic known occurrences of vertebrate fossils. • Vertebrate fossils and significant invertebrate fossils known to occur inconsistently, and predictability known to be low. • Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.
4	Class 4 geologic units are Class 5 units (see below) that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation.	• Significant soil/vegetative cover; outcrop is not likely to be impacted. • Areas of any exposed outcrop are smaller than 2 contiguous acres. • Outcrop forms cliffs of sufficient height and slope that most is out of reach by normal means. • Other characteristics that lower the vulnerability of both known and unidentified fossil localities.
5	Highly fossiliferous geologic units that regularly and predictably produce invertebrate fossils and/or scientifically significant invertebrate fossils, and that are at risk of natural degradation and/or human-caused adverse impacts.	• Vertebrate fossils and/or scientifically significant invertebrate fossils are known and documented to occur consistently, predictably, and/or abundantly. • Unit is exposed and little or no soil/vegetative cover. • Outcrop areas are extensive and discontinuous areas are larger than 2 contiguous acres. • Outcrop erodes readily and may form badlands. • Easy access to extensive outcrop in remote areas. • Other characteristics that increase the sensitivity of both known and unidentified fossil localities.

Sources: USDOI BLM (2007e, 2008c).

In addition to the statutes and regulations previously listed, fossils on public lands are managed through the use of internal BLM guidance and manuals. Included among these are BLM Manual 8270, *Paleontological Resource Management*, and BLM Handbook H-8270-1, *General Procedural Guidance for Paleontological Resource Management* (USDOI BLM 2008c, d).

3.8.2 Affected Environment

3.8.2.1 Study Methods and Study Area

Information on the paleontological resources of the 3 Bars Project area was derived from maps and publications by the Nevada Bureau of Mines and Geology and USGS (2012a), and the Mount Hope Project EIS and references cited therein (USDOI BLM 2012b).

The study area for direct, indirect, and cumulative effects to paleontological resources is the 3 Bars Project area (**Figure 3-1**).

3.8.2.2 Fossil Potential in the Study Area

No paleontological resources of critical scientific or educational value are known to occur within the 3 Bars Project area. Paleontological resources have been identified in several mountain ranges in the study area (Lumos and Associates 2007, USDOI BLM 2012b). At Roberts Mountains and Lone Mountain, the paleontological resources are associated with Ordovician rocks where the fossil assemblages provide evidence of mass extinctions. The Simpson Park Mountains and Roberts Mountains have yielded marine vertebrate fossils from Devonian rocks. The fossil-bearing formations have not been classified according to the PFYC system.

At Roberts Mountains, paleontological resources have been found near Vinini Creek, Pete Hanson Creek, and Cottonwood Canyon, and are significant for their invertebrate fossil resources because they have yielded numerous new species. Johnson (1962 *cited in* USDOI BLM 2012b) reported a previously unrecorded species of brachiopod, leading to the designation of a new Middle Devonian zone from rocks in the Roberts Mountains. Ausich (1978 *cited in* USDOI BLM 2012b) reported a new species of *Pisocrinus* from the Roberts Mountains which expanded the known range for this type of Silurian crinoid. Stone and Berdan (1984), based on investigations of the Late Silurian strata of the Roberts Mountains, identified 3 new genera and 18 new species of ostracodes.

3.8.3 Environmental Consequences

3.8.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, no key issues of concern were identified for paleontological resources. However, the BLM is obligated by statute to protect paleontological resources on federal lands from damage by activities initiated or approved of by the BLM.

3.8.3.2 Significance Criteria

The loss or destruction of scientifically important or valuable paleontological resources would constitute a significant impact.

3.8.3.3 Direct and Indirect Effects

3.8.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Paleontological resources are most valuable when they are found in place and undisturbed. Even if fossils are present "in float," on the soil surface or as part of soil horizons, if they are not found in their original stratigraphic position in the sedimentary layers they are less valuable scientifically.

Restoration treatments should have little or no impact on paleontological resources. Scientifically valuable fossils that may be present in the study area would be in bedrock outcrops and should not be affected. Indirect adverse effects to paleontological resources could occur through unauthorized collecting by workers at easily accessible outcrops.

3.8.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Mechanical treatments involving the use of heavy equipment, and any treatment method that has the potential to disturb more than surficial layers (disturbance greater than 6 to 8 inches deep), or has the potential to disturb bedrock, have the greatest possibility of causing impacts to paleontological resources. Equipment with treads (i.e., bulldozers with grousers) could damage fossil specimens found near the soil surface, but such action would not have as much impact as disturbance of fossils that are contained in bedrock and outcrop. If the disturbance is shallow, and not on exposed bedrock, the potential for loss or damage of fossils would be minimal. However, soil excavation and removal would only occur on a few acres annually within riparian zones, and mostly in areas that have likely been disturbed in the past by stream channelization and movement, so impacts to fossils from riparian zone treatments should be negligible.

The effects of fire on fossil resources have been studied by the USDOI National Park Service. A study was conducted in the Badlands National Park, South Dakota, where the effects of elevated temperatures on fossils were studied in controlled burns and under laboratory conditions (Benton and Reardon 2006). They found that moderate fire conditions appear to have "minimal impact on fossil resources" unless the specimens are in direct contact with burning fuel. It was found that high intensity fire conditions could have an effect on fossils even if there is no contact with burning fuel. Fossils exposed to low intensity fire conditions showed no alteration while fossils exposed to higher temperatures exhibited discoloration and fracturing. Since the most valuable fossil resources are still entrained in outcrops where there is less likelihood for fuel, and only a few acres of riparian habitat would be burned annually, the risk of impacts to fossil resources from prescribed fire on the 3 Bars Project area would be negligible.

Aspen Treatments

Mechanical treatments would generally involve the manipulation of vegetation above the soil surface. Aspen treatments presents a lesser risk of potential effects to fossils than riparian treatments, because mechanical treatments would not disturb the soil as deeply as would stream restoration treatments.

Pinyon-juniper Treatments

Manual treatments would primarily occur in Phase I and II woodland stands (see Section 3.12.2, Native and Non-invasive Vegetation Resources, for a discussion of pinyon-juniper phase classes) found at lower elevations and would be unlikely to disturb fossils.

Because the BLM proposes to use prescribed fire primarily in Phase III stands that are often found at higher elevations, it is possible that fires would come into contact with rock outcrops that might contain fossils. These include treatments in the Atlas, Frazier Unit, Henderson Corridor, Gable Corridor, and Vinini Corridor units, which are on Roberts Mountains where fossils have been found. Paleontological resources have been found near Vinini Creek, Pete Hanson Creek, and Cottonwood Canyon. Rock outcrops are also associated with old-growth pinyon-juniper and limber pine, but the BLM would not conduct fire treatments in old-growth areas.

Sagebrush Treatments

The BLM proposes to use mechanical and biological control methods and prescribed fire to treat noxious weeds and other invasive, non-native vegetation on the Rocky Hills and West Simpson Park units. No fossils have been identified in these units, and if present, would be found below the soil surface and should not be affected by treatment methods, including discing, tilling, and seeding, and use of livestock.

3.8.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The effects to paleontological resources under Alternative B would be less than for Alternative A. Approximately 6,350 acres would be treated annually, half as many as would be treated under Alternative A, and the BLM would not be able to use prescribed fire or wildland fire for resource benefit. Thus, there would be no risks to fossils from the use of fire, or from the equipment used to conduct these treatments. The BLM would conduct stream bioengineering on approximately 31 miles under this alternative; risks to fossils from stream treatments would be similar to those for Alternative A. Instead of using fire to treat Phase II and III pinyon-juniper, the BLM would rely on manual and mechanical methods to remove hazardous fuels and break up the continuity of fuels.

3.8.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

The effects to paleontological resources under Alternative C would be less than for the other action alternatives. Only about 3,200 acres would be treated annually, one-fourth that of Alternative A, and only using manual and classical biological control methods. Both of these methods would have little or no ground disturbance, and would not be done near rock outcrops. The BLM would conduct about 8 miles of riparian restoration, but the area of disturbance would be very small and the BLM would not be able to use mechanical equipment to restore stream habitat.

3.8.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to paleontological resources under Alternative D as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. As a result, there may be loss of soil and other land degradation that could affect paleontological resources found close to the ground surface, but this risk would be negligible.

3.8.3.4 Cumulative Effects

The CESA for paleontological resources is the same as for geology and minerals and is the 3 Bars Project area (**Figure 3-1**).

3.8.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Cumulative effects to paleontological resources would result from surface disturbance related to industrial developments, unauthorized collection, and natural erosion processes in the CESA. Utilities and infrastructure and land development activities in fossil-bearing formations could impact, expose, damage, or destroy paleontological resources, although these activities would be unlikely on the 3 Bars Project area. These projects would require large amounts of sand, gravel, and crushed rock, however, and these materials could contain fossils.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations. These treatments should have no direct effect on paleontological resources, which would be found in rock outcrops or buried in the soil. These treatments would help to reduce hazardous fuels, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites, potentially to the benefit of paleontological resources.

The BLM would conduct hazardous fuels and habitat restoration treatments on about 1,500 acres annually under existing authorizations, and likely on additional acreage under future authorizations, within the CESA. The effects of these treatments on paleontological resources would be similar to those for 3 Bars Project treatments and should be negligible.

The 8,300 acre Mount Hope Project is in the southeastern portion of the 3 Bars Project area. There are no known fossil-bearing rocks associated with the Mount Hope Project, and most geologic units associated with the mine site have low probability of having fossils (USDOI BLM 2012b:3-268). Disturbance activities occurring in non-fossil-bearing geologic formations would not impact or affect paleontological resources.

Surface disturbance from drilling of wells and construction of infrastructure for oil, gas, or geothermal development could impact fossil resources. The primary impact to paleontological resources would result from the excavation of material for construction of facilities. Extraction of gravel materials could impact paleontological resources. If a pipeline was constructed and placed underground, there could be impacts to subsurface fossil resources. Overall, disturbance from development would have a very low probability of impacting paleontological resources.

In the context of other land-disturbing activities in the CESA, effects from the 3 Bars Project would be negligible, as less than 2 percent of the surface area (about 12,700 acres) would be disturbed annually from 3 Bars Project actions. Thus, the cumulative effects from project actions in the context with disturbances from other activities within the CESA should be negligible.

3.8.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on paleontological resources would be similar to those described under Alternative A. The cumulative risks to paleontological resources under Alternative B would be less than for Alternative A, as only about half as many acres would be treated on the 3 Bars Project area and fire treatments would not be allowed under this alternative. Approximately 6,300 acres would be treated annually on the 3 Bars Project area to improve habitat and reduce hazardous fuels, or about 1 percent of the CESA. Thus, the cumulative effects from project actions in the context with disturbances from other activities within the CESA should be negligible.

3.8.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on paleontological resources would be similar to those described under Alternative A. The cumulative risks to paleontological resources under this alternative would be the least for the action alternatives. Approximately 3,200 acres would be treated annually on the 3 Bars Project area, or about 0.5 percent of the CESA. Only manual and classical biological control methods would be used, and these methods would have negligible effect on fossils. Stream bioengineering would occur on only about 8 miles of stream during the life of the project, one-fourth the mileage treated under Alternative A.

3.8.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on paleontological resources would be similar to those described under Alternative A. There would be no cumulative impacts to paleontological resources as no treatments would be authorized under this alternative. This alternative would not reduce the risk of wildfire or loss of soil due to erosion, thus there could be effects to fossils if wildfires occur in rock outcrops, or fossils are lost due to erosion.

3.8.3.5 Unavoidable Adverse Effects

The loss of paleontological resources has the potential to be adverse, especially if it results in the loss of scientifically important fossils. However, if surveys and inventories are conducted in areas where ground-disturbing activities are proposed to occur, the likelihood of adverse impacts would be greatly reduced and any impacts that did occur would be minimal.

3.8.3.6 Relationship between Local Short-term Uses and Long-term Productivity

Because paleontological resources are nonrenewable, there is no difference between short-term and long-term impacts. The resource cannot recover from some types of adverse impacts. Once disturbed, the materials and information associated with paleontological deposits may be permanently compromised. Any destruction of paleontological sites, especially those determined to have particular scientific value, would represent long-term losses. Furthermore, once paleontological deposits were disturbed and exposed, natural erosion could accelerate the destruction of fossils, and exposed fossils would be vulnerable to unauthorized collecting and digging. Any discoveries of paleontological resources as a result of surveys required prior to treatment would enhance long-term knowledge of the area and these resources (USDOI BLM 2007b).

3.8.3.7 Irreversible and Irretrievable Commitment of Resources

Because paleontological resources are nonrenewable, any impacts would render the resource disturbance irreversible and the integrity of the resource irretrievable.

3.8.3.8 Significance of the Effects under the Alternatives

None of the alternatives would be expected to result in the loss or destruction of scientifically important or valuable paleontological resources within the CESA or 3 Bars Project treatment areas. Thus, none of the direct, indirect, or cumulative impacts from the alternatives would create a significant impact within the CESA or 3 Bars Project area.

3.8.4 Mitigation

No mitigation measures for paleontological resources are recommended. According to Instructional Memorandum 2009-011 *Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources* (USDOI BLM 2008e), "If the proposed project will not disturb potentially fossil-yielding bedrock or alluvium, no additional work is necessary… Examples of such projects include noxious weed spraying, mechanical brush treatment, geophysical exploration, or surface disturbing activities such as road construction when the fossil resource is expected to be buried well below project compression or excavation depth or when surface fossil resources would be left undamaged."

3.9 Soil Resources

3.9.1 Regulatory Framework

There are no federal or state laws or regulations specific to soil. State and federal agencies, however, have identified best management practices (BMPs) to limit the effects of soil erosion on the aquatic environment, including water quality. The USEPA guidelines define BMPs as "methods, measures, or practices to prevent or reduce water pollution, including but not limited to, structural and non-structural controls, operation and maintenance procedures, and scheduling and distribution of activities. Usually BMPs are applied as a system of practices rather than a single practice. Best management practices are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility."

The BLM Nevada Northeastern Great Basin Resource Advisory Council, as chartered by the USDOI to promote healthy rangelands, has developed Standards and Guidelines for grazing administration on about 16.2 million acres of public lands in Nevada. Included in the Standards and Guidelines is Standard 1 – Upland Sites. This Standard states that "upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate and land form." Indicators include canopy and ground cover, including litter, live vegetation, and rock, appropriate to the potential of the site. Livestock grazing management and wild horse and burro population levels are appropriate when in combination with other multiple uses they maintain or promote upland vegetation and other organisms and provide for infiltration and permeability rates, soil moisture storage, and soil stability appropriate to the ecological site with management units (USDOI 2007b).

3.9.1.1 Nevada Best Management Practices

The use of BMPs in Nevada is addressed in the *Handbook of Best Management Practices* (Nevada Division of Environmental Protection and Nevada Division of Conservation Districts 1994). Nevada Administrative Code 445A.306 defines "Best Practices" as "measures, methods of operation, or practice that are reasonably designed to prevent, eliminate, or reduce water pollution from diffuse sources and that are consistent with the best practices in the particular field under the conditions applicable. This term is intended to be equivalent to the term 'best management practices' as used in federal statutes and regulations."

3.9.2 Affected Environment

3.9.2.1 Study Methods and Study Area

Information on major land resource areas and soil characteristics was obtained from the *Land Resource Regions and Major Land Resource Areas (MLRAs) of the United States, the Caribbean, and the Pacific Basin* (USDA Natural

Resources Conservation Service 2006), while information on soil characteristics was obtained from the Soil Survey Geographic Database (USDA Natural Resources Conservation Service 2012). The Mount Hope Project EIS, and references cited therein, was also consulted (USDOI BLM 2012b).

The study area for direct and indirect effects to soil resources is the 3 Bars Project area. The cumulative effects study area for soil resources is the Hydrologic Unit Code 10 watersheds wholly or partially within the project area (**Figure 3-1)**.

3.9.2.2 Soils Characteristics on the Project Area

3.9.2.2.1 Soil Orders

Soil resources in the project area formed in major land resource area 28B, the Central Nevada Basin and Range. The dominant soil orders in this major land resource area are Aridisols, Entisols, Inceptisols, and Mollisols (**Figure 3-12**). Aridisols form in an arid or semi-arid climate and are well developed soils that have a very low concentration of organic matter. In contrast, Mollisols are fertile soils with high organic matter and a nutrient-enriched, thick surface. Entisols are considered recent soils that lack soil development because erosion or deposition rates occur faster than the rate of soil development. Inceptisols are generally young mineral soils, but have had more time to develop profile characteristics than Entisols. The soils in this major land resource area generally are well drained, loamy or loamy-skeletal, and range from shallow to very deep (USDA Natural Resources Conservation Service 2006).

3.9.2.2.2 Soil Physical Properties

Soil physical characteristics, such as the susceptibility to erosion and the potential for revegetation, are important to consider when planning for vegetation treatment activities and stabilization of disturbed areas. These hazards or limitations for use are a function of many physical and chemical characteristics of each soil, in combination with the climate and vegetation. **Table 3-10** summarizes some important soil characteristics to be considered when evaluating the effects of vegetation treatment activities.

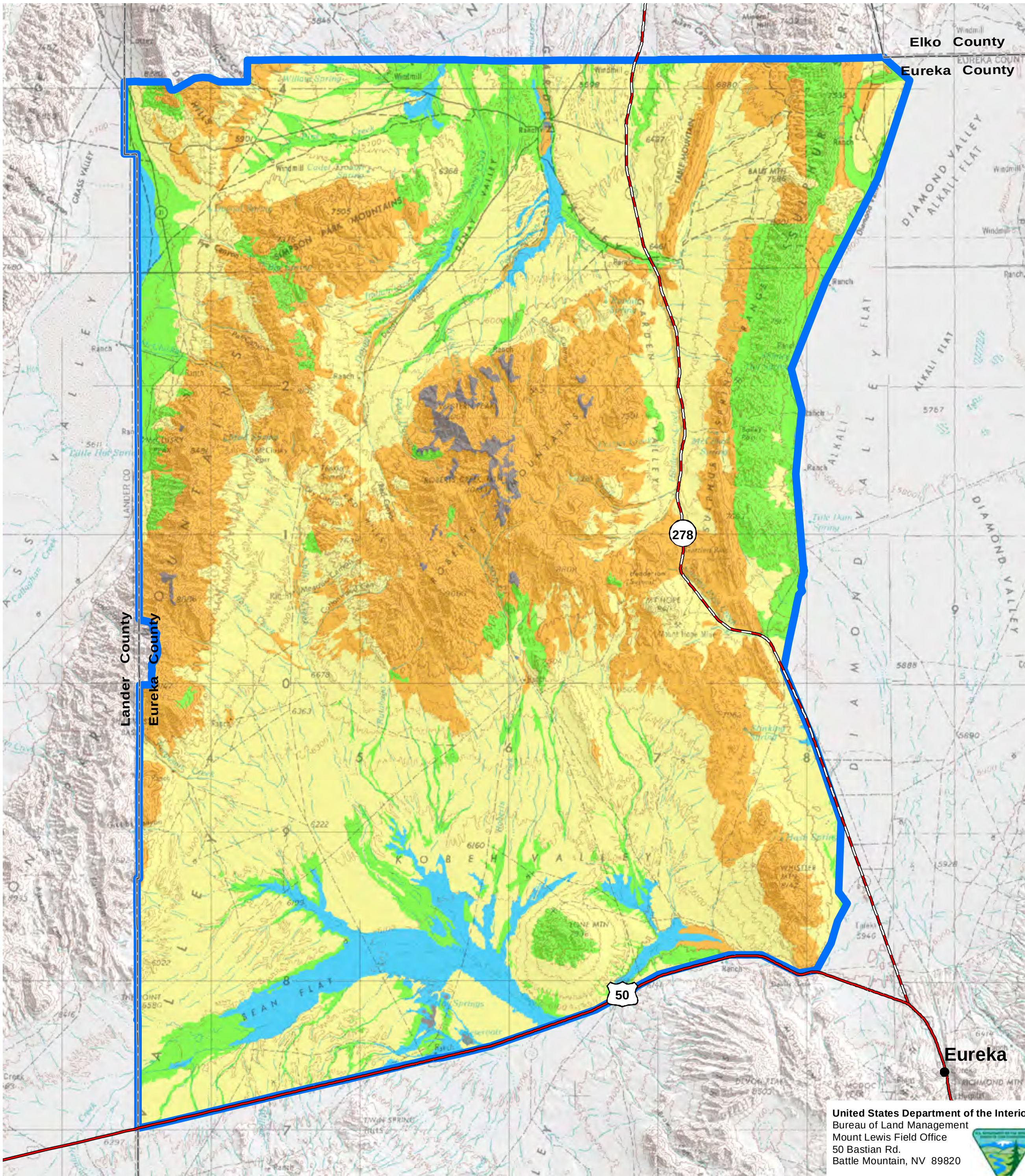
3.9.2.2.3 Soil Compaction

Soil compaction occurs when soil particles are pressed together and the pore spaces between them are reduced and bulk density is increased. Moist, fine textured soils are most susceptible to severe compaction. Approximately 19 percent of the soils in the project area are compaction prone (**Figure 3-13**).

3.9.2.2.4 Soil Erodibility Hazard

Water erosion is the detachment and movement of soil by water. Natural erosion rates depend on inherent soil properties, slope, soil cover, and climate.

Soil erodibility hazard potential has been assessed for both water driven and wind driven causes of erosion on each soil unit within the project area. Erodibility ratings are based on analyzing the dominant conditions of the surface layer of each soil within a soil unit. Water driven causes have been qualified based on the USDA Natural Resources Conservation Service K factor. The erosion K factor indicates the susceptibility of a soil to sheet and rill erosion by water, based primarily on the percentage of silt, sand, organic matter, and rock fragments within the soil unit and on soil structure and saturated hydraulic conductivity. Values of K range from 0.02 to 0.64. Soils with higher K values are more erodible than soils with lower K values. A small percentage of the soils within the project area



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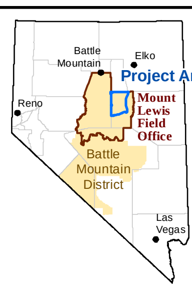

Legend

Soil Order

- Aridisols
- Entisols
- Inceptisols
- Mollisols
- Not Rated
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-12

Soil Order

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

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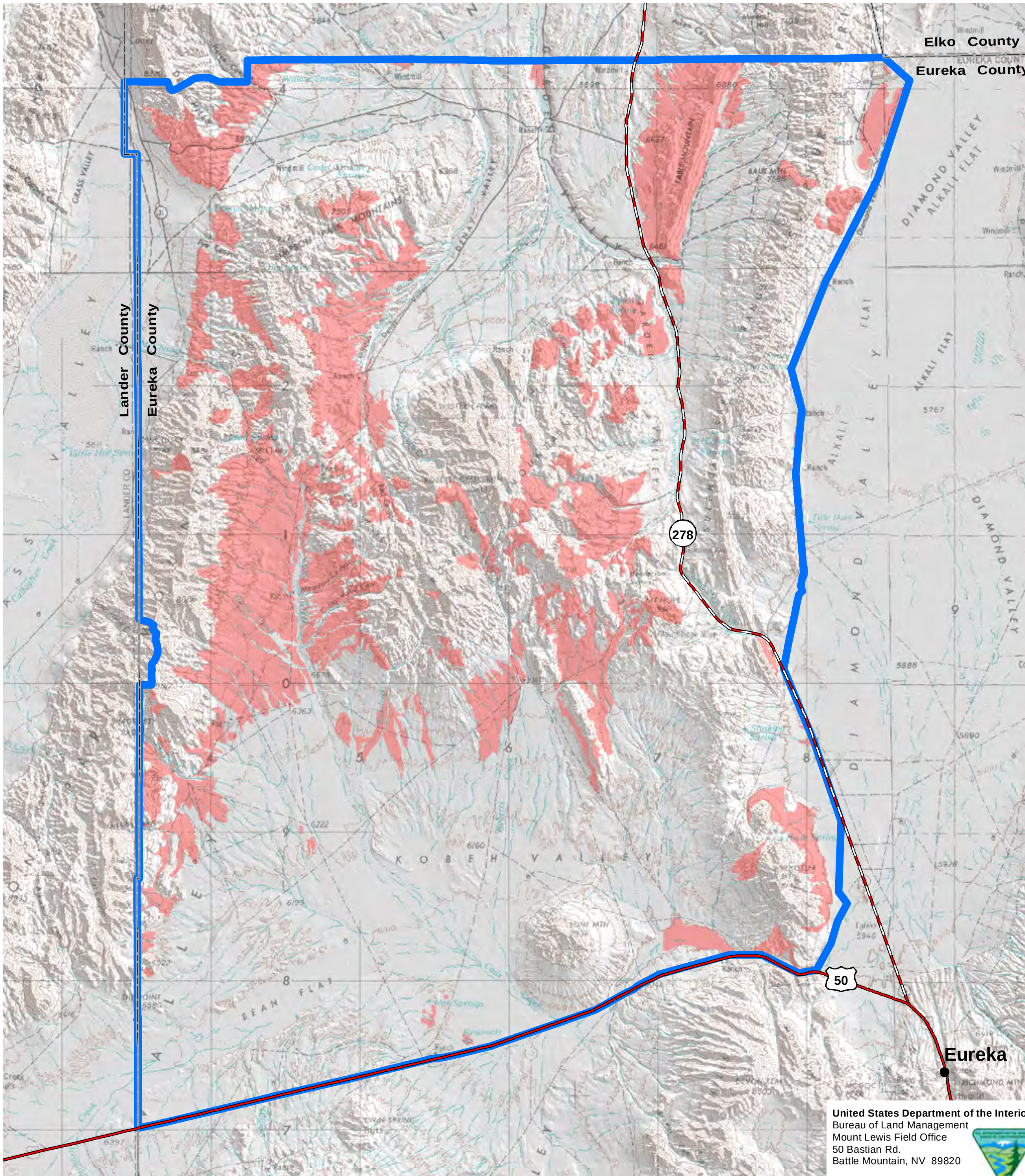

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Legend

Compaction Prone Soils
3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-13

Compaction Prone Soils

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

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(approximately 15 percent) have a “severe” soil erodibility hazard rating for water-caused erosion. These soils are on steep slopes (**Figure 3-14, Table 3-10**).

Wind erosion is the physical wearing of the earth’s surface by wind. Wind erosion removes and redistributes soil. Small blowout areas may be associated with adjacent areas of deposition at the base of plants or behind obstacles, such as rocks, shrubs, fence rows, and roadbanks (Soil Quality Institute 2001). Wind driven erodibility interpretations are based on USDA Natural Resources Conservation Service wind erodibility group ratings. Wind erodibility group ratings range from 1 to 8 with values of 1 and 2 considered “severe,” and thus considered a limitation within the project area. The wind erodibility group value is closely correlated to the texture of the surface layer, the size and durability of surface clods, rock fragments, and organic matter, and the calcareous reaction potential of the soil. Soil moisture and frozen soil layers also influence wind erodibility group ratings. Wind erodible soils are not prevalent in the project area. A small percentage of the soils within the 3 Bars Project area (less than 1 percent) have a “severe” soil erodibility hazard rating for wind-caused erosion (**Figure 3-15**). These soils are in the southeastern portion of the project area.

TABLE 3-10

Project Area Soil Limitations

Limitation	Acres	Percent of Project Area
Compaction Prone	141,484	19
Low Revegetation Potential	51,321	7
Wind Erodible	1,043	<1
Water Erodible	109,139	15
Shallow to Bedrock	490,311	65
Droughty	156,905	21

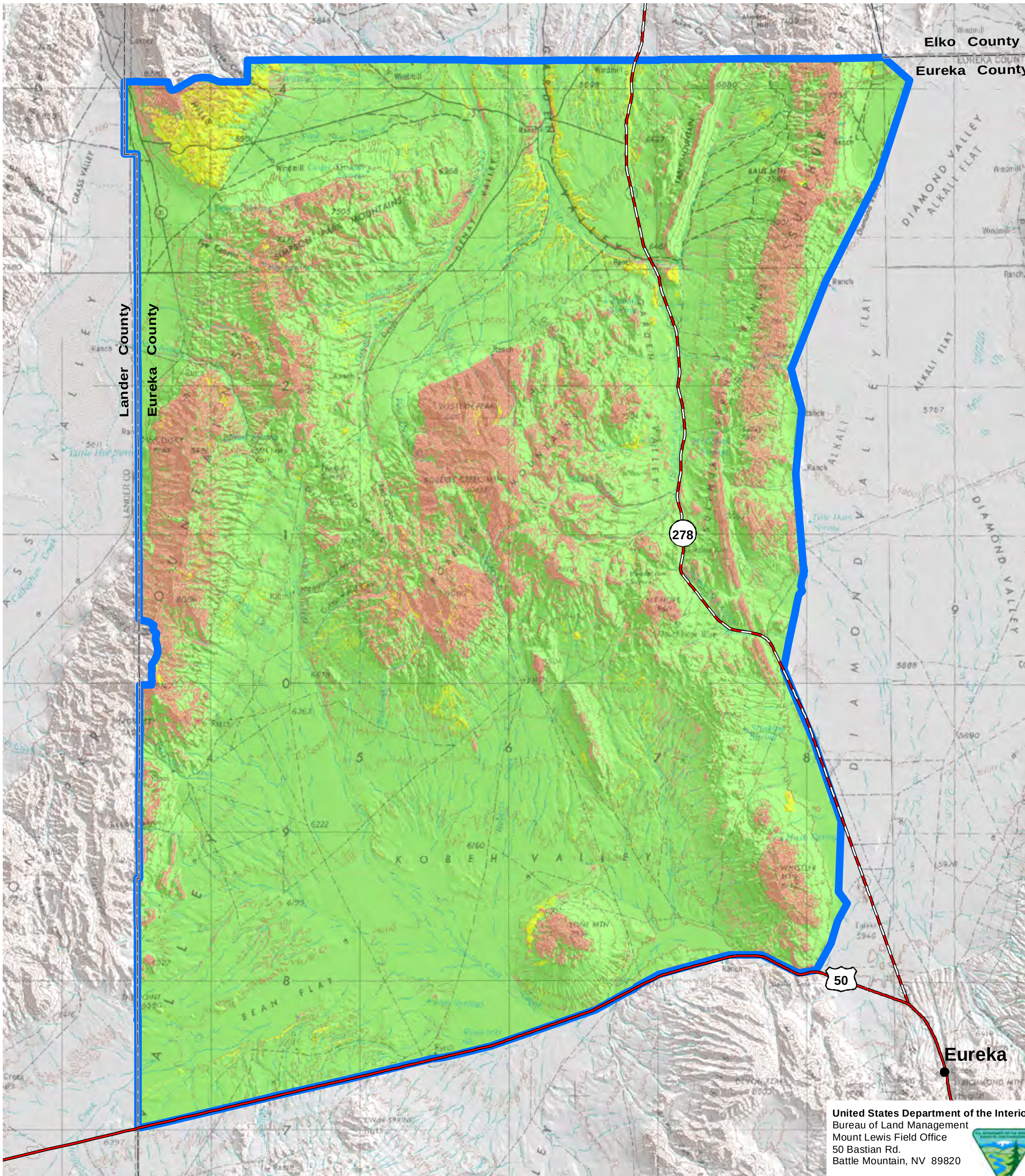
Source: USDA Natural Resources Conservation Service (2012).

3.9.2.2.5 Soil Productivity and Quality

Site productivity is primarily a measure of vegetation success. Productivity varies with vegetation community, but more importantly, with land management objectives as they relate to the establishment of desirable or productive vegetation types. In contrast, soil quality is an inherent soil resource characteristic involving aeration, permeability, texture, salinity and alkalinity, microbial populations, fertility, and other physical and chemical characteristics that are accepted as beneficial to overall plant growth and establishment. Topsoil thickness and organic matter content influence water and nutrient holding capacity and improve soil structure and soil quality. Topsoils in the project area have organic matter contents that range from 0 to 5 percent, as shown in **Table 3-11** and **Figure 3-16**.

3.9.2.2.6 Soil Textures

Surface soil textures in the project area range from silty clay to loamy very fine sand. Rock fragments such as gravel, cobbles, and stones are common in surface soils within the project area. The soils in the mountainous central part of the project area are typically very stony to very gravelly loams found on 8 to 50 percent slopes intermixed with rocky outcrops. These soils are shallow to moderately deep over lithic and paralithic bedrock and derive from residuum and colluvium from mixed igneous, metamorphic, and volcanic rocks. Soils found in the hilly terrain surrounding Mount Hope are on slopes ranging from 4 to 30 percent and are derived from volcanic rocks and limestone. **Table 3-12** and **Figure 3-17** provide information on the surface soil textures within the project area.



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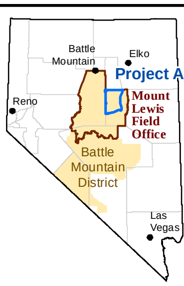


Legend

Soil Erosion Potential from Water

- Severe Water Erosion
- Moderate Water Erosion
- Low Water Erosion
- 3 Bars Project Area

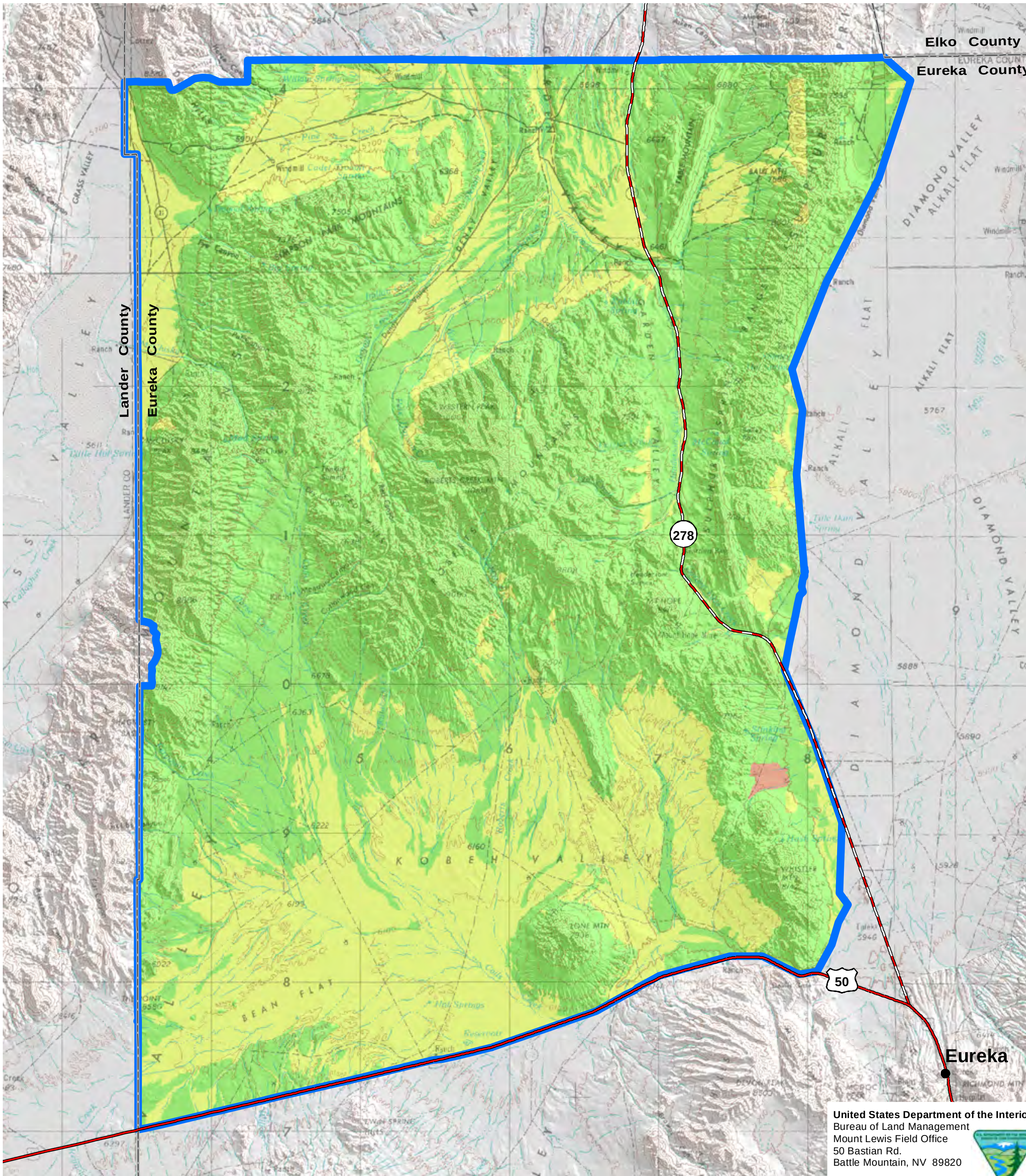
Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-14

Soil Erosion Potential from Water

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N



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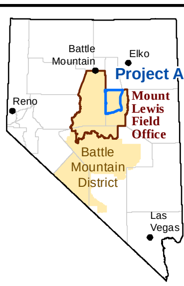

Legend

Soil Erosion Potential from Wind

- Severe Wind Erosion
- Moderate Wind Erosion
- Low Wind Erosion
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-15

Soil Erosion Potential from Wind

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

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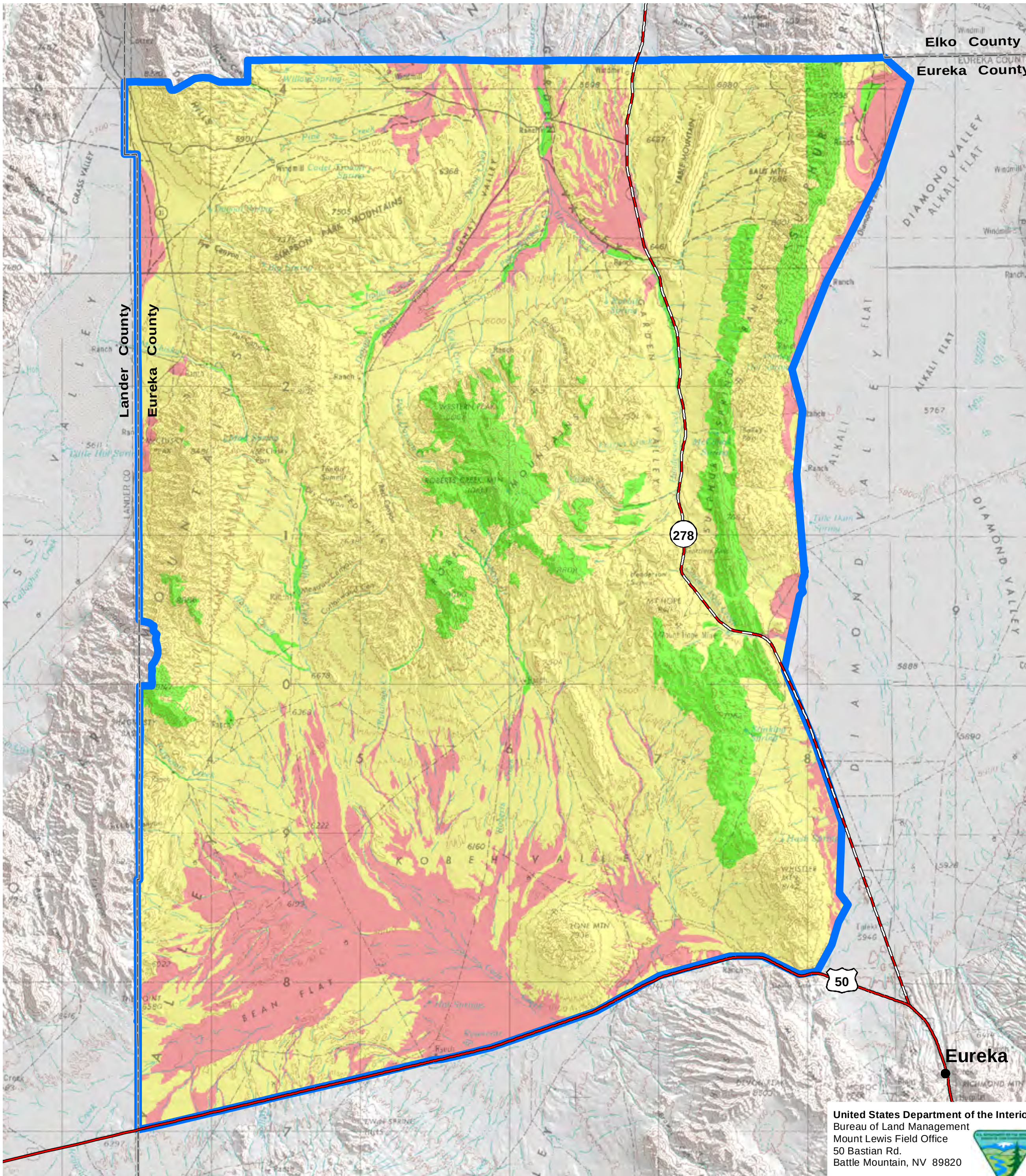

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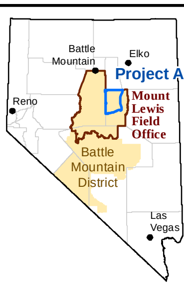

Legend

Organic Matter within Surface Soils

- < 1%
- 1 - 3%
- 3 - 5%
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-16

Organic Matter within Surface Soils

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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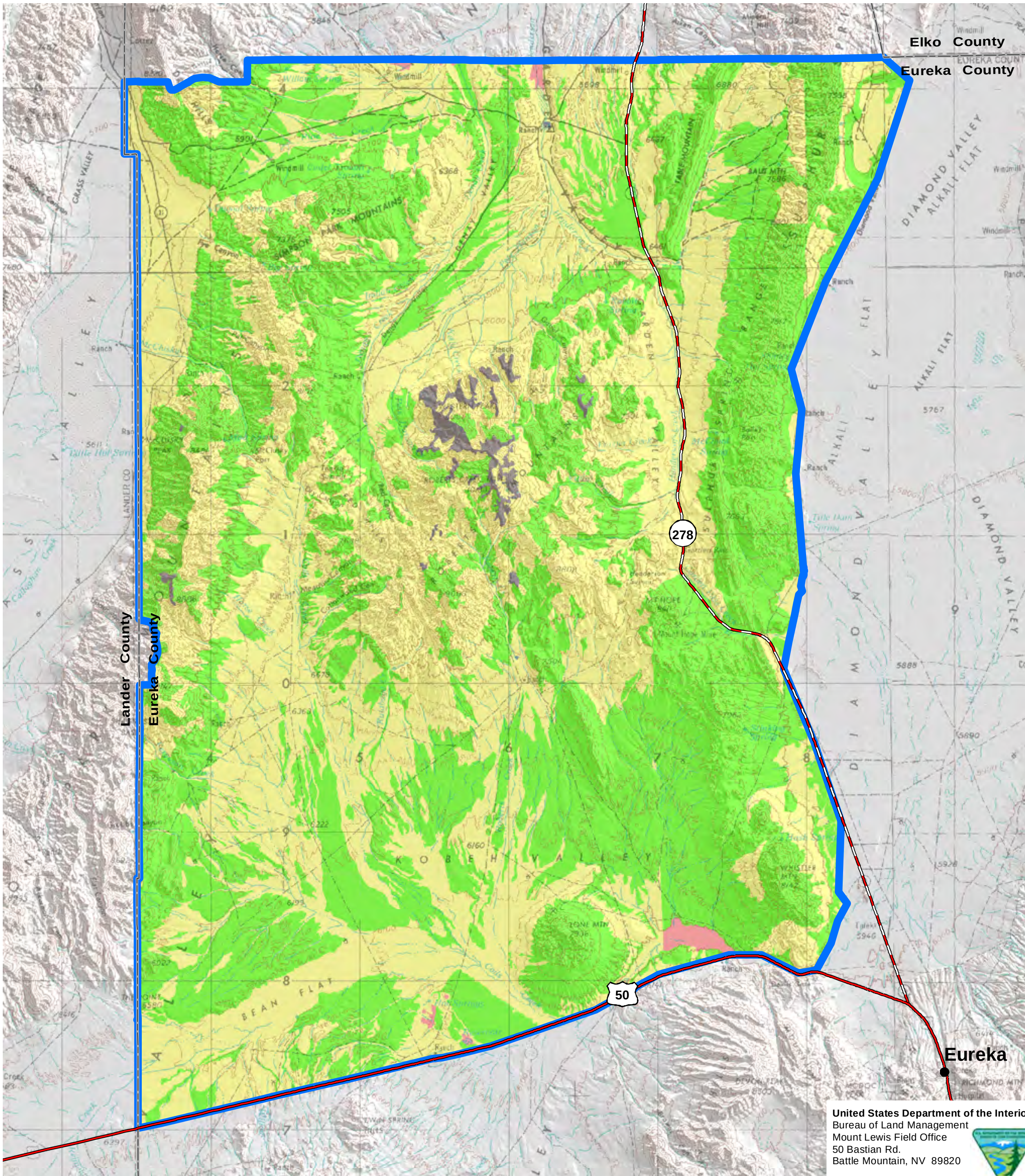
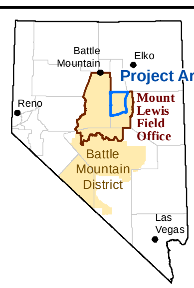




Legend

Soil Surface Texture

- Fine Texture
- Medium Texture
- Coarse Texture
- Not Rated
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-17

Soil Surface Texture

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
1:400,000

N

3.9.2.2.7 Low Revegetation Potential

Soils with low revegetation potential have chemical characteristics such as high salts, sodium, or pH that may limit plant growth. Saline soils affect plant uptake of water and sodic soils (soils with high levels of sodium) often have drainage limitations. In addition, the success of stabilization and restoration efforts in these areas may be limited unless additional treatments and practices are employed to offset the adverse physical and chemical characteristics of the soils. Approximately 7 percent of soils in the project area are characterized as having low revegetation potential (**Figure 3-18**).

3.9.2.2.8 Biological Soil Crusts

Biological soil crusts are also referred to as microbiotic, cryptogamic, cryptobiotic, and microphytic crusts. The names are all meant to indicate common features of the organisms that compose the crusts. Biological soil crusts are formed by living organisms and their by-products, creating a crust of soil particles bound together by organic materials. Chemical and physical crusts are inorganic features, such as a salt crusts or platy surface crusts. Biological soil crusts are commonly found in semiarid and arid environments throughout the world. Areas in the United States where crusts are a prominent feature of the landscape include the Great Basin (USDA Natural Resources Conservation Service 1997).

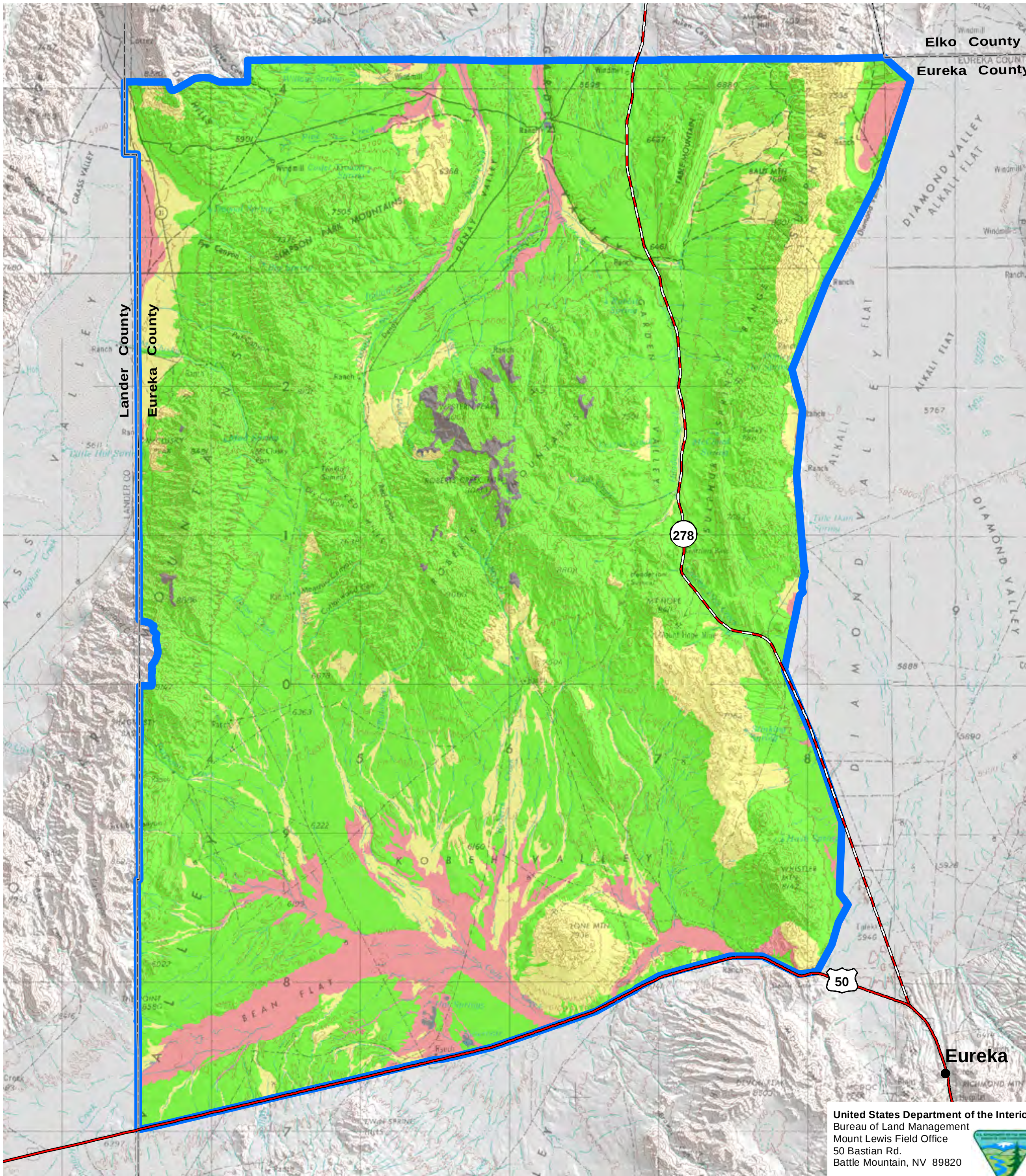
Biological soil crusts function as living mulch by retaining soil moisture and discouraging annual weed growth. They reduce wind and water erosion, fix atmospheric nitrogen, and contribute to soil organic matter. Structurally, biological soil crusts are a rough, uneven carpet or skin of low stature (1 to10 centimeters in height). Below ground, lichen and moss rhizines, fungal hyphae, and cyanobacterial filaments form a matrix that binds soil particles together. Horizontally, biological soil crusts occupy the nutrient-poor zones between vegetation clumps in many types of aridland vegetation. Compositionally, biological soil crusts are diverse. In many arid and semi-arid communities there are often many more species associated with the biological soil crust at a given site than there are vascular plants.

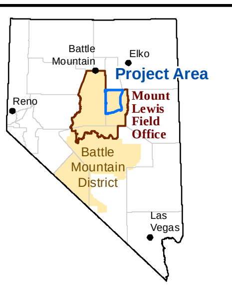
Biological soil crusts can also be used as indicators of ecological health. In addition, they act as indicators of abiotic factors, such as the presence of calcareous soils. Most crustal organisms are biologically active during the cool seasons when the soil surface is moist. In contrast, vascular plants are active in spring and summer when air temperatures are above freezing. Unlike vascular plants, crustal organisms, particularly lichens, are not greatly influenced by short-term climatic conditions. This makes them ideal indicators of long-term environmental factors (USDOI BLM and USDOI USGS 2001and references cited therein).

3.9.2.3 Vegetation Treatment Soil Suitability

3.9.2.3.1 Fire Damage Susceptibility

Wildfire is a naturally occurring event that has helped maintain ecosystem function in wildlands. Wildland fire can be caused by natural ignition, such as a lightning strike, or by man-caused ignition, and is used for a resource benefit. Buildup of excess fuel loads can result in high severity fires that damage the soils in the burn area. Prescribed burning is a restoration practice that is primarily designed to help return the natural fire cycle to the landscape.





Legend

Revegetation Potential

- Low Potential
- Moderate Potential
- High Potential
- Not Rated
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-18

Revegetation Potential

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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Percent Organic Matter	Acres	Percent of Project Area
<1	121,740	16
1-1.9	396,013	53
2-3.9	213,342	28
>4	18,714	2

Source: USDA Natural Resources Conservation Service (2012).

Vulnerability to fire damage ratings are used to assess the risks that a fire will create a water repellant (hydrophobic) soil layer, volatilize essential soil nutrients, destroy soil biological activity, and cause soil and water erosion on a burned site. Vulnerability to fire damage ratings are directly related to burn severity (e.g., a low to moderate severity burn will not result in water repellant layer formation). **Table 3-13** and **Figure 3-19** provide vulnerability to fire damage ratings for the 3 Bars Project area (USDA Natural Resources Conservation Service 2012). Sandy soils are more susceptible to formation of a water repellant layer than are fine textured soils. High rock fragment content increases the rate of heat transfer into the soil. Steep slopes increase the vulnerability to water erosion.

TABLE 3-12

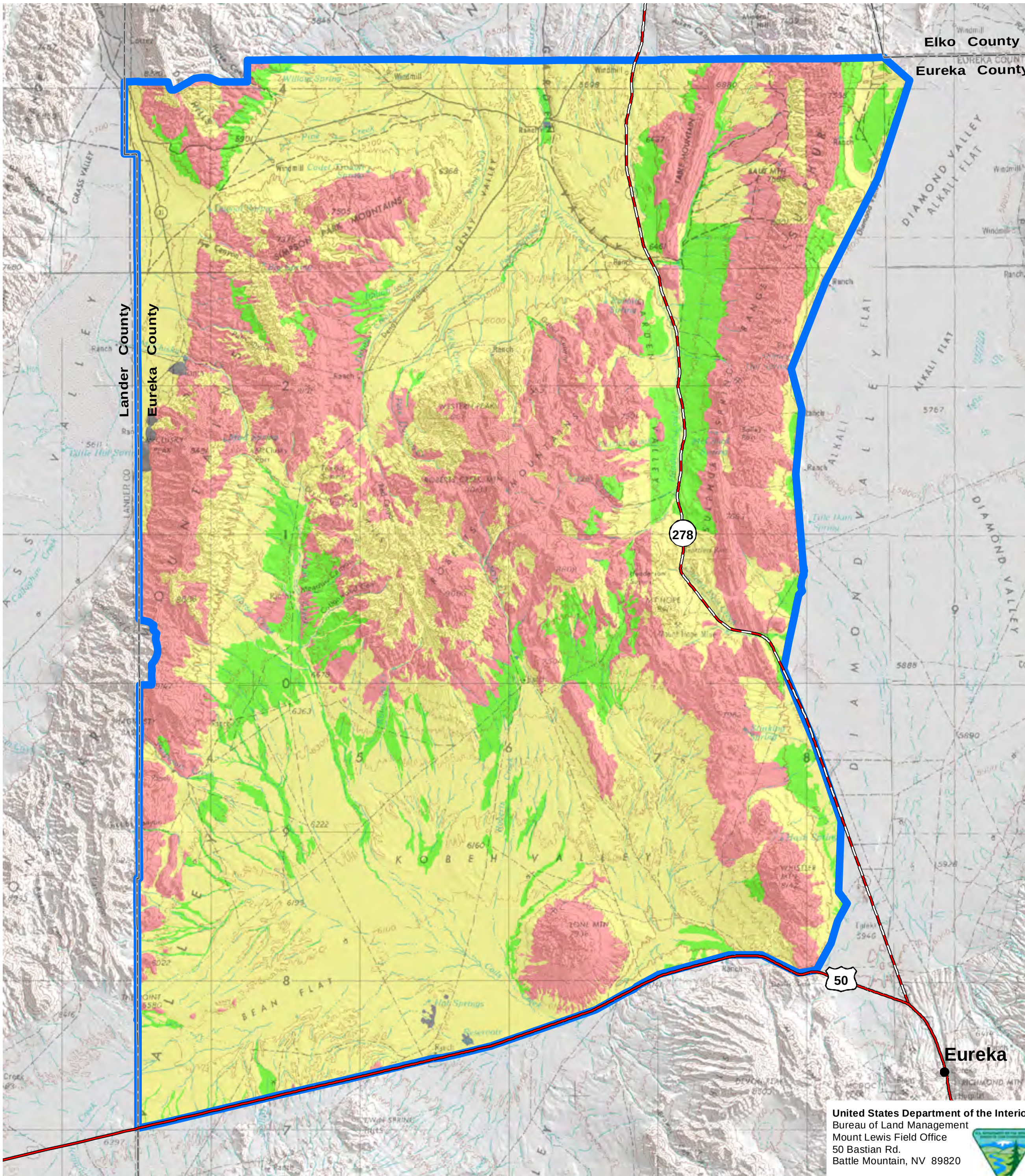
Soil Textures in the Project Area

Surface Texture	Acres	Surface Texture	Acres
Cobbly Loam	46,483	Silt Loam	66,405
Extremely Cobbly Loam	3	Silty Clay	317
Extremely Stony Loam	10,389	Silty Clay Loam	2,298
Fine Sandy Loam	19,655	Stony Loam	40,686
Gravelly Fine Sandy Loam	13,842	Very Cobbly Clay Loam	255
Gravelly Loam	119,273	Very Cobbly Loam	94
Gravelly Sandy Loam	15,949	Very Fine Sandy Loam	4,451
Gravelly Silt Loam	183	Very Gravelly Loam	75,154
Loam	138,274	Very Stony Loam	87,785
Loamy Very Fine Sand	1,043	No Data	5,307
Sandy Loam	101,965	**Total**	**749,810**

Source: USDA Natural Resources Conservation Service (2012).

Vulnerability to formation of hydrophobic (water repellant) layers varies by vegetation type. For example, pinyon-juniper vegetation types are more susceptible to hydrophobicity than shrubland or grassland vegetation types. Hot, dry south slopes are more susceptible to fire damage than cool northern slopes.

The vulnerability to fire damage rating should be used in conjunction with the rangeland seeding rating or the opportunity for restoration rating depending upon whether seeding or natural regeneration will be utilized on the site.



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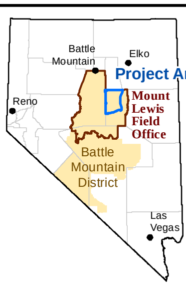


Legend

Fire Damage Susceptibility

- Highly Susceptible
- Moderately Susceptible
- Slightly Susceptible
- Not Rated
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-19

Fire Damage Susceptibility

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

TABLE 3-13

Soil Suitabilities for Vegetation Treatment (acres)

Suitability or Susceptibility	Fire Damage Susceptibility	Shredder Susceptibility	Site Degradation Susceptibility
Poorly Suited/Highly Susceptible	78,786	109,545	112,900
Moderately Suited/ Susceptible	444,257	210,470	426,103
Well Suited/Slightly Susceptible	225,446	428,474	209,487
Not Rated	1,321	1,321	1,321

Source: USDA Natural Resources Conservation Service (2012).

3.9.2.3.2 Shredder Susceptibility

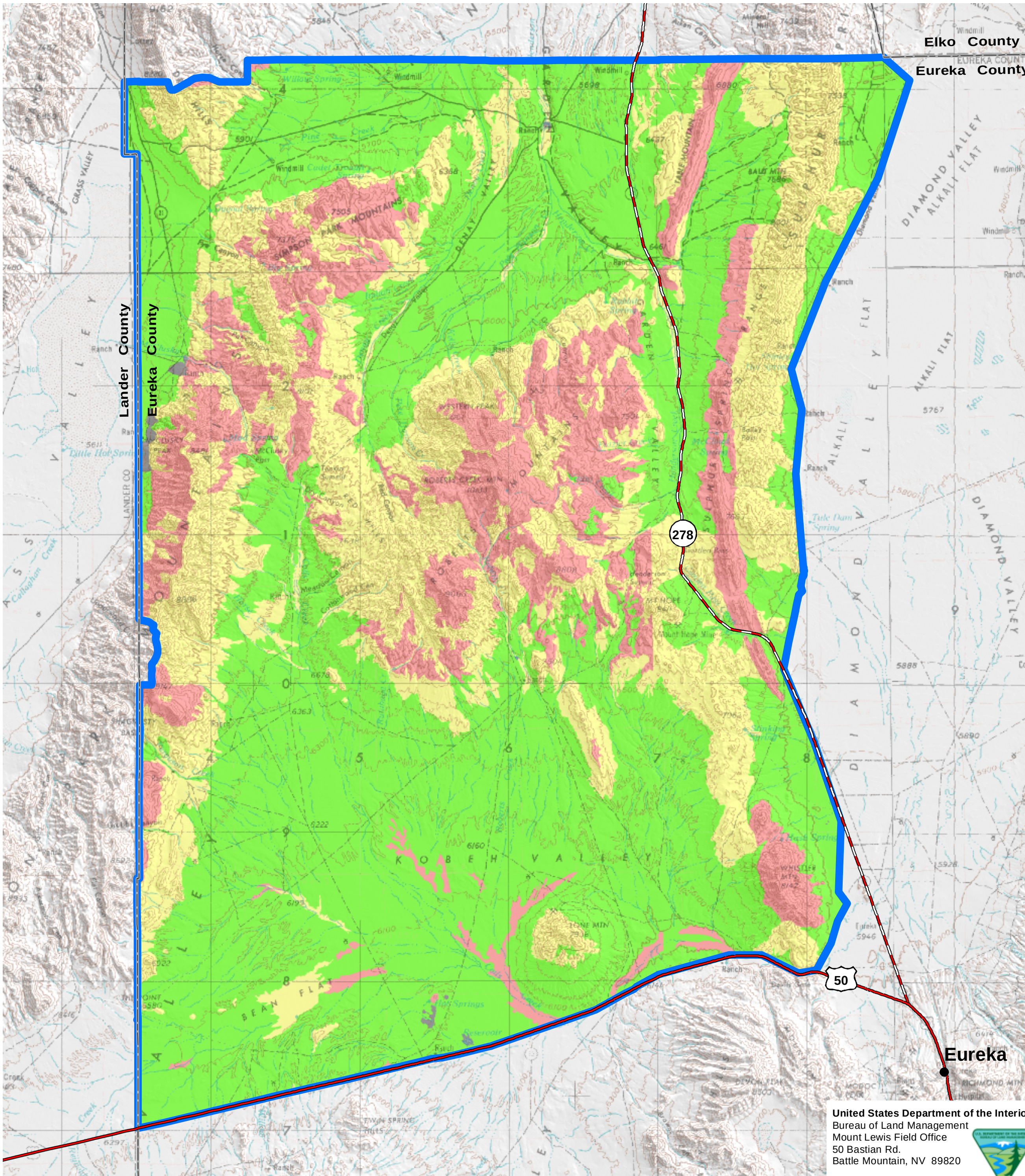
Shredder mechanical treatment is commonly practiced, sometimes in combination with seeding, for rangeland restoration. This type of treatment is often implemented in sagebrush, mountain shrub, and pinyon-juniper vegetation types to reduce the size and composition of dense brush and trees up to 15 to 18 inches diameter at breast height. The treatment objective of creating a mulch layer can include reducing hazardous fuel loads, increasing forage for livestock and wildlife, increasing infiltration, and reducing runoff and erosion (USDA Natural Resources Conservation Service 2012).

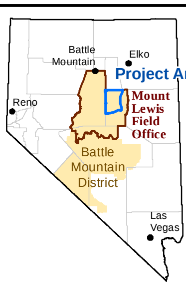
Shredder mechanical treatment suitability ratings represent the relative physical limitations of soil factors upon use of shredder implements suitable for treatment of rangeland sites. This rating should be used in conjunction with the rangeland seeding rating or the opportunity for restoration rating depending upon whether seeding or natural regeneration will be utilized on the site. **Table 3-13** and **Figure 3-20** show shredder suitability ratings for the 3 Bars Project area.

3.9.2.3.3 Site Degradation Susceptibility

Vulnerability to degradation is a function of resistance to degradation. Resistance to degradation of a rangeland or woodland site is a measure of its ability to function without change throughout a disturbance. The magnitude of decline in the capacity to function determines the degree of resistance to change. Resistance to degradation thus could be described as an area's buffering capacity (USDA Natural Resources Conservation Service 2012).

The vulnerability to site degradation suitability ratings represent the relative risk of water and wind erosion, salinization, sodification, organic matter, and nutrient depletion and/or redistribution, and loss of adequate rooting depth necessary to maintain desired plant communities. This rating should be used with the objective to protect vulnerable sites from the type of degradation that would result in accelerated erosion, reduction in water and air quality, invasion by annual grasses or noxious weeds and other invasive, non-native vegetation, and other large scale potential natural plant community conversions. When degradation of soil and natural plant community characteristics goes beyond the threshold for the ecological site, the ecological site characteristics cannot be restored without artificial restoration efforts. **Table 3-13** and **Figure 3-21** show the site degradation susceptibility ratings for the 3 Bars Project area (USDA Natural Resources Conservation Service 2012).





Legend

Mechanical Treatment Suitability (Shredder)

- Poorly Suited
- Moderately Suited
- Well Suited
- Not Rated
- 3 Bars Project Area

Source: USDA NRCS 2012.

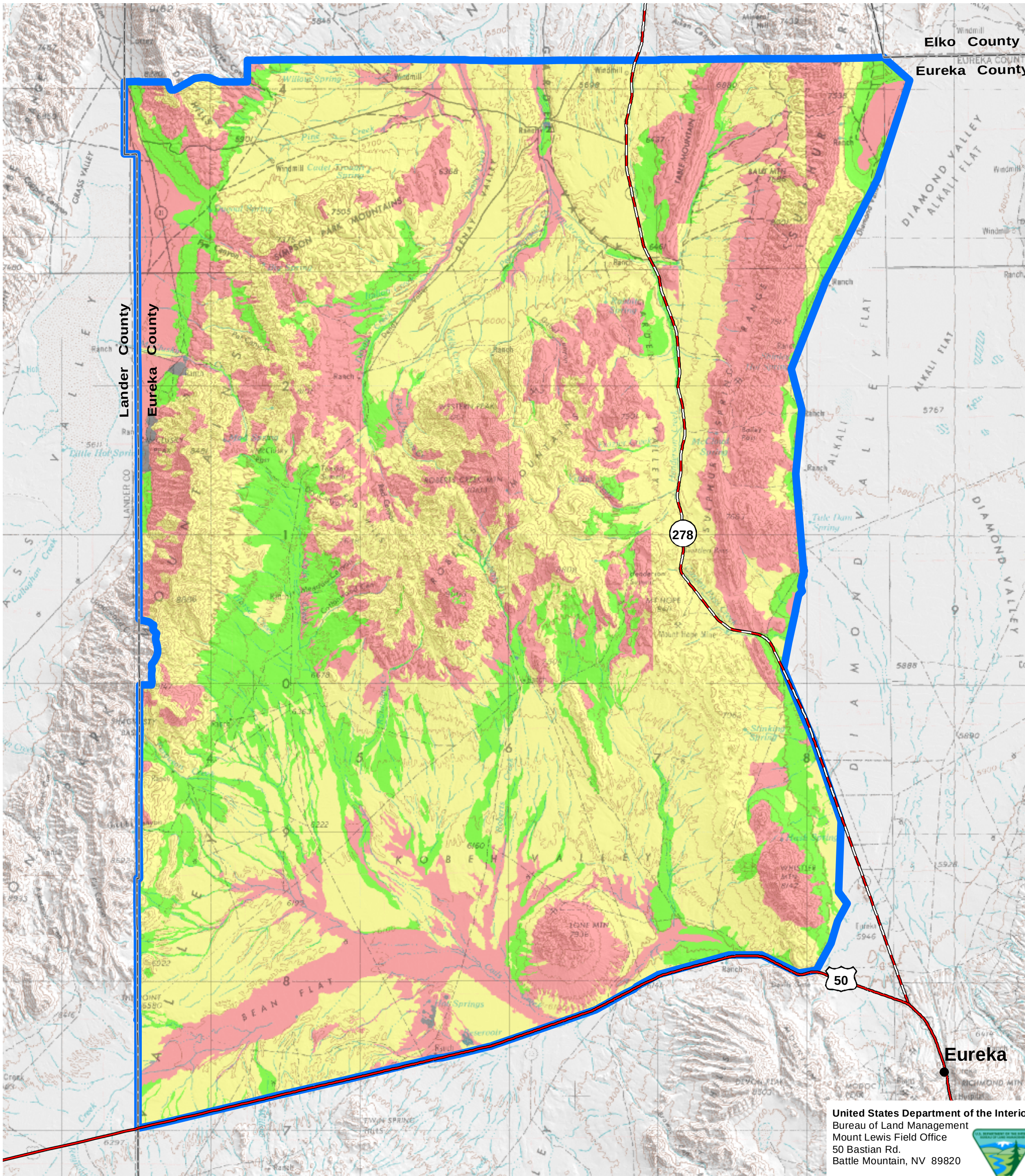
3 Bars Ecosystem and Landscape Restoration Project

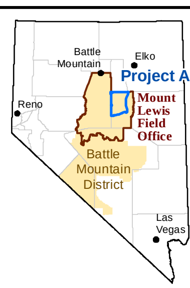
Figure 3-20

Mechanical Treatment Suitability (Shredder)

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N





Legend

Site Degradation Susceptibility

- Highly Susceptible
- Moderately Susceptible
- Slightly Susceptible
- Not Rated
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-21

Site Degradation Susceptibility

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3.9.3 Environmental Consequences

One of the goals of the 3 Bars Project is to improve soil quality and productivity and reduce soil erosion, especially in riparian zones. Restoration treatments would potentially affect soils by altering their physical, chemical, and/or biological properties. Physical changes could include the loss of soil through erosion or changes in soil structure, porosity, or organic matter content. Fire and other treatments would potentially alter nutrient availability and soil pH.

Some vegetation treatments might also alter the abundance and types of soil organisms that contribute to overall soil quality, including mycorrhizae (USDOI BLM 2007c:4-11). These consequences are expected to be short-term. Over the long-term, treatments that remove noxious weeds and other invasive non-native vegetation, reduce fuels, and restore native plants should enhance soil quality on the 3 Bars Project area.

3.9.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Several issues related to soil resources were identified during public scoping. These are:

- Concern that the recent Nevada Soil Survey information does not accurately reflect the historical occurrence of forest vegetation, and is strongly biased towards shrub-grass sites as soil surveys were based on what was present during the past few decades.
- Concern that the current soils information is being used as a justification for massive deforestation and sagebrush killing and does not accurately reflect ecological conditions, either historic or current.
- Concern that the soils information ignores the role of historic mining, agency treatment, and other deforestation.
- Concern that because sagebrush is seral to pinyon and juniper, the presence of sagebrush in some areas at the time of the soil surveys may likely have been the result of past deforestation or BLM treatments.
- Request basic information be provided regarding soil stability, erosion hazard, and wind and water erosion risks related to lands in the EIS area in order to understand likely sedimentation into streams, site soil stability post-treatment, likelihood of increased gullying, and other factors.
- Concern that the actions proposed would bring about widespread microbiotic crust loss and soil erosion from wind and water.

3.9.3.2 Significance Criteria

Impacts to soil would be considered significant if BLM actions resulted in:

- Accelerated erosion that would likely exceed annual soil loss tolerances.
- Loss of topsoil, soil quality, or productivity that would limit revegetation success.
- Accelerated erosion from watershed slopes, leading to increased sedimentation or turbidity in streams or ponds, or to other instabilities along stream corridors.

3.9.3.3 Direct and Indirect Effects

3.9.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

Restoration treatments could result in increased rates of erosion and reduced water infiltration, leading to reduced soil productivity. Erosion results when unstable soils are displaced under the forces of gravity, wind, or water. Although erosion is a natural process, it can increase markedly when vegetation is cleared (Bonneville Power Administration 2000). Unnaturally high erosion rates could occur as a result of soil disturbance during the restoration treatment, or from the resultant vegetation removal and associated decrease in soil stability. The effects of loss of plant cover and organic matter on soil erosion would be greatest for treatments in areas with soils having severe water and wind erosion hazards as shown in **Figures 3-14** and **3-15**.

Soils that are highly prone to water erosion would likely undergo accelerated erosion for a period during and after treatments. These areas are indicated on **Figure 3-14**. Erosion risk would be greatest for treatment areas on steep slopes, or where soils have clay, poor structural aggregation, or low organic content, and includes most riparian treatment areas. Treatments on these soils, particularly during wet periods, would encourage adverse impacts from soil erosion and sedimentation.

Removal of vegetation on public lands would influence the amount of water infiltrating into the soil in some areas. Removal of vegetation could increase surface runoff, reducing the amount of water that might infiltrate into the soil. However, vegetation removal would also eliminate the loss of water to the soil from water being captured by the plant canopy or lost through evapotranspiration.

Soil compaction associated with some vegetation treatment methods could reduce infiltration and soil productivity by eliminating pore spaces used for water storage and air exchange. Where highly compactable soils occur, noticeable compaction impacts would likely occur from vehicle traffic and equipment operations. These areas are indicated on **Figure 3-13**. Compaction could impede infiltration and accelerate runoff and erosion. Soil compaction may also result from manual construction of fences and spring exclosures, although disturbance areas would be small. Soil compaction risk would be greatest during wet or muddy conditions, such as during spring runoff, during rainstorms, and for a day or so after storm events.

Vegetation treatments can alter the chemistry of the soil. Treatment methods that reduce organic matter cover can reduce the productivity of soils by reducing carbon and other nutrient inputs, and by reducing the moisture-holding capacity. Erosion can result in the transport of organic matter and nutrients off site. Soils with little organic matter to begin with (e.g., most Aridisols) are more susceptible to losses of organic matter. Removing nitrogen-fixing plants, such as legumes, can reduce soil nitrogen, and removing logs and other plant material can deprive soils of nutrients provided by decaying material. Removing vegetation can also reduce evapotranspiration, allowing more water to leach soluble nutrients from the soil (USDOI BLM 2007c:4-12).

Laborers and vehicles accessing the site could disturb topsoil and/or surface organic matter; however, the extent of this disturbance should be limited. Coarse-textured soils and steep slopes would be the most fragile, and extensive areas of disturbance could result in increased erosion rates. There is the potential for some contamination of the soil from petroleum products used in hand-held power equipment or from transport vehicles, but these effects would be localized.

Beneficial Impacts

Although treatments would have short-term adverse effects on soil condition and productivity, it is predicted that disturbance effects resulting from restoration activities would be less severe than wildfire effects and erosion that would result from lack of restoration. In particular, efforts to restore stream functionality, reduce noxious weeds and other invasive non-native vegetation spread, and reduce wildfire risk would benefit soils. The time necessary to accomplish these beneficial results would vary between treatments and from site to site, but would likely be on the order of years to decades after treatment. Based on soil characteristics, site revegetation potential is moderate to high for 3 Bars Project treatment sites (**Figure 3-18)**.

Vegetation treatments that reduce or eliminate noxious weeds and other invasive non-native vegetation could be beneficial to soil quality. Beneficial impacts to soil stability and quality would ultimately result from revegetation treatments, due to the overall improvement in nutrient cycling, structural aggregation, reduction of erosion and sedimentation, accumulation of topsoil and organic matter, and enhanced infiltration.

If these treatments were to result in increased native plant cover on sites degraded by noxious weeds and other invasive non-native vegetation, soil quality would begin to rebound. Sites with a large component of noxious weeds and other invasive non-native vegetation may be at a higher risk for erosion than sites that support native vegetation. Invasive plants can increase the potential for wind or water erosion by altering the fire frequency or producing chemicals that directly affect soil quality or organisms. These negative effects include increased sediment deposition and erosion, and alterations in soil nutrient cycling. In areas where pinyon-juniper has invaded, studies show that when tree dominance is reduced and herbaceous cover is increased, runoff and soil erosion decrease on sites with relatively fine-textured soils. Leaving tree debris on the ground after mechanical treatments can intercept runoff and increase infiltration, increase soil moisture by reducing evapotranspiration and evaporative loss of soil water, and promote nutrient cycling (Tausch et al. 2009).

Restoration treatments would benefit soil quality and productivity by reducing the risk of wildfire. Wildfires generally occur when soils are driest, resulting in hot soil temperatures, loss of nutrients, consumption of soil organic matter, and reduction of soil aggregation, infiltration, and aeration (Erickson and White 2008). Catastrophic, stand-replacing wildfires in pinyon-juniper woodlands can cause the loss of 75 to 100 percent of the soil organic matter (Neary et al. 1999). Given the ability of an unplanned, uncontrolled, severe wildfire to cover a large geographic area, the detrimental effects of wildfire on soil quality have the potential to be high. Thus, vegetation management that reduces this risk would be beneficial to soil resources on public lands. Lower intensity prescribed fires would help avoid these conditions. This would be especially important on moderate and steep slopes, where uncontrolled catastrophic wildfires fires could cause severe erosion impacts.

Removal of noxious weeds and other invasive non-native vegetation should improve soil function and increase both soil biodiversity and soil moisture. Many noxious weeds and other invasive non-native vegetation have relatively sparse canopies, which allow for greater evaporation from the exposed soil than dense vegetative cover. Sites infested with noxious weeds and other invasive non-native vegetation often experience more extreme soil temperatures that can alter soil moisture regimes. Removal of noxious weeds and other invasive non-native vegetation and reestablishment of native vegetation should slow runoff and evaporation and moderate soil temperatures (USDOI BLM 2007c:4-23).

3.9.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Accelerated erosion and sediment yields could occur under Alternative A, primarily from pinyon-juniper and sagebrush treatments. About 4,000 of the acres treated annually would occur in areas that are susceptible to wind or water erosion, or would be compaction prone, while about 10,000 of the acres treated annually could occur in areas that are susceptible to damage from fire treatments.

Over time, the risks of water and wind erosion should be reduced from current levels. Soil fertility would improve over time for most treatments. Treatment activities that move pinyon-juniper woodlands and rangelands toward historical ranges of variability would provide favorable conditions for soil functions and processes that contribute to long-term soil productivity at a broad scale (USDOI BLM 2007c:4-18).

Riparian Treatments

The following discussion focuses on the effects of riparian treatments on soil. A discussion of stream processes, and how proposed stream engineering treatments would affect stream morphology and functionality, including processes related to soil erosion and deposition, is in Section 3.11.3 under Wetland, Floodplain, and Riparian Zones.

Adverse Effects

Locally, riparian conditions could be adversely affected if treatments resulted in accelerated soil erosion or deposition occurred near water bodies. These effects would occur along streams or other riparian zones if soils on nearby slopes were exposed and subjected to greater transport capacities from raindrop splash or overland flow.

Treatment work at several streams, ponds, and springs, including projects associated with the Black Spring Unit, Garden Spring Unit, Henderson above Vinini Confluence Unit, and Frazier Creek Unit groups, would involve using heavy equipment to reconstruct streams and improve riparian habitat. Because of the spatial scale of construction-related disturbance associated with channel modification projects, the risk of unanticipated impacts can be very high. This is particularly true when projects do not meet restoration objectives, are not constructed as planned, or are designed with inadequate knowledge of watershed processes, disturbance regimes, or altered watershed conditions. Poorly designed channel modification projects can result in unexpected channel erosion in adjacent reaches, aggradation or degradation of the channel bed, or other impacts to habitat and processes due to changes in channel slope, bed elevation, and sediment transport capacity. Furthermore, the dynamic nature of hydraulic forces, and the uncertainties inherent in design and analysis, may result in inadvertent impacts from channel modification even when properly designed (Saldi-Caromile et al. 2004).

The use of heavy equipment can result in soil compaction, particularly in areas of moist soils. Compaction by vehicles and other heavy equipment can reduce the porosity of soils, thus limiting water infiltration and increasing surface water runoff and erosion. Soil disturbance during stream restoration could increase erosion and degrade riparian habitat, especially when the treatment is performed on hillslopes. Erosion can be a problem on slopes greater than 20 percent. About 21 percent of riparian treatment acreage has moderate to high soil water erosion potential, 8 percent has moderate to high wind erosion potential, and 27 percent is compaction prone.

The treatment areas most prone to compaction and severe water erosion include the McClusky Creek and Indian Creek Headwaters North units. The McClusky Creek Unit in particular has a combination of severe water erosion risk and compaction-prone soils. For those streams identified for Lahontan cutthroat trout habitat improvement, streams most prone to severe water erosion would include portions of streams within the Vinini Creek and Roberts Creek units. Compaction prone soils exist at the upper Henderson Creek, Vinini Creek, and Willow Creek units. The Vinini Creek and Willow Creek units in particular have a combination of severe water erosion risk and compaction-prone soils, although mechanical equipment would not be used within Willow Creek. Wind erosion hazard is also a moderate risk for adverse impacts in the Lower Henderson Creek Unit. Treatment by mechanical methods during dry months can minimize the effects of erosion on riparian zones.

Prescribed fire would not be used as a primary treatment on riparian areas; however, pile burning could be used to dispose of activity fuels. It is unlikely that livestock would be used to treat cheatgrass in riparian areas, although classical biological control could be used to treat noxious weeds and other invasive, non-native vegetation on riparian areas.

Beneficial Effects

Stream restoration efforts would help reconnect the streams with their floodplains, and help stream systems dissipate energy associated with high water flow, filter sediment, capture bedload, aid in floodplain development, improve floodwater retention and groundwater recharge, restore desirable soil moisture regimes, and provide suitable conditions for riparian plants to develop root masses that stabilize streambanks against erosion. Stream bioengineering and stabilization efforts using manual and mechanical methods would reduce soil erosion and episodes of bank failure.

The BLM would manually remove pinyon-juniper that is encroaching into riparian zones. Pinyon-juniper is not a riparian species and does not hold soil as well as native riparian species. Pinyon-juniper would be cut into logs or mulched. Vegetation that is uprooted, shredded, mowed, or otherwise altered and scattered on the surface would improve soil cover and organic matter. Scattered vegetative debris could temporarily provide greater soil stability than before treatment. Noelle (2012) observed that slash did not affect runoff but sediment yield was significantly reduced in pinyon-juniper stands where slash was used to slow runoff on steep slopes.

Stream degradation in the 3 Bars Project area can be attributed to historic livestock, wild horse, and other wild ungulate soil disturbance in addition to other natural and human-caused factors, and this disturbance has led to soil erosion (USDOI BLM 1999a, 2004b, 2007f, 2008f, 2009e). To reduce these impacts, the BLM could use existing permanent fencing or small, temporary exclosures to temporarily exclude livestock, wild horses, and other wild ungulates from treatment areas to reduce soil disturbance and allow native vegetation to recover.

Aspen Treatments

Adverse Effects

Mechanical treatments could lead to soil erosion, as 57 percent of aspen management acreage has moderate to high soil water erosion potential and 14 percent is compaction prone; none of the aspen management treatments areas have potential for wind erosion.

Beneficial Effects

The BLM would remove pinyon-juniper trees to slow pinyon-juniper encroachment into aspen stands, and to create fire and fuel breaks. Only about 10 acres of pinyon-juniper would be treated annually near aspen stands. Creation of fire and fuel breaks would slow or stop the spread of a wildfire, to the benefit of soil, as discussed earlier.

Pinyon-juniper Treatments

Adverse Effects

Pinyon-juniper treatment areas are generally on moderate to steep hillslopes that are prone to erosion. Where trees are in dense stands, removal of these trees could lead to water and wind erosion as vegetative ground cover is mostly absent from these stands. These effects of vegetation loss would lessen as forbs and grasses improve ground cover, and soil loss could also be mitigated by leaving downed wood and slash on the ground as mulch.

Manual treatments using chainsaws would have few effects on soil as there would be little soil disturbance. The effects of mechanical treatments on soil would depend on the following: 1) the amount of soil exposed during the treatment; 2) the effect of ground disturbance on soil properties; and 3) the site conditions, especially slope and patterns of precipitation.

Mechanical treatments would affect soils by removing vegetation and by disturbing or removing topsoil. Because plant and litter cover protect the soil, and roots hold the soil in place, removal of plant materials exposes soil. Exposed soils are vulnerable to increased water and wind erosion and reduced water-holding capacity. Overall, about 37 percent of pinyon-juniper management acreage has moderate to high water erosion potential, 16 percent has moderate to high wind erosion potential, and 32 percent is compaction prone. Of those areas where mechanical treatments could occur, about 18 percent of the treatment acreage is poorly suited for shredding.

Although most of the mechanical treatments would not directly disturb the soil, the use of heavy equipment on treatment sites could result in increased soil compaction, and heavy equipment can shear and rut wet soils. Compaction by vehicles and other heavy machinery can reduce soil pores and limit water infiltration, soil aeration, and root penetration. Approximately 21 percent of treatment acres are prone to soil compaction.

Mechanical treatments could disrupt biological soil crusts. Crusts are sensitive to compaction by vehicles and other heavy equipment. The removal or destruction of biological soil crusts could adversely affect soil quality by increasing susceptibility to erosion, reducing nitrogen inputs, reducing infiltration, and potentially encouraging weed establishment (USDOI BLM 2007c:4-15).

The BLM would use manual and mechanical treatments to thin pinyon-juniper and create fuel breaks on up to 1,400 acres on the Lone Mountain area. Most trees would be thinned using chainsaws, while fire breaks would be created using manual and mechanical methods, such as shredding. These methods have minimal impact on the soil layer, and soils on Lone Mountain are not prone to compaction. Approximately 60 acres have water erosion hazard, and 400 acres have moderate wind erosion hazard.

The BLM would thin and remove pinyon-juniper and create fuel breaks in several drainages on Roberts Mountains. Treatment units include the Atlas, Birch, Frazier, Gable, Henderson, Upper Pete Hanson, Upper Roberts, and Vinini units. Approximately one-third of the proposed treatment acres are on soils that are susceptible to compacting, and the resulting adverse impacts to soil from erosion, runoff, sedimentation, and degraded soil quality would be of concern for this treatment group. In addition, approximately 17 percent of these areas has severe water erosion hazard. Nearly 80 percent of these areas has moderate or high fire damage susceptibility, while 26 percent is poorly suited for shredding. Thus, mechanical treatments may be preferable to fire treatments if there is concern about soil damage and loss.

On the Three Bars Ranch, Cottonwood/Meadow Canyon, Dry Canyon, Lower Pete Hanson, Tonkin North, Tonkin South, Whistler, and Sulphur Spring Wildfire Management units, soil compaction risk occurs on about 15 percent of the treatment areas, and the resulting accelerated erosion, runoff, sedimentation, and degraded soil quality would be a minor adverse impact within this treatment group. Approximately 21 percent of the treatment area has severe water erosion hazard due to slopes and inherent soil conditions. About 70 percent of the area has moderate or high fire damage susceptibility, while 18 percent of the area is poorly suited for shredding. Thus, shredding treatments may be preferable to prescribed fire treatments if there is concern about soil damage and loss. Approximately 30 percent of the Sulphur Spring Wildfire Management Unit is at risk for water erosion, while 90 percent of the unit has moderate or high fire damage susceptibility.

Potential adverse impacts from prescribed fires in pinyon-juniper treatment areas include greater vulnerability to accelerated erosion, loss of organic matter, temporarily reduced microbial populations, and the potential formation of water-repellent surface layers (Ice et al. 2004). Barger et al. (2012) found that prescribed fire in pinyon-juniper stands led to a 11- to 32-fold increase in wind erosion compared to shredded and control sites. He recommended that shredding should be preferred over prescribed fire where possible. Rau et al. (2005) observed that water repellency in pinyon-juniper forests varies by elevation and spatial variability in surface and soil organic matter associated with the vegetation. Spring burning in pinyon-juniper may cause a decrease in infiltration if coarse mineral particles are greater than 40 percent. They also noted that fall burning may lead to greater development of water repellency because fuel and soil moisture are typically lower in the fall.

Biological soil crusts are generally killed by hot ground fires; however, lightly scorched biological crusts may still function to reduce erosion (USDOI BLM and USDOI USGS 2001). Extensive and severe wildfires often destroy biological crusts and leave the bare soil unprotected, whereas small, less intense prescribed burns may leave some biological soil crusts intact and functioning. Biological soil crusts provide little fuel to carry a fire through the interspaces, thus acting as a refugia to slow the spread of fire and decrease its intensity (Rosentreter 1986). Over 80 percent of pinyon-juniper treatment areas is prone to fire damage that can create a water repellant soil layer, volatilize essential soil nutrients, destroy soil biological activity, and cause soil and water erosion on a burned site. Conducting prescribed burns when soils are not extremely dry, or during cooler times of the year, could reduce fire effects to soils and biological soil crusts.

Beneficial Effects

Restoration treatments that move woodlands toward historical ranges of variability would provide favorable conditions for soil functions and processes that contribute to long-term soil productivity at a broad scale (USDOI BLM 2007c:4-18). Erosion and sedimentation processes in pinyon-juniper stands would be reduced long-term by vegetation treatments. In a review by Wilcox and Davenport (1995), they found that as pinyon-juniper increases in density, the understory cover decreases. Hastings et al. (2003) observed accelerated erosion in areas where pinyon-juniper was encroaching into native woodlands and displacing native vegetation. Pierson et al. (2007) noted that juniper-dominated hillslopes had significantly lower ground cover and produced rapid runoff from rainfall events that was up to 15 times greater than on sites that were not dominated by juniper. They noted that cutting juniper stimulated herbaceous recovery, improved infiltration capacity, and protected the soil surface from rainfall events. Lossing (2012) observed that interception by pinyon-juniper reduced the amount of rainfall reaching the soil beneath the tree canopy by 44 percent. Mechanical treatments that ultimately result in improved plant cover and diversity can improve habitat for soil organisms and reduce the risk of soil erosion. Soil organic matter content, nutrient cycling, topsoil formation, and greater structural aggregation would increase following treatments. Soil fertility, aeration, and infiltration should also improve over time. The length of time for these effects to occur is likely to be on the order of years to decades, but improving trends may become noticeable after a few years (USDOI BLM 2007c:4-18).

Chipping and shredding of vegetation can result in all or most of the organic material remaining on site. The application of large quantities of fresh, woody organic material to the soil surface can provide protection to the soil in the form of mulch. It is well documented that mulch results in attenuated soil temperatures, improved water infiltration, increased soil moisture retention, and reduced sediment yield.

Several beneficial effects to soils would result from prescribed fires. These include increases in plant nutrient availability, and long-term enhancement of organic matter and microbial populations under desirable plant communities.

Sagebrush Treatments

Adverse Effects

Mechanical treatments would be limited to overseeding and planting with native sagebrush and perennial grass species within intact sagebrush communities, and to treating noxious weeds and other invasive non-native vegetation. In areas where mechanical treatments could occur, water and wind erosion is of concern at several treatment units. Overall, about 24 percent of sagebrush treatment acreage has moderate to high soil erosion potential, 75 percent has moderate to high wind erosion potential, and 39 percent is compaction prone. The BLM would overseed with native species within intact sagebrush communities, on the Alpha, Coils Creek, Kobeh East, Nichols, Roberts Mountain Pasture, and South Simpson units; approximately 60 percent of sagebrush treatment areas for this group have wind erosion hazards. Seeding and planting in these areas should result in little loss of soil due to wind erosion. The BLM would seed and plant and remove Phase I and II pinyon-juniper on the Table Mountain, Three Corners, and Whistler Sage units. Phase I pinyon-juniper would be removed using chainsaws, and chainsaws would also be the preferred method for removing pinyon-juniper in Phase II stands.

Most (84 percent) of the West Simpson Park Unit is susceptible to severe water erosion, and the Rocky Hills Unit has moderate risk of wind erosion (63 percent of potential treatment area). Use of equipment in these units could contribute to soil loss and reduced water infiltration, and some soils may not be well suited for use of shredding.

As noted above, mechanical treatments could disrupt biological soil crusts and result in conditions that favor the spread of cheatgrass. Deines et al. (2007) found that lichen-dominated soil crusts inhibited germination and root penetration by cheatgrass. However, invasions of noxious weeds and other invasive non-native vegetation into perennial plant communities can pose a long-term threat to biological soil crusts, as the crust-dominated interspace between the perennial plants is often heavily invaded (USDOI BLM and USDOI USGS 2001, Reisner et al. 2013).

Fire could be used on sagebrush treatment areas to remove cheatgrass and other non-native vegetation (crested wheatgrass and forage kochia) on the Rocky Hills and West Simpson Park units. About half of the acreage on the Rocky Hills and West Simpson Park units is moderately to highly susceptible to fire damage.

Discing would be used to control non-native vegetation, while drill and broadcast seeding would be used to revegetate treatment sites. These methods could improve soil porosity and aerate the root zone in clayey or compacted soils, but may degrade soil structure and reduce permeability to air and water on more fragile soil surfaces. This could promote soil erosion. Similar impacts could occur from harrowing and dragging, but generally would be less severe because of the shallower nature of these techniques. Treatments would likely destroy any existing biological soil crusts in the treatment area, which could reduce infiltration, accelerate erosion, and degrade soil microbiological properties (USDOI BLM 2007c:4-15).

The BLM could use livestock, in combination with mechanical treatments, to control cheatgrass on all units, and cheatgrass, forage kochia, and crested wheatgrass on the Rocky Hills and Table Mountain Units. The action of animal hooves could cause some disturbance, shearing, and compaction of soil, increasing its susceptibility to both water and wind erosion. Severe compaction often reduces the availability of water and air to plant roots, sometimes reducing plant vitality. Domestic animals could damage biological soil crusts at treatment sites through physical disruption, resulting in reduced species richness and lichen/moss cover (Belnap et al. 2001). Biological soil crusts, however, are not likely to be well developed in areas dominated by non-native vegetation.

Beneficial Effects

Treatments that thin the sagebrush canopy and promote the development of understory vegetation would help to stabilize soils and reduce the risk of wind and water erosion.

Sites with a large component of noxious weeds and other invasive non-native vegetation may be at a higher risk for erosion than sites that support native vegetation. Units with a large component of cheatgrass (fine fuels) may experience faster moving wildfires, which would adversely affect soils. Reestablishment of native vegetation on treatment sites would stabilize the fire cycle and lend to improved soil stability and productivity.

3.9.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Adverse effects to soil would generally be the same as described for Alternative A. Excluding prescribed fire and wildland fire for resource benefit would avoid the increases in runoff and erosion common to burned areas. Reduced soil infiltration, due to resinous sealing after intense burning, and loss of soil microorganisms would not occur as a result of prescribed burns.

The BLM would primarily be limited to mechanical methods (discing and seeding/planting) and using livestock to control cheatgrass over large areas. These methods could result in more soil disturbance and soil compaction than the use of fire. The West Simpson Park Unit is on rugged terrain, and use of mechanical equipment to control cheatgrass would be difficult and erosion potential from treatments would be great. The BLM would not be able to conduct prescribed burns to open up woodland stands to promote understory development and improve infiltration. The BLM also would not be able to use fire to remove hazardous fuels in Phase II and III pinyon-juniper stands. Thus, many of the beneficial, long-term effects of treatments on soils discussed under Alternative A would not be realized under Alternative B.

3.9.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

The BLM anticipates treating about one-fourth as many acres under Alternative C as under Alternative A. Because the BLM would be unable to use mechanical methods, and prescribed fire and wildland fire for resource benefit, adverse impacts and benefits to soil would be similar to those described under Effects Common to All Alternatives. The risk of localized compaction and short-term accelerated erosion would be less under Alternative C than the other alternatives, as there would be little ground disturbance under Alternative C. By not being able to use mechanical methods, there would be less risk of soil compaction and erosion from these treatments, and less risk for soil disturbance that could lead to noxious weeds and other invasive non-native vegetation infestations. However, the BLM would not be able to use mechanical equipment to thin and remove pinyon-juniper and create mulch to promote understory development, improve soil fertility, reduce soil erosion, and increase infiltration. The BLM also would also not be able to use equipment to reduce hazardous fuels, create fire and fuel breaks, and pile and slash burn to remove downed wood and slash, increasing the risk of wildfire and its impacts on soil. Thus, many of the beneficial, long-term effects of treatments on soils discussed under Alternatives A and B would not be realized under Alternative C.

3.9.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to soil resources from this alternative as no treatments would be authorized under this alternative. The BLM, however, would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Thus, long-term loss of soil and soil productivity due to erosion, stream channel instability, pinyon-juniper encroachment, and wildfire would be greatest under Alternative D.

3.9.3.4 Cumulative Effects

The CESA for soil resources is approximately 1,841,700 million acres and includes those watersheds at the Hydrologic Unit Code 10 level that are all or partially within the 3 Bars Project area (**Figure 3-1**). Approximately 92 percent of the area is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service. Past and present actions that have influenced soil resources in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.9.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Historic overgrazing, introduction of cheatgrass, large wildfires, and other natural and human-caused factors have contributed to the deviation of the plant communities from the Potential Natural Communities across the 3-Bars ecosystem. The Potential Natural Community is the plant community that would become established if all successional sequences were completed without interference by humans under current environmental conditions. Potential Natural Communities can include naturalized non-native species. This has led to a decrease in the functionality of ecological processes, thus reducing the resilience and resistance of these ecosystems to disturbance. The treatments proposed in the 3-Bars ecosystem are designed to help these ecosystems recover their functionality and return to their Potential Natural Community.

The BLM would continue wild horse management activities including AML reviews and adjustments, adjustments to HMA boundaries, wild horse gathers and fertility treatments to control wild horse populations, fence removal, enhancement of existing water sources and development of new water sources, and implementation of range improvement projects. These activities would better distribute wild horses across the range and reduce localized adverse effects to soils. The measures that the BLM would take to minimize livestock impacts to treatment areas are discussed in more detail in Section 3.18.4, and in **Appendix C**.

Land, utility, infrastructure, mineral, and other development, and oil, gas, and hydrothermal geothermal exploration and development, could affect about 10,000 acres in the reasonably foreseeable future, including about 8,335 acres of surface disturbance associated with the Mount Hope Project. Although disturbance areas would be reclaimed using soil removed from the site and stockpiled for later use, soil productivity may be less after reclamation. Land sales in Diamond Valley and Kobeh Valley associated with the Mount Hope Project, agriculture, ranching, and other land development interests, and for rights-of-ways for power and telephone lines, could lead to loss of soil if land sales lead to a use of that land, such as undeveloped land being converted to a housing development. Impacts to soil resources would be similar to those described under direct and indirect effects, and would include compaction, removal, stockpiling, denudation, and alteration of runoff. Although many past actions were not subject to reclamation, most current and reasonably foreseeable activities would be subject to reclamation, especially those regulated by federal, state, or local agencies.

The BLM would continue to conduct ground- and aerial-based herbicide application treatments to control noxious weeds and other invasive non-native vegetation. Although initial vegetation treatments using herbicides could indirectly lead to minor short-term soil erosion from the lack of rooting weedy plants, in the long-term those treatments would allow for deeper-rooting native plants to stabilize soils, enhance soil fertility, and reduce the risk of wildfire. Five herbicides are typically used on the 3 Bars Project area—2,4-D, glyphosate, imazapyr, metsulfuron methyl, and picloram. For the 3 Bars Project, it is likely that the BLM would also use imazapic to treat cheatgrass. Based on an assessment of risks to soil from the use of herbicides, there is potential for glyphosate and metsulfuron methyl to be transported by wind and water in areas with moderate to high risk of wind or water erosion. There should be few risks to soil organisms and soil productivity from use of these herbicides, however, as most of these herbicides degrade quickly (USDOI BLM 2007c:4-18).

Hazardous fuels reduction, habitat improvement, and invasive species control projects would occur on approximately 142,000 acres (127,000 acres for the 3 Bars Project and 15,000 acres for other hazardous fuels projects in the CESA), or about 8 percent of the CESA during the life of the project. Loss of vegetation and soil disturbance associated with the use of treatment equipment could cause some short-term loss of soil functions, processes, and productivity on nearly all treated land. However, these treatments would help to reduce the risk of wildfire within the CESA, a major contributor to loss of soil functions and processes. In addition, the BLM would conduct stream bioengineering and plantings along about 31 miles of stream to restore surface water systems to Proper Functioning Condition to improve riparian habitat and reduce soil erosion.

Although 3 Bars Project treatments would have short-term adverse effects on soil resources, soil functions and processes on about 127,000 acres should improve long-term as discussed under the direct and indirect effects of the alternatives. These benefits, along with those associated with hazardous fuels and habitat improvement projects elsewhere in the CESA (about 15,000 acres), would be greater under Alternative A than the other alternatives and would help to offset adverse effects to soils occurring elsewhere in the CESA from reasonably foreseeable future actions.

3.9.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on soil would be similar to those described under Alternative A. The BLM anticipates treating about half as many acres under Alternative B as under Alternative A, and less effort would be spent by the BLM on treatments to reduce wildfire risk and loss of soil from erosion, including use of fire to restore natural fire regimes.

Adverse effects to soil would generally be the same as described for Alternative A. However, by not using prescribed fire and wildland fire for resource benefit, there would be no risk to soil from fire treatments, including soil erosion, hydrophobicity, and loss of soil productivity, or increase in spread of noxious weeds and other invasive non-native vegetation.

The BLM would be limited to manual and mechanical methods and use of livestock to control noxious weeds and other invasive non-native vegetation on several thousand acres annually. These methods could result in more soil disturbance than the use of fire. By relying on manual, mechanical, and biological control methods, the BLM would be unable to use reduce hazardous fuels over large acreages, including dense stands of Phase II and III pinyon-juniper, and remove large amounts of downed woody material from treatment areas. Thus, the risk of wildfire and its effects on soil would be greater under this alternative than under Alternative A.

Although 3 Bars Project treatments would have short-term adverse effects on soil resources, soil productivity on about 63,500 acres should improve long-term, as discussed under the direct and indirect effects of the alternatives. Although these actions would benefit soils on the project area, and would help to offset adverse effects to soils occurring elsewhere in the CESA from reasonably foreseeable future actions, benefits to soils would not be as great as those that would occur under Alternative A.

3.9.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on soil would be similar to those described under Alternative A. Under Alternative C, the BLM would treat about 3,200 acres annually within the 3 Bars Project area, and about another 1,500 acres annually in the remainder of the CESA. Because of the limited number of acres treated, and lack of use of mechanical equipment and fire for 3 Bars Project treatments, short-term effects associated with the use of mechanical equipment and fire, including soil compaction, erosion, and disturbance, would not occur within the project area.

By not being able to use mechanical methods and fire, however, the BLM would have limited ability to reduce hazardous fuels, create fire and fuel breaks, thin and remove pinyon-juniper and sagebrush to promote understory development, enhance stream habitat and channel stability and functions in the riparian zone, shred vegetation to create mulch to help reduce soil water erosion and improve water infiltration, and remove downed wood in the 3 Bars Project area. Thus, there would be more soil erosion, less improvement in soil productivity, less water infiltration, and greater risk of wildfire and its impacts on soil within the CESA than would occur under the other action alternatives. Actions taken under this alternative would help to offset adverse effects to soils occurring elsewhere in the CESA from reasonably foreseeable future actions, but not to the extent that would occur under the other action alternatives.

3.9.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on soil would be similar to those described under Alternative A. There would be no cumulative impacts to soil resources from this alternative as no treatments would be authorized under this alternative. The BLM could conduct stream bioengineering treatments; create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire, but on a very limited acreage. Thus, loss of soil and soil productivity due to erosion, stream channel instability, spread of noxious weeds and other invasive and non-native vegetation, pinyon-juniper encroachment, and wildfire would continue on the 3 Bars Project area and would likely be greatest under this alternative. Treatments under Alternative D would do little to offset adverse effects to soils occurring from other reasonably foreseeable future actions within the CESA.

3.9.3.5 Unavoidable Adverse Effects

Regardless of the method used to remove vegetation, restoration treatments could potentially result in adverse short-term impacts to soil through increased erosion and reduced water infiltration, leading to loss of soil and reduced soil productivity. The degree of these effects would vary by treatment method (greater risk with mechanical and fire treatments), treatment type (greater risk with stream restoration in riparian zones), and soil risk category (greater risk in areas prone to water or wind erosion, or soil compaction), and if downed vegetation was left on the ground as mulch. To reduce this level of variability as much as possible, past treatment successes and failures would be evaluated and used to guide future treatment actions to ensure treatment success.

Vegetation treatments could disturb biological soil crusts, potentially reducing soil quality and ecosystem productivity. The extent of impacts to biological soil crusts would be dependent on the intensity and kind of disturbance and the amount of area covered. The duration of the effects would vary, but recovery of biological soil crusts typically takes much longer than the recovery of vascular vegetation (USDOI BLM 2007b:4-243).

3.9.3.6 Relationship between Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Although treatments would have short-term effects on soil condition and productivity, it is predicted that the soil disturbance associated with restoration activities would have less impact and be less severe than soil erosion caused by wildfire and encroachment by noxious weeds and other invasive non-native vegetation. Furthermore, monitoring and evaluation, integrated with an adaptive management approach, would allow the BLM to adjust treatments to reduce soil disturbance to levels that meet management objectives.

Studies in woodland and rangeland environments indicate that landscapes that resemble conditions within historical ranges of variability provide favorable conditions for soil functions and processes that contribute to long-term sustainability of soil productivity. Restoration activities that move landscapes toward historical ranges of variability would provide favorable conditions for soil functions and processes, and contribute to long-term soil productivity levels at a broad scale (USDOI BLM 2007b:4-247).

3.9.3.7 Irreversible and Irretrievable Commitment of Resources

Disturbance activities associated with proposed treatments could result in soil erosion and loss of soil and soil productivity. This loss of soil and soil productivity would be irretrievable in the disturbance area, although the soil could be available for use at some other location. This commitment of resources could extend over many years, depending on treatment methods and site-specific conditions, until soil quality attributes improved either through amendments or natural processes. However, a benefit of increasing the amount of acres treated would be to slow the loss of soil and soil productivity due to noxious weeds and other invasive non-native vegetation and wildfire, and to restore soil structure and function on degraded sites as part of a larger goal to restore native ecosystem processes. As a result of these actions, soil productivity in disturbed areas should reestablish over time (USDOI BLM 2007b:4-251).

3.9.3.8 Significance of the Effects under the Alternatives

Under all alternatives, there would be a short-term (less than 5 years) increase in soil erosion from 3 Bars Project and other CESA habitat improvement and hazardous fuels reduction treatments, primarily those where the soil is disturbed by mechanical or fire treatments, or by large-scale removal of non-native vegetation using herbicides. This increase in erosion could lead to increased sedimentation or turbidity in streams or ponds. These impacts from soil erosion would accrue with soil erosion and loss of soil associated with other land disturbance activities in the CESA. These losses of soil due to erosion and its impacts to water quality in streams and ponds in the CESA would be offset by long-term benefits from: 1) stream restoration projects that promote stream stability and riparian vegetation development; 2) improvements in vegetation in areas where thinning pinyon-juniper and sagebrush promotes understory development; 3) removal and control on noxious weeds and other invasive non-native vegetation; 4) revegetation of treatment sites with native vegetation; and 5) hazardous fuels treatments that reduce the risk of a catastrophic wildfire, including prescribed burning and use of wildland fire for resource benefit, and the creation of fire and fuel breaks.

It is possible that prescribed fire and wildland fire for resource benefit treatments could result in erosion that could exceed annual soil loss tolerances, and in the loss of topsoil, soil quality, or productivity that could limit revegetation success. Based on monitoring done by the BLM at fire treatment sites, loss of soil is low when sites are revegetated and noxious weeds and other invasive non-native vegetation is removed from treatment sites (USDOI BLM 2007c:4-18). There is also the potential that large-scale non-native control treatments using mechanical equipment could result in loss of vegetation and soil over large areas. However, the BLM would use SOPs to minimize this risk, including discing on contour, avoiding treatments on steep slopes, and restricting livestock access to treatment sites. Based on monitoring, loss of soil would be greater in areas burned by wildfire, as these areas can be large, are often in remote areas, and can be difficult to revegetate (Erickson and White 2008). Thus, BLM treatments that reduce the risk of wildfire should help to slow soil loss and loss of soil quality and productivity in the project area.

There should be an overall improvement in soil quality and productivity from treatments under all alternatives. Although the risks and benefits to soil from 3 Bars Project treatments would be greatest under Alternative A, proper adaptive management should greatly reduce risks by identifying and addressing treatment issues as they arise. 3 Bars Project treatments would not result in a long-term (greater than 5 years) significant increase in soil erosion, water quality degradation from soil erosion, loss of topsoil, or loss of soil quality or productivity in the 3 Bars Project area or CESA.

3.9.4 Mitigation

Soil resources would benefit from mitigation and monitoring measures identified in Section 3.18.4 (Livestock Grazing Mitigation). No mitigation or monitoring measures are recommended specifically for soil resources.

3.10 Water Resources

3.10.1 Regulatory Framework

Major regulations and agency policies guiding water resources management include:

- Clean Water Act Section 303 – Water Quality Standards and Implementation Plans. This requires each state to review, establish, and revise water quality standards for all surface waters within the state. Designated beneficial uses are assigned to surface waters.
- Clean Water Act Section 404 – Permits for Dredged or Fill Material. This regulates activities in wetlands and waters of the U.S. Subsequent court decisions and regional guidelines apply.

- Safe Drinking Water Act – 40 CFR Chapter 1, Subchapter D, Part 142 (National Primary Drinking Water Regulations) and Part 143 (National Secondary Drinking Water Standards).
- Title 40 Nevada Revised Statutes, Chapter 445A – State of Nevada water controls (authority for waterbody designated uses and water quality criteria).
- Title 48, Nevada Revised Statutes – State of Nevada water use administration.
- Nevada Administrative Code Chapter 445A.070 through 445A.2234, "Water Pollution Control" including beneficial use categories, water quality classes, and associated water quality criteria and standards promulgated from the Clean Water Act and Nevada Revised Statutes listed above.

Additional important policies and procedures involving water resources for the project area include water rights and water quality programs administered in the Nevada Division of Water Resources and Nevada Division of Environmental Protection; Memoranda of Understanding between the BLM and other state or federal agencies; and BLM policies developed under the Rangeland Health Standards promulgated under 43 CFR § 4180.2. The Federal Land Policy and Management Act, BLM Handbook H-4180-1 (*Rangeland Health Standards*; USDOI BLM 2001), and BLM Manual H-1601-1 (*Land Use Planning Handbook*; USDOI BLM 2005c), describe the agency goals and management approaches for water resources and riparian zones.

3.10.2 Affected Environment

3.10.2.1 Study Methods and Study Area

Information sources consulted for water resources include data, maps, and publications from the Nevada Division of Water Resources, USGS, a Montgomery and Associates (2010) report entitled *Hydrogeology and Numerical Flow Modeling*, and the Mount Hope Project EIS and references cited therein (USDOI BLM 2012b).

The study area for direct and indirect effects to water resources lies within the 3 Bars Project area. The study area for cumulative effects to water resources is the Hydrologic Unit Code 10 watersheds wholly or partially within the project area (**Figure 3-1**). This area includes parts of the drainages and groundwater basins as defined by the Nevada Division of Water Resources and identified in **Table 3-14**.

3.10.2.2 Hydrologic Setting

3.10.2.2.1 Overview

Most precipitation accumulates as snow on the mountain ranges. The highest elevations consist of moderately to steeply sloping mountains and ridges such as the Roberts Mountains. Rock outcrops are common at elevations above about 8,000 feet amsl and contribute to the increased extent of impervious areas there. Moderate to high gradient headwater streams occur at these elevations, mainly supplied by cold springs and snowmelt. In this zone, riffle sections in the streams generally have cobbly substrates (Bryce et al. 2003).

TABLE 3-14

Nevada Hydrographic Areas Included in the Water Resources Assessment

Hydrographic Area	Basin Number	Basin Area (acres)	Area within Project Boundary (acres)	Approximate Percentage of Basin Area within 3 Bars Project Area
Pine Valley	053	640,588	269,482	42
Grass Valley	138	379,846	59,174	16
Kobeh Valley	139	551,961	341,495	61
Diamond Valley	153	477,506	79,659	17
Total		**2,049,901**	**749,810**	**36**

Source: Nevada Division of Water Resources (2012).

Most of the annual runoff within the project area is derived from snowmelt. In the spring months, typically April through June, snowmelt produces runoff, which often results in the highest seasonal flows in the high mountain drainages. Occasionally, spring season rainfall coincides with the snowmelt, resulting in extremely high runoff. While there is potential for heavy thunderstorm events in mid- to late summer, spawned by moisture from the desert southwest, the hot, dry weather at this time of year, typically combined with little or no rain and high evaporation rates, generally produces the lowest flows of the year (USDOI BLM 2012b).

During the spring snowmelt period, water flows from the mountain ranges into nearby basins. As water flows from the mountains towards the valleys, it infiltrates into basin fill deposits along the range fronts. Thus, recharge into the basin fill deposits occurs along the margins of the valleys (or at higher elevations), and, except during times of high runoff, not in the central portion of the valleys.

Soils at mid-elevations are commonly rocky and shallow, promoting runoff. Perennial or intermittent moderate-gradient streams occur at middle elevations, and are supplied by snowmelt and springs. Broad alluvial fans and flatter saline playa deposits commonly accumulate in the extensive lower-elevation terrain. Eroded gullies are generally more common at lower elevations, and permanent lakes are uncommon to absent. In general, the lower elevation streams are relatively low-gradient, with substrates consisting of finer sediments (Bryce et al. 2003).

3.10.2.2.2 Basin Hydrology

Of the major basins in the study area, only Pine Valley drains outward to a larger surface water system (the Humboldt River). Kobeh Valley drains to Diamond Valley. The remaining three basins (Diamond, Grass, and Antelope basins) are closed, with no external surface drainage.

Kobeh Valley is a large basin with a drainage area of approximately 870 square miles. This basin is bounded on the north by the Roberts Mountains, on the west by the Simpson Park Mountains, on the east by Whistler Mountain, and on the south by the Monitor Range and Monitor and Antelope Valleys. Elevations on the basin floor range from 6,400 feet amsl on the west side of the basin to around 6,000 feet amsl on the east side at Devils Gate, an erosional gap that allows surface water from Kobeh Valley to enter Diamond Valley. Surface water also occasionally flows into the southern part of Kobeh Valley via the main ephemeral drainages in Antelope Valley (Antelope Wash) and the northern part of Monitor Valley (Stoneberger Creek). Ephemeral streams bring mountain-front runoff from the north, east, and south, and converge in the vicinity of U.S. Highway 50. This water is sufficiently close to the surface to allow for the development of an extensive area of phreatophytes, which are deep-rooted plants that obtain water from a permanent ground supply or from the water table. Springs in Kobeh Valley are found mainly within the mountains that border the valley, while wells are found throughout the basin (USDOI BLM 2012b).

Diamond Valley has a drainage area of approximately 750 square miles and is bounded on the west by the Sulphur Spring Range and Whistler Mountain, on the north by Diamond Hills, on the east by the Diamond Mountains, and on the south by the Fish Creek Range. The valley floor of Diamond Valley ranges in elevation from 6,200 feet amsl to 5,770 feet amsl at the playa found in the north end of the valley. Surficial drainage is from the bounding mountain ranges to the central axis of the valley and then northward to the playa. Diamond Valley is a closed basin and an extensive playa occupies the northern end of the valley, where all shallow groundwater flow converges. Agricultural irrigation and withdrawals of groundwater for municipal water supply occur in the southern part of the valley, north of Eureka, Nevada. Shallow alluvial groundwater in this area is recharged by mountain-front runoff from the major drainages near Eureka. Many springs are found within Diamond Valley at the north end, where groundwater flow converges and the water table in the shallow alluvial aquifer approaches the surface (USDOI BLM 2012b).

Pine Valley is north of Kobeh Valley and west of Diamond Valley. This basin is bounded on the south by Roberts Mountains, on the west by the Sulphur Spring Range, and on the north and west by the Cortez Mountains. The basin occupies approximately 1,000 square miles and drains northward to the Humboldt River. Basin floor elevations range from 5,800 feet amsl at the south end near Henderson Creek to 4,840 feet amsl at the north end. The Garden Valley sub-basin occupies the southeastern part of Pine Valley and is a separate basin between the Roberts Mountains and the Sulphur Spring Range. Drainage in this sub-basin converges on Henderson Creek and flows into Pine Valley. Springs in Pine Valley are mostly in the bounding mountain ranges, with local areas of springs in the basin along major drainages. Wells are found at the north end of Pine Valley in the area where ephemeral drainages from the mountains converge. There are a few wells in the Garden Valley sub-basin near Henderson Creek (USDOI BLM 2012b).

Grass Valley is west of Kobeh Valley and is a closed hydrographic basin bounded on the east by the Simpson Park Mountains and on the west by the Toiyabe Range. The Cortez Mountains bound the valley to the north (Everett and Rush 1966). The valley consists of two sub-basins that are interconnected, a smaller basin at the southwest end of the valley that is east of Mount Callaghan and the main part of Grass Valley. The lowest elevation in the valley is 5,611 feet amsl in the playa that occupies the northern part of the basin. The highest point is Mount Callaghan in the Toiyabe Range at 10,187 feet amsl. The basin has internal drainage only and groundwater is recharged by mountain-front runoff. Springs are found mainly in the smaller sub-basin at the southwest end of Grass Valley and along the mountain fronts where the basin alluvium contacts the bedrock of the bounding mountain ranges. All water in the basin flows toward the playa in the northern part of the basin and groundwater comes sufficiently close to the surface in the vicinity of the playa to allow for the development of an extensive area of phreatophytes. Limited irrigation and farming of alfalfa are found south of the playa (USDOI BLM 2012b).

Antelope Valley, although not a part of the hydrologic study area, is located south of Kobeh Valley and south of Diamond Valley. It is part of the regional groundwater flow system. This basin occupies 450 square miles and drains into Kobeh Valley. Groundwater in Antelope Valley also flows north into Kobeh Valley through the same gap as the surface water drainages. Elevations in Antelope Valley range from 6,800 feet amsl on the south end to around 6,075 feet amsl at the gap between Antelope Valley and Kobeh Valley (USDOI BLM 2012b).

Kobeh Valley, Diamond Valley, and Antelope Valley are part of the Diamond Valley Regional Flow System as described by Harrill et al. (1988 *cited in* USDOI BLM 2012b). Basins that are part of this flow system are internally connected by ephemeral streams and subsurface groundwater flow through the alluvial basin aquifers and the bedrock carbonate aquifers (Tumbusch and Plume 2006). Diamond Valley is the terminus of this flow system and the water resources at the south end of Diamond Valley have been developed for use in agricultural irrigation, mining in the Eureka area, and for municipal water supply for Eureka. Pine Valley, the Garden Valley sub-basin connected to Pine Valley, and Grass Valley are part of the Humboldt Regional Flow System (Harrill et al. 1988 *cited in* USDOI BLM 2012b), where surface and groundwater flows northward to the Humboldt River system.

3.10.2.3 Surface Water Resources

3.10.2.3.1 Streams and Creeks - Overview

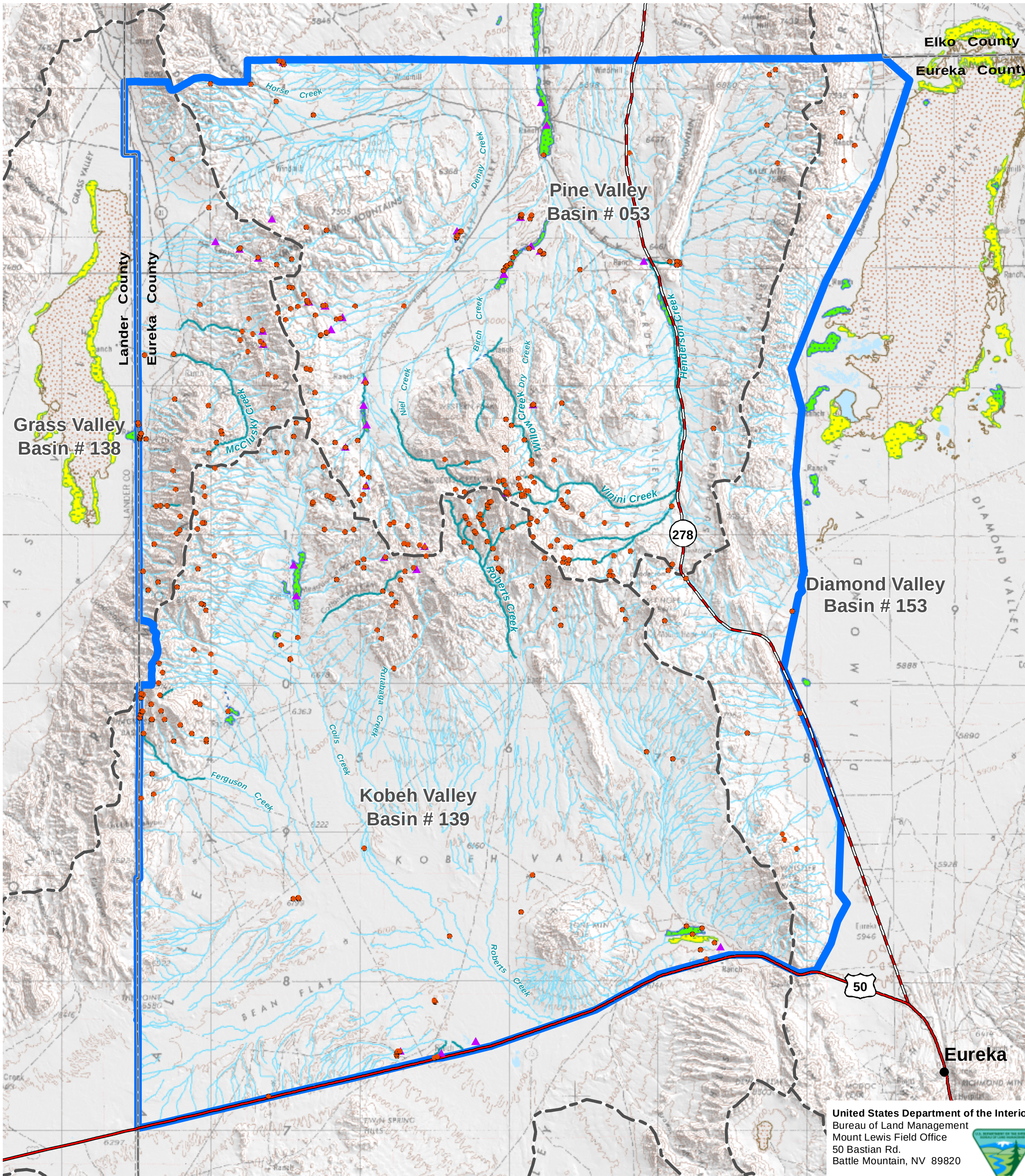
Numerous perennial, intermittent, and ephemeral streams occur within the project area (**Table 3-15)**. In general, perennial segments have their source in the mountains and, although they do respond to snowmelt and rainfall events, much of their flow is provided by groundwater discharge that occurs as spring flow. Perennial flow only occurs in a relatively few isolated stream reaches (**Figure 3-22**). Stream flows in the 3 Bars Project area primarily occur as intermittent flows from isolated springs, as short-term seasonal runoff from snowmelt or winter storms, or as ephemeral flow from intense but infrequent thunderstorms.[1] Numerous drainages leave the mountain fronts and cross over alluvial fans, where flows typically dissipate. When water does reach the valley floor during larger runoff events, the water is soon taken up by evapotranspiration and seepage into valley-floor sediments. Channels become poorly defined as they near the flatter portion of the basins and runoff infiltrates into permeable alluvial fan material (USDOI BLM 2012b).

Major perennial stream reaches include parts of Henderson Creek, McClusky Creek, Pete Hanson Creek, Roberts Creek, Vinini Creek, and Willow Creek. Additional, shorter perennial reaches occur on Birch Creek, Kelley Creek, Ferguson Creek, and in scattered locations on other streams throughout the project area.

The USDOI USGS (2012c) is monitoring streamflow at several locations within the project area (**Table 3-16**). Although monitoring only began in 2011, it is apparent that daily surface flows vary widely. The maximum flow months generally occur in spring, and the smallest flows are usually in late summer. Tonkin Spring has the steadiest flow of the stations in the USGS monitoring program.

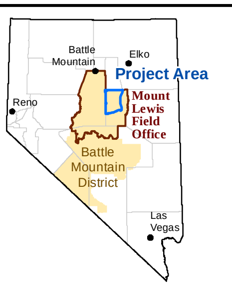
In addition to USGS monitoring, stream studies were carried out for the Mount Hope Project EIS (JBR 2009, USDOI BLM 2012b). The results of these investigations, which were conducted in the Pine Valley basin draining the northern and eastern Roberts Mountains, are summarized in **Table 3-17**. These investigations included the upper portions of Birch Creek, Henderson Creek, Pete Hanson Creek, and Vinini Creek. All measurements and samples were collected within the mountainous portions of the streams. They were conducted in a short time frame in late March and early April, 2009. Based on the amount of snowpack and occurrence of bare ground during the investigation, it was evident that some snowmelt and spring run-off had occurred prior to the initial sampling period. The air temperature was typically above freezing during the days, and snowmelt and runoff were observed (JBR 2009).

[1] The USGS does not distinguish between intermittent and ephemeral streams. The majority of streams classified as intermittent on the 3 Bars Project area do not have seasonal water, but only have water occasionally and would be classified as ephemeral.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)



Legend

- Spring
- Moist Site
- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Lake or Pond
- Playa
- Freshwater Emergent Wetland
- Freshwater Forested/ Shrub Wetland
- Hydrographic Basin
- 3 Bars Project Area

Source: BLM 2012g, USFWS 2012, NDOW 2012a, NDWR 2012, USGS 2012b.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-22

Streams, Lakes, Ponds, and Wetlands

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

TABLE 3-15

Perennial and Intermittent/Ephemeral Streams in the Project Area

Basin Number	Basin Name	Stream Name	Perennial Stream Miles	Intermittent/ Ephemeral Stream Miles[1]	Canal/ Ditch	Total Miles
053	Pine Valley	Birch Creek	1.50	5.07		6.57
		Denay Creek	2.22	22.61		24.83
		Dry Creek		8.38		8.38
		Frazier Creek		5.86		5.86
		Garden Pass Creek		0.98		0.98
		Geyser Creek		7.33		7.33
		Grouse Creek		2.30		2.30
		Henderson Creek	18.34	11.28		29.62
		Horse Creek		9.08		9.08
		Indian Creek		8.68		8.68
		Kelley Creek	2.20	0.68		2.88
		Niel Creek		5.21		5.21
		North Fork Pete Hanson Creek	1.71	0.69		2.40
		Pete Hanson Creek	6.07	12.84		18.91
		Pine Creek		12.84		12.84
		Vinini Creek	9.51			9.51
		Willow Creek	6.74	6.31		13.05
		Unnamed Creeks	7.85	728.76	1.87	738.48
138	Grass Valley	Coils Creek		0.94		0.94
		Indian Creek		0.01		0.01
		McClusky Creek	7.12	3.26		10.38
		Pine Creek		0.04		0.04
		Unnamed Creeks	5.09	138.46		143.55
139	Kobeh Valley	Coils Creek		35.62		35.62
		Cottonwood Creek	4.42	2.45		6.87
		Ferguson Creek	5.09	4.53		9.62
		Horse Creek		4.56		4.56
		Jackass Creek		2.96		2.96
		North Branch Horse Creek		0.89		0.89
		North Fork Horse Creek		2.42		2.42
		Roberts Creek	8.38	15.31		23.69
		Rutabaga Creek		12.79		12.79
		Slough Creek		7.78		7.78
		South Fork Horse Creek		1.64		1.64
		Stoneberger Creek		5.67		5.67
		U'ans-in-dame Creek		15.14		15.14
		Underwood Creek		11.06		11.06
		Willow Creek		0.27		0.27
		Unnamed Creeks	9.22	1,015.89	1.33	1,026.44

TABLE 3-15 (Cont.)

Perennial and Intermittent/Ephemeral Streams in the Project Area

Basin Number	Basin Name	Stream Name	Perennial Stream Miles	Intermittent/ Ephemeral Stream Miles[1]		Total Miles
153	Diamond Valley	Garden Pass Creek		6.01		6.01
		Slough Creek		0.57		0.57
		Tyrone Creek		4.57		4.57
		Unnamed Creeks	0.11	192.53		192.64
Totals			**95.57**	**2,334.27**	**3.20**	**2,433.14**

[1] The USGS does not distinguish between intermittent and ephemeral streams. The majority of streams classified as intermittent on the 3 Bars Project area do not have seasonal water, but only have water occasionally and would be classified as ephemeral.

Sources: JBR (2009), Montgomery and Associates (2010 *cited in* USDOI BLM 2012b), and USDOI USGS (2012b).

An important result of these flow investigations is that flow-gaining and flow-losing reaches occurred within short distances on upper Birch Creek and Pete Hanson Creek. These flow increases and decreases often occurred within several hundred feet (or less) of each other, and are likely to result mainly from groundwater and geologic factors along these headwater channel lengths. On Vinini and Henderson Creeks, snowmelt conditions and other complicating factors prevented conclusions about gaining and losing stream sections (JBR 2009).

3.10.2.3.2 Streams and Creek Flows by Basin

The following describes stream and creek flows by basins within the 3 Bars Project area. This information is based on studies for the Mount Hope Project EIS, and references cited therein (USDOI BLM 2012b). Major perennial stream reaches occur within the Pine Valley (56.1 miles), Grass Valley (12.2 miles), Kobeh Valley (27.1 miles), and Diamond Valley (0.11 mile) watersheds. In addition, approximately 2,334 miles of intermittent/ephemeral stream reaches have been identified in the project area.

Kobeh Valley

In Kobeh Valley, surface drainage is directed generally from the mountains to the central valley floor and then eastward toward Devils Gate, where flow occasionally passes into Diamond Valley via Slough Creek (**Figure 3-22**, **Table 3-15**). Surface water occasionally flows into the southern part of Kobeh Valley via the main ephemeral drainages in Antelope Valley (Antelope Wash) and the northern part of Monitor Valley (Stoneberger Creek). The Stoneberger Creek drainage enters the southwestern side of Kobeh Valley from Monitor Valley and crosses southern Kobeh Valley in a west to east direction through Bean Flat. Antelope Wash enters Kobeh Valley from the south at a point where several ephemeral drainages join on the southeastern side of Kobeh Valley to form Slough Creek. Slough Creek, also ephemeral, drains east through Devils Gate into southern Diamond Valley. Channel geomorphology and a lack of vegetation scour indicate that outflow through Devils Gate is a rare occurrence related to low frequency, high runoff events.

The two main internal drainages within Kobeh Valley are Coils Creek in the western part of the valley, which drains the east side of the Simpson Park Mountains and the western side of the Roberts Mountains, and Roberts Creek, which drains the central and southeastern part of the Roberts Mountains. Rutabaga Creek lies between these two drainages and drains the southern part of the Roberts Mountains.

Roberts Creek is perennial from the headwaters of its middle and east fork tributaries to near the base of the mountain. A segment of the Cottonwood Canyon drainage, on the southwest side of the Roberts Mountains, is also identified as containing perennial flow upstream of its confluence with the Coils Creek drainage. The only other identified perennial stream reaches in Kobeh Valley are Snow Water Canyon and Ferguson Creek on the east side of the Simpson Park Mountains, as well as Ackerman Creek, Basin Creek, Coils Creek, Dry Canyon, Dry Creek, Kelly Creek, Jackass Creek, and Meadow Canyon. A small segment of U'ans-in-dame Creek to the east-northeast of Lone Mountain has also been classified by the USGS as perennial. However, other investigations indicate that based on 2010 field observations, a review of Landsat images, and the USDA's National Agricultural Imaging Program aerial photography, it is now believed that this stream segment is not perennial (Montgomery and Associates 2010, USDOI USGS 2012c).

TABLE 3-16

Flow Summary from U.S. Geological Survey Monitoring Stations

Waterbody	USGS Station Number	Monitored Location (Latitude / Longitude)	Monitoring Period	Average Recorded Flow (cfs)	Maximum Recorded Flow (cfs)	Minimum Recorded Flow (cfs)	Maximum Monthly Average Flow (cfs)	Minimum Monthly Average Flow (cfs)
Coils Creek above Horse Creek	10245960	39° 46' 11" 116° 27' 52"	1/12/2011 to 9/30/2011	11.0	64 (1/17/2011)	0 (many)	24 (Apr)	0.01 (Aug)
Henderson Creek below Vinini Creek	10322535	39° 52' 08" 116° 10' 01"	1/11/2011 to 6/2/2012	8.1	19 (5/23/2011)	0 (many)	14 (May)	0.02 (Sep)
Pete Hanson Creek above Henderson Creek	10322555	39° 53' 25" 116° 22' 42"	5/5/2011 to 6/2/2012	9.7	17 (6/15/2011)	0 (4/2012)	12 (Jun)	0.84 (Sep)
Roberts Creek	10245970	39° 47' 23" 116° 18' 03"	6/4/2011 to 6/2/2012	2.8	11 (6/2012)	0.18 (1/2012)	8.9 (Jun)	0.68 (Aug)
Tonkin Spring above Denay Creek	10322510	39° 54' 17" 116° 24' 45"	8/26/2010 to 6/2/2012	1.7	2.4 (9/2011)	1.0 (1/2011)	2.0 (May, Aug)	1.2 (Jan)

cfs = cubic feet per second.
Source: USDOI USGS (2012c).

TABLE 3-17

Site-specific Stream Investigations

Stream	Measurement Date	Range in Channel Widths (feet)	Flow Range (gpm)	Flow Range (cfs)
Birch Creek	March 22-26, 2009	2.7 to 3.9	64 to 274	0.14 to 0.61
Pete Hanson Creek	March 3-27, 2009	0.9 to 5.7	269 to 614	0.60 to 1.37
Vinini Creek	March 25, 2009	1.3 to 3.8	15 to 269	0.03 to 0.60
Henderson Creek	April 7, 2009	2.2 to 2.5	269 to 359	0.60 to 0.80

gpm = gallons per minute.
cfs = cubic feet per second.
Source: JBR (2009).

Stream discharge measurements were taken along the course of Roberts Creek in 2007 (Montgomery and Associates 2010). Measurements made during August 2007 on the tributaries of Roberts Creek indicated that most of the flow originated from the east fork, at 108 gallons per minute (gpm; 0.24 cubic feet per second [cfs]), which received its flow from springs along the west and south to southeast flanks of the Roberts Mountains. The west and middle forks of Roberts Creek contributed little flow at that time, with the west fork being dry, and the middle fork discharge estimated at 4.5 gpm (0.01 cfs; Montgomery and Associates 2010). Measured discharge below the confluence of the three forks of Roberts Creek consistently decreased with distance downstream, indicating that Roberts Creek loses water over most of its length. These stream losses are assumed to result in recharge to the local alluvial and carbonate aquifer systems. Flow loss due to evaporation and transpiration from riparian vegetation adjacent to the stream bed may also be a contributing factor to the consistent downstream decrease in flow.

Coils Creek is interpreted by Rush and Everett (1964) to be the principal tributary to Slough Creek. They reported a flow of approximately 3,600 gpm (8 cfs) in May 1964 at a location in Section 27, Township 22 North, Range 49 East, in the west-central portion of the project area. Intermittent reaches of upper Coils Creek are mainly fed by spring flow and are used for irrigation purposes. More recent estimates of flows in Coils Creek are presented in **Table 3-16**.

In August 2007, Montgomery and Associates (2010) measured a flow of 9 gpm (0.02 cfs) in Rutabaga Creek on the southern flanks of the Roberts Mountains. Along the east slope of the Simpson Park Mountains, on the west side of Kobeh Valley, no surface flow was observed by Montgomery and Associates (2010) in Snow Water Canyon during June and December 2007, and April 2008. No surface flow was observed in Ackerman Canyon in April 2008, but a flow of 27 gpm (0.06 cfs) was observed in May 2008. An estimated surface flow of less than 112 gpm (0.25 cfs) was observed in Ferguson Creek in May, but not in August 2007. No surface flow was observed in Dry Canyon in June 2007. At the stream gauge on Roberts Creek, flows were 561 and 1,872 gpm (1.25 and 4.17 cfs) during April and May 2008, respectively.

Reported flows in Willow Creek and Dagget Creek, which drain the north end of the Monitor Range in southern Kobeh Valley, were approximately 450 and 670 gpm (1 and 1.5 cfs), respectively, in May 1964 (Robinson et al. 1967). No other drainages within the Kobeh Valley basin have recorded stream flows.

Pine Valley

The main streams in Pine Valley are in the Horse Creek, Denay Creek, Henderson Creek, and Pine Creek drainages (**Figure 3-22**, **Table 3-15**). Pine Creek is the principal stream in the valley and is a tributary to the Humboldt River. Eakin (1961 *cited in* USDOI BLM 2012b) reported that the flow in Pine Creek is maintained primarily by the discharge from hot springs.

Numerous headwater tributaries to Pine Creek form on the east- and southeast-facing slopes of the Cortez Mountains (Horse Creek drainage) and the northern part of the Simpson Park Mountains (Denay Creek drainage); on the north to northwest flanks of the Roberts Mountains (Pete Hanson Creek, Neil Creek, Kelly Creek, Birch Creek, Willow Creek, and Dry Creek); and on the northeast side of the Roberts Mountains in the Garden Valley subbasin (Henderson Creek, Vinini Creek, and Frazier Creek). Perennial streamflow segments have only been identified on portions of Denay Creek, Pete Hanson Creek, Willow Creek, Vinini Creek, and Henderson Creek (USDOI BLM 1997 *cited in* USDOI BLM 2012b).

Isolated reaches in the Horse Creek drainage of Pine Valley were reported to have flows ranging from 9 to 58 gpm (0.02 to 0.13 cfs) during August 2005 before surface flows were lost to infiltration or evapotranspiration (USDOI

BLM 2008g). The Denay Creek drainage arises from headwater springs in Red Canyon on the north slope of the Roberts Mountains, and is fed lower down in the drainage by perennial discharge from Tonkin Spring (**Table 3-16**). Denay Creek discharges into Tonkin Springs Reservoir, a small surface-water impoundment, approximately 1 mile downstream of Tonkin Spring. Between August 2007 and September 2009, Montgomery and Associates (2010) measured the discharge from Tonkin Spring during all months of the year, and the range of observed flows was from 525 to 1,086 gpm (1.17 to 2.42 cfs). This is generally within the range reported by the USDOI USGS (2012c; **Table 3-16**). This provides an estimate of the flows in Denay Creek just downstream of Tonkin Spring. Further east, along the north side of the Roberts Mountains, no flow was reported in Pete Hanson Creek during August 2007, but a flow of 1,023 gpm (2.28 cfs) was reported in June 2009. Also, Willow Creek was observed to have flows of 31 and 9 gpm (0.07 and 0.02 cfs) in August and October 2007, respectively (Montgomery and Associates 2010).

As part of the baseline characterization investigations for the proposed Mount Hope Project, three surface water monitoring stations were established on Henderson Creek in 2006, allowing two distinct reaches of the creek to be studied (**Table 3-17**). The upper monitoring station is approximately one-half mile southeast and downgradient of Spring 585 at an elevation of approximately 7,177 feet amsl. SRK (2008) reported that the creek flow is perennial at the upper monitoring station, with the flow is sustained by discharge from local springs and seeps. The middle monitoring station is approximately 2 miles downgradient of the upper station and is approximately 50 feet below the confluence of the north and south forks of Henderson Creek at an elevation of approximately 6,688 feet amsl. The creek flow at this location is also thought to be perennial and fed by springs and seeps in the upper part of the watershed. The stream channel morphology at the middle monitoring station is described as being substantially incised, with arroyo-like features. The lower monitoring station is approximately 2.5 miles downgradient of the middle station and is roughly 60 feet west of State Route 278 at an elevation of approximately 6,446 feet amsl. SRK characterized the lower reach as being perennial, but noted that the actual flowing locations of the creek near the lower monitoring station vary on a seasonal basis, such that the established sampling-point location was observed to be dry in the third and fourth quarters of 2006 and the first quarter of 2007.

During site visits in May 2006 and 2007, SRK (2008) recorded maximum flow rates of approximately 400, 3,180, and 2,600 gpm (0.9, 7.1, and 5.8 cfs) at the upper, middle, and lower monitoring stations, respectively, on Henderson Creek. Subsequent monitoring events recorded smaller flow rates, ranging from 45 to 112 gpm (0.1 to 0.25 cfs), at the upper and middle monitoring stations and no flow at the lower station.

Stream flow measurements were also made on Henderson and Vinini Creeks, north of Mount Hope in the Garden Valley subbasin of Pine Valley (Montgomery and Associates 2010). During August and October 2007, Vinini Creek was observed to be dry, whereas in May 2008 and June 2009 flows of 3,110 and 950 gpm (6.93 and 2.12 cfs), respectively, were recorded. Henderson Creek was measured in August 2007 at the confluence of its north and south fork tributaries. No stream flow was observed from the north fork at that time, whereas discharge from the south fork was reported to be 27 gpm (0.06 cfs). Other flow measurements in Henderson Creek were 36 gpm (0.08 cfs) in December 2007 and 135 gpm (0.3 cfs) in May 2008. Henderson Creek contained observable flow in a reach approximately 2.3 miles long before losing all of its surface flow to infiltration and evapotranspiration (Montgomery and Associates 2010 *cited in* USDOI BLM 2012b).

Diamond Valley

Harrill (1968 *cited in* USDOI BLM 2012b) described the existence of only a few perennial streams in Diamond Valley, all of which are on the east side of the valley on the western slopes of the Diamond Mountains (**Figure 3-22**, **Table 3-15**). This area is outside the 3 Bars Project area, but within the CESA. Cottonwood and Simpson Creeks were mentioned as the two most prominent perennial streams, and the only ones that supported ranching operations in the 1960s. The only intermittent streams in Diamond Valley with a significant volume of seasonal runoff are also in the Diamond Mountains. The rest of the streams in Diamond Valley are intermittent or ephemeral and were reported to have only minor flows.

Between May of 1965 and October of 1966, reported stream flows in 11 drainages within the CESA along the western side of the Diamond Mountains ranged from zero flow to a maximum of 785 gpm (1.75 cfs) in Cottonwood Creek on one occasion; all other observed flows during that time period were less than 287 gpm (0.64 cfs; Harrill 1968 *cited in* USDOI BLM 2012b). No flow was observed during March and June of 1966 in Garden Pass Creek, an ephemeral creek on the western side of Diamond Valley that originates at the topographic divide between Pine and Diamond Valleys, and an unnamed drainage on the eastern slopes of the Sulphur Spring Range in the northern part of Diamond Valley was also reported to be dry in April and October of 1966 (Harrill 1968 *cited in* USDOI BLM 2012b). Peak flow measurements made by the USGS in Garden Pass Creek between 1965 and 1981 ranged from 314 to over 290,000 gpm (0.7 to 650 cfs).

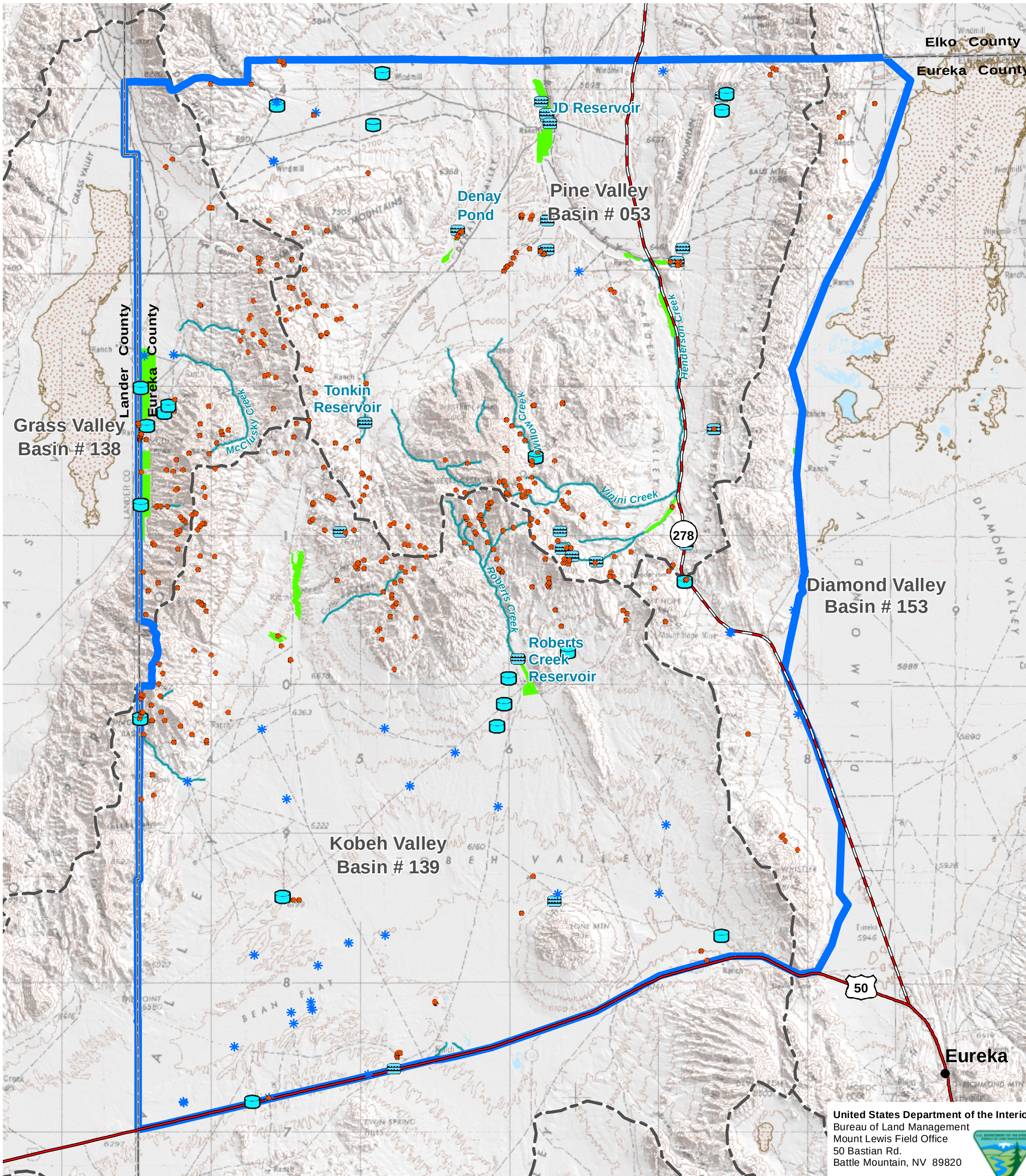
3.10.2.3.3 Springs

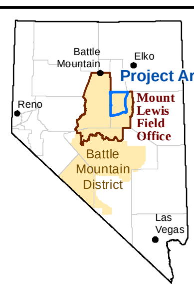
Approximately 334 springs occur within or immediately adjacent to the project area, including 141 known sites in Pine Valley, 131 in Kobeh Valley, 49 in Grass Valley, and 13 in Diamond Valley (**Figure 3-22**). Most springs are in mountainous parts of the project area, although some occur on alluvial fans or in valley floor positions. At any specific site, spring flows are either perennial (flowing year-round) or intermittent (flowing part of the year), depending on historic precipitation and geologic factors that govern the groundwater source of the spring. Some general flow characteristics are indicated in **Table 3-18** for springs where data are available. A substantial range in flows is apparent. Additional geologic aspects of spring origins and characteristics are discussed in the groundwater section.

3.10.2.3.4 Other Surface Water Features

There are no naturally occurring lakes or ponds within the project area. However, range water improvements, windmills, reservoirs, and improved springs occur throughout the project area (**Figure 3-23**). Agricultural water uses for irrigation and stock watering occur in Garden Valley and along the western edge of Diamond Valley. Other surface water impoundments that intermittently or perennially contain water include the following: 1) Tonkin Reservoir on upper Denay Creek, JD Ranch reservoirs on lower Henderson Creek and Pete Hanson Creek, and the Alpha Ranch impoundments of Henderson Creek and Chimney Springs in Pine Valley; 2) the Roberts Creek Ranch impoundment on Roberts Creek in Kobeh Valley; 3) the Shipley Hot Spring pond and the Flynn Ranch springs water impoundments in Diamond Valley; and 4) several small reservoirs on the upper Antelope Wash and its tributaries near the Segura Ranch in Antelope Valley. There may be other, smaller man-made impoundments in various drainages and downgradient of certain springs within the project area that were not located in the field or identified on maps or aerial photographs.

Saline flats or playas exist where streams empty or ground water discharges into areas with no outflow. Temporary ponding occurs in such areas after snowmelt or prolonged rainfall, but the accumulated water typically soon evaporates.





Legend

Water Developments and Water Uses
- Spring
- Windmill/Well
- Reservoir
- Stock Tank, Trough, or Waterhaul
- Irrigated Crop
- Perennial Stream
- Lake or Pond
- Playa
- Hydrographic Basin
- 3 Bars Project Area

Source: BLM 2012c,g; NDWR 2012; USGS 2012b.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-23

Water Developments and Water Uses

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

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Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
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TABLE 3-18

Flow Measurements at Springs

Spring	Associated Drainage	Flow (gpm)	Flow (cfs)	Measurement Date
Tonkin Spring	Denay Creek	449 to 1,077	1.0 to 2.4	Continuous
BC-1	Upper Birch Creek	78	0.17	03/22/2009
PH-2	Upper Pete Hanson Creek	10	0.02	03/27/2009
PH-7	Upper Pete Hanson Creek	2	0.004	03/27/2009
PH-7A	Upper Pete Hanson Creek	8	0.018	03/27/2009
PH-8	Upper Pete Hanson Creek	0	0	03/23/2009
PH-14	Upper Pete Hanson Creek	1	0.002	03/23/2009
PH-15	Upper Pete Hanson Creek	0	0	03/23/2009
HC-10A	Upper Henderson Creek	1	0.002	03/28/2009

gpm = gallons per minute.
cfs = cubic feet per second.
Source: JBR (2009) and USDOI USGS (2012b).

3.10.2.4 Surface Water Quality

Beneficial uses of surface water in the project area include livestock watering, irrigation, aquatic life support, recreation with either contact or noncontact with water, municipal supply, and wildlife propagation (Nevada Administrative Code 445A).

The Nevada Water Pollution Control Law provides the State of Nevada the authority to maintain water quality for public use, wildlife, industry, agriculture, and the economic development of the site. The Nevada Division of Environmental Protection defines waters of the state to include surface water courses, waterways, drainage systems, and underground water. The Nevada Water Pollution Control Law also gives the State Environmental Commission authority to require controls on diffuse sources of pollutants, if these sources have the potential to degrade the quality of the waters of the state. The USEPA has also granted Nevada authority to enforce drinking water standards established under the Safe Drinking Water Act.

The State of Nevada classifies surface water bodies into four classes—A, B, C, and D. Each class has associated water quality standards. Class A waters include waters or portions of waters in areas of little human habitation, and no industrial development or intensive agriculture, and where the watershed is relatively undisturbed by human activity. The beneficial uses of Class A waters are municipal or domestic supply, or both, with treatment by disinfection only, aquatic life, propagation of wildlife, irrigation, watering of livestock, recreation including contact with the water, and recreation not involving contact with the water. Class B waters include waters or portions of waters that are on areas of light or moderate human habitation, little industrial development, light-to-moderate agricultural development, and where the watershed is only moderately influenced by human activity (USDOI BLM 2012b).

The beneficial uses of Class B waters are municipal or domestic supply, or both, with treatment by disinfection and filtration only, irrigation, watering of livestock, aquatic life and propagation of wildlife, recreation involving contact with the water, recreation not involving contact with the water, and industrial supply. Class C waters include waters or portions of waters that are on areas of moderate to urban human habitation, where industrial development is present in moderate amounts, where agricultural practices are intensive, and where the watershed is considerably altered by human activity (USDOI BLM 2012b).

The beneficial uses of Class C waters are municipal or domestic supply, or both, following complete treatment, irrigation, watering of livestock, aquatic life, propagation of wildlife, recreation involving contact with the water, recreation not involving contact with the water, and industrial supply. Class D waters include waters or portions of waters in areas of urban development, are highly industrialized or intensively used for agriculture, or a combination of these, and where effluent sources include a multiplicity of waste discharges from the highly altered watershed. The beneficial uses of Class D waters are recreation not involving contact with the water, aquatic life, propagation of wildlife, irrigation, watering of livestock, and industrial supply, except for food processing purposes (USDOI BLM 2012b).

Roberts Creek and its tributaries are Class A water bodies from the headwaters to the reservoir and Class B water bodies below the reservoir. Denay Creek and its tributaries from the headwaters to Tonkin Reservoir and the Reservoir itself are Class A water bodies. Denay Creek below Tonkin Reservoir is a Class B water body. J.D. ponds are Class C water bodies. These water bodies have aquatic life, livestock, recreation, irrigation, and other beneficial uses. All other perennial streams in the vicinity of the project area are unclassified (USDOI BLM 2012b).

The Nevada Division of Environmental Protection requires compliance with National Pollution Discharge Elimination System permits related to discharge to waters of the U.S., including discharges of stormwater runoff. The Nevada Division of Environmental Protection requires that discharges into subsurface waters be controlled if the potential for contamination of groundwater supplies exist.

Surface water quality has been investigated through more intensive sampling at several locations within the Roberts Mountains by the USGS and JBR from 2009 to 2011 (JBR 2009, USDOI USGS 2012c). No water quality assessments are known to have occurred outside the Roberts Mountains. Results indicate generally good to excellent water quality in drainages within the Roberts Mountains. The waters are a calcium/magnesium bicarbonate type, with pH ranging generally between 7.8 to 8.6 standard units. Some pH values are slightly higher. Hardness ranges between approximately 200 to 300 milligrams per liter (mg/L) as calcium carbonate. In Birch Creek and Vinini Creek, the electrical conductivities are somewhat elevated (on the order of 6,500 micromhos per centimeter), indicating higher levels of dissolved salts. Elsewhere, conductivity values were moderate to low (200 to 400 microSiemens per centimeter). At springs such as PH-14 on Pete Hanson Creek, HC-10 on Henderson Creek, and Tonkin Spring above Denay Creek, somewhat greater concentrations of magnesium occurred in comparison to other locations. Dissolved oxygen concentrations were moderate in the USGS samples (6.6 to 8.1 mg/L). The lower dissolved oxygen values (below 7 mg/L) occurred with warmer water temperatures during June 2011 (USDOI USGS 2012c).

It is anticipated that water quality from these upgradient streams and springs would generally decline with increasing distance from the mountain headwaters. As the streams traverse lower-elevation alluvial fans and valley deposits, remaining flows are likely to have increased salinity and sediment concentrations.

3.10.2.5 Groundwater Resources

3.10.2.5.1 General Hydrogeologic Setting

The mountains that border the basins consist of complexly faulted and folded Paleozoic sedimentary rocks, with widespread occurrences of Jurassic, Cretaceous, and Tertiary intrusive and volcanic rocks. Carbonate rocks dominate the Sulphur Spring Range and Roberts Mountains, as well as the mountains bordering Eureka, Nevada. Siliceous clastic rocks are found in the Diamond Mountains along the east side of Diamond Valley. Tertiary intrusive and volcanic rocks are predominant in most of the other mountain ranges. The approximate axis of the Northern Nevada

Rift extends from Eureka northeastward through the Roberts Mountains and northeast into Grass Valley (Ponce and Glen 2002 *cited in* USDOI BLM 2012b).

The basin fill deposits consist of middle Tertiary through Quaternary sedimentary rocks and unconsolidated to partially consolidated alluvial, fluvial, and lacustrine sediments. Ash-flow and air-fall tuffs are interbedded with the sediments. Coarse alluvial sediments found along the mountain fronts grade basinward into finer alluvial fan, fluvial, and lacustrine sediments. Pliocene and Pleistocene lakes formed in many of the valleys during a period of wetter climate in the Great Basin. Pine Valley, Kobeh Valley, Grass Valley, and Diamond Valley contained extensive lakes during the Pliocene and early Pleistocene. Remnants of these pluvial lakes are elevated terrace deposits and a thick sequence of clay, silt, freshwater limestone, and evaporites that underlie the shallow alluvial sediments of the basins.

3.10.2.5.2 Groundwater Hydrology of Kobeh Valley

The Kobeh Valley basin is a roughly equidimensional basin. Descriptions of the valley have been taken from Rush and Everett (1964) and USDOI BLM (2012b). Geologically, Kobeh Valley consists of basin-fill alluvium within the main part of the basin and alluvial fan sediments along the mountain fronts surrounding the basin.

Montgomery and Associates (2010) completed a water balance study for Kobeh Valley basin during 2009. This is presented in **Table 3-19** along with their estimates for the 2009 water balance for Antelope, Diamond, and Pine Valley basins. The total outflow for the Kobeh Valley basin for 2009 was 20,800 acre-feet/year and exceeded the inflow of 18,000 acre-feet/year (Montgomery and Associates 2010 *cited in* USDOI BLM 2012b). By this water balance estimate, Kobeh Valley basin is losing water from storage due to groundwater pumpage and water levels in the valley should begin to decline. This may eventually affect the growth of phreatophytes.

3.10.2.5.3 Groundwater Hydrology of Diamond Valley

Diamond Valley is an elongate basin oriented approximately north–south. The north end of the valley is occupied by an extensive playa. The south end of the basin near Eureka is used for agricultural irrigation. The valley-fill sediments consist of at least 7,845 feet amsl of interbedded gravels, silts, clays, evaporates, Pleistocene lake-bed sediments, and volcanic tuffs.

Groundwater flow in the Diamond Valley basin has been noticeably altered by extensive agricultural irrigation in the southern part of the valley. Prior to the onset of intensive irrigation, groundwater in the Diamond Valley basin flowed from south to north and terminated in the playa at the north end of the basin. Eakin (1962 *cited in* USDOI BLM 2012b) completed a groundwater appraisal of the Diamond Valley basin and showed that water elevations in the southern part of the valley were around 5,870 feet amsl and those in the northern part near the playa were around 5,770 feet amsl. Water elevations in 2005 were around 5,800 feet amsl in the southern part of the basin. Irrigation pumping has created a groundwater depression that has concentrated groundwater flow into the southern part of the basin. Consequently, groundwater no longer flows into the playa area in the northern part of the basin from the south. Agricultural irrigation in the southern part of the basin has resulted in subsidence of the basin sediments.

Eakin (1962 *cited in* USDOI BLM 2012b) completed a preliminary water balance for the Diamond Valley basin. He estimated that groundwater recharge was around 16,000 acre-feet/year and that groundwater discharge was about 23,000 acre-feet/year. Evapotranspiration from natural vegetation was estimated at 14,100 acre-feet/year and water loss from meadow and pasture grass was estimated at 8,900 acre-feet/year. Pumpage from irrigation wells was around 5,000 acre-feet/year and the wells were screened in the upper 200 feet of the basin fill with well yields in the range of 1,000 to 2,500 gpm. Montgomery and Associates (2010 *cited in* USDOI BLM 2012b) estimated the water balance for the Diamond Valley basin. Their values are considerably different from those of Eakin (1962 *cited in* USDOI BLM 2012b), with precipitation recharge at 21,400 acre-feet/year and 8,900 acre-feet/year of groundwater inflow from Pine and Kobeh valley basins. Their evapotranspiration loss was 14,700 acre-feet/year and groundwater pumpage was 55,800 acre-feet/year with groundwater inflow from Pine Valley and Kobeh Valley basins.

With irrigation pumpage resulting in a groundwater sink in the southern part of the Diamond Valley basin and accompanying basin sediment subsidence, the playa at the north end of the valley no longer receives groundwater flow from the southern part of the valley. Prior to agricultural development of Diamond Valley, the playa at the north end of the valley was the terminus of the Diamond Valley regional groundwater flow system. Now, the groundwater sink created by irrigation pumpage is the terminus of the flow system. Without groundwater flow from the southern part of the valley, the playa at the north end of Diamond Valley can be expected to become progressively dryer, resulting in a change in vegetation types and a reduction in phreatophytes surrounding the playa.

TABLE 3-19

2009 Estimated Annual Groundwater Budget for Individual Basins

Budget Component	Antelope Valley	Diamond Valley	Kobeh Valley	Pine Valley[1]
Groundwater Inflow (acre-feet per year)				
Precipitation Recharge	4,100	21,400	13,200	34,900
Subsurface Inflow	0	7,800 (5,800 from Pine Valley and 2,000 from Kobeh Valley)	4,800 (1,600 from Monitor Valley, 2,700 from Antelope Valley, and 500 from Pine Valley)	0
Total Inflow	**4,100**	**29,200**	**18,000**	**34,900**
Groundwater Outflow (acre-feet per year)				
Evapotranspiration	1,400	14,700	15,900	17,100
Net Groundwater Pumping	Negligible	55,800	2,900	negligible
Subsurface Outflow	2,700 (to Kobeh Valley)	0	2,000 (to Diamond Valley)	17,600 (5,800 to Diamond Valley, 500 to Kobeh Valley, and 11,300 to northern Pine Valley)
Total Outflow	**4,100**	**70,500**	**20,800**	**34,700**
Inflow (Outflow)	**0**	**(41,300)**	**(2,800)**	**200**

[1] Within Hydrologic Unit Code 10 watersheds on/within 3 Bars Project area.
Source: Montgomery and Associates (2010) *cited in* USDOI BLM (2012b:3-55 to 3-56).

3.10.2.5.4 Groundwater Hydrogeology of Pine Valley

Pine Valley is an elongate basin, 55 miles long by 30 miles wide, northwest of Diamond Valley and north of Kobeh Valley. The principal drainage is Pine Creek and this drainage flows into the Humboldt River, placing Pine Valley in the Humboldt River Flow System. Garden Valley is a sub-basin of Pine Valley and is along the southeastern part of the basin, adjacent to Mount Hope. Henderson Creek drains Garden Valley and flows into Pine Creek. Most of the drainages that feed into Pine Creek originate in the Cortez Mountains or the Roberts Mountains.

The Pine Valley basin is characterized by shallow groundwater levels in the valley-fill alluvial aquifer. Groundwater elevations in the basin alluvial aquifer are around 5,800 feet amsl at the southern end of the valley and around 4,800 feet amsl near the northern end of the basin where Pine Creek flows into the Humboldt River. The hydrology of Pine Valley is characterized by shallow groundwater levels in the valley-fill alluvial aquifer (Eakin 1961 *cited in* USDOI BLM 2012b). Depth to groundwater, in the valley fill along Pine Creek, ranges from 0 to 10 feet below ground surface. Pine Creek is fed by groundwater baseflow on a year-round basis and by mountain-front runoff during the spring snowmelt in the bordering mountains, especially the Cortez Range and the Roberts Mountains. Eakin (1961 *cited in* USDOI BLM 2012b) estimated the recharge to Pine Valley at 46,000 acre-feet/year with discharge by evapotranspiration from natural vegetation and pasture grass at 24,000 acre-feet/year. Pine Creek discharges from 30 acre-feet/year during low flow periods to 2,100 acre-feet/year during high flow periods (Eakin 1961 *cited in* USDOI BLM 2012b). Montgomery and Associates (2010 *cited in* USDOI BLM 2012b) estimated the precipitation recharge for 2009 to be 34,900 acre-feet/year for the southern two-thirds of the basin (the area within the project area). Their water balance estimate had 17,100 acre-feet/year of evapotranspiration loss and 17,600 acre-feet/year of subsurface groundwater outflow to Diamond Valley (5,800 acre-feet/year), Kobeh Valley (500 acre-feet/year), and the northern one-third of Pine Valley (11,300 acre-feet/year). Montgomery and Associates (2010 *cited in* USDOI BLM 2012b) did not discuss groundwater baseflow to the Pine Creek basin and the discharge of this groundwater eventually to the Humboldt River.

3.10.2.5.5 Groundwater Hydrology of Grass Valley

Grass Valley is a closed hydrographic basin that has not received much study. Everett and Rush (1966 *cited in* USDOI BLM 2012b) described the general features of the basin hydrology. The Grass Valley basin is topographically and hydrologically closed and consists of two interconnected basins. The smaller basin is in the southwest corner of Grass Valley and is adjacent to Mt. Callaghan and fed by Current Creek and Skull Creek. This smaller basin contains abundant springs and drains through a gap in the bounding mountain ranges into the main part of the Grass Valley basin. The main basin of Grass Valley is elongate in a north-south direction and fed by ephemeral streams draining the Toiyabe Range that bounds the west side of the valley. Springs are found along both the east and west sides of Grass Valley near the contact between the alluvial fans that form the margins of the basin and the bounding bedrock of the fault-block ranges that border the basin. The Grass Valley basin is dominated by a large playa and the surrounding area phreatophytes that tap the shallow groundwater of the basin.

Groundwater recharge in the valley was estimated to be around 13,000 acre-feet/year. This is approximately balanced by evapotranspiration from the phreatophytes and groundwater pumpage. Estimated total precipitation for Grass Valley is around 29,000 acre-feet/year and approximately 45 percent of this precipitation recharges groundwater. This is balanced by evapotranspiration from the phreatophytes estimated at 12,000 acre-feet/year and by both limited groundwater pumpage (about 200 acre-feet/year) and consumption of groundwater by alfalfa grown south of the playa in the central part of the valley (Everett and Rush 1966 *cited in* USDOI BLM 2012b).

3.10.2.5.6 Basin Groundwater Quality

Groundwater quality in all the basins is similar and generally suitable for irrigation and stock watering. For most basins, the groundwater is dominated by calcium-sodium bicarbonate or sodium-calcium bicarbonate with the total dissolved solids generally below 1,000 mg/L and often below 500 mg/L. Water quality is best in the alluvial fans near the mountain fronts and becomes more saline near the valley centers. For valleys with playas, the water quality can become quite saline, with the total dissolved solids exceeding 1,000 mg/L and the groundwater near the playas being dominated by calcium sulfate. Chloride can be locally elevated near the playas. Shallow groundwater near the basins centers is generally more saline than groundwater in the alluvial fans near the mountain fronts.

Grass Valley has calcium bicarbonate dominated groundwater, with a total dissolved solids in the range of 300 to 500 mg/L (Everett and Rush 1966). Sulfate ranges up to 116 mg/L. Near the playas, groundwater in Grass Valley becomes saline with the total dissolved solids ranging up to 1,800 mg/L (Cohen 1964). Groundwater quality is suitable for irrigation, except beneath the playa area. Surrounding the playa and in the area of the phreatophytes, groundwater is dominated by sodium-calcium bicarbonate with a total dissolved solids in the range of 300 to 500 mg/L, sulfate ranging from 40 to 120 mg/L, and chloride less than 25 mg/L. In the area of the playa, the groundwater quality becomes saline due to evaporation in the playa. There are 23 wells of record and the deepest well is only 327 feet below ground surface. Water levels in the wells are generally within 50 feet of the surface (Everett and Rush 1966 *cited in* USDOI BLM 2012b).

Big Smoky Valley has groundwater that increases in total dissolved solids with depth (Handman and Kilroy 1997). The total dissolved solids ranged from a low around 65 mg/L up to 600 mg/L for groundwater in the alluvium away from the playas. Near the playas, total dissolved solids can reach 9,000 mg/L and the groundwater becomes dominated by calcium sulfate.

Diamond Valley is divided into two valleys (Eakin 1962 *cited in* USDOI BLM 2012b). The lower or southern part of the valley has good groundwater used for irrigation that is dominated by calcium bicarbonate, with total dissolved solids generally below 500 mg/L. The northern part of the valley is dominated by a playa and the groundwater becomes quite saline and dominated by calcium sulfate.

Monitor, Antelope, and Kobeh Valleys have groundwater dominated by calcium bicarbonate and the total dissolved solids are below 500 mg/L. Near the centers of the basins and especially near playas, the groundwater quality becomes more saline and the total dissolved solids exceed 1,000 mg/L (Rush and Everett 1964).

3.10.3 Environmental Consequences

3.10.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, the following issues were identified for water resources:

- How will water rights be addressed?
- How will treatments maintain or improve water quality?
- How will treatments protect surface and groundwater resources from degradation by fuel or oil spills and other human activities in the 3 Bars ecosystem that could result in the pollution of water resources?
- How will treatments maintain or improve watershed and streams/riparian zone conditions?
- How will treatments reduce the threat of knickpoints and/or headcuts, which indicate vertical instability and are a point source for accelerated erosion?
- Will pinyon-juniper treatments help to lessen water demands (through decreased evapotranspiration and sublimation), and increase the amount of water that infiltrates into the ground and discharges to seeps and springs?

- Will treatments remove stock ponds that have inhibited sediment transport conditions locally, stored sediment, and caused channel incision downstream?
- Will treatments improve bank stability?
- Will treatments benefit deep-rooted perennial upland herbaceous species that have declined due to decreasing infiltration rates and increasing run-off and surface erosion?
- What kinds of water developments are being considered for the planning area, and what are the projected water flow production rates and availability to wild horses, wildlife, and livestock?
- How will treatments reduce the impacts of wildfires on groundwater and surface water resources?
- Would there be effects on local aquifers from the removal of pinyon-juniper and from mining and other projects in the CESA?

3.10.3.2 Significance Criteria

Impacts to water resources would be considered significant if BLM actions resulted in:

- Release of contaminants such as sediment, fuels, or lubricants into perennial or intermittent streams or springs, creating a change of water quality that often or regularly exceeds the applicable Nevada Division of Environmental Protection water quality standards specified in Nevada Administrative Code 445A for existing uses such as aquatic life, irrigation, livestock watering, or propagation of wildlife.

- Prevention of access, consumptive use, or long-term diversion of surface water that adversely affects recognized water rights holders. This would include flows and seasons of use where existing beneficial water uses, as defined by the Nevada Division of Water Resources, may be affected.

- Accelerated erosion occurs from watershed slopes and leads to increased sedimentation in streams or ponds, or to other uncontrolled stream channel and bank instabilities (including conditions that foster aggradation and lateral migration, bank erosion or piping, or channel degradation through scour or collapse at knickpoints or headcuts).

- Lower groundwater levels due to decreased water recharge. For groundwater levels, the water level decline would need to be greater than seasonal fluctuations in water levels and persist for several years or more to be statistically verifiable.

3.10.3.3 Direct and Indirect Effects

3.10.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Much of the focus of restoration treatments would be on maintaining connections between streams and floodplains, increasing infiltration, decreasing overland flow, reducing discharge velocity, and encouraging riparian plant establishment. Numerous streams lack characteristics necessary for properly functioning riparian habitats. Invasive plant species, hazardous fuels buildup, pinyon-juniper encroachment, disturbance by historic livestock use, wild horses, and other wild ungulates, and climatic conditions are factors that have degraded riparian function on the 3 Bars Project area.

Groundwater in the 3 Bars ecosystem is an important component of riparian and wetland ecosystem health because it provides baseflow to streams, springs, and seeps that are an important source of water in riparian and wetland areas. Improvement of ecosystem health in riparian zones and increasing stream flows are expressed goals for the 3 Bars Project area (USDOI BLM 2009a:50). When functioning properly, streams, springs, seeps, and associated floodplains and wetlands absorb snowmelt and stormwater runoff, extend flows further into the year, and attenuate flood discharges.

Water Access

There could be short-term access restrictions to water along portions of streams, or at developed or undeveloped springs, to promote site restoration and establishment of native vegetation. Access to surface water sources could be temporarily interrupted through road closures, fencing, or other factors. However, the BLM would not completely block access to water for livestock, wild horses, and wildlife and access to water resources would be ensured to meet the needs of those species in accordance with Nevada Water Law and to ensure that existing water rights are satisfied and unimpaired.

Hillslope Erosion and Runoff

Removal of vegetation and disturbance of the soil could lead to increased water runoff and soil erosion. Interception and infiltration of rainfall and snowmelt would decrease as a result of overstory vegetation removal, formation of water resistant soil surfaces, or soil compaction. These effects could be minimized through the application of mulch and/or other erosion controls. After restoration with desirable vegetation, the erosive effects of snowmelt and rainfall would decrease, surface retention and infiltration would increase, and runoff and erosion conditions would improve.

Streambed or Bank Instability

Treatments could lead to short-term degradation of streambeds and streambanks due to removal of undesirable vegetation, and from in-channel earthwork. Adverse effects could include initiating or increasing the occurrence and migration rate of knickpoints, headcuts, or bank caving and lateral migration, with the largest expected effect being an increase in sedimentation. Restoration at treatment sites, stabilization practices along streams, and post-project monitoring and maintenance would reduce the severity and duration of these impacts. Long-term, treatments would ultimately improve stream function.

Surface Water Quantity

Restoration treatments would affect surface water quantity. Removal of vegetation could lead to increased runoff, and decreased infiltration, groundwater recharge, stream flow, and flow duration. Reductions in baseflows (groundwater contributions to streams) may result from increased surface runoff and reduced infiltration and groundwater recharge. Revegetation may increase evapotranspiration demands on springs and perennial or intermittent streams at some sites. Some treatments may increase demands by phreatophytic vegetation and reduce water flows at or near treatment sites. These effects may contribute to increased episodes of little or no flow in ephemeral streams. Use of water from nearby sources to extinguish wildfires could reduce the quantity of surface water resources, particularly during dry seasons (USDOI BLM 2007c:4-22).

Several studies have shown that removal of pinyon-juniper that is encroaching into riparian habitat can improve stream flow. DeBoodt (2008) found that in areas where all junipers were cut from a watershed, late season spring flow, days of recorded ground flow, and late season soil moisture increased compared to pre-treatment conditions. As a result, flows may endure longer into the summer months at some springs and perennial or intermittent streams where dense, deep-rooted pinyon-juniper or other stands are treated. The lengths of perennial or intermittent stream reaches may also increase. These benefits would be more likely in Phase II and III pinyon-juniper stands, or in the mountains or on upstream reaches of mountain-front alluvial fan channels.

Pierson et al. (2013) found that 2 years post fire, erosion remained 20-fold greater on burned than unburned pinyon-juniper woodland plots, but concentrated flow erosion from the intercanopy was reduced by growth of forbs and grasses in the understory. Their study suggested that burning may amplify runoff and erosion immediately post fire, but that activities that stimulate vegetation productivity may provide long-term reduction of soil loss, especially when compared to untreated areas with pinyon-juniper. Burning of Phase II and III woodlands enhanced herbaceous cover, decreased bare ground connectivity, improved infiltration, and reduced concentrated flow erosion within the intercanopy over the first 2 years following the fire. Short-term improvements in infiltration and erosion suggested that tree removal by burning may create a restoration pathway for woodland-encroached sagebrush steppe habitat, but that improvements may take 3 or more years to take effect, depending on the rate of vegetation and ground cover recruitment. In contrast, Pierson et al. (2013) observed that simply placing cut-downed trees into the unburned intercanopy had minimal immediate impact on infiltration and soil loss.

If slash and other downed woody material from treatments are used as mulch, this material should slow runoff and sedimentation, and infiltration and soil moisture would likely increase. Mulch would also help to capture sediments and decrease peak flows. As treated areas revegetate, there should be long-term benefits to stream flow and soil moisture.

Surface Water Quality

The water quality of perennial and intermittent streams could decrease in the short-term after treatments, due to runoff and erosion from loss of vegetative cover and soil disturbance. Some treatments could occur on soils that are susceptible to water and wind erosion (see **Figures 3-14** and **3-15**). However, by retaining downed woody material in treatment areas, these effects can be minimized or avoided.

If streamside vegetation is removed, the loss of shade could result in higher water temperatures and lower dissolved oxygen, to the detriment of fish and other aquatic organisms (USDOI BLM 2007c:4-22). Removal of vegetation and an increase in erosion and sedimentation could result in an increase in salts in receiving water bodies. Birch Creek and Vinini Creek have elevated electrical conductivities, indicating higher levels of dissolved salts. However, other streams on Roberts Mountains have lower conductivity values, so the potential for adverse salinity effects varies across the project area.

There is potential for fuel and lubricants used for equipment and transport vehicles to spill into water bodies. The BLM would minimize this risk by refueling and servicing equipment away from water bodies, and minimizing equipment use in aquatic bodies, where feasible.

The removal of hazardous fuels from public lands would result in a long-term benefit to surface water quality by reducing the risk of a future high-severity wildfire on the treatment site. A high-severity wildfire that removes excessive plants and litter could subsequently increase surface soil erosion and cause soil mass failures and debris flow, resulting in short-term increases in stream flows. In addition, fire retardants could affect water quality. Fire retardants that are used most extensively for emergency suppression contain nitrogen and phosphorus that could cause nutrient enrichment of surface waters. When mixed with water and exposed to ultraviolet radiation, some fire retardants break down into hydrogen cyanide, an extremely toxic substance (Fresquez et al. 2002 *cited in* USDOI BLM 2012b).

Over the long-term, vegetation treatments that move the 3 Bars ecosystem toward historical ranges of variability, with a preponderance of native plant communities in natural mosaic patterns and relatively uninterrupted disturbance regimes, would provide favorable conditions for surface water quality by reducing the incidence of soil erosion and sedimentation.

Groundwater Quantity and Recharge

As discussed above, studies by DeBoodt (2008), and Pierson et al. (2013) showed that the removal of vegetation could increase surface water runoff and reduce infiltration in treatment areas in the short-term, to the detriment of local-area groundwater recharge and availability. Some water may be retained in the system due to reduced evapotranspiration and, on a basin-wide scale, groundwater recharge would increase. Long-term, treatments may improve groundwater availability as native vegetation re-establishes on treatment sites, which would reduce runoff and increase infiltration. These effects would be most noticeable in Phase II and III pinyon-juniper stands where there is little understory. Baseflow to streams may also increase due to increased infiltration of precipitation and an increase in recharge to shallow groundwater. The increase in baseflow may be temporary unless long groundwater flow paths are involved. Removal of pinyon-juniper and replacement with a less water consumptive species is often cited as the prime example of the beneficial effect to groundwater recharge from removal of an invasive water consumptive species (USDOI BLM 2007c:4-21).

The key factors relating to the removal of a water consumptive species and increased infiltration are topographic slope, soil permeability, precipitation frequency and duration, and water consumptive nature of the replacement species. Steep slopes with tight or compact soils would have a greater tendency to show increased runoff after removal of a water consumptive species. This increased runoff would be temporary and would decline once the replacement species has established. However, the increased runoff would cause a reduction in infiltration and thus a potential reduction in recharge to shallow aquifers. Mulching treated areas with chopped vegetation would mitigate for these effects by slowing runoff and enhancing infiltration. Areas with frequent or intense precipitation would be expected to show a greater potential for increased infiltration after removal of a water consumptive species. Similarly, if the replacement species has a high capacity for soil water retention and consumption, then the benefits of removal of the less desirable species would be only temporary.

Groundwater Quality

Improvements in groundwater quality from vegetation treatments are more difficult to quantify, primarily due to the lack of long-term groundwater quality data needed to statistically defend an improvement in water quality. If vegetation treatments reduce nutrient uptake by plants, either by removing plants or replacing one species with another that requires less or different nutrients, then soluble nutrients like nitrogen may enter streams via groundwater baseflow from shallow aquifers due to dissolution of these nutrients by infiltrating precipitation (USDOI BLM 2007c:4-21). In areas with high salt levels in soils, a change in plant species may result in increased flushing of salts to groundwater. Nutrients sorbed onto soil particles, such as phosphorous, may be carried to streams in runoff. Groundwater quality may be affected, at least temporarily, by an influx of nutrients that would otherwise have been consumed by the vegetation that has been removed. Conversely, since runoff beneath pinyon-juniper has been shown to far exceed that of non-pinyon-juniper terrain, removing pinyon-juniper, placing mulch, and allowing native vegetation to stabilize the soil could decrease runoff and the associated erosion which carries sediment loads and increases total dissolved salts and other pollutants in the runoff.

3.10.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

The BLM has identified about 3,885 acres of riparian zone treatments. Most of the riparian treatments would be in the Kobeh Valley and Pine Valley watersheds. Treatment acres comprise only a small portion of the watershed basins within the project area and only 3 percent of all project treatment acreage (**Table 3-20**). The BLM would restore about 31 miles of perennial streams, 17 miles of intermittent streams, and 40 springs that are within the riparian treatment zone (**Table 3-21**). Manual and mechanical methods would be used for treatments, and it is possible that livestock could be used to remove cheatgrass in the riparian zone.

Riparian area treatments would focus on restoring stream and habitat functionality in areas where the stream channel morphology, and the plant species composition within the riparian zone, has been compromised by past actions. Because of the loss of structural integrity in compromised channels, stream velocities have increased over historic levels, nutrient-rich sediment is not being delivered to riparian vegetation, and there is less groundwater recharge within the floodplains. Near-stream groundwater levels have also dropped as a result of stream incision.

The following discussion focuses on the effects of riparian treatments on water resources. A discussion of stream processes, and how proposed stream engineering treatments would affect stream morphology and functionality, including processes related to water quantity and quality, is in Section 3.11.3 under Wetland, Floodplain, and Riparian Zone Resources.

Adverse Effects

Because riparian treatments would, by definition, be conducted close to surface water features, of all of the treatment types they would have the most potential to have adverse and beneficial impacts on water resources. Avoidance of these impacts would be particularly critical for occupied and potential Lahontan cutthroat trout streams, stream segments on the Roberts Mountains, such as Roberts Creek, and those tributaries that have Class A stream standards.

Degraded stream systems on the 3 Bars Project area reflect degraded conditions in their contributing watersheds. These conditions tend to increase the magnitude and frequency of high flows after precipitation events, increase sediment inputs into stream systems, and diminish the streams’ ability to resist degradation. The annual hydrograph, as differentiated from the storm event flow response described above, is also changed. High spring runoff flows often increase, while seasonal low flows (baseflows) decline or cease. Direct alterations include channel straightening, dredging, widening, narrowing, levee construction, floodplain fill, and riparian zone modification. Indirect activities include those that alter the principal processes that create and maintain stream channel conditions. Tree harvest, road building, and grazing also influence the supply and transport of water, sediment, energy (light and heat), nutrients, solutes, and organic matter (ranging from woody material to leaf litter; Saldi-Caromile 2004). Stream restoration treatments could further degrade conditions within the stream until it stabilizes. Channel restoration and vegetation removal and planting may temporarily increase erosion in treated areas.

TABLE 3-20

Percent of Watershed Basin within Treatment Areas

Basin Name	Basin Acres	Riparian	Aspen	Pinyon-juniper	Sagebrush
Diamond Valley	477,506	<0.1	0	6.8	1.4
Grass Valley	379,846	<0.1	0	0	2.2
Kobeh Valley	551,961	0.2	<0.1	8.9	8.1
Pine Valley	640,588	0.3	<0.1	7.8	8.0

Source: Nevada Division of Water Resources (2012).

TABLE 3-21

Perennial Stream Miles within Treatment Areas

Stream Name	Miles by Treatment Type			
	Aspen	Pinyon-juniper	Riparian	Sagebrush
Birch Creek	0.6	1.5	0	0
Denay Creek	0	0.1	0	0
Henderson Creek	0	1.8	5.6	4.6
McClusky Creek	0	0	3.3	0
Pete Hanson Creek	1.2	1.4	0	0
Roberts Creek	0	3.2	5.4	0
Vinini Creek	0.3	0	5.2	1.3
Willow Creek	0	0	5.0	0
Unnamed	1.7	5.7	6.7	0.5
Total Miles	**3.8**	**13.7**	**31.2**	**6.4**

Treatments on units of the Black Spring and Garden Spring groups, as well as those streams identified for Lahontan cutthroat trout habitat improvements, would involve using heavy equipment such as bulldozers and backhoes to reconstruct streams and improve riparian habitat. The soil disturbance associated with machinery used to remove vegetation and reconstruct streams, such as digging, plowing, or scraping, and from wheels and tracks of machinery, would increase the likelihood of soil and plant material being carried into streams by surface runoff. In addition, the compaction of soil by heavy equipment would increase the likelihood of surface runoff by reducing the soil’s infiltration capacity. However, leaving debris in place after treatments would limit these negative effects on infiltration rates and stream sedimentation (USDOI BLM 2007c:4-23). No mechanical equipment would be used within Willow Creek whenever possible.

Manual and mechanical methods could be used on units of the Garden Spring Group to remove pinyon-juniper. Chainsaw hand thinning is the preferred method for tree cutting in riparian treatment units. Because manual treatments would occur over small areas, and would involve little soil disturbance or vegetation removal, the effects on water resources would be minimal. Manual treatment seldom results in exposed soil, and plant materials would remain in the treatment areas, minimizing the risks of sedimentation and alteration to water flow (USDOI BLM 2007c:4-23).

Beneficial Effects

The primary objective of riparian management is to restore degraded streams to Proper Functioning Condition to benefit riparian habitat, riparian-dependent wildlife, and Lahontan cutthroat trout and other aquatic species. A proper functioning riparian zone has the necessary physical and structural components to dissipate stream energy associated with high water flows, as well as conditions that support a diverse and healthy population of fish and other aquatic organisms.

Stream bioengineering treatments that include improvements to stream channel morphology and plantings should reduce the occurrence of high flow events and allow higher flows to be distributed across the floodplain rather than focused in the channel. Where flows are restricted to narrow channels, the increase in energy confined within the channel has resulted in stream degradation. By creating conditions that slow water flow, and creating associated floodplains and wet meadows, the energy associated with water flow would be dissipated, reducing the potential for future channel degradation. In-channel work and road mitigation projects would provide additional benefits. Grade control structures would reduce incision rates and in some cases, reverse it through aggradation (one rock dam series). Post vanes and baffles would induce meanders and help restore natural sinuosity and slow discharge velocity. Road mitigation, such as rolling dips, berms, swales, and spill pads, would help move water off of roads and into the riparian and wetland areas. These structures may be installed in conjunction with stream bioengineering to improve and expand riparian habitat.

Hydrologic functions would improve over the long-term due to stream restoration, including stabilization or reduction of drainageway erosion features such as knickpoints, headcuts, gullies, and bank caving. Hydrologic functions would improve as a result of reconnecting hydrologic pathways and improvements in infiltration due to overland flow. Pinyon-juniper removal from riparian zones and adjacent upland areas may benefit hydrologic functions as well, by generating some minor improvement in water flow in treated streams. Greater infiltration and interception of precipitation from improvement in riparian vegetation would help increase groundwater recharge and attenuate runoff peaks. Local increases in flow durations and flowing reaches could occur at some streams and springs (Tague et al. 2008). Incised channels and channel straightening from roads have caused water levels to drop along many proposed treatment streams, causing nearby areas to dry out. By creating conditions that reduce channel incision, reduce surface runoff, and increase infiltration, the deep-rooted herbaceous species that are being lost in many riparian zones should benefit from these actions. In turn, as these species become reestablished, they should help to stabilize soils and improve water quality.

Treatments to remove pinyon-juniper from riparian treatment units and in nearby upland areas where pinyon-juniper is encroaching into riparian and sagebrush habitat may increase groundwater recharge. Longleaf pinyon pine and Utah juniper are not riparian species, and are not as effective as native vegetation in stabilizing soil near streams. Encroaching pinyon-juniper in Phase II and III stands has led to the loss of understory vegetation through shading, which has resulted in increased runoff and higher-than-normal flows in streams and accelerated the erosion of natural stream meander bends. Since sinuosity and slope are inversely proportional, the streambeds have begun incising to compensate for the increased flow rates, resulting in the lowering of the streambed and water table. By removing trees and leaving treatment slash and other woody debris on the ground as mulch, and allowing understory vegetation to re-establish, surface runoff rates and peak stream flows should lessen, less sediment would be transported to streams, and more water should infiltrate into the soil and recharge the groundwater (Lossing 2012, Noelle 2012).

Exclosure fencing using existing permanent fencing or small, temporary exclosures would control access to treatment sites by livestock, wild horses, and other wild ungulates and allow treatment areas to revegetate. Livestock, wild horses, and other wild ungulates can affect surface runoff through trampling, soil disturbance, and soil compaction. Past studies found that runoff from a heavily grazed watershed was 1.4 times that of a moderately grazed watershed, and 9 times greater than that of lightly grazed watershed. In some cases, however, light grazing may actually improve soil infiltration by breaking up physical crusts on the soil (USDOI BLM 2007c:4-24). Small breaks would be provided in the fencing, as needed, to ensure that animals have access to water in the vicinity of treatments.

Aspen Treatments

Aspen treatment areas overlap with approximately 4 miles of perennial streams, 55 miles of intermittent/ephemeral streams, and 35 springs. Efforts to stimulate aspen suckering and sucker survival would cause short-term soil disturbance and erosion, but as aspen stands improve, treatment actions should stabilize soils and improve hydrologic functions to the benefit of water resources. The BLM would remove pinyon-juniper and other non-riparian trees near aspen stands. Although it is unlikely that these treatments would enhance water yields, except perhaps at RM-A2 and RM-A10 along upper Roberts Creek and Upper Pete Hanson Creek, respectively, they would help to enhance fire breaks. Efforts to reduce the risk of catastrophic wildfires would reduce the potential for excessive loss of plant and litter cover and the potential for soil erosion and mass failures that would cause a decrease in water quality.

Pinyon-juniper Treatments

Treatments that reduce the abundance of pinyon-juniper near water bodies, promote the development of native forbs, grasses, and shrubs, and reduce the risk of fire spread in pinyon-juniper stands would provide the most benefits to surface and groundwater resources. Pinyon-juniper treatments would overlap with approximately 14 miles of perennial streams, 464 miles of intermittent/ephemeral streams, and 63 springs.

Adverse Effects

Impacts to water quantity and quality could be greater for pinyon-juniper treatment areas than for other treatment types because of the large acreage treated, and because pinyon-juniper treatment areas are generally on moderate to steep hillslopes that are prone to water erosion. In addition, where trees are in dense stands, removal of these trees could lead to short-term water and wind erosion as vegetative ground cover is mostly absent from these areas. Thurow and Hester (2012) found that runoff and erosion were greater from manual, mechanical, and fire treatments in pinyon treatment areas than untreated areas, and that it could take up to 10 years to return to normal levels, especially for mechanical treatments that disturb the soil. They noted that fire can increase the water repellency of soils, and increase runoff and erosion and loss of soil nutrients from the site until the burned site is revegetated. They also noted that studies have shown that burning can significantly reduce the infiltration rate and increase erosion due to loss of vegetation. These effects lessen as sites are revegetated.

Pierson et al. (2013) found that burning may amplify runoff and erosion immediately post fire, but that activities that stimulate vegetation productivity may provide long-term reduction of soil loss, especially when compared to untreated areas with pinyon-juniper. Burning of Phase II and III woodlands enhanced herbaceous cover, decreased bare ground connectivity, improved infiltration, and reduced concentrated flow erosion within the intercanopy over the first 2 years following the fire. Short-term improvements in infiltration and erosion suggested that tree removal by burning may create a restoration pathway for woodland-encroached sagebrush steppe habitat, but that improvements may take 3 or more years to take effect, depending on the rate of vegetation and ground cover recruitment.

Several thousand acres could be burned each year using prescribed fire and wildland fire for resource benefit. The potential effects of fire on water resources would depend largely on the severity and size of the fire, with a low severity burn being less likely to degrade water quality and quantity than a severe burn, and a small fire affecting a smaller surface area than a large fire. In addition, the closer the fire is to a water body, the more likely it would be to affect water quality. The BLM would use fire and fuel breaks to limit the spread of fire. Most fire treatments would occur along the western slopes of the Roberts Mountains, and at the Whistler and Sulphur Spring Wildfire Management units.

Prescribed fire could be used on several pinyon-juniper treatment areas, while wildland fire for resource benefit would be used on the Sulphur Spring Wildfire Management Unit. The BLM would also thin and remove pinyon-juniper and create fire breaks. Approximately one-third of the proposed treatment acres are on soils that are susceptible to compacting, and the resulting adverse impacts from erosion, runoff, sedimentation, and degraded soil quality would be of concern for this treatment group. In addition, approximately 17 percent of treatment acreages has severe water erosion hazard. Nearly 80 percent of the acreage associated with the Atlas, Birch, Frazier, Gable, Henderson, Upper Pete Hanson, Upper Roberts, and Vinini units has moderate or high fire damage susceptibility, while about 70 percent of acreage of the Three Bars Ranch, Cottonwood/Meadow Canyon, Dry Canyon, Lower Pete Hanson, Tonkin North, Tonkin South, and Whistler units, and Sulphur Spring Wildfire Management Unit, has moderate to high fire damage susceptibility. Thus, mechanical treatments may be preferable to fire treatments if there is concern about soil damage and loss. If fire is used, effort would be made to burn during the cooler periods of the year and to keep fire intensity low.

Beneficial Effects

Historical fire suppression has affected water quality and quantity on the 3 Bars Project area, as fire suppression is partly responsible for the spread of pinyon-juniper woodlands. The spread of Utah juniper and increase in the density of juniper stands has led to conditions that favored a decrease in soil infiltration and increase in peak discharges, especially in areas where dense pinyon-juniper cover has resulted in a lack of understory vegetation.

An important objective of pinyon-juniper treatments is to remove encroaching pinyon-juniper to restore the natural hydrologic regime. Treatments should lead to a long-term decrease in runoff, and an increase in infiltration, which should help to reduce the short-term intensity of stream flows during high rainfall events to the benefit of stream function and stability.

Hydrologic functions may ultimately improve along some perennial and intermittent streams and springs within the pinyon-juniper treatment areas. Petersen and Stringham (2008) found that water infiltration decreased as juniper canopy cover increased due to the loss of herbaceous and shrub vegetation. Depth of water was also lowest in plots dominated by juniper. Pierson et al. (2008) and Thurow and Hester (2012) found that runoff and erosion are greater from interspace areas than vegetated areas within pinyon-juniper woodlands. Lossing (2012) observed that removal of pinyon-juniper resulted in a 40 percent increase in the amount of rainfall reaching the soil surface compared to untreated stands. Thus, removal of trees should increase runoff, but could also increase infiltration.

Noelle (2012) observed that by leaving slash and other woody debris on the ground, sediment yield was significantly reduced. It is unlikely that additional water yields (flow durations and volumes) would be widespread, but they may occur at some treatment sites where dense pinyon-juniper stands occur along streams or near springs. As discussed earlier, removal of pinyon-juniper that is encroaching into riparian habitat can improve stream flow. These benefits would be more likely in Phase II and III pinyon-juniper stands, in the mountains, or on upstream reaches of mountain-front alluvial fan channels (DeBoodt 2008). However, Ffolliott and Gottfried (2012:15), in their literature review of hydrologic processes in pinyon-juniper woodlands, came to the conclusion “that the potential for increasing streamflow volumes by converting tree overstories to an herbaceous cover is poor." They attributed this to the fact that there are few opportunities to reduce evapotranspiration losses in areas with little rainfall where pinyon-juniper is typically found. The low amount of annual precipitation also has little influence on soil moisture.

Treatments along riparian corridors, including the Atlas, Birch, Frazier, Henderson, Upper Pete Hanson, Upper Roberts Creek, and Vinini units, may result in some streamflow increases and water quality improvements, while improvements to the understory should reduce soil erosion and impacts to water quality long-term. These treatment areas are within and along the flanks of the Roberts Mountains. Removal of pinyon-juniper from these areas can be expected to improve infiltration and recharge to shallow groundwater along and near stream areas. The degree of improvement would depend on the depth to groundwater and the nature of the bedrock hosting the shallow aquifer. Thurow and Hester (2012) found that runoff and erosion were greater from manual and mechanical treatments when slash was removed than allowed to remain on the ground.

At the 3 Bars Project hazardous fuels reduction treatment units, including Cottonwood/Meadow Canyon, Dry Canyon, Lower Pete Hanson, Sulphur Spring Wildfire Management, and Tonkin units, some flow increases may occur at springs or along streams due to treatments. Hydrologic and wetland functions may improve at the base of alluvial fans and along the valley axis in the upper Coils Creek drainage, near Meadow Canyon, and in the western part of the Three Bars Ranch treatment area. The Sulphur Spring Wildfire Management and Whistler units are along the western side of Diamond Valley and are in recharge areas for the shallow alluvial aquifer in Diamond Valley. Removal of pinyon-juniper could lead to an increase in groundwater recharge in Diamond Valley.

Efforts to reduce the risk of catastrophic wildfires through reduction of hazardous fuels and creation of fire and fuel breaks would reduce the potential for excessive loss of plant and litter cover and the potential for soil erosion and soil mass failures that cause a decrease in water quality. Fire use and other treatments that restore natural fire regimes and ecosystem processes would reduce the effects of fire suppression and benefit water resources and quality.

Sagebrush Treatments

Adverse Effects

Approximately 5 miles of perennial stream are associated with riparian management projects within the larger sagebrush treatment area (Lower Henderson 1 and 3, and Lower Vinini Creek units). Only 1.3 miles of perennial stream habitat are associated exclusively with sagebrush treatment projects—Table Mountain (Henderson and Vinini Creeks), and West Simpson Park (unnamed) units. Approximately 400 acres of treatments are associated with intermittent/ephemeral streams. Water erosion risk is low for most sagebrush treatment areas, except at West Simpson Park, where most (84 percent) of the treatment area would be susceptible to severe water erosion, and at the Three Corners Unit, where 27 percent of unit has severe or moderate risk of water erosion.

If livestock are used as a method of biological treatment to control cheatgrass, crested wheatgrass, and forage kochia, the action of their hooves would cause some disturbance, shearing, and compaction of soil, increasing its susceptibility to both water and wind erosion. Severe compaction often reduces the availability of water and air to the roots, sometimes reducing plant vitality (Belsky 2000).

Beneficial Effects

Seedings and plantings to promote sagebrush development in areas where sagebrush should occur based on ecological site description reference, desired state, or management objective, would help to stabilize soils and reduce the risk of wind and water erosion. Removal of pinyon-juniper from sagebrush treatment areas could improve water flows and groundwater recharge.

Mechanical treatments could improve infiltration in clayey or compacted soils. Henderson Creek is found within the Table Mountain area. Seeding and planting, and pinyon-juniper thinning, in this area may improve hydrologic functions along the creek, particularly by improving runoff conditions and reducing accelerated erosion and related suspended sediment and turbidity.

For some treatment areas, pinyon-juniper removal could improve groundwater recharge by limiting the amount of water lost through plant evapotranspiration. In this case, base flows, which are dependent on the quantity of groundwater discharge, would increase. These changes could be very minor or short-lived if areas were revegetated quickly.

Under some circumstances, vegetation removal could result in the reduction of groundwater discharge and baseflow as a function of reduced infiltration rates. Reduced infiltration rates result in more surface runoff reaching streams and lakes immediately after a rain event, thus increasing the velocity, frequency, and magnitude of peak stream flows. These changes in water quantity could alter the physical characteristics of stream channels and affect the speed of water movement. Any changes would last until the site was revegetated. Stream restoration projects adjacent to sagebrush treatment areas that improve stream function and restore riparian communities, however, should mitigate the short-term increase in runoff from these sites.

Non-native vegetation, specifically cheatgrass, on the 3 Bars Project area is associated with the occurrence of wildfires, which in turn have detrimental effects on water quality. Use of manual, mechanical, and biological control methods and fire use can benefit water quantity and quality if noxious weed and other invasive non-native vegetation removal reduces the risk of catastrophic wildfire.

3.10.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Of the approximately 6,350 acres that would be treated annually under Alternative B, about 2,000 acres would be treated in areas that have moderate to high water erosion potential, or about half that of Alternative A. Because prescribed fire and wildland fire for resource benefit would not be allowed under Alternative B, there would be no risks to water resources from fire use. Excluding prescribed burns would avoid the increases in runoff and erosion common to burned areas. Reduced soil infiltration, due to resinous sealing after intense burning that can occur in high fire susceptibility risk areas, would not occur as a result of prescribed burns. This may not be particularly beneficial, however, if more extensive and intense wildfires occur in place of controlled burns.

By not being able to use prescribed fire, the BLM would be limited to mechanical and biological control treatments to slow pinyon-juniper encroachment, thin pinyon-juniper to promote understory vegetation, and control noxious weeds and other invasive non-native vegetation. In addition, mechanical methods could result in more soil disturbance than the use of fire, which could lead to water degradation in areas with high water erosion risk. The West Simpson Park Unit is on rugged terrain, and use of mechanical equipment to control cheatgrass would be difficult and erosion potential from treatments in this area would be great. If not controlled, large infestations of cheatgrass and other noxious weeds and other invasive non-native vegetation could result in frequent wildfires that would degrade water quality.

3.10.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation and would only treat about one-fourth as many acres as would be treated under Alternative A.

The risk of localized soil compaction and short-term accelerated erosion from treatments, and its contribution to water quality degradation, would be less under Alternative C than the other alternatives, as there would be little ground disturbance under Alternative C. By not being able to use mechanical methods and fire to reduce hazardous fuels and create fire and fuel breaks, the risk of wildfire and its impacts on soil would be greater under this alternative than the other action alternatives. In addition, fewer acres would be treated to improve stream function and capability, and to remove pinyon-juniper and improve key sagebrush habitat, and benefits to surface and groundwater availability and quality from treatments under Alternative C would be less than under Alternatives A and B.

3.10.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to soil resources from this alternative as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. The processes that create knickpoints, headcuts, and unstable streambanks would remain active, there would be few benefits to deep-rooted vegetation near streams, and there would be little improvement in stream flows. Thus, the health of the landscape would continue to deteriorate, and water quality and quantity would also deteriorate due to loss of soil due to erosion, stream channel instability, pinyon-juniper encroachment, and wildfire. These long-term effects would be greatest under Alternative D.

3.10.3.4 Cumulative Effects

The CESA for water resources is approximately 1,841,700 million acres and includes those watersheds at the Hydrologic Unit Code 10 level that are all or partially within the 3 Bars Project area (**Figure 3-1**). Approximately 92 percent of the area is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service. Past and present actions that have influenced water resources in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.10.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

The use of temporary fencing to protect treatment areas within the CESA, should benefit water resources. The measures that the BLM would take to minimize livestock and wild horse impacts to treatment areas are discussed in more detail in Section 3.18.4 (Livestock Grazing Mitigation), and in **Appendix C**.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. These treatments could have short-term effects on water quality, primarily through ground disturbance and erosion associated with use of mechanical equipment, or if herbicides were accidentally spilled into a water body, but these risks would be negligible. Treatments would help to reduce hazardous fuels, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites on about 1,000 acres annually, to the benefit of water resources.

Five herbicides are typically used on the 3 Bars Project area—2,4-D, glyphosate, imazapyr, metsulfuron methyl, and picloram. For the 3 Bars Project, it is likely that the BLM would also use imazapic to treat cheatgrass. Based on an assessment of risks from the use of herbicides, there is potential for glyphosate and metsulfuron methyl to be transported by wind and water in areas with moderate to high risk of wind or water erosion. Several herbicides are known groundwater contaminants (USDOI BLM 2007b:4-29 to 4-34). The BLM would minimize the risk of contamination of water bodies from herbicides by using appropriate buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.

Land development, mineral development, and oil, gas, and hydrothermal exploration and development would disturb soil, which would lead to soil erosion and water quality impacts and use of groundwater for public and industrial uses. Land development and development of natural resources would involve the use of equipment and drilling wells, which could result in spills of hydrocarbons and other hazardous materials. This, in turn, could impact surface water and groundwater. For example, a recent oil spill at the Blackburn oil well in Pine Valley impacted over 3 acres (USDOI BLM 2012b:4-47).

Modeling suggests that there could be a significant impact to groundwater levels near the Mount Hope Project due to mining and other activities in the CESA, and that it may be 100 years or more before groundwater levels have recovered to their pre-mining levels (USDOI BLM 2012b:4-48 to 4-50). Mining activities within the CESA may also create significant adverse impacts to surface water resources including 2 perennial stream segments (Roberts Creek and Henderson Creek) and 22 springs, mainly by altering drainage features, by dewatering springs or stream segments, and by water quality impacts from disturbed area runoff or escapes from processing facilities. Most of these impacts from mining activities would be avoided or reduced through state and federal mining regulations and related compliance programs. However, modeling done for the Mount Hope Project found that agriculture, mining, and oil and gas development could lead to substantial water quantity and quality issues in the CESA (USDOI BLM 2012b:3-74 to 3-112).

Hazardous fuels reduction, habitat improvement, and noxious weeds and other invasive non-native species control projects would occur on approximately 142,000 acres (127,000 for the 3 Bars Project and 15,000 acres for other hazardous fuels projects in the CESA), or 8 percent of the CESA (about 1 percent of the CESA annually). These treatments would lead to short-term increases in soil erosion and surface water runoff, but would have long-term benefits to water quality and possibly to water flows. The disturbance effects resulting from restoration activities are predicted to have less impact and be less severe than effects and erosion caused by catastrophic wildfire, which could occur on about 6,900 acres annually. In addition, a reduction in the spread of noxious weeds and other invasive non-native vegetation is expected to help reduce soil erosion, especially in areas that are prone to water erosion. Overall, 3 Bars Project actions would have a minor contribution to water resources effects occurring within the CESA under Alternative A.

3.10.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on water resources would be similar to those described under Alternative A. The BLM anticipates treating about half as many acres under Alternative B as under Alternative A, and less effort would be spent by the BLM on treatments to reduce wildfire risk and loss of soil from erosion, including use of fire to restore natural fire regimes.

Adverse effects to water resources would generally be the same as described for Alternative A. However, by not using fire, there would be no risks to water quality from fire on several thousand acres annually within the 3 Bars Project area.

The BLM would be limited to discing and plowing and using livestock to control non-native vegetation on several thousand acres annually. These methods could result in more soil disturbance and soil erosion that could impact water quality, than the use of fire. The West Simpson Park Unit is on rugged terrain, and use of mechanical equipment to control cheatgrass would be difficult and erosion potential from treatments would be great.

Under Alternative B, annual hazardous fuels reduction and habitat improvement projects could occur on about 6,300 acres within the 3 Bars Project area, and on an additional 1,500 acres within the CESA under current or reasonably foreseeable future authorizations, or less than 1 percent of acreage within the CESA. Because of the large acreage treated, water quantity and quality should improve within the 3 Bars Project area and CESA, although not to the extent as would occur under Alternative A.

3.10.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on water resources would be similar to those described under Alternative A. Under Alternative C, the BLM would treat about 3,200 acres annually within the 3 Bars Project area. Adverse, short-term effects to water resources associated with the use of prescribed fire and wildland fire for resource benefit and mechanized equipment would not occur under Alternative C. However, fire use, herbicides, and mechanized equipment would be used in other portions of the CESA. These treatments in other portions of the CESA would affect about 1,500 acres annually. 3 Bars Project restoration treatments would have short-term adverse and long-term beneficial effects on water resources, but these effects would be negligible (0.2 percent of acreage within the CESA on an annual basis) in the context of the acreage within the CESA and other types of activities that have effects on water resources, such as the Mount Hope Project and irrigation. By not being able to use mechanical methods to thin and remove pinyon-juniper and sagebrush to encourage development of the understory, create fire and fuel breaks, use seeding/planting to improve habitat, and remove slash and other downed woody debris and reduce hazardous fuels, however, the risk of wildfire and its impacts on water resources would likely increase on the 3 Bars Project area. Because of the acreage treated, water quantity and quality would improve within the 3 Bars Project area and provide a minor benefit to water resources within the CESA, although not to the extent as would occur under Alternatives A and B.

3.10.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on water resources would be similar to those described under Alternative A. There would be no cumulative impacts to water resources from this alternative as no treatments would be authorized under this alternative. The BLM could conduct stream bioengineering treatments; create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire, but on a very limited acreage. Thus, factors that contribute to reduction in water quantity and degradation of water quality would remain, including soil erosion, stream channel instability, spread of noxious weeds and other invasive non-native vegetation, pinyon-juniper encroachment, and wildfire, and would likely be greatest under this alternative.

3.10.3.5 Unavoidable Adverse Effects

An increase in soil erosion and surface water runoff could result from restoration treatments, which could lead to streambank erosion and sedimentation. Rates of runoff would be influenced by precipitation rates, soil types, and proximity to the treated area. All vegetation removal activities could disturb the soil and reduce the amount of vegetation binding to soil, potentially causing erosion and increased sedimentation. The removal of vegetation would decrease the amount of rainfall captured by plants, detritus, and soil, potentially leading to increased stormwater flows, runoff velocity, and sedimentation.

3.10.3.6 Relationship between Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Over the short-term (several months or a few years), access for some users to surface water features within treatment areas would be restricted. The BLM would investigate the status of any water right associated with an affected water feature to determine whether, and to what extent, it could implement the proposed treatment, and if any mitigation was needed and the effectiveness of the mitigation. This would be an adverse impact to existing water rights holders and beneficial uses. The BLM would offset those impacts to existing water rights holders.

Treatment of vegetation would cause a short-term increase in soil erosion and surface water runoff. Successful control of noxious weeds and other invasive non-native plants, however, would lead to improved conditions in watersheds over the long-term, with the greatest improvement likely to occur in degraded watersheds. The eventual growth of desirable vegetation in treated areas would moderate water temperatures, buffer the input of sediment from runoff, and promote streambank stability. Ongoing efforts by the BLM to enhance vegetation would also help to increase the acreage of watersheds that are functioning properly. Improvement of watersheds and water flows and quality would benefit Lahontan cutthroat trout and other aquatic organisms that depend upon aquatic habitats for their survival.

Vegetation treatments that reduce hazardous fuels would benefit ecosystems by reducing the chances of a large, uncontrolled wildfire, which could destroy a large amount of high quality habitat and potentially lead to erosion, especially if followed by heavy rainfall. Hazardous fuels reduction would also decrease the likelihood that wildfire suppression activities would occur in or near aquatic habitats (USDOI BLM 2007b:4-247).

3.10.3.7 Irreversible and Irretrievable Commitment of Resources

An accidental fuel spill or uncontrolled wildland fire could cause damage to water bodies and the ability to use water resources in the affected area could be lost for a short period of time. However, these impacts would be highly unlikely and could be reversed if restoration treatments are successful. Other treatments should not result in irreversible or irretrievable commitments of water resources.

Under all alternatives, there could be a short-term (less than 5 years) increase in soil erosion from 3 Bars Project treatments, primarily those where the soil is disturbed by mechanical or fire treatments. This increase in erosion could lead to increased sedimentation or turbidity in streams or ponds. These impacts from soil erosion would accrue with soil erosion and loss of soil associated with other land disturbance activities in the CESA. These losses of soil due to erosion and its impacts to water quality in streams and ponds in the 3 Bars Project area would be offset by long-term benefits from: 1) stream restoration projects that promote stream stability and riparian vegetation development; 2) improvements in vegetation in areas where thinning pinyon-juniper promotes understory development; 3) removal and control of noxious weeds and other invasive non-native vegetation and revegetation of treatment sites with native vegetation; and 4) hazardous fuels reduction treatments that reduce the risk of a catastrophic wildfire, including prescribed burning and use of wildland fire for resource benefit, and the creation of fire and fuel breaks.

It is possible that prescribed fire and wildland fire for resource benefit treatments could result in erosion that could adversely affect water quality. However, the BLM would use SOPs to minimize this risk, including discing on contour and avoiding treatments on steep slopes. Loss of soil and its effects on water quality could be greater in areas burned by wildfire, as these areas can be large, are often in remote areas, and can be difficult to revegetate. Thus, BLM treatments that reduce the risk of a wildfire should help to slow soil erosion and improve water quality.

3.10.3.8 Significance of the Effects under the Alternatives

Under all alternatives, there could be short-term releases of sediments and fuels and lubricants from equipment into water bodies from actions within the CESA. The BLM would prevent or minimize the movement of fuels and lubricants into water bodies by fueling and servicing equipment off-site or away from streams. Although multiple treatments could occur on some treatment units or sites, especially those where prescribed fire and wildland fire for resource benefit are used (e.g., fire treatment followed by mechanical treatment to control non-native species and seeding), treatments would likely occur only once or twice a year. By retaining buffers between treatment areas and water bodies where feasible, and following other SOPs that protect water quality, it is unlikely that there would be a change in water quality that would often or regularly exceed Nevada water quality standards.

The BLM could, but is not likely to, divert water while reconstructing streams, and use water to manage prescribed fires and wildland fires for resource benefit. The BLM also may prevent access by livestock, wild horses, and other wild ungulates to treatment sites near water in riparian and aspen treatment areas until these areas were restored and able to accommodate use by these animals. It is anticipated that access restrictions would be in place for a minimum of 2 growing seasons or until vegetation establishment criteria are met. If access to treatment areas is restricted, the BLM would work with the affected permittee(s) to ensure livestock, wild horses, and other wild ungulates access water. Thus, there should be no significant long-term diversion, access restriction, or consumptive use of surface water that substantially reduces water availability and the uses recognized by Nevada Department of Water Resources in the CESA under all alternatives. This would include flows and seasons of use in springs or streams where existing beneficial water uses, as defined by Nevada Division of Environmental Protection and recorded by Nevada Department of Water Resources, may be affected.

Nearly all 3 Bars Project restoration treatments would cause short-term erosion that leads to increased sedimentation in streams or ponds. These risks would be greatest in restoration areas with moderate to severe water or wind erosion potential, or where soils are susceptible to fire degradation. Treatments that disturb the soil or remove large amounts of vegetation, including the use of mechanical treatments such as discing and plowing, and prescribed fire and wildland fire for resource benefit, could also lead to short-term erosion and sedimentation. Long-term, restoration treatments would lead to conditions that should reduce the risk of erosion, including revegetation of treatment sites with native vegetation and treatments to stimulate growth of the understory. Treatments that reduce the risk of wildfire, including hazardous fuels treatments, control of noxious weeds and other invasive non-native vegetation, and create fire and fuel breaks would reduce the risk of erosion resulting from wildfire and its effects on water quality. Thus, none of the alternatives would result in a significant long-term (greater than 5 years) accelerated erosion from watershed slopes or increased sedimentation in streams or ponds.

None of the treatments proposed under the alternatives should lead to significant uncontrolled stream channel and bank instabilities. However, stream channel improvements are not proposed under Alternative D, and only about 8 miles of degraded streams would be treated under Alternative C. Thus, it is likely that the number of miles of streams with stream and bank channel instability within the 3 Bars Project Area and CESA would continue to increase under Alternative D, while there would be little improvement in stream and bank channel stability under Alternative C.

As discussed in the Mount Hope Project EIS, mining, agriculture, and other activities in the CESA are predicted to have a significant impacts to surface and groundwater quantity, including 2 perennial stream segments and 22 springs (USDOI BLM 2012b:4-48 to 4-50); these impacts could last 100 years or more. Tomitigate these impacts, the BLM identified several mitigation measures, including installation of new wells or deepening of existing wells, development of existing water sources, including springs, and fencing to protect water sources (USDOI BLM 2012b:19-22). Short-term, 3 Bars Project restoration treatments also could contribute to localized, minor declines in groundwater levels, especially in large-scale fire treatment areas. However, these declines would likely not exceed seasonal fluctuations in water levels. Long-term, 3 Bars Project treatments should result in improved surface water flows and groundwater recharge. Thus, the effects of 3 Bars Project treatments would not, by themselves, result in a significant cumulative effect to water resources.

3.10.4 Mitigation

Water resources would benefit from mitigation measures identified in Section 3.18.4 (Livestock Grazing Mitigation). No mitigation or monitoring measures are recommended specifically for water resources.

3.11 Wetlands, Floodplains, and Riparian Zones

3.11.1 Regulatory Framework

This section discusses the laws and regulations that apply to wetlands, floodplains, and riparian zones potentially affected by the 3 Bars Project. These resources are considered valuable natural resources that provide habitat for a variety of dependent plant and wildlife species.

3.11.1.1 Definition of Wetlands

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) and USEPA in 33 CFR § 328.3 and 40 CFR § 230.3 as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, wet meadows, and similar areas.

The USACE's *Wetland Delineation Manual* defines a three parameter approach to delineating jurisdictional wetlands. In order for an area to be considered a jurisdictional wetland it must support each of the three wetland parameters: hydric soils, wetland vegetation, and wetland hydrology (USACE 1987).

Hydric soils are defined as "soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation." Wetland (hydrophytic) vegetation is defined as any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water. The *Wetland Delineation Manual* requires that, in most cases, more than 50 percent of the dominant vegetation include species that meet the wetland plant technical criteria. Wetland hydrology, although the driving force for wetland formation, is the most obscure attribute to define. Wetland hydrology encompasses all hydrologic characteristics of areas that are periodically inundated or have soil saturated to the surface at some time during the growing season (USACE 1987).

3.11.1.2 Definition of a Riparian Zone

BLM Manual 1737, *Riparian-Wetland Area Management*, defines a riparian zone as a form of wetland transition between permanently saturated wetlands and upland areas (USDOI BLM 1992a). These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian zones. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.

3.11.1.3 Definition of a Floodplain

The geomorphic floodplain is that area starting at or just above the bankfull elevation of the stream channel, where frequent flood events spill out of the channel. The floodplain is inundated relatively frequently, such as once every 1 to 3 years. The floodplain is normally a relatively flat topographic feature adjacent to the stream channel that allows floodwaters to spread out and thus dissipate energy. When flood energy is dissipated, floodwater velocity is reduced and sediments begin to settle out. All of this happens best when the active riparian floodplain is properly vegetated with riparian grasses, sedges, shrubs, and trees. The root masses of these plants anchor them into the floodplain and hold the sediments in place. The above ground parts of these riparian plants help to physically disrupt and retard the energy of floodwater and to trap and stabilize sediments.

3.11.1.4 Sections 401 and 404 of the Clean Water Act

The USACE regulates the discharge of dredged or fill material into waters of the U.S. under Section 404 of the Clean Water Act. Section 404 prohibits the discharge of dredged or fill material into waters of the United States, (including wetlands) without a permit from the USACE. The regulations and policies of the USACE mandate that the filling of wetlands be avoided unless it can be demonstrated that no practicable alternatives (to filling wetlands) exist.

Section 401 of the Clean Water Act requires that an applicant applying for a USACE permit for the discharge of dredge or fill material must also obtain a water-quality certificate from the appropriate state agency that states that their activity is consistent with the state’s water quality standards and criteria. The conditions in the certificate are incorporated into the USACE permit. Section 401 certifications are issued by the Nevada Division of Environmental Protection.

3.11.1.5 Executive Orders

Two Executive Orders apply to wetlands and floodplains:

- Executive Order 11990, *Protection of Wetlands* – agencies are to minimize destruction, loss, or degradation of wetlands, and enhance and preserve the natural and beneficial values of wetlands; and

- Executive Order 11988, *Floodplain Management* – addresses activities in floodplains and management of multiple resources comprising floodplain values.

3.11.2 Affected Environment

3.11.2.1 Study Methods and Analysis Area

Study methods employed in the preparation of this section include review of baseline information, a reconnaissance-level site visit, project-specific vegetation mapping, and agency coordination. Several sources were reviewed in the preparation of this section, including USGS topographic and USFWS National Wetland Inventory maps; aerial photographs; and technical documents including the Falcon to Gonder EIS (EDAW 2001), AECC (USDOI BLM 2009a), and Mount Hope Project EIS and references cited therein (USDOI BLM 2012b); discussions with BLM resource specialists; Geographic Information System shapefiles provided by BLM resource specialists for spring inventories and riparian monitoring; and site-specific studies conducted on the 3 Bars Project area.

The analysis area for direct and indirect effects to wetlands, floodplains, and riparian zones lies within the 3 Bars Project area. The analysis area for cumulative impacts to wetlands, floodplains, and riparian zones includes the Hydrologic Unit Code 10 watersheds wholly, or partially within, the project area (**Figure 3-1)**. This area includes parts of the drainages and groundwater basins as defined by the Nevada Department of Water Resources and identified in **Figure 3-22**.

3.11.2.2 Wetlands

No formal delineation of wetlands has been done for the project area. Based on the USFWS National Wetlands Inventory, approximately 2,363 acres of wetlands are found on the project area (USDOI USFWS 2012). Wetlands in the 3 Bars Project area include saline flats or playas, and wetlands associated with surface water features, including stream channels and reservoirs Wet meadows on the project area are dominated by hydrophytes such as Nebraska sedge, spikerush, alkali bluegrass, foxtail barley, clustered field sedge, and Baltic rush.

3.11.2.3 Riparian Zones

Approximately 96 miles of perennial stream are on the project area. These include Denay Creek, Henderson Creek, McClusky Creek, Roberts Creek, and Vinini Creek (**Figure 3-22**). There are also 2,334 miles of intermittent/ephemeral streams. The USGS does not distinguish between intermittent and ephemeral streams within the project area. The majority of streams classified as intermittent on the 3 Bars Project area do not have seasonal water, but only have water occasionally and would be classified as ephemeral. These streams may have associated riparian habitat. Riparian zones in the project area have vegetation dominated by wild rose, narrow-leaf willow, narrow-leaf cottonwood, redosier dogwood, and water birch. Aspen characterizes some of the mountainous riparian zones.

3.11.2.4 Floodplains

Federal Emergency Management Agency (FEMA)-designated Zone A flood hazard areas, which would be flooded during a 100-year, 24-hour runoff event, have been delineated in low-lying areas in the northern, eastern, and southern parts of the project area. Based on historical maps, the major Zone A delineations occur along Pine Creek, Henderson Creek, and lower Pete Hanson Creek in the northern part of the project area. All of the lower-elevation areas along Slough Creek, Coils Creek, and lower Roberts Creek are within floodplains (FEMA 2013). These zones range from approximately one-eighth to one-quarter mile wide along the individual streams, and coalesce to form broad flood zones up to 2 or 3 miles wide along the valley floors. No FEMA flood hazard Zone A delineations occur in the central or western part of the project area.

3.11.2.5 Proper Functioning Condition Surveys

Proper Functioning Condition surveys have been conducted by the BLM for wetlands and riparian zones on the project area. A wetland area or riparian zone is considered to be in Proper Functioning Condition when adequate vegetation, landform, or large woody debris are present to:

- dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality;
- filter sediment, capture bedload, and aid in floodplain development;
- improve floodwater retention and groundwater recharge;
- develop root masses that help to stabilize streambanks against cutting action;
- develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
- support greater biodiversity.

If a wetland or riparian zone is not in Proper Functioning Condition, it is placed into one of three other categories (BLM 1998a):

- **Functional-at-risk** – Riparian or wetland areas are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.
- **Nonfunctional** – Riparian or wetland areas clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, or meeting other goals mentioned above.
- **Unknown** – Riparian or wetland areas where managers lack sufficient information to make any form of determination.

Functional-at risk areas may be placed into other sub-categories, depending on whether an upward trend toward attaining, or a downward trend away from, Proper Functioning Condition can be determined.

Proper Functioning Condition ratings for the 3 Bars ecosystem for those streams and wetlands that have been rated are:

- Proper Functioning Condition - 47 miles of stream and 58 acres of wetlands.
- Functioning-at-risk with upward trend - 35 miles and 13 acres.
- Functioning-at-risk with trend not apparent - 34 miles and 29 acres.
- Functioning-at-risk with downward trend - 37 miles and 61 acres.
- Nonfunctional - 26 miles and 6 acres.

Factors contributing to degraded conditions include headcuts and knickpoints within deeply incised channels that are lowering the water table and drying out nearby wet meadows and riparian areas; altered runoff and infiltration regimes; bank shearing and terracing; channel erosion; poor sinuosity, width/depth ratio, and gradient along the stream reach; roads impacting stream flow; degradation by livestock and wild horses; frost heaving; lack of stream-floodplain connections; insufficient type or amount of vegetation to protect streambanks and slow discharge velocity; and noxious weeds and other invasive non-native vegetation (USDOI BLM 2009a, b).

A number of riparian and wetland areas on the Roberts Mountains are not at Proper Functioning Condition or have functioning-at-risk conditions with actively upward trends (**Figure 3-24**). Similar areas are more widely scattered in the Simpson Park Mountains. Pinyon-juniper expansion and/or encroachment are occurring in the Pete Hanson Creek and Birch Creek areas on the northern Roberts Mountains. Parts of Indian Creek and Indian Springs, a complex of sites in the northwestern part of the project area, and several sites in the Vinini and Henderson Creek drainages, are the major areas at Proper Functioning Condition. Other streams and springs are generally in a Functioning-at-risk condition; many have no observable trend, or are in a downward trend.

3.11.3 Environmental Consequences

3.11.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

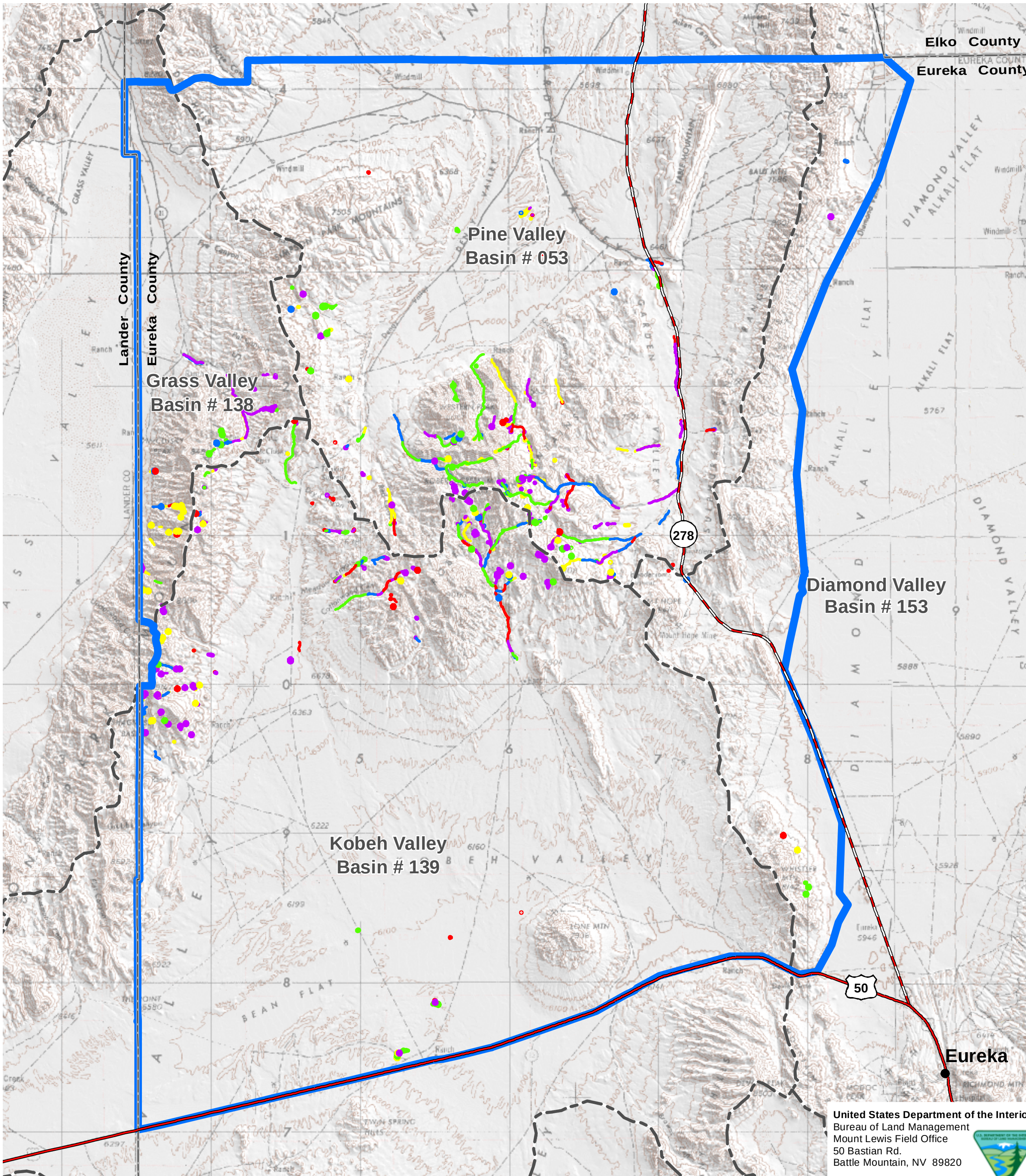
Key issues of concern that pertain to wetlands, floodplains, and riparian zones were identified in the AECC and during scoping. These issues include:

- Concerns about the impacts of the various treatments on wetlands and riparian zones.
- Impacts of livestock on wetlands and riparian zones.
- The potential that desertification is making riparian zones less resilient.
- Questions about hot season use of riparian and wetland areas for grazing.
- Recommendations that the BLM remove wild horses, cut trees, and construct enclosures in meadow areas.
- Streams, springs, and meadows are functioning at less than the Proper Functioning Condition.

3.11.3.2 Significance Criteria

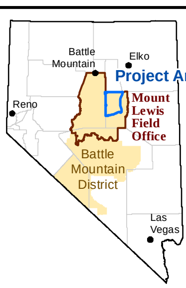
Impacts to wetlands, floodplains, and riparian zones would be considered significant if BLM actions resulted in one or more of the following:

- The destruction, loss, or long-term (greater than 10 years) degradation of wetlands, floodplains, or riparian zones.
- A long-term reduction in the flood-attenuation functions of floodplains.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)



Legend

Proper Functioning Condition Rating

- Proper Functioning Condition
- Functioning-at-risk with Upward Trend
- Functioning-at-risk with Trend Not Apparent
- Functioning-at-risk with Downward Trend
- Non-functioning
- 3 Bars Project Area

Source: NDWR 2012, BLM 2013h.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-24

Proper Functioning Condition Rating

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.
Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
This product was developed through digital means and may be updated without notice.

- A long-term reduction in the functions of wetlands or riparian zones, a long-term reduction of the acreage of riparian and wetland areas in Proper Functioning Condition, or a downgrade of Functioning-at-risk riparian or wetland areas to a downward trend or to nonfunctional.

3.11.3.3 Direct and Indirect Effects

3.11.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Restoration treatments would focus on stabilizing streambanks and channels, reducing erosion, improving water flows, restoring native fire resilient vegetation, reconnecting streams with their floodplains, and restoring natural channel dimension, pattern, and profile. Wetland, floodplain, and riparian zone treatments have effects in common with Soil Resources (Section 3.9), Water Resources (Section 3.10), Native and Non-invasive Vegetation Resources (Section 3.12), Fish and other Aquatic Organisms Resources (Section 3.15), and Wildlife Resources (Section 3.16). Thus, adverse and beneficial effects associated with those resources, primarily those for Riparian Treatments and Aspen Treatments, would also apply to wetland, floodplain, and riparian zone resources and the reader is encouraged to also review those sections.

Adverse Effects

Various treatments under the alternatives have the potential to adversely affect nearby wetlands, floodplains, and riparian zones. Adverse effects associated with vegetation removal in wetlands and riparian zones were discussed in the 17-States PER (USDOI BLM 2007c:4-28 to 4-29). Removal of vegetation and soil disturbance associated with treatments could lead to increased soil erosion and surface water runoff, which could lead to channel alterations and sedimentation in wetlands and riparian zones. Removal of vegetation could also decrease the amount of rainfall captured by plants, detritus, and soil, potentially leading to increased stormwater flows and runoff velocity in streams and indirectly affecting wetlands and riparian zones. Increased light and disturbance tend to favor early successional species, including noxious weeds and other invasive non-native vegetation. By leaving slash and other downed woody debris from treatments on the ground as mulch, runoff and erosion would be slowed and more water would infiltrate into the ground.

One important function of wetlands and floodplains is to dissipate the energies associated with flood events, thereby reducing erosion, capturing nutrient rich sediment, and improving water quality. Increased stormwater runoff can scour wetlands and floodplains and modify their morphology. Removal of vegetation may decrease resistance to overland flow. It would also decrease canopy interception of precipitation and evapotranspiration, which would increase the amount of free water. As a result, both increased runoff and increased infiltration would likely result. Siltation could reduce water quality and the amount of oxygen available to aquatic organisms. Siltation could also reduce the acreage of wetland and riparian habitat. Impacts associated with loss of vegetation would be short-term, as vegetation would soon return to treated areas. The BLM would reseed or replant wetland and riparian zones where the native plant community is unlikely to recover and occupy the site, and restrict livestock, wild horse, and wild ungulate access to treatment areas until establishment goals have been reached.

Beneficial Effects

Vegetation treatments would be used, to varying degrees, to help restore targeted wetlands and riparian zones to Proper Functioning Condition and to increase stream flows. Treatments would include stream bioengineering, structures such as deflectors and weirs, road and culvert modifications, removal of pinyon-juniper from aspen stands and historical riparian zones, hand planting of native species, and use of temporary and existing permanent fencing to restrict livestock, wild horse, and other wild ungulate access to treatment areas. These treatments, which would be designed specifically to improve the functions of targeted wetland and riparian zones, would be expected to have a beneficial effect on these areas. Excluding livestock, wild horses, and other wild ungulates from treatment areas using fencing would reduce soil disturbance in treatment areas and allow native vegetation to recover.

Removal of pinyon-juniper may improve water flows in streams and water yields at spring sources and in near-surface aquifers. Hand planting native species would benefit wetland and riparian zones by providing additional vegetation that would help prevent erosion, protect streambanks, and provide habitat for wildlife.

3.11.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Approximately 63 miles of streams have been identified as Functioning-at-risk with no trend or a downward trend, or Nonfunctioning. Riparian zone treatments would focus on restoring stream and habitat functionality in those streams where both the morphology and structural integrity of the stream channel, plant species composition, soil structure, or other conditions within the riparian zone have been compromised by past actions. The BLM proposes to restore streams by removing, or reducing the effects of, causative factors that have led to stream degradation, and implementing bioengineering, streambank stabilization, and other methods that utilize structures which manipulate stream power to meander degraded and incised water courses in ways that restore stream functionality.

Adverse Effects

Manual treatments proposed for riparian zones would generate a relatively small amount of ground disturbance. Treatments include placement of rocks, gravel, logs, and other bioengineered structures in streams to manipulate water flow, and plantings along the streambank. Some associated erosion and sedimentation into aquatic habitats would occur over the short-term, as degraded channels are induced to evolve back towards a stable dimension, pattern, and profile. Additionally, if noxious weeds and other invasive non-native vegetation are present on treatment sites, or brought to the site by workers or their equipment, they could increase as a result of disturbance.

Many of the mechanical treatments would occur within stream channels, where heavy equipment would be used to improve the structural integrity of the stream channel. The potential impacts of mechanical treatments on wetlands and riparian zones are discussed in the 17-States PER (USDOI BLM 2007c:4-29 to 4-30). Adverse effects would likely be associated with soil disturbance, vegetation removal, and any potential release of petroleum products from vehicles into aquatic systems. Use of heavy equipment in or near wetlands and riparian zones is likely to cause ground disturbance that could lead to a temporary increase in erosion. The use of heavy equipment can also result in soil compaction, particularly in areas of moist soils, which can increase surface runoff from the treated areas, reduce soil porosity, and limit water infiltration. Spills resulting from fueling, equipment maintenance, and operation could adversely affect water quality and the health of wetland or riparian zones. These effects would be minimized through the use of SOPs, including maintaining a 300-feet buffer between the fueling area and water bodies (**Appendix C**).

For Frazier Creek Group units, all pinyon-juniper within 200 feet of riparian zones or within historic floodplains would be removed, except on south or west facing slopes lacking shrubs or herbaceous vegetation. This could cause short-term soil disturbance and erosion and increase surface water flows until ground cover re-established. Use of mulch and other erosion controls on treatment sites would reduce these effects.

Many riparian treatment areas are within, or in close proximity to, aspen, pinyon-juniper, or sagebrush treatment areas as discussed below. Treatments in upland areas, especially those on hillslopes and involving the thinning or removal of pinyon-juniper, have the potential to adversely affect downslope riparian habitat. For example, removal of pinyon-juniper or other vegetation on nearby upland habitat could cause a short-term increase in surface water flows and soil erosion, leading to increased flows and sedimentation in streams. This could occur if a large precipitation event occurs before mulch is applied, and could generate erosion and sedimentation that could affect wetland, floodplain, and riparian habitats. By using slash and other woody debris from treatments as mulch, or having a vegetated buffer between upland treatment areas and water bodies, these effects to streams and other water bodies from upland treatments should be greatly reduced.

Beneficial Effects

It is expected that all of the proposed treatments in wetlands, floodplains, and riparian zones would have long-term beneficial effects on wetland and riparian habitats by restoring the natural processes that lead to Proper Functioning Conditions.

Efforts to restore optimal channel dimension, pattern, and profile would help to improve surface water quality, attenuate peak runoff, capture sediment, increase groundwater recharge and base flow, expand riparian acreage, and support healthy, soil stabilizing, riparian vegetation. By restoring streams to stable channel types, reducing runoff, and increasing infiltration, water should stay on the land longer to the benefit of deep-rooted riparian/wetland vegetation, resulting in expanded riparian zones and more stable streams. Stream incision, which can be caused by a loss of stream sinuosity associated with increased runoff and/or decreased soil stabilizing vegetation, has caused groundwater to drain to the lower stream level along many proposed treatment streams, causing nearby areas to dry out. By creating conditions that reduce channel incision, induce sinuosity and bank storage, and reduce surface runoff and increase infiltration, deep-rooted herbaceous species that are being lost in many riparian zones should benefit.

The BLM would remove pinyon-juniper that is encroaching into riparian zones. Treatments to remove pinyon-juniper from riparian management units may increase water yield and groundwater recharge, to the benefit of wetland vegetation, fish and other aquatic species, and wildlife (DeBoodt 2008). Pinyon and juniper are not riparian species, and are not as effective as native vegetation in stabilizing soil. If field investigations indicate that it would be beneficial to the system, logs and other woody debris would be placed into streams to slow water flows, induce meandering, and create wetland and riparian habitat. Pinyon-juniper that are cut down could also be removed from the site for firewood, fence posts, and other uses.

Many riparian treatment areas are within or in close proximity to upland treatment areas. Although treatments upslope from riparian zones could have short-term adverse effects on stream flows and water quality, long-term, these treatments should be beneficial. Studies have shown that runoff from sites dominated by pinyon-juniper is up to 15 percent greater than from sites without pinyon-juniper and that removal of pinyon-juniper that is encroaching into riparian habitat can improve streamflow. DeBoodt (2008) found that in areas where all junipers were cut from a watershed, late season spring flow, days of recorded ground flow, and late season soil moisture increased compared to pretreatment conditions.

Surface water runoff may increase short-term from removal of vegetation, especially encroaching pinyon-juniper in Phase II and III stands, because there is often minimal ground cover and shrub vegetation below pinyon-juniper trees, and less rainfall would be intercepted by foliage after tree removal (Lossing 2012). As ground cover and low shrubs re-establish on treatment sites, however, surface runoff and peak discharge should decrease, and infiltration should increase, to the benefit of riparian and wetland habitat downslope. As a result, flows may last longer into the summer months at some springs and in perennial or intermittent streams where dense, deep-rooted pinyon-juniper or other stands are treated. By reducing the magnitude of peak discharges, the chances of stream restoration treatments succeeding due to moderating water flows would greatly increase.

Because riparian treatment success in part depends upon successful completion of treatments upslope, the BLM would attempt to conduct treatments at similar times for treatment areas in close proximity to ensure that treatment impacts occur at about the same time, rather than over many years, and to ensure that treatments are integrated cohesively. For example, slash and other woody debris from pinyon-juniper treatments upslope from a riparian treatment area could be used as mulch to slow runoff on the pinyon-juniper treatment area, but also to provide logs and other woody debris for use in or near streams.

Prescribed fire and wildland fire for resource benefit would be used to slow pinyon-juniper encroachment, which would decrease runoff and evapotranspiration and increase infiltration and shallow subsurface recharge. This would help to increase base streamflows, expand riparian extents, and decrease the damaging effects of high peak discharges. Other beneficial effects include decreasing hazardous fuels, triggering germination of certain native plant species, stimulating growth of new vegetation, and creating wildlife habitat. Fire may also increase the levels of certain nutrients utilized by plants by raising soil pH and burning woody material. Finally, trees near streams that are removed by fire would become standing wood that would ultimately become large woody debris in stream channels, which could provide important habitat for fish (USDOI BLM 2007c:4-31). It is expected that appropriately planned prescribed fires would be of low intensity and unlikely to carry in the damp soils and vegetation of wetlands. Over the long-term, with the planned control of noxious weeds and other invasive non-native vegetation, replanting as needed, and better grazing management, it is expected that native species would return and potentially increase in abundance in wetlands and riparian zones.

Treatments that reduce hazardous fuels and create fire and fuel breaks would benefit wetlands and riparian zones by reducing the potential for catastrophic wildfires and resultant loss of high quality wetland and riparian habitat. Hazardous fuels reduction would also decrease the likelihood that wildfire suppression activities would be needed in or near aquatic habitats.

The BLM would use protective fencing, but not other treatments, to restore riparian habitats at Denay Pond, Lone Spring, and Treasure Well. The BLM would provide a water gap within the fencing to allow livestock to access a portion of these perennial water sources.

Aspen Treatments

Adverse Effects

The RM-A7, RM-A2, and RM-A5 aspen treatment units are partially or wholly within the larger Upper Henderson, Roberts Creek, and Upper Vinini Creek riparian units, respectively. Where projects overlap, riparian projects are typically limited to stream channel work, removal of nearby upland vegetation, plantings, and fencing, whereas aspen projects include pinyon-juniper removal, fencing, and disturbance to stimulate aspen suckering. In the areas of overlap, riparian zones and associated wetland areas may be subject to multiple project disturbances although the BLM would try to minimize multiple treatment disturbance by conducting treatments within the same general area at the about the same time.

Beneficial Effects

Aspen treatment projects would be expected to benefit riparian habitats by encouraging the growth of aspen communities. Aspen contributes to the stability of streams and provides shade and important wildlife habitat for a wide diversity of species (Shepperd and Mata 2005; see also Section 3.16). Therefore, riparian functions would be improved by aspen treatment projects.

Actions that stimulate or enhance aspen suckering and sucker survival should improve the health of aspen stands, and, longer-term, reduce the amount of dead and decaying vegetation in these stands that could provide fuel for a wildfire. The BLM also proposes to remove pinyon-juniper trees near aspen stands to create or enhance fire and fuel breaks to control wildfire spread. Prescribed fire could be used in aspen stands for pile burning.

Use of existing permanent fencing or small, temporary exclosure fencing would benefit areas with aspen sprouts that are heavily grazed. This should benefit aspen, as past studies have shown that aspen stands that are protected from herbivory successfully regenerate and form multi-aged stands without fire or other disturbance. It is believed that ungulate herbivory is the main reason that aspen has declined in central Nevada and on the 3 Bars Project area (Kay 2001, 2002, 2003), although Jones (2010) found that livestock herbivory on aspen could be reduced by using early season grazing and providing mineral supplements in areas with aspens. The BLM typically protects treated stands until the stand density is 1,500 stems per acre and sapling reach at least 7 feet in height. Typically, objectives are met in 3 to 5 years as a result of exclusion.

Pinyon-juniper Treatments

Approximately 938 acres of riparian treatments and 53 acres of aspen treatments could occur within a larger pinyon-juniper treatment project boundary, and could be affected by treatment actions within the larger area. These include about 535 acres (Roberts Creek Unit) associated with Upper Roberts Creek Unit, 235 acres (Roberts Creek Unit) associated with the Atlas Unit, and 118 acres (Frazier Creek, Upper Henderson, RM-A7, and RM-A9 units) associated with the Frazier and Vinini Corridor units. Pinyon-juniper treatments could also occur near riparian habitats that have not been targeted for improvements under riparian enhancement projects.

Adverse Effects

Widespread removal of pinyon-juniper stands could result in substantial ground disturbance, which, if a large precipitation event occurs before mulch is applied, could generate erosion and sedimentation that could affects wetland, floodplain, and riparian habitats. Where mulching and shredding are used as mechanical treatment, the material left on the site would cover bare, exposed soil to help encourage infiltration, capture sediment, and reduce runoff.

Beneficial Effects

It is expected that over the long-term, restoration of historic vegetation communities would benefit wetlands, floodplains, and riparian zones and lead to increased biodiversity in these areas. As discussed under Riparian Treatments, thinning and removal of pinyon-juniper and re-establishment of low-growing herbaceous and shrub cover, especially in Phase II and III stands, should reduce surface runoff and increase water infiltration. This would help to reduce peak flows, and associated channel incision and streambank instability, and increase base flows, which would provide water to streams for longer periods of time and better water quality, to the benefit of riparian and aquatic vegetation.

Thinning pinyon-juniper to improve sagebrush habitat and creating fuel breaks would encourage riparian growth and reduce the risk of wildfire in riparian zones within the Atlas, Frazier, Upper Roberts Creek, and Vinini units. Additionally, pinyon-juniper treatments, including thinning, removal of dead and diseased vegetation, and creation of fire and fuel breaks, would reduce the risk of catastrophic wildfire. Catastrophic wildfire could burn through large sections of riparian and wetland communities, killing vegetation and minimizing the functions of these areas, including water retention and streambank stability, which in turn could affect wetlands and riparian zones within the burn area.

Sagebrush Treatments

Approximately 522 acres of riparian treatments could occur within the larger sagebrush treatment project boundaries, and could be affected by treatment actions within the larger area. These include approximately 363 acres associated with the Lower Henderson 1 and 3 units and 134 acres associated with the Lower Vinini Creek Unit, which are within the Table Mountain Unit.

Sagebrush treatments could also occur near riparian habitats that have not been targeted for improvements under riparian enhancement projects. Only a few areas of perennial streams and seeps/springs are found within proposed sagebrush treatment areas. The Rocky Hills Unit includes two springs that are targeted for treatment under riparian enhancement projects. The West Simpson Park Unit includes seven seeps/springs and a small stretch of perennial stream. The Three Corners Unit includes seven seeps/springs. The Table Mountain Unit includes two large stretches of Henderson Creek, which are also targeted for treatment under riparian enhancement projects. The Roberts Mountain Pasture Unit includes one spring that is targeted for treatment under the Mud Spring Unit riparian enhancement project. No perennial streams (indicating riparian zones) or springs/seeps have been mapped in any of the remaining proposed sagebrush project areas. Therefore, sagebrush treatments in the Alpha, Coils Creek, Kobeh East, Nichols, South Simpson, and Whistler Sage units should not impact wetlands and riparian zones, although it is possible that unmapped wetlands, seeps, or springs occur in these areas.

Adverse Effects

In the sagebrush treatment areas that include riparian zones and wetlands, adverse effects from the various treatment methods could potentially occur. Prescribed fire could be used on hundreds of acres annually to control non-native vegetation, including cheatgrass, the West Simpson Park Unit. Prescribed fire over large acreages could result in loss of organic material on a site, exposing mineral soil, and sometimes forming hydrophobic soil layers that would slow water infiltration. About half of the acreage on the West Simpson Park Unit is moderately to highly susceptible to fire damage, however, the likelihood of a prescribed fire removing substantial amounts of organic material and causing formation of a hydrophobic layer is low in areas dominated by cheatgrass because of the limited amount of vegetation on the site.

Affected areas would primarily occur in units, where livestock could be used to remove cheatgrass and other non-native vegetation. Direct effects could include alteration of stream channel/wetland morphology and loss of native wetland or riparian vegetation. The action of animal hooves would cause some disturbance, shearing, and compaction of soil, increasing its susceptibility to both water and wind erosion. Severe compaction often reduces the availability of water and air to the roots and plant vitality. Biomass, vigor of native plants, and species diversity could all be reduced. The degree of effect would be dependent on the timing, duration, and intensity of grazing.

Beneficial Effects

Successful control of noxious weeds and other invasive non-native plants in wetlands and riparian zones associated with sagebrush treatments would lead to improved conditions in these habitats over the long-term. Treatments that promote the development of understory vegetation, and plantings on or near riparian management areas, would improve riparian habitat and water quality and nearby upland habitat.

Most of the riparian management acreage associated with sagebrush habitat is found on the Table Mountain Unit. Treatments in this unit would focus on removal of encroaching pinyon-juniper. Improvement in understory vegetation cover would reduce the risk of erosion and sedimentation in nearby streams, while removal of pinyon-juniper could improve water flows and availability in streams. Sites with a large component of noxious weeds and other invasive non-native plants may be at a higher risk for erosion than sites that support native vegetation. Non-native vegetation on the 3 Bars Project area is associated with historic wildfires and with rehabilitation of burned areas following wildfires. Treatments can benefit wetland, floodplain, and riparian habitats if vegetation removal reduces the risk of catastrophic fire.

3.11.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

About half as many acres would be treated under Alternative B as under Alternative A, primarily due to the higher costs associated with manual and mechanical treatments. Nearly all wetland, riparian, and aspen habitat and stream channel restoration could be done using manual and mechanical methods. Thus, acreage and miles of wetland, riparian, aspen, and stream channel restoration work done under Alternative B would be similar to that done under Alternative A. Under this alternative, the BLM would likely be able to restore a similar amount of Non-functioning and Functioning-at-risk wetlands and riparian zones to Proper Functioning Condition as under Alternative A.

Without use of prescribed fire and wildland fire for resource benefit, the effectiveness of some treatments could be reduced, but for many treatments there would be no differences in the outcome between alternatives. Fire treatments could lead to a short-term increase in erosion and stream sedimentation, and the spread of noxious weeds and other invasive non-native vegetation. These risks would not occur under this alternative, but the inability to use fire could reduce the effectiveness of pinyon-juniper removal in some areas. The inability to use fire may result in less improvement in water flows in streams due to fewer acres of pinyon-juniper removal, fewer long-term benefits to wetlands and riparian zones from development of more fire resilient vegetation after use of prescribed fire, and greater risk of catastrophic wildfire, under Alternative B than under Alternative A. The BLM would be less likely to reduce hazardous fuels and burn piles of slash, which would increase the risk of catastrophic wildfire under this alternative compared to Alternative A. The BLM would also have less success under Alternative B than Alternative A in slowing pinyon-juniper encroachment into riparian and other habitats, slowing the spread of noxious weeds and other invasive non-native vegetation, restoring fire as an integral part of the ecosystem, developing fire and fuel breaks, and reducing the risk of catastrophic wildfire.

3.11.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would treat about a fourth as much acreage as would be treated under Alternative A. As a result, effects to wetlands and riparian zones from treatments would be much lower than under Alternatives A and B. By not being able to use mechanical treatments, there would be no risk of sedimentation into streams and wetlands from erosion caused by mechanical treatments.

Wetland and riparian restoration treatments would largely consist of hand installation of fencing, hand replanting, and removal of pinyon-juniper with chainsaws. The BLM would be unable to use mechanical methods to address headcuts and stream incision through grade stabilization structures and streambank bioengineering. It would also be more difficult for the BLM to transport and place logs and woody debris from felled pinyon-juniper into streams, remove slash that could pose a fire risk, restore fire as an integral part of the ecosystem, develop fire and fuel breaks, and reduce the risk of catastrophic wildfire.

While an improvement in wetland and riparian function would be expected across all treated areas, the level of improvement would likely be less than under Alternatives A and B, and it is possible that some areas would not be restored to Proper Functioning Condition with only manual methods. Benefits associated with improvements to upland community types would be less than under Alternatives A and B, since a much smaller portion of the project area would be treated, and the reduction in wildfire risk would also likely be lower.

3.11.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to wetlands, floodplains, or riparian zones as no treatments would be authorized under this alternative. The BLM would not conduct stream bioengineering treatments; create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; treat large-scale infestations of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. The processes that create knickpoints, headcuts, and unstable streambanks would remain active, there would be few benefits to deep-rooted vegetation near streams, and there would be little improvement in stream flows. Thus, the health of wetlands, floodplains, and riparian zones would continue to deteriorate and few improvements would be seen in water quality and quantity in these areas. Because degraded channel morphology is a primary factor causing stream habitats to not function properly, Non-functioning and Functioning-at-risk wetlands and riparian zones would persist in the 3 Bars Project area.

3.11.3.4 Cumulative Effects

The CESA for wetland, floodplain, and riparian zone resources is approximately 1,841,698 acres and includes those watersheds at the Hydrologic Unit Code 10 level that are all or partially within the 3 Bars Project area (**Figure 3-1**). Approximately 92 percent of the area is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service. There are approximately 77,629 acres of wetlands (2,363 acres on the 3 Bars Project area and 75,266 acres on other portions of the CESA; most of the non-3 Bars wetland acreage is associated with a large playa that is usually dry but has soils typical of wetlands), 5,271 miles of perennial and intermittent/ephemeral streams (2,433 miles within the 3 Bars Project area, 2,728 miles within other portions of the CESA), and 1,116 springs and seeps (334 within the3 Bars Project area, 782 within other portions of the CESA) within the CESA. Past and present actions that have influenced wetland, floodplain, and riparian zone activity in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.11.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Past land uses in the CESA have resulted in the degradation of wetlands, riparian zones, and floodplains and reduced their functions. In particular, the BLM has indicated that roads, historic grazing regimes, and pinyon-juniper encroachment have negatively affected riparian and wetland functions and values, water quantity and timing, and water quality (USDOI BLM 2009a).

The BLM would continue ongoing management reviews to ensure proper livestock management and the long-term success of the proposed treatments.

Proposed 3 Bars Project treatments would help to reduce land disturbance and restore degraded habitats, and discourage establishment and expansion of noxious weeds and other invasive non-native vegetation, especially on riparian and aspen habitats. The BLM also proposes to install small scale, temporary exclosure fencing to limit livestock, wild horse, and other wild ungulate access to treatment areas, although water gaps would be incorporated into fencing along streams to allow these animals to access water. These actions should help to improve water quality in affected streams, restore streams to Proper Functioning Condition, and improve riparian habitat. The measures that the BLM would take to minimize livestock and wild horse impacts to treatment areas are discussed in more detail in Section 3.18.4 (Livestock Grazing Mitigation), and in **Appendix C**.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. These treatments should not have a direct effect on wetlands, floodplains, and riparian zones unless they cause erosion, or there is an accidental spill of an herbicide into a water body. These treatments would help to reduce hazardous fuels, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites, potentially to the benefit of wetlands, floodplains, and riparian zones. Herbicides could be transported in runoff to water bodies and effect wetland, floodplain, and riparian vegetation, but the BLM would use buffers between water bodies and treatment areas and/or carefully select the timing of applications and types of herbicide to minimize or avoid these risks.

Land development, mineral development, and oil, gas, and hydrothermal exploration and development could affect about 15,500 acres in the reasonably foreseeable future, including about 8,335 acres of disturbance associated with the Mount Hope Project. These projects could disturb wetlands, riparian zones, and floodplains on a small portion of this land through soil disturbance, water diversion, pumping of groundwater, filling, and removal of vegetation.

As discussed in the Mount Hope Project EIS under Wetland and Riparian Zones (USDOI BLM 2012b: Section 3-11), and in this EIS under Water Resources (Section 3.10), there is concern that pumping of water for future livestock and domestic uses, mining, and agriculture could reduce surface water flows in streams and wetlands associated with the Diamond Mountains, Diamond Valley, Roberts Mountain, Kobeh Valley, and Pine Valley. Although the Mount Hope Project EIS determined that effects on streams and wetlands would not be significant, it did find that effects to groundwater resources from the mine project and other water users could be significant within the CESA.

Catastrophic wildfire can affect wetlands by causing extensive burns, which may potentially include wetland and riparian vegetation, particularly during drought conditions when soils and vegetation are dry. About 140,000 acres could burn within the CESA over the next 20 years, based on acreage burned since 1985. While large fire events have been sporadic within the CESA since 1985, on average 6,900 acres have burned annually. The wide-scale removal of riparian and wetland vegetation by fire would be expected to return affected areas to early-successional conditions, and could reduce structural diversity of wetland and riparian habitats. Wide-scale removal of vegetation would also result in increased sedimentation into wetlands and riparian zones.

Hazardous fuels reduction, habitat improvement, and noxious weeds and other invasive non-native vegetation management projects on the 3 Bars Project and other areas within the CESA would occur on approximately 142,000 acres (127,000 for the 3 Bars Project and on 15,000 acres for other hazardous fuels projects in the CESA), or about 8 percent of the CESA. These treatments would lead to short-term increases in soil erosion and surface water runoff, but long-term benefits to water quality and possibly water flows. Pinyon-juniper removal within riparian zones could lead to increased water flows, and allow native vegetation to re-establish along streambanks. Long-term, 3 Bars Project actions should make a substantial contribution toward improving wetland, floodplain, and riparian zone conditions within the CESA and help to offset adverse effects to these resources from other reasonably foreseeable future actions under Alternative A.

3.11.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on wetlands, floodplains, or riparian zones would be similar to those described under Alternative A. However, by not using fire on the 3 Bars Project area, there would be no effects to wetland and stream water quantity and quality from fire on several thousand acres annually within the CESA.

The BLM would be limited to manual and mechanical methods such as use of chainsaws and discing and plowing, and using livestock to control noxious weeds and other invasive non-native vegetation on several hundred acres annually within the CESA. These methods could result in more soil disturbance and erosion and inherent water quality issues than would the use of fire. The West Simpson Park Unit is on rugged terrain, and use of mechanical equipment to control cheatgrass would be difficult and erosion potential from treatments would be great.

The BLM would conduct hazardous fuels reduction and habitat improvement projects using manual and mechanical methods on about 63,000 acres within the 3 Bars Project area, and on about 15,000 acres in other portions of the CESA, or about 4 percent of acreage within the CESA. Wetland, stream and floodplain habitat should improve within the 3 Bars Project area and within the CESA, although not to the extent as would occur under Alternative A.

3.11.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on wetlands, floodplains, or riparian zones would be similar to those described under Alternative A. Adverse, short-term effects to wetlands, riparian zones, and floodplains associated with the use of fire and mechanized equipment would not occur under Alternative C. By not being able to use mechanical methods and fire to reduce hazardous fuels and create fire and fuel breaks, the risk of wildfire and its effects on wetlands, floodplains, and riparian zones would likely increase on the 3 Bars Project area.

The BLM would conduct hazardous fuels reduction and habitat improvement projects using manual methods on about 32,000 acres within the 3 Bars Project area, and on about 15,000 acres in other portions of the CESA, or about 3 percent of acreage within the CESA. Only about 100 acres of wetland and riparian habitat, and 1 mile of stream habitat, would be restored annually on the 3 Bars Project area. Wetland, riparian, and floodplain habitat should improve within the 3 Bars Project area and within the CESA, but not to the extent as would occur under Alternatives A and B.

3.11.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on wetlands, floodplains, or riparian zones would be similar to those described under Alternative A. There would be no cumulative impacts to wetlands, floodplains, or riparian zones as no treatments would be authorized under this alternative. The BLM could conduct stream bioengineering treatments; create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildland fire under existing and future authorizations, but only on about 1,500 acres annually under current and reasonably foreseeable future authorizations. Given the low acreage of habitat treated annually, and because factors causing streams and wetlands to not function properly would remain, including soil erosion, stream channel instability, spread of noxious weeds and other invasive non-native vegetation, pinyon-juniper encroachment, and wildfire, improvement to wetland, floodplain, and riparian functions within the CESA would be least under this alternative.

3.11.3.5 Unavoidable Adverse Effects

An increase in soil erosion and surface water runoff could result from vegetation removal, and could lead to channel erosion and sedimentation in wetlands, floodplains, and riparian zones (Ott 2000). The rate of runoff would be influenced by the precipitation rate, soil type, and proximity to the treated area. All vegetation removal activities could disturb the soil and reduce the amount of vegetation binding to the soil, potentially causing erosion and increased sedimentation to wetlands, floodplains, and riparian zones, although the use of mulching could minimize these effects.

The removal of vegetation would decrease the amount of rainfall captured by plants, detritus, and soil, potentially leading to increased stormwater flows and runoff velocity in wetland and riparian zones. Increased stormwater runoff can scour streams, modify their morphology, and affect the distribution and abundance of aquatic organisms within the area. Siltation of wetlands could reduce water quality and the amount of oxygen available to aquatic organisms. In addition, siltation could reduce the acreage of wetland and riparian habitat (USDOI BLM 2007c:4-243).

3.11.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Removal of vegetation could cause a short-term increase in soil erosion and surface water runoff, which could impact wetlands, floodplains, and riparian zones. Successful control of noxious weeds and other invasive non-native plants in these areas, however, would lead to improved conditions in these habitats over the long-term. The eventual growth of desirable vegetation in treated areas would moderate water temperatures, buffer the input of sediment from runoff, and promote channel stability in riparian zones. Project activities would also enhance the acreage of streamside wetlands by reconnecting streams to their floodplains. Ongoing efforts by the BLM to restore wetlands, floodplains, and riparian zones would enhance the function of treated areas in the project area, and would help increase the miles of streams and acres of wetlands that would be classified by the BLM as Proper Functioning. Improvement of riparian, floodplain, and wetland habitat would also benefit Lahontan cutthroat trout and other species of concern, such as Greater sage-grouse, which depend on these habitats for their survival.

3.11.3.7 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of wetland, floodplain, or riparian resources. Although there would be short-term impacts to these resources from the proposed project treatments, these impacts would not be irretrievable and would be reversed if restoration treatments were successful (USDOI BLM 2007c:4-251).

3.11.3.8 Significance of the Effects under the Alternatives

Based on the significance criteria presented in Section 3.11.3.2, it is not expected that direct, indirect, or cumulative effects from the 3 Bars Project would result in a significant adverse cumulative effect to wetlands, floodplains, or riparian zones under any of the alternatives.

None of the reasonably foreseeable future actions should result in the significant destruction or loss of wetlands. For upland treatments with the potential to remove large areas of vegetation (fire and mechanical), the BLM would maintain vegetated buffers between the treatment area and wetlands. If noxious weeds or other invasive non-native vegetation were removed from wetlands, the affected area would be replanted or reseeded to encourage recovery of native species. Some degree of wetland degradation would be possible as a result of land development, and sedimentation, reduced vegetative cover, and physical disturbance associated with hazardous fuels and habitat restoration treatments within the CESA. However, these effects would be short-term in duration, and wetlands would eventually recover to their original or an improved condition.

Removal of vegetation within floodplains could minimize the flood attenuation functions of floodplains, as there may be increased overland flow to streams and increased risk of flooding. However, these effects would only last until the treatment sites recover, or are restored through reseeding or replanting. Maintaining vegetated buffers between treatment areas and water bodies would help to preserve some flood attenuation functions of floodplains.

The majority of stream restoration treatments would be done in streams with little to no stream-floodplain connections. Thus, historical floodplains would only experience flows during very rare high magnitude discharge events. Treatments to improve the structural integrity of stream channels would likely improve the flood attenuation functions of those areas over the long-term.

None of the actions under the alternatives would result in a long-term reduction in the functions of wetlands or riparian zones, a long-term reduction in the acreage of riparian and wetland areas in Proper Functioning Condition, or a downgrading of Functional-at-risk riparian or wetland areas to a negative trend or Nonfunctional. Removal of vegetation in these areas, or nearby upland areas, could temporarily reduce certain functions, including the ability to dissipate overland flow, improve floodwater retention and groundwater recharge, stabilize streambanks against cutting actions, and provide habitat for a diversity of wildlife. All of these functions factor into the Proper Functioning Condition of a wetland or riparian zone. These adverse effects would be short-term, and over the long-term, the affected areas would return to their original or improved functioning condition.

3.11.4 Mitigation

Wetlands, floodplains, and riparian zones would benefit from mitigation identified in Section 3.18.4 (Livestock Grazing Mitigation). No mitigation or monitoring measures are recommended specifically for wetlands, floodplains, and riparian zones.

3.12 Native and Non-invasive Vegetation Resources

3.12.1 Regulatory Framework

3.12.1.1 Special Status Species

The Endangered Species Act of 1973 provides for conserving federally listed endangered and threatened plant species, and plant species proposed for federal listing. The Act also requires that federal agencies consult with the USFWS to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued survival of a listed species or result in the adverse modification or destruction of its critical habitat. Critical habitat is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the USFWS under the Act.

In addition to administering conservation programs for listed species and species proposed for listing under the Act, the BLM also administers programs for sensitive species under guidance from Manual 6840, *Special Status Species Management* (USDOI BLM 2008h). BLM Special Status Species are federal candidate species for listing as threatened or endangered under the provisions of the Act, and those designated by the Director or individual State Directors as BLM sensitive. Conservation of BLM sensitive species means the use of programs, plans, and management practices to minimize or eliminate threats affecting the overall condition of the species, and/or improve the condition of the species' habitat.

3.12.1.2 Federal Laws

Federal laws pertaining to noxious weeds and other invasive non-native vegetation include the Lacey Act as amended (18 USC § 42), the Carson-Foley Act of 1968 (Public Law 90-583), the Federal Noxious Weed Act of 1974, as amended by the Food, Agriculture, Conservation, and Trade Act of 1990 (Section 1453, "Management of Undesirable Plants on Federal Lands," USC §2801 et seq.), the Federal Plant Pest Act (7 USC § 150aa et seq.), and the Plant Protection Act of 2000 (7 USC § 7701 et seq.), as amended by the Noxious Weed Control and Eradication Act of 2004 (Public Law 108-412).

3.12.1.3 BLM Guidance and Regulations

BLM Handbook H-1740, *Integrated Vegetation Management* (USDOI BLM 2008b) provides guidance on the management of vegetation on public lands and discusses the use of treatment methods for ensuring management success.

3.12.1.4 Resource Advisory Council Guidance

The BLM Nevada Northeastern Great Basin Resource Advisory Council, as chartered by the USDOI to promote healthy rangelands, has developed Standards and Guidelines for grazing administration on about 16.2 million acres of public lands in Nevada. Included in the Standards and Guidelines are guidelines for vegetation management. These include guidelines to control noxious weeds and other invasive non-native vegetation, including cheatgrass; limit grazing in salt desert plant communities to very early season or dormant season; create and maintain a diversity of sagebrush age and cover classes; maintain healthy stands of pinyon-juniper and ensure a combination of stand stages; and use native vegetation to reclaim sites (USDOI §2007b).

3.12.1.5 Woodlands

The Federal Land Policy and Management Act of 1976 and BLM Manual 5000-1, *Forest Management Public Domain* (USDOI BLM 1991b), include requirements for planning and implementing forestry and woodland projects. Additionally, 43 CFR §5400 regulates the sale of forest products harvested from public lands.

3.12.1.6 Prime Farmlands

Prime farmland, as defined by 7 CFR § 657.5 "is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding" (USDA Natural Resources Conservation Service 2000).

3.12.2 Affected Environment

3.12.2.1 Study Methods and Analysis Area

Several sources were reviewed in the preparation of this section, including USGS topographic and USFWS National Wetland Inventory maps; aerial photographs; USDA Natural Resources Conservation Service (2012) soil survey for Eureka County; documents prepared for nearby projects, including the Falcon to Gonder EIS (EDAW 2001), AECC (USDOI BLM 2009a), and Mount Hope Project EIS and references cited therein (USDOI BLM 2012b); BLM Special Status Species list and Nevada Heritage Program Special Status Plant Species database; range allotment studies conducted by the BLM; discussions with BLM resource specialists; Geographic Information System shapefiles provided by BLM resource specialists for spring inventories and riparian monitoring; site-specific studies conducted on the 3 Bars Project area; and site visits.

In 2010 and 2011, two studies were conducted to obtain additional information on rangeland and woodland health on the 3 Bars ecosystem. Based on these studies, two reports were prepared: 1) a *3 Bars Ecosystem and Landscape Restoration Project Pinyon-juniper Assessment* that provided the results from an assessment of pinyon-juniper stands within the 3 Bars ecosystem (AECOM 2011a); and 2) a *Landscape Restoration Project Rangeland Health Report* that provided the results of a 2010 to 2011 evaluation of rangeland health on approximately 532,000 acres within the 3 Bars ecosystem (Eastern Nevada Landscape Coalition and AECOM 2012). In addition, the BLM has conducted rangeland health studies on much of the remaining portions of the 3 Bars Project area that were not evaluated during 2010 and 2011 studies.

The soil surveys for Eureka, Lander, and White Pine Counties (USDA Natural Resources Conservation Service 2012), vegetation mapping done by the BLM, and vegetation surveys done for this project by the Mount Lewis Field Office and its consultants (AECOM 2011a, b, Eastern Nevada Landscape Coalition and AECOM 2012), were used to describe the vegetation on the 3 Bars Project area. Grassland included wildfire burn areas in the northern Simpson Park Mountains (1999 Trail Canyon Fire Area) and the 2012 Frazier Fire wildfire, and historic crested wheatgrass seedings. The pinyon-juniper vegetation type was based on those areas having Phase II and III pinyon-juniper stands (see Section 3.12.2.2.8 for a discussion of pinyon-juniper phases).

The USDA Natural Resources Conservation Service (2012) soil survey was used to determine the ecological site descriptions for the project area. Rangeland landscapes are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site, as defined for rangeland, is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. A description of the ecological site descriptions can be found in Appendix B of the *Landscape Restoration Project Rangeland Health Report* (Eastern Nevada Landscape Coalition and AECOM 2012). The ecological site descriptions are based on physiographic, climatic, vegetative, and soil factors for each soil association.

The ecological site descriptions were then grouped by associated dominant vegetation type (overstory and understory species) into broader vegetation cover types to characterize the Potential Natural Community for each plant association. The Potential Natural Community is defined as the biotic community that would become established on an ecological site if all successional sequences were completed without interference by people under the present environmental conditions (Habich 2001).

The BLM Special Status Species list was reviewed to determine which special status plant species could occur in the project area. In addition, Geographic Information System shapefiles of previously documented special-status plant occurrences were obtained from the Nevada Natural Heritage Program. The Nevada Natural Heritage Program maintains a database on the general location and status of Nevada's sensitive plants, animals, and natural biological communities. The Nevada Native Plant Society list of plant species of concern was also reviewed. The Nevada Native Plant Society is a non-profit organization that functions in an advisory capacity to state and federal agencies regarding Nevada native plants and their distributions. The Nevada Native Plant Society has created six categorical designations of plants to identify their respective concern for these species. These designations do not afford legal status or protection for the species, but the lists produced by Nevada Native Plant Society are utilized by agencies in their planning processes for activities that may impact the species or habitat.

Surveys conducted in support of the Mount Hope Project EIS were reviewed for information on special status plant species. Focused surveys for special status plant species were conducted on the majority of the Mount Hope Project area by SRK during June, 2005, and during the bloom period in 2006 (SRK 2007a). These surveys targeted Beatley buckwheat, an imperiled species, least phacelia, a BLM sensitive species, and windloving buckwheat, a BLM Special Status Species. In addition, spring areas with potential habitat for least phacelia in the project area were visited quarterly during water sampling activities (SRK 2007a). Field surveys were conducted in the well field, powerline, and transmission line areas in mid-July and August 2007 (SRK 2007b). A special status plant survey in the Kobeh Valley portion of the project area was conducted in July 2008 (Great Basin Ecology 2008 *cited in* USDOI BLM 2012b), and the USFWS (USDOI USFWS1993) has conducted surveys for Monte Neva paintbrush, a state critically endangered species, on portions of the 3 Bars Project area.

The study area for direct, indirect, and cumulative impacts to native and non-invasive vegetation, including woodlands, is the 3 Bars Project area. The CESA for cumulative impacts to native and non-invasive vegetation includes the Hydrologic Unit Code 10 watersheds wholly, or partially within, the project area (**Figure 3-1**).

3.12.2.2 Vegetation Communities

Major vegetation community types in the 3 Bars Project area include pinyon-juniper woodland, mountain mahogany woodland, aspen, big sagebrush, low sagebrush, black sagebrush, greasewood, salt desert scrub, grasslands, and cheatgrass (a non-native plant; **Figure 3-25**, **Table 3-22**). Information on noxious weeds and other invasive and non-native vegetation, including cheatgrass, is provided in Section 3.13.

Seral status is an expression of the condition of the vegetation community and is useful in determining whether an area is progressing toward its Potential Natural Community. The Potential Natural Community is considered achieved with the presence of 77 to 100 percent of the desired key species in a plant community. **Figure 3-26** and **Table 3-22** show the location and extent of major expected vegetation communities, based on ecological site description, in the project area.

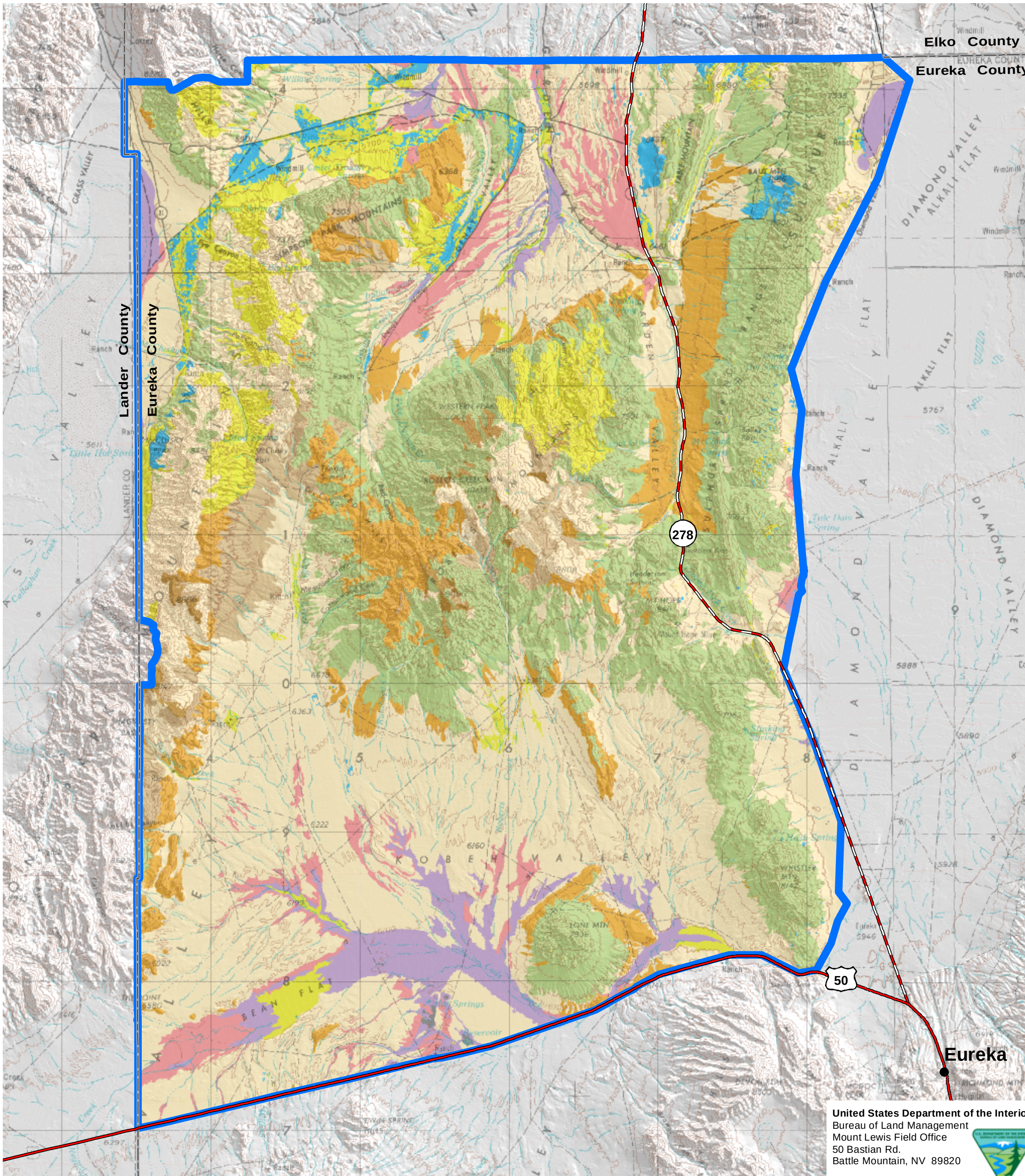
Each of the major vegetation communities shown in **Figures 3-25 and 3-26** is briefly described below, followed by a discussion of the ecological health of these communities in the project area, as determined by rangeland health assessments conducted by Eastern Nevada Landscape Coalition and AECOM (2012), pinyon-juniper mapping (AECOM 2011a), and discussions with BLM resource specialists.

TABLE 3-22

Current and Expected Vegetation Types within the 3 Bars Project Area

Vegetation Community	Actual[1]		Expected[2]		Difference between Actual and Expected Vegetation
	Acres	Percent	Acres	Percent	
Big Sagebrush	345,372	46.1	354,082	47.2	-8,709
Greasewood	31,642	4.2	32,392	4.3	-750
Low Sagebrush	23,228	3.1	28,914	3.9	-5,686
Black Sagebrush	62,109	8.2	77,148	10.3	-15,039
Mountain Mahogany	4,275	0.6	13,730	1.8	-9,455
Grassland[3]	52,146	7.0	4,433	0.6	47,713
Pinyon-juniper[4]	190,357	25.4	209,176	27.9	-18,819
Pits, Playas, and Water	378	0.1	384	0.1	-6
Salt Desert Scrub	28,061	3.7	29,552	3.9	-1,491
Non-native Vegetation	12,242	1.6	0	0.0	12,242
Total	**749,810**	**100.0**	**749,810**	**100.0**	**0**

[1] Actual acres are derived by what vegetation was present when vegetation surveys were completed.
[2] Expected acres are derived from ESDs.
[3] Grassland is defined as those areas comprised of native, fire-induced, and man-made grass cover.
[4] Pinyon-juniper vegetation type is based on those areas having Phase II and III pinyon-juniper stands (see Section 3.12.2.2.8 for a discussion of pinyon-juniper phases).
Sources: AECOM (2011a, b), USDA Natural Resources Conservation Service (2012).



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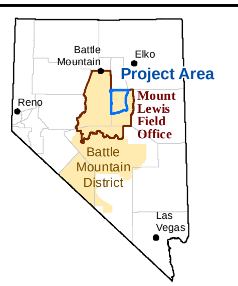


Legend

Vegetation Community

- Big Sagebrush[d]
- Black Sagebrush[d]
- Low Sagebrush[d]
- Greasewood[d]
- Invasive Species[a,c]
- Mountain Mahogany[d]
- *Grassland[a,b,d]
- +Pinyon-juniper[c]
- Salt Desert Scrub[d]
- Pits, Playas, or Water[d]
- 3 Bars Project Area

Source: [a]USGS 2004; [b]BLM 2012g;[c]AECOM 2011a,b; [d]USDA NRCS 2012.
*Grassland is comprised of native, fire induced, and man-made grass cover.
+Pinyon-juniper represents phase 2/3 successional stages only.

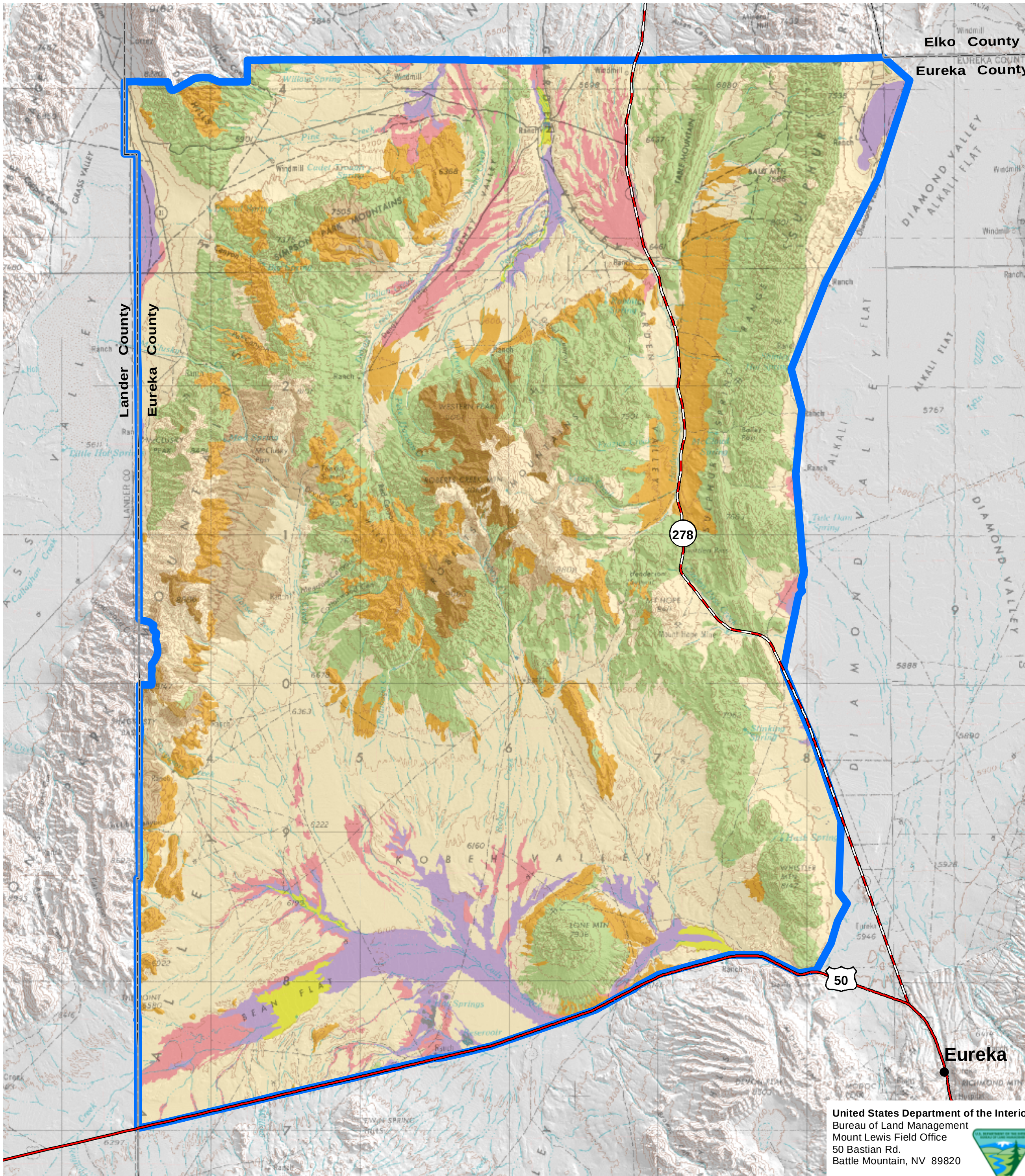
3 Bars Ecosystem and Landscape Restoration Project

Figure 3-25

Current Vegetation Communities

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notice.



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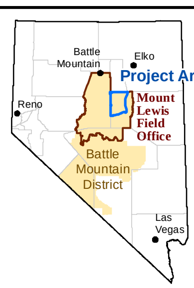

Legend

Vegetation Community

- Big Sagebrush
- Black Sagebrush
- Low Sagebrush
- Greasewood
- Mountain Mahogany
- Native Grassland
- Pinyon-juniper
- Salt Desert Scrub
- Pits, Playas, or Water
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-26

Major Vegetation Communities in the 3 Bars Project Area based on Ecological Site Data

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.
Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
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3.12.2.2.1 Grassland

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According to the USDA Natural Resources Conservation Service (2012) ecological site data, native grassland dominated by alkali sacaton is expected to cover about 4,433 acres, or 0.6 percent of the 3 Bars Project area. Other associated species may include alkali cordgrass, , three-awn grasses, blue grama grass, needle-and-thread, and Muhly grass. The community may also include scattered shrubs and dwarf-shrubs sagebrush, saltbush , species of joint fir or Mormon tea, snakeweed, and winterfat.

The grassland community is comprised of three ecological sites. Characteristics of these sites are shown in **Table 3-23**.

Grassland in the project area suffers from a lack of diversity, and some areas have been taken over by cheatgrass. About 4,433 acres of the project area should consist of native grassland. Over 52,000 acres are currently categorized as grassland, however, most (over 47,000 acres) of these acres consist of areas burned by wildfire, or occupied by non-native grasses (primarily crested wheatgrass) planted by man.

3.12.2.2.2 Big Sagebrush

The big sagebrush vegetation type is present on alluvial fans, hillsides, and ephemeral drainages. This vegetation type occurs at elevations between 5,500 and 10,000 feet amsl on the 3 Bars Project area. Approximately 407,481 acres, or 54.3 percent, of big sagebrush is found on the project area. According to the ecological site description, big sagebrush communities should cover about 354,082 acres, or 47.2 percent of the 3 Bars Project area. The dominant overstory vegetation, depending on the location, is either basin big sagebrush, Wyoming big sagebrush, or mountain big sagebrush. Understory species commonly associated with big sagebrush communities includes basin wildrye, Thurber's needlegrass, greenstem paperflower, bluebunch wheatgrass, mountain brome, Letterman's needlegrass, Indian ricegrass, and needle-and-thread (USDA Natural Resources Conservation Service 2012). Other species may include bottlebrush squirreltail, rabbitbrush, Sandberg bluegrass, lupine, rabbitbrush, winterfat, and antelope bitterbrush.

The Wyoming big sagebrush type is a prevalent vegetation type in the project area, and generally dominates the lower to mid-elevation zones in Kobeh Valley. Based on the USDA Natural Resources Conservation Service (2012) soil surveys, the rangeland health assessment conducted in support of the project, other rangeland health data from the BLM, and ecological site descriptions for upland vegetation communities, big sagebrush communities in the 3 Bars Project area show low grass production. While some desirable forbs and grasses occur, they only amount to a low percentage of overall vegetation. The dominant shrub, Wyoming big sagebrush, is appropriate for the site, but production is often low (Eastern Nevada Landscape Coalition and AECOM 2012). For most ecological sites in this type, grass species have the potential to comprise over 50 percent of vegetative composition, with shrubs being at or below 50 percent of the total composition. On several sites, primary grasses, including bluebunch wheatgrass and needle-and-thread, are absent.

The big sagebrush community is comprised of 11 ecological sites. Characteristics of these sites are shown in **Table 3-24**. The decline in abundance and health of the sagebrush community is a major concern within the 3 Bars ecosystem. Generally, the big sagebrush community in the 3 Bars Project area suffers from the following concerns (USDOI BLM 2009a, Eastern Nevada Landscape Coalition and AECOM 2012):

- Most (if not all) sampled sites examined in the rangeland health assessments lacked an understory of native bunchgrasses, and those that support bunchgrasses typically only support one species.
- Many sites lack an understory of native perennial forbs.
- Shrub diversity on most sites is less than desirable and below what the ecological site would allow.
- Some areas are characterized by monocultures of sagebrush or bitterbrush, although Bukowski and Baker (2013) suggest that historical sagebrush landscapes were dominated by large, contiguous areas of sagebrush, and that variation in sagebrush density was a common source of patchiness.
- Some areas have been overtaken by cheatgrass as a result of wildfire.
- Some areas suffer from invasions of noxious weeds and other invasive non-native vegetation.

In addition, large areas that are dominated by big sagebrush have experienced extensive encroachment from pinyon-juniper woodland.

3.12.2.2.3 Low Sagebrush

The low sagebrush community is dominated by low sagebrush. Common understory species are bluebunch wheatgrass and Idaho fescue (USDA Natural Resources Conservation Service 2012). Other overstory species commonly found in this community include Nevada ephedra and rabbitbrush, while dominant understory species include squirreltail and cheatgrass. On the 3 Bars Project area, low sagebrush occurs on the alluvial fans, hillslopes, and bottom areas at lower to mid-elevations (6,000 to 8,800 feet amsl). The low sagebrush community covers about 23,228 acres, or 3.1 percent of the project area. According to the ecological site description, low sagebrush communities should cover about 28,914 acres, or 3.9 percent of the 3 Bars project area.

The low sagebrush community is comprised of three ecological sites. Characteristics of these sites are shown in **Table 3-25**. Issues associated with health of the low sagebrush community are similar to those discussed above for big sagebrush, however low sagebrush is much less widespread in the project area.

3.12.2.2.4 Black Sagebrush

The black sagebrush community is dominated by black sagebrush. Common understory species are bluebunch wheatgrass, Indian ricegrass, and needle-and-thread. In the 3 Bars Project area, black sagebrush occurs on summits and slideslopes of lower piedmont slopes and low hills on all exposures, alluvial fans, hillsides, and bottom areas at low to mid-elevations (5,000 to 6,500 feet amsl). The black sagebrush community covers about 62,109 acres, or 8.2 percent of the project area. According to the ecological site description, black sagebrush communities should cover about 77,148 acres, or 10.3 percent of the 3 Bars project area.

The black sagebrush community is comprised of three ecological sites. Characteristics of these sites are shown in **Table 3-26**. Issues associated with health of the black sagebrush community include a lack of an understory of native

TABLE 3-23

Ecological Sites for Grassland Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Alkali sacaton-alkali cordgrass Sandberg bluegrass-alkali sacaton	R024XY043NV	Wet meadow 6 to 8 inches	The plant community is dominated by alkali bluegrass, alkali sacaton, Baltic rush, and inland saltgrass. Potential vegetative composition is about 85 percent grasses and 15 percent forbs.	Where management results in abusive grazing use by livestock or horses, woody plants often increase, especially rabbitbrush species. Inland saltgrass and Baltic rush increase and may eventually dominate the site. Foxtail barley, annual mustards, and other undesirable forbs and grasses are species likely to invade this site.
Tufted hairgrass	R025XY005NV	Wet meadow	The plant community is dominated by tufted hairgrass. Nevada bluegrass, alpine timothy, Sierra clover, and meadow sedges are important plants associated with this site.	Where management results in chronic, repetitive, multi-year improper grazing, tufted hairgrass composition is reduced with foxtail barley, rushes, sedges, and forbs such as wild iris, cinquefoil, and yarrow increasing on the site. Willows and roses often increase in the overstory. Redtop, Kentucky bluegrass, thistles, and quackgrass are species likely to invade this site. Where stream channels become entrenched, the water table is lowered and a more drought tolerant plant community occurs. Vegetation includes cattail, bulrush, spike rush, reedgrass, and water-loving sedge.
Alkali sacaton-alkali cordgrass	R028BY002NV	Saline meadow	The plant community is dominated by alkali sacaton. Alkali cordgrass, alkali bluegrass, and sedges are important associated plant species. Potential vegetative composition is about 85 percent grasses and grass-likes, 10 percent forbs, and 5 percent shrubs.	As ecological condition declines, inland saltgrass and Baltic rush increase as alkali sacaton and alkali bluegrass decrease. Where severe stream entrenchment occurs, the potential for this site is lost due to change in soil moisture balance. Typically, this site is succeeded by the plant community characterized in the Saline Bottom (028BY004NV) site description following severe stream down cutting.

TABLE 3-24

Ecological Sites for Big Sagebrush Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Wyoming big sagebrush/Thurber's needlegrass	R024XY005NV	Loamy 8 to 10 inches	The plant community is dominated by Thurber's needlegrass and Wyoming big sagebrush. Potential vegetative composition is about 55 percent grasses, 5 percent forbs, and 40 percent shrubs.	Where management results in chronic, repetitive, multi-year improper grazing by livestock or horses, Thurber's needlegrass composition declines and is replaced by bluegrasses and bottlebrush squirreltail as the dominant understory grasses. Cheatgrass and other annuals will often dominate the understory as Wyoming big sagebrush and Douglas' rabbitbrush increase in the overstory with degraded ecological condition. Where site degradation has been fire-induced, broom snakeweed and rabbitbrush often dominate the site. Repeated burning of the plant community at intervals less than 10 to 15 years results in complete site dominance by annuals (primarily cheatgrass and tansy mustard) and the near total absence of woody plants, including sagebrush.
Wyoming big sagebrush/basin wildrye	R024XY006NV	Dry floodplain	The plant community is dominated by basin wildrye. Basin big sagebrush and black greasewood are other important species associated with this site. Potential vegetative composition is about 70 percent grasses, 5 percent forbs, and 25 percent shrubs.	Where management results in chronic, repetitive, multi-year improper grazing by livestock or horses, basin wildrye is replaced by woody plants. Rubber rabbitbrush, black greasewood, and basin big sagebrush increase as ecological condition declines. Russian thistle and cheatgrass are species likely to invade this site.

TABLE 3-24 (Cont.)

Ecological Sites for Big Sagebrush Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Big sagebrush/ bluebunch wheatgrass-Thurber's needlegrass	R025XY014NV	Loamy 10 to 12 inches	The plant community is dominated by bluebunch wheatgrass, Thurber's needlegrass, and big sagebrush. Potential vegetative composition is about 65 percent grasses, 10 percent forbs, and 25 percent shrubs.	Where management results in chronic, repetitive, multi-year improper grazing, big sagebrush and Douglas' rabbitbrush become dominant with increases of bottlebrush squirreltail and Sandberg bluegrass in the understory. Cheatgrass and annual mustards are plants likely to invade this site.
Wyoming big sagebrush/bluebunch wheatgrass-Thurber's needlegrass	R025XY019NV	Loamy 8 to 10 inches	The plant community is dominated by Thurber's needlegrass, bluebunch wheatgrass, and Wyoming big sagebrush. Potential vegetative composition is about 65 percent grasses, 5 percent forbs, and 30 percent shrubs.	As ecological condition declines, big sagebrush and rabbitbrush become dominant with an increase of Sandberg's bluegrass, bottlebrush squirreltail, phlox, and other and mat-forming forbs in the understory. Cheatgrass, halogeton, Russian thistle, and annual mustards are species likely to invade this site. Utah juniper will invade this site where it occurs adjacent to these woodland areas.
Wyoming big sagebrush-black sagebrush/Indian ricegrass	R025XY025NV	Chalky knoll	The plant community is dominated by Indian ricegrass, Wyoming big sagebrush, and black sagebrush. Shrubs dominate the aspect of the site. Antelope bitterbrush, spiny hopsage, and bottlebrush squirreltail are other important species associated with this site. Potential vegetative composition is about 40 percent grasses, 10 percent forbs, and 50 percent shrubs.	As ecological condition declines, rabbitbrush and littleleaf horsebrush increase in density while Indian ricegrass and other perennial grasses are reduced in the understory. Cheatgrass, annual mustards, Russian thistle, halogeton, and Utah juniper are species likely to invade this site.

TABLE 3-24 (Cont.)

Ecological Sites for Big Sagebrush Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Basin big sagebrush/ basin wildrye	R028BY003NV	Loamy bottom 10 to 14 inches	The plant community is dominated by basin wildrye. Potential vegetative composition is about 85 percent grasses, 5 percent forbs, and 10 percent shrubs.	As ecological condition declines, basin big sagebrush and rabbitbrush increase within the plant community as basin wildrye and Nevada bluegrass decrease. With continued site degradation, rubber rabbitbrush becomes the dominant plant. Species most likely to invade this site are cheatgrass, annual mustards, and thistle.
Big sagebrush/Thurber's needlegrass-greenstem paperflower	R028BY007NV	Loamy 10 to 12 inches	The plant community is dominated by Thurber's needlegrass, bluebunch Wheatgrass, and big sagebrush. Potential vegetative composition is about 65 percent grasses, 10 percent forbs, and 25 percent shrubs and trees.	Where management results in chronic, repetitive, multi-year improper grazing, big sagebrush, rabbitbrush, bottlebrush squirreltail, and Sandberg bluegrass increase, while Thurber's needlegrass, bluebunch wheatgrass, and other desirable forage species decrease. Cheatgrass readily invades this site following disturbances. Singleleaf pinyon and Utah juniper invade this site where it occurs adjacent to pinyon-juniper woodlands. When pinyon-juniper occupy this site, they compete with other species for available light, moisture, and nutrients. If pinyon-juniper canopies are allowed to close, they can eliminate all understory vegetation.

TABLE 3-24 (Cont.)

Ecological Sites for Big Sagebrush Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Wyoming big sagebrush/Indian ricegrass-needle-and-thread	R028BY010NV	Loamy 8 to 10 inches	The plant community is dominated by Wyoming big sagebrush, Indian ricegrass, and needle-and-thread. Potential vegetative composition is about 50 percent grasses, 5 percent forbs, and 45 percent shrubs and trees.	As ecological condition declines, Wyoming big sagebrush and Douglas' rabbitbrush increase, while Indian ricegrass and needle-and-thread decrease. Various annual species are likely to invade this site. Utah juniper readily invades this site where it occurs adjacent to this woodland. When Utah juniper occupies this site it competes with other species for available light, moisture, and nutrients. If Utah juniper canopies are allowed to close, they can eliminate all understory vegetation.
Mountain big sagebrush/basin wildrye	R028BY024NV	Loamy bottom 14+ inches	The plant community is dominated by basin wildrye. Potential vegetative composition is about 85 percent grasses, 5 percent forbs, and 10 percent shrubs.	As ecological condition declines, mountain big sagebrush and rabbitbrush increase within the plant community as basin wildrye, slender wheatgrass, and Nevada bluegrass decrease. With continued site degradation, rubber rabbitbrush may become the dominant plant. Species most likely to invade this site are cheatgrass, annual mustards, and thistle.
Mountain big sagebrush/mountain brome-Letterman's needlegrass	R028BY029NV	Loamy 16+ inches	The plant community is dominated by mountain brome and Letterman's needlegrass. The visual aspect is dominated by mountain big sagebrush in association with a variety of mountain browse shrubs.	As ecological condition declines, mountain big sagebrush and snowberry become dominant, while mountain brome and Letterman's needlegrass decrease.

TABLE 3-24 (Cont.)

Ecological Sites for Big Sagebrush Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Mountain big sagebrush/bluebunch wheatgrass	R028BY030NV	Loamy 12 to 16 inches	The plant community is dominated by bluebunch wheatgrass and mountain big sagebrush. Potential vegetative composition is about 55 percent grasses, 10 percent forbs, and 35 percent shrubs and trees.	As ecological condition declines, rabbitbrush and big sagebrush become more prevalent and may eventually dominate the site as condition further declines. Shallow-rooted bluegrasses, bottlebrush squirreltail, and arrowleaf balsamroot increase in the understory as condition deteriorates. Cheatgrass is the species likely to invade this site. Singleleaf pinyon and Utah juniper readily invade this site. In the absence of natural fire, pinyon-juniper will increase on this site and may eventually dominate the plant community.

TABLE 3-25

Ecological Sites for Low Sagebrush Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Low sagebrush/ Idaho fescue-bluebunch wheatgrass	R025XY017NV	Claypan 12 to 16 inches	The plant community is dominated by Idaho fescue, bluebunch wheatgrass, and low sagebrush. Potential vegetative composition is about 60 percent grasses, 15 percent forbs, and 25 percent shrubs.	As ecological condition declines, dwarf sagebrush species and Douglas' rabbitbrush become dominant with increases of bottlebrush squirreltail, Sandberg bluegrass, and mat forming forbs in the understory. Cheatgrass is the species most likely to invade this site.
Low sagebrush/ greenstem paperflower-Thurber's needlegrass	R028BY037NV	Claypan 12 to 14 inches	The plant community is dominated by bluebunch wheatgrass, Thurber's or western needlegrass, and low sagebrush. Potential vegetative composition is about 50 percent grasses, 10 percent forbs, and 40 percent shrubs and trees.	As ecological condition declines, rabbitbrush and low sagebrush become dominant with increases of bottlebrush squirreltail and Sandberg bluegrass. Singleleaf pinyon and Utah juniper invade this site where it occurs adjacent to these woodlands. When juniper and pinyon occupy this site, they compete with other species for available light, moisture and nutrients. If pinyon-juniper canopies are allowed to close, they can eliminate all understory vegetation.
Low sagebrush-black sagebrush/ bluebunch wheatgrass	R028BY038NV	Mountain ridge 14+ inches	The plant community is dominated by bluebunch wheatgrass, muttongrass, and low or black sagebrush. Black sagebrush is typically restricted to the ridge crest areas where soil depth is most limiting. Potential vegetative composition is about 45 percent grasses, 10 percent forbs, and 45 percent shrubs.	As ecological condition declines, low sagebrush, black sagebrush, and Douglas' rabbitbrush become dominant with increases of Sandberg bluegrass and phlox in the understory. Phlox, goldenweed, and other mat-forming forbs are usually the dominant herbaceous species on sites in lower condition. Cheatgrass is the species most likely to invade this site.

TABLE 3-26

Ecological Sites for Black Sagebrush Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Black sagebrush/Indian ricegrass/needle-and-thread	R028BY011NV	Shallow calcareous loam 8 to 10 inches	The plant community is dominated by black sagebrush, Indian ricegrass, and needle-and-thread. Potential vegetative composition is about 50 percent grasses, 5 percent forbs, and 45 percent shrubs.	As ecological condition declines, black sagebrush, rabbitbrush, and shadscale increase, while perennial grasses, palatable shrubs, and forbs decrease. Cheatgrass and halogeton are species likely to invade on this site. Rodent activity is typically evidenced by small patches dominated by spiny hopsage. Utah juniper readily invades this site where it occurs adjacent to these woodlands. When Utah juniper occupies this site, it competes with other species for available light, moisture, and nutrients. If tree canopies are allowed to close, they can eliminate all understory vegetation.
Black sagebrush/Indian ricegrass/needle-and-thread	R028BY016NV	Shallow calcareous slope 8 to 10 inches	The plant community is dominated by black sagebrush, Indian ricegrass, and needle-and-thread. Potential vegetative composition is about 40 percent grasses, 5 percent forbs, and 55 percent shrubs and trees.	As ecological condition declines, black sagebrush, small rabbitbrush, and shadscale increase, while perennial grasses and forbs are reduced in the understory. Cheatgrass, Russian thistle, and halogeton are species likely to invade this site. Utah juniper readily invades this site where it occurs adjacent to these woodlands. When Utah juniper occupies this site, it competes with other species for available light, moisture, and nutrients. If the juniper canopy is allowed to close, it can eliminate all understory vegetation.
Black sagebrush/bluebunch wheatgrass	R028BY027NV	Shallow calcareous slope 14+ inches	The plant community is dominated by bluebunch wheatgrass and black sagebrush. Potential vegetative composition is about 65 percent grasses, 10 percent forbs, and 25 percent shrubs.	Black sagebrush and rabbitbrush will increase, while bluebunch wheatgrass and other desirable grasses will decrease, with excessive use by cattle and horses. With excessive use by sheep, black sagebrush, muttongrass, and forbs decrease as bluebunch wheatgrass initially increases.

bunchgrasses, and those that support any bunchgrasses typically only support one species, lack of an understory of native perennial forbs, and pinyon-juniper expansion (USDA Natural Resources Conservation Service 2012).

3.12.2.2.5 Greasewood

Black greasewood scrub dominates the southern end of the Kobeh Valley at elevations ranging from 5,500 to 6,200 feet amsl. The northern portion of the project area also supports stands of greasewood in low-lying areas. The characteristic overstory shrub is black greasewood. Greasewood is considered a phreatophyte (i.e., a plant that sends its roots into the water table and depends on a constant supply of groundwater). Common understory grasses in greasewood communities include alkali sacaton, salt grass, and basin wildrye. The greasewood community covers about 31,642 acres, or 4.2 percent of the project area. According to the ecological site description, greasewood is expected to cover about 32,392 acres, or 4.3 percent of the project area (USDA Natural Resources Conservation Service 2012). Because greasewood occurs on extremely alkaline substrates, which are generally less suitable for other competing vegetation types, the actual distribution of greasewood in the project area is very similar to what would be expected for its ecological site. The project does not include specific proposed management actions for greasewood communities.

The greasewood community is comprised of four ecological sites. Characteristics of these sites are shown in **Table 3-27**. Cheatgrass invasion is the primary issue affecting the greasewood community.

3.12.2.2.6 Salt Desert Scrub

Salt desert scrub vegetation typically occurs in saline areas along drainages, margins of lake beds and marshes, and on flats and basins. In the 3 Bars Project area, this community occurs at elevations between 5,500 and 6,200 feet amsl. The salt desert scrub community covers about 28,061 acres, or 3.7 percent of the project area. According to the ecological site description, salt desert scrub dominated by shadscale is expected to cover about 29,552 acres, or 3.9 percent of the 3 Bars Project area (USDA Natural Resources Conservation Service 2012). Other species present in this community include Indian ricegrass, squirreltail, bud sagebrush, iodine bush, halogeton, spiny hopsage, salt grass, and rock willow. The overall composition for sites with this vegetation type shows that they often have low grass production. The dominant grass species, such as bottlebrush squirreltail and Indian ricegrass, are often absent from the sites (Eastern Nevada Landscape Coalition and AECOM 2012). However, this community is relatively limited on the 3 Bars Project area, and no management actions specific to salt desert scrub are proposed.

The salt desert scrub community is comprised of four ecological sites. Characteristics of these sites are shown in **Table 3-28**.

3.12.2.2.7 Quaking Aspen

Since European settlement, the occurrence of aspen in the American West has declined from nearly 10 million acres to 4 million acres (about a 60 percent decline). Eighty percent of remaining aspen stands are being invaded by native conifers. In a study of 100 aspen stands in southeastern Oregon, northeastern California, and northwestern Nevada, 12 percent of the aspen stands were completely replaced by western juniper. These stands were identified as previously being dominated by aspen based on the high density of dead aspen logs in the understory. In addition, post-settlement western juniper was the dominant tree species in 23 percent of the stands and common to co-dominant in 42 percent of the aspen stands (Miller et al. 2005).

TABLE 3-27

Ecological Sites for Greasewood Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Greasewood/basin wildrye	R024XY007NV	Saline bottom	The plant community is dominated by basin wildrye. Black greasewood is the dominant shrub. Potential vegetative composition is about 70 percent grasses, 5 percent forbs, and 25 percent shrubs.	Where management results in excessive grazing use by livestock, rabbitbrush and black greasewood increase and become the dominant vegetation in lower condition classes. Inland saltgrass increases as condition declines and usually dominates the understory during low ecological conditions.
Greasewood/basin wildrye-saltgrass	R024XY011NV	Sodic flat 6 to 8 inches	The plant community is dominated by black greasewood. Potential vegetative composition is about 25 percent grasses, 5 percent forbs, and 70 percent shrubs.	Herbaceous understory is reduced or eliminated and the site becomes a nearly pure stand of black greasewood. Halogeton, fivehook bassia, and annual mustards are species likely to invade this site.
Greasewood/basin wildrye-alkali sacaton	R028BY004NV	Saline bottom	The plant community is dominated by basin wildrye and alkali sacaton. Potential vegetative composition is about 80 percent grasses and grass-like plants, 5 percent forbs, and 15 percent shrubs.	As ecological condition declines, black greasewood and rubber rabbitbrush increase, while basin wildrye and alkali sacaton decrease. With further site degradation, rubber rabbitbrush typically becomes the dominant species.
Greasewood/alkali sacaton-saltgrass	R028BY020NV	Sodic flat 5 to 8 inches	The plant community is dominated by black greasewood, alkali sacaton, and inland saltgrass. Vegetation on this site is normally restricted to coppice mound areas that are surrounded by playa-like depressions or nearly level, usually barren, interspaces. Potential vegetative composition is about 15 percent grasses, 5 percent forbs, and 80 percent shrubs.	As ecological condition declines, the herbaceous understory is reduced or eliminated and the site becomes a community of halophytic shrubs dominated by black greasewood. Halogeton and annual mustards are species likely to invade this site.

TABLE 3-28

Ecological Sites for Salt Desert Scrub Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Shadscale saltbush-bud sagebrush/ squirreltail-Indian ricegrass	R024XY002NV	Loamy 5 to 8 inches	The plant community is dominated by shadscale, bud sagebrush, and Indian ricegrass. Potential vegetative composition is about 25 percent grasses, 5 percent forbs, and 70 percent shrubs.	Where management results in chronic, repetitive, multi-year improper grazing by livestock or horses, shadscale increases in density while Indian ricegrass and bud sagebrush composition is reduced. With further site degradation, shadscale may become dominant to the extent of a nearly pure stand. Cheatgrass, halogeton, and tansy mustard are likely to invade this site.
Shadscale saltbush-rock willow/ squirreltail	R024XY003NV	Sodic terrace 6 to 8 inches	The plant community is dominated by shadscale and black greasewood. Potential vegetative composition is about 10 percent grasses, 5 percent forbs, and 85 percent shrubs.	Where management results in chronic, repetitive, multi-year improper grazing by livestock or horses, black greasewood and seepweed increase in density as perennial grass species decline. Russian thistle, annual mustards, and halogeton are species likely to invade disturbed areas on this site.
Winterfat/Indian ricegrass	R028BY013NV	Silty 8 to 10 inches	The plant community is dominated by winterfat and Indian ricegrass. Potential vegetative composition is about 30 percent grasses, 5 percent forbs, and 65 percent shrubs.	As ecological condition declines, bottlebrush squirreltail and shadscale increase as winterfat and Indian ricegrass decrease. With further site deterioration, cheatgrass, halogeton and annual mustards invade the interspace areas between shrub species. On heavily disturbed sites, these annual species, particularly halogeton, become dominant. Soils of this site are easily eroded and gullies often form, interrupting the overland flow patterns.
Shadscale saltbush/ Indian ricegrass-squirreltail	R028BY017NV	Loamy 5 to 8 inches	The plant community is dominated by Indian ricegrass, bottlebrush squirreltail, and shadscale. Potential vegetative composition is about 30 percent grasses, 5 percent forbs, and 65 percent shrubs	As ecological condition declines, shadscale increases in density, while Indian ricegrass, bottlebrush squirreltail, and bud sagebrush compositions are reduced. With further site degradation, shadscale may become dominant to the extent of a nearly pure stand. Cheatgrass, halogeton, and tansy mustard are species likely to invade this site.

Quaking aspen occurs in isolated stands in riparian habitats within the project area and is found in deep to very deep soils (see **Figure 3-25**). The aspen community covers about 533 acres, or 0.1 percent of the 3 Bars Project area (USDOI USGS 2004, USDOI BLM 2010d, USDA Natural Resources Conservation Service 2012). Aspen communities have the highest biodiversity of any upland forest type in the Intermountain West, supplying important wildlife forage, cover, and breeding sites (Finch and Ruggiero 1993).

Aspen are clonal, relying on root sprouting to reproduce and spread. They are also fire-adapted, and require periodic disturbance such as fire to stimulate root suckering and reduce competition from conifers (Bartos and Mueggler 1979, 1981, Bartos et al. 1991, 1994, Shepperd 1993, Shepperd and Smith 1993; *all in* Kay 2001). Successful aspen seeding is rare; according to Kay (2001) there hasn't been suitable climatic condition for aspen seedling success for thousands of years. Because aspen trees are short-lived, ongoing regeneration is important for the long-term persistence of aspen stands.

A 2001 study of aspen stands in the Roberts Mountains area concluded that aspen are generally in poor condition and that many stands are not readily regenerating (Kay 2001). The BLM has also observed that aspen regeneration and recruitment are below their potential throughout the 3 Bars Project area. While fire suppression may be a contributing factor, ungulate herbivory of new growth from root suckers appears to be the primary factor preventing successful regeneration of aspen stands. Aspen regeneration is a key management concern and aspen enhancement is one of the primary goals of the 3 Bars Project.

3.12.2.2.8 Mountain Mahogany Woodland

Curl-leaf mountain mahogany woodlands occur in hills and mountain ranges of the intermountain basins. This vegetation type occurs on rocky outcrops or escarpments and forms small- to large-patch stands in woodland areas. Most stands occur as shrublands on ridges and steep rimrock slopes, but may also occur as small trees in steppe areas. The mountain mahogany woodland community covers about 4,275 acres, or 0.6 percent, of the project area. According to the USDA Natural Resources Conservation Service (2012) ecological site description, mountain mahogany woodland is expected to cover about 13,730 acres, or 1.8 percent of the 3 Bars Project area. Elevations range from 6,800 to 9,800 feet amsl. Curl-leaf mountain mahogany, mountain big sagebrush, greenstem paperflower, and Thurber's needlegrass are characteristic species of this vegetation community. Other associated species may include antelope bitterbrush, manzanita, gooseberry, or snowberry. Scattered junipers or pines may also occur. Curl-leaf mountain mahogany is a slow-growing, drought-tolerant species that generally does not resprout after burning and needs the protection from fire that rocky sites provide. In some instances, mountain mahogany is being impacted by pinyon-juniper encroachment or infilling, making this species more susceptible to impacts from fire. Mountain mahogany stands in the project area appear to be in fairly healthy condition, and the only management activities specifically targeting mountain mahogany communities would be the removal of dead trees and limbing of trees to improve stand health. The mountain mahogany community is comprised of two ecological sites. Characteristics of these sites are shown in **Table 3-29**.

3.12.2.2.9 Pinyon-juniper Woodland

Pinyon-juniper woodlands generally occur on steep south-trending hillsides and mountains at all aspects, between 5,500 and 8,600 feet amsl. This vegetation type generally occurs on shallow, loamy soils with high percentages of coarse fragments. Singleleaf pinyon pine and Utah juniper dominate the overstory. The understory is often nothing more than barren soil in dense stands of pinyon-juniper. According to the ecological site description for this

TABLE 3-29

Ecological Sites for Mountain Mahogany Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Curl-leaf mountain mahogany/mountain big sagebrush/ greenstem paperflower-Thurber's needlegrass	R028BY042NV	Mahogany thicket	The plant community is dominated by curl-leaf mountain mahogany, but trees such as singleleaf pinyon pine, Utah juniper, white fir, and limber pine may occur sporadically in the overstory canopy. Mountain big sagebrush and snowberry are the principal understory shrubs. Bluebunch wheatgrass and Thurber's needlegrass are the most prevalent understory grasses. Total overstory canopy cover exceeds 45 percent. Understory vegetation comprises less than 10 percent of the total site production. Potential vegetative composition for the understory is about 55 percent grasses, 10 percent forbs, and 35 percent shrubs. The overstory of curl-leaf mountain mahogany is about 85 percent of the total site production.	As ecological condition declines, the understory grasses and forbs are reduced as mountain big sagebrush and snowberry increase. Heavy utilization by livestock and/or wildlife will cause the reproduction and overall production of curl-leaf mountain mahogany to be severely impacted. Cheatgrass is the species most likely to invade this site.
Curl-leaf mountain mahogany/mountain big sagebrush/ greenstem paperflower-needlegrass	R028BY043NV	Calcareous mahogany savanna	The plant community is dominated by curl-leaf mountain mahogany. Mountain big sagebrush is the principal understory shrub. Bluebunch wheatgrass, western needlegrass, Columbia needlegrass, and Letterman's needlegrass are the most prevalent understory grasses. Total overstory canopy cover is less than 50 percent. Understory vegetation comprises about 20 percent of the total site production. Potential vegetative composition for the understory is about 55 percent grasses, 10 percent forbs, and 35 percent shrubs. Overstory trees and tree-like shrub composition is about 80 percent of the total site production.	As ecological condition declines, understory grasses and forbs are reduced as mountain big sagebrush and Douglas' rabbitbrush increase. Heavy utilization by livestock and wildlife will result in most of the foliage of the mountain mahogany growing above the reach of browsing animals and will severely limit production. Cheatgrass is the species most likely to invade this site.

association, the potential natural vegetation includes Thurber's needlegrass, bluebunch wheatgrass, black sagebrush, Mountain big sagebrush, Indian ricegrass, and greenstem paperflower (Eastern Nevada Landscape Coalition and AECOM 2012, USDOI BLM 2012b). Other shrubs present include antelope bitterbrush and rabbitbrush. Additional grasses include Sandberg bluegrass, bottlebrush squirreltail, Idaho fescue, and basin wildrye.

The pinyon-juniper community is comprised of nine ecological sites. Characteristics of these sites are shown in **Table 3-30**.

Based on the project-specific mapping, pinyon-juniper woodlands cover approximately 190,357 acres, or 25.4 percent of the project area. These include areas with Phase II and III stands (see below for a description of phases), but not Phase I stands. According to the ecological site description, this vegetation type would be expected to be present on approximately 209,176 acres or 27.9 percent of the project area. The difference (approximately 18,819 acres) shows that Phase II and III pinyon-juniper is less common that it was historically. This may reflect, in part, the extensive use of pinyon-juniper in the making of charcoal in the late 1800s (see Section 3.12.2.6), and recent fires (1999 to present), that removed a substantial acreage of pinyon-juniper on the Simpson Park Mountains and Sulphur Spring Range and on Roberts Mountains. However, if Phase I stands are also considered, there are about 118,000 more acres with pinyon-juniper than would be expected under normal conditions. The Phase I acreage demonstrates the rapid expansion of pinyon-juniper woodland in the project area at the expense of other potential natural vegetation.

One resource management focus of the 3 Bars project is the overall distribution and structure of pinyon-juniper woodlands within the project area. In the Great Basin, pinyon-juniper has expanded outside of their historical range, and the density of trees has increased in older stands. Since the advent of fire suppression, there has been a migration of pinyon-juniper into sagebrush steppe communities. Sagebrush on much of the 3 Bars Project area has also been replaced with pinyon-juniper woodlands (USDOI BLM 2009a, 2012b, AECOM 2011a, Eastern Nevada Landscape Coalition and AECOM 2012). Many of these indicators have been observed in Phase III (or late successional) pinyon-juniper woodlands, which generally have a high density of trees and buildup of fuels.

Romme et al. (2009), however, noted that pinyon-juniper typically experience long fire rotations of 400 years or more and because fires were never frequent, fire exclusion cannot be the principal mechanism responsible for infill in persistent woodlands. Miller and Rose (1999) and Romme et al. (2009) suggested that infilling of previously existing pinyon-juniper woodlands and expansion of pinyon-juniper into former grasslands and shublands may also reflect increased grazing pressure since the mid- 1800s, and normal fluctuations associated with climate that have occurred over thousands of years, including rising CO_2 levels that have occurred during the past 100 years and wet climatic conditions from 1870 to 1915. Still, Romme et al. note that fire exclusion since the mid-1800s, coincident with the onset of livestock grazing, are likely the primary causes of pinyon-juniper infill and expansion into former grasslands and savannahs. In addition, infilling and expansion in the 3 Bars Project area likely reflect the recovery of preexisting woodlands following severe woodcutting that occurred around Eureka during the late 1800s for production of charcoal (see Section 3.12.2.6; Zeier 1987).

The BLM considers two classification schemes when assessing the condition of pinyon-juniper woodlands. One scheme is based on historical types of pinyon-juniper vegetation (Romme et al. 2007), and one is based on transitional phases of woodland succession for mountain big sagebrush associations (Miller et al. 2008). These classification systems are summarized in **Table 3-31**.

Generally, areas of potential expansion are areas in which pinyon-juniper woodlands have not historically been present. These areas are targeted by the BLM for treatments to restore historical community types. Phase III

TABLE 3-30

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Singleleaf pinyon-Utah juniper/mountain big sagebrush/ bluebunch wheatgrass-Thurber’s needlegrass	F024XY049NV	Not applicable	An overstory canopy cover of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that influenced the structure and composition of the climax vegetation of this woodland site. This site is dominated by singleleaf pinyon pine and Utah juniper. Mountain big sagebrush is the principal understory shrub. Bluebunch wheatgrass, Indian ricegrass, and Thurber’s needlegrass are the most prevalent understory grasses. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and about 30 to 50 percent singleleaf pinyon pine. Understory vegetative composition is about 60 percent grasses, 10 percent forbs, and 30 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 300 to 700 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Utah juniper-singleleaf pinyon/ Wyoming big sagebrush/Thurber's needlegrass	F024XY050NV	Not applicable	An overstory canopy of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this woodland site. This site is dominated by Utah juniper and singleleaf pinyon pine. Wyoming big sagebrush is the principal understory shrub. Thurber's needlegrass, bluebunch wheatgrass, and bluegrasses are the most prevalent understory grasses. Overstory tree canopy composition is about 60 to 80 percent Utah juniper and about 20 to 40 percent singleleaf pinyon. Understory vegetative composition is about 50 percent grasses, 10 percent forbs, and 40 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 200 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Singleleaf pinyon-Utah juniper/black sagebrush/Thurber's needlegrass-bluebunch wheatgrass	F024XY051NV	Not applicable	An overstory canopy of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this woodland site. This site is dominated by singleleaf pinyon pine and Utah juniper. Black sagebrush is the principal understory shrub. Bluebunch wheatgrass, bluegrass, Thurber's needlegrass, and Indian ricegrass are the most prevalent understory grasses. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and about 30 to 50 percent singleleaf pinyon. Understory vegetative composition is about 35 percent grasses, 15 percent forbs, and 50 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 250 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Singleleaf pinyon-Utah juniper/black sagebrush/ mountain big sagebrush/ Thurber's needlegrass-bluebunch wheatgrass	F024XY051NV/ F024XY049NV	Not applicable	An overstory canopy of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this woodland site. This site is dominated by singleleaf pinyon pine and Utah juniper. Black sagebrush is the principal understory shrub. Bluebunch wheatgrass, bluegrass, Thurber's needlegrass, and Indian ricegrass are the most prevalent understory grasses. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and about 30 to 50 percent singleleaf pinyon. Understory vegetative composition is about 35 percent grasses, 15 percent forbs, and 50 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 250 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Utah juniper/ Wyoming big sagebrush/ bluebunch wheatgrass- Thurber's needlegrass	F025XY059NV	Not applicable	This site is dominated by Utah juniper. Wyoming big sagebrush is the principal understory shrub. Bluebunch wheatgrass, Thurber's needlegrass, Indian ricegrass, and bluegrasses are the most prevalent understory grasses. Phlox and milkvetch are common understory forbs. Overstory tree canopy composition is 100 percent Utah juniper. An overstory canopy cover of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this woodland site. Understory vegetative composition is about 50 percent grasses, 20 percent forbs, and 30 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 200 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Singleleaf pinyon-Utah juniper/black sagebrush/ bluebunch wheatgrass-Indian ricegrass	F028BY060NV	Not applicable	An overstory canopy of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this woodland site. This site is dominated by singleleaf pinyon pine and Utah juniper. Black sagebrush is the principal understory shrub. Bluebunch wheatgrass, bluegrass, Thurber's needlegrass, and Indian ricegrass are the most prevalent understory grasses. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and about 30 to 50 percent singleleaf pinyon. Understory vegetative composition is about 35 percent grasses, 15 percent forbs, and 50 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 250 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Singleleaf pinyon-Utah juniper/ Wyoming big sagebrush/ bluebunch wheatgrass-Indian ricegrass	F028BY061NV	Not applicable	An overstory canopy of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influences the structure and composition of the climax vegetation of this woodland site. This site is dominated by Utah juniper and singleleaf pinyon pine. Wyoming big sagebrush is the principal understory shrub. Bluebunch wheatgrass and Thurber's needlegrass are the most prevalent understory grasses. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and about 30 to 50 percent singleleaf pinyon. Understory vegetative composition is about 50 percent grasses, 10 percent forbs, and 40 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 200 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Singleleaf pinyon-Utah juniper/mountain big sagebrush/ bluebunch wheatgrass	F028BY062NV	Not applicable	This site is dominated by singleleaf pinyon and Utah juniper. An overstory canopy of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Mountain big sagebrush is the principal understory shrub. Bluebunch wheatgrass, Indian ricegrass, and Thurber's needlegrass are the most prevalent understory grasses. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and about 30 to 50 percent singleleaf pinyon. Understory vegetative composition is about 60 percent grasses, 10 percent forbs, and 30 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 300 to 700 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Not applicable.

TABLE 3-30 (Cont.)

Ecological Sites for Pinyon-juniper Community

Ecological Site Community	Site Descriptor	Soil Type	Potential Native Vegetation	Plant Community Dynamics
Singleleaf pinyon-Utah juniper/ mountain big sagebrush/ bluebunch wheatgrass-Thurber's needlegrass-greenstem paperflower	R028BY007NV/ F024XY049NV	Loamy 10 to 12 inches	The understory plant community is dominated by Thurber's needlegrass, bluebunch wheatgrass, and big sagebrush. Potential vegetative composition is about 65 percent grasses, 10 percent forbs, and 25 percent shrubs and trees. An overstory canopy of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this woodland site. This site is dominated by singleleaf pinyon and Utah juniper. Black sagebrush is the principal understory shrub. Bluebunch wheatgrass, bluegrass, Thurber's needlegrass, and Indian ricegrass are the most prevalent understory grasses. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and about 30 to 50 percent singleleaf pinyon. Understory vegetative composition is about 35 percent grasses, 15 percent forbs, and 50 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 250 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.	Where management results in chronic, repetitive, multi-year improper grazing, big sagebrush, rabbitbrush, bottlebrush squirreltail, and Sandberg's bluegrass increase, while Thurber needlegrass, bluebunch wheatgrass, and other desirable forage species decrease. Cheatgrass readily invades this site following disturbances. Singleleaf pinyon pine and Utah juniper invade this site where it occurs adjacent to pinyon-juniper woodlands. When pinyon and juniper occupy this site they compete with other species for available light, moisture, and nutrients. If pinyon-juniper canopies are allowed to close, they can eliminate all understory vegetation.

woodlands have the greatest tree density, and the greatest amount of canopy fuels, which puts them at increased risk for loss from high intensity wildfires (Tausch 1999 *cited in* Miller et al. 2008). According to Miller et al. (2008), however, treatments in Phase I and II expansion woodlands to halt their succession to Phase III woodlands may be more successful and cost-effective than treatments in Phase III woodlands. **Figure 3-27** differentiates expansion areas from areas of historic occurrence. Based on this mapping, approximately 46 percent of areas with trees are in Phase I, 35 percent are in Phase II, and 19 percent are in Phase III (AECOM 2011a). However, pinyon-juniper trees occupy only a portion of the area delineated into phases, especially for areas dominated by Phase I and II pinyon-juniper. In Phase I areas, grasses, forbs, and shrubs comprise much, if not most, of the area. Areas of recent pinyon-juniper expansion seem to be most prevalent at the lowest elevations, where topography is gentle (AECOM 2011a).

Old-growth pinyon-juniper stands are 140 years old or greater. Because age is difficult to estimate from tree core samples from Utah juniper trees, cores from singleleaf pinyon pines are typically used to determine the age of a particular stand of trees. Old-growth pinyon-juniper stands tend to occur on slopes, ridges, and inaccessible areas (i.e., areas not easily logged; AECOM 2011a). Areas having old growth pinyon-juniper woodlands are Indian Springs, Pete Hanson Creek, higher elevations on steep slopes, and the northern portion of the Sulphur Spring Range. Based on sample tree cores from the 3 Bars Project area, the majority of old-growth trees are between 160 and 200 years old, and as old as 290 years (AECOM 2011a). As discussed in Section 3.12.2.6, much of the older pinyon-juniper was harvested to make charcoal for the mining industry in the mid-1800s.

The following indicators of decline in the health of pinyon-juniper woodlands have been observed within the project area:

- Lack of understory species diversity, and absence or decline in associated woodland species (e.g., aspen, bitterbrush, and curl-leaf mountain mahogany).
- Widespread occurrence of Fire Regime Condition Class II and III (fire regimes that have been moderately or significantly altered from their historical range) due to excessive fuel loadings.
- Decreased tree vigor and pine nut production.
- Increased pathogen infestations resulting in greater than 20 percent ongoing mortality within a given stand.
- Stand conditions in excess of 400 steams per acre in several watersheds. Expansion onto adjacent range sites and encroachment into the interspaces within woodland sites including important wildlife and Greater sage-grouse habitats.

Many of these indicators have been observed in Phase III (or late successional) pinyon-juniper woodlands, which generally have a high density of trees and buildup of fuels.

3.12.2.3 Allotment Vegetation and Monitoring Studies

Rangeland systems common to the 3 Bars ecosystem consist of shrublands with a bunchgrass understory (Eastern Nevada Landscape Coalition and AECOM 2012). Overall, the area is experiencing issues with invasive annual grass species (mainly cheatgrass) that are altering the fire regime, as discussed in Section 3.13 (Noxious Weeds and other Invasive Non-native Vegetation). Large wildfires, caused by a buildup of cheatgrass and shrubs, are compromising the health of the sagebrush-steppe habitat. The encroachment of pinyon-juniper woodlands is also compromising the health of the sagebrush-steppe habitat.

TABLE 3-31

Pinyon-juniper Classification Schemes

Classification	Description
Historical Based System[1]	
Persistent Woodlands	Vary from sparse stands of small trees growing in poor substrates to relatively dense stands of large trees on productive sites. However, by definition they are communities in which pinyon pine and/or juniper are dominant species (historically and currently).
Pinyon-juniper Savannas	Predominantly found on gentle upland and transitional valley locations, where soil conditions favor grasses (or other grass-like plants), but can support at least some tree cover.
Areas of Potential Expansion	Occur when pinyon pine and juniper expand into new areas where they were not found historically.
Transitional Phases of Woodland Succession System[2]	
Phase I (early)	Trees are present, but shrubs and herbs are the dominant vegetation that influence ecological processes on the site.
Phase II (mid)	Trees are co-dominant with shrubs and herbs, and all three vegetation layers influence ecological processes on the site.
Phase III (late)	Trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site.

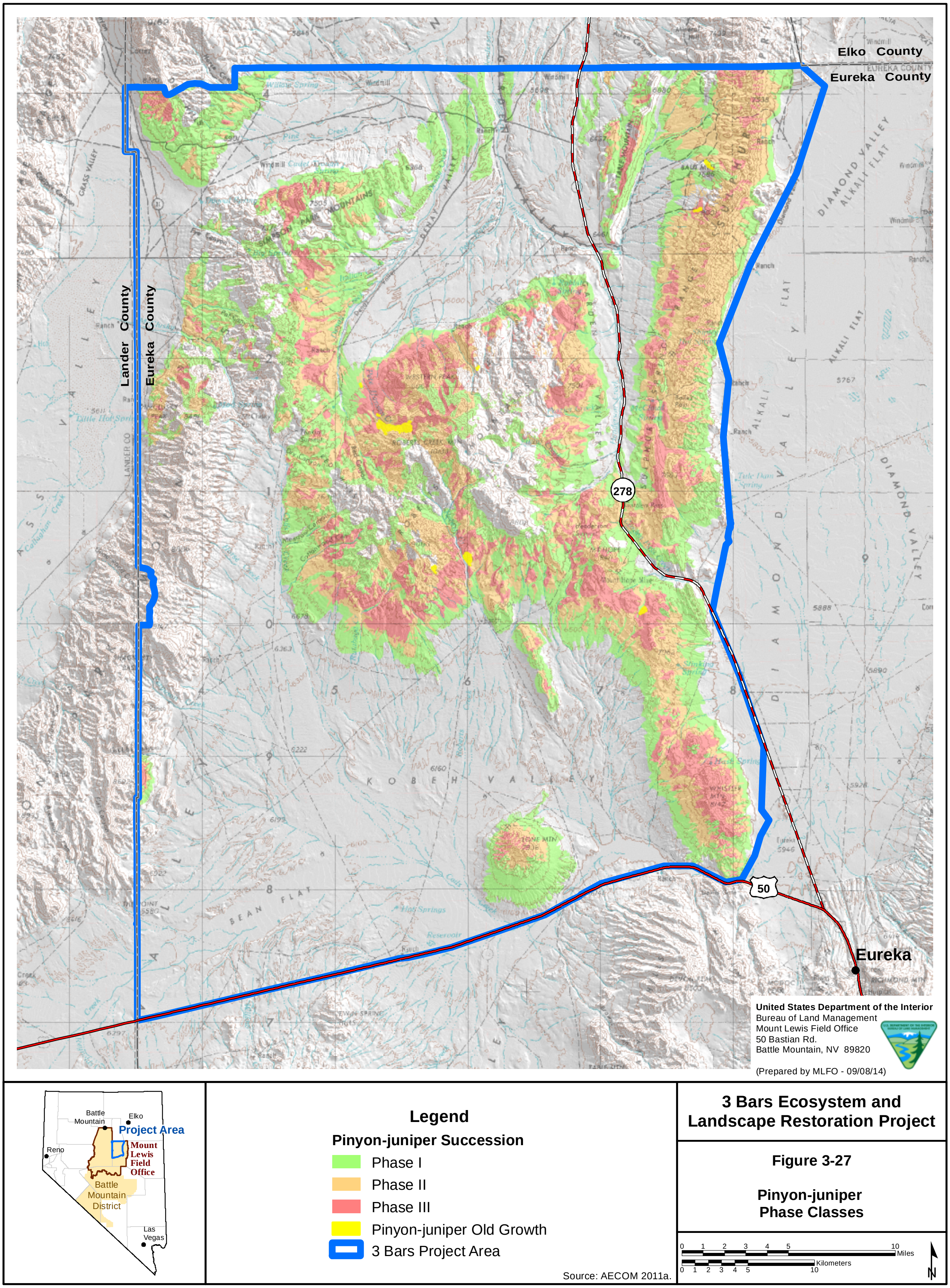
[1] Romme et al. (2007).
[2] Miller et al. (2008).

Rangeland health studies were conducted in six allotments between December 2010 and September 2011 (**Figure 3-28**). Seventy Key Management Areas (KMAs) within these allotments were assessed for their ecological status. These areas were selected because they met the following criteria:

- representative of larger areas of interest;
- contained within a single ecological site and plant community;
- contain key species; and
- capable of responding to management action that would be indicative of a response on a larger scale.

The results of these studies were discussed in the *Final 3 Bars Ecosystem and Landscape Restoration Project Rangeland Health Report* (Eastern Nevada Landscape Coalition and AECOM 2012). This report provides an overview assessment of rangeland health in the 3 Bars ecosystem as well as a more detailed analysis of six allotments that span the project area from the northern to southern extent. The analysis focused on the assessment of individual KMAs within each allotment, and was extrapolated to the entire allotment. Within these KMAs, three parameters were used to measure overall rangeland health—production, desired dominant species, and Potential Natural Community for grass, forb, and shrub species.

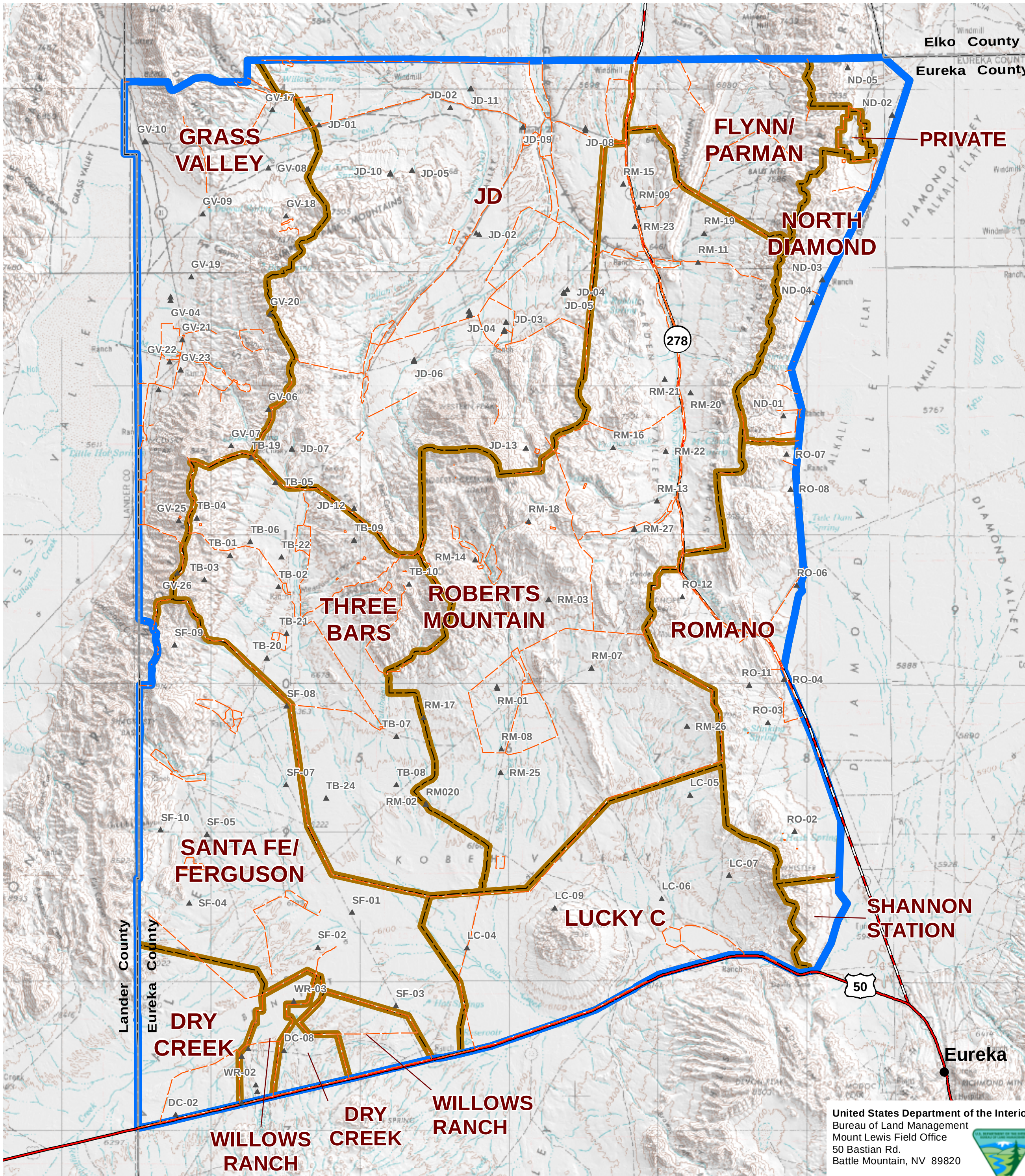
Production is a measurement of the above-ground weight of the sampled vegetation. Desired dominance refers to the species types that should be present on an ecological site given its stage of succession. The Potential Natural Community is a measurement of plant composition, not to be confused with production. A site could be experiencing



3 Bars Ecosystem and Landscape Restoration Project

Figure 3-27

Pinyon-juniper Phase Classes



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)

Legend

- Key Management Area
- Fence
- Allotment Boundary
- 3 Bars Project Area

Source: BLM 2012h, 2013i.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-28

Range Allotments and Key Management Areas

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

high production, but have low Potential Natural Community, if it is only producing a single grass, forb, or shrub species.

One of the objectives of the 3 Bars Project is to restore the functionality of the plant communities within the project area. The similarity index is used to compare the present state of vegetation on an ecological site in relation to the kinds, proportions, and amounts of vegetation expected for the site. For many areas within the project area, the goal is to restore the state of the plant community to a condition that is considered to be in a mid- to late-successional status. However, desired plant communities may be developed on a treatment-by-treatment basis depending on site-specific conditions and needs (e.g., use of non-native desired species to combat cheatgrass). After management objectives have been developed, one specific plant community may be identified as the desired plant community. Once the desired plant community has been identified, it is appropriate to determine the similarity index of the existing community to the desired plant community. Successional status is determined by the similarity index, which is expressed as the percentage of a plant community that is on the site compared to the Potential Natural Community for that site. Early successional status indicates that 0 to 25 percent, mid-successional status indicates that 26 to 50 percent, and late successional status indicates that 51 to 76 percent of the plant community is presently on the site compared to the Potential Natural Community. The Potential Natural Community occurs when 77 to 100 percent of the Potential Natural Community is on the site. **Figure 3-29** shows successional status on the 3 Bars Project area. **Tables 3-32** to **3-37** discuss some of the vegetation concerns and plant community status at each of the KMAs.

3.12.2.3.1 Flynn/Parman Allotment

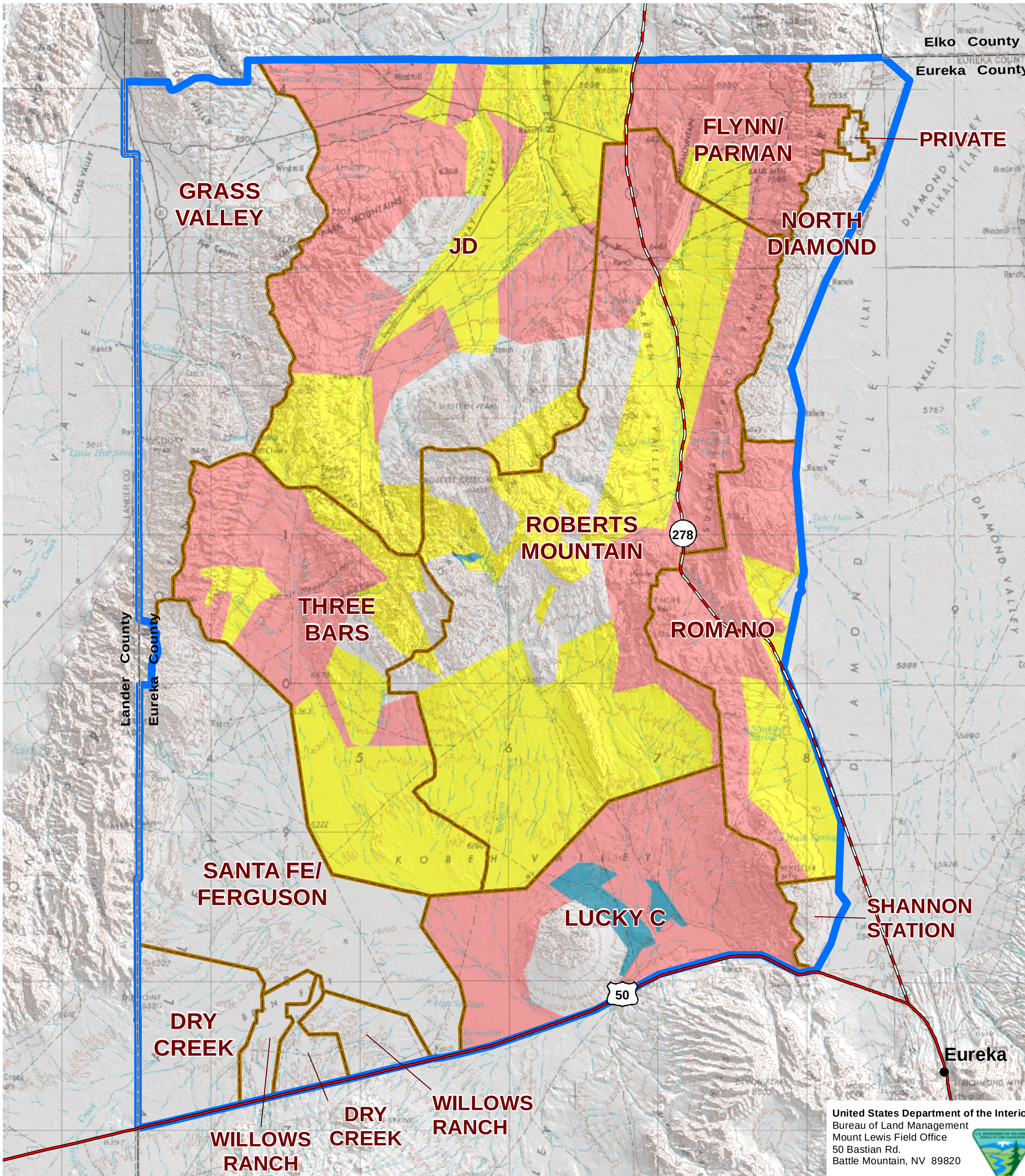
The Flynn/Parman Allotment consists of terrain ranging from moderately sloping hills to low mountains. Vegetation in the lower elevations includes big sagebrush with an understory of Sandberg's bluegrass, bottlebrush squirreltail, and Indian ricegrass. Mid-elevation vegetation includes pinyon-juniper and big sagebrush with an understory of bottlebrush squirreltail, Nevada bluegrass, and western wheatgrass. The vegetation at upper elevations includes pinyon-juniper with understories of bluebunch wheatgrass, basin wildrye, Thurber's needlegrass, and antelope bitterbrush. Five wildfires have occurred in this allotment since 1994, ranging from 61 to 3,275 acres, and have resulted in some of the area being infested with cheatgrass (see Section 3.13, Noxious Weeds and other Invasive Non-native Vegetation). Four of these fire sites were re-seeded with a mixture of native and non-native species.

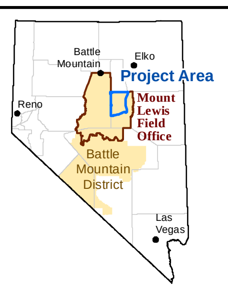
3.12.2.3.2 Roberts Mountain Allotment

The Roberts Mountain Allotment consists of terrain ranging from level valleys to high mountains. The vegetation in the valleys includes big sagebrush with an understory of Sandberg's bluegrass, bottlebrush squirreltail, and Indian ricegrass. Vegetation at mid-elevations includes pinyon-juniper, big sagebrush, and low sagebrush with an understory of bottlebrush squirreltail, Thurber's needlegrass, and Nevada bluegrass. Vegetation at upper elevations includes pinyon-juniper, mountain mahogany, willow, aspen, big sagebrush, and low sagebrush with an understory of bottlebrush squirreltail, Thurber's needlegrass, and Nevada bluegrass. Since 1954, five vegetation treatments have been applied; they include three crested wheatgrass seedings between 1954 and 1956 totaling 8,425 acres, an herbicide treatment application in 1965 totaling 2,111 acres, and pinyon-juniper thinnings in 2008 and 2009 totaling 1,660 acres. Additionally, a fire burned 627 acres in 2006.

3.12.2.3.3 JD Allotment

The JD Allotment consists of terrain ranging from flats and rolling hills to high mountains. Several seeps, springs, and streams are found in the mid- to upper elevations, supporting willow and aspen stands. Vegetation in the lower





Legend

Successional Status

- Early (0-25%)
- Mid (25-50%)
- Late (51-76%)
- Not Available
- Allotment Boundary
- 3 Bars Project Area

Source: BLM 2012g, ENLC and AECOM 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-29

Current Rangeland Conditions

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

TABLE 3-32

Flynn/Parman Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Flynn/ Parman	FJ1	50	27	5	60	45	12	This site is rated as early seral primarily due to a lack of desired perennial grass and shrubs. The primary and secondary perennial grass species are absent from the site. The dominant perennial grass found on the site is Sandberg's bluegrass; while desirable, it should not be the dominant perennial grass species for this site, based on the Ecological Site Description (ESD). Production of forbs is above the Potential Natural Community (PNC) for the site, with the dominant species being arrowleaf balsamroot.
	FJ2	50	25	5	60	45	13	This site was recently disturbed by a wildfire, and is rated as early seral primarily due the lack of desired shrubs and perennial grasses. The dominant shrub species are missing from the site, and many of the desired perennial grasses are present, but are well below PNC. Production for forbs is well above PNC, however the dominant forb species, spiny phlox, is an undesirable forage species.
	FP1	50	56	5	39	45	5	This site is rated as early seral, primarily due to a lack of desired shrubs. The dominant shrub species, Wyoming big sagebrush, is on the site but is not abundant. Production of forbs is above PNC; however, the dominant forb species, spiny phlox, is an undesirable forb species. It is important to note that this site has a much larger juniper component than is represented by the production study. The ESD for this site states that juniper readily invades this type of site where it is adjacent to woodlands, and when juniper occupies this site, it competes for other species for nutrients and available light. Where juniper canopies are allowed to close, juniper can cause the elimination of understory vegetation.

TABLE 3-32 (Cont.)

Flynn/Parman Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Flynn/ Parman	FP2	50	58	5	38	45	<1	This site has been disturbed by a wildfire, and is rated as early seral primarily due the lack of desired shrubs and perennial grasses. The dominant shrub species are missing from the site, as well as the primary and secondary grasses. Production of forbs is above PNC, however, the dominant forb species, spiny phlox, is an undesirable forage species.
	FP3	55	29	10	64	35	5	This site appears to have been disturbed, although the cause of the disturbance is uncertain. It is rated as early seral primarily due to the lack of desired shrubs and perennial grasses. The dominant shrub species are missing from the site, and many of the desired perennial grasses are missing or present but below PNC. Production of forbs is above PNC, however, the dominant forb species, spiny phlox, is an undesirable forage species.
	FP4	65	73	10	19	25	<1	This site has been disturbed by a wildfire, and is rated as early seral primarily due the lack of desired shrubs, perennial grasses, and forbs. The dominant shrub species are missing from the site. In addition, the site is missing some desired perennial grasses. Production of forbs is above PNC, however, the dominant forb species, spiny phlox, is an undesirable forage species

TABLE 3-33

Roberts Mountain Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Roberts Mountain	RM7	65	14	10	8	25	78	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The primary and secondary perennial grass species are absent from the site. The dominant perennial grass found on the site is crested wheatgrass. While desirable, it should not be the dominant perennial grass species for this site, based on the ESD. Production of forbs is below PNC for the site.
	RM9	65	17	10	26	25	57	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The primary and secondary perennial grass species are absent from the site. The dominant perennial grass found on the site is crested wheatgrass. While desirable, it should not be the dominant perennial grass species for this site, based on the ESD. No desirable forbs are found at the site.
	RM11	50	31	5	2	45	67	This site is rated as late seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses found on the site are squirreltail and Sandberg's bluegrass; while desirable, they should not be the dominant perennial grass species for this site, based on the ESD. Several desirable forbs are found at the site, but production of these plants is low.
	RM14	55	7	10	23	35	70	This site is rated as late seral primarily due to the lack of a desired perennial grasses. The dominant perennial grasses listed on the ESD (with the exception of bluebunch wheatgrass) are found on the site, but production is low. In addition, the site is lacking its secondary shrub, antelope bitterbrush.

TABLE 3-33 (Cont.)

Roberts Mountain Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Roberts Mountain	RM18	45	9	10	60	45	30	This site is rated as late seral primarily due to the lack of desired perennial grasses. The dominant perennial grasses listed on the ESD (with the exception of bluebunch wheatgrass and pine needlegrass) are found on the site, but production is extremely low.
	RM19	50	10	5	4	45	86	This site is rated as late seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD (with the exception of needle-and-thread) are found on the site, but production is low. Desirable perennial forbs are found at the site, but production is low.
	RM20	50	4	5	19	45	77	This site is rated as late seral primarily due to the lack of desired perennial grass and forbs. The dominant perennial grasses listed on the ESD are absent from the site. Several other desirable perennial forbs (milkvetch, hawksbeard, and long leaf phlox) are found on the site, but production is low.
	RM21	50	7	5	12	45	81	This site is rated as late seral primarily due to the lack of desired perennial grasses. The dominant perennial grasses listed on the ESD (with the exception of needle-and-thread) are found on the site, but production is low.
	RM22	50	7	5	4	45	89	This site is rated as late seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are not on the site, only two perennial forbs are found the site, and production is low.
	RM23	50	7	5	<1	45	83	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD (with the exception of Thurber's needlegrass) are found on the site, but production is low. The site is lacking in desirable perennial forbs.

TABLE 3-33 (Cont.)

Roberts Mountain Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Roberts Mountain	RM25	50	3	5	1	45	96	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD (with the exception of needle-and-thread) are found on the site, but production is low. Only one perennial forb is found on the site, and production is low.
	RM26	50	28	5	7	45	64	This site is rated as PNC primarily due to the presence of desirable perennial grasses and forbs.
	RM27	50	9	5	24	45	67	This site is rated as late seral primarily due to the lack of desired perennial grasses. The dominant perennial grasses listed on the ESD (with the exception of needle-and-thread) are found on the site, but production is low.
	RM108	65	21	10	5	25	74	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are not found on the site. Crested wheatgrass dominates the site. Several perennial forbs are found on the site, but production is low.
	RM208	50	1	5	1	45	98	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. Only one perennial forb was found on the site, and production is low.
	RM308	60	6	10	2	30	92	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. Perennial forbs are on the site, but production is low.

elevations includes Wyoming big sagebrush, shadscale, and budsage with an understory of Sandberg's bluegrass and bottlebrush squirreltail. Vegetation in the higher elevations consists of pinyon-juniper, low sagebrush, and some mountain mahogany with an understory of Sandberg's bluegrass, bottlebrush squirreltail, Thurber's needlegrass, and bluebunch wheatgrass. Since 1961, nine seedings, eight wildfires, two mechanical treatments, and one herbicide treatment application have occurred, as follows:

Seedings (11,133 acres)

1961 = 888 acres of crested wheatgrass
1964 = 1,692 acres of crested wheatgrass
1966 = 698 acres of crested wheatgrass
1985 = 1,383 acres of crested wheatgrass
1994 = 1,642 acres of native and non-native species
1995 = 838 acres of native and non-native species
1996 = 385 acres of native and non-native species
1999 = 2,250 acres of crested wheatgrass
2000 = 1,357 acres of native and non-native species

Fires (34,581 acres)

JD Fire 1985 = 1,128 acres
Simpson Fire 1994 = 1,663 acres (reburned in the 1999 Trail Canyon Fire)
Mud Fire 1996 = 385 acres (reburned in the 1999 Trail Canyon Fire)
Trail Canyon Fire 1999 = 17,694 acres
Tonkin Fire 2000 = 1,357 acres
Tonkin Fire 2006 = 72 acres
JD Fire 2006 = 210 acres
Frazier Fire 2012 = 12,072 acres

Chaining after the Trail Canyon re-seeding 1999 = 17,744 acres

Chemical and mechanical treatment applications

Ester 2,4-D aerial spray 1966 = 1,796 acres
Chaining after the Trail Canyon re-seeding 1999 = 17,744 acres
Hand thinning of pinyon-juniper 2008 = 2,209 acres

3.12.2.3.4 Three Bars Allotment

The Three Bars Allotment consists of terrain ranging from valley bottoms to high mountains. Vegetation in the lower elevations includes Wyoming big sagebrush with an understory of Sandberg's bluegrass, bottlebrush squirreltail, and Indian ricegrass. Vegetation in the higher elevations consists of pinyon-juniper, Wyoming big sagebrush, mountain big sagebrush, and black sagebrush with an understory of bottlebrush squirreltail, Thurber's needlegrass, Indian ricegrass, Great Basin wildrye, Idaho fescue, and Nevada bluegrass. Two fires have occurred within the Three Bars Allotment; the Trail Canyon Fire in 1999 that burned 3,490 acres, and the HaHa Fire in 2005 that burned 24 acres.

The following six allotments (Dry Creek, Grass Valley, North Diamond, Santa Fe/Ferguson, Shannon Station, and Willows Ranch) were not part of the *Final 3 Bars Ecosystem and Landscape Restoration Project Rangeland Health*

TABLE 3-34

JD Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
JD	JD1	55	6	5	18	40	41	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. No perennial forbs are found on the site.
	JD2	25	3	5	15	70	82	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. No perennial forbs are found on the site.
	JD3	50	<1	5	0	45	100	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site.
	JD4	65	63	5	0	30	37	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. Crested wheatgrass is the dominant grass. No perennial forbs are on the site.
	JD5	55	54	5	<1	40	63	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. No perennial forbs were found on the site.
	JD6	50	10	5	0	45	90	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. No perennial forbs were found on the site.
	JD7	65	9	10	82	25	9	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and shrubs. The dominant perennial grasses listed on the ESD are lacking on the site. Shrubs are on the site, but production is low.

TABLE 3-34 (Cont.)

JD Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
JD	JD8	40	30	10	<1	50	70	This site is rated as late seral primarily due to the lack of the production of desired perennial grasses and shrubs. Grass production is lower than desired, but several desirable species are present. No desirable forbs are on the site.
	JD9	65	94	5	5	30	0	This site is rated as early seral primarily due to the lack of desired perennial grasses, forbs, and shrubs. The dominant perennial grasses listed on the ESD are lacking on the site. No perennial forbs are on the site. The dominant grass is crested wheatgrass, which is a non-native seeded species.
	JD10	50	15	5	0	45	85	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site. Perennial forbs were found on the site during nested frequency studies, but not during production studies.
	JD11	25	12	5	13	70	73	This site is rated as late seral primarily due to the lack of production of desired perennial grasses and shrubs. The dominant perennial grasses listed on the ESD are on the site but production is low. No perennial forbs were found on the site. Only one shrub, shadscale saltbush, was found during the production studies.
	JD12	55	44	10	41	35	15	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and shrubs. Perennial grass production is low, and one of the dominant perennial grasses listed on the ESD is lacking on the site. Several desirable perennial forbs are found on the site. Shrub production is low, and antelope bitterbrush was not found on the site.

TABLE 3-34 (Cont.)

JD Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
JD	JD13	55	17	10	67	35	16	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and low shrub production. The dominant perennial grasses listed on the ESD are lacking on the site, and the perennial grasses that are present have low production. A variety of desirable shrubs are on the site, but production is low.
	JD14	50	32	5	24	45	44	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The dominant perennial grasses listed on the ESD are lacking on the site, and only one perennial forb was found on the site.
	JD15	55	48	5	22	40	30	This site is rated as early seral primarily due to the lack of desired perennial grasses and low shrub production. The dominant perennial grasses listed on the ESD are lacking on the site. Shrub production is low and the secondary shrub was not found on the site.
	JD16	65	58	10	29	25	13	This site is rated as early seral primarily due to the lack of desired perennial grass, forb, and shrub production. The dominant perennial grasses listed on the ESD are lacking on the site. Perennial forbs are found on the site, but production is low. Shrub production is low, and the secondary shrub was not found on the site.
	JD17	40	69	5	0	55	29	This site is rated as early seral primarily due to the low production of desired perennial grasses and shrubs. Needle-and-thread, one of the dominant perennial grasses listed on the ESD, is lacking on the site. No perennial forbs were detected during production. Shrub production is low.

TABLE 3-34 (Cont.)

JD Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
JD	JD18	55	52	10	15	35	33	This site is rated as early seral primarily due to the low production of desired perennial grasses, forbs, and shrubs. The dominant perennial grasses listed on the ESD are lacking on the site. Production of forbs is low, despite the presence of several desirable species. The secondary shrub was not found on the site, and mountain big sagebrush has low production.
	JD19	65	21	10	21	25	58	This site is rated as early seral primarily due to the low production of desired perennial grasses, forbs, and shrubs. The dominant perennial grasses listed on the ESD are lacking on the site. Production for forbs is high, and includes several desirable species. No desirable shrubs are present.

TABLE 3-35

Three Bars Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Three Bars	BI2	65	21	10	15	25	64	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The primary perennial grass species is absent from the site. The desirable grasses present are only found in small amounts. Production of forbs and shrubs is above PNC.
	TB1	50	24	10	10	40	66	This site is rated as early seral primarily due to the lack of desired perennial grasses. The primary and secondary perennial grass species are absent from the site. The desirable grasses present are only found in small amounts. Production of forbs is below PNC and the production of shrubs is above PNC.
	TB2	65	37	10	37	25	26	This site is rated as early seral primarily due to the lack of desired perennial grasses. The primary and secondary perennial grass species are absent from the site. Many of the perennial grasses found on the site have low production. Production of forbs and shrubs is above PNC.
	TB3	65	6	10	79	25	15	This site is rated as early seral primarily due to the low production of desired perennial grasses and shrubs. The primary and secondary perennial grass species are absent from the site. Desirable shrub composition is below PNC.
	TB4	55	15	10	82	35	3	This site is rated as early seral primarily due to the lack of desired perennial grasses and shrubs. The primary and secondary perennial grass species are absent from the site. The desirable grasses present are only found in small amounts. Production of shrubs is below PNC.

TABLE 3-35 (Cont.)

Three Bars Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Three Bars	TB6	50	51	10	8	40	41	This site is rated as early seral primarily due to the lack of desired perennial grasses. The primary and secondary perennial grass species are absent from the site. Bluegrass and squirreltail are the dominant grasses on the site, and while they are desirable grasses, they should not be the dominant grasses for this site. The desirable grasses present are only found in small amounts. Production of forbs and shrubs is close to PNC.
	TB7	50	50	5	1	45	49	This site is rated as early seral primarily due to the lack of desired perennial grasses and forbs. The primary and secondary perennial grass species are absent from the site. The primary grass on the site is Sandberg's bluegrass and while desirable, it should not be the dominant grass species for this site. In addition, the site lacks the desired production for forbs and Wyoming big sagebrush.
	TB8	50	<1	5	0	45	100	This site is rated as mid-seral primarily due to the lack of desired perennial grasses and forbs. The primary and secondary perennial grass species are absent from the site. Only one grass, squirreltail, is on the site, and it has very low production. Shrub production is above PNC.
	TB9	45	43	10	41	45	16	This site is rated as late seral primarily due to the amount of production of the perennial grasses and forbs. However, this site is lacking the primary and secondary perennial grass species. The dominant grass species is bluegrass, and while desirable, it should not be the dominant grass on the site. Sagebrush production is also low on this site.

TABLE 3-35 (Cont.)

Three Bars Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Three Bars	TB10	45	43	10	16	45	41	This site is rated as late seral primarily due to the production of the perennial grasses, forbs, and shrubs.
	TB19	45	35	10	57	45	8	This site is rated as mid-seral primarily due to the amount of production of perennial grasses and forbs. However, this site is lacking the primary and secondary perennial grass species. The dominant grass species is bluegrass, and while desirable, it should not be the dominant grass on the site. Sagebrush production was not observed on this site.
	TB20	65	22	10	46	25	32	This site is rated as early seral primarily due to the lack of production of the perennial grasses and variety of forbs and shrubs. The primary and secondary perennial grass species were not found on the site. The main forb species found on the site was spiny phlox, and while desirable, it should not be the dominate forb on the site. The secondary shrub, antelope bitterbrush, is absent from the site.
	TB21	65	39	10	39	25	22	This site is rated as early seral primarily due to the lack of perennial grasses and variety forbs. This site is lacking the primary grass species listed on the ESD for the site. The only forb observed on the site was spiny phlox; it should not be the dominant forb species. Antelope bitterbrush, the secondary shrub, was not found on the site.
	TB22	65	56	10	37	25	7	This site is rated as mid-seral primarily due to the amount of production of the perennial grasses and shrubs. However, this site is lacking the secondary perennial grass species listed on the ESD. Shrub production was found to be low on this site and the secondary shrub was not detected.

TABLE 3-35 (Cont.)

Three Bars Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Three Bars	TB24	50	36	5	13	45	51	This site is rated as early seral primarily due to the lack of production of the perennial grasses. The primary grass is present in only a small amount, and the secondary grass is not found on the site. The dominant grass species was bluegrass, and while desirable, it should not be the dominant grass on the site.

3.12.2.3.5 Romano Allotment

The Romano Allotment consists of terrain ranging from valley bottoms to low mountains. Vegetation in the lower elevations includes Wyoming big sagebrush with an understory of Sandberg's bluegrass, bottlebrush squirreltail, and Indian ricegrass. Vegetation in the mid-range elevations consists of pinyon-juniper and Wyoming big sagebrush with an understory of bottlebrush squirreltail, Nevada bluegrass, and western wheatgrass. Vegetation at higher elevations consists of pinyon-juniper with an understory of bluebunch wheatgrass, basin wildrye, Thurber's needlegrass, and antelope bitterbrush. There are scattered occurrences of cheatgrass within the Romano Allotment (see Section 3.13, Noxious Weeds and other Invasive Non-native Vegetation).

3.12.2.3.6 Lucky C Allotment

The Lucky C Allotment consists of terrain ranging from valley bottoms to low mountains. Vegetation on the lower elevations includes black greasewood with an understory of basin wildrye and inland saltgrass. Vegetation at mid-range elevations consists of Wyoming big sagebrush and basin big sagebrush with an understory of needle-and-thread grass and Indian ricegrass. Vegetation at higher elevations consists of black sagebrush with an understory of Indian ricegrass and needle-and-thread grass. Pinyon-juniper is found on Lone Mountain.

The following six allotments (Dry Creek, Grass Valley, North Diamond, Santa Fe/Ferguson, Shannon Station, and Willows Ranch) were not part of the *Final 3 Bars Ecosystem and Landscape Restoration Project Rangeland Health Report* (Eastern Nevada Landscape Coalition and AECOM 2012). Health assessments and evaluations have been conducted by the BLM, with the exception of the Santa Fe/Ferguson allotment, and the results follow.

3.12.2.3.7 Dry Creek Allotment

The Potential Natural Communities for the Dry Creek Allotment consist of Wyoming big sagebrush with an understory of Indian ricegrass and needle-and-thread grass at the lower elevations; black sagebrush with an understory of Indian ricegrass and needle-and-thread grass at the mid-elevations; and low sagebrush with an understory of Thurber's needlegrass and bluebunch wheatgrass and Utah juniper and singleleaf pinyon pine communities in the upper elevations.

3.12.2.3.8 Grass Valley Allotment

The Potential Natural Communities for the Grass Valley Allotment in the lower elevations consist of alkali sacaton, saltgrass, alkali bluegrass, basin wildrye, and black greasewood in the poorly drained areas and Wyoming big sagebrush, shadscale, and budsage, with an understory of Indian ricegrass, bottlebrush squirreltail, and bluegrass on the alluvial fans. The mid-elevation Potential Natural Communities consist of pinyon-juniper, curl-leaf mountain mahogany, black sagebrush, mountain big sagebrush, and low sagebrush with an understory of bluebunch wheatgrass, Idaho fescue, Thurber's needlegrass, bottlebrush squirreltail, Nevada bluegrass, and basin wildrye. The higher elevation Potential Natural Communities consist of mountain big sagebrush, snowberry, serviceberry, and low sagebrush with an understory of mountain brome, Thurber's needlegrass, basin wildrye, Idaho fescue, and bluegrass. Portions of the Grass Valley Allotment were burned in the 1999 Trail Canyon Fire and are now dominated by cheatgrass.

TABLE 3-36

Romano Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Romano	RO2	50	33	5	13	45	50	This site is rated as mid-seral primarily due to the lack of production of the perennial grasses. Both the primary and secondary grasses are present, but only in small amounts. The dominant grass species is bluegrass, and while desirable, it should not be the dominant grass on the site.
	RO3	55	58	10	9	35	33	This site is rated as mid-seral primarily due to the lack of variety of perennial grasses and shrubs and the low production of forbs. The secondary grass (Indian ricegrass) was not found on the site and the site is dominated by needle-and-thread. Only one perennial forb was detected in measurable amounts. The site was also missing its secondary shrub (four-wing saltbush).
	RO4A	50	52	5	2	45	35	This site is rated as early seral primarily due to the lack of production of native perennial grasses and forbs. The primary grass (Indian ricegrass) was not detected on the site, and the secondary grass was only present in a small amount. Only one perennial forb (milkvetch) was found and only in trace amounts.
	RO4B	50	100	5	0	45	0	This site is rated as early seral due to the lack of production of the native perennial grasses, forbs, and shrubs. The only species found on the site was a non-native seeded species, crested wheatgrass.
	RO6	30	4	5	36	65	60	This site is rated as mid-seral primarily due to the lack of production of the perennial grasses, forbs, and shrubs. Perennial grass production is low, and no perennial forbs were found on the site. The dominant shrub, shadscale saltbush, is low.

TABLE 3-36 (Cont.)

Romano Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Romano	RO7	50	37	5	24	45	39	This site is rated as early seral primarily due to the lack of production of the perennial grasses, forbs, and shrubs. The primary grass was found in only trace amounts and the secondary grass was absent from the site. Several perennial forbs were found on the site, but forb production is dominated by bur buttercup, an undesirable annual forb. Shrub production is below PNC.
	RO8	50	42	5	0	45	58	This site is rated as early seral primarily due to the lack of production of perennial grasses. The primary grass is present in small amounts, but the secondary grass was not found. The dominant grass species is bluegrass, and while desirable, it should not be the dominant grass on the site. No perennial forbs were found.
	RO11	55	16	10	46	35	37	This site is rated as mid-seral primarily due to the lack of production of the perennial grasses. Both the primary and secondary grasses are present, but only in small amounts. The dominant grass species is bluegrass, and while desirable, it should not be the dominant grass on the site.
	RO12	65	49	10	36	25	15	This site is rated as early seral primarily due to the lack of production of the perennial grasses and shrubs. Both the primary and secondary grasses were not found. The dominant grass species is bluegrass, and while desirable, it should not be the dominant grass on the site. Big sagebrush production is below PNC, and the secondary shrub, antelope bitterbrush, was not detected.

TABLE 3-37

Lucky C Allotment Key Management Areas

Allotment	KMA Number	Grass Composition (%)		Forb Composition (%)		Shrub Composition (%)		Major Concerns
		Desired	Actual	Desired	Actual	Desired	Actual	
Lucky C	LC4	35	40	5	0	60	60	This site is rated as early seral primarily due to the lack of production of the perennial grasses, forbs, and shrubs. The species composition is acceptable for this site type, but the actual production is low.
	LC5	55	79	10	8	35	13	This site is rated as mid-seral primarily due to the lack of production of the perennial forbs and shrubs. Only one perennial forb was detected. Shrub production is below PNC, and the secondary shrub, fourwing saltbush, was not detected.
	LC6	50	33	5	23	45	44	This site is rated as early seral primarily due to the lack of production of the perennial grasses and shrubs. The species composition is acceptable for this site type, however actual production is low.
	LC7	50	21	5	30	45	49	This site is rated as early seral primarily due to the lack of production of the perennial grasses and shrubs. The species composition is acceptable for this site type, however actual production is low.
	LC9	50	28	5	45	45	27	This site is rated as early seral primarily due to the lack of production of the perennial grasses and shrubs. The species composition is acceptable for this site type.

3.12.2.3.9 North Diamond Allotment

The Potential Natural Communities for the North Diamond Allotment in the lower elevations consist of alkali sacaton, saltgrass, and alkali bluegrass in the poorly drained areas and big sagebrush with an understory of Indian ricegrass, bottlebrush squirreltail, and bluegrass in the remainder of the lower elevations. Mid-elevation Potential Natural Communities consist of pinyon-juniper communities and the Potential Natural Communities in the higher elevations have mountain big sagebrush, antelope bitterbrush, snowberry, serviceberry, and curl-leaf mountain mahogany with an understory of bluebunch wheatgrass, various needlegrass species, Indian ricegrass, and bottlebrush squirreltail.

3.12.2.3.10 Santa Fe/Ferguson Allotment

The Potential Natural Communities for the Santa Fe/Ferguson Allotment consist of Wyoming big sagebrush with an understory of Indian ricegrass and needle-and-thread grass, and salt desert scrub dominated by shadscale, Indian ricegrass, and squirreltail, and greasewood with alkali sacaton and salt grass at the lower elevations. Black sagebrush, with an understory of Indian ricegrass and needle-and-thread grass, is found at the mid-elevations.

3.12.2.3.11 Shannon Station Allotment

The Potential Natural Communities for the Shannon Station Allotment in the lower elevations consist of alkali sacaton, saltgrass, and alkali bluegrass in the poorly drained areas and big sagebrush with an understory of Indian ricegrass, bottlebrush squirreltail, and bluegrass in the remainder of the lower elevations. Mid-elevation Potential Natural Communities consist of pinyon-juniper communities and the Potential Natural Communities in the higher elevations consist of mountain big sagebrush, antelope bitterbrush, snowberry, serviceberry, and curl-leaf mountain mahogany with an understory of bluebunch wheatgrass, various needlegrass species, Indian ricegrass, and bottlebrush squirreltail.

3.12.2.3.12 Willows Ranch Allotment

The Potential Natural Communities for the Willows Ranch Allotment consist of Wyoming big sagebrush with an understory of Indian ricegrass and needle-and-thread grass, salt desert scrub dominated by shadscale, Indian ricegrass, and squirreltail, greasewood with alkali sacaton and salt grass, and grassland dominated by alkali sacaton, alkali cordgrass, and three-awn grasses at the lower elevations. Black sagebrush, with an understory of Indian ricegrass and needle-and-thread grass, are found at the mid-elevations.

3.12.2.4 Special Status Plant Species

No focused special status plant surveys were conducted in support of this project. The BLM Special Status Species list for the Battle Mountain District includes 40 plant species that have the potential to occur in the District. A USFWS species list (USDOI USFWS 2011) by county was reviewed in support of this analysis. No federally listed plants are known to occur in Eureka County and none are expected to occur on the project area. In addition, the BLM obtained data from the Nevada Natural Heritage Program (2012) on special status species occurrence on the 3 Bars Project area. Information on plant species that may occur within the 3 Bars Project area is provided in **Table 3-38**. Of the six species listed in the table, the Nevada Natural Heritage Program has records of three occurring within the 3 Bars Project area—Beatley buckwheat, least phacelia, and one-leaflet Torrey milkvetch. Beatley buckwheat, a BLM Sensitive Species, is known from Roberts Mountains, with an additional mapped occurrence immediately northwest of the project area. Least phacelia, a BLM Sensitive Species, is also known from Roberts Mountains. One-leaflet

Torrey milk vetch is known from the southern end of the Kobeh Valley, near U.S. Highway 50. Lahontan beardtongue, a BLM Sensitive Species, has been documented from the area near the intersection of U.S. Highway 50 and Nevada State Route 278 near the southeastern corner of (but outside of) the project area.

According to BLM resource specialists, the Monte Neva paintbrush (state listed as critically endangered) is only found in riparian areas associated with hot springs at low elevations within the greasewood-rabbitbrush-sand dropseed community. The only known location with this habitat type within the 3 Bars Project area is Hot Springs Hill north of U.S. Highway 50 in the Santa Fe Ferguson Allotment. Of the low elevational riparian treatment areas in Kobeh Valley, including Lone Mountain Spring, Mud Spring, and Treasure Well, none have the appropriate characteristics for the Monte Neva paintbrush. The USFWS has conducted surveys in the general area of Hot Spring Hill, including the three spring areas, and found no evidence of Monte Neva paintbrush (Morefield 1993).

None of these special status plant species have been found within proposed 3 Bars treatment areas, although one mapped occurrence of Beatley buckwheat is within approximately 1,300 feet of the proposed Upper Vinini Creek riparian treatment area. Although not mapped within proposed project areas, sensitive species could still occur in these areas, since surveys for these species have not been conducted for the 3 Bars project. None of these species were found during any of the focused Mount Hope Project special status species plant surveys.

TABLE 3-38

Special Status Plant Species that may Occur on the 3 Bars Project Area

Common Name	Scientific Name	Habitat	Status[1]
Beatley buckwheat	*Eriogonum beatleyae*	Rock outcrops	BLM Sensitive and NNHP S2
Lahontan beardtongue	*Penstemon palmeri* var. *macranthus*	Moist washes, roadsides, and canyon floors	BLM Sensitive and NNHP S2
Least phacelia	*Phacelia minutissima*	Wetlands (including riparian zones, aspen stands, and sagebrush swales)	BLM Sensitive and NNHP S2
Monte Neva paintbrush	*Castilleja salsuginosa*	Wetlands and travertine hot spring mounds	Nevada Critically Endangered and NNHP S1
Nevada willowherb	*Epilobium nevadense*	Pinyon-juniper slopes with limestone outcrops or talus	BLM Sensitive and NNHP S2
One-leaflet Torrey milkvetch	*Astragalus calycosus* var. *monophyllidius*	Sagebrush	NNHP S2

[1] Nevada Natural Heritage Program (NNHP) S1 = critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, imminent threats, or other factors (state rank indicator); NNHP S2 = Imperiled due to rarity or other demonstrable factors (state rank indicator).

Sources: Nevada Natural Heritage Program (2001, 2010, 2012), USDOI BLM (2012b).

3.12.2.5 Special Woodland Products

The BLM allows the harvest of Christmas trees and fuel wood from any location within the 3 Bars Project area. For commercial users, the BLM would issue a permit for the harvest of Christmas trees or fuel wood and would assign the user to a specific area where pinyon-juniper occurs. The public and commercial users may harvest pine nuts and native seeds within designated harvest areas, as identified in the Shoshone-Eureka RMP, by permit. The locations of allowable harvest areas are shown in **Figure 3-30**.

3.12.2.5.1 Woodland Products

Harvested fuel wood includes deadwood (dead branches or wood) and greenwood (living branches or wood). Juniper trees are commonly harvested for use as fence posts. The public may harvest fuel wood (green or dead), posts, or Christmas trees anywhere on public lands within the 3 Bars Project area, except WSAs, while commercial harvest is handled on a case-by-case basis and requires site-specific NEPA documentation and a permit from the Mount Lewis Field Office. Juniper posts and other types of greenwood must be harvested within designated harvest units. Species approved for commercial and personal harvest include singleleaf pinyon pine and Utah juniper, with permits for a limited amount of curl-leaf mountain mahogany also available. The vast majority of woodland product harvest is wood cutting by private individuals.

Commercial wood harvest permits are fairly uncommon in the 3 Bars Project area. Based on data from 1996 through 2011, the Battle Mountain District issued only 11 commercial harvest permits for cutting within Eureka County. During this same period, only one permit for commercial harvest for posts was issued.

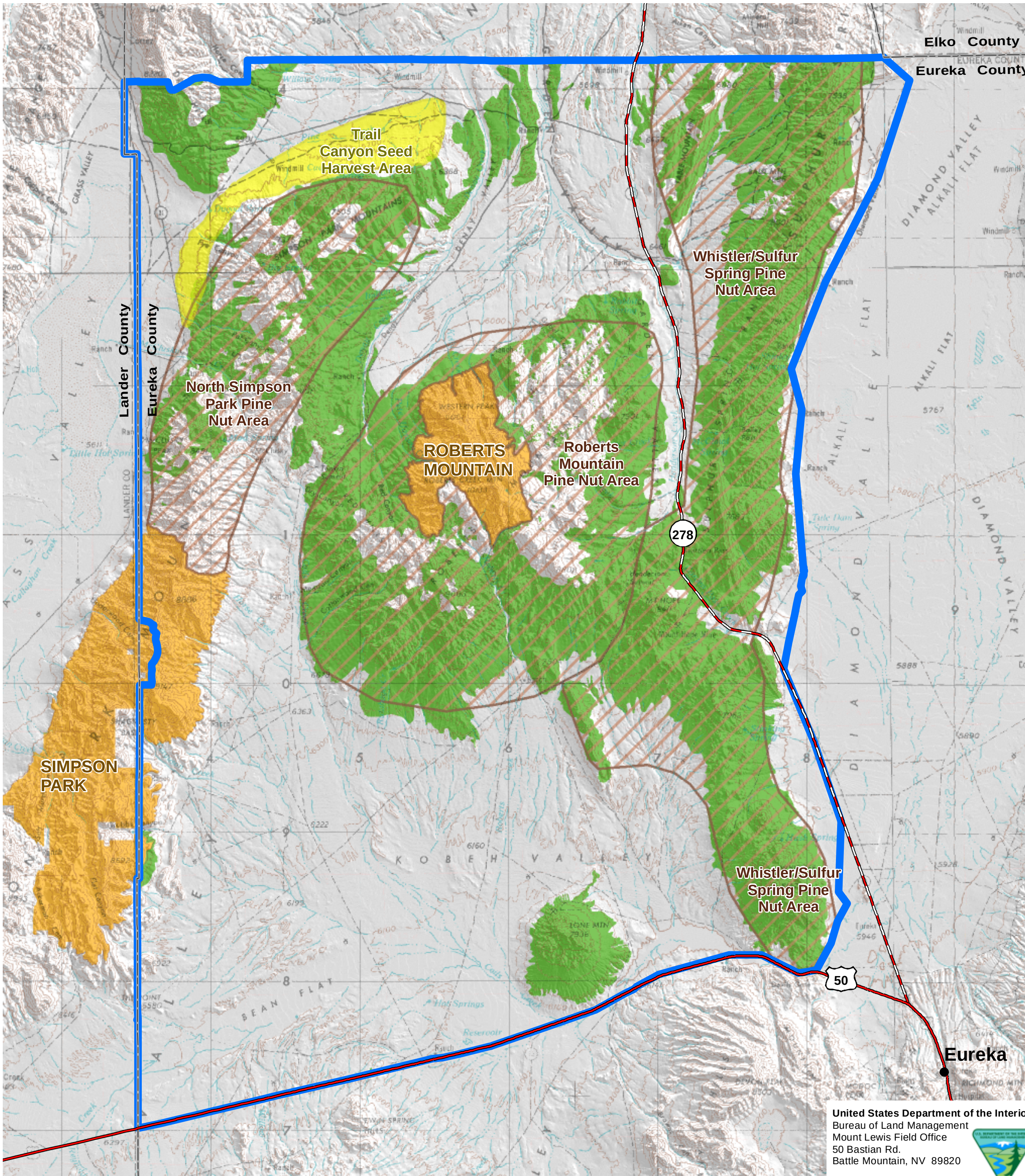
3.12.2.5.2 Christmas Trees

The public may harvest Christmas trees from most unrestricted public land through permit, while commercial harvest is handled on a site-specific basis with site-specific NEPA documentation and requires a permit from the Mount Lewis Field Office. The most common species allowed for harvest are singleleaf pinyon pine and Utah juniper.

Between 1997 and 2010, the Battle Mountain District issued permits to cut between 114 and 402 Christmas trees annually. In most years, between 100 and 200 trees were cut within the District.

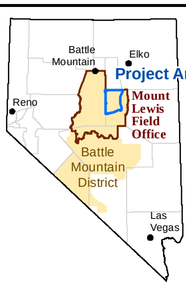
3.12.2.5.3 Pine Nuts

Pine nuts, which are produced by singleleaf pinyon pines, are collected for personal use and commercial purposes. Families may collect up to 25 pounds of pine nuts per year without a permit; a permit is required for collection of additional nuts. All woodland areas within the 3 Bars Project area are open to the public for harvest of pine nuts (**Figure 3-30**). All pine nuts intended for resale require a permit/contract. The three designated areas in the 3 Bars Project area for commercial pine nut harvest (North Simpson Park, Roberts Mountains, and Whistler/Sulphur Spring) total approximately 303,300 acres. The amount of commercial pine nut harvest is variable from year to year, depending on the yearly crop. The BLM does not have information about harvest of pine nuts by individuals, as a permit is not required. Based on data from 1996 through 2011, permits for commercial pine nut harvest were issued in fiscal years 1998, 1999, and 2010. A total of six permits were issued for Eureka County over this period.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)



Legend

- Private Fuelwood and Christmas Tree Harvest Area
- Seed Harvest Area
- Commercial Pine Nut Sale Area
- Wilderness Study Area
- 3 Bars Project Area

Source: AECOM 2011a; BLM 2012i, 2013d,e.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-30

Forest Products (Private Fuelwood, Pine Nuts, Christmas Trees, and Seed Harvest)

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

3.12.2.5.4 Seed Harvest

Commercial harvesters collect seed from plants within the 3 Bars Project area. The project area contains one designated harvest unit for commercial seed harvest, Trail Canyon, which is approximately 14,200 acres. Seed harvest typically occurs in the late summer to early fall months. The most commonly harvested seeds are from big sagebrush, shadscale, four-wing saltbush, Indian ricegrass, and forage kochia. The highest level of demand for native seed typically follows catastrophic wildfires in the region, when seed is needed for stabilization and/or restoration of impacted areas.

3.12.2.6 Historic Use of Pinyon-juniper Woodlands

The production of charcoal and cordwood was one of the area's most significant industries, and it resulted in substantial changes to the environment as it existed before 1850. The furnaces of the Eureka Mining District and other mines within the area required tremendous quantities of charcoal. In addition, cordwood and lumber were needed for other purposes such as construction. Pinyon-juniper cordwood was also used for fuel by the Eureka & Palisade Railroad until 1890, when the railroad switched to coal. Within the 3 Bars Project area, cordwood for the Eureka & Palisade Railroad was cut into 4-foot lengths and delivered by contractors to stations along the route (Zeier 1985). By far the largest consumer of charcoal was the Eureka mills. In 1880, at the height of mining within the Eureka District, the mills consumed a total of 1.25 million bushels of charcoal. These operations included the vast majority of the 3 Bars Project area. Young and Budy (1979:117 *cited in* Zeier 1985:18) stated that:

…the demand for charcoal was so great that deforestation became a severe problem. From our estimates of wood yield, 4,000 to 5,000 acres of woodland had to be cut annually to supply the mills. By 1874 the mountain slopes around Eureka were denuded of pinyon and juniper for a radius of twenty miles. By 1878 the average hauling distance from (charcoal) pit to smelter was 35 miles.

Based on a review by Lanner and Frazier (2011), by 1878 the pinyon-juniper forest around Eureka Had been denuded to a distance of 50 miles, an area that includes the Roberts Mountains, Simpson Creek Mountains, and Sulphur Mountains. By 1887, woodcutters were cutting second-growth timber that was not over 5 inches in diameter. These reports indicate that pinyon-juniper woodlands near Eureka and on the 3 Bars Project area were widespread, continuous, and dense; there were no comments on scattered-tree savannahs in the area.

3.12.3 Environmental Consequences

3.12.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Key issues of concern pertaining to native and non-invasive vegetation types were identified in the AECC and during scoping. These include the following:

- Plant communities that are below their Potential Natural Community and desired vigor.
- Decline of aspen, mountain mahogany, and other important plant community components resulting from a failure of these species to regenerate or establish in historic or new habitats.
- The need to assess the success of rehabilitation projects after treatments.
- Too much loss of forested vegetation, based on the BLM's interpretation of what desired conditions are.

- Reference is made to "phase class" and "fire regime condition," but very little discussion was given to ecological condition classes within the concept of the range of natural variability, or the place of old-growth/persistent pinyon-juniper on the landscape.
- Loss of mature and old-growth pinyon-juniper in the project area.
- Reducing stand density and distribution of Utah juniper to benefit pinyon pine.
- The potential for mechanical disturbance and injury to pinyon pines to promote insects and pathogens.
- Concerns regarding alteration of the sagebrush and pinyon-juniper communities, as these are suffering from past and ongoing disturbances.
- Concerns regarding the recovery and viability of listed, rare, and imperiled species found on the 3 Bars Project area, including special-status plant species.
- The potential for treatments to cause invasion of weedy species into woodlands, or juniper expansion.
- Concern regarding the use of exotics, such as crested wheatgrass, to restore burned areas.
- The need for scientific justification for the desired conditions for woodlands.
- Concerns about the use of fire in native plant communities and success of past fire management activities.
- Concern that the typical response to fire is to place a fence, which is often permanent, around the perimeter of a burned area.
- Describe the success of past fire management activities.

3.12.3.2 Significance Criteria

The following would have a significant adverse effect on native and non-invasive vegetation:

- Take of a federally listed plant species or increased mortality of a proposed or candidate plant species.
- Local extirpation of a rare or sensitive species not currently listed under the Endangered Species Act.
- Long-term loss or degradation of a unique or high quality plant community.
- A measurable long-term reduction in diversity within a high quality plant community.
- An overall decline in woodland health.
- A reduction in aspen regeneration or recruitment.
- A long-term reduction in the amount of special woodland products such that harvest of these resources would be limited or precluded.
- A long-term loss of access to woodland resources.

Analysis for vegetation communities was conducted by overlaying Geographic Information System shapefiles of the proposed treatment areas with the baseline data for vegetation types derived from project specific mapping or from the ecological site data (USDA Natural Resources Conservation Service 2012) as described above. Temporary and permanent impacts were identified and compared to the thresholds established above.

3.12.3.3 Direct and Indirect Effects

3.12.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

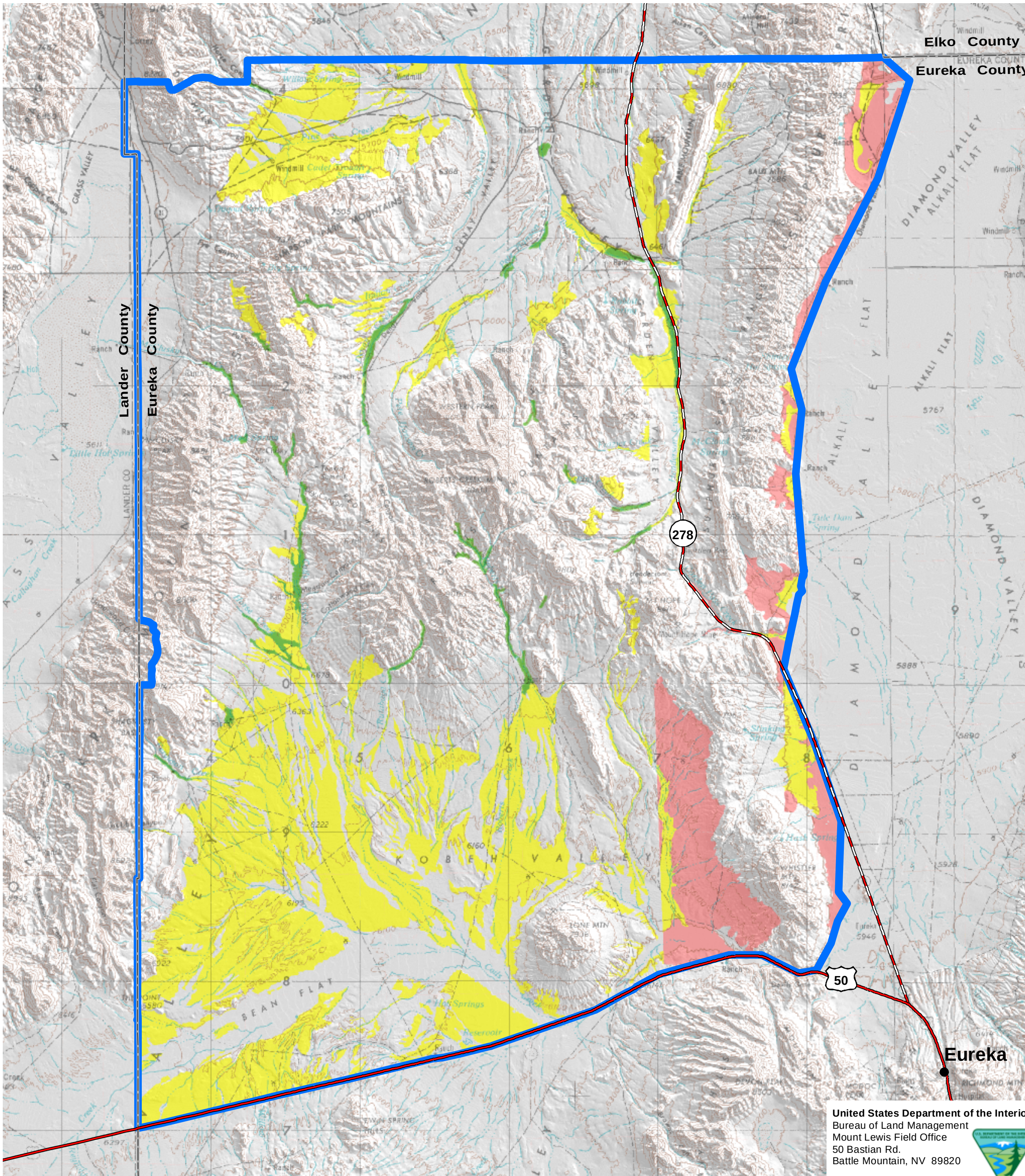
Vegetation removal treatments can create conditions that result in a temporary loss of some desirable or more mature vegetation through inadvertent removal of non-target vegetation. Removal of target and non-target vegetation could also cause soil disturbance that favors the introduction and spread of noxious weeds and other invasive non-native vegetation, to the detriment of native species. The BLM would implement vegetation treatments to thin and remove pinyon-juniper. Removal of pinyon-juniper could reduce the amount of pine nuts, wood, and other woodland products available for commercial and individual harvest. Thinning and removal of pinyon-juniper also would result in dead wood and slash material that, if not removed, mulched, or burned, could provide fuel for a wildfire.

The locations of prime farmlands within the 3 Bars Project area are shown on **Figure 3-31**. There are no prime farmlands on BLM-administered land within the treatment areas because the BLM does not allow for irrigation on public land. Aspen treatments should not impact prime farmland because only a small area would be treated. Pinyon-juniper treatments could affect the prime farmland along Coils Creek from pinyon-juniper treatments in Dry Canyon and Cottonwood/Meadow Creek. Prime farmland along Denay Creek could be affected by the Tonkin North and South Units pinyon-juniper treatments. Prime farmland could also be affected by the Henderson 1 and Roberts Creek units riparian treatments, the Vinini Corridor, Upper Roberts, and Atlas Units pinyon-juniper treatments, and Table Mountain Unit sagebrush treatment. Effects of the treatments, if any, would primarily be related to short-term erosion and its effects on water quality that could result from upland and riparian zone treatments.

Beneficial Effects

All proposed treatments or combinations of treatments are designed to enhance native plant (re)establishment, and therefore would be expected to have a beneficial impact on native vegetation by increasing the extent of native plant communities in the project area. Treatments that benefit native plant communities could potentially provide habitat that is more suitable for rare and sensitive plant species. Treatments would result in improved health and vigor of riparian, aspen, and sagebrush communities. As treatments restore the functionality of the ecosystem, the system would become more resistant to invasion by noxious weeds and other invasive non-native vegetation, drought, and wildfire. As the health of the system improves, native species would make greater contributions to the health and recovery of the system and serve as an important seed source for areas adjacent to treatment sites. Over time, this would allow the 3 Bars Project area to recover from past disturbances.

The degree of the benefit provided by project treatments would depend on how effective the treatment is at controlling the target species and/or enhancing desired vegetation. In some cases, a combination of methods (such as mechanical methods to remove the species followed by fire to reduce the seedbank) may be required to effectively control the target species and manage native vegetation over the long-term. Small, temporary exclosure fencing may also be required, to protect native plant communities until desirable vegetation has established. Therefore, while some benefit is expected under all the treatments, the level of benefit is expected to vary by alternative, as some methods are more effective than others, and some of the alternatives allow for application of a wider variety of tools and for treatment of much larger areas. More discussion of the effectiveness of the various treatment methods is provided in the 17-States PER (USDOI BLM 2007c:2-12 to 2-19).



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
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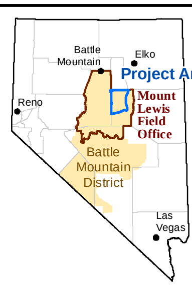
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)



Legend

Farmland Classification

- Prime Farmland if Irrigated
- Prime Farmland if Irrigated and Reclaimed of Excess Salts and Sodium
- Farmland of Statewide Importance
- 3 Bars Project Area

Source: USDA NRCS 2012.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-31

Farmland Classification

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

All treatments that reduce the buildup of hazardous fuels would help reduce the risk of wildfire in the 3 Bars Project area. Therefore, these treatments would be expected to have a long-term benefit by reducing the likelihood that a catastrophic wildfire could burn sensitive plant species and high quality native plant communities, such as sagebrush, desert salt scrub, native grasslands, and native woodlands.

Fuels reduction treatments and creation of fuel and fire breaks would reduce the risk of catastrophic wildfire in pinyon-juniper and sagebrush habitat. The reduced risk of wildfire would be expected to benefit sagebrush and pinyon-juniper communities, which are generally adversely affected by large wildfires. In pinyon-juniper habitats,

wildfires tend to kill all pinyon pines and junipers that are burned, regardless of size (Romme et al. 2007). Pinyon-juniper sites that are dominated by trees have a large component of canopy fuels and reduced ground fuels as a result of a reduced shrub layer. This fuel distribution promotes infrequent, high intensity fires over more frequent and moderate fires (Miller et al. 2008). The reduced risk would benefit Phase III woodlands with a dominance of canopy fuels, many of which occur on soil types that historically supported pinyon-juniper and may have a component of old growth pinyon-juniper. A large fire would be expected to result in loss of sagebrush and pinyon-juniper woodlands over a large geographic area, potentially including old-growth trees and persistent woodland stands. Reduced catastrophic wildfire risk would also benefit woodland products associated with pinyon-juniper communities. Reduced densities of trees could lead to improved health of treated stands by reducing competition, promoting regeneration, and decreasing the risk of infestation by pathogens and insects (Marcus et al. 2011). High tree densities appear to contribute to pinyon Ips and mistletoe, which may be the result of resource limitation and close proximity of trees, although site condition may be the most important factor (Greenwood 2006). Additionally, treatments that target pinyon-junipers infested with pathogens and pests in the North and South Tonkin units would help improve the health of these stands.

Thinning pinyon-juniper woodlands would be expected to benefit pine nut production by reducing the spacing between trees. Space between trees allows the crowns of pinyon pines to develop fully, which typically results in more pine nut production (USDOI BLM and Colorado Wood Utilization and Marketing Program 2008). Additionally, fuels reduction treatments would decrease the risk of a wildfire burning pinyon pines that bear harvestable pine nuts. Long-term, treatments should benefit nearby prime farmlands by reducing upslope erosion and risk of a severe wildfire.

3.12.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Adverse Effects

Project activities have the potential to disturb vegetation at treatment sites, and therefore could result in the temporary loss of riparian and wetland vegetation. Mechanical treatments typically result in widespread soil disturbance in treated areas, as discussed in Section 3.9.3 of this EIS and in the 17-States PER (USDOI BLM 2007c:2-14). Machinery used in mechanical treatments could result in inadvertent removal of native vegetation. The risks for loss and damage to riparian and wetland vegetation would be greatest in project groups with the largest acreage and that employ the most extensive mechanical treatments (project groups that include streambank earthwork as well as pinyon-juniper removal—Frazier Creek Group and Garden Spring Group). To minimize these effects, chainsaw thinning would be the preferred method for cut pinyon-juniper in riparian treatment areas. For the Denay Pond group, the disturbance associated with mechanical treatments would be minimal, since only fence installation would occur.

Riparian treatments are proposed to occur in areas identified as harvest units for Christmas trees, greenwood, and pine nuts. Within riparian treatment areas, only pinyon-juniper removal would be expected to affect woodland products. Pinyon-juniper removal would occur over a very small portion (less than 1 percent) of designated harvest areas for Christmas trees, pine nuts, and green wood (shown in **Figure 3-30**). These treatments would affect a fraction of a percent of the total woodland products harvest acreage within the 3 Bars Project area, and would not constitute a measurable reduction in special woodland products available for harvest.

Ground-disturbing activities could impact special status plant species, if any are present in the proposed riparian treatment areas. No federally listed plant species are known or likely to occur in treatment areas, but several BLM Special Status Species could potentially occur in wetland and riparian zones within the project area. BLM policy requires the Mount Lewis Field Office to survey treatment sites for listed and other special status species prior to conducting ground-disturbing activities. Pre-treatment surveys would allow the BLM to avoid or minimize impacts to these species when implementing project treatments.

Beneficial Effects

In the long-term, treatments are expected to result in an expansion of riparian and wetland habitat, (re)establishment of riparian and wetland habitat where these communities have been lost or diminished due to erosion, incising, and herbivory, and protection of riparian habitats from wildfire. Native riparian vegetation is much more resilient to wildfire than riparian corridors that have been taken over by upland vegetation such as pinyon-juniper or sagebrush. Efforts by the BLM to enhance wetland and riparian vegetation would help to increase the number of miles of stream and acres of wetlands that are in Proper Functioning Condition.

Pinyon-juniper would be removed from the riparian zone for treatment areas within the Frazier Creek and Garden Spring groups using manual and mechanical methods and prescribed fire. The total treatment area involving pinyon-juniper removal would be approximately 2,682 acres, although removal of pinyon-juniper would not occur over this entire area. Treatments would target pinyon-juniper where it is encroaching into sagebrush habitat along riparian zones (Phase I - 769 acres and Phase II – 524 acres), but riparian management treatments would also occur along streams in areas dominated by Phase III pinyon-juniper (296 acres). Treatments targeting pinyon-juniper would result in the loss of these woodland species. However, these treatments would benefit riparian vegetation.

Removal of pinyon-juniper in Phase II and III stands could provide trees for greenwood cutting. Use of fire and mechanical methods to thin and remove pinyon-juniper in Phase II and III stands should improve riparian zone health and functionality.

Aspen Treatments

Adverse Effects

The effects associated with manual treatments would be low in aspen treatment areas, since a minimal amount of soil disturbance would occur. Standard Operating Procedures would be implemented to prevent the spread and establishment of noxious weeds and other invasive non-native vegetation, and slash would be left onsite to promote seedling and sapling establishment and to promote infiltration. There could be loss of non-target vegetation.

As noted by Kay (2003), while fire usually has a beneficial effect on aspen by stimulating root suckering and killing invading conifers, the condition and trend of aspen in north central Nevada, in general, is not related to the absence of fire.

Ground-disturbing activities could impact special status plant species, if any are present in the proposed aspen treatment areas. No federally listed plant species are known or likely to occur in the project area, but several BLM Special Status species could potentially occur within aspen treatment units within the project area. BLM policy requires the Mount Lewis Field Office to survey treatment sites for listed and other special status species prior to conducting ground disturbing activities. Pre-treatment surveys would allow the BLM to avoid or minimize impacts to these species when implementing project treatments.

Beneficial Effects

Mechanical methods would promote aspen suckering through hormonal stimulation. Treatment of aspen stands with mechanical treatment is expected to enhance the rejuvenation of existing stands and would result in an expansion of the total area occupied by aspen stands and increased vigor of stands in comparison to current conditions. In some cases, mechanical methods would be used to remove pinyon-juniper to reduce competition for resources. Cutting trees and ripping the root mass stimulates sprouting, which is a much more reliable and cost-effective method of regenerating aspen than planting seedlings or encouraging natural reseeding.

Removal of pinyon-juniper trees in aspen stands has the potential to result in damage or disturbance to existing aspen. However, aspen are known to respond well to disturbance, which stimulates suckering and treatment/cutting of mature trees is part of proposed treatments in some projects, such as RMA-5, JD A-1, and TB-A.

Removal of conifers would allow sunlight to reach the woodland floor and warm the soil, thereby stimulating aspen sprouting, and could also create conditions that allow aspen to expand into surrounding areas. In mixed aspen-conifer stands, mechanical treatments may be an effective means of regenerating aspen, by providing hormonal stimulation and reducing competition (Sheppard 2008).

Protective fencing that reduces herbivory would benefit areas that contain aspen sprouts. Studies have suggested that the downward trend in aspen communities in north-central Nevada, including the 3 Bars Project area, is not related to climatic variation, fire suppression, woodland succession, or browsing by mule deer, but is related to past and present levels of livestock grazing (Kay 2002, 2003). Fencing the aspen stand would protect aspen sprouts, thus allowing the aspen stand to regenerate and form multi-aged stands without using fire or other disturbance.

Pinyon-juniper Treatments

Adverse Effects

Potential adverse effects associated with manual treatments in pinyon-juniper habitats are discussed in the 17-States PER (USDOI BLM 2007c:4-49). These treatments could result in small amounts of trampling or accidental removal of non-target plants. Additionally, there would be minor risks associated with spills of oil and fuels from hand-held equipment. The overall effects to native communities would be minimal and short-term in duration. Use of manual methods would allow the BLM to avoid old-growth trees during treatments, and would cause minimal soil disturbance and associated risks for establishment and spread of noxious weeds and other non-native invasive species. However, increased light availability on the site and shading of desirable understory plants by heavy slash could provide conditions that favor invasive species (Tausch et al. 2009). Slash piles could lead to the infestation of healthy trees by Ips beetles if placed too close to the base of trees (Marcus et al. 2011). Additionally, the understory response following treatments may be delayed by several years, and slash left behind on site would have the potential to increase fuel loads and create a fire hazard for a minimum of 2 years (Tausch et al. 2009). Chainsaw cutting in juniper woodlands has been correlated with increased shrub and grass cover, which may include at least an initial increased cover of cheatgrass on sites where a seed source for this species is present (Miller et al. 2005). Fire risks associated with slash would be mitigated to some degree by associated programs to use felled trees for posts, mulch, or other uses, and following manual treatments with pile and slash burning.

Potential adverse effects associated with mechanical treatments are discussed briefly in the 17-States PER (USDOI BLM 2007c:4-47). Most pinyon-juniper would be removed using mechanical methods and prescribed fire and wildland fire for resource benefit. Mechanical treatments are often used to reduce tree dominance in Phase II and III woodlands, but could also be used with chainsaws in Phase I stands if the equipment does not harm the sagebrush community. However, mechanical treatments may stimulate understory shrub vegetation, to the detriment of forbs and grasses (see review in Jones et al. 2012), and making seedbed preparation and sowing difficult when the site requires revegetation (Tausch et al. 2009). In some cases, non-native species might be used in order to prevent cheatgrass establishment and spread. Mechanical treatments can result in substantial soil disturbance that favors noxious weeds and other invasive non-native species, as discussed for riparian treatments, or less desirable native species (Jones et al. 2012). However, when mechanical treatments are applied in combination with seeding, the associated soil disturbance can increase the establishment and success of seeded species (Miller et al. 2005). Heavy equipment could also impact desirable understory vegetation (Tausch et al. 2009) including special status species, and contribute to soil erosion and compaction (Miller et al. 2005). While mechanical treatments can be used on stands of trees, they can also be used on individual trees, allowing old-growth trees to be avoided. Generation of slash and associated fire risks would be similar to those discussed for manual treatments, although more slash is likely to be generated using mechanical methods. Large amounts of slash in late Phase II and Phase III stands and could create a fire hazard for a minimum of 2 years and could limit the mobility of domestic and wild large herbivores (Tausch et al. 2009). In some areas, the creation of fire and fuel breaks could also lead to noxious weeds and other invasive non-native vegetation establishment and spread.

Mechanical treatments such as shredding generally increase herbaceous biomass, but this improvement in forb and grass cover may disappear after about 25 years as pinyon-juniper reestablishes on the site (Tausch and Hood 2007). Lanner and Frazier (2011) suggested that it may be futile to remove pinyon-juniper from the landscape, given their recovery from deforestation during the mining area. Use of mechanical equipment can also be limited by terrain (Miller et al. 2005), and as discussed under Soil Resources (Section 3.9), much of the area targeted for pinyon-juniper management is not suitable for shredding because of steep slopes and other factors. Shredding could also cause the loss of desirable vegetation, and lead to invasion of the site by noxious weeds and other invasive non-native vegetation. Thus, shredding would likely be used on a limited basis in the 3 Bars Project area.

The BLM would utilize fire as one means of removing and thinning pinyon-juniper from treatment sites, especially on areas with steep slopes or where stand replacement is desired. Prescribed fire could be used as a treatment tool in nearly all of the proposed treatment areas. Prescribed fire could be used on several thousand acres annually, although prescribed fires and wildland fire for resource benefit use would generally be limited to less than 1,000 acres at any one time. In addition, the BLM would utilize wildland fire for resource benefit in the Sulphur Spring Wildfire Management Unit. In this unit, the BLM would allow a wildfire to burn in areas where natural fire would benefit multiple resources and fuel loads exceed 2 tons per acre in shrublands and 10 tons per acre in pinyon-juniper woodlands, with individual fire size not to exceed 1,000 acres. The general effects of fire on pinyon-juniper woodlands are discussed in the 17-States PER (USDOI BLM 2007c:4-37 to 4-40). These include a short-term decrease in desirable vegetation and increase in noxious weeds and other invasive non-native vegetation.

Prescribed fire treatments can produce desirable results on sites with woodlands in Phases I and II particularly when there is an abundance of perennial natives in the understory (Tausch et al. 2009). The BLM plans to conduct most burns on Phase II or Phase III sites to initiate stand replacement and to avoid impacts to shrubby vegetation including sagebrush. These sites generally have a depleted understory, thus 1) fire may be difficult to carry through the stand as a result of limited ground and ladder fuels, 2) treatment may be more costly, and 3) site response may be less predictable and has a lower potential for success (for example, more annuals versus perennials may establish as a response to fire compared to treating sites that are in earlier stages of woodland succession). In addition, Bauer and Weisberg (2009) noted that there is little ecological justification for reintroducing fire to areas of persistent (historic) woodland, at least within the context of restoring natural fire regimes, because these areas may not have experienced the effects of fire exclusion. This may be especially true given that these areas were likely deforested during the mining era in the late 1800s.

Where tree dominance is high and woodlands are contiguous, crown fires can rapidly cover large areas. When pinyon pines dominate, their bark can easily carry fire into the crown. When weeds, such as cheatgrass, are present on the site, risk of failure is increased, especially if the site is warm and dry, or where soils are shallow or fine-textured. Hydrophobicity can be a problem directly beneath the tree canopy resulting in limited seedling establishment and increased soil erosion (Tausch et al. 2009). Thus, to limit these risks, the BLM may also use mechanical treatments to increase native herbaceous vegetation prior to burning and improve the potential for successful prescribed fire treatments.

Treatments in the Sulphur Spring Wildfire Management Unit would restore fire as an integral part of the ecosystem and improve plant species diversity. By reducing fuel accumulations and creating canopy openings in the pinyon-juniper, sagebrush and other shrub species and forbs and grasses should increase. Re-introduction of fire is preferred to non-fire treatments for habitat restoration, where feasible. Although wildland fire for resource benefit would have a substantial impact on wildlife and their habitat in both the short and long-term, controlling pinyon-juniper without the re-introduction of periodic fire (such as cutting western juniper trees), despite providing ecological and hydrologic benefits, may not result in full restoration. The underlying proximate cause of pinyon-juniper expansion, the absence of periodic fire, would remain. Eventually, especially if pinyon-juniper is nearby, and if other conditions remain the same, the site would be invaded again and pinyon-juniper problems would re-emerge (Kerr and Salvo 2007).

Regardless of the cause of the fires in pinyon-juniper habitat, some post-burn restoration and management may be needed. After broadcast burns, the BLM may need to reseed burned areas with forbs, grasses, and shrubs. Based on past reseeding treatments conducted for several wildfire burns in the District, seeding and planting of native and non-native vegetation may have limited success, especially during drought years, and native release of seeds may be the primary mechanism for site revegetation. However, in areas with sufficient moisture, seedings have been successful and have resulted in an abundance and diversity of forbs, grasses, and shrubs. For example, at the Fluffy Flat wildland fire site, 11.4 percent of vegetation was comprised of seeded species and seedling survivorship was 54 percent 3 years after seeding (USDOI BLM 2011e). To ensure vegetation restoration success, the BLM may prohibit livestock access to the area through grazing closure decisions, completed through a separate process. The BLM may also use small, temporary exclosure fencing, including electric fencing, which has been used effectively at wildfire restoration sites to improve revegetation success by excluding livestock, wild horses, and other wild ungulates (USDOI BLM 2009d, e, 2010e, f, g, h, i, j, 2011e, f).

Grasses and forbs would benefit from prescribed fire and would be the first to revegetate the site. If non-native annual grasses and forbs occur on a site prior to fire, and if fire intensity is high, then non-native annual grasses and forbs would be the first to establish after a fire. Without other treatments, non-native annual grasses and forbs may dominate the site (USDOI BLM 2012g). The BLM generally has had good success in controlling non-native vegetation and allowing native vegetation to establish on sites treated using prescribed fire on the 3 Bars Project area (see Section 3.13.3.3). However, some sites could require seeding or other rehabilitation efforts following the fires, or it could take decades following a fire to fully establish all desired vegetation including understory vegetation and mixed-aged stands of pinyon-juniper.

Vegetation succession after fire would also vary depending on the canopy cover and site conditions. While regrowth of native understory species is rapid and vigorous when the canopy cover is relatively open, poorer native regrowth would be expected on sites with fewer understory plants and a depleted seed bank. On these sites, reseeding and/or a combination of treatment types would be necessary.

Pinyon-juniper enhancement projects would occur within designated harvest units for woodland products. There is a large degree of overlap between harvest units and pinyon-juniper treatment areas. Trees would be removed from these areas, although not over the entire area. As a result of thinning treatments, the number of pinyon-juniper trees within harvest areas would be reduced, although woodland products would still be available over portions of treatment areas. Treatments would affect approximately 26 percent of the total designated woodland products harvest area. Removal of pinyon pines and juniper from these areas would eliminate or limit the ability to harvest woodland products there.

Ground-disturbing activities could impact special status plant species, if any are present in the proposed pinyon-juniper treatment areas. No federally listed plant species are known or likely to occur in the project area, but several BLM Sensitive Species could potentially occur within pinyon-juniper treatment units within the project area (**Table 3-38**). BLM policy requires the Mount Lewis Field Office to survey treatment sites for listed and other special status species prior to ground-disturbing activities. Pre-treatment surveys would allow the BLM to avoid or minimize impacts to these species when implementing project treatments.

Beneficial Effects

Selective cutting by the BLM or public (greenwood cutting) using chainsaws would remove trees throughout the designated units with minimal effects on other vegetation. Some debris would be left on-site following selective cutting treatments. In dense stands, large amounts of debris would be piled and burned on-site. Burning piles on-site would remove the large volumes of fuel from the site, reducing the threat of a large-scale stand replacing fire.

Mechanical treatments, such as mulching and shredding, would be done on tree-dominated sites that have sufficient desired understory vegetation. The advantages of mechanical removal of trees include flexibility in timing of the treatment application and the ability to precisely control treatment boundaries or targeted trees. For example, old-growth trees can be better protected if manual or mechanical methods are used than if fire is used (Tausch et al. 2009). Residual woody vegetation would be left on-site and would consist of slash/wood chips created from shredders. Wood chips scattered across the site would allow for increased infiltration and water retention and decreased soil erosion. When compared to the bare soils under closed canopy woodlands, shredding treatments would increase water retention, infiltration, seedling protection, and establishment. The decomposition of woody plant material should also improve soil nutrient content that could enhance seedling recruitment and establishment and the long-term viability of the grass and shrub community, as well as provide protection to the soil resource (Brockway et al. 2002, USDOI BLM 2012g).

This treatment method would alter vegetation communities on the site and would favor grasses and forbs over shrubs and trees. Reduced competition and ground disturbance may allow native seed banks to aid in the reestablishment of native species. Areas to be treated with this method would consist of tree dominated areas with little desired understory vegetation.

While pinyon-juniper can be controlled without the use of prescribed fire or wildland fire for resource benefit, non-fire methods generally do not provide long-term control if pinyon-juniper remains nearby. Fire treatments, including thinning, piling, and burning, typically can remove more trees per unit cost than shredding and mulching, while leaving less woody debris on the ground that could serve as fuel for a wildfire (Gottfried and Overby 2011). Studies suggest that dense stands of Phase II and III pinyon-juniper, where most BLM fire treatments would occur, cannot be managed effectively by fire alone, but must also be treated mechanically to increase herbaceous vegetation that fuels the fire (Ansley and Rasmussen 2005, Tausch and Hood 2007, Tausch et al. 2009). Thus, the BLM would use manual and mechanical methods, in addition to fire, for those units with Phase II and III stands that are proposed for treatment with fire.

Treatments to reduce hazardous fuels, increase canopy spacing among pinyon-juniper, remove diseased trees, remove encroaching pinyon-juniper, and create fire and fuel breaks would help to reduce wildfire risk to the benefit of native vegetation. Monitoring at the Red Hills hazardous fuels reduction site has shown that the risk of wildfire was reduced from a “very high to extreme” risk to “low” risk at 35 monitoring sites, and “low to moderate” risk at 5 sites, after 3 years. A variety of desirable forbs, grasses, and shrubs were observed re-colonizing treatment areas, and fuel breaks were still viable (USDOI BLM 2008i).

The BLM would restore fire as an integral part of the ecosystem, improve species diversity, and reduce hazardous fuels on the Sulphur Spring Wildfire Management Unit by using wildland fire for resource benefit. The BLM would allow fire to burn on about 20 to 40 percent of the area, but generally burns would be limited to small acreages to create a mosaic of habitats and to create fuel breaks. By keeping burned areas small, the risk of a cheatgrass infestation would be much less. Several wildfires have occurred in this area in recent years due to dense fuel accumulations and pinyon-juniper cover. In recent years, the BLM has used chainsaws, mowers/shredders, and prescribed fire to create fuel breaks and remove diseased pinyon-juniper (USDOI BLM 2009a). By reducing fuel accumulations and opening up the canopy cover, sagebrush and other shrub cover should increase, a more natural fire regime would be restored in the area, and the risk of future wildfires would be diminished. Both prescribed fire and wildland fire for resource benefit could be used year-round, although prescribed fire treatments tend to be conducted during fall through spring and outside of the migratory bird breeding season.

A large amount of downed logs and woody debris would result from pinyon-juniper management and could be used for firewood. By thinning and removing pinyon-juniper, competition among remaining trees for water and other resources would decline, stand health would improve through reduced competition, and the remaining pinyon pines should be able to produce more nuts.

Sagebrush Treatments

Of the treatments in pinyon-juniper-dominated communities, about 75 percent would occur in Phase I stands. Therefore, the vast majority of project treatments would occur in areas that support, or have supported, sagebrush, and areas where pinyon-juniper encroachment into the sagebrush community is occurring. The BLM would treat up to 50 percent of the unit in units dominated by non-native vegetation in an effort to restore native species in areas of historic importance to Greater sage-grouse. The BLM would only use native species when overseeding sagebrush communities.

Adverse Effects

Projects to reduce non-native vegetation dominance (Rocky Hills Unit), and treat cheatgrass (West Simpson Park Unit), would potentially have short-term adverse effects on sagebrush habitats. However, provided project objectives are met, the long-term goal of these activities is to improve the quality of sagebrush habitats. In some cases, the species composition at treatment sites would change, as sagebrush enhancement projects would focus on the components of Greater sage-grouse habitat. For instance, at the Rocky Hills Unit, where there are extensive stands of crested wheatgrass and forage kochia, the BLM would conduct treatments to minimize the non-native herbaceous component and increase the sagebrush and native herbaceous component.

Other sagebrush projects (Table Mountain, Three Corners, and Whistler Sage units) would involve removal of Phase I and II pinyon pine and juniper from sagebrush habitats. These treatments would have an adverse effect on pinyon-juniper woodlands by reducing the overall cover of this habitat type. The goal of most of these treatments would be to restore sagebrush habitat in areas where sagebrush should occur based on ecological site description reference, desired state, or management objective. The long-term result of the treatments would be a reduction in pinyon-juniper and an increase in sagebrush. However, if the treatments do not continue indefinitely, it is likely that over time, pinyon-juniper would once again expand into sagebrush habitats.

Manual and mechanical treatments would have the potential to disturb sagebrush habitats, with potential impacts similar to those discussed for other community types. Ground disturbance associated with mechanical treatments would occur in all of the sagebrush project areas. These treatments could potentially result in trampling and inadvertent removal of non-target plants, as well as soil disturbance that could favor the establishment and spread of cheatgrass and other noxious weeds and other invasive non-native vegetation. The greatest risk for adverse effects would occur where the largest ground areas are disturbed, and where weed seeds are already present.

Grazing can contribute to the spread of noxious weeds and other invasive non-native vegetation through preferential grazing of native vegetation over noxious weeds and other invasive non-native vegetation, and by movement of noxious weeds and other invasive non-native vegetation into uninfested areas via livestock feces (USDOI BLM 2007c). Therefore, there would be some risk of establishment or spread of noxious weeds and other invasive non-native vegetation in treated sagebrush sites if these species are already present in the grazed areas, or if the livestock are brought in from an area where these species occur.

Sagebrush treatments would affect woodland products, as pinyon pine and juniper would be removed from sagebrush habitat. The proposed treatments would affect a relatively small portion (5 percent) of the total designated woodland product harvest area. This reduction in woodland product species would continue for as long as the BLM continued treatments to slow or reverse the encroachment of pinyon-juniper into sagebrush.

Ground-disturbing activities could impact special status plant species, if any are present in the proposed sagebrush treatment areas. No federally listed plant species are known or likely to occur in the project area, but several BLM Sensitive Species could potentially occur within sagebrush treatment units within the project area (**Table 3-38**). BLM policy requires the Mount Lewis Field Office to survey treatment sites for listed and other special status species prior to ground disturbing activities. Pre-treatment surveys would allow the BLM to avoid or minimize impacts to these species when implementing project treatments.

Beneficial Effects

The purpose of mechanical treatments would be to remove pinyon-juniper and noxious weeds and other invasive non-native vegetation, and for seeding and planting. The BLM would minimize soil disturbance as much as possible to reduce the potential for noxious weed and other invasive non-native vegetation establishment.

Pinyon-juniper removal projects at the Table Mountain, Three Corners, and Whistler Sage units would likely have a beneficial effect on sagebrush habitats. Woodland encroachment into sagebrush communities can reduce the structural complexity of these communities, decrease the seed bank, and reduce fuels and the role of fire, such that tree recruitment is favored, and increase surface runoff and erosion (Miller et al. 2005 *cited in* Pierson et al. 2008). Therefore, removal of trees from these habitats would likely improve the quality of sagebrush habitats.

Prescribed fire, along with broadcast seeding, could be used in the West Simpson Park Unit to control cheatgrass. Fire use would be followed by broadcast seeding, drill seeding, or hand plantings in an effort to re-establish native shrub and herbaceous species within an historic Greater sage-grouse area.

A limited amount of downed logs and woody debris would result from sagebrush treatments and could be used for firewood. Down trees could be made available for commercial woodcutting and other forest products use, although it is unlikely that these uses would occur on the project area.

3.12.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Under this alternative, the total acreage treated would be approximately half that of Alternative A. Effects to native plants and natural plant communities from mechanical methods would be similar to those under Alternative A, as similar amounts of mechanical treatments would likely be used.

Given that fire would not be used under this alternative, treatment programs might not be as effective as under Alternative A. Phase I and II pinyon-juniper woodlands would be targeted for treatments. Treatment programs would not include fire or a combination of fire and other methods, and they might not be as effective at meeting project objectives as under Alternative A. It would be difficult for the BLM to conduct pinyon-juniper and noxious weeds and other invasive non-native vegetation treatments on hillslopes, or over large acreages, using mechanical methods, where fire use treatments would be effective. Loss of pinyon-juniper and associated increase in sagebrush would be less than under Alternative A, as less acreage would be treated. The acreage of persistent woodlands and sagebrush habitats benefiting from treatments would be less than under Alternative A. Since treatment of Phase III woodlands would be minimal, these areas, which have the greatest risk for loss from high intensity fires, would remain at a high risk under this alternative.

More acres would be available for commercial and individual harvest of woodland products under Alternative B than under Alternative A. Some treatments to improve historic pinyon-juniper communities would occur, which could benefit future pine nut harvest in these areas, but the acreage benefiting from these treatments would be substantially lower than under Alternative A. Additionally the risk that a wildfire would burn large areas of woodland products would be greater under this alternative than under Alternative A.

Under Alternative B, it is unlikely that the BLM restore fire as an integral part of the ecosystem and reduce extreme, very high, and high wildfire risks to moderate risk or less. As a result, it is likely that the amount of area meeting Potential Natural Community objectives would be less than would occur under Alternative A.

3.12.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Given that fire, mechanical methods, and livestock grazing would not be used under this alternative, the BLM would have the fewest options for its treatment programs, and these programs would likely not be as effective as under the other alternatives. The BLM would be unable to combine treatment methods for optimal control of certain species and for enhancement of native plant communities. Additionally, removal of fuel hazards would be least under this action alternative, and the risk of catastrophic wildfire would be greatest. Because this alternative is the most limited in terms of the tools available for large scale restoration, it is the least likely of the action alternatives to help attain larger ecosystem restoration goals for the 3 Bars Project area.

Under this alternative, only manual methods would be used to treat vegetation. Pinyon-juniper would be removed using chainsaws. Risks to non-target vegetation from treatments would be least under this alternative. Phase I woodlands and a limited acreage of Phase II woodlands would be targeted for treatments. As all treatments would be manual, their effectiveness would likely be lower than under the other alternatives. Additionally, the BLM would not be able to slash and pile burn following treatments to reduce the short-term fire hazard, although programs to use felled trees for posts, mulch, and other forest products uses would help minimize the fire risk. Loss of pinyon-juniper and the associated increase in sagebrush would be less than under Alternatives A and B. The acreage of persistent woodlands and sagebrush habitats also benefiting from treatments would be less than under Alternatives A and B. Since Phase III woodlands likely would not be treated, these areas, which have the greatest risk for loss from high intensity fires, would remain at a high risk under this alternative.

Acres available for commercial and individual harvest of woodland products would be greater than under Alternatives A and B, based on the amount of area treated. Treatments to improve historic pinyon-juniper habitats would be limited under this alternative. The risk that a wildfire would burn large areas of woodland products available for harvest would be greater than under Alternatives A and B. Long-term benefits to woodland products would be less under this alternative than under Alternatives A and B.

As under Alternative C, it is unlikely that the BLM would restore fire as an integral part of the ecosystem; or reduce extreme, very high, and high wildfire risks to moderate risk or less or be able to increase the presence of native shrubs and herbaceous species in areas dominated by crested wheatgrass and forage kochia. In addition, the BLM would make little or no contribution toward developing fire and fuel breaks or reducing the risk of a large-scale wildfire under Alternative C. As a result, it is likely that the amount of area meeting Potential Natural Community objectives would be less than would occur under Alternatives A and B.

3.12.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct impacts to native and non-invasive vegetation from 3 Bars Project treatments as no treatments would be authorized under this alternative. Under this alternative, the BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; treat large-scale infestations of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Threats to ecosystem health under this alternative would include the continued decline of ecosystem health due to further decline in native understory species in the upland plant communities: further expansion of pinyon-juniper woodland into other communities, including sagebrush, riparian, and aspen habitats; and the continued increase of the risk for catastrophic wildfire as a result of high fuel loads. Given the low acreage treated annually (about 1,500 acres), there would be little or no improvement in the amount of acreage in Proper Functioning Condition.

3.12.3.4 Cumulative Effects

The CESA for native and non-invasive vegetation resources is approximately 1,841,698 million acres and includes those watersheds at the Hydrologic Unit Code 10 level that are all or partially within the 3 Bars Project area (**Figure 3-1**). Past and present actions that have influenced native and non-invasive vegetation activity in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.12.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Historic overgrazing, introduction of cheatgrass, large wildfires, and other natural and human-caused factors have contributed to the departure of the plant communities from the Potential Natural Community across the 3-Bars ecosystem. This has led to a decrease in the functionality of ecological processes, thus reducing the resilience and resistance of these ecosystems to disturbance. The treatments proposed in the 3-Bars ecosystem are designed to provide the means needed for these ecosystems to recover.

In the short-term, small, temporary exclosure fences may change the distribution of grazing by livestock, wild horses, and some wildlife. As distribution patterns change, utilization would also change. Wildlife and wild horse utilization would decrease in treatment areas while temporary exclosure fences are in place, but would increase in other areas. Once the temporary exclosure fences are removed, wild horses and wildlife may be attracted to the treatment areas resulting in potentially higher use of the area than before. Temporary exclosure fences would exclude livestock, although AUMs may be temporarily suspended to prevent overuse in other areas.

According to utilization data, about 6 percent of the 3 Bars Project area is experiencing moderate to severe forage utilization (see Section 3.18.3). However, about 35 percent of proposed riparian zone treatment areas, 25 percent of pinyon-juniper treatment areas, and 48 percent of sagebrush treatment areas are experiencing moderate to severe forage utilization. In addition, about 1,600 acres within the Simpson Park Northeast Unit are experiencing moderate to severe forage utilization, although only about 150 acres would be treated within this unit.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. These treatments could have a short-term adverse effect on non-target vegetation. These treatments would have long-term beneficial effects by helping to reduce hazardous fuels, improve native vegetation, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites.

All of the formulations of herbicide active ingredients would have the potential to adversely affect non-target vegetation under one or more exposure scenarios. The assessment completed for the 17-States PEIS found that the most likely mode of impact to non-target plants is via spray drift, particularly for aerial applications, and accidental exposure scenarios, such as a spill (USDOI BLM 2007b:4-44).

Land development, mineral development, and oil, gas, and hydrothermal exploration and development could affect about 15,000 acres in the CESA in the reasonably foreseeable future, including about 8,335 acres of disturbance associated with the Mount Hope Project, and from materials sites, roads, and rights-of-way for roads, pipelines, and power and telephone lines. Although some of the disturbance areas from these projects would be reclaimed, these activities would lead to long-term losses in native plant communities in the affected areas. No federally listed plant species are known or likely to occur in the CESA, but several BLM Sensitive Species occur within the CESA and could be impacted by reasonably foreseeable future actions under Alternative A.

An estimated 140,000 acres would be burned by wildfire within the CESA within the next 20 years, based on wildfire incidence since 1985. Wildfire could cause the wide-scale removal of vegetation in the CESA. Wildfires that are not reseeded would return to early-successional conditions and would be left to recover naturally. In the absence of invasive species, the site may successfully revegetate if perennial grasses survive the fire, otherwise it would be necessary to reseed and control the invasive species with herbicide treatments to rehabilitate the site. Areas with intact plant communities would be more resilient to wildfire and may retain functionality of ecosystem processes. Areas with degraded plant communities may benefit from wildfire and the subsequent reseeding and herbicide treatments to restore functionality of ecosystem processes.

Short-term, there would be loss of vegetation, particularly pinyon-juniper and non-native vegetation, and there could be an increase in noxious weeds and other invasive non-native vegetation. Long-term, these treatments should result in vegetation that is more fire resilient, more abundant, and similar to the Potential Natural Community. Hazardous fuels and other habitat improvement treatments would occur on about 127,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within other portions of the CESA under existing and future authorizations, or about 8 percent of the CESA. Noxious weed and other non-native vegetation treatments would remove vegetation that contributes to short return-interval fires and the loss of native vegetation. These treatments would help to reduce the risk of wildfire within the CESA. In addition, the BLM would conduct stream bioengineering and plantings on about 31 miles of stream to slow stream flow and create pools and wet meadows, to improve wetland and riparian vegetation and water flows and quality. Overall, there would be a net beneficial accumulation of effects from BLM treatments and treated areas would move toward their Potential Natural Community. These benefits would be greatest under Alternative A.

3.12.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on vegetation would be similar to those described under Alternative A. Under Alternative B, the inability to use prescribed and wildland fire for resource benefit would restrict BLM’s ability to reduce wildfire risk, restore natural fire regimes, and influence vegetation communities on a large scale within the 3 Bars Project area. Prescribed fire would be limited to a few hundred acres annually in other portions of the CESA outside the 3 Bars Project treatment area based on previous authorizations.

Short-term, there would be disturbance to and loss of vegetation, particularly pinyon-juniper and non-native vegetation, and there could be an increase in noxious weeds and other invasive non-native vegetation. Long-term, these treatments should result in vegetation that is more fire resilient, more abundant, and similar to the Potential Natural Community. Hazardous fuels and other habitat improvement treatments would occur on about 63,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within other portions of the CESA under existing and future authorizations, or about 4 percent of the CESA. These treatments would help to reduce the risk of wildfire within the CESA. Overall, there would be a net beneficial accumulation of effects from BLM treatments and treated areas would move toward their Potential Natural Community. However, because the BLM would treat fewer acres, and would not be able to use fire, benefits to vegetation would be less under Alternative B than under Alternative A.

3.12.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on native and non-invasive vegetation would be similar to those described under Alternative A. Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation. As a result, the BLM anticipates treating about one-fourth as many acres under Alternative C as under Alternative A. These methods would cause little vegetation and soil disturbance and would also give the BLM greater control on the types and amount of vegetation that are removed.

By not being able to use mechanical methods and fire to improve the health and resiliency of native vegetation, reduce hazardous fuels, create fire and fuel breaks, and remove downed wood and slash, the risk of wildfire and its impacts on vegetation would likely increase on the 3 Bars Project area.

Hazardous fuels reduction and habitat improvement projects could occur on about 32,000 acres within the 3 Bars Project area. Fire and mechanized equipment could be used on about 15,000 acres in other portions of the CESA to improve native vegetation, remove hazardous fuels, and reduce the risk of wildfire. Collectively, about 3 percent of the CESA would be treated by the BLM.

There would still be a net benefit from BLM treatments and treated areas would move toward their Potential Natural Community on portions of the project area. Because the BLM would not be able to use fire and mechanical treatments and fewer acres would be treated, however benefits to vegetation under Alternative C would be less than under Alternatives A and B.

3.12.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on native and non-invasive vegetation would be similar to those described under Alternative A. There would be no cumulative impacts to native and non-invasive vegetation from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based methods, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage. Thus, factors that contribute to loss of native and non-invasive vegetation health and resiliency would remain, including spread of noxious weeds and other invasive non-native vegetation, pinyon-juniper encroachment, and wildfire, and would likely be greatest under this alternative. Under this alternative, the BLM would do little to move plant communities toward their Potential Natural Community.

3.12.3.5 Unavoidable Adverse Effects

The proposed vegetation treatments would cause unavoidable short-term disturbances to native and non-invasive vegetation communities by removing both target and non-target vegetation. In some cases, treatments would return all or a portion of the treated area to an early successional stage by freeing up resources such as light and nutrients. These adverse effects would be temporary and would consist of short-term losses of native vegetation and associated habitat values. The vegetation treatments would also have unavoidable adverse effects to pinyon-juniper habitats and woodland products harvest areas by substantially reducing the acreage of pinyon-juniper within the project area.

These adverse effects are a goal of the treatment program, and are intended to be long-term; in the absence of treatments, pinyon-juniper habitats would continue to expand.

3.12.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

The proposed vegetation treatments would have short-term adverse impacts to existing vegetation, including native trees, shrubs, forbs, and grasses, as these could be removed during treatments. Treatments that remove or control noxious weeds and other invasive non-native vegetation could provide immediate benefits to native species, such as increased access to water and nutrients and enhanced vigor from reduced competition with invasive species. Treatments that remove hazardous fuels from public lands would be expected to benefit the long-term health of plant communities in which natural fire cycles have been altered. The suppression of fire results in the buildup of dead plant materials (e.g., litter and dead woody materials), and often increases the density of flammable living fuels on a site. Treatments that restore and maintain fire-adapted ecosystems, and increase ecosystem functionality, through the appropriate use of mechanical thinning, use of wildland fire for resource benefit or prescribed fire, and other vegetation treatment methods, would decrease the effects of future wildfires on plant communities and improve ecosystem resilience and sustainability. Over the long-term, treatments should also reduce the incidence and severity of wildfires across the project area.

Treatments that control populations of non-native species on public lands would be expected to benefit native plant communities over the long-term by aiding in the reestablishment of native species. The degree of benefit would depend on the success of these treatments over both the short-and long-term. Some treatments are very successful at removing noxious weeds and other invasive non-native vegetation over the short-term, but are not successful at promoting the establishment of native species in their place. In such cases, seeding and planting of native plant species would be beneficial. Plant communities that have declined substantially in geographic extent from historical to current periods (e.g., big sagebrush and bunchgrasses) would increase. Treatments would also manipulate the vegetation in the project area to more closely resemble the Potential Natural Communities and to counteract the invasion of sagebrush-steppe and other habitats by pinyon-juniper woodland.

Short-term uses are also discussed in other sections of this EIS, including the potential loss of fish and wildlife habitat, increase in noxious weeds and other invasive non-native vegetation, loss of rangeland for livestock and wild horse use, and loss of public use of lands for recreation, as a result of treatments to restore vegetation and other resources, reduce hazardous fuels, and reduce the risk of wildfire. Long-term, treatments to reduce the risk of wildfire and restore habitat should enhance the resilience and health of the landscape and land productivity, and reduce the risk of future wildfire and resultant loss of natural and social resources. As discussed above, short-term uses and enhancement of long-term productivity would generally be in proportion to acres treated and methods used by the BLM.

3.12.3.7 Irreversible and Irretrievable Commitment of Resources

Loss of native vegetation and plant productivity as a result of treatments would persist only until vegetation was reestablished, usually within several growing seasons. Loss of pinyon-juniper communities would last for as long as treatments continue, and would not be irreversible and irretrievable.

3.12.3.8 Significance of the Effects under the Alternatives

Based on the significance criteria presented in Section 3.12.3.2 it is not expected that any of the proposed alternatives would have a significant direct, indirect, or cumulative adverse effect on native and non-invasive vegetation, provided the BLM adheres to the SOPs referenced in **Appendix C**, and provided that treatments are effective at accomplishing their intended outcome.

Because no federally listed, proposed, or candidate plant species are known or likely to occur within the proposed treatment areas within the CESA, take or increased mortality of these species should not occur. Several rare or sensitive species not currently listed under ESA are known to occur in the 3 Bars project area or nearby. None are known to occur within the proposed treatment areas, although populations could occur in these areas. Pre-treatment surveys for rare plants would identify whether these species are present and allow the BLM to design treatment programs to avoid or minimize effects to these species. Should these species be present, it is possible that limited mortality could occur, but local extirpation of these species would not occur as a result of project activities.

None of the action alternatives would result in a long-term loss or degradation of a unique or high quality plant community, a measurable reduction in diversity within a high quality plant community, or an overall decline in woodland health. As discussed throughout this section, while there could be some short-term impacts to native communities as a result of implementing treatments, over the long-term the proposed treatments would help sustain and improve unique and high quality plant communities (sagebrush, historic pinyon-juniper, aspen). Woodland health in treated stands should improve over the long-term, and aspen regeneration and recruitment should increase.

While all of the action alternatives would result in a long-term reduction in the amount of special woodland products available for harvest, the designated harvest areas within the Battle Mountain District are very large, and would still provide suitable access to and availability of pinyon-juniper woodlands used for commercial and individual harvest.

3.12.4 Mitigation

Native and non-invasive vegetation resources would benefit from mitigation and monitoring measures identified in Section 3.18.4 (Livestock Grazing Mitigation). No mitigation or monitoring measures are recommended specifically for native and non-invasive vegetation resources.

3.13 Noxious Weeds and other Invasive Non-native Vegetation

3.13.1 Regulatory Framework

3.13.1.1 Executive Order 13112

Executive Order 13112, Invasive Species (February 3, 1999), instructs federal agencies to prevent introductions of non-native invasive species, control their spread in a cost-effective and environmentally sound manner, and minimize the economic, ecological, and human health impacts that invasive species cause. The Invasive Species Council, made up of federal agencies and departments, oversees and facilitates implantation of the Executive Order. The Executive Order also instructs the Secretary of the Interior to establish an advisory committee comprised of local, state, tribal, and regional stakeholders.

3.13.1.2 Federal Laws

Federal laws pertaining to noxious and invasive weeds include the Lacey Act as amended (18 USC § 42), the Carson-Foley Act of 1968 (Public Law 90-583), the Federal Noxious Weed Act of 1974, as amended by the Food, Agriculture, Conservation, and Trade Act of 1990 (Section 1453, Management of Undesirable Plants on Federal Lands; 7 USC § 2814 et seq.), the Federal Plant Pest Act (7 USC § 150aa et seq.), and the Plant Protection Act of 2000 (7 USC § 7701 et seq.), as amended by the Noxious Weed Control and Eradication Act of 2004 (Public Law 108-412).

3.13.1.3 Nevada Laws

Chapter 555 of the Nevada Revised Statute pertains to noxious weeds. The Nevada Department of Agriculture is responsible for jurisdiction, management, and enforcement of this state law. The law mandates that plants on Nevada's noxious weed list be controlled on both private and public lands. The law also calls for the establishment of county weed control districts, which are responsible for control and eradication of noxious weeds. The Diamond Valley Weed District coordinates weed control efforts on public and private lands in Eureka County. The Nevada state noxious weed list can be found at URL: http://agri.nv.gov/Plant/Noxious_Weeds/Noxious_Weed_List/.

3.13.1.4 BLM Guidance and Regulations

BLM Manual 9015, *Integrated Weed Management*, provides policy relating to the management and coordination of noxious weeds and other invasive non-native vegetation activities (USDOI BLM 1992b). The policy requires that ground-disturbing projects and projects that alter plant communities be assessed to determine the risk of introducing or spreading noxious weeds and other invasive non-native vegetation. If the risk is moderate or higher, a management program must be established.

Two documents identify broad objectives for management of vegetation on BLM-administered lands—*Partners against Weeds: An Action Plan for the Bureau of Land Management* (USDOI BLM 1996), and *Pulling Together: National Strategy for Invasive Plan Management* (USDOI BLM 1998b). Treatment activities at the local level are guided by the goals, standards, and objectives of land use plans developed for each BLM field office. The BLM's noxious weeds and other invasive non-native vegetation control program has three performance measures: inventory, treatment, and post-treatment effectiveness monitoring. BLM funding is associated with achievement of performance measure targets.

BLM Handbook H-1740, *Integrated Vegetation Management* (USDOI BLM 2008b), and the BLM Battle Mountain District's *Integrated Weed Management Plan Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b) direct management of noxious weeds and other invasive non-native plant species within the 3 Bars Project area. The District's weed management plan is most concerned with State of Nevada noxious weeds and invasive annual grasses found on or with the potential to spread into the jurisdictional boundaries of the Battle Mountain District.

3.13.2 Affected Environment

3.13.2.1 Study Methods and Analysis Area

3.13.2.1.1 Study Methods

Information about the presence and distribution of noxious weeds and other invasive non-native vegetation was obtained from past noxious weeds and other invasive non-native vegetation inventory, treatment, and monitoring data, background documents, aerial photographs, visual surveys for cheatgrass conducted during late fall and winter 2009-2010, and rangeland health studies conducted during fall 2010 and summer 2011.

The Mount Lewis Field Office has conducted noxious weed surveys over much of the 3 Bars Project area. These surveys are concentrated in areas that have been disturbed by human factors, sensitive natural areas, high-risk areas (e.g., riparian and wetland areas), high resource value habitat (e.g., for Greater sage-grouse), disturbed areas (e.g., roadsides and rangelands), and heavy public use areas (e.g., recreation sites). Noxious weeds and other invasive non-native vegetation inventory, treatment, monitoring, mapping, and reporting are conducted by Mount Lewis Field Office resource specialists and community partners, including Eureka County, Diamond Valley Weed District, and through Bootstraps, a University of Nevada-Reno Cooperative Extension program developed specifically to conduct noxious weed treatments and inventory throughout the Battle Mountain District (USDOI BLM 2011g).

Rangeland health studies conducted by the BLM and Eastern Nevada Landscape Coalition (Eastern Nevada Landscape Coalition and AECOM 2012), included observations of noxious weeds and other invasive non-native vegetation within representative portions of the project area. Data collected during the studies included information about species composition and dominance within the sampling plots, including presence of canopy gaps, which provides some indication of the potential for invasion of the area by invasive species.

A cheatgrass assessment for the project identified areas of cheatgrass establishment and propagation, as well as areas at risk for new cheatgrass establishment, particularly fire scars. During field surveys conducted in late fall 2009, much of the project area was surveyed for cheatgrass monocultures by ecologists conducting other project-related fieldwork. Ecologists looked for and identified large cheatgrass infestations, and mapped their locations using Global Positioning System technology. Aerial photographs and BLM burn data were reviewed to delineate areas of apparent dense cheatgrass coverage on recent burn areas (post 1984), which are considered areas with a high potential for infestation by cheatgrass monocultures. In February 2010, areas of cheatgrass monoculture potential were surveyed for cheatgrass presence. Recent burn areas were also identified during these surveys. The mapping from these surveys was used to develop cheatgrass coverage polygons for the project area. The results were presented in the *3 Bars Ecosystem and Landscape Restoration Project Cheatgrass Assessment* (AECOM 2011b).

3.13.2.1.2 Study Area

The study area for direct and indirect effects to noxious weeds and other invasive non-native vegetation is the 3 Bars Project area. The CESA for cumulative impacts to noxious weeds and other invasive non-native vegetation includes the Hydrologic Unit Code 10 watersheds wholly, or partially within, the project area (**Figure 3-1**).

3.13.2.2 Noxious Weeds and other Invasive Non-native Vegetation

The Battle Mountain District's noxious weed suppression efforts are concentrated on Russian knapweed, saltcedar (tamarisk), perennial pepperweed (tall white top), hoary cress, various thistle species, and on non-native annual grasses (USDOI BLM 2009b). Elongated mustard, which is not currently listed by the State of Nevada as a noxious weed, is also of concern, as it is listed as a noxious weed in surrounding states and is found within Eureka County. The 3 Bars Project area is being closely watched for potential establishment and spread of this species.

3.13.2.2.1 Noxious Weeds

Coverage of noxious weed infestations in the 3 Bars Project area is approximately 12,242 acres, or 1.6 percent of the project area. Noxious weeds and non-native annual grasses occur sporadically, particularly infesting wildfire burn scars and other disturbance areas. Noxious weeds are concentrated around areas of high soil disturbance, including roadsides, and areas of soil/water disturbance associated with riparian resources. Areas with the greatest concentration of noxious weeds include the Henderson Creek area, Roberts Creek area, Ferguson Creek, and Gable and Willow Canyons. The most prevalent noxious weeds in the 3 Bars Project area are musk thistle and hoary cress.

As stated in the BLM Battle Mountain District's *Integrated Weed Management Plan Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b), the following areas are associated with noxious weeds and non-native invasive species on public lands in the Battle Mountain District.

- Along rights-of-way and improved dirt roads **-** hoary cress, Russian knapweed, and halogeton.
- Heavily trampled/disturbed rangeland **-** hoary cress, Russian/spotted knapweed, various thistles, salt cedar, and halogeton.
- Along waterways/flood zones – perennial pepperweed, salt cedar, hoary cress, and various thistles.
- Wildfire burn scars **-** cheatgrass, red brome, hoary cress, and various thistles.
- Open range **-** cheatgrass, medusahead rye, and red brome.
- Recreation/industrial **-** puncture vine and hoary cress.

Table 3-39 provides a summary of the noxious weeds that are known to occur within the 3 Bars Project area, and the recommended control methods for these species.

3.13.2.2.2 Cheatgrass Monocultures

Because cheatgrass is so widespread and established on rangeland within the Battle Mountain District, surveys for this species are not normally conducted. However, areas of observed cheatgrass and areas with the potential for cheatgrass monocultures within the project area have been mapped, as shown on **Figure 3-32**. Mapped areas include relatively large cheatgrass monocultures in former burn areas in the northern half of the project area. Large burn areas in the northern portion of the project area are considered areas of cheatgrass monoculture potential. However, the BLM has seeded many of these burn areas with non-native perennial grasses and forage kochia under the BLM Emergency Stabilization and Rehabilitation Program to combat cheatgrass expansion. During the rangeland health studies, cheatgrass was observed in sampling areas throughout the project area, with the greatest frequency of observance in areas that have been affected by wildfire (Eastern Nevada Landscape Coalition and AECOM 2012). Cheatgrass is likely present in other portions of the 3 Bars Project area, although not necessarily in quantities that warrant treatment.

TABLE 3-39

Noxious Weeds on the 3 Bars Project Area

Species	Typical Habitat	Control method
Black henbane	Open sites with well-drained soils. Roadsides, waste areas, field borders, and pastures.	Mechanical or manual methods prior to seed production; burning dry mature plants; and chemical control by using metsulfuron methyl or picloram.
Canada thistle	Wide range of environmental and soil conditions. Rangeland, pastures, waste areas, roadsides, and along waterways.	Repeated mechanical/manual methods prior to seed production; biological control; chemical control by using 2,4-D, clopyralid, dicamba, glyphosate, or picloram.
Hoary cress	Disturbed alkaline soils. Pastures, fields, roadsides, rangelands, waste areas, and along waterways.	Manual removal; chemical control by using 2,4-D, chlorsulfuron, or metsulfuron methyl. Not effective: Mechanical control.
Musk thistle	Roadsides, pastures and waste areas.	Manual or mechanical methods after bolting but prior to flowering; biological control; chemical control by using 2,4-D, clopyralid, dicamba, chlorsulfuron, metsulfuron methyl, or picloram.
Perennial pepperweed	Moist sites. Floodplains, pastures, meadows, hay fields, and along waterways.	Chemical control by using 2,4-D, chlorsulfuron, glyphosate, imazapic, or metsulfuron methyl. Not effective: Mechanical or prescribed fire treatments.
Russian knapweed	Broad range of sites. Rangeland, waste areas, roadsides, and along waterways.	Chemical control by using chlorsulfuron, clopyralid, or glyphosate. Not effective: Mechanical methods.
Saltcedar	Edges of waterways, lakes, and ponds.	Mechanical/manual control or prescribed fire combined with chemical application; biological control; chemical control by imazapyr, glyphosate, or triclopyr.
Scotch thistle	Pastures, rangelands, roadsides, and waste areas.	Mechanical or manual methods prior to flowering; chemical control by using 2,4-D, chlorsulfuron, clopyralid, dicamba, metsulfuron methyl, or picloram.

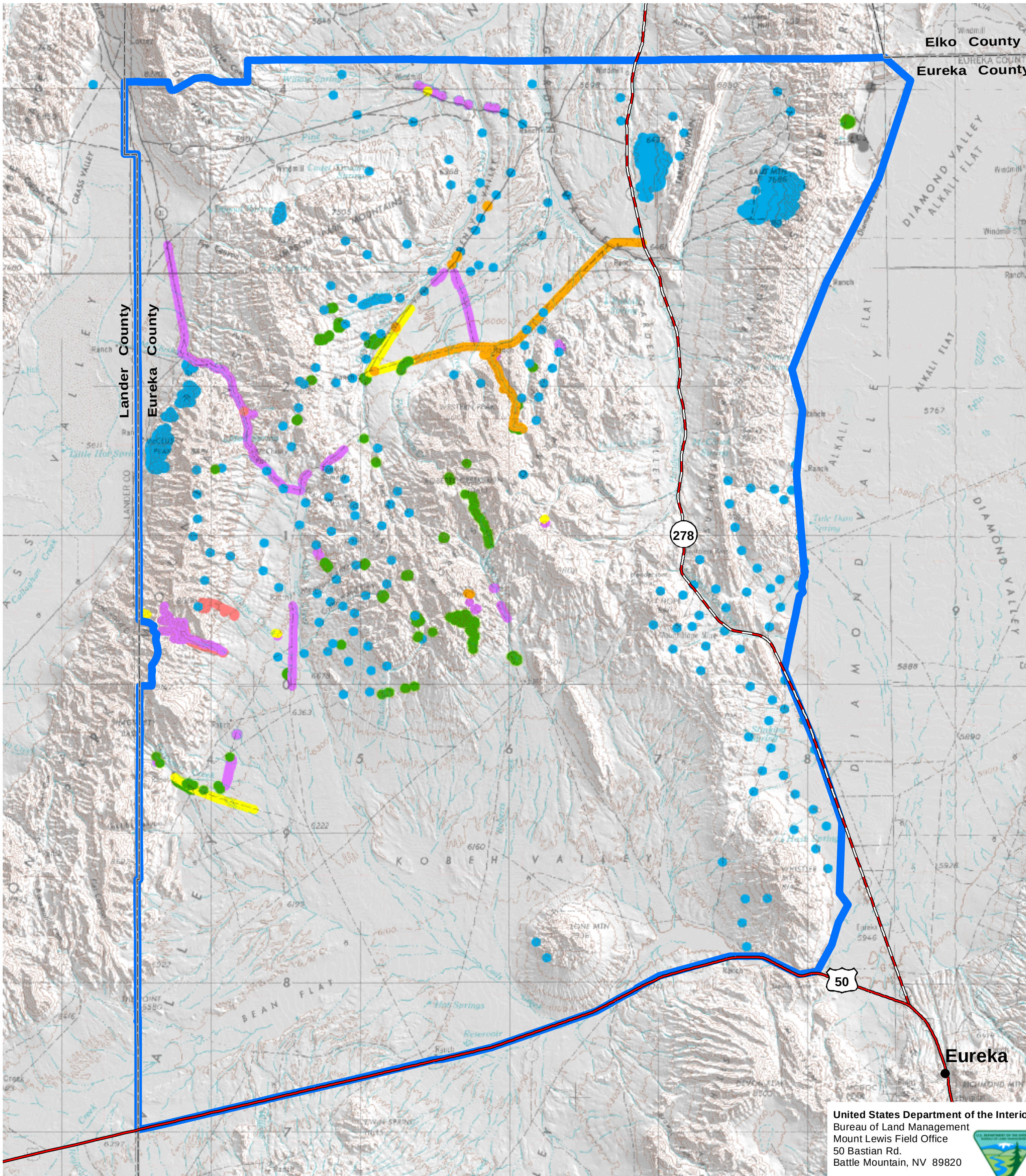
Source: University of Nevada Cooperative Extension (2010).

3.13.3 Environmental Consequences

3.13.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Key issues of concern pertaining to noxious weeds and other invasive non-native vegetation were identified in the AECC and during scoping. These include the following:

- The potential for the return of invasive species (primarily cheatgrass) following treatments.
- The potential for disturbance associated with vegetation treatments to increase the abundance of invasive species, or result in the establishment of new invasive species populations.
- The role of livestock grazing and climate change on noxious weeds and other invasive non-native vegetation invasion.
- The potential for treatments to cause invasion of noxious weeds and other invasive non-native vegetation into woodlands, or juniper expansion.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)

Legend

- Black Henbane
- Cheatgrass
- Hoary cress
- Musk thistle
- Perennial pepperweed
- Russian knapweed
- Scotch thistle
- 3 Bars Project Area

Source: BLM 2010k, 2012g; AECOM 2011b.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-32

Cheatgrass and Other Weeds

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.
Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
This product was developed through digital means and may be updated without notice.

- Avoid the use of prescribed fire and burn only in areas not at risk of exotic species invasion.
- Concern regarding the use of exotics, such as crested wheatgrass, to restore burned areas.
- Concern that the typical response to fire is to place a fence, which is often permanent, around the perimeter of a burned area.
- Who or what is threatened by the woody vegetation that is termed hazardous fuels, and is cheatgrass a hazardous fuel?
- Concerns about the use of herbicides in native plant communities.

3.13.3.2 Significance Criteria

The following would have a significant adverse effect on vegetation:

- At the end of 10 years, an introduction of noxious weeds and other invasive non-native vegetation into a relatively weed free treatment area at a moderate or high ecological risk, relative to baseline levels.
- At the end of 10 years, an expansion of noxious weeds and other invasive non-native vegetation within and outside of the treatment areas into a relatively weed free area at moderate or high ecological risk, relative to baseline levels.

3.13.3.3 Direct and Indirect Effects

3.13.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

Vegetation removal treatments can create conditions that favor early successional species and also result in a temporary loss of more mature vegetation. Most noxious weeds are early successional species that benefit from light and disturbance (Baker 1986). All treatments that cause disturbance or remove plants from an area could lead to a competitive advantage for many noxious weeds and other invasive non-native vegetation, particularly if a seed source is present on the site. There is also some potential for noxious weeds and other invasive non-native vegetation seeds to be transported onto treatment sites on workers' shoes and clothing, with the plant materials used in rehabilitation projects, and on vehicles. It is expected that manual treatments would have a low potential for increasing noxious weeds and other invasive non-native vegetation coverage, given the minimal amounts of disturbance. To minimize these effects, the BLM would follow SOPs to prevent the inadvertent introduction and spread of noxious weeds and other invasive non-native vegetation, and monitor areas where soil is disturbed and where noxious weeds and other invasive non-native vegetation are inventoried or treated. The BLM would also inspect plant materials prior to planting to ensure that they are weed-free, and would identify and plant appropriate seed mixtures and plants suitable for specific habitats. It is assumed that the risks associated with manual treatments would be similar for all project groups.

Beneficial Effects

All treatments, or combinations of treatments, designed to control noxious weeds and other invasive non-native species would be expected to have a beneficial impact by reducing populations of these species. The reduction of fuel loads would decrease the risk of severe or repeat wildfires, thereby reducing the risk of spread of cheatgrass and other noxious weeds and other fire-dependent invasive non-native species. By removing these species, overall ecosystem health and functionality would improve, and by restoring rangeland health native species would be better able to compete with noxious weeds and other invasive non-native species.

3.13.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Adverse Effects

Some of the proposed projects could promote the establishment and spread of noxious weeds and other invasive non-native vegetation. Machinery used in mechanical treatments can result in inadvertent removal of native vegetation, and has the potential to spread seeds of noxious weeds and other invasive non-native vegetation. Furthermore, soil disturbance stimulates germination of noxious weeds and other invasive non-native vegetation seeds by providing physical cues that competing vegetation is absent (Cornell University Weed Ecology and Management Laboratory, no date). Additionally, vehicles and other mechanical equipment can damage or crush existing desirable riparian and wetland vegetation or bring propagules of non-native species into treatment areas and create sites for noxious weeds and other invasive non-native vegetation establishment (BLM 2007c:4-45). The risks for loss and damage to existing riparian and wetland vegetation and spread of noxious weeds and other invasive non-native vegetation would be greatest in project groups with the largest acreage and that employ the most extensive mechanical treatments (project groups that include streambank earthwork as well as pinyon-juniper removal (Garden Spring Group and Frazier Creek Group). For the Denay Pond group, the disturbance associated with mechanical treatments would be minimal, since only fence installation would occur.

Beneficial Effects

Successful control of invasive plants in riparian zones using manual and mechanical methods would lead to improved conditions in these habitats over the long-term. The eventual growth of desirable vegetation in treated areas would moderate water temperature, buffer the input of sediment from runoff, and promote bank stability in riparian zones. Efforts by the BLM to enhance wetland and riparian vegetation would also help to increase the number of miles of stream and acres of wetlands that are in Proper Functioning Condition.

Aspen Treatments

Adverse Effects

The risks of introduction and spread of noxious weeds and other invasive non-native vegetation through manual and mechanical methods would be similar to those described for riparian zones. At all aspen treatment areas, the risks associated with manual treatments would be low, since a minimal amount of soil disturbance would occur, SOPs would be implemented to prevent the establishment and spread of noxious weeds and other invasive non-native vegetation, and woody debris would be left onsite to promote seedling and sapling establishment.

Treatment activities that cause soil disturbance and create open conditions, including mechanical methods and fire, could facilitate noxious weeds and other invasive non-native vegetation establishment and spread. These include project areas where pinyon-junipers would be removed (JD-A4 group and RM-A2 group). In areas where the mechanical treatments are limited to cutting aspen or ripping root masses, less disturbance would be expected given the targeted nature of these treatments.

Beneficial Effects

While noxious weeds and other invasive non-native vegetation control is not identified as part of the treatment design for these sites, the BLM could use manual and mechanical methods to treat noxious weeds and other invasive non-native vegetation that are present on aspen treatment areas. By directly targeting noxious weeds and other invasive non-native vegetation in the course of completing other proposed treatments, the proposed project would have a beneficial effect on native plant communities.

Pinyon-juniper Treatments

Adverse Effects

Manual and mechanical treatments could cause soil disturbance that leads to the establishment and spread of noxious weeds and other invasive non-native vegetation, as increased light availability in the site and shading of desirable understory plants by heavy slash could provide conditions that favor invasive species (Tausch et al. 2009). Chainsaw cutting in juniper woodlands has been correlated with increased shrub and grass cover, which may include at least an initial increased cover of cheatgrass on sites where a seed source for this species is present (Miller et al. 2005). Fire risks associated with slash would be mitigated to some degree by associated programs to use felled trees for posts, mulch, or other forest products uses, and following manual treatments with pile and slash burning. In some areas, the creation of fire and fuel breaks could also lead to noxious weeds and other invasive non-native vegetation establishment and spread.

Grasses and forbs would benefit from prescribed fire and would be the first to revegetate the site. If non-native annual grasses and forbs occur on a site prior to fire, and if fire intensity is high, then non-native annual grasses and forbs would be the first to establish after a fire. Without other treatments, such as the use of herbicides, non-native annual grasses and forbs may dominate the site (USDOI BLM 2012g). The BLM generally has had good success in controlling non-native vegetation and allowing native vegetation to establish on sites treated using prescribed fire on the 3 Bars Project area (see Section 3.12.3.3). However, some sites could require seeding or other rehabilitation efforts following the fires, or it could take decades following a fire to fully establish all desired vegetation including understory vegetation and mixed-aged stands of pinyon-juniper.

Cheatgrass could potentially increase in dominance following a fire. Over time, the presence of cheatgrass in an area can increase the frequency of fire, potentially altering the successional trajectory, such that the understory never progresses from annual grass to perennial grass and shrub/grass mix, and the community never returns to a perennial grass or woodland stage (Miller and Tausch 2001, Ansley and Rasmussen 2005). Therefore, fire treatments would be most successful on sites where perennial grasses are likely to recover and establish after treatment, and least successful on sites where cheatgrass is present. Increased dominance of cheatgrass is particularly a concern for the Sulphur Spring Wildfire Management Unit, where wildfires would be allowed to burn for resource benefit, and where cheatgrass is already present, including a large monoculture (see **Figure 3-32**). However, the BLM would take into account the potential for cheatgrass to respond to fire when managing wildland fires in this area. The BLM would also take into account the live fuel moisture conditions, weather conditions and trends, whether the fire would meet management objectives, and the fire return interval (i.e., if an area has recently burned, it would not be allowed to burn again until it is within the range of the normal fire return interval). Fires would be suppressed during periods of low fuel moisture, or in areas with large populations of cheatgrass. Since cheatgrass is present throughout the Sulphur Spring Wildfire Management Unit, the potential for cheatgrass spread as a result of treatments exists. Rehabilitation following the treatment would be conducted in areas where native communities are unlikely to regrow after a fire. Additionally, all sites are monitored for at least 3 years to assess whether further action is needed.

Beneficial Effects

The predominant noxious weeds and other invasive non-native vegetation infestations in pinyon-juniper treatment areas are cheatgrass, musk thistle, and black henbane. Treatments directed at these and other weeds during the course of completing proposed pinyon-juniper enhancement projects would be expected to have a beneficial effect on ecosystem health.

The BLM would restore fire as an integral part of the ecosystem, improve species diversity, and reduce hazardous fuels on the Sulphur Spring Wildfire Management Unit by using wildland fire for resource benefit. The BLM would allow fire to burn on about 20 to 40 percent of the area, but generally burns would be limited to small acreages to create a mosaic of habitats and to create fuel breaks. By keeping burned areas small, the risk of a cheatgrass infestation is much less.

Sagebrush Treatments

Adverse Effects

Treatments to reduce herbaceous dominance (Rocky Hills Unit) and treat cheatgrass (West Simpson Park Unit) would potentially have short-term adverse effects on sagebrush habitats. However, provided project objectives are met, the long-term goal of these treatments is to improve the quality of sagebrush habitats. In some cases, the species composition at treatment sites would change, as sagebrush enhancement projects would focus on the components of Greater sage-grouse habitat. For instance, at the Rocky Hills Unit, the long-term result of the project would be to minimize the herbaceous component and increase the sagebrush component.

Manual and mechanical treatments would have the potential to disturb sagebrush habitats, with potential impacts similar to those discussed for other community types. Ground disturbance associated with mechanical treatments could occur on all of the sagebrush project areas. These treatments could potentially result in trampling and inadvertent removal of non-target plants, as well as soil disturbance that could favor the establishment and spread of cheatgrass and other noxious weeds and other invasive non-native vegetation. The greatest risk for adverse effects would occur where the largest ground areas are disturbed, and where noxious weeds and other invasive non-native vegetation seeds are already present.

Biological control has been identified for use to remove cheatgrass, crested wheatgrass, and forage kochia. Grazing can contribute to the spread of noxious weeds and other invasive non-native vegetation through preferential grazing of native vegetation over noxious weeds and other invasive non-native vegetation, and by movement of noxious weeds and other invasive non-native vegetation into uninfested areas via livestock feces (USDOI BLM 2007c). Therefore, there would be some risk of establishment or spread of noxious weeds and other invasive non-native vegetation in treatment areas since these species are already present in the areas. Using SOPs to prevent noxious weeds and other invasive non-native vegetation spread, monitoring, and follow-up treatments would help to minimize these risks.

Beneficial Effects

Prescribed fire and broadcast seeding could be used on the West Simpson Unit to control cheatgrass. Livestock could be used to biologically control cheatgrass. In all areas where the BLM would employ the use of livestock as a biological control, other control methods would also be used to restore ecologically functioning sagebrush habitat. These could include mechanical treatments such as discing and seeding. These efforts to reduce cheatgrass cover would have a beneficial outcome in these areas.

The Rocky Hills Unit was replanted with non-native crested wheatgrass and forage kochia after the 1999 Trail fire. Crested wheatgrass can establish with minimal seedbed preparation, can survive periods of drought, and can compete with weedy species (Davies et al. 2010). This species, however, is a prolific seed producer that can dominate a site and exclude native vegetation, including the native bunchgrasses and big sagebrush that offer better wildlife value (Monson 2002, Braun 2006). Forage kochia was originally introduced into the U.S. to compete with halogeton. It has since been shown to compete well against other aggressive, exotic annual noxious weeds and other invasive non-native vegetation such as cheatgrass, Russian thistle, and medusahead rye. Plantings of forage kochia can decrease densities of annual weeds, thus decreasing fire intervals of degraded rangelands while providing valuable forage to livestock and forage and cover for wildlife (Tilley et al. 2006).

Projects that target non-native vegetation, including cheatgrass, crested wheatgrass, and forage kochia would be beneficial for native vegetation, as they would help to restore native sagebrush communities in these areas that are currently dominated by a non-native species. Competition from these non-native species has limited sagebrush expansion in previously burned areas. The BLM proposes to restore areas seeded with crested wheatgrass and forage kochia to native vegetation. Non-native vegetation would be treated in strips. As treated strips are restored with native vegetation, additional strips would be treated. Pehrson and Sowell (2011) studied methods to eliminate crested wheatgrass and establish sagebrush. They found that no technique eliminated crested wheatgrass in a single application. Grazing and fire had no long-term impacts on crested wheatgrass. Mechanical treatments, such as plowing, discing, and cultivating reduced and eradicated crested wheatgrass, but invasive grasses followed treatments and made it difficult to establish native seeded species.

In some areas dominated by cheatgrass, the BLM may initiate a phased succession approach to restoration that includes treating the area with various methods, including mechanical treatments and prescribed fire, and then planting the area with crested wheatgrass and forage kochia to compete directly with remaining cheatgrass. Once these species have stabilized the site, the BLM would begin to convert the site back to native vegetation.

3.13.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Given that fire would not be used under this alternative, treatment programs might not be as effective as under Alternative A. Because only mechanical and manual methods would be used, it would be difficult for the BLM to conduct hazardous fuels reduction, and noxious weeds and other invasive non-native vegetation treatments on steep hillslopes or over large acreages. The BLM would not be able to use fire to remove the mat of dead vegetation in cheatgrass-dominated areas, or to promote the health and resiliency of native vegetation. Thus, the wildfire risk would be greater under this alternative than under Alternative A, as would the potential for establishment and spread of noxious weeds and other invasive non-native vegetation.

3.13.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Given that fire and mechanical methods would not be used under this alternative, the BLM would have the fewest options for its treatment programs, and these programs would likely not be as effective as under the other action alternatives. The BLM would be unable to combine treatment methods for optimal control of cheatgrass and other noxious weeds and other invasive non-native vegetation. Because this alternative is the most limited in terms of the tools available for large scale restoration, it is the least likely of the action alternatives to help attain larger ecosystem restoration goals for the 3 Bars Project area.

Because only manual methods would be used, it is unlikely that the BLM would slow the spread of noxious weeds and other invasive non-native vegetation, including cheatgrass; restore fire as an integral part of the ecosystem; and reduce extreme, very high, and high wildfire risks to moderate risk or less. Thus, wildfire risk would be greater under this alternative than under Alternatives A and B, as would the potential for establishment and spread of noxious weeds and other invasive non-native vegetation.

3.13.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to noxious weeds and other invasive non-native vegetation from 3 Bars Project treatments as no treatments would be authorized under this alternative. Under this alternative, the BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; treat large-scale infestations of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Threats to ecosystem health under this alternative would be associated with the ongoing expansion of noxious weeds and other invasive non-native vegetation; continued decline of ecosystem health due to further decline in native understory species in the upland plant communities; further expansion of pinyon-juniper woodland into other communities, including sagebrush, riparian, and aspen habitats; and the continued increase of the risk for catastrophic wildfire as a result of high fuel loads. Given the low acreage treated annually, there would be little or no improvement in reducing the amount of acreage infested with noxious weeds and other invasive non-native vegetation.

3.13.3.4 Cumulative Effects

The CESA for noxious weeds and other invasive non-native vegetation is approximately 1,841,698 million acres and includes those watersheds at the Hydrologic Unit Code 10 level that are all or partially within the 3 Bars Project area (**Figure 3-1**). Past and present actions that have influenced noxious weeds and other invasive non-native vegetation activity in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.13.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Historic overgrazing, introduction of cheatgrass, large wildfires, and other natural and human-caused factors have contributed to the departure of the plant communities from the Potential Natural Community across the 3-Bars ecosystem. This has led to a decrease in the functionality of ecological processes, thus reducing the resilience and resistance of these ecosystems to disturbance. The treatments proposed in the 3-Bars ecosystem are designed to provide the means needed for these ecosystems to recover.

In the short-term, small, temporary exclusion fences may change the distribution of grazing by livestock, wild horses, and some wildlife. As distribution patterns change, utilization would also change. Utilization would decrease in treatment areas while temporary exclusion fences are in place, but would increase in other areas. Once the temporary exclusion fences are removed, animals may be attracted to the treatment areas resulting in potentially higher use of the area than before. Temporary exclusion fences would exclude livestock, although AUMs may be temporarily suspended to prevent overuse in other areas.

The BLM would continue using ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations. These treatments would help to reduce hazardous fuels, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites on about 1,000 acres annually. The active ingredients in herbicide formulations could adversely affect non-target vegetation under one or more exposure scenarios, particularly for aerial applications, and accidental exposure scenarios such as a spill (USDOI BLM 2007b:4-47).

Agriculture, land development, mineral development, and oil, gas, and hydrothermal exploration and development could affect about 10,000 acres in the reasonably foreseeable future, including about 8,335 acres of disturbance associated with the Mount Hope Project. Although some of the disturbance from these projects would be reclaimed, these activities would lead to long-term losses in native plant communities in the affected areas, and entail disturbance that could facilitate the establishment and spread of noxious weeds and other invasive non-native vegetation.

Since 1985, approximately 7,000 acres have burned annually in the CESA, although the acreage burned annually is quite variable. It is projected that an additional 140,000 acres could be burned in the CESA during the next 20 years. A wildfire would cause the wide-scale removal of vegetation in the CESA, and would also lead to the spread of noxious weeds and other invasive non-native vegetation.

Hazardous fuels reduction, habitat improvement, and noxious weed and other invasive non-native vegetation control projects would occur on up to 142,000 acres (127,000 for the 3 Bars Project and 15,000 acres for other hazardous fuels projects in the CESA), or 8 percent of the CESA. As discussed under direct and indirect effects, these treatments would lead to short-term increases in noxious weeds and other invasive non-native vegetation.

Long-term, these treatments should result in a reduction of noxious weeds and other invasive non-native vegetation and return of native and non-invasive vegetation that is more fire resilient, more abundant, and similar to the Potential Natural Community. These treatments would also help to reduce the risk of wildfire within the CESA, which often leads to the establishment and spread of noxious weeds and other invasive non-native vegetation.

3 Bars Project treatments would affect less than 1 percent of the CESA annually, and these effects should be beneficial long-term. Thus, there would be a negligible short-term accumulation of adverse effects and minor long-term accumulation of benefits from 3 Bars Project actions combined with effects from other treatments.

3.13.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on noxious weeds and other invasive non-native vegetation would be similar to those described under Alternative A. The BLM would treat about half as many acres under Alternative B as under Alternative A, and less effort would be spent by the BLM on treatments to reduce wildfire risk and its impacts on vegetation, including the use of fire to restore natural fire regimes.

The use of mechanical treatments would give the BLM greater latitude to control various types of vegetation compared to fire treatments, but efforts to control cheatgrass and other noxious weeds and other invasive non-native vegetation would be difficult on steep slopes and over large acreages. Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on about 15,000 acres within other portions of the CESA, or about 4 percent of the acreage within the CESA. Thus, the BLM would be less successful in controlling noxious weeds and other invasive non-native vegetation on the project area and in the CESA under Alternative B than under Alternative A.

3.13.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on noxious weeds and other invasive non-native vegetation would be similar to those described under Alternative A. Under Alternative C, the BLM anticipates treating about one-fourth as many acres as under Alternative A. Adverse, short-term effects to vegetation associated with the use of fire and mechanized equipment would not occur under Alternative C.

By not being able to use mechanical methods, such as mowing, chopping, tilling, discing, harrowing, and drill seeding, the BLM would do little to reduce hazardous fuels, create fire and fuel breaks, treat areas with noxious weeds and other invasive non-native vegetation, or remove downed wood and slash. Thus, the risk of wildfire and spread of noxious weeds and other invasive non-native vegetation would remain high on the 3 Bars Project area and within the CESA. Only about 32,000 acres, or about 2 percent of the CESA, would be treated within the CESA. These treatments would benefit the 3 Bars ecosystem, but not to the extent as under Alternatives A and B.

3.13.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on noxious weeds and other invasive non-native vegetation would be similar to those described under Alternative A. There would be no cumulative impacts to noxious weeds and other invasive non-native vegetation from 3 Bars Project treatments from this alternative as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage. Thus, factors that contribute to the spread of noxious weeds and other invasive non-native vegetation would remain, and would likely be greatest under this alternative.

3.13.3.5 Unavoidable Adverse Effects

The proposed vegetation treatments would cause unavoidable short-term disturbances to plant communities by removing both target and non-target vegetation. In some cases, treatments would return all or a portion of the treated area to an early successional stage by freeing up resources such as light and nutrients. These adverse effects would be temporary and would consist of short-term losses of native vegetation and associated habitat values.

3.13.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

The proposed vegetation treatments would have short-term adverse impacts on non-target vegetation, including native trees, shrubs, forbs, and grasses, as these could inadvertently be removed during treatments. Treatments that remove or control noxious weeds and other invasive non-native vegetation could provide immediate benefits to native species, such as increased access to water and nutrients and enhanced vigor from reduced competition with invasive species. Over the long-term, treatments should also reduce the incidence and severity of wildfire across the project area.

Treatments that control populations of noxious weeds and invasive and non-native species on public lands would be expected to benefit native plant communities over the long-term by aiding in the reestablishment of native species. The degree of benefit would depend on the success of these treatments over both the short- and long-term. Some treatments are very successful at removing noxious weeds and other invasive non-native vegetation over the short-term, but are not successful at promoting the establishment of native species in their place. In such cases, seeding and planting of native plant species would be beneficial.

3.13.3.7 Irreversible and Irretrievable Commitment of Resources

Loss of native vegetation and plant productivity as a result of treatments would persist only until vegetation was reestablished, usually within several growing seasons.

3.13.3.8 Significance of the Effects under the Alternatives

While treatments would result in short-term increases in populations of noxious weeds and other invasive non-native species such as cheatgrass, post-treatment control and rehabilitation are expected to slow the spread of noxious weeds and other invasive non-native vegetation. Under Alternative C, mechanical methods would not be used to target noxious weeds and other invasive non-native vegetation and vegetation control might be more difficult, although manual methods of weed control could still be used successfully, particularly if the treatment area is relatively small. Under Alternative A, the spread of cheatgrass following prescribed or wildland fire for resource benefit is of particular concern. Additionally, SOPs would require the BLM to address the potential proliferation of cheatgrass when planning burns or assessing rehabilitation needs post-burn. Since the significance criteria allow 10 years to control noxious weeds and other invasive non-native vegetation that are introduced as a result of treatments, additional monitoring beyond 3 years would be required to ensure that no further control is required beyond the standard 3-year monitoring period.

3.13.4 Mitigation

Noxious weed and other invasive and non-native vegetation control would benefit from mitigation measures identified in Section 3.18.4 (Livestock Grazing Mitigation). No mitigation or monitoring measures are recommended specifically for noxious weed and other invasive non-native vegetation control.

3.14 Wildland Fire and Fire Management

Species diversity within a plant community depends on species composition, the adaptive traits of plants, the timing of fire, and the nature of fire as it moves through the community. The spatial arrangement of fuels and individual plants can be important to survival, particularly where fuels are unevenly distributed. Concentrations of live or dead fuels can generate high fire intensities and severities on relatively small sites, which can enhance or reduce diversity depending on the community. The areas within and surrounding the 3 Bars ecosystem are of high value to the Mount Lewis Field Office. The area has a high occurrence of wildfires with large fire potential in many places as demonstrated by past fire history and deviation from historic fire regimes. The Battle Mountain District provides aggressive initial attack for all fires within this area.

3.14.1 Regulatory Framework

The Battle Mountain District Fire Management Program is guided by the policies expressed in national policy documents and referenced in Chapter 1. District policy documents include the *Approved Resource Management Plan Amendment for Fire Management with Environmental Assessment and Decision Record Shoshone-Eureka Planning Area* (Shoshone-Eureka Fire Land Use Plan Amendment; USDOI BLM 2002); and the 2004 *Battle Mountain District Fire Management Plan* (Fire Management Plan; USDOI BLM 2004a).

In addition, fire management guidance is provided by the following BLM documents:

BLM Manual 1740, *Renewable Resource Improvements and Treatments* (USDOI BLM 2008j), and BLM Manual Handbook H-1740-1, *Renewable Resource Improvement and Treatment Guidelines and Procedures* (USDOI BLM 2007g), provide guidance and procedures for management and treatment of renewable resources, including utilization of management prescribed fire and emergency fire rehabilitation.

BLM Handbook 1742, *Burned Area Emergency Stabilization and Rehabilitation* (USDOI BLM 2007h), provides guidance for emergency fire rehabilitation including measures to prevent accelerated soil erosion and establishment of noxious and invasive plant species, and post fire management of restoration areas.

BLM Manual 9212, *Fire Prevention,* is consistent with Departmental policy (910 Department Memorandum 1.4), and it is the BLM's policy that:

- Prevention of catastrophic wildfires is a high priority. Commitment to an effective wildland fire prevention program is expected at all levels within the Bureau.
- The wildfire prevention program shall be designed to minimize losses from fire consistent with resource objectives identified in RMPs.
- Wildfire prevention shall stress the analysis of risks, hazards and values and the development of specific educational, engineering, enforcement and administrative prevention actions.
- Wildfire prevention activities shall be coordinated with all federal, state, county, and municipal agencies.
- Each state and district office shall provide coordination, guidance, and assistance to achieve an aggressive wildfire prevention program and shall maintain and update as required a Wildfire Prevention Plan integrated with the Fire Management planning process.
- Wildfire Prevention Program funding shall be consistent with the identified needs as determined through a prevention analysis that is approved as an operational plan of the Fire Management Plan (BLM 9212-1).
- The BLM shall emphasize the use of hazardous fuel reduction techniques as part of the wildfire prevention program.

BLM Manual 9214, *Prescribed Fire Management*, and BLM Handbook H-9214-1, *Prescribed Fire Handbook*, describe the authority and policy for prescribed fire use on public lands administered by the BLM. It is BLM policy that:

- The role of fire and its potential use will be considered in establishing the management strategy for all ecosystems.

- Prescribed fires may be initiated by planned or unplanned (unscheduled) ignition.
- All prescribed fire (including hazard reduction) projects will support one or more approved land management objective(s) derived from the Bureau's land management planning process.
- The planning and execution of the prescribed fire will be funded by the benefiting program(s).
- Each prescribed fire project will have an approved Prescribed Fire Plan completed before ignition.
- Each prescribed fire will be managed and executed in conformance with the approved plan by qualified personnel. The term qualified will include experience, training, and physical fitness for key positions.
- Prescribed fire projects will comply with federal, state and local regulations and standards, including air quality and smoke management programs.
- Pre-burn, burn, and post-burn fuel and weather measurement(s) will be taken on all prescribed fire projects for planning purposes, prescription, compliance, and project evaluation. It may not be necessary to take post-burn weather measurements on fuel reduction projects.
- Pre-burn and post-burn monitoring will be conducted to determine whether resource and fire objectives are achieved, unless where previous documented experience is adequate to predict post-burn results.

The Eureka County Master Plan discusses fire management and makes these recommendations regarding burning within the County (Eureka County 2010):

- Prevent significant deterioration of the superior air quality found in Eureka County.
- Manage smoke from prescribed burns through techniques of smoke avoidance, dilution, and emission reduction, and limit unnecessary emissions from existing and new point and nonpoint sources through development and implementation of best management practices.
- Engage federal land management agencies in burn planning.
- Conduct prescribed burning at the maximum rate allowed by Clean Air Act and State regulations.
- Maintain records of both acreage and tonnage burned and compare to allowable values.
- Review burn plans for compliance with best management practices for point source emissions.
- Review burn calculations and plans to assure that air quality maximums are not exceeded.
- Evaluate whether prescribed burning plan conforms to the requirements and guidelines for air quality and smoke management being developed by the State of Idaho.
- Review best management practices as necessary to assure applicability and compliance.
- Conduct an annual review of the backlog of prescribed burns, pending applications, and requests for additional prescribed burns to incorporate them into the following year annual plan.

For wildfires, Eureka County supports the right for local citizens to protect their property from fires originating on state and federal lands. The County advocates active fire management on federal lands, including, where appropriate and in consultation with grazing permit holders, adjacent landowners, local volunteer fire fighters and Eureka County, a let-burn policy. The County is opposed to arbitrary and inequitable restriction of post-fire land use for recreation and livestock grazing. The County insists that all post-fire land use restrictions be adequately justified and based on peer-reviewed science (Eureka County 2010).

3.14.2 Affected Environment

3.14.2.1 Study Methods and Study Area

The following documents were important sources of information for this assessment:17-States PER (USDOI BLM 2007c); *Wildland Fire in Ecosystems Effects of Fire on Flora* (USDA Forest Service 2000); *Proceedings of the Invasive Species Workshop: The Role of Fire in the Control and Spread of Invasive Species* (Tall Timbers Research Station 2001); Shoshone-Eureka Fire Land Use Plan Amendment (USDOI BLM 2002); Fire Management Plan (USDOI BLM 2004a); *Wildland Fire in Ecosystems: Fire and Non-native Invasive* Plants (Zouhar et al. 2008); and AECC (USDOI BLM 2009a). Information about the occurrence of wildland fires was obtained from historic records maintained by the Battle Mountain District Office, field surveys, and discussions with District fire management staff.

The study area for direct and indirect effects to resources affected by fire management activities lies within the 3 Bars Project area. The cumulative effects study area includes the Hydrologic Unit Code 10 watersheds within, or partially within, the project area (**Figure 3-1)**.

3.14.2.2 Fire Incidence in the 3 Bars Project Area

Since 1985, about nine fires have occurred annually within the project area, burning about 4,225 acres annually and about 520 acres per fire. The number of fires and acres burned was higher in the mid- to late-1990s than during the past decade (**Figure 3-33**, **Table 3-40**).

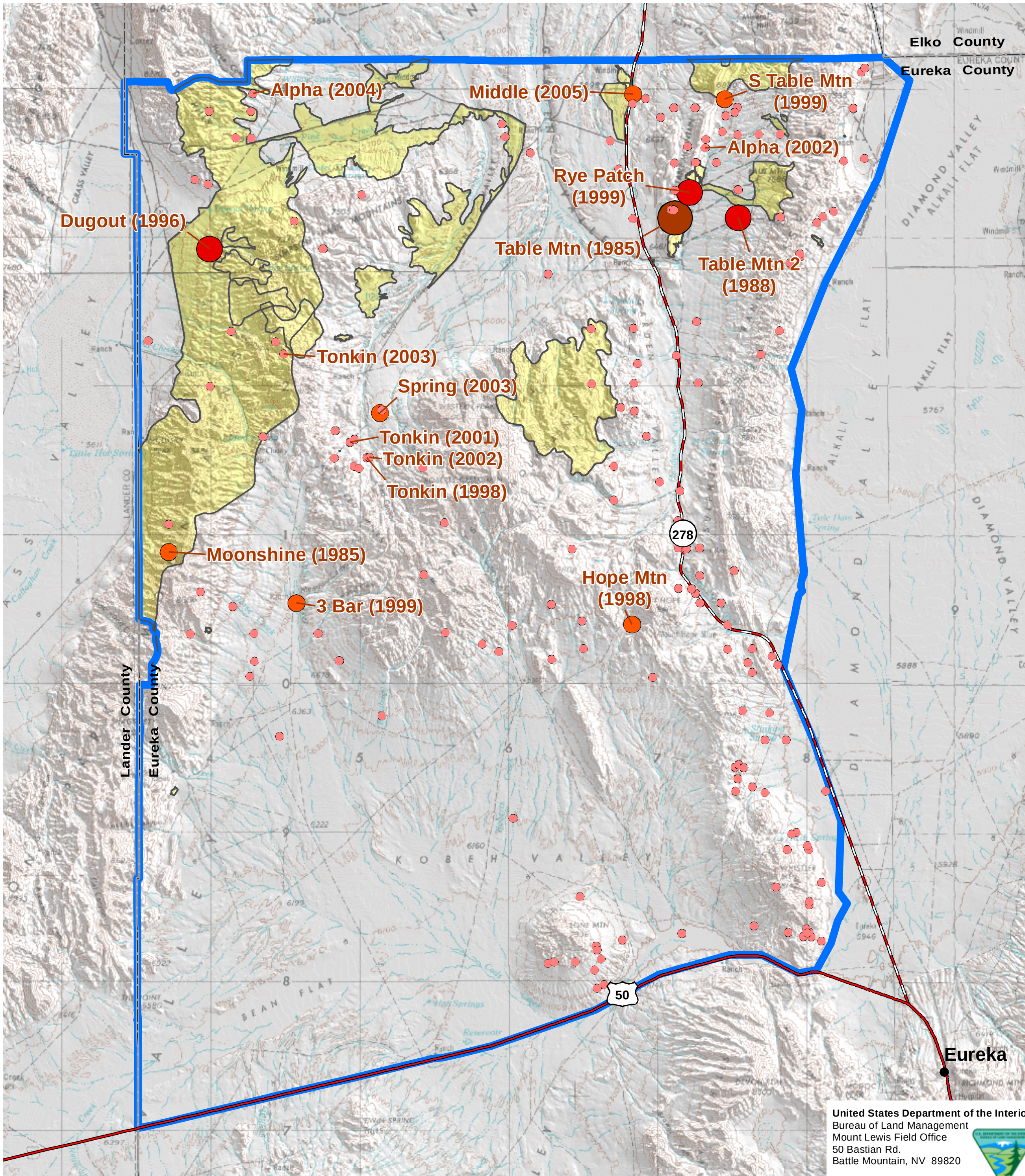
3.14.2.3 Fire Regimes and Fire Condition Classes in the 3 Bars Project Area

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse scale definitions for natural (historical) fire regimes have been developed by Hardy et al. (2001) and Schmidt et al. (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). Fire regimes are based on a number of factors including frequency, intensity, size, pattern, season, and severity. Individual fires can vary greatly in severity, and the specific effects and risks caused by a fire will depend on the specifics of its fire regime. As shown in **Table 3-41**, the BLM has identified five fire regimes, three of which occur in the 3 Bars Project Area.

An FRCC is a classification of the amount of departure from the natural regime. The BLM has identified three FRCCs, as described in **Table 3-42**. Based on FRCCs, the BLM determines where to use fire and other treatment methods to restore public lands to their natural fire regime. For the 3 Bars Project, treatments are focused on FRCC II and III areas.

Fire risk is different than FRCC. Fire risk involves several factors, including ignition sources, fuels topography, and weather, while FRCC is a classification of the amount of departure from the natural regime (Hann and Bunnell 2001).

As discussed earlier, current fire regimes have deviated substantially from historical regimes, as shown in **Figures 3-34** and **3-35**, and **Tables 3-41** and **3-42**. Nearly 80 percent of lands on the project area were historically in Fire Regime IV, while nearly 90 percent of acreage is now within FRCC II. This has led to moderate to extreme risks for a catastrophic fire on the project area (**Figure 3-36**; USDOI BLM 2009a).



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Legend

Fire Starts (1985 - 2008)

- 0 - 10 ac.
- 10 - 100 ac.
- 100 - 1,000 ac.
- > 1,000 ac.

Large Fire Perimeter (1985 - 2012)

3 Bars Project Area

Source: BLM 2012f,g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-33

Fire History and Occurence

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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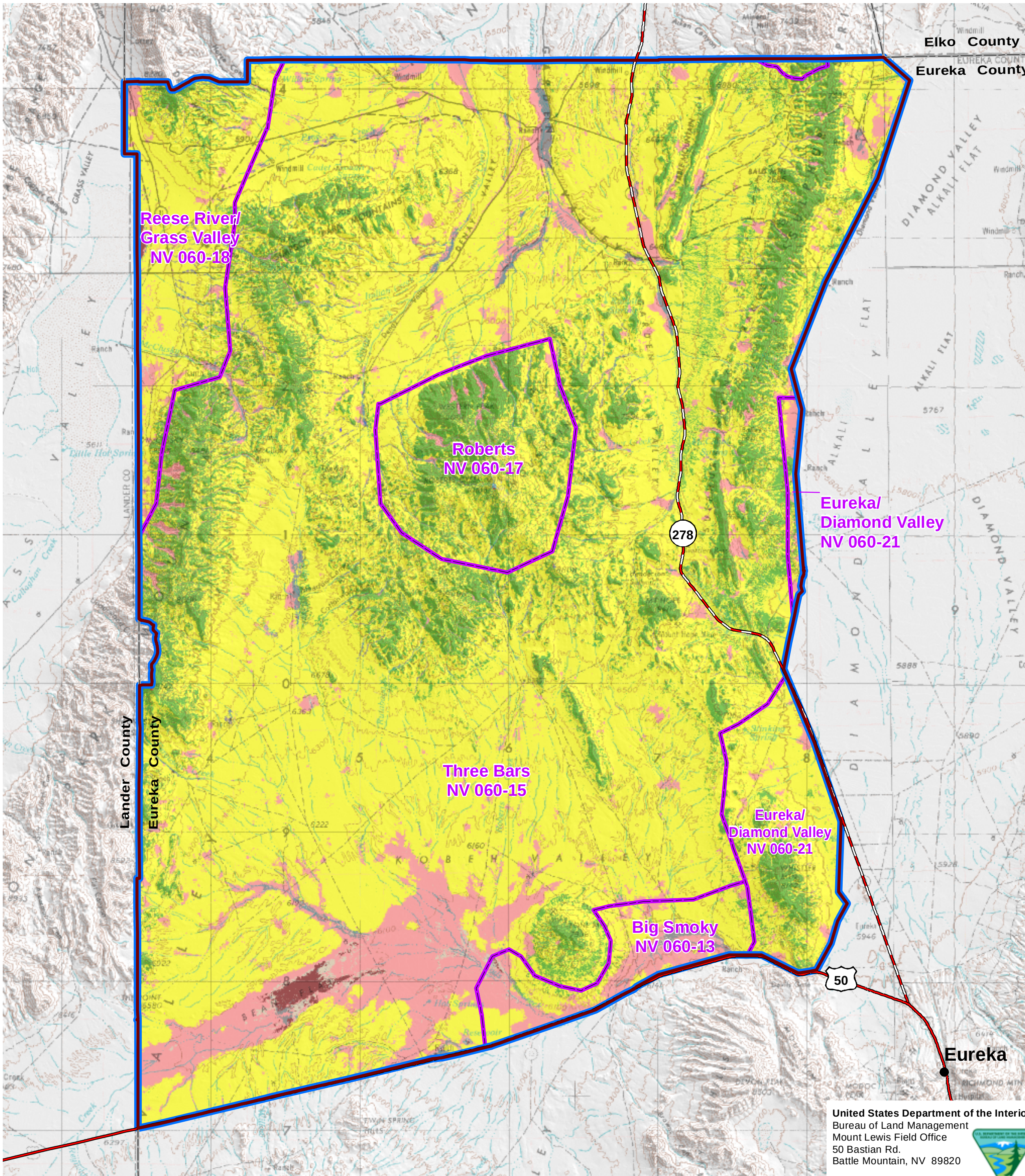

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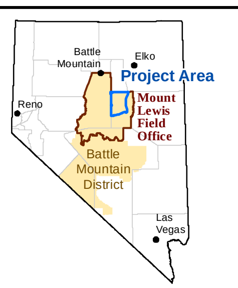

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Natural Fire Regimes

- Fire Regime Group III
- Fire Regime Group V
- Fire Regime Group IV
- Barren
- Sparsely Vegetated
- Indeterminate Fire Regime Characteristics
- Fire Management Unit
- 3 Bars Project Area

Source: BLM 2012g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-34

Natural Fire Regimes

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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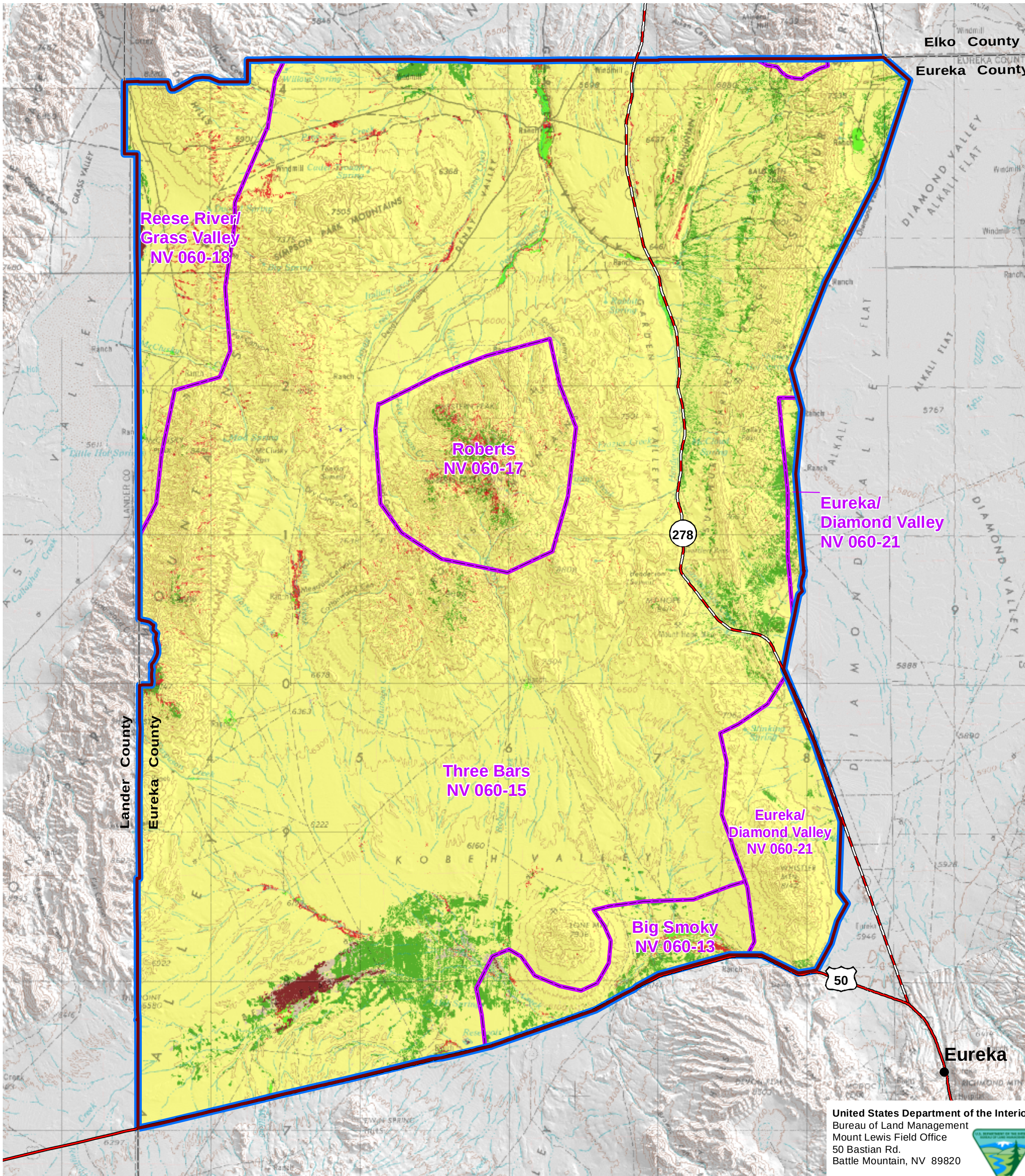

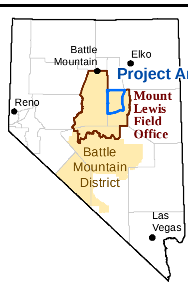

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Current Fire Regime Condition Classes

- Condition Class 1
- Condition Class 2
- Condition Class 3
- Agriculture
- Barren
- Sparsely Vegetated
- Fire Management Unit
- 3 Bars Project Area

Source: BLM 2012g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-35

Current Fire Regime Condition Classes

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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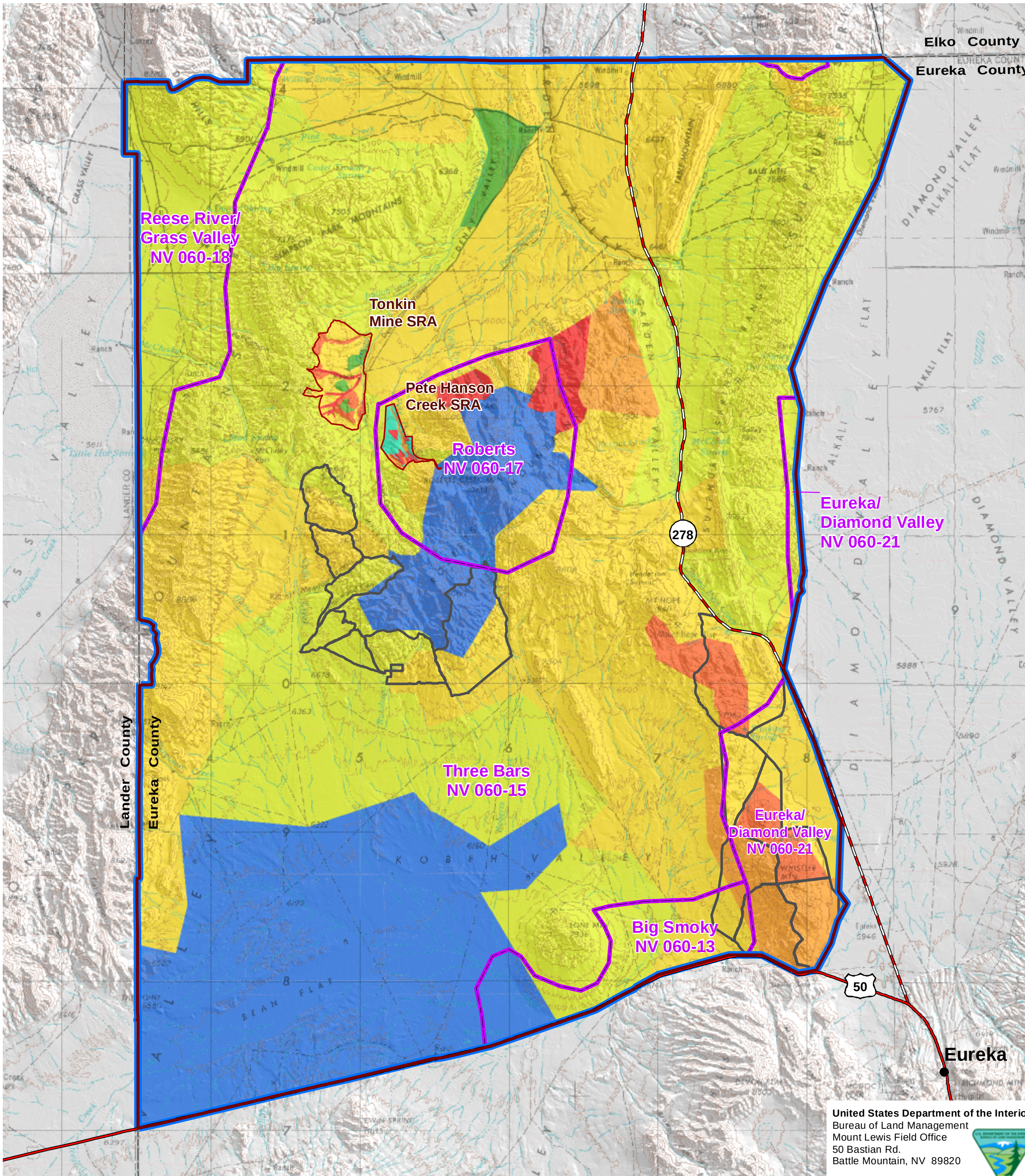

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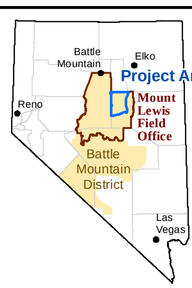

Legend

Fire Risk

- Low to Moderate
- Moderate
- Moderate to High
- High
- High to Very High
- Very High
- Very High to Extreme
- Extreme

- Current Identified "Strategic Areas" Site/Risk Assessment
- Strategic Areas - Ongoing Assessments
- Fire Management Unit
- 3 Bars Project Area

Source:BLM 2009a,f, 2012g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-36

Current Risk of Catastrophic Fire and Threat to Resource Values

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

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Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
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TABLE 3-40

Fire History on the 3 Bars Project Area

Year	Number of Fires	Total Acres Burned	Year	Number of Fires	Total Acres Burned
1985	9	18,164	1999	16	74,164
1986	4	12	2000	11	1,396
1987	1	0	2001	14	10
1988	4	652	2002	12	6
1989	7	0	2003	15	31
1990	10	0	2004	6	2
1991	5	1	2005	21	227
1992	8	10	2006	8	909
1993	2	0	2007	7	52
1994	13	2,074	2008	7	172
1995	12	329	2009	0	0
1996	10	2,009	2010	1	1,208
1997	4	2	2011	4	71
1998	8	2,540	2012	1	12,073

TABLE 3-41

Fire Regime Descriptions (Historical Fire Regimes)

Group	Frequency	Severity	Severity Description	Number of Acres in Project Area
I	0 – 35 years	Low/mixed	Generally low-severity fires replacing less than 25 percent of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75 percent of the overstory.	0
II	0 – 35 years	Replacement	High-severity fires replacing greater than 75 percent of the dominant overstory vegetation.	0
III	35 – 200 years	Mixed/low	Generally mixed-severity; can also include low-severity fires.	102,000
IV	35 – 200 years	Replacement	High-severity fires.	576,750
V	200+ years	Replacement/any severity	Generally replacement-severity; can include any severity type in this frequency range.	71,250

Estimated from LANDFIRE database.

TABLE 3-42

Fire Regime Condition Class Descriptions

Condition Class	Fire Regime	Risk of Losing Key Ecosystem Components	Vegetation Attributes	Acres in 3 Bars Project Area
I	Fire regimes are within historical range.	Risk of losing key ecosystem components is low.	Vegetation attributes are intact and function within an historical range.	45,000
II	Fire regimes on the land have been moderately altered from historical ranges. Fire return intervals have increased or decreased from historical frequencies by 1 or more return intervals, resulting in moderate changes to: • The size, frequency, intensity, or severity of fires; or • Landscape patterns.	There exists a moderate risk of losing key ecosystem components from fire.	Vegetation attributes have been moderately altered from the historical range of attributes.	625,000
III	Fire regimes on the land have been significantly altered from historical ranges. Fire return intervals have increased or decreased from historical frequencies by multiple return intervals, resulting in dramatic changes to: • The size, frequency, intensity, or severity of fires; or • Landscape patterns.	There exists a high risk of losing key ecosystem components from fire.	Vegetation attributes have been significantly altered from the historical range of attributes.	52,500

Estimated from LANDFIRE database.

3.14.2.4 Resource Management Plan Amendments for Fire Management

In 2002, the BLM prepared an amendment to the Shoshone-Eureka RMP in order to address fire management. Under the Shoshone-Eureka Fire Land Use Plan Amendment Decision Record, the BLM decided to improve fire management within the planning area by restoring fire as an integral part of the ecosystem, improving the diversity of vegetation, and reducing fire fuel hazards. This would be accomplished through the use of prescribed fire and fire use for resource benefit, and by using mechanical treatments such as green strips, shaded fuel breaks, and tree thinning to reduce wildfire fuel hazards. By taking these actions, it was expected that the size and severity of future wildfires would be reduced (USDOI BLM 2002:1, 9). This amendment was developed in response to the 1999 wildfire season, when 279,990 acres burned within the Battle Mountain District, substantially more acres than the average of 5,900 acres that burned annually during the previous 10 years.

In the amendment, the BLM developed fire management categories, ranging from wildland fire not appropriate and full suppression with an aggressive initial attack is recommended (Category A), to wildland fire is appropriate and there are no constraints (Category D). Under the fire management plan, most of the 3 Bars Project area dominated by pinyon-juniper vegetation was categorized as Category C. Under Category C, wildland fire is appropriate, but there are constraints on its use. In Category C areas, prescribed fire use tends to be site-specific and is designed to accomplish protection or improvement goals, and the desired future condition is a healthy ecosystem characterized by a good distribution and proportion of successional stages that would occur over time under a natural fire regime. The remainder of the 3 Bars Project area was categorized as Category B. Under this category, unplanned fire is likely to cause negative effects, but these effects may be mitigated through fuels management. Prescribed fire has limited use and mechanical treatments are normally preferred (USDOI BLM 2002:10, 12).

3.14.2.5 Fire Management Plan

The purpose of the 2004 Fire Management Plan is to identify and integrate all wildland fire management guidance, direction, and activities required to implement national fire policy, the National Fire Plan, the Healthy Forest Restoration Act, and the Healthy Forest Initiative. The Fire Management Plan also reflects and integrates fire management direction from the Shoshone-Eureka RMP, and the Shoshone-Eureka Fire Land Use Plan Amendment.

Management direction allows for fire to be restored as an integral part of the ecosystem to meet resource management objectives on BLM-administered lands. The Fire Management Plan identifies and directs fire strategies to provide for firefighter safety, the protection of human life, and the safeguarding of private property through aggressive fire protection, reduction of hazardous fuels, and restoration of fire-damaged ecosystems.

Fire Management Plan Objectives

The Fire Management Plan identifies numerous objectives for managing fires in the project area. These include:

- Protection of human life, safety of wildland firefighters, and protection of human safety and health.
- Protection of private property and natural and cultural resources, including preventing the destruction of cultural properties from suppression actions.
- Protection of communities and associated infrastructure.
- Providing for vegetative and ecological diversity.
- Protection of important wildlife habitat from devastating wildland fire effects.
- Protection of all fisheries, including existing and historical Lahontan cutthroat trout habitats.
- Protection of HMA foaling areas during foaling seasons.
- Providing for vegetative and ecological diversity.
- Protection of important raptor nesting habitat.
- Protection of riparian zones from devastating wildland fire effects.
- Restoring fire as an integral part of the ecosystem.
- Using mechanical treatments to reduce wildfire fuel hazards.

- Fire is considered a natural and desirable element in WSAs. Interim guidance directs BLM to rely on methods least damaging to wilderness values, and to limit surface disturbance to the protection of life and private property. All WSAs are managed as Visual Resource Management Class I areas.
- Rehabilitation and restoration of all wildfires 300 acres or larger.

In addition, the Fire Management Plan identifies several objectives for managing prescribed fires in the project area. These are:

- Utilize prescribed fire to mitigate hazardous fuels to acceptable levels.
- Utilize prescribed fire to promote resource management to maintain the natural component of the ecosystem and restore fire as an integral part of the ecosystem.
- Utilize wildland fire for resource benefit to maintain important habitat and restore fire as an integral part of the ecosystem as approved by site-specific activity level document.
- Restore pinyon pine and juniper woodland density and coverage to the approximate values found under natural fire return intervals.

3.14.2.6 Fire Management Units

As discussed in the Fire Management Plan, the BLM has divided the Battle Mountain District into Fire Management Units (FMUs). A FMU is a specific land management area that is defined by fire management objectives, management constraints, topographic features, access, values to be protected, political boundaries, fuel types, and/or major fire regime groups. The Battle Mountain FMUs are scaled to best define predominate fire management objectives, physical characteristics, resource values, and fire planning attributes, including for lands within the 3 Bars Project area (USDOI BLM 2004a).

The 3 Bars Project area is part of five FMUs—Big Smoky (NV-060-13), Three Bars (NV-060-15), Roberts (NV-060-17), Reese River/Grass Valley (NV-060-18), and Eureka/Diamond Valley (NV-060-21; **Figure 3-35**). The following summarizes information from the 2004 Fire Management Plan.

3.14.2.6.1 Big Smoky (NV-060-13)

The Big Smoky FMU lies between the Toiyabe Mountain Range to the west, and the Toquima Mountain Range to the east. The FMU is 407,715 acres, of which 96 percent of acres are administered by the BLM; 19,758 acres are within the project area. Most of the vegetation is salt-desert shrub, but some sagebrush pockets exist. During 1980 to 2003, the average wildfire size was less than an acre and nearly all wildfires were started by lighting, with a few fires started by humans.

Wildfires typically occur during May through October. Temperatures during the fire season typically range from the mid-80s to the upper 90s °F with relative humidity typically in the teens or single digits. Summer thunderstorms bring frequent lightning and can bring brief, heavy rains. Occasionally, dry or isolated thunderstorms plague the District with multiple ignitions.

Fire is an uncommon component of salt-desert shrub ecosystems as is abundant fine fuel loadings. Wind-driven fires in the sagebrush can advance with high rates of spread and can cover vast distances quickly. Fires in the salt-desert shrub vary in intensity and are highly dependent on the presence of fine fuels. The presence of cheatgrass can dramatically shorten fire return intervals in all vegetative communities and cause fires to spread very quickly, but very little cheatgrass has been seen in this FMU. Live fuel moisture, pathogens, relative humidity, wind, and slope will greatly influence fire behavior in these desert fuel types.

The salt-desert scrub communities are Fire Regime IV and FRCC I. The sagebrush/grass communities are Fire Regime II and FRCC II.

3.14.2.6.2 Three Bars (NV-060-15)

The Three Bars FMU is in Lander and Eureka Counties and is 880,852 acres; approximately 618,601 acres are within the project area. The FMU is bound on the west by Grass Valley, on the south by the U.S. Highway 50, on the east by Diamond Valley, and on the north by the District Boundary. U.S. Highway 50 and State Highway 278 provide the primary access to this FMU. Over 97 percent of this FMU is administered by the BLM. The unit is rated as having high value habitat, with over 85 percent of vegetation comprised of pinyon-juniper and sagebrush. During 1980 to 2003, the average wildfire size was about 300 acres and nearly all wildfires were started by lighting, with a few fires started by humans.

Wildland fires typically occur during May through September. Maximum temperatures for this FMU rarely exceed 100 °F during this period. Frequent lightning storms bring moderate amounts of precipitation occur throughout the summer.

Fire behavior differs in the three fuel types found in this FMU. Fires in sagebrush, which is the dominant fuel type, historically were medium sized and of mixed severity. Recent sagebrush fires in this FMU have been medium-sized fires but of high severity. Fires in pinyon-juniper stands are characterized by either single tree/small group fires or large, stand-replacing events. Salt-desert shrub fires typically only burn under severe conditions (i.e., high wind, low relative humidity, and with abundant fine fuel loading). Fire is a relatively uncommon component of salt-desert shrub fuel types. Living vegetation fuel moisture, pathogens, relative humidity, fine fuels, wind, and slope will greatly influence fire behavior in these fuel types. Fires in the sagebrush and salt-desert shrub types are generally easier to suppress than fires in the pinyon-juniper type.

The pinyon-juniper and sagebrush types are in Fire Regime II and FRCC II.

3.14.2.6.3 Roberts (NV-060-17)

The Roberts FMU consists of 39,192 acres in the Roberts Mountains of Eureka County, and these acres are within the project area. State Highway 278 and the Alpha Road provide the primary access to this FMU. One hundred percent of this FMU is administered by the BLM. The unit is rated as Special Management Area, with vegetation comprised mostly of pinyon-juniper, mountain shrub, and sagebrush. During 1980 to 2003, the average wildfire size was about 3 acres and nearly all wildfires were started by lighting.

Wildfires typically occur during May through September. Maximum temperatures for this FMU rarely exceed 100 °F during this period. Frequent lightning storms bring moderate amounts of precipitation during the summer.

Fire behavior differs in two main fuel types. Fires in the pinyon-juniper type are characterized by either single tree/small group fires or large stand replacing events. Fires in the sagebrush type are historically characterized by medium-sized fires of mixed severity. Lately, the trend has been medium- to large-sized fires of moderate to high severity. Living vegetation fuel moisture, pathogens, relative humidity, fine fuels, wind, and slope will greatly influence fire behavior in these fuel types. Fires in sagebrush are generally easier to suppress than fires in the pinyon-juniper type.

The pinyon-juniper type and sagebrush type are in Fire Regime II and FRCC II.

3.14.2.6.4 Reese River/Grass Valley (NV-060-18)

The Reese River/Grass Valley FMU lies in the northern portion of the District and is 843,149 acres; only a portion of the FMU is in the project area (40,501 acres). The portion of the FMU in the project area is bordered by U.S. Highway 50 on the south and the Dry Hills and the Cortez Mountains on the east. This FMU in the project area is administered by the BLM. Much of the unit contains cheatgrass. Fires are often quite large (greater than 1,000 acres) and are started by lighting and human causes.

Wildfires typically occur during May through October. Wind driven fires in the sagebrush can advance with high rates of spread and can cover vast distances quickly. Fires in the salt-desert shrub vary in intensity and are highly dependent on the presence of fine fuels. Fire is an uncommon component of salt-desert shrub ecosystems as are abundant fine fuel loadings. Areas where cheatgrass have invaded are at the highest risk for fire. The presence of cheatgrass can dramatically shorten fire return intervals in all vegetative communities and cause fires to spread very quickly. Living vegetation fuel moisture, pathogens, relative humidity, wind, and slope will greatly influence fire behavior in these fuel types.

The vast majority of the FMU occurs in valley locations. In these areas, diurnal winds and temperatures can vary greatly. These areas can experience 180-degree changes in slope and valley winds. Additionally, these locations are prone to intense heating (heat sinks) during the day and rapid cooling at night. Generally cool air flows to the lowest elevations at night, which are typically the valley locations. The mountains and valleys are aligned southwest to northeast, which is in concert with the typical prevailing wind direction. This FMU has a history of having large wildfires, most recently, the wildfires of 1999. The 1999 Antelope fire burned nearly 100,000 acres. Thunderstorms have been responsible for erratic and rapid fire spread during past fire events.

The sagebrush type is in Fire Regime II and FRCC III, and the salt-desert shrub communities are in Fire Regime IV and FRCC III.

3.14.2.6.5 Eureka/Diamond Valley (NV-060-21)

The Eureka-Diamond Valley FMU is 243,330 acres in Eureka County in the southern end of Diamond Valley; 30,573 acres are within the project area. The FMU is bound on the east by the Diamond Mountain Range, on the west by the Mountain Boy Range, on the north by Alkali Flat, and the south by the Fish Creek Range. U.S. Highway 50 and State Route 278 provide the primary access to this FMU. Seventy-nine percent of this FMU is administered by the BLM, while 20 percent is privately owned. The unit is rated as Wildland Urban Interface, with 74 percent of vegetation comprised of pinyon-juniper, mountain shrub, and sagebrush, and 20 percent not having significant vegetation. During 1980 to 2003, the average wildfire size was about 500 acres and most wildfires were started by lighting.

Wildfires typically occur May through September. Maximum temperatures for this FMU rarely exceed 90 °F during the same period. Frequent lightning storms bring moderate to heavy amounts of precipitation during the summer.

Fires in the pinyon-juniper type are characterized by either single tree/small group fires or large stand replacing events. Fires in the sagebrush type are historically characterized by medium-sized fires of mixed severity. Living vegetation fuel moisture, pathogens, relative humidity, fine fuels, wind, and slope will greatly influence fire behavior in both of these fuel types. Diamond Valley is a heat sink for this FMU and could significantly alter fire behavior.

The pinyon-juniper type and sagebrush types are in Fire Regime II and FRCC II.

3.14.3 Environmental Consequences

3.14.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

The following fire management issues were identified by the public during scoping:

- Concern that the BLM thinks it can impose fire and other treatments to restore the historical ranges of fire occurrence and achieve an artificially desired future condition.
- Fuels reduction should only occur in the wildland-urban interface or where there is a threat of significant wildfire.
- Assess whether seeding crested wheatgrass, grazing, and high stocking rates may result in more extensive and larger acreage fires.
- The BLM should develop a methodology to prioritize any treatments of hazardous fuels.
- The BLM needs to provide a full accounting of all fuels/fire/habitat projects conducted by the District in the past 10 years.

3.14.3.2 Significance Criteria

Impacts from the alternatives would be considered significant if they caused 1) a change from a lower FRCC to a higher FRCC (e.g., from FRCC I to FRCC II or FRCC II to FRCC III), 2) an increase in risk of loss of life or property from wildland fire, or 3) an increase in the risk of a catastrophic wildfire.

3.14.3.3 Direct and Indirect Effects

3.14.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

In general, proposed treatments would have few adverse impacts on wildfire risk. It is possible that the use of vehicles to transport workers to the treatment site, or use of chainsaws or other gas-powered equipment could cause a spark that results in a wildfire. Vehicles could also transport noxious weeds and other invasive non-native vegetation seeds and vegetative parts from a treatment site to other 3 Bars Project areas, resulting in noxious weeds and other invasive non-native vegetation spread and increased risk of wildfire. However, these risks would be minor as transport vehicles would contain fire extinguishers and other fire suppression equipment and would generally remain on roads. If slash or other woody material from woodland treatments were not disposed of properly, they could serve as an ignition source for a wildfire. To reduce this risk, felled trees would be disposed of by using trees for posts or as mulch, by selling trees for commercial use, by placing logs in streams to slow water flow, or by burning piles or slash.

Beneficial Effects

Treatments that remove hazardous fuels from public lands would be expected to benefit the health of plant communities in which natural fire cycles have been altered. Fire suppression leads to the buildup of unhealthy and dead plant materials (e.g., litter and dead woody materials), and often increases the density of flammable living fuels on a site (e.g., dead branches on living shrubs or live plants, especially during dry periods) that can lead to crown fires (Cochrane et al. 2012). The resultant fires burn hotter, spread more quickly, and consume more plant materials than historical wildfires that occurred under conditions of lower fuel loading. In addition, human-caused wildland fires occur with greater frequency than they historically did, resulting in altered plant community structure. Treatments that restore and maintain fire-adapted ecosystems, through the appropriate use of mechanical thinning, fire use, and other vegetation treatment methods, would decrease the effects from fire to communities and improve ecosystem resilience and sustainability (USDOI BLM 2007c:4-53).

Creating and maintaining fire and fuel breaks would be a common objective of many of the treatments proposed on the 3 Bars ecosystem. This includes creating green strips and shaded fuel breaks to compartmentalize wildland fire and reduce the risk of a catastrophic wildfire. The BLM would use existing barriers/breaks to halt fire spread to the extent practicable, and use thinnings and plantings adjacent to barriers/breaks to enhance their effectiveness. Fire and fuel breaks would be created or enhanced under all alternatives, and would primarily be created using manual and mechanical methods.

3.14.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Under Alternative A, the BLM would meet FMU objectives under the Fire Management Plan (USDOI BLM 2004a). The BLM would be able to reduce hazardous fuels, and create fire and fuel breaks to slow the spread of a wildfire. Because about 17 percent of the 3 Bars Project Area would be treated during the next 10 to 15 years, and nearly all proposed treatments would provide some benefit toward hazardous fuels reduction, the BLM estimates that the FRCC on about 95,000 acres would improve over the next 10 to 15 years under Alternative A.

Riparian Treatments

Adverse Effects

Prescribed fire treatments could jump fire boundaries and burn a larger area than planned. In addition, seeding may be needed, and livestock would need to be kept off of treated areas for at least 2 growing seasons after a prescribed fire, to promote the development of native forage and give forage ample time to recover (USDOI BLM 2007c:4-96).

Beneficial Effects

Riparian treatments would help to reduce the risk of wildfire by reducing hazardous fuels and restoring natural fire regimes in riparian zones. Manual and mechanical treatments would help restore and enhance riparian function, and improve the ability of streams and associated riparian, wetland, and floodplain habitat to serve as a fuel break. At Hash Spring and several other springs, and at project sites where Lahontan cutthroat trout habitat improvements would occur, the BLM would improve riparian habitat by removing pinyon-juniper using manual and mechanical methods or prescribed fire. Most pinyon-juniper removal would occur adjacent to roads or other fire breaks, or to create or enhance fuel breaks adjacent to riparian zones. Fuel and fire breaks would help to control the spread of wildfires.

Aspen Treatments

Some slash from pinyon-juniper treatments would be left in place to promote aspen suckering and seedling establishment, or to act as deadfall to limit livestock, wild horse, and other wild ungulate movement onto treatment areas. This woody material could provide fuel for a wildfire until it decomposes. However, this risk would be minimized by gathering up excess material and selling it to the public, or pile/slash burning the material.

Actions that stimulate or enhance aspen suckering and sucker survival should improve the health of aspen stands, and, long-term, reduce the amount of dead and decaying vegetation in these stands that could provide fuel for a wildfire.

Pinyon-juniper Treatments

Adverse Effects

On the Lone Mountain area of Kobeh Valley, trees would be thinned primarily by using chainsaws. Downed trees and other woody material could serve as fuel for a wildfire. Slash from chainsaw treatments in late Phase II and Phase III woodlands can create a fire hazard for at least 2 years, and may open sites for introduction of invasive plant species (Tausch et al. 2009). Woody material from shredding treatments can also contribute to available fuels and often creates favorable conditions for noxious weeds and other invasive non-native species (Gottfried and Overby 2011).

On the Atlas, Frazier, and several other units, pinyon-juniper would be removed using manual and mechanical treatments. If not disposed of properly, uprooted and downed trees and slash could provide fuels for a wildfire and serve as a conduit for carrying a wildfire between valley and mountain areas. To reduce this risk, felled trees would be used for posts or mulch, sold for forest products use, placed in streams to slow water flow, or burned in piles or as slash.

Fire treatments could expose bare soil and allow noxious weeds and other invasive non-native vegetation, such as cheatgrass, to establish and spread. The BLM has conducted monitoring at prescribed fire treatment areas, and has found that noxious weeds and other invasive non-native vegetation may be found at treatment sites post-burn. At the Red Hills site, for example, very low to low densities of cheatgrass were seen at about half of the monitoring stations 1 year after the burn, especially in areas of high-severity burning (USDOI BLM 2008i). As of 2013, cheatgrass is still present in the Red Hills project, but its coverage is very spotty across the landscape both in where it occurs and how much occurs. No monitoring of the site was done in 2013, but monitoring is scheduled for 2014 (Lewis 2014).

Beneficial Effects

Manual, mechanical, and fire treatments in pinyon-juniper management areas would provide several benefits. Creating and enhancing fuel breaks in pinyon-juniper stands would break up the continuity of fuel, moderate fire behavior, and reduce the risk of loss of habitat and other resources from a catastrophic wildfire.

The BLM would place downed logs into streams to slow water flow. Logs should help to expand the size of streams where gradients are more gradual, and these stream features could also serve as fuel breaks to slow the spread of wildfire.

On the Cottonwood/Meadow Canyon, Dry Canyon, Three Bars Ranch, Tonkin North, and Whistler units, the focus of treatments would be on hazardous fuels reduction using manual and mechanical methods and prescribed fire. Much of the west slope of Roberts Mountains has not experienced a large-scale wildfire in over 100 years. These units have been identified as having high to very high risk of catastrophic wildfire, or in the case of the Tonkin North and Whistler units, very high to extreme wildfire risk (**Figure 3-36**). These units have moderate amounts of standing dead and dead down wood, excessive surface litter, and a closed canopy that is conducive for a crown fire (USDOI BLM 2009a). By increasing canopy spacing among pinyon-juniper, the potential for a crown fire would be less, while residual trees would provide surface shading that lowers fuel temperatures (Tausch et al. 2009).

Monitoring at the Red Hills hazardous fuels reduction project, which included prescribed fire and mechanical treatments, showed that treatments helped to reduce hazardous fuels and wildfire risk. The risk of wildfire was reduced from a "very high to extreme" risk to "low" risk at 35 monitoring sites, and "low to moderate" risk at 5 sites. The FRCC Rating was II before the burn, and was "low II" after the burn. A variety of desirable forbs, grasses, and shrubs were observed re-colonizing treatment areas, and fuel breaks were still viable (USDOI BLM 2008i).

Pathogens and pests, including mistletoe, have led to unhealthy pinyon-juniper stands in the Tonkin North and South units and a build-up of hazardous fuels. The BLM proposes to remove up to half of the trees using manual and mechanical means and prescribed fire. These projects would enhance the health and resilience of pinyon-juniper woodlands and reduce the amount of hazardous fuels and wildfire risk. In recent years, the BLM has conducted hazardous fuels reduction treatments in the Tonkin Springs area using chainsaws, bull-hogs, and feller-bunchers, and created fuel breaks using a rotary mower (USDOI BLM 2005b).

The BLM would restore fire as an integral part of the ecosystem and reduce hazardous fuels on the Sulphur Spring Wildfire Management Unit by using wildland fire for resource benefit. Several wildfires have occurred in this area in recent years due to dense fuel accumulations and pinyon-juniper cover. In recent years, the BLM has used chainsaws, mowers/shredders, and prescribed fire to create fuel breaks and remove diseased pinyon-juniper (USDOI BLM 2009a). By reducing fuel accumulations and opening up the canopy cover, sagebrush and other shrub cover should increase, a more natural fire regime would be restored in the area, and the risk of future wildfires would be diminished.

Regardless of the cause of the fires in pinyon-juniper habitat, some post-burn restoration and management may be needed. After broadcast burns, the BLM may need to reseed burned areas with forbs, grasses, and shrubs. Based on past reseeding treatments conducted for several wildfire burns in the District, seeding and planting of native and non-native vegetation may have limited success, especially during drought years, and native release of seeds may be the primary mechanism for site revegetation. However, in areas with sufficient moisture, seedings have been successful and have resulted in an abundance and diversity of forbs, grasses, and shrubs (USDOI BLM 2011e). To ensure vegetation restoration success, the BLM may exclude livestock access to the area through grazing closure decisions, competed through a separate process. The BLM may also use small, temporary exclusion fencing, including electric fencing, which has been used effectively at wildfire restoration sites to improve revegetation success by excluding livestock, wild horses, and other wild ungulates (USDOI BLM 2009a, d, 2010e, f, g, h, i, j, 2011e, f).

The BLM would carefully monitor prescribed fire treatment sites to ensure that cheatgrass and other invasive non-native vegetation does not become established on these areas. In general, burns at lower elevations are more likely to have noxious weeds and other invasive non-native vegetation issues than treatments at higher elevations. Monitoring for the Red Hills hazardous fuels reduction project 1 year after prescribed fire and mechanical treatments showed evidence of cheatgrass in areas where severe burning occurred, but no cheatgrass or other noxious weeds and other invasive non-native vegetation in areas where burning was less severe (USDOI BLM 2008i). As of 2013, cheatgrass is still present in the Red Hills project, but its coverage is very spotty across the landscape both in where it occurs and how much occurs 5 years after treatment. No monitoring of the site was done in 2013, but monitoring is scheduled for

2014 (Lewis 2014). Cheatgrass and other noxious weeds and other invasive non-native vegetation can be controlled on wildland fire sites using herbicides, but it may take several years before this vegetation is brought under control (USDOI BLM 2011e, f).

Sagebrush Treatments

Adverse Effects

Where trees or sagebrush are left on the ground as slash, or piled, the potential for this material to serve as fuel for a wildfire exists. Pinyon-juniper trees would be disposed of by using trees for posts or mulch, selling trees, or placing them in streams. Treatments of noxious weeds and other invasive non-native vegetation would result in dead vegetation that could provide fuel for a hazardous wildfire until the site was restored using native vegetation or crested wheatgrass or forage kochia.

Beneficial Effects

At sites dominated by herbaceous or invasive species, such as the Rocky Hills and West Simpson Park units, the units could be treated using mechanical methods. The West Simpson Unit was burned during the 1999 Trail Canyon Fire, and has substantial cheatgrass cover and is in an area rated as high to very high for risk of a catastrophic wildfire. Cheatgrass is quite flammable during the summer, and efforts to eliminate it or slow its spread would help to reduce the risk of wildfire. Crested wheatgrass, forage kochia, and cheatgrass dominate the Rocky Hills Unit, and the unit has little sagebrush habitat. The BLM would use mechanical methods (discing and broadcast/drill seeding) to reduce herbaceous vegetation and promote the establishment of a native sagebrush community. The BLM may also use prescribed fire and biological control (livestock grazing) to also remove cheatgrass prior to seeding at the West Simpson Park Unit.

3.14.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The risk of treatments causing a wildfire that spreads beyond treatment boundaries would be less under this alternative than Alternative A. Miles traveled by vehicles, the number of acres treated using manual and mechanical equipment, the amount of downed trees and slash material created, and the miles of fire and fuel breaks created would be similar between this alternative and Alternative A. Because the BLM would not use prescribed fire to treat vegetation under this alternative, there would be no risk of a prescribed fire spreading beyond treatment boundaries.

Without the use of prescribed fire and wildland fire for resource benefit, the BLM would be less likely to restore fire as an integral part of the ecosystem, reduce the risk of a large-scale wildfire, or reduce extreme, very high, and high wildfire risks to moderate risk or less than under Alternative A. About 8 percent of the 3 Bars Project area would be treated under this alternative. About 1,000 to 2,000 acres would be treated annually to reduce hazardous fuels, and the FRCC would be reduced on about 7,500 to 15,000 acres over the next 10 to 15 years. It is unlikely the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse in the long-term, however, and the BLM would still need an aggressive wildland fire prevention and control program for the long-term.

Treatments would help to meet some of the FMU objectives under the Fire Management Plan (USDOI BLM 2004a), but not to the same extent as they would under Alternative A. Manual and mechanical treatments would help to reduce hazardous fuels, protect and improve fish and wildlife habitat, and create fire and fuel breaks to slow the spread of a wildfire. Prescribed fire and fire for resource benefit are identified as important treatment options under the Fire Management Plan for all FMUs, except the Big Smoky FMU, but would be unavailable to the BLM as a management tool under this alternative.

3.14.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

This alternative focuses on the use of treatments that would have minimal ground disturbance. Recovery of vegetation through this more passive management approach is expected to take longer than under active management, where treatments such as seeding with native species, establishing intermediate vegetation to control erosion, and use of fire to reduce hazardous fuels, would be expected to promote faster recovery.

Under this alternative, there would be no wildland fire risks associated with the use of prescribed fire. The BLM would not use mechanical equipment (other than vehicles to transport work crews to treatment sites), so there would be no risk of a wildland fire being started by tractors, mowers, and other mechanical treatment equipment. However, workers would still use chainsaws and other hand-held power equipment that could cause a spark and start a wildland fire. Large numbers of workers and their vehicles would be needed to accomplish proposed treatments under this alternative. Vehicle miles traveled would likely be greatest under this alternative. Downed trees and slash material from treatments would be difficult to remove without mechanical equipment or pile/slash burning.

The number of miles of fire and fuel breaks created under this alternative would be less than under Alternatives A and B, as the BLM would not be able to use mechanical equipment, such as bulldozers, mowers, and mulchers, and prescribed fire to create fire and fuel breaks. Fire and fuel break treatments would primarily be limited to stream and aspen habitats, or near roads, where pinyon-juniper would be removed to enhance or create new breaks.

Alternative C would not restore fire as an integral part of the ecosystem, reduce the risk of a large-scale wildfire, or reduce extreme, very high, and high wildfire risks to moderate risk or less. Only about 500 to 1,000 acres would be treated annually to reduce hazardous fuels, and the BLM estimates that the FRCC would be reduced on only about 3,750 to 7,500 acres over the next 10 to 15 years, fewer acres than under Alternatives A and B.

The BLM would not meet FMU objectives under the Fire Management Plan (USDOI BLM 2004a). Manual treatments could be used to create a few miles of fuel breaks to slow the spread of a wildfire. Although the BLM could treat acreage using manual methods as proposed for each FMU, the BLM would not be able to conduct fire treatments as recommended in the Fire Management Plan to reduce hazardous fuels and the risk of a catastrophic wildfire in FMUs.

3.14.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to wildland fire from 3 Bars Project treatments as no treatments would be authorized under this alternative. Under this alternative, the BLM would not meet the fire use purposes to 1) restore fire as an integral part of the ecosystem, 2) reduce the risk of a large-scale wildfire, 3) reduce extreme, very high, and high wildfire risks to moderate risk or less, and 4) develop fuel breaks within treatment and adjacent areas. Threats to ecosystem health that could lead to catastrophic wildfire under this alternative would be associated with the ongoing expansion of noxious weeds and other invasive non-native vegetation; continued decline of ecosystem health due to further decline in native understory species in the upland plant communities; further expansion of pinyon-juniper woodland into other communities, including sagebrush, riparian, and aspen habitats; and an increase of fuel loads. There would be no improvement in the FRCC on the 3 Bars Project area and the BLM would not meet FMU objectives.

3.14.3.4 Cumulative Effects

The CESA for wildland fire is approximately 1.84 million acres and includes those watersheds at the Hydrologic Unit Code 10 level that are all or partially within the 3 Bars Project area (**Figure 3-1**). Approximately 92 percent of the area is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service. Past and present actions that have influenced wildland fire activity in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.14.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Historic overgrazing, introduction of cheatgrass, large wildfires, and other natural and human-caused factors have contributed to the departure of the plant communities from the Potential Natural Community across the 3-Bars ecosystem. This has led to a decrease in the functionality of ecological processes, thus reducing the resilience and resistance of these ecosystems to disturbance. The treatments proposed in the 3-Bars ecosystem are designed to provide the means needed for these ecosystems to recover.

In the short-term, small, temporary fences may change the distribution of grazing by livestock, wild horses, and wildlife. As distribution patterns change, utilization would also change. Utilization would decrease in treatment areas while temporary exclusion fences are in place, but would increase in other areas. Once the temporary exclusion fences are removed, animals may be attracted to the treatment areas resulting in potentially higher use of the area than before. Temporary exclusion fences would exclude livestock, although AUMs may be temporarily suspended to prevent overuse in other areas.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. These treatments could have a short-term adverse effect on non-target vegetation. These treatments would have long-term beneficial effects by helping to reduce hazardous fuels, improving native vegetation, slowing the spread of noxious weeds and other invasive non-native vegetation, and reducing surface runoff and erosion associated with burn sites on about 1,000 acres annually.

As discussed earlier, the BLM conducts fuel treatment projects under the direction of the Fire Management Plan. In addition to those areas identified under the proposed action, the BLM also proposes to treat hazardous fuels on an additional 8,300 acres in high to very high fire risk areas on and near the 3 Bars Project area. These include treatments in pinyon-juniper and sagebrush habitat using prescribed fire and manual and mechanical methods to remove pinyon-juniper, enhance wildlife habitat, and create fuel breaks.

Recreational use of the 3 Bars Project area increases the risk of a wildland fire due to accidental or intentional ignition of vegetation from a campfire, cigarette, hot vehicle muffler, or other human-caused ignition source. In addition, recreational users can spread noxious weeds and other invasive non-native vegetation that attaches to vehicles or to clothing or shoes, and can later cause new noxious weeds and other invasive non-native vegetation infestations and provide fuels for a wildland fire.

Land, mineral, oil, gas, geothermal, and other development would cause land disturbance and the spread of noxious weeds and other invasive non-native vegetation within the 3 Bars Project and nearby areas. Development would lead to additional human activity in the area, and increase the potential for a human-caused wildland fire. The BLM and other fire-fighting agencies would have to contribute labor and equipment to protect developments from loss of human life and property from wildfire, instead of allowing these areas to burn naturally.

Hazardous fuels treatments would occur on about 142,000 acres (9 percent) of lands within the CESA. Although this would still be a small portion of lands within the CESA, treatments would be targeted toward public lands with high to very high wildfire risk. Given that over 90 percent of acres impacted by future actions are focused on hazardous fuels reduction and resource management, treatments would reduce wildfire risk long-term. At fire management treatment levels projected to occur in the CESA during the next 25 years under Alternative A, the BLM should meet the FMU objectives for most FMUs (USDOI BLM 2004a). The FRCC on about 142,000 acres would improve over the next 25 years.

3.14.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on wildfire would be similar to those described under Alternative A. The BLM anticipates treating about half as many acres under Alternative B as under Alternative A. Because the BLM would not use fire to treat vegetation on the 3 Bars Project area, the risk of a prescribed fire spreading beyond treatment boundaries would be less under this alternative than under Alternative A. However, the BLM would less able to restore fire as an integral part of the ecosystem; reduce the risk of a large-scale wildland fire; slow the spread of noxious weeds and other invasive and non-native vegetation; or reduce extreme, very high, and high wildfire risks to moderate risk or less under this alternative than under Alternative A on the 3 Bars Project area.

About 78,000 acres of vegetation would be treated to reduce hazardous fuels and improve rangeland health within the CESA, or about 4 percent of the CESA. This would include about 63,000 acres treated annually by the BLM on the 3 Bars Project area, and about 15,000 acres treated by the BLM on other areas within the CESA. Acres treated to reduce the FRCC under this alternative would be half that of Alternative A, and it is also less likely that the BLM would meet FMU objectives under the Fire Management Plan under this alternative than under Alternative A on the 3 Bars Project area.

3.14.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on wildland fire would be similar to those described under Alternative A. The BLM anticipates treating about one-fourth as many acres under Alternative C as under Alternative A, mostly due to the higher costs associated with manual and classical biological control methods. The risk of treatments causing a wildland fire would be slightly less under this alternative than Alternative A. Because the BLM would not use fire to treat vegetation on the 3 Bars Project area, the risk of a prescribed fire spreading beyond treatment boundaries would also be less under this alternative than Alternatives A and B.

By not being able to use mechanical methods, such as mowing, chopping, tilling, discing, harrowing, and drill seeding, however, the BLM would do little to reduce hazardous fuels, create fire and fuel breaks, treat areas with noxious weeds and other invasive non-native vegetation, or remove downed wood and slash. Under Alternative C, the BLM would conduct fire management treatments on only about 2 percent of the CESA. This would include about 32,000 acres treated by the BLM to reduce hazardous fuels and wildfire risk on the 3 Bars Project area, and about 15,000 acres treated by the BLM elsewhere within the CESA. Only one-fourth as many acres would be treated to reduce the FRCC under this alternative as under Alternative A. It is also less likely that the BLM would meet FMU objectives under the Fire Management Plan under this alternative than under Alternatives A and B on the 3 Bars Project area.

3.14.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on wildland fire would be similar to those described under Alternative A. There would be no cumulative effects on wildfire from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire, but on only about 1,500 acres annually under existing and reasonably foreseeable future authorizations.

Hazardous fuel levels would likely increase, and only a limited number of miles of fuel and fire breaks would be constructed under this alternative compared to the action alternatives. The trend toward large-sized fires of moderate to high severity in sagebrush, and large stand-replacing fires in pinyon-juniper, would likely increase. The BLM would do little to reduce the FRCC, and it is also less likely that the BLM would meet FMU objectives under the Fire Management Plan under this alternative than under the action alternatives on the 3 Bars Project area. Given the large number of utilities and infrastructure, mineral, oil, gas, geothermal, and other land developments that are reasonably foreseeable in the CESA, the need for an aggressive wildland fire prevention and control program to protect natural resources and public health and infrastructure could increase from current levels.

3.14.3.5 Unavoidable Adverse Effects

There is a risk, albeit small, of treatments causing a wildland fire. Although the BLM would implement SOPs to reduce this risk to near nil, it cannot be totally ignored. These risks include the potential for vehicles and manual and mechanical equipment to accidentally ignite a wildland fire. A prescribed fire or wildland fire for resource benefit could expand beyond treatment boundaries and become a wildland fire that could adversely impact natural and social resources. Treatments would result in the production of downed trees and other woody material that could become hazardous fuels. Workers and their vehicles could transport noxious weeds and other invasive non-native vegetation outside the treatment area, and this vegetation could become a hazardous fuel. Noxious weeds and other invasive non-native vegetation could also establish and spread in areas treated using prescribed fire and wildland fire for resource benefit.

3.14.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

As discussed throughout this EIS, all restoration treatments would likely result in short-term uses and adverse effects, but if treatments are even modestly successful they would benefit land productivity long-term; wildland fire management treatments are no exception. Short-term uses have been discussed in other sections of this EIS, including the potential loss of vegetation, loss of use of woodland products, loss of fish and wildlife habitat, increase in noxious weeds and other invasive non-native vegetation, loss of rangeland for livestock and wild horse use, and loss of public use of lands for recreation, as a result of treatments to restore vegetation and other resources, reduce hazardous fuels, and reduce the risk of wildfire. Long-term, treatments to reduce the risk of wildfire should enhance the resilience and health of the landscape and land productivity, and reduce the risk of future wildfire and resultant loss of natural and social resources. As discussed above, short-term uses and enhancement of long-term productivity would generally be in proportion to acres treated and methods used by the BLM.

3.14.3.7 Irreversible and Irretrievable Commitment of Resources

Fire management actions could result in an irretrievable loss of resources if they are lost for a period of time and cannot be replaced without reclamation. For example, prescribed fire could be used to treat unhealthy pinyon-juniper. If the burn is severe enough, native vegetation could be lost and replaced by cheatgrass. However, the site could be reclaimed with seedings and plantings of native vegetation. The fact that the BLM is proposing to restore a degraded landscape in the 3 Bars Project area suggests that the landscape is resilient, and that natural and man-made causes that have led to resource losses that can be corrected and retrieved over time.

Prescribed fire and wildland fire for resource benefit, and possibly manual and mechanical methods, used for hazardous fuels reduction and to reduce wildland fire risk could result in the loss of old-growth pinyon-juniper stands that could be considered by some to be irreversible, because it would take several hundred years before old growth stands would again occur on the site.

3.14.3.8 Significance of the Effects under the Alternatives

Treatment actions under all of the alternatives would not lead to a significant increase in wildland fire risk on the 3 Bars Project area and CESA. Treatments would help maintain or reduce the FRCC in treatment areas, reduce the risk of loss of life or property from wildland fire, and reduce the risk of a catastrophic fire. However, the alternatives would differ substantially in the magnitude of improvements, and whether restoration actions taken under an alternative would be effective in lowering overall wildland fire risks within the 3 Bars ecosystem.

Substantially more acres within the CESA would be treated under Alternative A than the other alternatives, and over the next 10 to 15 years about 17 percent of the acreage on the 3 Bars Project area would be treated under this alternative. Thus, the potential for meaningful improvement in the landscape is greatest under this alternative. Under Alternative A, the potential for loss of life or property from wildland fire on the 3 Bars Project area would probably remain little changed from current conditions over the short-term, but should decrease long-term as fire return intervals in pinyon-juniper stands return to more natural cycles, hazardous fuels levels decrease, fire and fuel breaks are installed, and the landscape becomes more fire resilient. Although the change in overall FRCC would be slow, long-term it is likely that there would be a general shift in acreage from a higher FRCC to a lower one. It is also assumed that the risks of a catastrophic wildfire would decrease as resource conditions improve within the CESA due to fire management and other treatments under Alternative A.

Under Alternative B, the BLM would be limited to the use of manual, mechanical, and biological control methods and would treat about half as many acres (about 7,800 acres annually) within the CESA compared to Alternative A. Under this alternative, the potential for loss of life or property from wildland fire on the 3 Bars Project area would probably remain little changed from current conditions. The BLM would not be able to use prescribed fire and fire for resource benefit or herbicides to reduce hazardous fuels, but would be able to compartmentalize and slow the spread of wildland fire using manual and mechanical treatments to create fire and fuel breaks. Because fire would not be available to the BLM to help to restore nature fire cycles on the 3 Bars ecosystem, the ability of the BLM to improve ecosystem health and resiliency and reduce hazardous fuels would be limited.

Under Alternative C, the BLM would be limited to use of manual and classical biological control methods and would treat only about one-fourth the acreage treated under Alternative A. Treatments would primarily focus on riparian and aspen restoration and removal of pinyon-juniper in Phase I and II woodlands, and creation of fire and fuel breaks. Little hazardous fuels reduction or noxious weed and other invasive non-native vegetation control would occur, and fire and fuel break treatments would be limited to areas adjacent to roads and streams. The BLM would have limited ability to reduce the risk of a catastrophic fire and to control its spread, and risks of loss of life or property from wildfire within the CESA would likely increase long-term. Prescribed fire and fire for resource benefit would not be available to the BLM to help to restore nature fire cycles over portions of the 3 Bars ecosystem, and mechanical treatments would not be available for use to control or eliminate noxious weeds and other invasive non-native vegetation, create fire and fuel breaks, thin and remove pinyon-juniper that is encroaching into sagebrush habitat or is unhealthy, and to reseed disturbed areas. Thus, the ability of the BLM to improve ecosystem health and resiliency and reduce hazardous fuels would be more limited under Alternative C than under the other action alternatives.

3.14.4 Mitigation

No mitigation measures are proposed for wildland fire risk.

3.15 Fish and Other Aquatic Resources

3.15.1 Regulatory Framework

Several laws protect fish and other aquatic resources and their habitats. The Sikes Act of 1974 authorizes the USDOI to plan, develop, maintain, and coordinate programs with state agencies for the conservation and rehabilitation of wildlife, fish, and game on public lands. The Fish and Wildlife Conservation Act of 1980 encourages federal agencies to conserve and promote the conservation of non-game fish and wildlife species and their habitats.

3.15.1.1 Endangered Species Act

In accordance with Section 7 of the Endangered Species Act, federal agencies must "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species." The purpose of the Act is to provide a means for conserving the ecosystems upon which threatened and endangered species depend, and to provide a program for protecting these species. The Act defines an endangered species as a species that is in danger of extinction throughout all or a major portion of its range. A threatened species is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a major portion of its range. This Act also addresses species that have been proposed for listing as either threatened or endangered, but for which a final determination has not been made. Critical habitat is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the USFWS under the Endangered Species Act. The Lahontan cutthroat trout is the only federally listed (threatened) species that occurs on the 3 Bars Project area.

3.15.1.2 Special Status Species

BLM Sensitive Species are defined as those plant and animal species for which population viability is a concern, as evidenced by: 1) significant current or predicted downward trend in population numbers or density, or 2) a significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution. These species are protected under provisions of the Endangered Species Act or under the Nevada BLM sensitive status

(BLM Manual 6840, *Special Status Species Management*; USDOI BLM 2008h). In addition, there is a Nevada State Protected Animal List (Nevada Administrative Code 501.100 - 503.104) that the BLM has incorporated, in part, into the sensitive species list. No BLM sensitive aquatic species are known to occur within the project area.

3.15.1.3 BLM and Nevada Department of Wildlife Memorandum of Understanding

Wildlife and fish resources and their habitat on public lands are managed cooperatively by the BLM and NDOW under a Memorandum of Understanding as established in 1971. The Memorandum of Understanding describes the BLM's commitment to manage wildlife and fisheries resource habitat, and the NDOW's role in managing populations. The ecological definition of a population is a group of organisms of one species that interbreed and live in the same place at the same time. The BLM meets its obligations by managing public lands to protect and enhance food, shelter, and breeding areas for wild animals. The NDOW assures healthy wildlife numbers through a variety of management tools including wildlife and fisheries stocking programs, hunting and fishing regulations, land purchases for fish and wildlife management, cooperative enhancement projects, and other activities.

3.15.1.4 Nevada Department of Wildlife Programs

The NDOW is the state agency responsible for the restoration and management of fish and wildlife resources within the state. The NDOW administers state fish and wildlife management and protection programs as set forth in Nevada Revised Statute Chapter 501, Wildlife Administration and Enforcement, and Nevada Administrative Code § 503, Hunting, Fishing and Trapping; Miscellaneous Protective Measures. Nevada Revised Statute § 501.110 defines the various categories of fish and wildlife in Nevada, including protected categories. Nevada Administrative Code §§ 503.010-503.080, 503.110, and 503.140 list the fish and wildlife species currently placed in the state's various legal categories, including protected species, game species, and pest species.

3.15.2 Affected Environment

3.15.2.1 Study Methods and Study Area

Aquatic biological resources within the project area include fish and aquatic invertebrates and their habitat. Descriptions of fish and other aquatic resources were based on published and unpublished information regarding the types of aquatic habitat and their associated species or groups found in the 3 Bars Project area. Data sources used to identify habitat and aquatic species occurrences include the Mount Hope Project EIS and references cited therein (USDOI BLM 2012b), NDOW reports on fish populations and Lahontan cutthroat trout, the species management plan for the Lahontan cutthroat trout (Elliot 2004), and published reports of snails (SRK 2010). In addition, BLM and NDOW staff were contacted for information on fish and other aquatic resources on the 3 Bars Project area.

The study area for direct and indirect effects to aquatic biological resources includes streams, springs, and wetlands within the project area. The CESA for cumulative impacts to aquatic biological resources includes the Hydrologic Unit Code 10 watersheds wholly, or partially within, the project area, as shown in **Figure 3-1**.

3.15.2.2 Aquatic Habitat

The types of aquatic habitat that occur with the analysis area include perennial, intermittent, and ephemeral streams, springs, and wetlands. Perennial waterbodies contain water continuously during an average water year. Intermittent waterbodies contain water or flow on a sporadic or periodic basis, while ephemeral waterbodies contain water on a short-term basis after precipitation events. The majority of the streams within the project area are intermittent/ephemeral.[2] In terms of stream lengths, the Pine Valley Basin contains the greatest number of miles of streams with perennial reaches. These streams include Birch, Denay, Henderson, Kelley, North Fork Pete Hansen, Pete Hansen, Vinini, and Willow Creeks (**Figure 3-22**). Of these streams, Henderson and Vinini Creeks contain the most perennial lengths, with 18.3 and 9.5 miles, respectively. Roberts Creek, with 8.4 miles, is the only stream in the Kobeh Valley Basin that contains perennial reaches. McClusky Creek (7.1 miles of perennial stream length) is the only perennial stream in the Grass Valley Basin that is within the 3 Bars Project area. Springs and wet areas are scattered throughout the project area. The majority of springs are found at higher elevations in the Simpson Park Range, on Roberts Mountains, and in the Sulphur Spring Range.

Aquatic habitat surveys were conducted in Birch and Pete Hanson Creeks as part of fish surveys in July 2009, and in 2011 in Willow Creek. These streams were selected for study due to the presence of Lahontan cutthroat trout, a federally listed threatened species under the Endangered Species Act. Based on the Habitat Condition Index, NDOW rated the stream reaches from poor to good in Birch and Pete Hanson Creeks, and fair to excellent in Willow Creek (NDOW 2009a, Starr 2011). The overall Habitat Condition Index rating was good in Birch and Willow Creeks and fair in Pete Hansen Creek. The Habitat Condition Index rating involved evaluating six parameters in the field, including pool abundance, pool structure, substrate stability, bank cover, soil stability, and bank vegetation stability. Downcutting of the stream channel exists in portions of Willow Creek (Starr 2011), but the downcut sections were not part of the Willow Creek habitat survey sites. Habitat information for these streams is provided in **Table 3-43.**

TABLE 3-43

Habitat Characteristics of Birch, Pete Hanson, and Willow Creeks

Stream	Discharge (cfs)[2]	Average Depth (feet)	Average Width (feet)	Substrate (%)		Bank Vegetative Cover (%)		
				Gravel	Rubble	Trees	Shrubs	Grasses/Forbs
Birch Creek	1.0-4.3	0.4	4.4	18	38	47	31	22
Pete Hanson Creek	1.0-4.3	0.4	4.4	44	28	19	36	45
Willow Creek	0.1-1.3	0.2	2.5	53	28	6	31	61

Cfs = cubic feet per second.
Source: NDOW (2009a), Starr (2011).

Stream assessments were conducted in Birch and Pete Hanson Creeks in 2001 for the purpose of evaluating the stream's ability to dissipate energy, protect banks, and minimize erosion (USDOI BLM 2012b, 2014). The streams' functioning condition was rated in qualitative terms using information about channel morphology, hydrology, soil, and vegetative parameters. Of the 5.4 miles of Birch Creek that were surveyed, conditions were rated as Proper Functioning Condition for 0.7 mile and Functional-at-risk Downward Trend for 0.4 mile. The remaining 4.3 miles

[2] The USGS does not distinguish between intermittent and ephemeral streams. The majority of streams classified as intermittent on the 3 Bars Project area do not have seasonal water, but only have water occasionally and would be classified as ephemeral.

were classified as an intermittent stream. Assessment results for 9.5 miles of Pete Hanson Creek were Proper Functioning Condition (5.3 miles), Functional-at-risk Upward (1.6 miles) Functional-at-risk Trend Not Apparent (1.3 miles) and Intermittent (1.3 miles). Assessment results for 5.8 miles of Willow Creek were Proper Functioning Condition (1.4 miles), Functional-at-risk Upward (1.6 miles), Functional-at-risk Trend Not Apparent (0.8 mile), and Non-functional (2.0 miles). Stream evaluations also were completed for other streams within the 3 Bars Project area. Several stream reaches did not meet the Proper Functioning Condition or Functional-at-risk Upward Trend including perennial streams such as Henderson, Vinini, Roberts, and McClusky Creeks. The NDOW conducted aquatic habitat surveys of Birch Creek and Pete Hanson Creek in 2009, and Willow Creek in 2011. Streambank stability, bank alteration, and erosion evaluations were completed for these streams in July 2010. The survey indicated that 73 percent of surveyed reaches had stable streambanks while 16 percent had active bank erosion, in Birch Creek. Similar results were observed in Pete Hanson Creek, where 74 percent of reaches surveyed had stable banks, while active bank erosion was observed on 15 percent of reaches. Bank alteration from livestock was estimated at 3 percent of the surveyed reach in Birch Creek and 4 percent of the surveyed reach in Pete Hanson Creek. Stable streambanks were found along 78 percent of surveyed reaches for Willow Creek (USDOI BLM 2014).

Based on public scoping comments, habitat conditions could be improved in project study area perennial streams that contain fish. The public recommended removal of fish barriers consisting of culvert and a large headcut on lower Roberts Creek, and habitat improvements on Birch, Pete Hanson, Vinini, Henderson, Roberts, and McClusky Creeks.

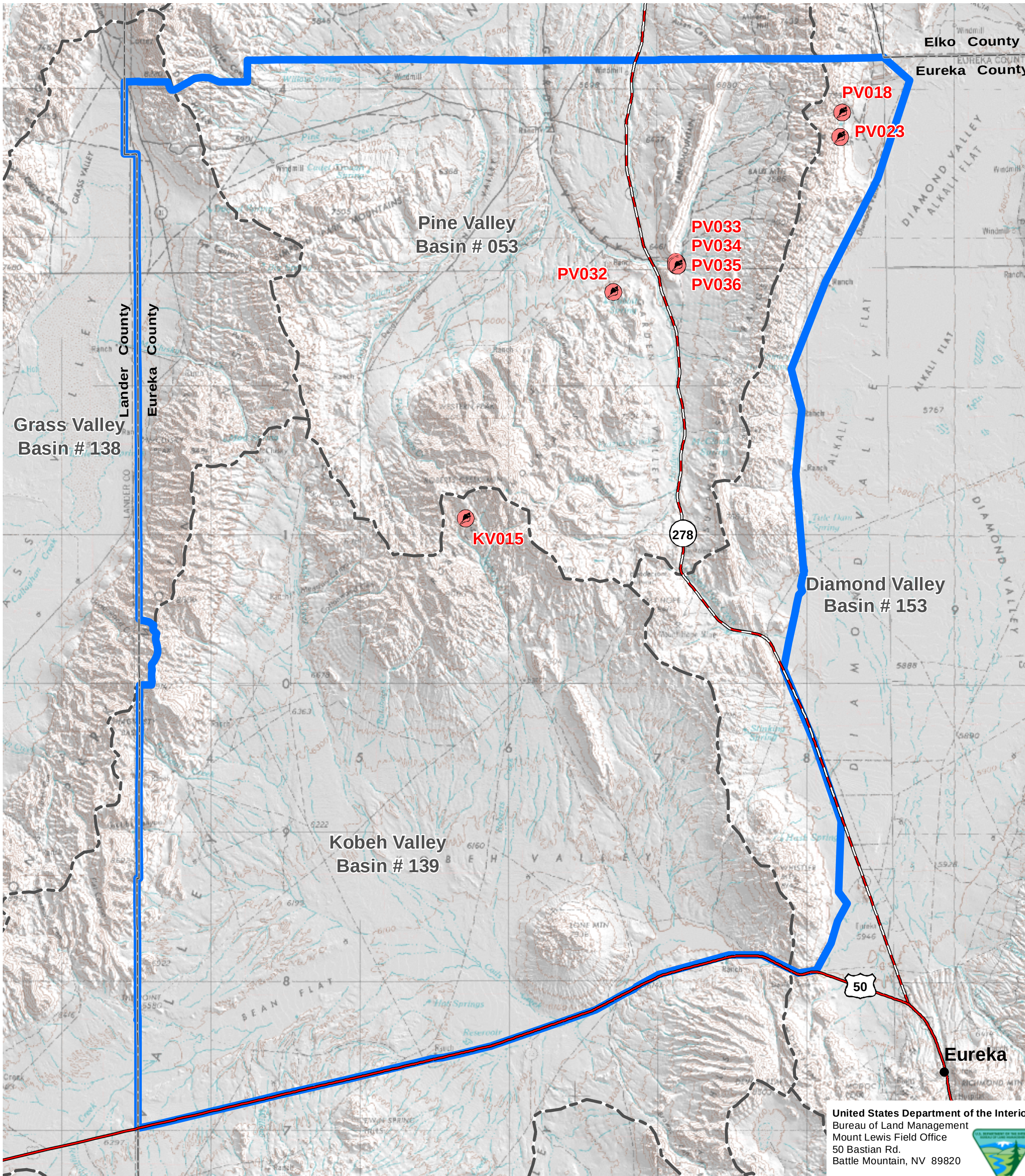
3.15.2.3 Aquatic Species

3.15.2.3.1 Invertebrates

Permanent and temporary waterbodies provide habitat for aquatic invertebrates. These aquatic organisms are indicators of water quality conditions and they serve important roles in the dynamics of the aquatic food web. Based on surveys in Birch Creek, the most abundant invertebrate groups included mayflies (Ephemeroptera), caddiflies (Trichoptera), stoneflies (Plecoptera), flies (Diptera), beetles (Coleoptera), and leeches (Hirudinea; USDOI BLM 2012b). These same groups, as well as snails (Gastropoda) and true bugs (Hemiptera), were common in Pete Hanson Creek. Invertebrate groups collected in Willow Creek included mayflies, stoneflies, and beetles (Starr 2011). Invertebrates were considered to be abundant at all sites sampled in Willow Creek.

Five major invertebrate groups typically are present in all types of springs including nematodes, aquatic worms (Oligochaeta), water mites (Acari), caddisflies, and chironomid midges. Several groups such as flatworms and stoneflies are present only in springs with permanent water sources.

A regional springsnail survey was conducted in selected springs within Antelope, Diamond, Huntington, Kobeh, Little Smokey, and Pine Valleys in 2007 by SRK (2010). Approximately 40 of the surveyed springs are within the 3 Bars Project area. Six of these springs contained snails, although species were not identified (**Figure 3-37**). Snails also were observed at two sites within unnamed streams in Pine Valley. Some of these snails could be springsnails. This group of mollusks is considered important because of their restricted distribution and native origin. The BLM considers springsnails to be a sensitive group and manages public lands to protect these species and their habitats.



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Mount Lewis Field Office
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Battle Mountain, NV 89820

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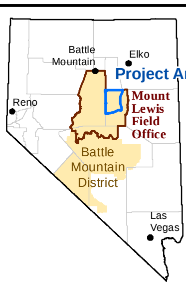


Legend

Snail Observation
Hydrographic Basin
3 Bars Project Area

Source: SRK 2010.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-37

Snail Observations

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

3.15.2.3.2 Lahontan Cutthroat Trout

Fish surveys in the project study area have focused on the occurrence of Lahontan cutthroat trout. The Lahontan cutthroat trout is an inland subspecies of cutthroat trout (family Salmonidae). The species may be either riverine or lacustrine and is endemic to the Lahontan Basin of northeast California, southeast Oregon, and northern Nevada.

The range for Lahontan cutthroat trout in Nevada includes the Truckee, Carson, Walker, Quinn, and Humboldt River Basins, the Honey and Coyote Lake Basins, and Black Rock Desert Basin. Riverine, or stream-dwelling, Lahontan cutthroat trout usually live less than 5 years and may reach 10 to 15 inches in length. Females mature at 3 to 4 years of age and males at 2 to 3 years of age (Coffin and Cowan 1995). As with all cutthroat trout, the Lahontan cutthroat trout is an obligate riverine spawner. Spawning occurs from April to July, depending on stream discharge, elevation, and water temperature. Most remaining populations of Lahontan cutthroat trout in Nevada occupy higher elevation, low-order streams (Dunham et al. 1999). Spawning and nursery habitat is characterized by cool-water pools in close proximity to instream cover, velocity breaks, well-vegetated and stable streambanks, and relatively silt-free rocky substrate in riffle-run areas (Coffin and Cowan 1995). This species spawns in riffles over gravel substrate when water temperatures are between 41 to 60 ˚F. Intermittent tributaries are sometimes used as spawning sites during high-water years. Fry may develop in the tributary stream until flushed into the mainstream during high runoff (Coffin 1981 *cited in* USDOI BLM 2012b, Trotter 1987).

General characteristics of riverine cutthroat trout habitat include a relatively stable flow regime, a 1:1 pool to riffle ratio, well-vegetated stable streambanks, instream cover exceeding 25 percent, and relatively silt-free riffle-run areas. Cutthroat trout waters generally have a stable summer temperature regime with less than 39 ˚F fluctuation in water temperature and maximum water temperatures less than 72 ˚F (Hickman and Raleigh 1982). Lahontan cutthroat trout may have a higher thermal tolerance than other cutthroat trout and can tolerate temperatures exceeding 80 ˚F for short periods of time and 57 to 63 ˚F fluctuations of temperature (Ausich 1983, and Dickerson and Vinyard 1999 *cited in* USDOI BLM 2012b). Beaver ponds may provide thermal refuge for trout in the summer and winter. Habitat requirements may vary somewhat with life stage and season (Coffin and Cowan 1995). Lahontan cutthroat trout primarily feed on terrestrial and aquatic invertebrates, although larger fish may be fish-eating.

The decline of the Lahontan cutthroat trout has been primarily attributed to the loss and degradation of habitat. Agricultural and municipal uses of water from streams or lakes have reduced or altered the stream discharge in this species' range. Grazing has altered the physical characteristics of stream channels and increased the sediment loads in many Lahontan cutthroat trout streams. Mining, urban development, logging, road construction, and dam building have also been associated with changes in stream channel morphology and water quality (Coffin and Cowan 1995, NDOW 2004).

The Lahontan cutthroat trout competes with non-native trout species that were historically stocked for recreational fishing opportunities. Dunham and Vinyard (1996 *cited in* USDOI BLM 2012b) found that the distribution of Lahontan cutthroat trout can be truncated when brook trout are present, although they noted that the results were variable. Furthermore, Lahontan cutthroat trout have hybridized with non-native rainbow trout in many areas (Coffin and Cowan 1995, NDOW 2004).

Lahontan cutthroat trout conservation efforts are ongoing and involve fish transplants, population and habitat surveys, genetic evaluations, habitat improvement projects, grazing management, use of riparian fencing, and creation of fishery management plans for several basins. The objective of these management efforts is the protection or restoration of habitats that sustain viable self-sustaining populations of this species. A self-sustaining population is defined as having been established 5 or more years and having three or more age classes (Coffin and Cowan 1995).

Lahontan cutthroat trout populations occur in three streams within the project study area—Birch, Pete Hanson, and Willow Creeks. The headwater areas of Birch and Pete Hanson Creeks originate at elevations of approximately 8,200 and 7,200 feet amsl, respectively. Genetic analyses have determined that pure strains (i.e., fish with unmixed lineage over many generations) exist in Pete Hanson Creek. Recent genetic analysis on the Birch Creek Lahontan cutthroat trout has shown a small degree of hybridization with rainbow trout. Of the 30 fish sampled, 8 had rainbow trout alleles at one locus that were the result of an historic hybridization event. Results for the genetic analysis on the Willow Creek population are pending. Pete Hanson Creek was stocked with Lahontan cutthroat trout from Shoshone and Santa Fe Creeks (Elliott 2013a).

Surveys in 2009 indicated that Lahontan cutthroat trout occupy approximately 1.9 miles in Birch Creek and 3.5 miles in Pete Hanson Creek (**Figure 3-38**). Population estimates during the 2009 surveys were 116 fish/mile in Birch Creek and 445 fish/mile in Pete Hanson Creek (NDOW 2009a). Comparison of 2009 Lahontan cutthroat trout densities with previous survey results indicated that population levels in Birch Creek are stable, while the Pete Hanson population estimates are more variable (**Table 3-44**). Lahontan cutthroat trout were surveyed in Willow Creek in September 2011 (Starr 2011). The estimated density for this species was 106 fish/mile in the lower portion of the creek. The fish collected in Willow Creek were considered healthy and representative of at least three different Lahontan cutthroat trout age classes. Lahontan cutthroat trout occupies approximately 0.5 mile in the middle portion of Willow Creek. In addition to occupied habitat in these perennial and intermittent streams, potential habitat has been identified by the NDOW surveys (**Figure 3-38**). Potential recovery streams for Lahontan cutthroat trout within the project area include Henderson and Vinini Creeks (Coffin and Cowan 1995); these streams have 15.6 miles of potential habitat (7 and 8.6 miles respectively).

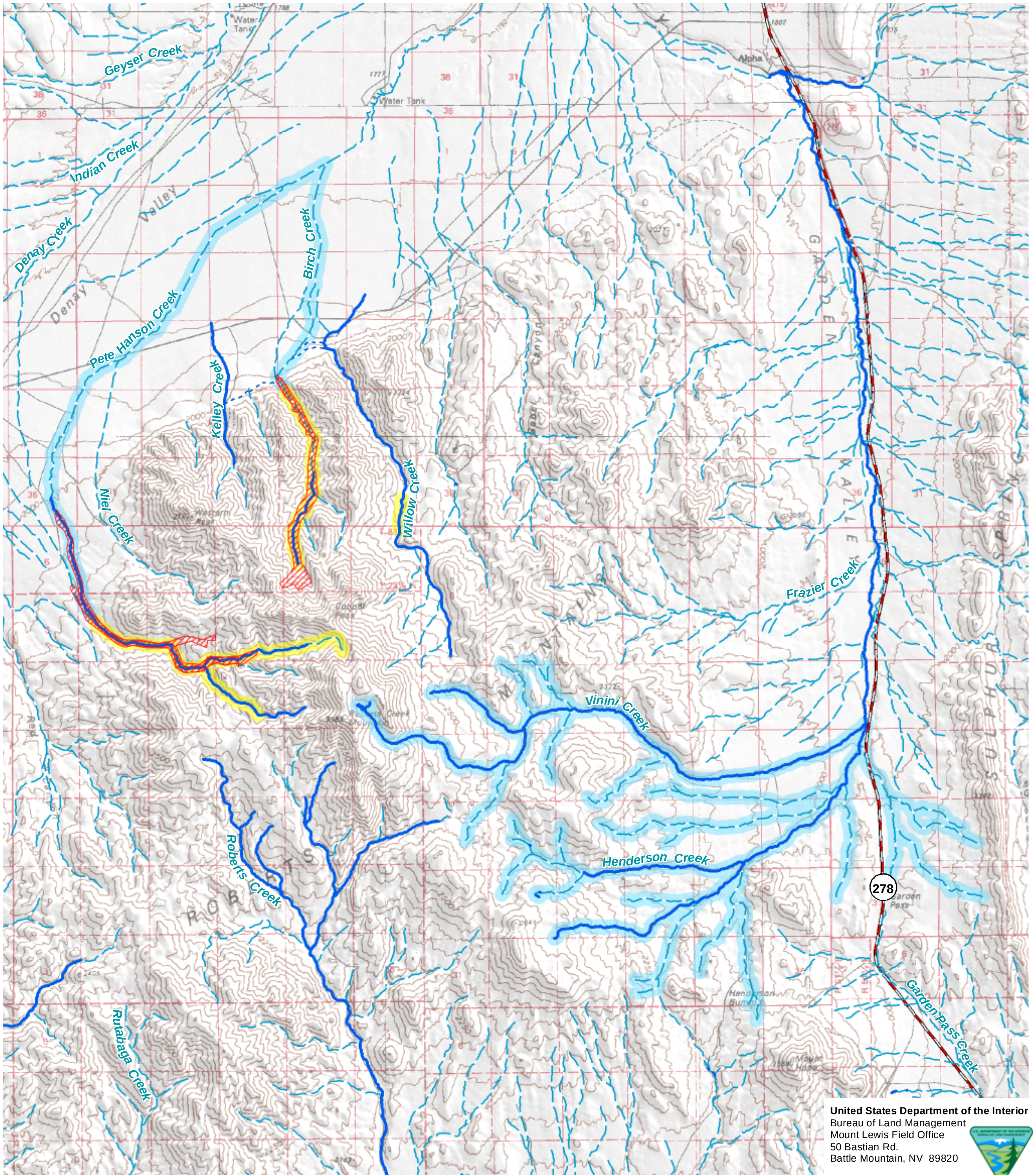
TABLE 3-44

Summary of Lahontan Cutthroat Trout Surveys in Birch, Pete Hanson, and Willow Creeks

Stream	Survey Years			
	1998	2003	2009	2011
Birch Creek				
Miles Occupied	1.5	1.5	1.9	NS
LCT/Stream Mile	153	198	116	NS
Pete Hanson Creek				
Miles Occupied	3.5	3.5	3.5	NS
LCT/Stream Mile	382	823	445	NS
Willow Creek				
Miles Occupied	NS	NS	NS	0.5
LCT/Stream Mile	NS	NS	NS	106

NS = Not surveyed.
LCT = Lahontan cutthroat trout.
Source: NDOW (2009a), Starr (2011).

Management direction for Lahontan cutthroat trout is provided in the *Lahontan Cutthroat Trout Species Management Plan for the Upper Humboldt River Drainage Basin* (Elliott 2004), and the *Lahontan Cutthroat Trout Recovery Plan* (Coffin and Cowan 1995). A portion of the project area falls within the Humboldt River basin, which supports the greatest number of riverine populations. Management objectives for this species focus on the protection and



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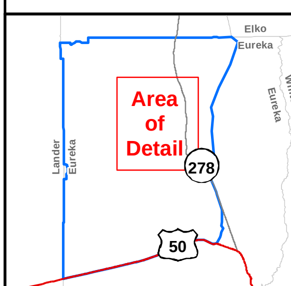


Legend

- LCT Populated Creek
- LCT Potential Habitat
- Less than Optimal Conditions for LCT
- Perennial Stream Reach
- Intermittent Stream Reach
- Canal/Ditch
- 3 Bars Project Area

Source: BLM 2009f, 2012j; JBR 2009; NDOW 2012b; USGS 2012b.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-38

Lahontan Cutthroat Trout (LCT) Habitat

0 1 2 3 Miles
0 1 2 3 4 Kilometers

N

restoration of habitats that sustain viable self-sustaining populations. Threats to Lahontan cutthroat trout include habitat fragmentation due to physical and biological conditions, alteration of stream discharge, water quality degradation, and introduction of non-native fish species (Coffin and Cowan 2005, USDOI USFWS 2010).

3.15.2.3.3 Other Fish

Other fish species are also likely to occur in study area streams, based on historic occurrences. Speckled dace, redside shiner, Tahoe sucker, mountain sucker, and Lahontan tui chub have been reported in the Pine Creek Drainage (Elliott 2013b). Speckled dace also are known to occur in Coils Creek. Two additional streams, Roberts and McClusky Creeks, contain sport fish species including brook, brown, and rainbow trout (Petersen 2012). McClusky Creek has been stocked with brook trout, and Roberts Creek with rainbow trout (Elliott 2013b).

3.15.3 Environmental Consequences

3.15.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, the following issues were identified for aquatic biological resources:

- Habitat conditions for Lahontan cutthroat trout are less than optimal.
- Limiting factors for Lahontan cutthroat trout include insufficient residual pool depth and cemented substrate.
- There has been a decline in fisheries habitat complexity.
- Address the need for habitat improvements in occupied Lahontan cutthroat trout streams (Birch, Pete Hanson, and Willow Creeks), Lahontan cutthroat trout recovery streams (Vinini and Henderson Creeks), and sport fish streams (Roberts and McClusky).
- Increase public awareness of Lahontan cutthroat trout in Willow Creek.
- Consider historical and current population trends for Lahontan cutthroat trout in the 3 Bars Project area to determine recovery status.
- Identify known and potential conflicts with Lahontan cutthroat trout and livestock and wild horses and mitigation measures that could be implemented to minimize effects from these conflicts.
- Concern regarding historical trout numbers in some drainages within the 3 Bars project study area.
- Concern regarding fish barriers consisting of culverts and a headcut on Lower Roberts Creek.
- Evaluate and consider the effect of wildland fire on special status species.

3.15.3.2 Significance Criteria

Impacts to aquatic biological resources would be considered significant if the BLM actions resulted in the following:

- Action results in long-term (greater than 3 years in duration) alteration or loss of habitat in streams or springs containing Lahontan cutthroat trout (current populations or recovery sites), or other aquatic species.

- Action causes long-term (greater than 3 years in duration) loss of riparian vegetation from prescribed fire treatment or surface disturbance activities in streams or springs containing Lahontan cutthroat trout (current populations or recovery sites), or other aquatic species.
- Action results in water quality effects and potential toxicity conditions involving spills or chemical use that last more than 1 month in streams or springs containing Lahontan cutthroat trout (current populations or recovery sites), or other aquatic species.
- Action causes a flow reduction lasting more than 1 month in streams containing Lahontan cutthroat trout (current populations or recovery sites), or other aquatic species.
- Action causes permanent barriers to fish movement in streams containing Lahontan cutthroat trout (current populations or recovery sites), or other aquatic species.

The following assumptions were used in the impact analysis for aquatic biological resources:

- Surface disturbance activities within approximately 0.25 mile and upgradient of perennial streams could result in sediment or contaminant input to the streams.
- Flow reductions of greater than 5 percent of baseline conditions on a continual basis could result in an adverse effect on aquatic habitat for Lahontan cutthroat or other trout, or native fish species.

3.15.3.3 Direct and Indirect Effects

3.15.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Habitat Alteration

Proposed treatments would disturb aquatic habitat if equipment or vehicles enter streams or other waterbodies. The magnitude of the effect would vary depending on the area of disturbance and the duration of the activity. Instream disturbance would alter bottom substrates and possibly change the types of fish cover such as cobble, vegetation, or woody debris in the affected area, and the substrate alteration could adversely affect fish spawning habitat. Habitat alteration could affect Lahontan cutthroat trout, since restoration treatments are proposed for streams occupied by this species including Birch, Pete Hanson, and Willow Creeks. Final aspects of restoration treatment in Lahontan cutthroat trout occupied streams would be determined through BLM consultation with the USFWS and with input from NDOW. These treatments would be designed in a manner that would minimize direct effects to Lahontan cutthroat trout. The USFWS, and to some extent NDOW, would determine what level of impact would be acceptable.

The outcome of the restoration would ultimately benefit Lahontan cutthroat trout populations by expanding suitable habitat as a result of increased stream connectivity. Stream enhancements could involve the creation or expansion of pool habitat, improvements in the riffle to pool ratio, and the addition of instream cover for fish. Stream enhancements would also benefit other fish and macroinvertebrate species that inhabit the treated streams.

Small, temporary exclosure fencing and revegetation treatments would result in benefits to aquatic species. Small, temporary exclosure fencing would restrict access to treated areas by livestock, wild horses, and other wild ungulates. This action would exclude livestock, wild horses, and other wild ungulates from riparian treatment areas, resulting in reduced bank erosion and improved riparian vegetation cover. After treatment activities are completed, treated sites may be replanted. The addition of vegetation and riparian cover would be beneficial to water quality by reducing erosion in the drainage. In addition, the BLM would place logs and other woody debris from felled pinyon-juniper into streams to slow water flow and create fish habitat.

Vegetation Modification

Treatment activities would affect riparian vegetation through disturbance by vehicles or equipment. Removal of noxious weeds and other invasive non-native plant species would cause a short-term loss of riparian vegetation, which could adversely affect aquatic habitat and ecological requirements for aquatic species, and cause a temporary increase in bank erosion.

Proposed treatments would have beneficial effects on riparian vegetation depending on the activity. Riparian vegetation is an important habitat component for aquatic species, as plants provide overhanging cover, temperature control via shading, bank stability, a food source from insects on the vegetation, and nutrient input to the stream from loss of leaves and branches. Beneficial effects would result from riparian restoration actions that would improve riparian community health and resiliency. These include stream channel restoration and removal of pinyon-juniper from the riparian zone. Replacing invasive plant species with native vegetation can improve food availability to insectivorous fish species, as native plants typically support a more diverse native insect community. The removal of noxious weeds and other invasive non-native vegetation and restoration of the streamside vegetation to include native plant species would be beneficial to the stream morphology and the ecological requirements for aquatic species long-term (USDOI BLM 2007b:4-76).

Water Quality

Proposed treatments would result in short-term adverse effects on water quality. Surface disturbing activities within or near streams and springs could cause short-term increased sediment input. The extent of the area affected by sediment would depend on soil composition and the characteristics of the receiving stream or standing waterbody (e.g., flow conditions, channel or waterbody morphology, presence of aquatic vegetation, and gradient). Streams with firm substrates consisting of sand, gravel, or cobble would exhibit lower levels of sedimentation compared to soft substrates such as silt. Typically, the extent of downstream movement of sediment is less during low flow conditions and more extensive during high flow conditions. However, the suspended sediment levels would be more diluted under high flow conditions due to the higher water volumes.

Increases in sediment entering a stream could adversely affect fish health and stream quality. Suspended sediment can affect physiological functions such as oxygen uptake for aquatic species. Depending on the sediment level and sensitivity of the species, effects can range from reduced health to mortality (Waters 1995). Increased sediment levels can bury invertebrates and early life stages of fish. Sedimentation can affect fish habitat by covering spawning and rearing areas, thereby reducing the survival of fish embryos and juvenile fish. Excessive sedimentation also can fill in pool habitats. Pool habitats provide important fish cover due to depth and overwintering habitat.

Vehicles and equipment used within or adjacent to streams and waterbodies could also pose a risk to aquatic biota from fuel spills or lubricant leaks. If fuel reached a waterbody, aquatic species could be exposed to toxic conditions. Impacts could include direct mortality or reduced health of aquatic organisms. The magnitude of a potential spill would depend on the flow conditions, channel or waterbody morphology, and gradient, and the response time and effectiveness of containment and cleanup operations. To reduce these risks, refueling activities would not be allowed within 300 feet of a stream.

Long-term, treatments that restore channel morphology and stream function, remove noxious weeds and other invasive non-native vegetation, improve the health and resiliency of riparian vegetation, and reduce the risk of catastrophic wildfire would benefit water quality and aquatic organisms.

Water Use

Stream water could be used during restoration projects and for prescribed fire control and could result in temporary reductions in stream flows or water levels in ponds. The BLM occasionally withdraws water from streams or ponds during wildfire events as an emergency measure for fire suppression. The BLM works closely with resource advisors to make sure this option is authorized and does not impact other key resources including aquatic species. Water withdrawal would consider the presence of Lahontan cutthroat trout and game fish species and their habitats when selecting water sources. Flow regime is considered the primary determinant regarding the structure and function of aquatic and riparian ecosystems for streams and rivers (Poff et al. 2010). Based on a literature review by Poff and Zimmerman (2010), fish was the only aquatic biological group to consistently respond negatively to reductions in flow magnitude. Flow or water level reductions could adversely affect fish by decreasing the amount of aquatic habitat and affect critical life events such as spawning, early life development, growth, physiological functions, and competition (Bradford and Heinonen 2008, Poff and Zimmerman 2010).

The response of macroinvertebrate communities to reduced flow has been the subject of recent literature reviews by Dewson et al. (2007) and Poff and Zimmerman (2010). Based on a review of studies involving relatively large flow reductions (approximately 60 to 100 percent compared to base flow conditions), results showed that macroinvertebrate abundance and diversity declined in most cases due to reduced habitat diversity, loss of food sources, and changes in competition and predation. Increased water temperature and sedimentation and altered attached algae assemblages also can contribute to changes in aquatic community composition and taxonomic richness.

3.15.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Riparian area treatments would focus on restoring stream and habitat functionality in areas where both the morphology and structural integrity of the stream channel, and the plant species composition within the riparian zone, have been compromised by past actions. Examples of compromised stream channel integrity include: 1) areas where the channel is eroded and incised; 2) areas where there is a sharp break in the slope of the channel due to erosion (knickpoint or headcut); and 3) areas where the channel has been diverted from its historic watercourse due to road construction or other factors. Because of loss of structural integrity in compromised channels, stream velocities have increased over historic levels, nutrient-rich sediment is not being delivered to riparian vegetation, and there is less groundwater recharge within the floodplains, to the detriment of fish and other aquatic organisms.

Treatments would primarily occur in upper and lower Henderson Creek (8.9 miles of perennial stream), Roberts Creek (7.6 miles), upper and lower Vinini Creek (5.9 miles), and Willow Creek (4.3 miles). Willow Creek supports Lahontan cutthroat trout along 0.5 mile of occupied perennial stream habitat, while Henderson and Vinini and unnamed creeks have known or potential Lahontan cutthroat trout habitat, including approximately 9.3 miles of potential perennial habitat and 3.6 miles of potential intermittent habitat. None of the springs are known to contain snails or springsnails.

Adverse Effects

Riparian vegetation removal could adversely affect ecological functions of riparian vegetation on a short-term basis, although the affected area would represent a relatively minor portion of the overall riparian zone. Streamside vegetation removal could decrease the amount of woody debris deposited in the stream, although the BLM proposes to place down logs and other wood from felled pinyon-juniper into streams to improve stream habitat.

The adverse effects of mechanical treatments on water quality would be expected to be localized and of short-term in duration, with water quality returning to pre-disturbance conditions within several days or weeks after treatment is completed. Adverse effects for all proposed riparian zone projects could result from soil disturbance and erosion, and the spill of fuel or lubricants into water bodies. Habitat alteration or loss at a particular site would be considered relatively minor in relation to the overall habitat in the stream, especially since treatments would be focused on degraded stream habitat. Instream disturbance would occur in Lahontan cutthroat trout occupied (Willow Creek) or recovery (Henderson and Vinini Creeks) streams, and game fish streams (Roberts and McClusky Creeks), as part of habitat enhancement. The BLM would consult with the USFWS and NDOW regarding designing treatments in a manner that would minimize direct effects to Lahontan cutthroat trout. This approach would avoid significant impacts to Lahontan cutthroat trout.

The adverse effects of mechanical treatments on water quality would be expected to be short-term in duration, with water quality returning to pre-disturbance conditions within several days or weeks after treatment is completed. Adverse effects for all proposed riparian zone projects could result from soil disturbance and erosion, and the spill of fuel or lubricants into water bodies. Habitat alteration or loss at a particular site would be considered relatively minor in relation to the overall habitat in the stream. Riparian treatments would be localized and targeted for areas that are generally degraded in terms of riparian vegetation quality or characterized by the absence or limited number of riparian species. The BLM would consult with the USFWS and NDOW regarding designing treatments in a manner that would minimize direct effects to Lahontan cutthroat trout. This approach would avoid significant impacts to Lahontan cutthroat trout. Treatment methods used in Birch and Willow Creeks within the Roberts Mountains WSA would have to meet non-impairment criteria for WSAs, but would not include the use of vehicles or building of new roads.

Beneficial Effects

The BLM's highest priority is to use vegetation treatments to restore high priority subbasins within key watersheds to benefit fish and other aquatic organisms. Over the short-term, adverse effects to aquatic organisms from vegetation treatment activities proposed by the BLM could occur, but treatments would lead to improved conditions for aquatic species over the long-term. The eventual growth of desirable vegetation in treated areas would moderate water temperatures, buffer the input of sediments from runoff, promote bank stability, and contribute woody debris to aquatic bodies. Ongoing efforts by the BLM to enhance riparian vegetation would also help to increase the number of miles of BLM-administered streams that are classified as Proper Functioning Condition.

Removing invasive vegetation such as pinyon-juniper could increase streamflow, while replacing noxious weeds and other invasive non-native species with native vegetation would stabilize streambanks and moderate streamflows. Furthermore, replacing noxious weeds and other invasive non-native vegetation with shrubs and trees would also increase the amount of woody debris in water bodies that can be used as habitat by fish (USDOI BLM 2007c:4-69).

The beneficial effects of riparian treatments would include aquatic habitat enhancements. Various treatment methods would be used to improve issues involving headcuts and stream incisions. The treatment activities would include streambank bioengineering, grade stabilization, and vegetation plantings to initiate stream restoration. These treatment activities would enhance pool and riffle habitat by increasing depths and providing additional in-stream structure by adding cobble and boulder substrates and woody debris. After restoration is completed, aquatic habitat would occur on a more consistent basis as a result of increased stability of the channel banks and substrates. The habitat improvements also would be beneficial to macroinvertebrates by stabilizing bottom substrates and creating a diverse composition of substrate types. Macroinvertebrates represent an important food source for fish species. As a result of the stream restoration activities, habitat for Lahontan cutthroat trout (in both occupied and recovery streams) and game fish species would be improved in terms of functionality and structure. Habitat improvements in the Lahontan cutthroat trout recovery streams may assist in the reintroduction of this species into habitats that were used historically, which would meet the goals and objectives of the *Lahontan Cutthroat Trout Recovery Plan* (Coffin and Cowan 1995). In addition, wet meadows and stream reaches could be created under this treatment, which would provide additional aquatic habitat for fish and invertebrates.

Vegetation treatments to thin or remove pinyon-juniper from within floodplains and near streams would help to create fire breaks and would benefit aquatic animals by reducing the risk that a large, uncontrolled wildfire would destroy a large amount of high quality aquatic habitat. Fire can adversely affect aquatic organisms by degrading water quality and raising water temperature (USDOI BLM 2007c:4-70).

After restoration, treatment areas may be excluded using small, temporary exclosure fencing to ensure that restored sites and plantings are not damaged by livestock, wild horse, and other wild ungulates. Also, fencing would be used to protect riparian habitat at Denay Pond, Lone Spring, and Treasure Well.

Aspen Treatments

Adverse Effects

Potential adverse impacts to fish and other aquatic resources from the three aspen treatments associated with stream habitat would be similar to those for riparian treatments. However, only about 15 acres of aspen would be treated annually under the proposed action, and only 4 miles of stream are associated with aspen treatments. Aspen treatments would occur in areas that are occupied, or could be occupied, by Lahontan cutthroat trout. Treatments could result in erosion that could adversely impact nearby stream habitat and aquatic resources, including game and non-game fish.

Beneficial Effects

Restoration of aspen stands could benefit fish and other aquatic species, primarily through an improvement in water quality. Pinyon-juniper would be removed to reduce competition between aspens and pinyon-junipers for space and nutrients, and may occur near roads to improve their effectiveness as fuel breaks. Fuel breaks would help to slow the spread of wildfire, reducing the chances that a large, uncontrolled wildfire would destroy a large amount of high quality aquatic habitat. Downed trees and other large woody material from felled trees could be placed in streams as a source of woody debris for fish. The additional woody debris would provide improvements in the quantity and quality of fish cover and an additional source of organic material to the stream. The BLM would remove or burn slash and downed wood if there is the potential for the material to increase the risk of wildfire.

If small, temporary exclosure fencing is installed near streams, it would benefit aquatic habitat and species by restricting livestock, wild horses, and other wild ungulates from entering the stream. This would reduce the amount of direct alteration of aquatic habitat and minimize erosion. Fencing would also help to ensure that aspen restoration treatments are successful.

Pinyon-juniper Treatments

Adverse Effects

Approximately 5 miles of stream are associated with riparian management projects that occur within the larger pinyon-juniper management area. Seven miles of perennial stream treatments are associated exclusively with pinyon-juniper management projects, including the Birch Creek, Upper Pete Hanson, Tonkin South, Upper Roberts Creek, and Vinini treatment units. These pinyon-juniper project areas also overlap with Lahontan cutthroat trout and other fish habitat—Atlas (Roberts Creek), Birch Creek (Birch Creek), Lower Pete Hanson (Pete Hanson Creek), Pete Hanson (Pete Hanson Creek), and Vinini Unit (Henderson Creek). Habitat alteration could occur near streams that provide known or potential Lahontan cutthroat trout habitat (Birch, Pete Hanson, and Henderson Creeks).

The types of impacts to these perennial and intermittent streams would be similar to those discussed earlier, including increased sediment loads into streams, spill of fuel or lubricants into streams, and flow reduction due to use of water for fire control. Approximately 30 percent of the treatment area for these units has moderate to high water erosion risk, and mechanical treatments could cause soil disturbance that could lead to erosion and sedimentation of streams. The effects of treatments on water quality would be short-term, with water quality returning to pre-disturbance conditions within several days or weeks after treatment is completed. However, this risk is negligible in areas where pinyon-juniper are felled using chainsaws, or pinyon-juniper are shredded, as the resultant woody debris would help to protect the soil. If large amounts of woody debris are left on the ground, however, it could provide fuel for a wildfire.

Fire treatment could result in increased turbidity in streams due to runoff from burn areas. Sediment input could adversely affect stream substrate composition due to increased silt deposition. The magnitude of sediment input would depend on gradient in the burned portion of the drainage area and the extent of vegetation growth between the burn area and the receiving streams. Densely vegetated areas could capture and reduce the sediment input to streams. Standard operating procedures would reduce the sediment input to downgradient streams, but would not eliminate all sediment input into drainages. Sediment input could adversely affect aquatic habitat and the health of fish and invertebrate species.

High severity fires tend to burn much of the organic material on a site, exposing mineral soil, and sometimes creating hydrophobic soil layers. This hydrophobic condition increases the rate of water runoff and erosion. Nearly all of the treatment acreage associated with treatment units near perennial streams has soils with a moderate to high risk of fire degradation. The BLM would reduce this risk by conducting low severity prescribed burns. It is unlikely that burning would be conducted along streams with Lahontan cutthroat trout due to the potential for adverse impacts to stream water quality and loss of vegetative cover adjacent to streams. The BLM would consult with the USFWS before conducting treatments near streams occupied by Lahontan cutthroat trout.

Water may be needed for fire control. If water sources include perennial streams or springs connected to surface flow, temporary flow reductions could occur in streams. The magnitude of the effect would depend on the water volume and timing of the withdrawal.

Beneficial Effects

The removal of pinyon-juniper vegetation in riparian zones could increase stream flows and improve aquatic habitat as a result of reduced water uptake by vegetation. Manual, mechanical, and fire treatments in pinyon-juniper management areas would improve aquatic habitat by placing woody debris at strategic locations to expand the size of the streams and result in the creation or expansion of pool habitats. These treatments would benefit Lahontan cutthroat trout habitat in Birch, Pete Hanson, and Willow Creeks. Habitat improvements near Henderson Creek could assist in the recovery of Lahontan cutthroat trout. The stream structures (i.e., logs and pools) could also serve as fuel breaks to slow the spread of wildland fire and reduce fire effects on aquatic habitat and species.

Prescribed fire treatments could benefit aquatic species by reducing hazardous fuel loads, and therefore the risk of a destructive high-intensity wildfire. In many cases, pre-treatment fuels reductions (e.g., thinning and pile burning) would be necessary to reduce the severity of prescribed burns near or within riparian zones (USDOI BLM 2007b:4-70). Removal of pinyon-juniper and shredding of sagebrush to create fuel breaks would help to contain and limit the spread of wildfire, to the benefit of aquatic resources.

Sagebrush Treatments

Adverse Effects

Four streams (Birch, Henderson, Pete Hanson, and Vinini Creeks) provide potential Lahontan cutthroat trout, with 1.6 miles of potential perennial and 4.4 miles of intermittent habitat within sagebrush treatment areas. However, there is no occupied Lahontan cutthroat trout habitat in the sagebrush treatment areas. None of the springs are known to contain snails or springsnails.

Most of the sagebrush projects (Alpha, Kobeh East, Nichols, Roberts Mountain Pasture, South Simpson, Three Corners, and Whistler Sage) overlap with intermittent/ephemeral, but not perennial streams. Potential habitat and water quality effects in these streams would mainly affect invertebrate communities, but fish could also be present during spring runoff.

Approximately 5 miles of perennial stream are associated with riparian management projects within the larger sagebrush management area (Lower Henderson 1 and 3, and Lower Vinini Creek units). Only 1.3 miles of perennial stream habitat are associated exclusively with sagebrush management projects—Table Mountain (Henderson and Vinini Creeks), and West Simpson Park (unnamed) units. Lahontan cutthroat trout potential habitat occurs in Henderson and Vinini Creeks, while native fish (speckled dace) have been reported in Coils Creek. Manual and mechanical treatments could result in increased water runoff and erosion, and spills of fuels and lubricants, to the possible detriment of water quality and aquatic habitat.

Fire treatments on the West Simpson Park Unit to remove non-native vegetation could result in increased turbidity in streams due to runoff from burned areas. Adverse effects on stream habitat and aquatic species would vary depending on the precipitation conditions. Under average and dry year precipitation conditions, measured effects of prescribed fire would be relatively small or undetectable (Clifton et al. 2006). If large storm events occur within the first few years after prescribed fire, erosion could be substantial.

Livestock grazing could be used for short periods to remove undesirable vegetation before using other treatment methods. Grazing can contribute to the spread of noxious weeds and other invasive non-native vegetation through preferential grazing of native vegetation over noxious weeds and other invasive non-native vegetation, and by movement of undesirable vegetation into uninfested areas in livestock feces (USDOI BLM 2009b). Livestock could also degrade vegetation and soils, and deposit fecal material in or near streams, which would adversely affect water quality and habitat for aquatic species. Livestock grazing also could directly alter aquatic habitat if animals have access to the stream channels.

Beneficial Effects

The beneficial effects of sagebrush treatments would include improvements in aquatic and riparian habitats and a reduction in wildfire risk. Grade stabilization structures, streambank bioengineering, removal/reconstruction of water development, and vegetation planting to initiate stream restoration would be used at the Henderson 1 and 2 units and Lower Vinini Unit that are within sagebrush treatment units and would benefit aquatic species and habitat. Trees that are removed as part of this treatment could be placed in streams to expand the stream width and help create or expand pool habitats. The woody structures also would provide additional in-stream cover for fish and organic material to the stream environment.

The BLM would use mowers and shredders to create fuel breaks. A decreased risk of wildfire would benefit aquatic habitat and species by reducing the occurrence of catastrophic wildfires and the associated adverse effects on habitat and species.

3.15.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, the number of acres of riparian treatments (4,000 acres) and miles of stream improved to restore channel morphology and function (31 miles) would be similar to Alternative A.

Because the BLM would have to rely more on mechanical treatments to reduce hazardous fuels and improve woodland health, improve the health of aspen stands, and control non-native vegetation, short-term soil disturbance and erosion would be similar to that under Alternative A, even though fewer acres would be treated. However, fire-related effects on water quality and aquatic habitat would not occur under Alternative B. Although this would be beneficial to fish in the short-term, in the long-term there would be a higher risk of wildfire as a result of buildup of hazardous fuel materials that could have been removed through the use of prescribed fire and wildland fire for resource benefit. Fire would also not be used to improve woodland health and for stand replacement treatments in Phase II and III pinyon-juniper stands. These stands would be highly susceptible to a wildfire. Adverse effects on aquatic habitat and species could result from wildfires near perennial streams and springs.

Under Alternative B, the BLM would be able to demonstrate that it is restoring landscapes and addressing multiple resource issues. The BLM would also make gains toward meeting Proper Functioning Condition objectives on several streams in the project area. Treatment benefits to fish and other aquatic organisms under Alternative B would be less than under Alternative A, but not substantially less, as fire would be used sparingly to improve habitat for fish under Alternative A. However, risks to fish from wildfire would be greater under this alternative than for Alternative A.

3.15.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under this alternative, the BLM would only treat vegetation using manual and classical biological control methods. Overall, only about one-fourth as many total acres, acres of wetland, floodplain, and riparian habitat, and miles of stream restoration would be treated under Alternative C as compared to Alternative A. Short-term soil disturbance and erosion would occur in watersheds as a result of manual and classical biological treatments, but effects would be substantially less under this alternative than under the other action alternatives because fewer acres would be treated, and because manual and biological treatments cause less soil disturbance compared to mechanical and fire treatments.

The BLM would have limited success in restoring channel morphology and function in degraded streams to benefit Lahontan cutthroat trout and other aquatic organisms. The BLM would be able to hand place rocks, logs, and other materials in streams to slow water flows, and may be able to make minor changes to the stream morphology using hand tools, but these improvements would be minor.

Pinyon-juniper would be removed using chainsaws. Phase I woodlands and a limited acreage of Phase II woodlands would be targeted for treatments. Most treatments would occur near streams and roads to promote their use as fire breaks, to the benefit of aquatic resources. However, the BLM would not be able to conduct fire treatments to reduce hazardous fuels, or use mechanical equipment to create fire and fuel breaks, and thus the risks of wildfire and its effects on fish and other aquatic resources would be greater under this alternative than under the other action alternatives.

Under Alternative C, the BLM would do little to slow the spread of noxious weeds and other invasive non-native vegetation, including cheatgrass, or protect fish and wildlife habitat from devastating wildfire effects. Thus, benefits to fish and other aquatic organisms under Alternative C would be less than under Alternatives A and B. Although the BLM would make some gains toward meeting Proper Functioning Condition objectives on several streams in the project area, these gains would be less than under Alternatives A and B.

3.15.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to fish or other aquatic resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; reconstruct stream channels and improve riparian habitat; thin and/or remove pinyon-juniper and sagebrush to encourage understory development; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire to the benefit of fish and other aquatic resources and their habitats. Alternative D poses the greatest threat to Lahontan cutthroat trout, through long-term habitat loss and degradation.

3.15.3.4 Cumulative Effects

The CESA for fish and other aquatic resources is approximately 1,841,698 acres and includes those watersheds at the Hydrologic Unit Code 10 level that are all or partially within the 3 Bars Project area (**Figure 3-1**). Approximately 92 percent of the area is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service. Past and present actions that have influenced fish and other aquatic resources in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.15.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

As discussed in Section 3.3.2.3.3, historic livestock grazing use has contributed to soil erosion and water quality degradation, especially in riparian zones and near streams occupied, or potentially occupied, by Lahontan cutthroat trout and other fish. This degradation in habitat is a major reason why the BLM is conducting stream channel and habitat restoration along 31 miles of streams. The BLM also proposes to install small, temporary exclosure fencing to exclude livestock, wild horse, and other wild ungulate access to riparian zone and aspen treatment areas. These actions should help to improve water quality in affected streams.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. The BLM primarily uses 2,4-D, glyphosate, imazapyr,, metsulfuron methyl, and picloram on the 3 Bars Project area, and could use imazapic on the area in the future. These herbicides have negligible to low risks to fish and other aquatic resources, except under accidental spill situations, which would be unlikely (USDOI BLM 2007b:4-80).These treatments could have a short-term adverse effect on non-target vegetation. These treatments would have long-term beneficial effects by helping to reduce hazardous fuels, improve native vegetation, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites to the benefit of fish and other aquatic resources.

Recreation activities, primarily off-road vehicle travel, could impact stream habitat. Approximately 496 miles of road are within 500 feet of streams within the CESA. Approximately 16 miles of road are within 500 feet of perennial streams including Birch, Denay, Henderson, Pete Hanson, Vinini, and Willow Creeks. Approximately 11 miles of known or potential Lahontan cutthroat trout habitat occurs near roads. In addition, 76 miles of off-highway vehicle routes are within 500 feet of streams. Of those, approximately 11 miles of off-highway vehicle routes are within 500 feet of the same perennial streams that are near roads. Two miles of streams within 500 feet of off-highway vehicle routes contain known or potential Lahontan cutthroat trout habitat. Unpaved roads and off-highway vehicle routes near streams could contribute runoff and sediment to streams. Fishermen may also harvest Lahontan cutthroat trout and other game fish.

As discussed in the Mount Hope Project EIS, there is concern that water withdrawals for future livestock and domestic uses, mine projects, and agricultural activities could reduce surface water flows in streams associated with the Diamond Mountains, Diamond Valley, Roberts Mountain, Kobeh Valley, and Pine Valley. Water drawdown could adversely impact habitat used by Lahontan cutthroat trout, and could also impact habitat for other aquatic organisms and potential habitat for Lahontan cutthroat trout on Henderson Creek (USDOI BLM 2012b:4-48 to 4-50). If deemed necessary by the BLM based on water monitoring, the Mount Hope Project proponent would augment water flows at several springs and at Henderson and Roberts Creeks (USDOI BLM 2012b:3-93 to 3-105).

Future mining activities within the CESA may create adverse impacts to surface water resources, mainly by altering drainage features, by dewatering springs or stream segments, and by water quality impacts from runoff from disturbed areas or escapes from processing facilities. Most of these potential impacts from mining activities would be avoided or reduced through state and federal mining regulations and related compliance programs.

Surface water features within the CESA generally resemble those within the project area, consisting mainly of streams, springs, ponds, and playas in various conditions. In some locations, notably along Henderson and Pine Creeks and near the town of Eureka, irrigation return flows may have poorer water quality than rangeland streams and springs. These areas are not used by Lahontan cutthroat trout, but could be used by other fish and aquatic resources.

Land development, mineral development, and oil, gas, and geothermal exploration and development could affect about 10,000 acres in the reasonably foreseeable future, including about 8,335 acres of disturbance associated with the Mount Hope Project, and acreage associated with potential land sales (although it is unlikely that all of this land would be developed), roads, and rights-of-way for power and telephone lines. These projects would disturb soil, and could lead to soil erosion and water quality impacts in streams used by game fish and other aquatic resources. Land development and development of natural resources would involve the use of equipment and drilling of wells that could result in hydrocarbon and other spills of hazardous materials that could impact surface water and groundwater; a recent oil spill at the Blackburn oil well in Pine Valley impacted over 3 acres (USDOI BLM 2012b:4-47).

Hazardous fuels reduction, habitat improvement, and noxious weed and other invasive non-native vegetation control projects would occur on up to approximately 142,000 acres (about 127,000 for the 3 Bars Project and about 15,000 acres for other hazardous fuels projects in the CESA), or 8 percent of the CESA. As discussed under direct and indirect effects, these treatments would lead to short-term increases in soil erosion and surface water runoff, but long-term benefits to water quality and possibly water flows to the benefit of fish and other aquatic organisms. Fire treatments could cause the development of hydrophobic soils, increasing surface water runoff. Soils over much of the CESA are susceptible to fire degradation. The disturbance effects resulting from restoration activities are predicted to have less impact and be less severe than fire effects and erosion caused by wildfire. Based on historic numbers, approximately 140,000 acres could burn during the next 20 years within the CESA.

3 Bars Project treatments would have short-term adverse effects on about 4,000 acres of riparian habitat, 9 miles of occupied Lahontan cutthroat trout streams, and 68 miles of potential Lahontan cutthroat trout streams. In addition, treatments under Alternative A could affect aquatic organisms found in about 1,000 miles of perennial and intermittent/ephemeral streams on the 3 Bars Project area. Adverse effects from treatments would generally be short-term, while benefits would be long-term and would accumulate with fish and other aquatic resources habitat effects that occur on other portions of the CESA. Because stream restoration and enhancement treatments on the 3 Bars Project area under Alternative A would affect less than 0.2 percent of the acreage on the CESA, these effects would be negligible. About 17 percent of the 3 Bars Project Area and 8 percent of the CESA would be treated to reduce hazardous fuels, and slow the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper. A reduction in wildfire risk on the CESA would benefit aquatic organisms, and would be greatest under Alternative A.

3.15.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on fish and other aquatic resources would be similar to those described under Alternative A. Acres and types of wetland and riparian habitat treated under this alternative would be similar to Alternative B. However, less effort would be spent by the BLM on treatments to reduce wildfire risk and its associated impacts to aquatic habitat from soil erosion, including use of fire to restore natural fire regimes.

Adverse effects to fish and other aquatic resources would generally be the same as described for Alternative A. However, by not using fire, there would be no risks to fish and other aquatic resources or their habitats from fire on up to several thousand acres annually within the 3 Bars Project area. However, the use of fire could occur on several hundred acres annually on other portions of the CESA.

Because of the large number of acres treated, water quantity and quality should improve within the 3 Bars Project area and provide a benefit to fish and other aquatic resources within the CESA, although not to the extent as would occur under Alternative A.

Under Alternative B, restoration projects would occur along about 31 miles of streams, including about 9 miles of streams occupied by Lahontan cutthroat trout, and on about 2,000 acres of wetland and riparian habitat. Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or about 4 percent of the acreage within the CESA. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper should slow, but treatments to reduce this risk on the CESA would be less under Alternative B than under Alternative A.

3.15.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on fish and other aquatic resources would be similar to those described under Alternative A. Adverse, short-term effects to fish and other aquatic resources associated with the use of fire and mechanized equipment would not occur under Alternative C. However, fire use and mechanized equipment would be used on other portions of the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire. Treatments in the CESA would affect about 47,000 acres, or about 2 percent of the CESA; less than 0.2 percent of acreage on the CESA would be affected annually. 3 Bars Project restoration treatments would have short-term adverse and long-term beneficial effects on fish and other aquatic resources, but these effects would be negligible in the context of the acreage within the CESA and other types of activities that have effects on water resources, such as the Mount Hope Project. By not being able to use mechanical methods and fire to reduce hazardous fuels, treat vegetation to make it more fire resilient, create fire and fuel breaks, and remove downed wood and slash, however, the risk of wildfire and its impacts on water resources would likely increase on the 3 Bars Project area, to the potential detriment of fish and other resources that depend upon water in the CESA.

3.15.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on fish and other aquatic resources would be similar to those described under Alternative A. There would be no cumulative effects on fish and other aquatic organisms from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage.

Based on historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually in the CESA to reduce hazardous fuel levels and improve ecosystem health. Hazardous fuel levels would likely increase, and only a limited number of miles of fuel and fire breaks would be constructed under this alternative compared to the action alternatives. The BLM would conduct stream bioengineering and riparian habitat enhancements on a limited acreage and these projects would have to be authorized through separate decisions. Stream channels and riparian habitat would likely remain degraded and contribute to water quality concerns. Thus, riparian habitat used by Lahontan cutthroat trout and other aquatic organisms would remain degraded and contribute to water quality concerns. The trend toward large-sized fires of moderate to high severity in sagebrush, and large stand-replacing fires in pinyon-juniper, would likely increase. Of note, large regional wildfires have contributed to runoff, erosion, and water quality issues within the CESA, particularly outside treatment areas in the eastern mountainous parts of Grass Valley and Pine Valley. It is likely that wildfire incidence and severity would remain high under Alternative D. These effects would be detrimental to fish and other aquatic organisms.

3.15.3.5 Unavoidable Adverse Effects

Unavoidable adverse effects on aquatic biological resources include treatments that disturb soil and increase sedimentation, which could result in short-term adverse effects on water quality and aquatic species. In addition, removal of pinyon-juniper in riparian treatment areas could reduce stream shading, which could increase stream temperatures and adversely affect aquatic species. These adverse impacts generally would be short-term in duration (several months to several years), and would be addressed by resource protection measures implemented during and after the project treatment activities.

3.15.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

As discussed under direct and indirect effects, treatments could lead to short-term habitat loss, and possibly loss of aquatic organisms, due to removal of vegetation and erosion. Long-term, control of aquatic and riparian vegetation would improve habitat quality for fish and other aquatic resources, improve hydrologic function, and reduce soil erosion. Vegetation treatments that reduce hazardous fuels would benefit aquatic organisms by reducing the chances of a large, uncontrolled wildfire, which could result in the destruction of a large amount of high quality wetland and riparian habitat, especially if followed by heavy rainfall. Hazardous fuels reduction would also decrease the likelihood that wildfire suppression activities would occur in or near aquatic habitats. Treatments that restore natural fire regimes and native vegetation near streams should ensure a steady supply of large woody debris that would provide habitat for aquatic organisms in the long-term (USDOI BLM 2007b:4-248).

3.15.3.7 Irreversible and Irretrievable Commitment of Resources

Loss of control over a prescribed fire could also harm aquatic habitat and cause mortality or injury to aquatic organisms. Treatments would likely result in short-term habitat degradation and some reduction in populations of fish and other aquatic organisms. These effects, however, would be reversible, as habitats would improve and aquatic organism populations would likely increase as a result (USDOI BLM 2007b:4-252).

3.15.3.8 Significance of the Effects under the Alternatives

3 Bars Project restoration treatments and other actions in the CESA should not have a significant adverse impact on fish and other aquatic resources. One of the goals of the 3 Bars Project is to improve habitat for Lahontan cutthroat trout and other fish and wildlife by restoring stream and habitat functionality through in-channel activities such as re-contouring and installing grade-control structures and plantings. Treatments could occur on several miles of streams annually and could lead to short-term stream channel instability and degradation. The BLM would also remove encroaching pinyon-juniper and noxious weeds and other invasive non-native vegetation on about 3,900 acres of riparian habitat, and revegetate treatment areas with native vegetation. The BLM would work with the USFWS and NDOW to ensure that treatments would not result in a long-term (greater than 3 year in duration) alteration or loss of habitat in streams or springs containing Lahontan cutthroat trout (current populations or recovery sites). The BLM also may exclude livestock, wild horse, and other wild ungulate access to treated areas until site-specific treatment goals and objectives were met. These treatments are expected to improve stream habitat within 2 to 3 years. Stream restoration is not planned on other portions of the CESA, but could occur in the future should funding become available.

Nearly all 3 Bars Project restoration treatments would cause short-term erosion that leads to increased sedimentation in streams or ponds that could harm aquatic species, and which could last for several years. These risks would be greatest in restoration areas with moderate to severe water or wind erosion potential, or where soils are susceptible to fire degradation. Treatments that disturb the soil or remove large amounts of vegetation, including use of mechanical treatments such as discing and plowing, and prescribed fire and wildland fire for resource benefit, would also lead to short-term erosion and sedimentation. Long-term, restoration treatments would lead to conditions that should reduce the risk of erosion, including revegetation of treatment sites with native vegetation and conducting treatments to stimulate growth of the understory. Treatments that reduce the risk of wildfire, including hazardous fuels treatments, control non-native vegetation, and create fire and fuel breaks would also reduce the risk of fire-associated erosion and its effects on water quality. Thus, none of the alternatives would result in a significant long-term (greater than 3 years) increase in erosion and the associated increased sedimentation in streams or ponds.

Under all alternatives, there is potential for short-term releases of fuels and lubricants from equipment into water bodies that could affect Lahontan cutthroat trout or other aquatic species, although this risk would be negligible. The BLM would prevent or minimize the movement of fuels and lubricants into water bodies by fueling and servicing equipment off-site at least 300 feet from streams. Operators would also carry absorbent material and other spill clean-up materials to use should a spill occur in a water body. By retaining buffers between treatment areas and water bodies where feasible, and following other SOPs that protect water quality, it is unlikely that there would be a change in water quality that would often or regularly exceed Nevada water quality standards.

Treatments under all alternatives would not cause a flow reduction lasting more than 1 month in streams containing Lahontan cutthroat trout (current populations or recovery sites), or other aquatic species. The BLM could divert water while reconstructing streams. The BLM may exclude livestock, wild horse, and other wild ungulate from treatment sites near water in riparian and aspen treatment areas until these areas were restored and able to accommodate use by these animals. It is anticipated that access restrictions would be 2 to 3 years. If access is restricted, the BLM would work with affected permittee(s) to ensure access to water. Thus, there should be no significant long-term diversion, or access restriction that substantially reduces water availability and the uses recognized by Nevada Department of Water Resources in the analysis area or immediately adjacent to it under all alternatives. This would include flows and seasons of use in springs or streams where existing beneficial water uses, as defined by Nevada Division of Environmental Protection and recorded by Nevada Department of Water Resources, may be affected.

Poorly designed, installed, or maintained culverts have impacted stream flows and fish movement on several streams on the 3 Bars Project area (AECOM 2010). The BLM would work to replace these culverts, and would ensure that any future culverts used in stream reconstruction would not cause permanent barriers to fish movement in streams.

3.15.4 Mitigation

The following mitigation measures would be implemented to reduce or avoid impacts to fish and other aquatic biological resources:

1. If instream disturbance is required as part of treatment, activities would be scheduled to avoid spawning periods of game fish species or Lahontan cutthroat trout. The measure would be effective in protecting spawning periods of game or special status fish species.

2. If water is required for fire control, perennial streams with game or special status species or springs with connections to these perennial streams would not be used as water sources. This measure would be effective

in avoiding flow reductions in streams with important aquatic species by restricting their use as water sources for fire control.

3. The BLM would consult with the NDOW before conducting prescribed fire and other treatments that could adversely impact Lahontan cutthroat trout when working near Lahontan cutthroat trout occupied or potential habitat. The measure would be effective in protecting stream habitat for Lahontan cutthroat trout.

In addition, fish and other aquatic resources would benefit from mitigation measures identified in Section 3.18.4 (Livestock Grazing Mitigation).

3.16 Wildlife Resources

3.16.1 Regulatory Framework

3.16.1.1 Endangered Species Act

In accordance with Section 7 of the Endangered Species Act, federal agencies must "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species." The purpose of the Act is to provide a means for conserving the ecosystems upon which threatened and endangered species depend, and to provide a program for protecting these species. The Act defines an endangered species as a species that is in danger of extinction throughout all or a major portion of its range. A threatened species is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a major portion of its range. This Act also addresses species that have been proposed for listing as either threatened or endangered, but for which a final determination has not been made. These so-called "candidate" species are those for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the Act, but for which development of a proposed listing regulation is precluded by other, higher priority listing activities. Critical habitat is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the USFWS under the Act. The yellow-billed cuckoo is the only federally listed wildlife species on the 3 Bars ecosystem; the Columbia spotted frog is a candidate for listing; and the Greater sage-grouse is a special status species.

3.16.1.2 BLM Special Status Species

BLM Special Status Species are defined as those plant and animal species for which population viability is a concern, as evidenced by a significant current or predicted downward trend in population numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution. These animals are protected under provisions of the Act or under BLM Manual 6840, *Special Status Species Management* (USDOI BLM 2008h). In addition, there is a Nevada State Protected Animal List (Nevada Administrative Code §§ 501.100 - 503.104) that BLM has incorporated, in part, into the Special Status Species list. The Greater sage-grouse is protected under the September 2015 *Nevada and Northeastern California Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision* (ARMPA).

3.16.1.3 BLM and Nevada Department of Wildlife Memorandum of Understanding

Wildlife and fish resources and their habitat on public lands are managed cooperatively by the BLM and NDOW under a Memorandum of Understanding as established in 1971. The Memorandum of Understanding describes the

BLM's commitment to manage wildlife and fisheries resource habitat, and the NDOW's role in managing populations. The BLM meets its obligations by managing public lands to protect and enhance food, shelter, and breeding areas for wild animals. The NDOW assures healthy wildlife numbers through a variety of management tools including wildlife and fisheries stocking programs, hunting and fishing regulations, land purchases for wildlife management, cooperative enhancement projects, and other activities.

3.16.1.4 Nevada Department of Wildlife Programs

The NDOW is responsible for the restoration and management of fish and wildlife resources within the state. The NDOW administers state wildlife management and protection programs as set forth in Nevada Revised Statutes Chapter 501, Wildlife Administration and Enforcement, and Nevada Administrative Code Chapter 503, Hunting, Fishing and Trapping; Miscellaneous Protective Measures. Nevada Revised Statute § 501.110 defines the various categories of wildlife in Nevada, including protected categories. Nevada Administrative Code §§ 503.010 to 503.080, 503.110, and 503.140 list the wildlife species currently placed in the state's various legal categories, including protected species, game species, and pest species.

3.16.1.5 Migratory Bird Treaty Act and Migratory Bird Conservation Act

Migratory birds, with the exception of native resident game birds, are protected under the provisions of the Migratory Bird Treaty Act of 1918. Under this act, nests with eggs or the young of migratory birds may not be harmed, nor may any migratory birds be killed. Measures to prevent bird mortality must be incorporated into the project's design.

The Migratory Bird Conservation Act of 1929, as amended, makes it unlawful to directly or indirectly harm migratory birds. If the USFWS determines that migratory birds could be harmed by BLM vegetation treatment actions, the two agencies would develop a site-specific assessment and mitigation to prevent harm to these birds.

Per the *BLM Nevada Wildlife Surveys* protocol, the BLM is required to conduct migratory bird surveys in and adjacent to (within 100 meters; 328 feet) a project area prior to disturbance. These surveys are adequate for up to 14 days. Additional surveys must be conducted after 14 days have elapsed if the project has not been implemented (USDOI BLM 2013j).

3.16.1.6 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC § 668) applies primarily to taking, hunting, and trading activities that involve any bald or golden eagle. The Act prohibits the direct or indirect take of an eagle, eagle part or product, nest, or egg. The term "take" includes "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Disturb is defined as to "agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: 1) injury to an eagle, or 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." Golden eagles are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, both of which prohibit take. Prior to conducting a treatment, the BLM would survey for eagles as per guidance in the *BLM Nevada Wildlife Surveys* protocol (USDOI BLM 2013j).

3.16.1.7 Other Regulations

The Sikes Act is federal legislation that authorizes the USDOI to plan, develop, maintain, and coordinate programs with state agencies for the conservation and rehabilitation of wildlife, fish, and game on public lands. The Fish and Wildlife Conservation Act of 1980 encourages federal agencies to conserve and promote the conservation of non-game fish and wildlife species and their habitats.

3.16.2 Affected Environment

3.16.2.1 Study Methods and Analysis Area

The NDOW provided a list of wildlife species that have been observed within the project area, or which NDOW biologists believe have a strong potential to occur within the project area, based on knowledge of the species' habitat preference and conditions. BLM biologists reviewed these lists prior to their incorporation into this document. The NDOW *Wildlife Action Plan* and the NDOW *Draft Nevada Wildlife Action Plan Public Review* provided information about key habitats and the species that depend on them, including species descriptions, range maps, and habitat needs (Wildlife Action Plan Team 2006, 2012). The *Revised Nevada Bat Conservation Plan* provided in-depth analysis of Nevada's bat species, habitat and conservation needs, and distribution (Bradley et al. 2006). The *Nevada Comprehensive Bird Conservation Plan* was used as a supplemental resource for information about bird life history and habitats, especially for those species not covered in either the 2006 or 2012 Wildlife Action Plans (Great Basin Bird Observatory 2010).

Several previous studies in or near the project area provided useful reference and analysis relevant to the proposed project. The most significant of these was the Mount Hope Project EIS (USDOI BLM 2012b). The Mount Hope Project is in the southeast corner of the 3 Bars Project area, and the study area for some aspects of the Mount Hope EIS included much the 3 Bars Project area. Finally, numerous Geographic Information System data files for wildlife species presence and seasonal habitat range were consulted in conjunction with the above referenced documents.

The project area for analysis of direct and indirect effects to wildlife resources is the 3 Bars Project area. The cumulative effects analysis area includes the 3 Bars Project area, and areas within 10 miles of the project area boundary, as shown in **Figure 3-1**.

3.16.2.2 Wildlife Habitat

Important wildlife habitat in the area includes big sagebrush (mountain, basin, and Wyoming big sagebrush), low sagebrush, pinyon-juniper woodlands, aspen, riparian, and salt desert scrub vegetation types. The components of these habitats are described in Section 3.12, Native and Non-native Vegetation Resources, while wetland, floodplain, and riparian habitats within the project area are described in Section 3.11, Wetlands, Floodplains, and Riparian Zones.

3.16.2.2.1 Sagebrush

Sagebrush communities in Nevada provide habitat for approximately 100 bird species and 70 mammal species, including at least 28 rodent species (Braun et al. 1976). Big sagebrush provides important habitat for many sagebrush obligate and facultative wildlife species. "Obligate" species are those that live only within a particular habitat type, while "facultative" species prefer a particular habitat, but are not restricted to it. Sagebrush lizard, Greater sage-grouse, sage thrasher, sage sparrow, Brewer's sparrow, sagebrush vole, pygmy rabbit, and pronghorn antelope are sagebrush obligate species (Paige and Ritter 1999, Knick et al. 2003). Low sagebrush areas provide seasonal habitat for some species and year-round habitat for smaller animal species. Sagebrush provides important nesting and foraging habitat, and protection from predators and from the weather. The deep, often sandy or loose soils are easy to dig, and burrowing and denning species are common. Sagebrush range in good condition typically supports a lush undergrowth of bunchgrasses and forbs. This highly productive understory is critical to the needs of wildlife species, including sagebrush vole and several species of shrew that depend on the productivity of the grass component for both prey production and cover (Wildlife Action Plan Team 2012).

Wildfire, spread of noxious weeds and other invasive non-native species, and pinyon-juniper encroachment are major threats to sagebrush habitat and associated wildlife (Connelly et al. 2004). The decline in sagebrush habitat in the western U.S. has resulted in the Greater sage-grouse being petitioned for listing as threatened or endangered, and shrubland birds are declining faster than any other group of species in North America (Knick et al. 2003). The Brewer's sparrow population has declined by over 50 percent since 1966, and the loggerhead shrike population continues to decline across its range (Wildlife Action Plan Team 2012).

3.16.2.2.2 Pinyon- juniper Woodland

Pinyon-juniper woodlands provide a variety of sheltering functions for wildlife that range from hiding cover to cavities and nest sites for birds, bats, and small mammals. Numerous wildlife species frequent pinyon-juniper habitats in the western United States. At least 70 species of birds and 48 species of mammals have been associated with these woodlands (Gottfried et al. 1995). Over the past 150 years, pinyon-juniper has expanded into sagebrush, riparian, and aspen habitats, to the detriment of species that use these habitats. Ironically, despite the increase in amount of pinyon-juniper habitat on the landscape, resident seed and fruit eating bird species such as pinyon jay, western scrub jay, and mountain chickadee are undergoing substantial population declines in the pinyon-juniper biome, while migratory insectivore populations are little changed (Sauer et al. 2008 *cited in* Great Basin Bird Observatory 2011).

The pinyon-juniper woodlands provide important thermal protection for wildlife during winter, and shelter from the intense sun during the summer. For birds and bats in particular, pinyon-juniper woodlands provide structure for nesting and roosting and locations for foraging that would otherwise be missing from the mid-elevation cold desert. The pinyon nut crop is an important food source for a number of species, including pinyon jay and a variety of small mammals. The juniper berry crop is also an important food resource for birds and small mammals (Wildlife Action Plan Team 2012). Pinyon-juniper at different successional stages offers different benefits for different species, and pinyon-juniper communities can range from open stands with a diverse understory of shrubs and grasses to closed woodlands with little understory vegetation. Open pinyon-juniper/big sagebrush/bunchgrass stands are mid-successional and characterized by herbaceous, shrub, and tree layers, and often host a high diversity of wildlife species. As western juniper dominance increases, structural diversity declines. Old growth stands also differ structurally from post-settlement woodlands, including having a greater density of cavities, which benefits cavity nesting species (Miller et al. 2005).

3.16.2.2.3 Aspen and Riparian

Wildlife use riparian zones disproportionately more than any other type of habitat in the Great Basin (see review in Thomas et al. 1979, Wildlife Action Plan Team 2012). Riparian habitat in the Great Basin supports a rich diversity of wildlife, including more than one-half of the bird species that breed regularly in the Great Basin (Wildlife Habitat Council 2005). Riparian areas provide important habitat for numerous wildlife species on the 3 Bars Project area, but several species, including northern leopard frog, Lewis' woodpecker, northern goshawk, mountain quail, willow flycatcher, Cassin's finch, montane shrew, and numerous species of bats preferentially use riparian zones (USDOI BLM 2003b, Wildlife Action Plan Team 2012).

Biological diversity is higher in aspen stands than in any other upland forest type in the West (Finch and Ruggiero 1993 *cited in* Kay 2003). Numerous wildlife species use aspen areas and aspen stands typically have high bird abundance and richness, but several species, including Lewis' woodpecker, northern goshawk, Cassin's finch, mountain quail, mule deer, and numerous species of bats preferentially use aspen habitats on the 3 Bars Project area (Wildlife Action Plan Team 2012). Aspen are found on scattered tracts on the 3 Bars Project area, but their future is uncertain. Studies in California, Oregon, and Nevada have shown that 12 percent of aspen stands have been completely replaced by pinyon-juniper, and pinyon-juniper was dominant or co-dominant on another 65 percent of stands (Kerr and Salvo 2007). Studies in Nevada and on the 3 Bars Project area have shown that unless protected by fencing, aspen stands are degraded by livestock. In areas where aspens were protected from grazing, they successfully regenerated and formed multi-aged stands. Aspen have also declined from fire suppression, but even if burned, will not regenerate if ungulate herbivory is excessive (Kay 2001, 2003, USDOI BLM 2010d).

Aspen communities are particularly important to cavity nesting species in Nevada because stems attain sizes over 10 inches diameter at breast height and the wood is soft and easy to excavate. Because large diameter aspen occur more frequently in riparian aspen stands, these areas tend to be preferred by cavity nesting species. In addition to cavities and peeling bark, mature aspen communities provide larger diameter trees utilized by wildlife as forage substrate or nesting. For example, northern goshawks can live in and utilize high-elevation shrub-steppe habitats because stringers of large-diameter aspen trees with closed canopies in the riparian zones will support their nesting needs. Birds and small mammals utilize mid-story structure and herbaceous/shrub understory of aspen communities for forage, nesting, and protective cover. Downed trees in aspen habitat can create slow moving water conditions favorable to Columbia spotted frog, a federal candidate species and BLM Special Status Species.

3.16.2.2.4 Salt Desert Scrub

The intermountain cold desert shrub, including salt desert scrub, is the most important habitat in Nevada for several BLM Special Status Species, including pale kangaroo mouse and loggerhead shrike. The shrub habitat provides nesting structure and protection from predators and the weather. This habitat is important to loggerhead shrike, which can attain high breeding densities in valley bottoms where individual shrubs can be quite large and provide good cover and nest protection. Soils tend to be loose and either sandy or gravelly and are often easy to dig, providing important denning and burrowing habitat. Small and medium mammals including rabbits, jackrabbits, and various rodents that forage in the brush serve as prey for raptors. Washes provide unique habitat for certain terrestrial species including amphibians. By retaining higher soil moisture than surrounding upland areas, they can serve as enhanced movement and migration pathways for these species and facilitate their distribution across the landscape, perhaps serving an important role in amphibian metapopulation maintenance. As a result of the limited water availability associated with salt desert scrub, the habitat is used seasonally by larger animals and provides a lower abundance of smaller animals than found in the more mesic plant communities (Wildlife Action Plan Team 2012).

3.16.2.3 Wildlife Species

Wildlife species and habitats occurring in the project area are typical of the central Basin and Range region, and are relatively abundant within and adjacent to the project area. Wildlife species that are not special status species are discussed below; a discussion of special status species, such as those listed as federally threatened or endangered, or BLM Special Status Species, follows. These discussions only address a portion of the wildlife species that occur within the 3 Bars Project area, and focus on those species where the BLM has the most information.

3.16.2.3.1 Reptiles and Amphibians

Records for amphibian occurrence within the project study area are lacking. Based on amphibian records in areas adjacent to the project study area, species occurrence could include the Great Basin spadefoot toad, western toad, northern leopard frog, and Columbia spotted frog (Petersen 2012). The Columbia spotted frog is discussed under BLM Special Status Species.

Potential habitat for amphibians within the project study area includes springs, wet areas, and streams. Many of the toad species, such as Great Basin spadefoot, utilize terrestrial habitats throughout most of the year, but they move to aquatic habitats for breeding in the spring or early summer.

The northern leopard frog was petitioned for listing, but the status review and 12-month finding concluded that listing the western population is not warranted at this time (USDOI USFWS 2011). Habitat for northern leopard frog typically includes springs and wet areas. Breeding typically occurs in the spring or early summer for leopard frogs.

There are a variety of snakes and lizards that are known either to occur or have the potential to occur within the project area, in almost every habitat type. Likely species include rubber boa and ringneck snake, which can occupy a variety of grassland and woodland habitats including aspen woodlands, and often occur near riparian zones. The greater short-horned lizard also uses a variety of habitats including sagebrush, and open pinyon-juniper woodlands, and prefers areas where substrate is stony, sandy, or firm, but usually where there is some fine loose soil**.** Desert horned lizard and long-nosed leopard lizard tend to prefer arid shrublands, and may occur in the project area, and the great basin rattlesnake is likely to occur in the broken rocks and brush habitats within the project area. Other reptiles known or likely to occur in the project area include coachwhip, common sagebrush lizard, great basin collared lizard, western fence lizard, long-nosed snake, and striped whipsnake (NDOW 2008a, 2009b, Wildlife Action Plan Team 2012).

3.16.2.3.2 Birds

Waterfowl

Waterfowl and wading birds occur in shallow lakes, marshes, grassy meadows, and wetlands. These birds may use the project area for breeding, as a wintering ground, as year-round habitat, or during migration. Snow geese, tundra swans, and other waterfowl overwinter within the project area, while mallards and Canada geese overwinter and breed here. Great blue heron forage in shallow water and marshy areas year-round, while populations of American bittern, black-crowned night heron, and sora use these habitat areas during the breeding season. Other species of waterfowl, including several species of teal as well as egret, rails, and coots, are known to occur in the project area. Migratory and breeding populations of sandhill crane use the wet meadows, riparian zones, and agricultural lands for foraging, and often congregate in large numbers in eastern Nevada, including all of Eureka County (Wildlife Action Plan Team 2006, 2012, Great Basin Bird Observatory 2010, Cornell Lab of Ornithology 2011).

Doves and Quail

Mourning dove and chukar partridge are small game birds that occur on the project area. Mourning doves primarily inhabit open country, areas with scattered trees, and woodland edges, and forage for seeds on the ground. They are frequently found along unimproved roads where they obtain gravel for food digestion, or near springs and artificial sources of water (Cornell Lab of Ornithology 2011, USDOI BLM 2012b). Mourning doves are a year-round resident in Nevada (Otis et al. 2008). Chukar partridge were introduced to Nevada in the 1940s and are now widely distributed. Optimum habitat for chukar partridge consists of steep rugged canyons with numerous talus slopes and rocky outcrops; the species typically inhabits rock outcrops and ledges adjoining grassy and sagebrush hillsides. Chukar partridge eat a variety of leafy green food, weed seeds, fruits, berries, insects, and beetles. Chukar partridge are common in the Roberts Mountains, Whistler Mountain, and Sulphur Spring Range. Occupation of seasonal habitat varies with moisture and snow levels. The birds typically move to lower elevations and south-facing slopes during heavy snow events, and concentrate around water sources during the summer months (USDOI BLM 2012b).

Raptors

A variety of raptors are known to use the project area for roosting, nesting, and/or hunting. Golden eagle, northern harrier, prairie falcon, Cooper’s hawk, ferruginous hawk, red-tailed hawk, Swainson’s hawk, sharp-shinned hawk, American kestrel, and western burrowing owl have been known to nest in the area. Nesting data since 2006 indicates active use of the area by prairie falcons, and kestrels. Northern goshawk, a BLM Special Status Species, occurs in riparian habitat in the Roberts Mountains area. There are also numerous historic nesting records for ferruginous hawk, another BLM Special Status Species, within open habitat areas of the 3 Bars project area, including a site in the southeastern section of the project area that has been used within the past 10 years, Flammulated owls may occur in woodland areas in the north-central part of the project area. Additional raptors sighted in the area include merlin and rough-legged hawk (Wildlife Action Plan Team 2006 and 2012, NDOW 2009c, 2010a, USDOI BLM 2012b).

Migratory Birds

Neo-tropical migrant birds are bird species that migrate from the temperate portions of the continent to winter in the tropics of North and South America. Neo-tropical migrants are most commonly associated with habitats having a strong vertical component of woody shrubs and trees. A number of migratory birds that breed in North America and winter in the neotropical region of South America also breed in the project area and vicinity.

Species commonly occurring in pinyon-juniper habitats and that are known to occur or have the potential to occur in the project area include the pinyon jay, western bluebird, Virginia’s warbler, black-throated gray warbler, and Scott’s oriole. Sage thrasher, Brewer’s sparrow, and sage sparrow use sagebrush habitats within the project area, while loggerhead shrike and green-tailed towhee also have potential to occur in the sagebrush habitats in the project area. Gray flycatcher is known to occur within the project area and may use pinyon-juniper, tall sagebrush, or riparian habitats (Great Basin Bird Observatory 2010, USDOI BLM 2012b, Wildlife Action Plan Team 2012). Other migratory species known to occur within the project area include common nighthawk, common raven, mountain bluebird, black-throated sparrow, lark sparrow, and western meadowlark.

3.16.2.3.3 Mammals

Large Game

Mule deer use a variety of vegetation types and habitats seasonally within the project area in their pursuit of forage, thermal cover, and escape cover for seasonal needs. Vegetation important for mule deer includes serviceberry, snowberry, mountain mahogany, sagebrush, aspen, cottonwood, willow, chokecherry, wild rose, singleleaf pinyon pine, Utah juniper, eriogonum, arrowleaf balsamroot, penstemon, phlox, sorrel, hawksbeard, lupine, and numerous forbs. Riparian vegetation along streams, meadow areas, and aspen stands are important fawn-rearing areas (USDOI BLM 2007g). Six mule deer herds have all or a portion of their range within the project area, including the Sulphur Spring herd, Whistler herd, Fish Creek herd, Roberts Mountain herd, Simpson Park herd, and Cortez Mountains herd (**Figure 3-39**). Mule deer habitat is concentrated primarily in the eastern half of the project area, including the Roberts Mountains area, and in the Simpson Park area.

Habitat for mule deer over much of the 3 Bars Project Area is in decline, and proposed treatments are designed to slow or reverse this trend (**Figure 3-40**). Factors contributing to this decline include pinyon-juniper encroachment into shrublands, decadent and unhealthy pinyon-juniper stands, high levels of hazardous fuels that could lead to a catastrophic wildfire and loss of deer habitat, livestock grazing, noxious weeds and other invasive non-native vegetation, and human-related disturbance.

The mule deer population in NDOW hunt units 141 through 145 has been stable to slightly increasing from 2009 to 2011, with a December 2011 population estimate of nearly 1,500 animals (NDOW 2012b, c). The Roberts Mountains deer are migratory in nature. Mule deer leave Roberts Mountains in October or November and migrate south into the Mountain Boy and Fish Creek Ranges south of U.S. Highway 50. The migration pattern includes moving south from Roberts Creek Ranch to Lone Mountain and from Henderson Summit along Whistler Mountain to Devils Gate (USDOI BLM 2012b).

Pronghorn antelope occupy the lowlands and the foothills of the project area and are mostly absent from the Roberts Mountains area (**Figure 3-41**; NDOW 2008b). Pronghorn numbers have increased throughout the area in recent years, partially in response to vegetation changes resulting from past range fires. Wyoming big sagebrush habitat is particularly important to pronghorn (Tsukamoto 2003). Important vegetation species for pronghorn include low sage, black sage, serviceberry, shadscale, winterfat, rabbitbrush, greasewood, ricegrass, needlegrasses, lupine, spurge, balsamroot, several eriogonum species, scarlet globe-mallow, phlox, locoweed, and other perennial forbs. Ten antelope herds have all or a portion of their range within the project area. The 2006 population estimate for the NDOW hunt units was 450 animals, up from 240 in 2002, and population growth was observed in 2011 (NDOW 2012b). The pronghorn antelope population in Kobeh Valley is low and variable with most of the antelope observed in the southern part of the valley near Lone Mountain and U.S. Highway 50 (USDOI BLM 2012b).

Habitat for pronghorn antelope over much of the 3 Bars Project Area is in decline, and proposed treatments are designed to slow or reverse this trend (**Figure 3-41**). Factors contributing to this decline include pinyon-juniper encroachment into shrublands, high levels of hazardous fuels that could lead to a catastrophic wildfire and loss of pronghorn antelope habitat, livestock grazing, noxious weeds and other invasive non-native vegetation that displace native forbs and grasses, dense stands of Wyoming big sagebrush, and human-related disturbance.

Bighorn sheep occur in mesic to dry grasslands or shrub-steppe in mountains, foothills, or river canyons, in areas with access to steep, rugged terrain for escape from predators. While historic populations of bighorn sheep were in most mountain ranges within Nevada, there are no known bighorn sheep populations with the 3 Bars Project area. The most recent NDOW sighting for bighorn sheep in the project area was in 1983, on the east side of the Roberts Mountains (NDOW 2008a, 2010b). Potential habitat for bighorn sheep exists in the Roberts Mountains area, the Whistler Range, Lone Mountain, the Simpson Park Mountains, and the Cortez Mountains (NDOW 2010b).

Other Mammals

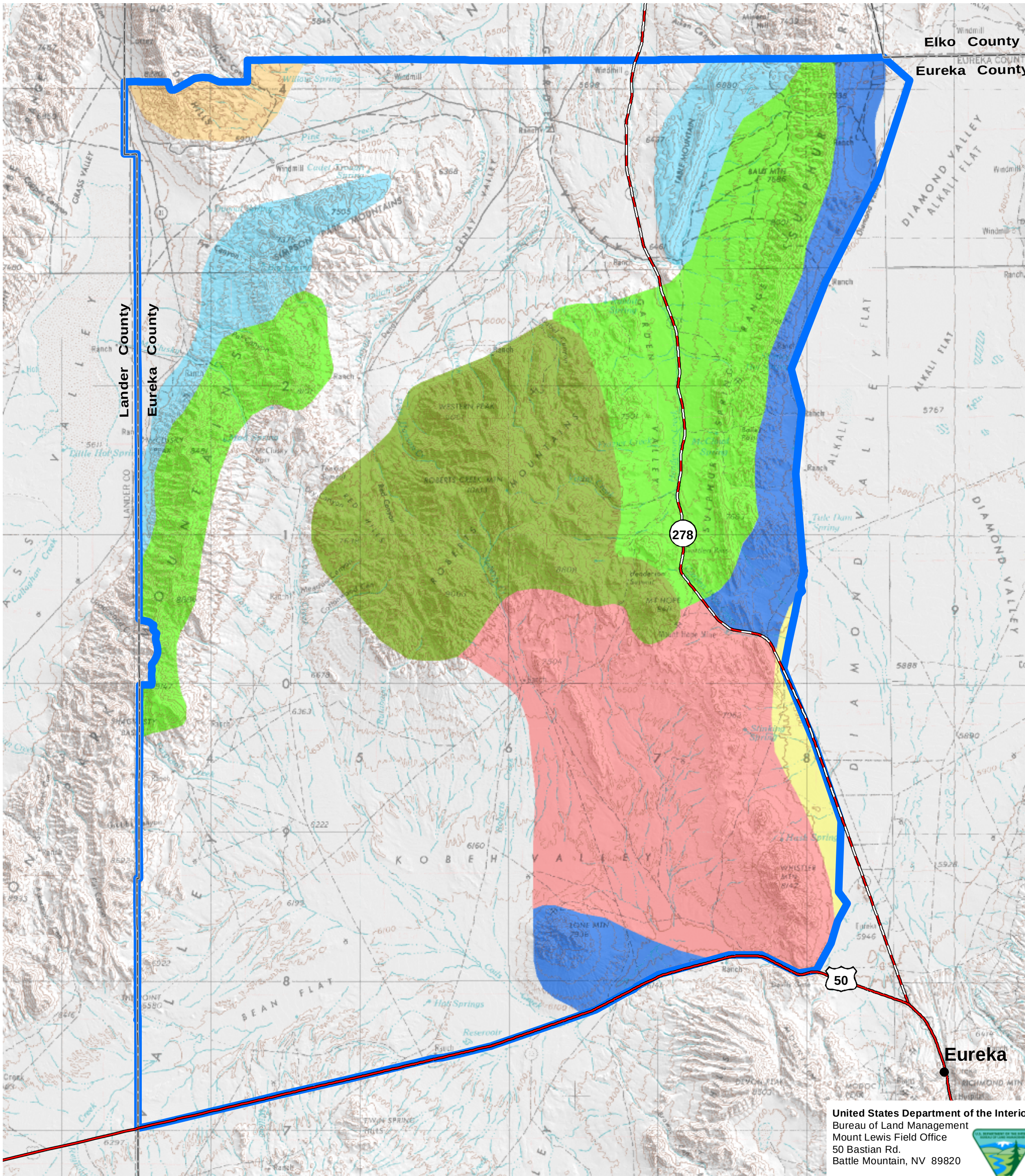
Cougars are found primarily in the mountainous portions of the 3 Bars Project area, and bobcats have been seen throughout the 3 Bars Project area, including near Table Mountain in the Sulphur Spring Range, along Vinini Creek on the Roberts Mountains, and in the central area south of Roberts Mountains. Coyotes occupy almost all habitat types and have been observed in the southern part of the project area (NDOW 2012d). One of the most diverse groups represented in the project area is rodents, with species of chipmunks, mice, ground squirrels, jumping mice, kangaroo rats, and voles present throughout. Members of the rabbit family, including pygmy rabbit, black-tailed jackrabbit, and mountain cottontail, also occur in the project area (USDOI BLM 2012b). Pika could be found on Roberts Mountains.

The *Revised Nevada Bat Conservation Plan* and NDOW data show several records for bat occurrences within the project area. Bats inhabit or utilize many niches across the 3 Bars landscape. These include caves, abandoned mines, cliffs, springs, riparian, aspen, pinyon-juniper, subalpine coniferous forest, and desert shrub habitats. The only documented bat occurrences in the project area are for long-eared myotis, which has been recorded on the eastern edge of the project area and in the Roberts Mountains. Townsend's big-eared bat and western small footed myotis may occur on the southeastern edge of the project area (Bradley et al. 2006, NDOW 2008a). Bat species are discussed in greater detail in the Special Status Species section.

3.16.2.3.4 Special Status Species

The following discussion of BLM Special Status Species is based on two lists: the BLM's Special Status Species list for the Battle Mountain District, and the NDOW list of species known to occur within the 3 Bars Project area or that NDOW biologists believe have the potential to occur within the project area, based on habitat needs and habitat conditions (NDOW 2012d). The lists were cross-referenced with each other to obtain a list of Special Status Species known to occur or with potential to occur within the 3 Bars Project area. NDOW Geographic Information System data were used to verify whether there are current or historic occurrences of a species within the project area, but because absence of a Geographic Information System record does not necessarily indicate that the species is absent, only that no record has been made of its presence in a particular location, the following section considers all BLM Special Status Species suspected or known to occur within the 3 Bars Project area.

Table 3-45 lists the special status species within the Project Area. Of these, the yellow-billed cuckoo is the only species federally listed as threatened or endangered; and the Columbia spotted frog is a federal candidate species.



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Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

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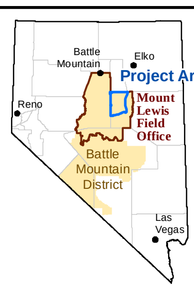


Legend

Mule Deer Habitat
- Summer Range
- Crucial Summer Range
- Winter Range
- Crucial Winter Range
- Transition Range
- Year-round Range
- Agricultural Lands/ Unique Habitat
- 3 Bars Project Area

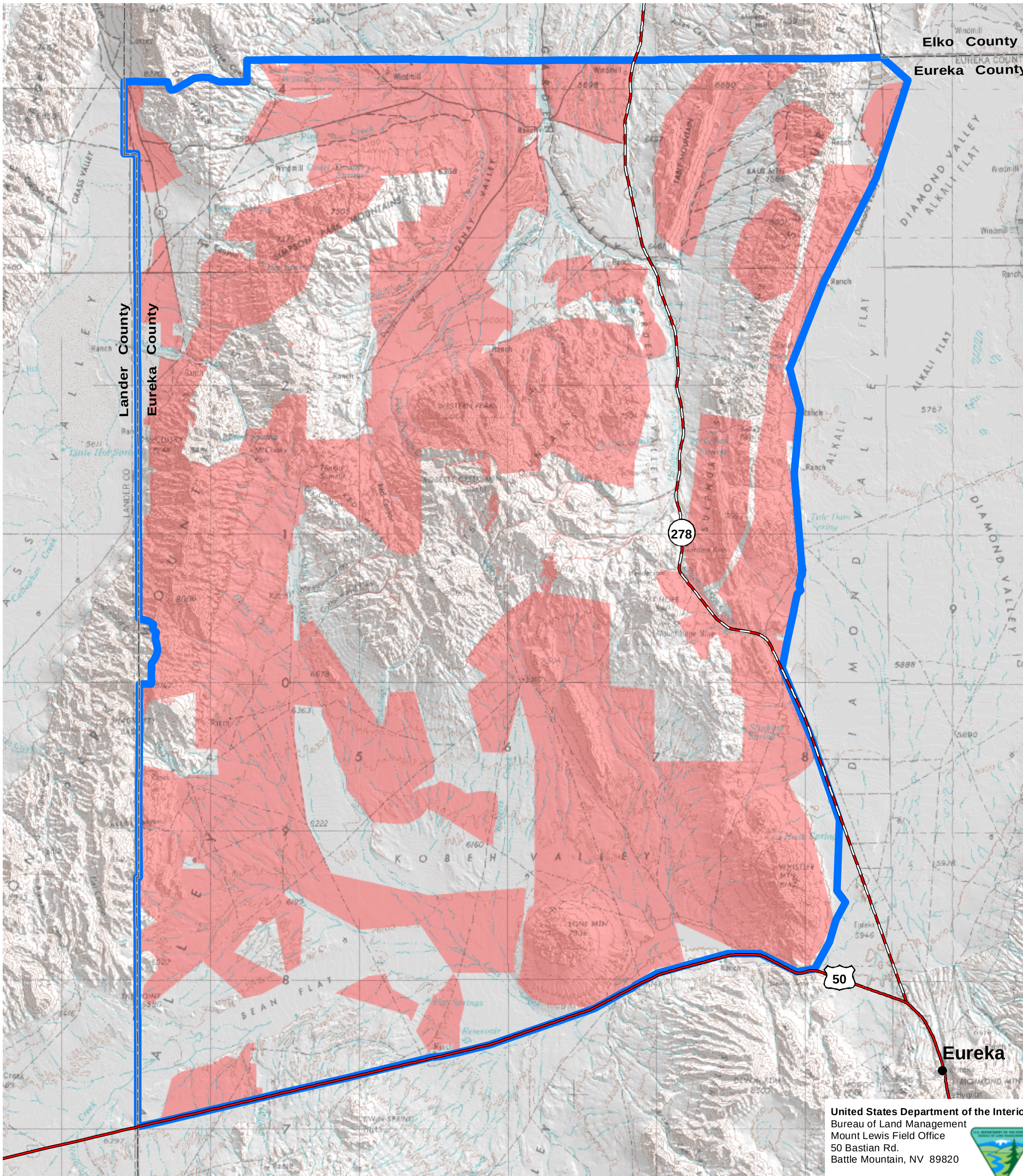
Source: NDOW 2009d.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-39

Mule Deer Habitat

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers



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3 Bars Ecosystem and Landscape Restoration Project

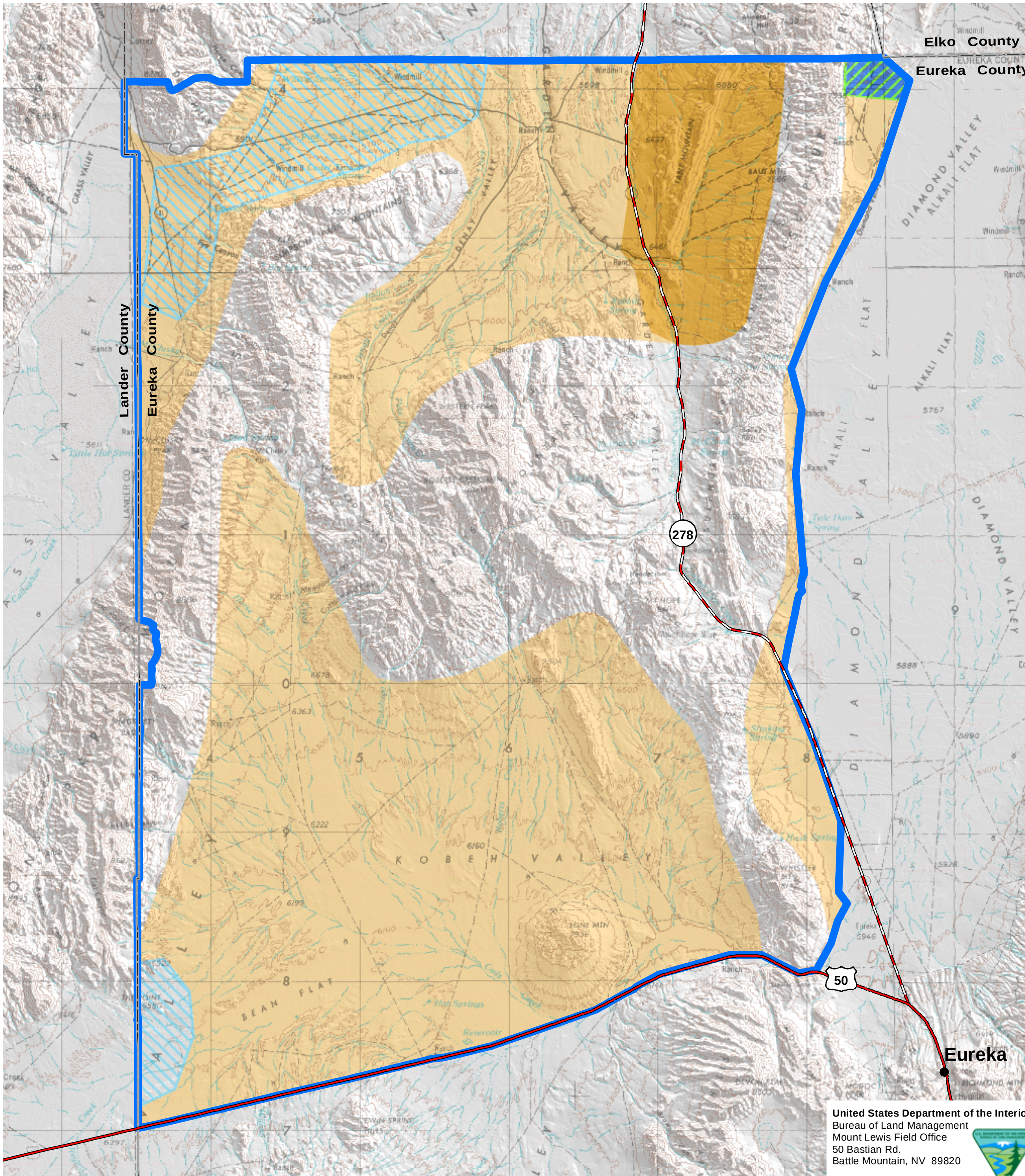
Figure 3-40

Areas with Degraded Habitat Conditions

Legend
- Degraded Habitat
- 3 Bars Project Area

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

Source: BLM 2009a.



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Legend

Pronghorn Habitat

- Summer Range
- Winter Range
- Crucial Winter Range
- Year-round Range
- Crucial Year-round Range
- 3 Bars Project Area

Source: NDOW 2008b.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-41

Pronghorn Habitat

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

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Amphibians

Columbia Spotted Frog

Columbia spotted frogs are closely associated with clear, slow-moving or ponded surface waters, with little shade, and relatively constant water temperatures. Breeding and egg-laying occurs in waters with floating vegetation and larger ponds such as oxbows, lakes, stock ponds, and beaver-created ponds; in some areas, this species is critically tied to beaver ponds. Adults are opportunistic feeders, and eat insects, mollusks, crustaceans, and spiders. Tadpoles eat decomposed plants and live green algae.

Columbia spotted frogs occur in three geographically separated subpopulations in the Jarbidge and Independence Mountains, the Ruby Mountains, and in the Toiyabe Mountains. There are no recorded occurrences in the project area.

TABLE 3-45

Special Status Species Known or with Potential to Occur on the 3 Bars Project Area

Common Name/Group	Scientific Name	Status	Habitat
REPTILES AND AMPHIBIANS			
Columbia spotted frog	*Rana luteiventris*	Federal Candidate	Clear, open, slow moving or still water with consistent temperature.
BIRDS			
Bald eagle	*Haliaetus leucocephalus*	BLM Sensitive	Large conifers for roosting.
Black rosy-finch	*Leucosticte atrata*	BLM Sensitive	Barren, rocky, or grassy areas and cliffs among glaciers or above timberline.
Brewer’s sparrow	*Spizella breweri*	BLM Sensitive	Sagebrush and large openings in pinyon-juniper.
Ferruginous hawk	*Buteo regalis*	BLM Sensitive	Pinyon-juniper edges, sagebrush, and other open areas and wooded edges.
Golden eagle	*Aquila chrysaetos*	BLM Sensitive	Open or sparsely wooded habitats in mountainous areas.
Greater sage-grouse	*Centrocercus urophasianus*	BLM Sensitive	Sagebrush.
Lewis’ woodpecker	*Melanerpes lewis*	BLM Sensitive	Aspen and riparian.
Loggerhead shrike	*Lanius ludovicianus*	BLM Sensitive	Desert scrub, especially creosote bush. Nests in sagebrush.
Northern goshawk	*Accipiter gentilis*	BLM Sensitive	Aspen and riparian.
Peregrine falcon	*Falco perigrinus*	BLM Sensitive	Desert scrub, including sage and steppe habitat near cliffs.
Pinyon jay	*Gymnorhinus cyanocephalus*	BLM Sensitive	Pinyon-juniper.
Sage thrasher	*Oreoscoptes montanus*	BLM Sensitive	Sagebrush.
Swainson’s hawk	*Buteo swainsoni*	BLM Sensitive	Wooded riparian near sage and brushland.

TABLE 3-45 (Cont.)

Special Status Species Known or with Potential to Occur in the 3 Bars Project Area

Common Name/Group	Scientific Name	Status	Habitat
BIRDS (Cont.)			
Western burrowing owl	*Athene cunicularia*	BLM Sensitive	Sagebrush.
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Riparian obligate and dense riparian cottonwood-willow stands.
MAMMALS			
California myotis	*Myotis californicus*	BLM Sensitive	Desert to forest.
Dark kangaroo mouse	*Microdipodops megacephalus*	BLM Sensitive	Sagebrush.
Fringed myotis	*Myotis thysanodes*	BLM Sensitive	Desert to forest.
Hoary myotis	*Lasiurus cinereus*	BLM Sensitive	Forests/woodlands, including pinyon-juniper and forested riparian zones.
Little brown bat	*Myotis lucifugus*	BLM Sensitive	Associated with coniferous forest with a nearby water source.
Long-eared myotis	*Myotis evotis*	BLM Sensitive	Coniferous forests.
Long-legged myotis	*Myotis volans*	BLM Sensitive	Pinyon-juniper woodland and montane coniferous forests. May use shrub habitat including sagebrush.
Pygmy rabbit	*Brachylagus idahoensis*	BLM Sensitive	Sagebrush.
Silver-haired bat	*Lasionycteris noctivagans*	BLM Sensitive	Forests and wooded areas near water, including pinyon-juniper forests and wooded riparian corridors.
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM Sensitive	Caves and mines in a variety of habitats, including pinyon-juniper and mahogany woodlands.
Western pipistrelle	*Parastrelluss hesperus*	BLM Sensitive	Desert habitats including sagebrush, and occasionally in pinyon-juniper habitat with rock outcrops and canyons.
Western small-footed myotis	*Myotis ciliolabrum*	BLM Sensitive	Various, including grasslands, shrubland, coniferous forest, and urban settings.

Sources: Bradley et al. (2006), Great Basin Bird Observatory (2010), and Wildlife Action Plan Team (2012).

Birds

Greater Sage-grouse

Greater sage-grouse are largely dependent on sagebrush for nesting and brood rearing and feed almost exclusively on sagebrush leaves during the winter. Greater sage-grouse are known to occur in foothills, plains, and mountain slopes where sagebrush meadows and aspen are in close proximity. A dense sagebrush overstory and an herbaceous understory of grasses are important to provide shade and security, and both new herbaceous growth and residual cover are important in the understory.

Greater sage-grouse have specific habitat requirements to carry out their life cycle functions. Early spring habitats or breeding sites called “leks” are usually situated on ridge tops or grassy areas surrounded by a substantial brush and herbaceous component (USDOI BLM 2012b). Leks have less herbaceous and shrub cover than the surrounding areas. In early spring, males gather in leks where they strut to attract females. Nests are located in thick cover in sagebrush habitat and consist of a shallow depression on the ground. Habitat for brood-rearing in early spring is critical to brood survival. Important habitat components for brood rearing include a sagebrush overstory, an herbaceous understory, and the presence of plentiful insects, especially wasps, bees, ants and beetles, which provide a high-protein diet for broods. Insects are especially important in the diet of newly hatched broods. Over the fall, birds shift from consuming large amounts of forbs to eating mostly sagebrush. Access to sagebrush for food and cover in winter is critical to their survival.

Greater sage-grouse habitat is found over most of the 3 Bars Project area. The distribution of Greater sage-grouse on the project area is closely tied to the sagebrush ecosystem that provides nesting, brood-rearing, and fall/winter cover as well as forage throughout the year. Summer habitat consists of sagebrush mixed with areas of wet meadows, riparian, and irrigated agricultural fields. Fall habitat consists of a mosaic of low-growing sagebrush and Wyoming big sagebrush. Winter habitat is contingent on the severity of winter weather, topography, and vegetative cover, but access to sagebrush for food and cover in winter is critical to Greater sage-grouse survival.

Late spring habitat and nesting sites are in thick cover in sagebrush habitat beneath sagebrush or other shrubs. Individual Greater sage-grouse move seasonally between habitat types throughout the year (USDOI BLM 2012b). With the exception of a few of the higher elevation areas, all of the 3 Bars project area is within the summer distribution range for Greater sage-grouse. Nearly all of the foothills and lowland areas are within the winter range of the species, and Kobeh Valley and Denay Valley are within nesting range.

The NDOW defines lek status as active, inactive, historic, or unknown. An active lek is defined as a lek that had two or more birds present during at least one of three or more surveys in a given breeding season. For a strutting ground to attain this status, it must also have had two or more birds present during at least 2 years in a 5-year period. An inactive lek is a lek that has been surveyed three or more times during one breeding season with no birds detected during the surveys and no sign observed on the lek. If a lek is only surveyed once during a breeding season and was surveyed under adequate conditions and no birds were observed at the location during the current and the previous year and no sign was observed at the lek, then an inactive status can be applied to the lek. An unknown lek is a lek that may not have had birds present during the last survey, but could be considered viable due to the presence of sign at the lek. This designation could be especially useful when weather conditions or observer arrival at a lek could be considered unsuitable to observe strutting behavior. The presence of a single strutting male would invoke the classification of the lek as unknown. A lek that was active in the previous year, but was inadequately sampled (as stated above) in the current year with no birds observed could also be classified as unknown. An historic lek is a lek that has not had bird activity for 20 years or more and has been checked according to protocol at least intermittently. Another means of classifying a lek as historic is to photograph a lek location and determine if the habitat is suitable for normal courtship displays. For example, if a lek location lies in a monotypic stand of sagebrush that is 3 to 4 feet tall, then conditions are no longer suitable for leking activity.

The BLM and Forest Service have developed a National Greater Sage-Grouse Planning Strategy for identifying important Greater sage-grouse habitat. Currently, agencies are utilizing habitat classifications addressed in the

ARMPA to guide land use decisions— Priority Habitat Management Areas (PHMA), General Habitat Management Areas (GHMA) and Other Habitat Management Areas (OHMA). Priority Habitat Management Areas and General Habitat Management Areas indicate where land-use changes could result in an expected negative impact to sage-grouse population health and are shown on **Figure 3-42** for the 3 Bars Project area. These classifications are a conglomeration of NDOW Greater seasonal sage-grouse data.

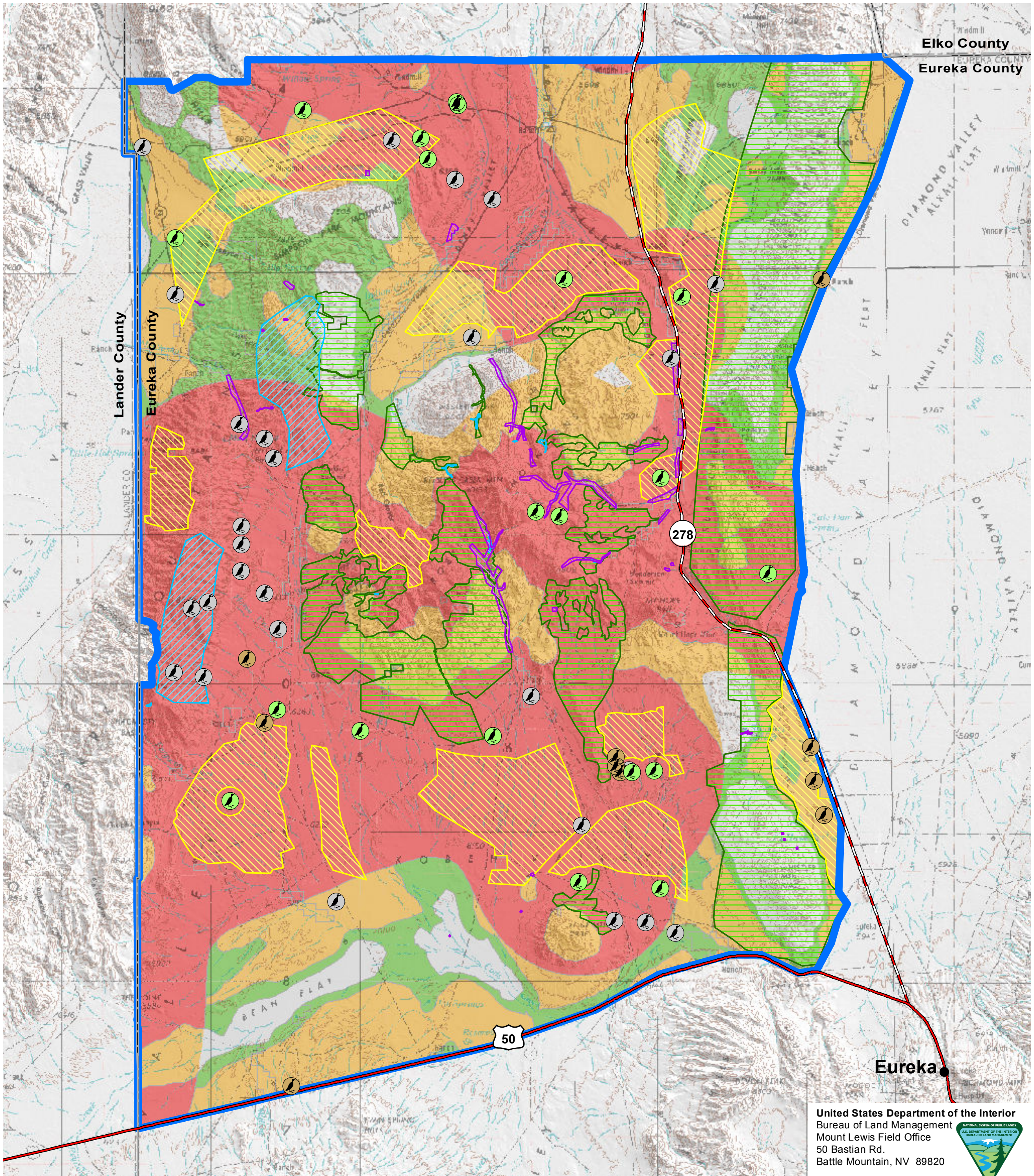
Priority Habitat Management Areas consist of essential, irreplaceable and important habitats for Greater sage-grouse. These areas include breeding habitat (lek sites and nesting habitat), brood-rearing habitat, winter range, and important movement corridors. Priority Habitat Management Areas primarily consists of sagebrush, but may also include riparian communities, perennial grasslands, agricultural land, and restored habitat, including recovering burned areas. The BLM and the Forest Service define PHMA as having the highest conservation value to maintaining sustainable Greater sage-grouse populations.

General Habitat Management Areas consist of habitat types of moderate importance to Greater sage-grouse, however, GHMA may also include areas of higher quality habitat that lacks bird survey and inventory data to support a priority habitat ranking. General Habitat Management Areas provides some benefit to Greater sage-grouse populations but, in many instances, lacks a key component, such as adequate shrub height or density or sufficient herbaceous understory, which prevents it from meeting its full ecological potential. General Habitat Management Areas also may include areas burned recently that have not sufficiently recovered or sagebrush communities with pinyon-juniper encroachment. The BLM and the Forest Service define GHMA as lands where some special management will apply to sustain Greater sage-grouse populations. General Habitat Management Areas have the potential to be reclassified as Priority Habitat Management Areas if restoration efforts enhance the habitat quality or ongoing field efforts document Greater sage-grouse use.

Other Habitat Management Areas consist of lands identified as unmapped Greater sage-grouse habitat that are within the planning area and contain seasonal or connectivity habitats.

The Greater sage-grouse population trends are tracked based on the number of males per lek (Sage- and Columbian Sharp-Tailed Grouse Technical Committee 2008). Individual Greater sage-grouse counts can vary year to year and approximately 10 years of data are required to establish population trends. Populations in Eureka County showed a 25 percent increase between 2011 and 2012, but are only 55 percent of the highest recorded levels in 1986. The peak male attendance at ten comparable leks surveyed in 2012 was 259, for an average of 25.9 males per lek. In 2011, 207 males were counted for an average of 20.7 males per lek. The average in 2006 was 41 males, which is the highest average since the 1986 average of 47 males. In addition to trend counts there were additional leks monitored by the NDOW, BLM, and University of Nevada-Reno graduate students in 2012. The 18 leks monitored in 2012 had 346 males in attendance for an average of 19.2 males per lek. In 2011, these same leks had 307 males yielding an average of 17.1 males per lek for a 12 percent increase from 2011 to 2012. Within the 3 Bars project area, there were 21 active leks surveyed in 2012; 339 males were counted, for an average of 16.1 males per lek. An additional 27 leks have a status of unknown, and there are 10 historic lek sites (**Figure 3-42**; Podborny 2012).

Habitat for Greater sage-grouse over much of the 3 Bars Project Area is in decline, and proposed treatments are designed to slow or reverse this trend (**Figure 3-40**). The most significant threats to Greater sage-grouse in Nevada are natural system modifications due to wildfire and the subsequent loss of habitat as well as impacts of invasive species (cheatgrass) and pinyon-juniper encroachment. Other threats include habitat fragmentation and disturbance, particularly roads and utility service lines as a result of both renewable and non-renewable energy resources, and degradation caused by overgrazing, mining, and recreational activities.



Legend

Greater Sage-grouse Leks and Habitat

- Active Lek
- Historic Lek
- Unknown Lek Status
- Priority Habitat Management Area
- Other Habitat Management Area
- General Habitat Management Area
- Non-Habitat
- Pinyon-juniper Treatment Area
- Sage Treatment Area
- Aspen Treatment Area
- Riparian Treatment Area
- 3 Bars Project Area

Source: BLM 2012f,k.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-42

Greater Sage-grouse Leks and Habitat

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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Bald Eagles

Bald eagles are found throughout Nevada as part of the species winter range and are known to occur within the project area, with most occurrences along the northeastern edge of the project area boundary. Bald eagles roost preferentially in large conifers or other sheltered sites in winter and typically select the larger, more accessible trees. There are no known bald eagle nesting sites within the project area (NDOW 2009c).

Golden Eagle

Golden eagles are found throughout Nevada and the project area. Golden eagles are generally found in a variety of open to semi-open landscapes, especially in hilly or mountainous regions, and avoid heavily forested areas. This species typically nests on rock ledge on cliffs or occasionally in large trees. Pairs may have several nests, and may use the same nest in consecutive years or shift to using an alternate nest in different years. Nests have been recently found in the project area (USDOI BLM 2012b). Golden eagles feed mainly on small mammals (e.g., rabbits, marmots, ground squirrels), although they are opportunistic and may also eat insects, snakes, birds, young deer or pronghorn antelope, and carrion.

Northern Goshawk

Northern goshawks breed and winter throughout the state. Northern goshawks rely on open sagebrush adjacent to riparian and aspen stands for foraging, and aspens are a key habitat feature. Nests are generally constructed in the largest trees in dense, large tracts of mature or old growth aspen stands with high canopy closure (60 to 95 percent) and sparse ground cover, near the bottom of moderate slopes, and near water or dry openings. Prey items include tree squirrels, ground squirrels, rabbits, and various bird species, depending on availability. Within the project area, northern goshawks are known from aspen and riparian habitat in the west-central Roberts Mountains (NDOW 2009c).

Peregrine Falcon

Peregrine falcons use various open environments including steppe, over open water, and desert shrub habitats including sagebrush, usually in close association with suitable nesting cliffs. They can also be found in mountainous, open forested regions, and human population centers. Peregrine falcons often nest on ledges or in holes on rocky cliff faces, commonly in sites sheltered by an overhang. There is an historic NDOW record for peregrine falcons in the Roberts Mountains (NDOW 2009c). Peregrine falcons feed primarily on birds, ranging in size from medium songbirds up to small waterfowl. They may also hunt small mammals, such as bats, or lizards, fishes, and insects.

Swainson's Hawk

Swainson's hawks are a spring and summer resident of Nevada, including the project area. Open riparian woodlands, including aspen woodlands, with significant expanses of pasture, agricultural fields, wet meadow, or open shrublands with grass cover in the immediate vicinity, provide an ideal landscape for the Swainson's hawk. The preferred nesting site is in large riparian trees. Small mammals are typical prey (Great Basin Bird Observatory 2010).

Ferruginous Hawk

Ferruginous hawks are year-round and breeding residents in central Nevada, including the 3 Bars Project area. Habitat includes open country, sagebrush, saltbush-greasewood shrubland, and the periphery of pinyon-juniper and other woodland and desert communities. In Nevada, ferruginous hawks nest primarily in live juniper trees. Mammals are the primary prey during the breeding season, although birds, amphibians, reptiles, and insects are also taken. Ferruginous hawk sightings in the 3 Bars Project area have occurred around the perimeter of the project area in relatively level, open terrain. There are over 50 records for nesting sites within the project area, although only one of these, in the southeastern corner of the project area, has been observed active within the past 10 years (NDOW 2009c). Small mammals are the primary prey during the breeding season, although birds, amphibians, reptiles, and insects also are taken.

Western Burrowing Owl

Western burrowing owls are mostly migratory in northern Nevada, although some individuals may overwinter. Preferred habitat is characterized by short vegetation and the presence of fresh small mammal burrows, indicating an abundance of the deer mice and meadow voles that are preferred food. Western burrowing owls typically nest and roost in burrows abandoned by grounds squirrels, badgers, fox, and tortoise, although they occasionally excavate fresh burrows (Wildlife Action Plan Team 2006).

Within the project area, there are records for western burrowing owl from the open lands surrounding the Roberts Mountains. The most recent record is for two owls sighted at a burrow in 2006, in the southwestern quadrant of the project area. (NDOW 2009c).

Yellow-billed Cuckoo

The yellow-billed cuckoo is listed as threatened, under the Endangered Species Act. Historically, the species was found state-wide areas of large, contiguous, densely wooded cottonwood-willow riparian habitat. The species nests in willows and forages for large insects, its primary food source, in cottonwood trees. The last sighting of yellow-billed cuckoo in or near the project area was in 1976, just outside of the southeast corner of the project area boundary (Nevada Natural Heritage Program 2006).

Lewis' Woodpecker

Lewis' woodpeckers are a year-round resident within the project area. Important habitat features include an open tree canopy, a brushy understory with ground cover, dead trees for nest cavities, dead or downed woody debris, perching sites, and abundant insects. In Nevada, this species is most strongly associated with deciduous riparian woodlands dominated by aspen or cottonwood (Great Basin Bird Observatory 2010). The species is a weak excavator, and as such it is dependent on dead trees, and tends to nest in existing tree cavities. Key habitat factors include the presence of large, partly decayed snags, an open forest structure for aerial foraging, and a well-developed shrub or native herbaceous layer that promotes healthy populations of flying insects.

Lewis' woodpeckers feed on insects including ants, beetles, flies, grasshoppers, tent caterpillars, and mayflies during the summer, and ripe fruit and nuts in the fall and winter. Unlike other woodpeckers, Lewis' woodpeckers do not bore for insects, but will catch them in flight, glean insects from tree branches or trunks, and forage on the ground. Lewis' woodpeckers are suspected, but not documented, within the project area (Great Basin Bird Observatory 2010).

Loggerhead Shrike

Loggerhead shrikes are a year-round resident throughout the state. This species breeds in open country with scattered trees and shrubs, savanna, desert scrub, and, occasionally in open woodlands. Loggerhead shrikes often perch on poles, wires, or fence posts and suitable hunting perches are an important part of the habitat. Nesting habitat includes shrubs and small trees, including cholla cactus and sagebrush.

Loggerhead shrike feed primarily on large insects, small birds, lizards, frogs, and rodents, and will occasionally scavenge. While there are no records for loggerhead shrike within the project area, there are occurrence records near the southeastern edge of the project area.

Sage Thrasher

Sage thrashers occupy the Great Basin region of Nevada including the project area. Sage thrashers breed and forage in sagebrush, juniper, mountain mahogany, and aspen communities, and have a preference for patchy habitat with adequate shrub cover. The species occasionally nests on the ground but more typically nests in low shrubs, typically sagebrush. Sage thrashers feed on a wide variety of insects, including grasshoppers, beetles, weevils, ants, and bees, as well as fruits and berries. There are extant sage thrasher records for the southeastern corner of the project area (Great Basin Bird Observatory 2010).

Black Rosy-finch

Black rosy-finches winter in central Nevada, including the project area (Ellsworth 2013). This species uses barren, rocky, or grassy areas and cliffs among glaciers or beyond timberline as habitat. During migration and winter this species also occurs in open fields, cultivated lands, brushy areas, and around human habitation. Black rosy-finches usually nest in rock crevices or in holes in cliffs above snow fields, although it may nest in old abandoned buildings, mine shafts, or other protected sites. The black rosy-finch forages on the ground for seeds. In the spring, it gleans wind-blown insects from the snow, and later in the season it may glean insects from vegetation or may chase flying insects and catch them in the air.

Brewer’s Sparrow

Brewer’s sparrows breed in northern Nevada, including the project area, but does not overwinter in the project area. The species is strongly associated with healthy sagebrush habitats, and prefers areas with patchy cover by scattered tall shrubs and short grasses. Brewer’s sparrows can be found to lesser extent in mountain mahogany and rabbitbrush habitats, bunchgrass grasslands with shrubs, bitterbrush, ceanothus, and manzanita, and in large openings in pinyon-juniper stands. Sagebrush is the preferred nesting habitat.

Brewer’s sparrows are primarily a ground forager. During the summer they eat a variety of insects, and in the fall and winter transitions to a diet of seeds. Brewer’s sparrow nest in sagebrush throughout the 3 Bars Project area (Ellsworth 2013).

Pinyon Jay

Pinyon jays are a year-round resident anywhere in Nevada where pinyon pine occurs, including appropriate habitats in the project area. Pinyon jays have a strong preference for pinyon-juniper woodlands, and occur less frequently in pine habitats. During the non-breeding season, this species may also occur in scrub oak and sagebrush. Pinyon jays nest in shrubs or trees when adequate numbers of pine seeds are available. The pinyon jay diet consists of pinyon nuts and other pine seeds, berries, small seeds, and grain, as well as insects including beetles, grasshoppers, caterpillars, and ants. Pinyon jays may also eat bird eggs and hatchlings. Pinyon jays have been observed on Roberts Mountains and Sulphur Spring Range (Ellsworth 2013).

Mammals

Dark Kangaroo Mouse

The dark kangaroo mouse inhabits stabilized dunes and other sandy soils in valley bottoms and alluvial fans dominated by big sagebrush, rabbitbrush, and horsebrush. These nocturnal rodents typically occur in sandy habitats below the elevation where pinyon-juniper occur and above elevations where greasewood and saltbush predominate. Although restricted to sand, it displays a broad tolerance for soils with varying amounts of gravel. Seeds are the primary food source although it will also eat some insects. It does not appear to use free-standing water and probably gets moisture from its food sources. It is believed to store food in seed caches within the burrow system.

There is one extant record for dark kangaroo mouse within the project area. This record is from 2005, in the southeast Kobeh Valley near Whistler Mountain (NDOW 2008a). The potential range of the species includes appropriate habitat throughout the project area.

Pygmy Rabbit

The pygmy rabbit is a diminutive native species that is found primarily on plains dominated by big sagebrush and on alluvial fans where plants occur in tall, dense clumps. Deep, loose soils are required for burrow excavation, although they will occasionally occupy burrows dug by other animals in harder soils. Big sagebrush is the primary food and may comprise up to 99 percent of food taken in winter and 51 percent in the summer. Wheatgrass and bluegrass are highly preferred foods in the summer. Cheatgrass invasion is detrimental to pygmy rabbits. Shrub cover is necessary for protection during dispersal and cheatgrass monocultures may provide a barrier to dispersal. Pinyon-juniper encroachment decreases understory species and, in turn, decreases suitable pygmy rabbit habitat. Pygmy rabbits spend the majority of their lives within 40 feet of their burrows (Utah Division of Wildlife Resources 2003), although occasionally males will venture more than 2 miles during the breeding season (Katzner and Parker 1998).

Pygmy rabbits are found in several locations in the project area, including along the east side of the Kobeh Valley, several locations along riparian systems in the central and southern portion of Roberts Mountains, and in the Parks Mountains north of Cottonwood Canyon. Surveys conducted in the southeast portion of the project area as part of the Mount Hope Project EIS found 19 burrows and 10 pygmy rabbits. The majority of the sightings and burrows were along the old railroad grade to the west of and paralleling State Route 278, and numerous sightings and burrow complexes were also along the alluvial fan east of Mount Hope Spring (NDOW 2009c, e, USDOI BLM 2012b).

California Myotis

The California myotis is found throughout Nevada, primarily at elevations below 6,000 feet amsl. The species is somewhat of a habitat generalist, and is found in habitats ranging from desert scrub to forested areas. This bat roosts in crevices, including those found in mines, caves, buildings, rocks, hollow trees, and under bark. California myotis forages in the open for a variety of small insects such as moths, flies, and beetles. Most records for the species are from southern Nevada, but the species has the potential to occur in the project area (NDOW 2008a).

Fringed Myotis

The fringed myotis is found throughout central and southern Nevada in a wide range of appropriate habitat, from low desert scrub to high elevation coniferous forests, including white fir forests and pinyon-juniper woodlands. This species roosts in mines, caves, trees, and buildings, and may also use rock crevices, tree hollows, and rock crevices in cliff faces. Nurseries and hibernacula are generally mines or caves. Foraging occurs in and among vegetation, with some gleaning activity. In some areas, there is evidence that fringed myotis use forest edges as well as areas above the forest canopy for foraging. The fringed myotis eats a variety of insects but seems to preferentially select beetles. There are no records for fringed myotis within the project area (NDOW 2008a).

Hoary Bat

The hoary bat is a tree-roosting species, found primarily in forested/woodland upland habitats such as pinyon-juniper and conifers, as well as in gallery forest riparian zones. Hoary bats day roost 10 to 18 feet above ground in trees that offer good protective leaf cover, but that are open below to facilitate flying in and out of the roost. Hoary bats may migrate for the winter or hibernate on tree trunks, in a tree cavity, or in a squirrel's nest. Food items include a variety of insects but moths, dragonflies, and beetles feature prominently. Foraging is generally over the tree canopy. In the open, rapid descending arcs are exhibited. Hoary bats will follow watercourses for foraging and drinking. The nearest records for hoary bat are southwest of the project area although their range includes the project area (NDOW 2008a).

Little Brown Bat

The little brown bat is found primarily at higher elevations, and is often associated with coniferous forest and with larger bodies of water or rivers. Often, roost sites are associated with these aquatic features. Little brown bats have adapted to using human-made structures for resting and maternity sites, but will also use caves, hollow trees, and rock outcrops. These bats feed heavily on aquatic insects such as caddisflies, midges, and mayflies, although a variety of other terrestrial insects may be eaten. Foraging occurs in open areas among vegetation, along water margins, and sometimes a few feet above the water surface.

In the eastern U.S., little brown bats suffer from white-nose syndrome, with over 5 percent mortality in some areas, Should the disease spread to the west, white nose syndrome would be a significant threat to the overall viability of the species. Little brown bat is more common in the northern part of Nevada. There are no records for little brown bat in the project area (NDOW 2008a).

Long-eared Myotis

The long-eared myotis is usually associated with coniferous forests. Individuals roost under exfoliating tree bark, and in hollow trees, and occasionally in caves, mines, cliff crevices, sink-holes, and rocky outcrops on the ground. It is often described as a hovering gleaner that feeds by eating prey off foliage, tree trunks, rocks, and from the ground. The species is found throughout the state and its range includes the project area; there are species records for long-eared myotis in the Roberts Mountains (NDOW 2008a).

Long-legged Myotis

The long-legged myotis is found in pinyon-juniper woodland and montane coniferous forest habitats, and is occasionally found in salt desert scrub, blackbrush, mountain shrub, and sagebrush habitats. This species roosts primarily in hollow trees, particularly large-diameter snags or live trees with lightning scars, and may use rock crevices, caves, mines, and buildings when available. Long-legged myotis feeds primarily on moths, but also feeds on beetles, flies, and termites.

The species is found throughout the state and its range includes the project area. There are no species records for long-legged myotis in the project area (NDOW 2008a).

Silver-haired Bat

The silver-haired bat is a forest-associated species and is more commonly found in mature forests. These bats are found primarily at higher latitudes and altitudes in coniferous and mixed deciduous and coniferous forests/woodlands of pinyon-juniper, limber pine, aspen, cottonwood, and, willow. These bats forage for a wide variety of insects above the forest canopy or along wooded edges, roadsides, and the edges of streams and waterbodies. Moths appear to be a major portion of their diet. Loss of foraging habitat in riparian zones is a threat.

The species is found throughout the state and its range includes the project area. There are no species records for silver-haired bats in the project area (NDOW 2008a).

Townsend's Big-eared Bat

The Townsend's big-eared bat roosts in mines, caves, and cave-like spaces in pinyon, curl-leaf mountain mahogany, blackbrush, sagebrush, salt desert scrub, agricultural, and occasionally urban habitats. Foraging associations include the edge of habitats along streams that are adjacent to and within a variety of wooded habitats. Townsend's big-eared bats are moth specialists, with nearly all of their diet consisting of moths.

The species' range includes the entire state including the project area. The nearest records to the project area for Townsend's big-eared bat are immediately north and northwest of the project area and southeast of the project area (NDOW 2008a).

Western Pipistrelle

The western pipistrelle can be found in Sonoran desert habitats of blackbrush, creosote, salt desert shrub, and sagebrush, with occasional occurrence in pinyon-juniper woodlands, usually in association with rock features such as granite boulders and canyons. The species typically roosts in rock crevices, but may use mines, or, less frequently, buildings and vegetation. Food includes small moths, leafhoppers, mosquitoes, and flying ants. Foraging occurs in the open.

The species is found throughout most of the state, primarily in the southern and western portions. The species has the potential to occur in the project area although there are no records for western pipistrelle in the project area (NDOW 2008a).

Western Small-footed Myotis

The western small-footed myotis is found in a variety of habitats including desert scrub, grasslands, sagebrush steppe, blackbrush, greasewood, pinyon-juniper woodlands, pine-fir forests, agricultural, and urban areas. This species is a crevice rooster and uses mines, caves, buildings, rock crevices, hollow trees, and exfoliating bark on trees. Western small-footed myotis forages early in the evening on a variety of insects including small moths, flies, ants, and beetles that occur in open areas.

The species is found throughout Nevada except for the far southeastern corner of the state. The species has been observed near the southeast corner of the project area (NDOW 2008a).

3.16.3 Environmental Consequences

3.16.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, a number of concerns specific to wildlife and 3 Bars ecosystem restoration were identified and are discussed in this section. These include:

- Reduction in the amount of key wildlife habitat because of degraded range conditions due to past rangeland management practices and past range disturbances.
- Project actions could have large-scale effects ranging from increased sedimentation of streams to major fragmentation of pinyon jay, Virginia's warbler, Greater sage-grouse, Brewer's sparrow, and other sensitive species' habitat.
- Encroachment and expansion of pinyon-juniper into important habitat for Greater sage-grouse or other wildlife species.
- Proposed treatments in pinyon pine woodlands and any resulting impacts to pine nuts could impact several species of birds and mammals, including pinyon jay and mule deer.
- There is a need to thin pinyon-juniper along drainages to improve water flows in streams and to open up corridors for animal movement on the south and east side of drainages.
- There is a need to assess treatment impacts on wildlife species that are dependent on old growth pinyon-juniper as well as on other species that may nest in the area or migrate through it.
- There is a need to assess how sagebrush treatments would impact habitat for pygmy rabbit, sage sparrow, and other sagebrush species.
- The potential to fragment remaining patches of sagebrush by mowing and chopping could hasten the decline of the Greater sage-grouse population.
- That all factors affecting Greater sage-grouse (including predators and hunters) be considered, not just loss of habitat.
- Need to address movements of Greater sage-grouse hens with broods from valley nesting and early brood rearing sites to upper elevation sagebrush and riparian communities on Roberts Mountains.
- Thinning of the pinyon-juniper woodlands along creek bottoms may be beneficial to the survival of Greater sage-grouse.
- The effects of invasion of undesirable plant species into Greater sage-grouse and other wildlife habitats.
- The high, very high, or extreme risk of catastrophic wildfire in important Greater sage-grouse habitats.
- Fences can cause avian mortality from collisions, including significant Greater sage-grouse mortality, and can serve as perches for predators or observation posts for the brown-headed cowbird.
- Proper size, shape, and design of vegetation treatments to create an edge effect would be critical in the success of the project for wildlife.

- Whether Greater sage-grouse, pygmy rabbit, pinyon jay, loggerhead shrike, and other species in the 3 Bars ecosystem are present at levels that provide viable populations in the short-, mid-, and long-term, especially under continued livestock degradation of habitats, utility corridor developments, mining and energy developments, and the spread of cheatgrass and noxious weeds and other invasive non-native vegetation that would be promoted by the various vegetation and woodland removal plans the BLM may be contemplating.
- Whether there is an opportunity for the reintroduction of bighorn sheep into the 3 Bars ecosystem if domestic sheep operations voluntarily relinquish their permits, a change of livestock occurs, or further research is conducted into bighorn sheep diseases.

3.16.3.2 Significance Criteria

Impacts to wildlife would be considered significant if BLM actions resulted in:

- A substantial, long-term (greater than 10 years) reduction in the quantity or quality of habitat critical to the survival of local populations of common wildlife species.
- Injury or mortality to common wildlife species, such that species populations would not recover within 5 years.
- Mortality to a listed species or species proposed for listing that could result in a "take" under the Endangered Species Act.
- A reduction in the population, habitat, or viability of a species of concern or sensitive species that would result in a trend toward endangerment or the need for federal listing.
- Any loss of birds, eggs, or nesting habitat critical to migratory birds under the Migratory Bird Treaty Act, in the project area.

3.16.3.3 Direct and Indirect Effects

3.16.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Impacts

Adverse effects to wildlife common to all treatments include injury and loss of life, noise and other disruptions associated with treatment applications, and temporary and long-term habitat effects.

The use of vehicles and treatment equipment for restoration poses a risk of injury or death by crushing animals or their nests or roosts, and vehicle weight may collapse burrows or compact soils. Soil compaction may also make burrow or den excavation difficult. Fuel spills could have negative effects to wildlife species on land if fuel is ingested, and could negatively impact water quality. The likelihood of such an impact is negligible, though, as refueling would generally occur off-site or away from treatment areas.

Hand-held manual equipment, including chainsaws, mechanical equipment, and transport vehicles create noise that can disturb animals and cause them to flee or alter their behavior or habitat use. Most researchers agree that noise can affect an animal's physiology and behavior, and if it becomes a chronic stress, noise can be injurious to an animal's energy budget, reproductive success, and long-term survival (Radle 2007). The loudness of normal conversation is about 65 decibels, while the loudness of a chainsaw is about 110 decibels. These effects would be short-term and occur within a relatively small area, however, and would not likely to have much effect on the long-term health and habitat use of wildlife in the treatment area.

Over the short-term, treatments could make habitats less suitable for some wildlife species, requiring displaced wildlife to find suitable habitat elsewhere. If these habitats were already near or at capacity in the number of wildlife they could support, displaced animals might perish or suffer lower productivity. In many cases, the treatments would return all or a portion of the treated area to an early successional stage, favoring early successional wildlife species. In areas where fire suppression has historically occurred, vegetation treatments could benefit native plant communities by mimicking a natural disturbance component that has been missing from these communities. Treatments would also restore native vegetation in areas where noxious weeds and other invasive non-native vegetation have displaced native plant species. Wildlife that occurred historically in these areas would likely increase in numbers, while species that have adapted to the disturbed conditions, such as chukar partridge, would decline (USDOI BLM 2007c:4-75).

Species that are mobile or that are not dependent on a specific habitat type can relocate during treatment activities and adapt to a new environment. Species that require very specific habitat conditions or that cannot relocate easily may be more vulnerable to impacts. Treatments that cover a large area have more potential to affect species, because there may be less opportunity for an animal in the interior of a treatment area to vacate, and because the number of individual animals affected is likely to be greater for a large area (USDOI BLM 2007c:4-74).

Small, temporary exclosure fencing would be used to protect treatment sites. Although fencing would benefit wildlife habitat, it can also modify wildlife movements and wildlife may collide with fences. Stevens (2011) found that sage-grouse collisions with fences were fairly common in Idaho, especially in areas near leks.

Beneficial Impacts

Proposed treatments would occur across the 3 Bars Project landscape, would target areas with declining habitat quantity and quality, and would facilitate wildlife movement across the landscape. There has been a loss of habitat diversity and complexity due to pinyon-juniper encroachment into riparian, woodland, and sagebrush habitats, and decrease in the abundance and diversity of animals that can be supported in areas with pinyon-juniper encroachment. Loss of habitat at the landscape level would be addressed by reducing levels of pinyon-juniper encroachment into other habitats, reducing the spread of noxious weeds and other invasive non-native vegetation, and reducing the risk of catastrophic wildfire. Treatments that slow or reverse pinyon-juniper encroachment and promote the development of native vegetation would improve habitat structure and species composition (USDOI BLM 2007c:4-85).

Cheatgrass and other noxious weeds and other invasive non-native plants provide few wildlife benefits, often occur in monocultures across the landscape, and alter wildfire cycles to the detriment of native vegetation and wildlife. By slowing or reversing the spread and occurrence of noxious weeds and other invasive non-native vegetation on the landscape, greater numbers and types of wildlife would be supported by the area, and risks to special status species and other species found in low numbers in treated ecosystems would be reduced.

Treatments that reduce hazardous fuel loads, slow the spread of pinyon-juniper, reduce woodland densities, reduce the incidence of disease within pinyon-juniper communities, reduce the spread of noxious weeds and other invasive non-native vegetation, and create fuel and fire breaks would reduce the risk of catastrophic wildfire harming wildlife or their habitat (Connelly 2013). Fire and fuel breaks would be designed in collaboration with NDOW to minimize the loss of sagebrush in key habitats. Treatments aimed at restoring natural fire cycles would improve vegetation resilience and increase plant diversity across the landscape, to the benefit of wildlife (USDOI BLM 2007c:4-85).

Improvements in habitat quality would increase the carrying capacity of the landscape and allow it to support larger and healthier wildlife populations. In particular, treatments would benefit mule deer, pronghorn antelope, and Greater sage-grouse by removing pinyon-juniper that reduces habitat quality or thinning vegetation (pinyon-juniper) to allow more desirable vegetation, such as forbs and grasses, to better compete and thrive. Thinning and removing pinyon-juniper would also benefit local and seasonal movements of wildlife, including mule deer and Greater sage-grouse. The BLM would not thin or remove sagebrush in Greater sage-grouse wintering and breeding areas, as recommended by Connelly (2013). Removing pinyon-juniper could benefit Greater sage-grouse because they are thought to avoid trees and other tall vegetation during migration and local movements. Because water is scarce on the 3 Bars Project area, the BLM would implement stream and riparian restoration projects to improve water availability for wildlife. In addition, slash piles left from thinning pinyon-juniper would be used provide microhabitat and cover for reptiles, rabbits and other small mammals, and songbirds.

Wildfire, spread of invasive plants, and other factors have caused habitat fragmentation and the loss of connectivity between blocks of habitat, especially in lower elevation riparian zones, woodlands, and sagebrush. Fragmentation has isolated some animal populations and reduced the ability of populations to disperse across the landscape by increasing the distance that wildlife must travel between suitable habitat patches. Treatments that restore native vegetation in disturbed areas should reduce fragmentation and restore connectivity among blocks of similar habitat, allowing wildlife to move more easily across the landscape (USDOI BLM 2007c:4-85).

3.16.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Because of the increase in the amount of habitat treated, both short-term impacts and long-term benefits to wildlife would be greatest under this alternative. Species would benefit through the slowing of pinyon-juniper encroachment; removal of crested wheatgrass, forage kochia, and cheatgrass; creation of a matrix of habitat types; reseeding and replanting of native shrubs, forbs, and grasses to restore habitat; a reduction in the threat of a catastrophic wildfire; and increase in edge habitat. Species that would benefit from edge habitat would include Greater sage-grouse that might forage in meadows and near streams, but seek shrub cover for shelter; raptors that perch in pinyon-juniper trees but forage in adjacent grassland and sagebrush habitats; and mule deer that forage in meadows, but seek shelter and thermal cover in adjacent pinyon-juniper woodlands.

Riparian Treatments

Adverse Effects

Treatment activities may result in a permanent or temporary loss of cover along riparian zones, potentially exposing animals to predators and causing the loss of thermal cover during temperature extremes. Loss of wooded areas adjacent to streams may make the habitat unsuitable for species that prefer wooded riparian zones.

Treatment work at several streams, ponds, wells, and springs would involve using heavy equipment to reconstruct streams and improve riparian habitat. Heavy equipment and placement of rock and other structures in streams pose a risk of injury or death by crushing animals or their breeding sites; amphibians would be most susceptible to harm or injury from use of heavy equipment near streams. If not done properly, stream reconstruction could worsen stream channel morphology, alter water depths and flows, and cause the loss of additional riparian habitat. Changes in water availability and flow rates would be especially harmful to amphibians that lay their eggs in water and require relatively stable water conditions for their eggs and hatchlets. Loss of riparian vegetation would contribute to sedimentation via increased runoff and erosion, affecting in-stream habitat for aquatic species including amphibians that forage, breed, or hide in stream gravel or spaces between stones (Pilliod et al. 2003).

Manual and mechanical methods would be used at Hash Spring and several other springs, as well as at sites where Lahontan cutthroat trout habitat improvements are planned. About half of the pinyon-juniper treatments would occur in Phase I stands, and the remaining treatments would be split nearly evenly between Phase II and III stands. Most of the Phase II and III treatments would occur along Roberts Creek. This would reduce the amount of habitat available to pinyon-juniper dependent species, including pinyon jay, gray flycatcher, juniper titmouse, Bewick's wrens, blue-gray gnatcatchers, black-throated gray warblers, and ferruginous hawks (Miller et al. 2005). Removal of Phase III trees and decayed and malformed trees could eliminate habit for cavity-nesting birds, such as woodpeckers and owls, and nesting and roosting habitat for small mammals, such as bats, squirrels, and mice. Removal of pinyon-juniper, particularly large trees, would also reduce the capacity of woodlands to intercept snow and provide snow-intercept thermal cover during winter (Hunter 1990 *cited in* USDOI BLM 2007c). Loss of winter cover may negatively affect mule deer that use pinyon-juniper areas during the winter (Miller et al. 2005). Fire and fuel breaks could serve as a barrier to small mammal and amphibian movement.

Small, temporary exclosure fences erected at riparian treatment sites could have an adverse effect on some small mammals, birds, and reptile populations because fences may provide perches for raptors and ravens that predate on small mammals such as mice, bats, and squirrels. Fences could also provide scanning perches for brown-headed cowbirds, thereby helping them to locate and parasitize bird nests and small mammals, such as bats, squirrels, and mice.

Beneficial Effects

Riparian treatments are designed to enhance water quality and quantity for wildlife, while also promoting improved habitat conditions that lead to higher quality forage and cover. Approximately 85 percent of riparian treatment acreage is within mule deer summer or winter range habitat, while over 80 percent of the riparian treatment acreage is within the summer or winter range for Greater sage-grouse (**Figures 3-39** and **3-42**; NDOW 2008a, 2009d). Proposed treatments would focus on restoring degraded riparian habitat, including restoring about 1,250 acres of mule deer habitat, 177 acres of pronghorn antelope habitat, and 2,093 acres of Greater sage-grouse PHMA.

A key feature of healthy riparian habitat is a high diversity of microhabitats. However, riparian habitat systems on the 3 Bars Project area have been altered through actions such as stream channelization, construction of water diversions for livestock, construction of roads, introduction of noxious weeds and other invasive non-native vegetation, and pinyon-juniper encroachment. For many wildlife species, these alterations often mean a loss of habitat (Tsukamoto 1983, Wasley 2004, Wildlife Action Plan Team 2012).

Manual and mechanical treatments are often more effective than other treatment methods, especially in sensitive areas, such as wetland and riparian habitat, or near habitats of plant and animal species of concern, where greater control over treatment effects is required or effects to non-target species are a concern (USDOI BLM 2007c:4-88). Stream restoration using manual and mechanical methods would reduce stream erosion and episodes of bank failure, improving both water quality and stream access for wildlife, while fencing and plantings would improve cover, shoreline stability, and wildlife habitat value. Treatments in riparian zones would create wet meadows and meandering streams and reduce water loss associated with stream downcutting; this would benefit amphibians and provide improved forage and habitat for birds and mammals. Riparian zones in rangelands typically produce more edge habitat in a small area than other habitat types. Mule deer spend a disproportionate amount of time in riparian habitats, including use as fawning habitat (Thomas et al. 1979), and would see an increase in habitat area and quality as a result of treatments. Riparian zones also produce large quantities of insects, which in turn provide food for wildlife, including Greater sage-grouse and bats.

Reducing the cover of pinyon-juniper on up to 900 acres in riparian treatment areas could improve water flows, allow more desirable riparian, woodland, and sage-brush vegetation to thrive, and open up movement corridors for Greater sage-grouse and other wildlife (see review in Miller et al. 2005:35). Use of felled trees in streams to slow water would create pools that provide breeding habitat for amphibians and open-water drinking areas for bats and other wildlife. By mulching or piling trees, cover and thermal habitat would be created that would provide protection and warmth to amphibians, reptiles, birds, and small mammals. Removal of pinyon-juniper should also improve flows in nearby creeks as water uptake by trees is lessened. For example, DeBoodt (2008) found that in areas where all juniper were cut from a watershed in Oregon, that late season spring flow, days of recorded ground flow, and late season soil moisture increased compared to pretreatment conditions.

Greater sage-grouse would benefit from riparian treatments that remove pinyon-juniper within those corridors used by sage-grouse for seasonal movements, and improve habitat quality within brood-rearing areas. Pinyon-juniper treatments within riparian corridors on the Roberts Mountains would be particularly beneficial because dense woodlands likely contribute to a high mortality rate for female Greater sage-grouse and their young as they move from nest sites in the surrounding valleys to higher elevation meadows. It is likely that the removal of pinyon-juniper and regeneration of a riparian and shrub community would facilitate movements and improve Greater sage-grouse survival. Wet meadow and other riparian restoration treatments would increase the availability of insects and other food items needed by Greater sage-grouse chicks and adults. Forbs and insects comprise the bulk of Greater sage-grouse chick diets until they are about 12 weeks old (Crawford et al. 2004), and are important to Greater sage-grouse chick survival (Drut et al. 1994). Atamian et al. (2010) found that Greater sage-grouse and their broods preferred higher elevation, moist sites with riparian shrubs or sagebrush during late brood rearing, and lack of this habitat could be a limiting factor for Greater sage-grouse chick survival (Drut et al. 1994).

Aspen Treatments

Adverse Effects

The primary impact to wildlife from treatments would be from noise, which could cause wildlife to leave the treatment area for a short period of time. There is concern that noise and other disturbance could cause wildlife, including northern goshawk, to abandon nests, however treatment areas would be surveyed for nesting birds prior to treatment and if nests are found, treatments would be delayed until young have fledged.

There also would be loss of pinyon-juniper habitat where trees are felled to slow pinyon-juniper encroachment into aspen stands, and to create fire and fuel breaks. About 10 acres of pinyon-juniper would be treated annually near aspen stands. Effects to wildlife and their habitat from pinyon-juniper removal would be similar to those described under Riparian Management.

Beneficial Effects

Aspen treatments would benefit a variety of wildlife. All of the aspen treatment sites are within mule deer summer or winter range, and 60 percent of the sites are within pronghorn summer or winter range (**Figures 3-39** and **3-41**; NDOW 2008b, 2009d). Of the 151 acres of proposed aspen treatments, about 146 acres are within areas where the

BLM has determined that mule deer habitat is degraded and 88 acres are within degraded pronghorn antelope habitat; treatments could improve habitat conditions for these species (**Figure 3-40**). Lewis' woodpeckers, northern goshawks, and several species of bats are special status species that have been observed using aspen habitats on the 3 Bars Project area. Northern goshawk preferentially use mature aspen communities for nesting, foraging, and roosting, and Lewis's woodpecker and several species of bats use cavities and peeling bark in aspen stands (Wildlife Action Plan Team 2012). Northern goshawk use mature aspen almost exclusively for nesting in the Great Basin (Wildlife Action Plan Team 2012), and their apparent decline in Nevada has been attributed to the loss of mature aspen stands that provide structural support for goshawk nests (Great Basin Bird Observatory 2010). DeByle (1985) noted that stimulation of suckering substantially increased the number of shrub-nesting birds associated with the stand.

Aspen areas provide important habitat for a variety of wildlife, and are being lost to pinyon-juniper encroachment. Mule deer use stream corridors within aspen habitat for fawning and as movement corridors, and treatments would improve both mule deer access and habitat quality. About half of the cavity-nesting birds in the western U.S nest in aspen stands (DeByle 1985). Bird species richness and diversity in sagebrush communities are strongly and positively correlated with the presence of nearby aspen stands, while encroachment of pinyon-juniper into aspen stands negatively impacts bird species diversity and richness. Manual and manual treatments to remove encroaching pinyon-juniper would help to ensure the long-term health and longevity of aspen and other woodlands by removing competing pinyon-juniper and encouraging aspen stand regeneration via seeds and suckering.

The BLM would remove pinyon-juniper within 200 feet of aspen stands to improve their effectiveness as fire breaks. Fire breaks would help to protect mature aspen stands from fire and slow or compartmentalize wildland fire, to the benefit of wildlife and their habitat. Protective fencing in aspen stands would help to slow or reverse the loss of aspen habitat.

Pinyon-juniper Treatments

Adverse Effects

Treatments proposed by the BLM that remove or reduce pinyon-juniper habitat could adversely impact wildlife that use these woodlands. The types and magnitude of adverse effects would differ according to the pinyon-juniper phase that treatments are conducted in. In general, adverse effects to wildlife habitat would be less in Phase I than Phase II or III woodlands. Adverse effects from Phase I treatments to wildlife habitat would primarily be related to loss of woodland edge habitat. For example, ferruginous hawks use pinyon-juniper/sagebrush/grassland edge habitat for nesting and foraging. Treatments in Phase I woodlands would not impact species that use the understory vegetation because chainsaws would be the primary treatment tool. Phase I treatments would not target old growth pinyon-juniper, so bats and birds that use old growth stands would not be impacted. Chainsaw thinning in Phase I stands would cause only a slight increase of fuels and wildfire risk. Treatments in Phase II and III habitat would open up pinyon-juniper woodland to stimulate understory vegetation to the benefit of some species, but would also remove old trees that provide winter cover and trees with rough bark used by roosting bats.

Over 70 species of birds nest in pinyon-juniper, and removal of pinyon-juniper could adversely impact migratory birds that use pinyon-juniper, including gray flycatcher, juniper titmouse, Bewick's wrens, and black-throated gray warbler (Miller et al. 2005). Populations of several of these species are in decline despite the increase in pinyon-juniper on the landscape. These species generally favor stands that have an open canopy with a significant shrub understory, and the interface between pinyon-juniper and sagebrush; densely wooded interior locations and Phase III stands are generally bird poor (Noson 2002 *cited in* Miller et al. 2005, Great Basin Bird Observatory 2011).

Pinyon-juniper stands provide important winter habitat for wildlife. In Oregon, higher winter bird densities occur in open juniper woodlands than in any other plant community (Miller 2001). Mule deer are also an important inhabitant. Dense stands of pinyon-juniper provide habitat for mule deer during severe winter weather because of the reduced snow cover and increased thermal cover in these areas. Bats favor old growth trees that have rough bark and crevasses. Removal of pinyon-juniper in Phase II and III stands could mean a loss of this wildlife benefit. Pinyon-juniper woodlands also provide habitat structure that would be lost if woodlands were converted to grasslands (Maser and Gashwiler 1978).

Downed trees and other woody material left on the ground from thinnings and tree removal could serve as fuel for a wildfire. Slash from shredding and other treatments in late Phase II and Phase III woodlands can create a fire hazard for at least 2 years, and may leave sites vulnerable to the introduction of invasive plant species (Tausch et al. 2009, Gottfried and Overby 2011). Slash piles can aid in the establishment of new vegetation or seedlings and pose a long-term benefit for wildlife species that prefer more herbaceous and shrub cover. A delayed understory response to treatments is common, and it may be several years before a treated site regains full habitat value (Tausch et al. 2009). In the interim, the treated area may run the risk of noxious weeds and other invasive non-native vegetation colonization and associated decline in habitat value for wildlife species, or be at higher risk of erosion and associated declines in aquatic habitat quality if streams are nearby.

The BLM does not plan to conduct burns in Phase I stands, but would conduct stand-replacement burns that could treat several thousand acres annually in Phase II and III stands. As noted earlier, about 60 percent of treatments would occur in Phase II and III stands. These burns could have adverse and beneficial effects on pinyon jays and other wildlife. Prescribed fires would open up pinyon-juniper stands and stimulate the growth of native forbs and grasses. However, given that prescribed fire burns would be less selective in controlling vegetation than manual or mechanical methods, and several thousand acres (but no more than 70 percent of the area) per treatment area could be burned annually, there could be a loss of mountain and Wyoming big sagebrush and other shrubs that are desirable for pronghorn antelope and mule deer. Numerous studies have shown that it can take decades for Wyoming big sagebrush to recover from fire, and that sage-grouse avoid burn areas (Sage- and Columbian Sharp-tailed Grouse Technical Committee 2008). Treated areas must then be reseeded to ensure that burned areas do not become infested with noxious weeds and other invasive non-native vegetation, to the detriment of wildlife. It is likely that large, older pinyon-juniper trees that provide juniper berries and pinyon nuts for pinyon jay and mule deer would also be lost (Balda and Masters 1980). Removal of mature and decadent and diseased trees would eliminate habitat used by cavity-nesting birds, roosting bats, and small mammals. In addition, large burns create more homogenous conditions that are less favored by wildlife, and remove thermal and hiding cover needed by mule deer (USDOI BLM 1991c).

The large size of a treatment area may make it difficult for animals to flee during disturbance, especially fire, and may increase fire mortality. Species that are small or not very mobile may find it difficult to relocate into new, appropriate habitat in the wake of treatment activities, if the treated area is not immediately suitable for use. Greater sage-grouse chicks and roosting bats would likely not be able to escape fire. To minimize or avoid loss to Greater sage-grouse chicks, the BLM would not conduct treatments in brood-rearing areas, including the Atlas, Frazier, Gable, Henderson, Upper Roberts, and Vinini units, between May 15 and September 15 or as current policy dictates, including field verifications by BLM-approved biologists.Additional guidelines in Appendix C, Standard Operating Procedures, will also be followed.

Wildland fires for resource benefit in the Sulphur Spring Wildfire Management Unit would be allowed during the summer, and could be more intense than prescribed fires and could lead to noxious weeds and other invasive non-native vegetation problems. At a minimum, it could take longer for native forbs and grasses to establish on sites burned by wildland for resource benefit than on sites burned with prescribed fire because wildfires tend to burn hotter and are more intense. Because of the large treatment area and the inability to anticipate when or where a wildfire would occur, there would be limited opportunities to control which areas burn in order to minimize the loss of Wyoming sagebrush or other more desirable vegetation, to survey for sensitive species, or to mitigate for impacts to sensitive wildlife species within the time frames described in the SOPs (**Appendix C**). Large-scale fires could also increase habitat fragmentation, to the detriment of birds including Brewer’s sparrow, pinyon jay, and Virginia’s warbler, and to less mobile species, such as reptiles and small mammals. Use of bulldozers and other firefighting equipment, and possibly aerial retardants, to protect private property could disturb wildlife and their habitats and cause harm or injury to less mobile species.

Beneficial Effects

Although one of the primary objectives of pinyon-juniper management is to improve woodland health and reduce the risk of high-intensity crown fires in dense woodland stands, treatments would also benefit wildlife by 1) removing pinyon-juniper to develop and enhance movement corridors for Greater sage-grouse; 2) removing pinyon-junipers to slow encroachment into Greater sage-grouse leking and nesting areas; 3) removing and thinning pinyon-juniper to break up the continuity of fuels and reduce the risk of catastrophic wildfire; and 4) improving wildlife habitat on the Sulphur Spring Wildfire Management Unit using wildland fire for resource benefit.

Most land managers target Phase I and II stands, which are often the most valuable to pinyon-juniper dwelling birds. Approximately 40 percent of treatments would be in Phase I stands and primarily involve the use of chainsaws to remove scattered trees. The BLM proposes to treat Phase II and III stands by opening up the canopy to stimulate growth in the shrub and herbaceous layers, and to reduce wildfire risk. About 40 percent of treatments would be in Phase II, and 20 percent in Phase III stands, using mostly mechanical methods, prescribed fire, and wildland fire for resource benefit (Sulphur Spring Wildfire Management Unit). While Phase I treatments may benefit Greater sage-grouse habitat, there may also be limited benefit to resident bird species that favor pinyon-juniper/sagebrush woodland edge habitat. By targeting Phase II and III stands, however, the BLM may enhance habitat for some pinyon-juniper dwelling species by opening up dense pinyon-juniper stands and creating more edge habitat (Great Basin Bird Observatory 2011).

As observed throughout the Great Basin, as pinyon-juniper cover has increased, the cover of shrubs and herbaceous understory species has declined, to the detriment of wildlife (Willis and Miller 1999 *cited in* Miller et al. 2005). The overall goal is to manage pinyon-juniper for wildlife by restoring the balance between pinyon-juniper and understory plants such as shrubs, grasses, and forbs (Miller 2001). All of the pinyon-juniper treatment sites are within mule deer summer or winter range, 60 percent of sites are within pronghorn summer or winter range, while about half of the treatment area is within Greater sage-grouse PHMA (see **Figures 3-39, 3-41,** and **3-42**; NDOW 2008b, 2009d).

Manual and mechanical treatments would be used to control the encroachment of pinyon and juniper into sagebrush, riparian, and aspen sites. The most common method to remove pinyon-juniper is with chainsaws. These treatments would generally occur in Phase I stands. With chainsaws, pinyon-juniper can be removed or thinned, while still retaining some patches for wildlife. Chainsaws offer flexibility in the timing of application and the ability to precisely control treatment boundaries or target specific trees, including selective cutting of diseased trees or leaving habitat trees. Some cut trees, slash, or chips would be left on site to control erosion, aid in seedling establishment, and provide wildlife habitat (Tausch et al. 2009). Miller et al. (1999) found that avian species diversity was greater on plots where juniper was removed and slash remained than on closed woodlands. Pronghorn antelope and mule deer benefit from mechanical treatments by foraging on strips of grasses and forbs that would be created for fuel breaks.

Much of the focus of treatments would be on thinning or removing pinyon-juniper to benefit Greater sage-grouse and other wildlife using mechanical methods in Phase II and III stands. This would improve food and cover for small mammals by increasing shrub and herbaceous recruitment and seed production. Opening up dense stands of pinyon-juniper benefits edge species, ground-feeding and ground-nesting birds, and small mammals. Openings of 250 acres or less and created by mechanical means benefit deer, small mammals, and birds. Studies have shown that breeding bird densities increase as pinyon-juniper stands are opened up and treatments that create patches of treated and untreated pinyon and juniper promote species diversity (Scott and Boeker 1977, O'Meara et al. 1981, Payne and Bryant 1998). In addition to removing downed trees, the BLM would place larger wood into streams to slow water flow and provide habitat for amphibians and other wildlife.

In pinyon-juniper woodlands, female cone production declines as woods close in and the competition between trees increases; thinning or removing Utah juniper using manual and mechanical methods should enhance cone and seed production and improve food and cover for small mammals by increasing shrub and herbaceous recruitment and seed production. Juniper cones are consumed by deer mice, golden-mantled ground squirrel, Lewis' woodpecker, scrub jay, mountain bluebird, and cedar waxwing, and the berries are the primary winter food for American robin and Townsend's solitaire. Mule deer, mountain cottontail, and coyote also consume juniper cones, and woodrats, cottontail, black-tailed jackrabbit, and porcupine forage on juniper foliage at certain times of the year. There are reports of twice as many species and up to a 60 percent increase in deer mice, piñon mice, and Ord's kangaroo rat in thinned versus unthinned pinyon-juniper stands, and small mammal numbers generally increase when pinyon-juniper is thinned or completely cut, as long as slash remains (Miller et al. 2007).

Treatments on the Atlas, Frazier, Gable, Henderson, Upper Roberts, and Vinini units would help to open up Greater sage-grouse travel corridors between lower elevation winter and leking habitats and upper elevation nesting and brood-rearing habitats, by removing pinyon-juniper that are encroaching into these drainages. Treatments would also provide forage for Greater sage-grouse and other wildlife by promoting development of native grasses, forbs, and shrubs through removal of pinyon-juniper. Several studies have shown that Greater sage-grouse avoid pinyon-juniper stands and that the number of Greater sage-grouse using an area increases after pinyon-juniper removal (see review in USDOI USFWS 2008:60-61). In general, adult survival is high, but is offset by low juvenile survival (Crawford et al. 2004). Removal and thinning of pinyon-juniper in drainages should improve brood survivorship during movements from between breeding areas in the valleys and brood-rearing areas on Roberts Mountains, while these treatments in conjunction with riparian treatments should improve brood habitat and survivorship. Treatments could also benefit pinyon jays by opening up closed-canopy woodlands, while protecting old-growth pinyon-juniper habitat, and should ensure that roosting habitat is maintained for bats.

The Atlas and Henderson units provide habitat for pygmy rabbits. Pygmy rabbits forage primarily on sagebrush, so treatments that remove pinyon-juniper and stimulate the growth of sagebrush and herbaceous vegetation would benefit pygmy rabbits long-term. Pinyon-juniper encroachment has adversely impacted pygmy rabbit populations (Grayson 2006), and has shifted pygmy rabbit habitat to lower elevation in the western U.S. (Larrucea and Brussard 2008). Although pygmy rabbits would use areas with limited pinyon-juniper cover, stands with 40 percent or greater cover provide only marginal habitat for pygmy rabbits (Miller et al. 2005). Treatments to promote development of sagebrush, other shrubs, and herbaceous species would benefit pygmy rabbits.

Prescribed fire, in addition to manual and mechanical treatments, would be used to enhance habitats. Fire almost always reduces pinyon-juniper canopy or density, but is most effective when used in conjunction with mechanical treatments, that first reduce juniper competition and increase herbaceous growth that fuels the fire (Ansley and Rasmussen 2005).

The BLM would reduce hazardous fuels on up to 10,000 acres annually on the Cottonwood/Meadow Canyon, Dry Canyon, Three Bars Ranch, Tonkin North, and Whistler units. Proposed treatment areas provide important year-round habitat for Greater sage-grouse and pronghorn antelope, and crucial summer range for mule deer. In addition to reducing hazardous fuels and risk of loss of wildlife and their habitat from a catastrophic wildfire, treatments would improve shrub and herbaceous diversity, improve wildlife habitat, and improve hydrologic function. Treatments would kill most of the pinyon-juniper overstory and set back plant development and succession, and would increase forage for wildlife. When conditions are favorable for a stand-replacing fire, burning kills most of the pinyon-juniper overstory and increases plant diversity and patchiness. While loss of pinyon-juniper can reduce thermal and hiding cover for ungulates, an increase in plant species diversity after fire can benefit deer as well as ground-nesting birds (Lyon et al. 2000a, b).

In 2010 and 2011, the BLM mapped pinyon-juniper phases and areas with old-growth trees on the 3 Bars Project Area (AECOM 2011a). There are several old-growth pinyon-juniper stands on Roberts Mountains; these stands would be left untreated. Protection of old-growth pinyon-juniper favors wildlife species that preferentially use pinyon-juniper old-growth. Old-growth juniper have more cavities than young trees, and offer significant habitat benefit to cavity nesting species including red-breasted nuthatch, mountain bluebird, mountain chickadee, and northern flicker (Miller et al. 2005). Bushy-tailed woodrat is also common in old-growth pinyon-juniper, where it nests in cavities.

Sagebrush Treatments

Adverse Effects

Livestock could be used to remove cheatgrass. Livestock can directly harm wildlife by trampling on animals or their nests, and grazing can alter grassland structure, to the detriment of birds and small mammals (Wiens and Dyer 1975). Given that grazing would be limited to areas dominated by cheatgrass, which has low habitat value for wildlife, these risks to wildlife would be low.

In several treatment areas, the BLM would plant sagebrush seedlings and reseed with native grasses and forbs to encourage establishment of sagebrush and herbaceous vegetation near historic leks (Rocky Hills Unit), and to restore areas degraded by cheatgrass (West Simpson Park Unit, and Table Mountain Unit). The BLM would use native seeds and plants whenever possible, but could also use non-native grasses such as crested wheatgrass and forage kochia. Crested wheatgrass and forage kochia have limited value for most wildlife, including Greater sage-grouse. However, they do provide forage for livestock, wild horses, and other wild ungulates, help to stabilize soils and reduce erosion in areas burned by wildfire, and exclude cheatgrass. Non-native seedings would only be used 1) in areas that have previously burned and are beyond use of Emergency Stabilization and Rehabilitation techniques, 2) to create green strips; and 3) for soil stabilization in low precipitation zones.

Beneficial Effects

The 3 Bars Project area provides important habitat for Greater sage-grouse, mule deer, pronghorn antelope, and other wildlife. Approximately 98 percent of proposed treatment acres are within pronghorn antelope summer or winter range, 65 percent are within summer or winter range for Greater sage-grouse, and 55 percent are within mule deer summer or winter range (see **Figures 3-39, 3-41,** and **3-42**; NDOW 2008b, 2009d, 2012d, e).

An estimated 50 percent of the original sagebrush habitat in the Great Basin has been lost in the past century, with increasing occurrence of wildfire being a major contributor to this loss (Sage- and Columbian Sharp-tailed Grouse Technical Committee 2009). Loss and degradation of sagebrush habitat has also occurred on the 3 Bars Project area, and proposed treatments would focus on restoring sagebrush habitat. Over 85 percent of the acres treated would occur where the BLM has determined that pronghorn antelope habitat is declining, nearly half of the acres treated would occur where Greater sage-grouse habitat is declining, and 45 percent of the acres treated would occur where mule deer habitat is declining (**Figure 3-40**).

Pinyon-juniper treatments to enhance sagebrush habitat would benefit sage obligate species, including Greater sage-grouse, sage sparrow, Brewer's sparrow, sage thrasher, pygmy rabbit, sagebrush vole, pronghorn antelope, and sagebrush lizard. Several shrub-steppe birds show population decreases when pinyon-juniper density and total area of cover increase. Sage thrasher in particular is very sensitive to pinyon-juniper encroachment into sagebrush, and one study found a 90 percent decline in a population with a 6 percent increase in pinyon-juniper cover. Brewer's sparrow and vesper sparrow are also sensitive to pinyon-juniper encroachment (Miller et al. 2005). Removing or thinning pinyon-juniper creates openings for raptors to use while hunting. Ferruginous hawks prefer more open country, sagebrush, and the periphery of pinyon-juniper and sagebrush. They nest in pinyon-juniper trees (Wildlife Action Plan Team 2012). Thus, treatments to create mosaic of pinyon-juniper and sagebrush habitat on the Whistler Unit, and to restore sagebrush on the Rocky Hills Unit, should benefit ferruginous hawks by making it easier for hawks to find prey, while creating new sagebrush habitat for prey species.

Removing pinyon-juniper from sagebrush habitat improves fawning habitat for mule deer, and improves browse resources (Wasley 2004). It also benefits pronghorn antelope, which preferentially use open, shrub-steppe communities (such as sagebrush) rather than stands with scattered trees or woodlands (Tsukamoto 2003, Wasley 2004). Pinyon-juniper encroachment has also impacted pygmy rabbit populations (Grayson 2006), especially when pinyon-juniper cover exceeds 40 percent. Pinyon-juniper removal projects on the Three Corners and Whistler Sage units could benefit pygmy rabbits, although treatments would occur in Phase I stands where pinyon-juniper cover is less than 40 percent. Because pinyon-juniper can uptake large amounts of water, removal of pinyon-juniper may also improve water supply and flow in creeks, which would benefit wildlife.

Chainsaws would be used to thin and remove pinyon-juniper in Phase I stands that have encroached into sagebrush habitat. The effects to wildlife and their habitat from pinyon-juniper removal and thinning in Phase I stands are discussed under Pinyon-juniper Treatments.

Several leks were found on the Rocky Hills Unit before the 1999 Trail Canyon Fire. West Simpson Park, which provides mule deer winter range, was also burned by the 1999 Trail Fire and is now dominated by cheatgrass. Table Mountain has been burned by several wildfires in the past few decades. It also has cheatgrass, and provides only marginal habitat for Greater sage-grouse, although several leks are nearby. Plowing and discing, and prescribed fire, could be used to reduce the reproduction of cheatgrass and crested wheatgrass. Treatments that break the fire-cheatgrass-fire cycle and risk of future wildfire on treated and nearby sagebrush habitat, should improve wildlife habitat by increasing the cover of native shrubs, grasses, and forbs that provide better habitat value for wildlife, and possibly encourage Greater sage-grouse to again nest in these units.

The BLM may use livestock and pathogens to control cheatgrass and other non-native vegetation, as livestock can reduce cheatgrass dominance, while a naturally-occurring pathogens such as *Ustilago bullata* can cause head smut in cheatgrass (Pellant 2002). The BLM may use livestock to remove some cheatgrass before other treatments. These treatments would be used to restore degraded rangeland that provides few wildlife benefits. Noxious weeds and other invasive non-native vegetation can hinder pygmy rabbit movement and increases a predators' ability to detect the rabbits. Treatments to control noxious weeds and other invasive non-native vegetation at West Simpson Park could encourage nearby pygmy rabbits to use this unit.

3.16.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The types and magnitude of effects for manual, mechanical, and biological control treatments would be similar between Alternatives A and B. Because the BLM would not be able to use fire, there would be no harm to or loss of wildlife from prescribed fire and wildland fire for resource benefit. The few wildlife that use dense stands of pinyon-juniper would not experience habitat loss under this alternative, and may even see habitat gains as more pinyon-juniper habitat shows Phase II or III characteristics.

Acres and types of wetland and riparian habitat and miles of streams treated would be similar to Alternative A. However, less effort would be spent by the BLM on slowing pinyon-juniper encroachment into sagebrush and riparian communities; reducing the amount of Phase II and III pinyon-juniper treated using stand-replacement fires; restoring habitat where sagebrush should occur based on ecological site description reference, desired state, or management objective; and reducing the acres of priority habitat treated to improve species diversity, especially through cheatgrass control.

Because fire would not be available to reduce hazardous fuel loads, Alternative B may pose a greater long-term risk for wildfire due to the accumulation of fuels. The BLM would also be less able to promote more fire resilient and diverse habitat on the 3 Bars Project area.

The inability to use prescribed fire and wildland fire for resource benefit would probably have few short-term adverse effects. Long-term, however, mule deer, Greater sage-grouse, migratory birds, and other wildlife would experience fewer of the benefits associated both with creating openings in dense pinyon-juniper habitat and with creating a mosaic of pinyon-juniper and sagebrush habitat. Prescribed fire to treat non-native vegetation on the West Simpson Park Unit also would not be available under this alternative.

3.16.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation. The BLM has not identified areas where it would use classical biological control, but if nematodes, insects, or fungi are used on the 3 Bars Project area, treatments would generally be small in size and effects would be localized, or if used on cheatgrass, could cover large areas of habitat that are little used by wildlife. Thus, the effects on wildlife from classical biological control would be minor and primarily restricted to those species using vegetation treated by these methods. The BLM would not be able to use livestock to remove cheatgrass under Alternative C nor to reduce the competitiveness of exotic species such as crested wheatgrass and forage kochia on the Rocky Hills Unit.

Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. There would be fewer direct impacts to wildlife from treatments under this alternative than the other alternatives, because adverse impacts, such as harm to or death of wildlife, and noise and other disturbances, would be much less with manual methods than the other methods. Since fewer acres would be treated, there would be fewer benefits to wildlife under this alternative than under Alternatives A and B. Manual treatments would be small in scale and mostly targeted to pinyon-juniper stands. Benefits to special status species and migratory birds would primarily be limited to those species that use the pinyon-juniper and sagebrush interface, while Greater sage-grouse, pygmy rabbit, and other sagebrush dependent wildlife would see few benefits.

3.16.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to wildlife resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; thin or remove pinyon-juniper and sagebrush to encourage understory development; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildland fire to the benefit of wildlife and their habitats. Because no habitat would be restored, Alternative D also poses the greatest threat to special status species, including migratory birds, through long-term habitat loss and degradation. Species at greatest risk from habitat degradation are Greater sage-grouse, pygmy rabbit, northern goshawk, cavity nesting birds, and migratory birds through densification of pinyon-juniper and sagebrush, loss of aspen habitat, and pinyon-juniper encroachment.

3.16.3.4 Cumulative Effects

The wildlife CESA is approximately 1,883,729 acres and extends 10 miles beyond the 3 Bars Project area (**Figure 3-1**). Approximately 92 percent of the area is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service. Past and present actions that have influenced wildlife resources in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.16.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

The BLM would continue ongoing management reviews to ensure proper livestock management and long-term success. Modifications will be made through a separate process from the 3 Bars Project.

The BLM may install small, temporary exclosure fencing to exclude livestock, wild horse, and other wild ungulate access to riparian and aspen treatment areas. These actions should help to improve water quality in affected streams, restore streams to Proper Functioning Condition, and improve riparian habitat to the benefit of amphibians, Greater sage-grouse, and other wildlife.

The BLM would continue to manage livestock to meet Greater sage-grouse habitat objectives. These objectives include having suitable sagebrush cover and utilization levels to ensure that adequate habitat would be available for Greater sage-grouse during all life stages (see further discussion in Section 3.3.2.3.3; USDOI BLM 2013c).

The BLM would continue to treat noxious weeds and other invasive non-native vegetation in areas with known infestations, including areas burned by wildfire or prescribed fire, and in new areas under the Early Detection and Rapid Response program. Noxious weeds and other invasive non-native vegetation would typically be found in newly burned or disturbed areas, along roads, near mining and energy developments, and in areas where livestock and wild horses congregate. These treatments would benefit wildlife and their habitats, except for those few species that use cheatgrass and other noxious and invasive species. Cheatgrass is usually most prevalent in areas that have been burned by wildfire.

Five herbicides are typically used on the 3 Bars Project area—2,4-D, glyphosate, imazapyr, metsulfuron methyl, and picloram. For the 3 Bars Project, it is likely that the BLM would also use imazapic to treat cheatgrass. Based on analysis done for the 17-States PEIS, formulations of 2,4-D could have moderate to high risks, while risks from the other herbicides to wildlife would have low to negligible risks to wildlife. A detailed analysis of the risks to wildlife and their habitat from the use of herbicides is provided in the 17-States PEIS (USDOI BLM 2007b:4-96).

Recreational use of the 3 Bars Project area would adversely impact wildlife by disturbing animals and possibly from fuel or other petroleum product spills from recreation vehicles that could impact drinking water. Wildlife could be injured or killed by recreational vehicles, or from illegal hunting. Visitor use of the CESA would result in increased risk of a wildland fire due to accidental or intentional ignition of vegetation from a campfire, cigarette, hot vehicle muffler, or other human-caused ignition source. Recreational users can spread noxious weeds and other invasive non-native vegetation that attaches itself to vehicles or to clothing or shoes, and can later cause new noxious weeds and other invasive non-native vegetation infestations and degrade wildlife habitat. Garbage and other debris left behind by recreational users could be ingested by wildlife and harm or kill animals, or attract ravens and other scavengers. As the local population increases, there would be increased hunting pressure on Greater sage-grouse and other wildlife. However, there are no studies that have demonstrated that regulated hunting is the cause of the decline of Greater sage-grouse in recent time (Connelly et al. 2004). Pine nut harvesting would cause a loss of pine nuts as food for wildlife.

Utility and infrastructure projects could kill, injure, or disturb wildlife, causing habitat loss and fragmentation, and possibly altering wildlife migration patterns and movements. Wildlife can strike fences and be injured or killed and be killed by vehicles on roads, and powerlines and communication sites may be used as perches by raptors, to the detriment of their prey. During a 10-year study of the effects of the Falcon-Gonder transmission line, which is in the eastern portion of the 3 Bars Project area, researchers found that counts of common ravens along the transmission corridor, and raven-associated disturbances of Greater sage-grouse leks, increased substantially during the 10-year period after construction of the transmission line. However, researchers did not find a meaningful impact of the transmission line on Greater sage-grouse nest survival (Collopy and Lammers 2005, Nonne et al. 2011).

Several studies have shown that mining and energy development can have a substantial impact on Greater sage-grouse habitat use and breeding success, and because of their large footprints, can fragment habitat (Braun et al. 2002, Lyon and Anderson 2003, Hollaran and Anderson 2004, Braun 2006, Great Basin Bird Observatory 2011; also see review in USDOI USFWS 2008), although habitat loss and fragmentation can be reduced over time as developments are reclaimed.

Construction and operation of the Mount Hope Project would directly affect wildlife habitat through removal of vegetation, primarily in the big sagebrush vegetation community. Approximately 8,318 acres of wildlife habitat would be directly removed. Upon completion, approximately 7,656 acres would be reclaimed by revegetating disturbed areas with shrubs, forbs, and grasses (USDOI BLM 2012b). The mine project would also cause death and injury to wildlife, disturb wildlife, and fragment wildlife habitat. Mule deer, Greater sage-grouse, and other wildlife migrations and movements would be impacted by the mine project. Mule deer migrate along routes from Pine Valley south around the Roberts Mountains into Kobeh Valley and Diamond Valley and could be affected by the Mount Hope Project.

Core breeding, brood-rearing, and wintering habitat for Greater sage-grouse is within the mine project area. The mine project could impact the movement of Greater sage-grouse between Kobeh Valley and Roberts Mountains. Other impacts to Greater sage-grouse from the mine project include increased raptor or scavenger predation from elevated equipment and power poles; visual encroachment or interruptions created by elevated equipment, power poles, vehicular travel and dust; interruption of "bird foot traffic" created by above-ground pipes, extended elevated berms, or other linear features that may block passage; noise created by pumps, vehicles, and equipment; collision with fences and other structures; and unreclaimed surface disturbance resulting in habitat loss (USDOI BLM 2012b).

The mine project waste rock stockpile would be constructed over burrows and areas where pygmy rabbits have been sighted. In addition, the mine project access road and growth media stockpiles may also cover burrows and areas where pygmy rabbits have been sighted. These impacts would be limited to selected burrows and a limited number of individuals may be extirpated; these impacts are not expected to result in a population-level effect that would affect the potential listing of the species under the Endangered Species Act. The BLM has calculated that approximately 475 acres of pygmy rabbit habitat would be disturbed by the mine project. Of those 475 acres, 211 acres are occupied by pygmy rabbits and 264 acres are considered potential pygmy rabbit habitat.

One commenter during public scoping asked about the potential for reintroduction of Rocky Mountain bighorn sheep into the 3 Bars Project area. The NDOW does have plans to reintroduce bighorn sheep into the Cortez Range, which is immediately northwest of the 3 Bars Project area. These plans have been met with some resistance from local ranching interests, and the plan is currently on hold. There are no plans to reintroduce bighorn sheep on Roberts Mountains, as permittees are authorized to graze sheep on the mountain. Should sheep permits be retired or changed to cattle permits in the future, it is possible that NDOW could reintroduce bighorn sheep on Roberts Mountains (Foree 2012).

It is estimated that approximately 140,000 acres would be burned by wildfires over the next 20 years, and in some years wildfires may burn substantial acreage, based on acreage burned since 1985 in the CESA. About 75,000 acres burned in the 3 Bars Project area, and nearly 56,000 acres within remaining areas of the CESA, in 1999. In addition to concerns about how wildland fires may result in establishment and spread of noxious weeds and other invasive non-native vegetation, such as cheatgrass, there is concern that as wildland fire intervals increase, the likelihood of vegetation reaching late successional stages would be reduced, to the detriment of species that favor late successional habitat, such as sage thrasher and gray flycatcher (Great Basin Bird Observatory 2010).

In addition to treatments under the proposed action, the BLM also proposes to treat hazardous fuels on approximately 1,500 acres annually in high to very high fire risk areas on and near the 3 Bars Project area and within the CESA. These include treatments of pinyon-juniper and sagebrush using prescribed fire and manual and mechanical methods, to remove pinyon-juniper, enhance wildlife habitat, and create fuel breaks. In addition to improving wildlife habitat by creating a mosaic of habitats and opening up pinyon-juniper stands to promote development of shrubs, grasses, and forbs to the benefit of Greater sage-grouse and other wildlife, these treatments would also reduce the risk of wildfire and loss of wildlife habitat.

Under Alternative A, adverse effects from treatments would generally be short-term, while benefits would be long-term and would accumulate with wildlife habitat effects that occur on other portions of the CESA. Proposed BLM restoration projects would have short-term adverse and long-term beneficial effects on about 142,000 acres of wildlife habitat within the CESA during the life of the project. About 17 percent of the 3 Bars Project Area and 8 percent of the CESA would be treated to reduce hazardous fuels and improve ecosystem health and resiliency. Habitat improvement and a reduction in wildfire risk on the CESA would benefit wildlife and help offset some of the adverse effects to wildlife from other reasonably foreseeable future actions in the CESA, and would be greatest under Alternative A.

3.16.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on wildlife resources would be similar to those described under Alternative A. The BLM anticipates treating about half as many acres (63,500) on the 3 Bars Project area under Alternative B than under Alternative A. The types and magnitude of adverse impacts to wildlife from prescribed fire treatments, including loss of life and injury, loss of habitat, and habitat fragmentation, would not occur within the 3 Bars Project area, but could occur on several hundred acres annually within other portions of the CESA under current and reasonably foreseeable future authorization. Long-term benefits from prescribed fire and wildland fire for resource benefit, including improving pinyon-juniper health, stimulating aspen suckering, creating a mosaic of habitat, slowing pinyon-juniper encroachment, making vegetation more fire resilient, creating openings in pinyon-juniper habitat to promote shrub, forb, and grass development, and reducing the risk of catastrophic wildfire, would occur on only a few hundred acres annually under this alternative, under previous and reasonably foreseeable future authorizations, and would provide few benefits for wildlife.

Adverse and beneficial effects of 3 Bars Project treatments on wildlife resources would accumulate with those from other actions in the CESA. About 8 percent of the 3 Bars Project Area and 4 percent of the CESA would be treated to reduce hazardous fuels and improve ecosystem health and resiliency. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing wildfires in pinyon-juniper should remain near current levels. Treatments to reduce this risk on the CESA would benefit wildlife and their habitats, but not to the extent as would occur under Alternative A.

3.16.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on wildlife resources would be similar to those described under Alternative A. Because mechanical treatments would not be used, the BLM would not be able to use this method to stimulate aspen suckering on about 450 acres. The BLM would be less able to reduce the risk of pinyon-juniper encroachment into aspen stands, and thin and remove pinyon-juniper to create and enhance fire and fuel breaks to reduce the risk of wildfire destroying aspens.

There would be no risk of injury or death to wildlife from use of mechcanical equipment. The BLM would have less success in opening up pinyon-juniper to promote development of shrubs, grasses and forbs; reducing hazardous fuels; removing cheatgrass and other non-native species; creating a mosaic of habitats; creating fire and fuel breaks; restoring stream habitat; and reseeding and replanting vegetation to restore wildlife habitat compared to Alternatives A and B. The BLM would be able to use mechanical methods on several hundred acres annually for other projects in the CESA under Alternative C under current and reasonably foreseeable future authorizations, but the total amount of acreage treated using mechanical methods would be about 90 percent less than under Alternative A.

Under Alternative C, proposed restoration projects would have adverse and beneficial effects to about 47,000 acres of wildlife habitat within the CESA during the life of the project. Treatments would primarily restore pinyon-juniper and sagebrush habitat through thinnings and removal of pinyon-juniper. Wildfire risk to wildlife and their habitats would increase in the CESA. Wildlife species diversity and numbers, and habitat quality, would show little improvement under Alternative C, primarily because only about 2 percent of the CESA would be treated to improve wildlife habitat, and the BLM would be limited in the types of treatments it could conduct to reduce the risk of wildfire and improve wildlife habitat.

3.16.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on wildlife resources would be similar to those described under Alternative A. There would be no cumulative effects on wildlife resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildland fire under current and reasonably foreseeable future authorized actions, but on a very limited acreage.

Based on historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually in the CESA to reduce hazardous fuel levels and improve ecosystem health. Hazardous fuel levels would likely increase, and only a limited number of miles of fuel and fire breaks would be constructed under this alternative compared to the action alternatives. The BLM would conduct stream bioengineering and riparian habitat enhancements only on a limited acreage and these projects would have to be authorized through separate decisions. Thus, stream channels and riparian habitat would remain degraded and contribute to water quality concerns. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing wildfires in pinyon-juniper would likely increase.

3.16.3.5 Unavoidable Adverse Effects

The proposed vegetation treatments could kill or harm wildlife, and cause unavoidable short-term adverse impacts to wildlife habitat and wildlife habitat use. The extent of these disturbances would vary by the extent and type of treatment. In general, greatest risks would be associated with the use of prescribed fire and wildland fire for resource benefit. These effects would be of special concern when they impact BLM Special Status Species, including Greater sage-grouse, pygmy rabbit, raptors, and bats.

3.16.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

All treatments would have short-term adverse impacts to wildlife and their habitats. Treatments that improve habitat would provide long-term benefits to wildlife. Treatments that remove hazardous fuels from public lands and reduce the risk of a large, catastrophic wildfire would reduce the potential for future death and injury of wildlife and lead to improved habitat. Treatments that slow pinyon-juniper encroachment and control populations of noxious weeds and other invasive non-native species on public lands would be expected to benefit most wildlife over the long-term by aiding in the reestablishment of native vegetation and restoring wildlife habitat to near historical conditions.

3.16.3.7 Irreversible and Irretrievable Commitment of Resources

Wildlife habitat lost as a result of treatments would be irretrievable until native plant communities were reestablished, usually within several growing seasons. Treatments that improve rangeland and woodland ecosystem health, including removal of noxious weeds and other invasive non-native vegetation, slowing of pinyon-juniper encroachment, and enhancement of riparian, aspen, and sagebrush habitat, would translate into benefits for wildlife.

3.16.3.8 Significance of the Effects under the Alternatives

Under all alternatives, there would be a short-term (less than 10 years) loss of habitat due to proposed treatments, in particular pinyon-juniper, and cheatgrass and other noxious weeds and other invasive non-native species. However, pinyon-juniper is common throughout Nevada and the western U.S., and cheatgrass is an invasive weed with few wildlife values. Treatments would improve habitat on much of the 3 Bars Project area and CESA. Thus, there would be no significant direct, indirect, or cumulative long-term impacts to the quantity or quality of habitat critical to the survival of local populations from 3 Bars Project treatments within the 3 Bars Project area or CESA.

Under all alternatives, there would be injury or mortality to common wildlife species, primarily from use of prescribed fire and wildland fire for resource benefit, and from mechanical treatments. Less mobile species, such as amphibians, reptiles, and small mammals, would be most susceptible. Injury or mortality to wildlife would be in proportion to acres treated (greatest risk under Alternative A) and treatment methods (least risk under Alternative C). BLM Special Status Species, whose populations would be at most risk of not recovering in 5 years, are either mobile, could retreat to burrows, or use aquatic habitats to avoid fire and most mechanical treatments. Thus, populations of species that could be impacted by treatments should recover within 5 years, or should not suffer losses that would affect population viability. Thus, there would be no significant direct, indirect, or cumulative long-term impacts to local wildlife populations from 3 Bars Project treatments within the 3 Bars Project area or CESA.

The yellow-billed cuckoo is listed as threatened, under the Endangered Species Act on the CESA, however, the last sighting of yellow-billed cuckoo in or near the project area was in 1976, just outside of the southeast corner of the project area boundary. Thus, proposed treatments on the 3 Bars Project area or CESA would not result in the “take” of a listed species, or species proposed for listing.

Under all alternatives, there could be a short-term reduction in the population, habitat, or viability of a species of concern or sensitive species. However, these losses would not result in a trend toward endangerment or the need for federal listing. Species of greatest concern are the Greater sage-grouse, northern goshawk, pygmy rabbit, and several species of bats. Under all alternatives, the BLM would conduct treatments that would restore habitat for these species. The BLM would remove pinyon-juniper in Phase II and III stands, potentially to the detriment of bats that roost under the bark of these trees. However, pinyon-juniper is common in Nevada, the BLM would protect old-growth pinyon-juniper and conduct most treatments outside the period when bats would be using trees for roosts, and bats use other habitats for roosting and breeding in addition to pinyon-juniper. Thus bat populations should not be imperiled from treatments in the CESA. The BLM would avoid treatments near pygmy rabbit burrows, where feasible, on the 3 Bars Project area. In addition, most of the treatments on the 3 Bars Project area and CESA would benefit the sagebrush habitat used by Greater sage-grouse, pygmy rabbit, and other wildlife. The BLM would also improve aspen habitat to benefit northern goshawk. Thus, there should be a long-term gain in habitat value to species of concern on the CESA.

Under all alternatives, there could be a loss of birds, eggs, or nesting habitat critical to birds protected under the Migratory Bird Treaty Act, and should this loss occur, it could be significant. As discussed in **Appendix C**, the BLM would conduct nest surveys prior to any surface-disturbing activities that would occur during the avian breeding season. If nests are found within the treatment area, or if other evidence of nesting is observed, treatment activities may be postponed until after the completion of nesting; a protective buffer will be delineated and the buffer area will be avoided to prevent destruction or disturbance to nests and birds until they are no longer active; or the area will be removed from project consideration. The BLM will also avoid raptor and Greater sage-grouse nesting areas. However, there is no guarantee that all nests would be found, and it is possible that migratory birds or their nests or young could be impacted by resource and other development in the CESA. The BLM would work with the USFWS to minimize or mitigate these losses.

3.16.4 Mitigation

Wildlife resources would benefit from mitigation measures identified in Section 3.18.4 (Livestock Grazing Mitigation). No mitigation or monitoring measures have been identified specifically for wildlife resources.

3.17 Wild Horses

3.17.1 Regulatory Framework

Management of wild horses and burros on BLM-administrated land is regulated under the Wild Free-Roaming Horses and Burros Act of 1971 and the multiple use objectives of the Federal Land Policy and Management Act. There are wild horses, but no wild burros, on the 3 Bars Project area. The Act requires that wild horse and burro populations be managed at levels that allow for the preservation and maintenance of a thriving natural ecological balance. Methods used to control wild horse and burro populations primarily involve gathers to remove excess animals, and fertility control through injections of immunocontraceptives to reduce population growth rates. The BLM is also guided by the Nevada Northeastern Great Basin Resource Advisory Council to promote healthy rangelands through implementation of standards and guidelines for maintaining healthy wild horse and burro herds on HMAs (USDOI 2007b). These include managing wild horses in HMAs based on the capability of the HMA to provide suitable feed, water, cover, and living space, and control of population levels to ensure the long-term health of wild horse populations.

3.17.2 Affected Environment

3.17.2.1 Study Methods and Study Area

BLM wild horse gather reports, monitoring data, and inventories were used to assess conditions of wild horses and their associated HMAs, including overall herd health, population compared to AML, and available water sources. The *2007 Roberts Mountain Complex Wild Horse Gather Environmental Assessment*, the *Roberts Mountain Complex Final Gather and Removal Report of January 2008*, the *2008 Roberts Mountain HMA Genetic Report*, the *2008 Callaghan Complex Wild Horse Gather Environmental Assessment*, the *Callaghan Complex Gather Report of February 2009*, and the *Callaghan Complex Genetic Report of 2009* provided much of the information for this assessment (USDOI BLM 2007h, 2008k, l, 2009g, h). The *Wild Horses and Burros Management Handbook H-4700-1* (USDOI BLM 2010l) was also consulted for information on wild horse management.

The study area for the assessment of direct and indirect impacts to wild horses includes the HMAs within the 3 Bars Project area as shown on **Figure 3-43**. Herd Management Areas are for long-term management of wild horses and are designated “Special Management Areas” on public lands. Establishment of HMAs must take into consideration the AML for the herd, the habitat requirements of the animals, and the relationships with other uses of public land.

The objective of the management of wild horses is to limit the animals’ distribution to Herd Areas, which are areas of public lands identified as being habitat used by wild horses at the time of the passage of the Wild Free-Roaming Horses and Burros Act (43 CFR § 47000-5[d]). A herd is defined as one or more stallions and his mares and foals.

The CESA area for assessment of cumulative effects includes all of the HMAs that are contained within or partially overlap the 3 Bars Project area boundary.

3.17.2.2 General Herd and Herd Management Area Characteristics

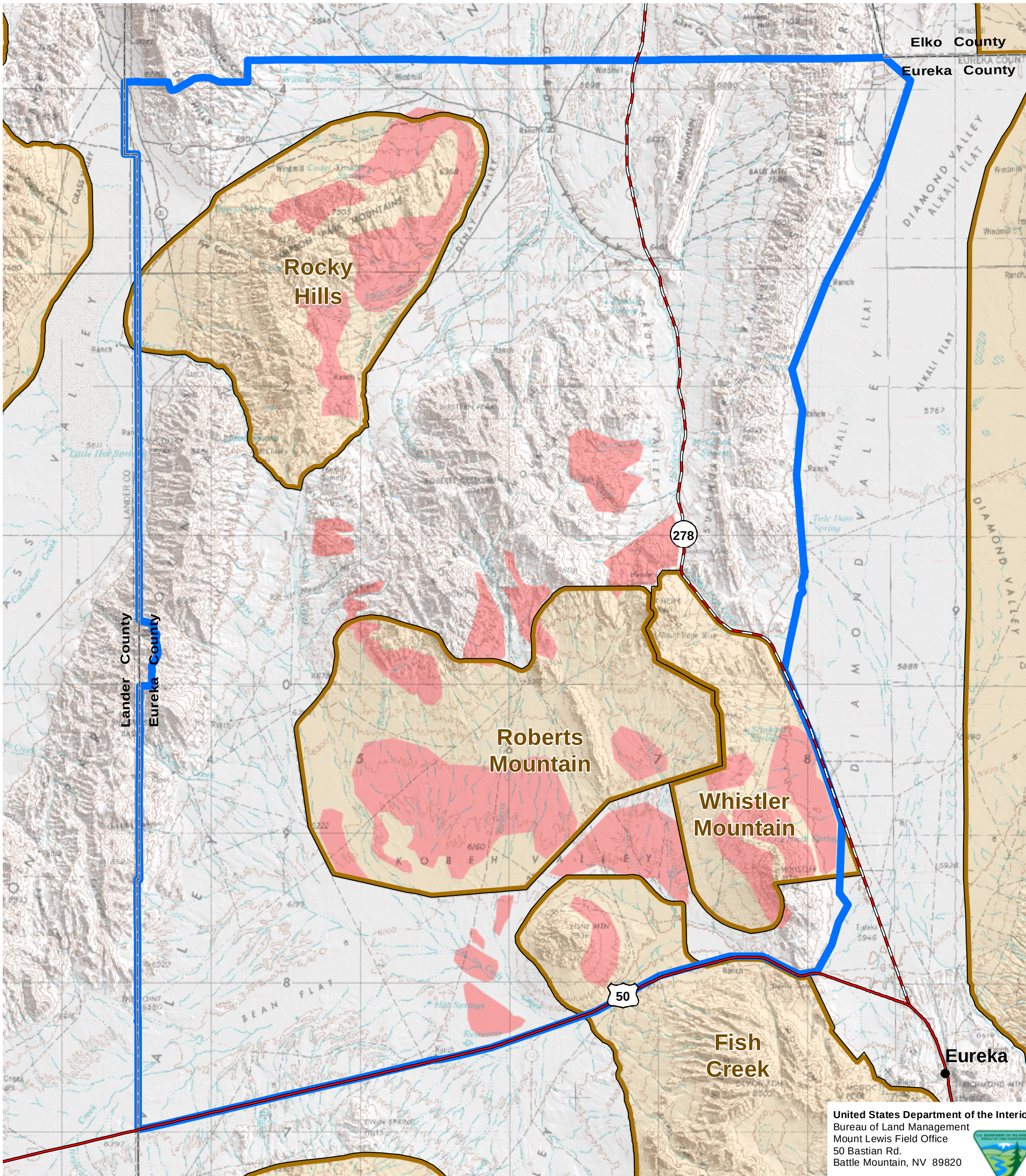
The 3 Bars Project area contains four HMAs—Fish Creek North[3], Rocky Hills, Roberts Mountain, and Whistler Mountain, totaling 246,536 acres. The HMAs are grouped into two different complexes. The Callaghan Complex consists of the Rocky Hills HMA and others not overlapped by the project area. The Roberts Mountain Complex contains the Roberts Mountain, Whistler Mountain, and Fish Creek North HMAs. Highway 50 divides Fish Creek North from Fish Creek South and precludes movement of the wild horses in the northern portion with the portion of the HMA south of U.S. Highway 50. As a result, the northern portion of the Fish Creek HMA is managed as a Complex with the Roberts Mountain and Whistler Mountain HMAs. Also included in this Complex is the Kobeh Valley Herd Area which is not currently designated as an HMA. The Kobeh Valley Herd Area surrounds the Fish Creek North HMA and wild horses pass through the Herd Area between the HMAs.

Limited year-round water sources, coupled with wild horse overpopulation, have resulted in wild horse concentrations in portions of the Roberts Mountain and Rocky Hills HMAs. Herd populations frequently exceed the desired AML due to inadequate gather frequency. As a result of populations over the AML, and limited forage and water during drought years, wild horse body scores declined and emergency gathers were required in portions of the Roberts Mountain Complex in 2001 and 2008. Permanent and temporary fences throughout the Rocky Hills and Roberts Mountain HMA hinder free-roaming abilities of wild horses in these HMAs.

Sampling of both the Rocky Hills and the Roberts Mountain Complex for genetic health indicates that the genetic variability of wild horses in these herds is high due to the population sizes and mixing between herds. The history of these herds is traced back to the early settlers of the area and the saddle horses used for ranch work. Some of the horses within the Rocky Hills HMA share traits with those of curly horses introduced into Nevada in the mid-1800s.

The BLM is required to maintain an inventory of wild horses or burros on public lands. Inventories are typically conducted using aircraft, and mostly by helicopter. A systematic grid is flown of the HMA using experienced observers. A direct count is obtained along with other monitoring data such as wild horse distribution, animal health, resource condition, and availability. Inventories are conducted every 2 to 3 years. During years when an inventory is not conducted, the Mount Lewis Field Office uses an average rate of increase derived from historical herd growth across the District, which is 17.5 to 19 percent annually, although the herd growth can fluctuate from year to year and among HMAs.

[3] The Fish Creek HMA exists on both the north and south sides of U.S. Highway 50, and is crossed by two rights-of-way fences. The portion of the HMA north of U. S. Highway 50 is referred to as Fish Creek North, though the HMA name has not yet been officially changed.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)

Legend

- Wild Horse Herd Management Area
- Areas Where Habitat Improvement is Needed
- 3 Bars Project Area

Source: BLM 2010m, 2012g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-43

Wild Horse Herd Management Areas and Habitat Improvement Areas

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

3.17.2.3 Individual HMA Characteristics

Table 3-46 displays the HMAs that are within the project area, their approximate size, the established AML, and the estimated 2013 population following the spring 2013 foaling season. The most recent inventory for the Roberts Mountain Complex was completed in November 2012, with Rocky Hills completed in conjunction with the Callaghan Complex in August 2012[4].

3.17.2.3.1 Rocky Hills HMA

The Rocky Hills HMA is 50 miles southwest of Carlin, Nevada, in Eureka County. It is approximately 15 miles east to west and 13 miles north to south. The elevation ranges from 5,500 to 8,100 feet amsl. In 1999, the Trail Canyon Fire burned approximately 50 percent of the Rocky Hills HMA and forced a gather that resulted in the removal of 98 percent of the wild horse population. Three years later, 74 horses were released into the HMA, most over 9 years of age. The most recent gather in this HMA occurred in 2011 as part of the Callaghan and New Pass/Ravenswood Complex gather (USDOI BLM 2010n). The Rocky Hills HMA (in conjunction with the Callaghan Complex) has been part of a program to reduce population growth through limited removals and the application of fertility control since 2008. The objective is to return to these areas every few years to gather wild horses, re-treat the females with fertility control and remove only a few animals (primarily young animals), and release most of the population back to the range. During the most recent inventory in August 2012, it was noted that the population consisted of approximately 7 percent foals, which was markedly lower than untreated populations exhibiting composition of foals ranging from 16 to 20 percent.

TABLE 3-46

Herd Management Areas

HMA	Acreage	Appropriate Management Levels	2014 Population (estimated)
Rocky Hills	83,997	86-143	130
Fish Creek North[1]	19,300	6-10	6
Roberts Mountain	99,992	150	443
Whistler Mountain	43,247	14-24	20

[1] The portion of the Fish Creek HMA north of U.S. Highway 50 is shown in the table. The entire HMA, which extends south of U.S. Highway 50, exceeds 252,000 acres.

The Rocky Hills HMA wild horses are large horses and display a variety of colorations including paint, buckskin, grulla, appaloosa, roan, and dun. Horses may reach 16 hands (a hand is 4 inches) or taller, and may reflect some draft

[4] Annual average rate of increase used to compute the 2013 estimated population for Roberts Mountain Complex is 19 percent. The annual rate of increase used for Rocky Hills for 2013 was 12 percent. Fertility control applications are being used on the Rocky Hills HMA to reduce foaling rates.

horse traits such as heavy muscling and large bone structure. The wild horses in the Rocky Hills HMA are descendants of the saddle horses raised by the Demale Family at the JD Ranch prior to the passage of the Wild Free-Roaming Horses and Burros Act, and may include Morgan, Saddlebred, Quarterhorse, Thoroughbred, Appaloosa, and heavier draft breeds.

Wild horses within the Rocky Hills HMA have generally exhibited good health and body condition, and no issues with disease or genetic defects are known. Sex ratios and age structures are expected to be within normal ranges for wild horse herds.

The southern portion of the HMA tends to be under-utilized, with horses congregating in the northeastern portion. This is likely due to areas of thick pinyon-juniper cover and fencing that precludes wild horse access to water sources and movement in the southern portion of the HMA. Perennial streams, which may not flow year-round within the HMA, provide variable amounts of water to wild horses. Other intermittent or ephemeral drainages may provide water during periods of spring run-off or during wet years. Many areas in the northern three-quarters of the HMA have been identified as lacking or having poor water availability and quality.

3.17.2.3.2 Fish Creek North HMA

The Fish Creek HMA is west of Eureka, Nevada. Approximately 92 percent of the HMA is south of U.S. Highway 50 and is cut off from the north portion by highway rights-of-way fences that preclude wild horse movement. The north portion of the Fish Creek HMA, referred to as the Fish Creek North HMA, was once part of the Kobeh Herd Area of which portions were designated as a part of the Fish Creek HMA and the Whistler Mountain HMA. The Fish Creek North HMA is associated with the Roberts Mountain Complex. The portion south of U.S. Highway 50 is not associated with the 3-Bars project and is not discussed further. The Fish Creek North HMA is approximately 6 miles from east to west and 5 miles from north to south. The elevation ranges from approximately 6,030 to 7,900 feet amsl. The habitat consists of pinyon-juniper, black sagebrush, Wyoming big sagebrush, and sodic bottom vegetation types that are not highly productive. Horses from this HMA were last gathered with the Roberts Mountain Complex gather in 2008.

Wild horses make intermittent use of the Fish Creek North HMA, moving through Kobeh Valley and between the Roberts Mountain, Whistler Mountain, and Fish Creek North HMAs. Despite fences, wild horses have found places to cross into the Roberts Mountain HMA (USDOI BLM 2007h). It is suspected that the Whistler Mountain and Fish Creek North herds travel into the Roberts Mountain HMA for water and to seek higher elevations in the summer months, and Whistler Mountain and Fish Creek North HMAs during winter months when deeper snow covers higher elevations. Due to the proximity of the HMA to the Roberts Mountain and Whistler Mountain HMAs, and documented movement of these horses, wild horses most closely resemble the horses within the Roberts Mountain HMA.

3.17.2.3.3 Roberts Mountain HMA

The Roberts Mountain HMA is 30 miles northwest of Eureka, Nevada, and west of Highway 278. It is approximately 10 miles east to west and 17 miles north to south. The elevation ranges from 5,500 to 7,500 feet amsl (USDOI BLM 2008l). In January 2008, a gather was conducted and 308 wild horses were removed, leaving 118 to 123 in the HMA. The 2014 population estimate was 443 horses, or about 293 horses above the established AML.

Perennial streams, which may not flow year-round within the HMA, provide variable amounts of water to wild horses. Other intermittent or ephemeral drainages may provide water during periods of spring run-off or during wet years. Few water sources exist in the southern and southwestern portion of the HMA. Forage in the low elevations that provides important winter range is also limited and is in a degraded state. As a result, concentrations of wild horses have been documented in portions of the HMA near available water sources, especially when the population exceeds the established AML. Additionally, wild horses move into higher elevations and into areas outside of the HMA to access water and forage. Wild horses are generally familiar with the location of fences and gates and are able to move within and outside of the HMA through gates and around drift fences (USDOI BLM 2007h). A large portion of the population exists outside of the HMA where use by wild horses has not been allocated. During the most recent inventory in November 2012, 56 percent of the wild horses were observed outside of the HMA boundary.

Wild horses of the Roberts Mountain HMA are known to have desirable traits. Size of the horses is typically larger than other wild horses, averaging 15 hands. Conformation of the animals is very good, with well-muscled shoulders and hindquarters typical of working stock ancestry. The wild horses include desirable colors including palomino, buckskin, and roan in addition to traditional colors of bay, brown, sorrel, and black. Health and body condition scoring of the Roberts Mountain HMA wild horses is typically adequate; however during drought or periods of overpopulation, forage in the lower elevation winter range becomes limited in relation to that needed to support a healthy population. This has resulted in emergency conditions in the past, specifically during the 2008 winter gather.

3.17.2.3.4 Whistler Mountain HMA

The Whistler Mountain HMA is 10 miles northwest of Eureka, Nevada, and west of Highway 278. It is approximately 7 miles from east to west and 16 miles from north to south. The elevation ranges from 5,900 to 8,225 feet amsl. This HMA was gathered with the Roberts Mountain Complex in 2008.

Intermittent and ephemeral channels provide negligible amounts of water, and areas in the central portion of the HMA lack or have poor water quality and availability. The western portion of the HMA has been under-utilized by wild horses in the past, partially due to lack of water sources. Wild horses commonly move from the Whistler Mountain HMA into the Roberts Mountain HMA or Kobeh Valley Herd Area. Lone Mountain Spring and Treasure Well in the Kobeh Valley (outside of the Whistler Mountain HMA boundary), are frequently utilized by wild horses from the Whistler Mountain and Fish Creek North HMAs.

No fences separate the Fish Creek North and Whistler Mountain HMAs, and horses move freely between them. Despite allotment boundary fences, wild horses have found places to cross into the Roberts Mountain HMA. It is suspected that the Whistler Mountain and Fish Creek North herds travel into the Roberts Mountain HMA for water and to seek higher elevations in the summer months, and use the lower elevations of Whistler Mountain HMA and Kobeh Valley during the winter months (USDOI BLM 2007h).

3.17.2.4 Conflicts among Wild Horses, Livestock, and Wildlife

Herd Management Areas within the project area overlap with grazing allotments (**Table 3-47**). The allocation of forage vegetation has to be adequate to support livestock, wild horses, and wildlife in a sustainable manner, otherwise forage for livestock, wild horses, and wildlife becomes degraded, as has occurred over much of the project area (**Figure 3-29)**. Typically, horses are treated very similar to livestock in terms of calculating AUMs, and dietary overlap between wild horses and cattle is very similar. Forage vegetation and water resources are also shared with wildlife.

3.17.2.5 Population Management and Control

Wild horses have relatively few natural predators, which allow their population rates to grow at an average rate of 18 to 25 percent per year (USDOI USGS 2012d). When unchecked, this rate of increase is greater than the rangeland can provide for and will begin to negatively affect the health of wild horses as well as wildlife. The Wild Free-Roaming Horses and Burros Act requires that wild horse and burro populations be managed at levels that allow for the preservation and maintenance of a thriving natural ecological balance. Current methods used to control wild horse populations include gathers and removals, adoption, and an immunocontraceptive (fertility control). Additional Population Growth Suppressants that could become available in the future include gelding of stallions or spay of a select number of mares, or implementation of improved fertility control formulations or methods. Any future gathers to implement Population Growth Suppressants would be documented through appropriate NEPA analysis.

TABLE 3-47

Allotments within Herd Management Areas

Herd Management Area	Allotment	Acreages	Percent of HMA	Percent of Allotment in HMA	Percent of Forage Allotted to Wild Horses (estimated)
Rocky Hills	Grass Valley	33,321	40	12	11
	JD	50,676	60	36	10-17
Fish Creek North	Lucky C	19,300	100	17	17
Roberts Mountain	Roberts Mountain	63,995	64	39	10
	Three Bars	35,997	36	45	
Whistler Mountain	Lucky C	12,109	28	11	17
	Romano	31,138	72	41	8

USDOI BLM (2007h, 2010m).

Several contraceptive methods have been explored since 1990, but most have proven to be ineffective. One method that has been effective is the injection of an immunocontraceptive known as Porcine Zona Pelludica, which is injected into mares during horse gathers. Porcine Zona Pelludica is a desirable method of fertility control for the following reasons (USDOI USGS 2012d):

- effects passively wear off and normal fertility can resume in 3 to 4 years;
- there is no harm if injected into mares that are already pregnant;
- research suggests that Porcine Zona Pelludica does not affect ovarian function or hormonal health;
- life span seems to increase (5 to 10 years) with improved health of treated mares, apparently due to the absence of stresses from pregnancy and lactation; and
- Porcine Zona Pelludica may be 90 percent effective in blocking fertility in mares for up to 3 years.

3.17.3 Environmental Consequences

3.17.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on information in the AECC and public scoping comments, the following concerns regarding wild horses were identified and are discussed in the effects analysis.

- Competition among wild horses, livestock, and wildlife for forage and water.
- Poor health scores recorded during horse gathers.
- Effects of project actions in and around foaling areas during the foaling season.
- Appropriate development of water sources to help disperse wild horses.
- The effect wild horses would have on project reclamation areas and the ability to achieve the desired goals.
- Injury or death of wild horses due to project activities.

3.17.3.2 Significance Criteria

Impacts to wild horses would be considered significant if BLM actions resulted in:

- Loss of habitat, forage, or water that results in adverse effects to the overall health of wild horses for more than 3 years after treatments.
- Interference with the historical distribution and movement patterns of wild horses within the affected HMAs.

3.17.3.3 Direct and Indirect Effects

3.17.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Restoration activities could have short-term effects on wild horses by exposing them to treatments that could harm their health, interfere with their movements, cause changes in vegetation that could alter the carrying capacity of the HMAs, or limit their access to water, which could ultimately affect their genetic health. Long-term, vegetation management activities would improve the amount and quality of forage, and potentially increasing the carrying capacity of the HMAs. Refer to Appendix C which describes the Standard Operating Procedures that would be followed in order to minimize impacts to wild horses during treatment efforts.

Adverse Effects

Forage Vegetation

Most treatment methods would result in a temporary loss of forage for wild horses. Even when vegetation is not physically damaged or removed, treated areas may require a minimum of 2 growing seasons of rest before they would be available to grazing animals and electric or other temporary fencing may be used to exclude wild horses from treatment areas, if necessary. The 2 year closure would be for areas where seeding or planting occurs. During this period, horses would have to utilize other portions of the HMA, which could increase competition with livestock and wildlife for forage. Only temporary electric fencing would be used within HMAs to protect treatment areas. No barbed wire fencing would be used in HMAs except for small, temporary riparian or aspen exclosures.

Movement Patterns

Under the proposed action, the BLM could use small, temporary (usually less than 3 years) exclosure fencing to protect treatments in riparian and aspen management units. Temporary fencing generally would not impact wild horses if there is reliable water outside of the exclosure or a water gap, and interference with the movement patterns of wild horses would be negligible due to the small size of the exclosures. Temporary electric fencing could be used to protect treatment areas in sagebrush and pinyon-juniper areas for up to 2 years following treatment. Electric fencing may be used during critical times of the year, or year-round if necessary. No barbed wire fence would be constructed, except perhaps for small riparian or aspen exclosures. The treatment activities within the HMAs may cause disturbance to wild horses, causing them to move to other locations within the HMAs. As a result, there could be temporary changes to movement and distribution patterns in the HMA. Normal movement patterns would be expected to return once treatment activity is complete. Movement patterns are also influenced by population size, and other environmental conditions.

Beneficial Effects

With increased abundance of perennial desirable forage species, the overall quality of wild horse habitat would increase. Forage resources would be more abundant throughout the year, including during the winter months. Healthy, perennial forage species are better able to withstand drought, and would provide more abundant forage during drought. It is anticipated that treatments would reduce the risk of wildfire and resultant loss of habitat for wild horses, and move riparian vegetation communities closer to their Proper Functioning Condition and Potential Natural Community. Improved habitat would result in improved health of wild horses through heavier body weights, larger and healthier foals, and increased ability to survive during harsh winters and drought.

Forage Vegetation

Treatments that improve the quality and abundance of native forbs and grasses and reduce the cover of noxious weeds and other invasive non-native vegetation would benefit wild horses by increasing the acreage available for grazing and the quantity and quality of forage. Treatments that reduce the risk of future catastrophic wildfire through fuels reduction and construction of fire and fuel breaks would also benefit wild horses, as wildfires would cause the loss of forage and could lead to infestations of noxious weeds and other invasive non-native vegetation in burned areas.

Health

Treatments that improve habitat quantity and quality for wild horses should result in healthier horses, reduce the need for emergency removals, increase movement patterns, and maintain and improve genetic diversity, while preserving wild horse historic traits long-term.

Water Resources

Riparian treatments of springs and streams should help several streams achieve Proper Functioning Condition in the long-term and improve water flows and quality. Reduced stream velocities would improve riparian vegetation health, groundwater recharge, and water quality. Streams would be stabilized and more resilient. Removal of pinyon-juniper near streams could increase stream flows. Treatments to reduce hazardous fuels, remove noxious weeds and other non-native vegetation, and restore native, fire resilient vegetation would reduce the risk of wildfire and its adverse impacts on water quantity and quality and peak flows.

3.17.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Under Alternative A, the BLM would make substantial gains in improving forage and water quantity and quality, which would help to distribute wild horses more evenly over the 3 Bars Project area, and would improve the health of these animals.

Riparian Treatments

About 286 acres of riparian treatments would occur within HMAs, with most treatments in the Rocky Hills HMA (**Table 3-48)**. **Table 3-48** includes acres within the HMA boundaries and does not include acres of treatment outside of HMAs.

TABLE 3-48

Surface Disturbance by Herd Management Area for Treatment Types

HMA Name	Management Type (acres)				Total
	Riparian	Aspen	Pinyon-juniper	Sagebrush	
Fish Creek North	0	0	1,359	1	1,360
Roberts Mountain	25	0	18,572	4,352	22,950
Rocky Hills	229	0	5,611	9,175	15,014
Whistler Mountain	32	0	18,879	1,421	20,332
Total	286	0	44,421	14,949	59,656

Adverse Effects

Manual and mechanical treatments could temporarily reduce the amount of forage on the treatment site, and wild horses could experience short-term disturbances associated with mechanical noise and the presence of humans. However, since animals could leave the area during treatments, effects would be minor (USDOI BLM 2007c:4-100). Noise and other disturbances may require wild horses to find other water sources to avoid treatment activities. This could cause an increased use of other water sources and increased competition between other wild horses, livestock, and wildlife. These effects are expected to be temporary with normal use patterns resuming once treatments are completed.

Small, temporary exclosure fencing could be used to exclude wild horses from riparian treatment sites, although water gaps in the fencing would allow wild horses to access water within portions of the treatment area. The BLM would also use exclosure fencing at Denay Pond to prevent wild horses from entering most of this area and allow the site to restore naturally. A gap would be provided in the fencing to allow wild horses and livestock to access a small portion of the pond.

Beneficial Effects

By stabilizing channels, revegetating treatment sites, and creating appropriate access to water sources, the BLM would reduce erosion and return riparian systems to a Proper Functioning Condition for the benefit of wild horses.

Through these treatments, water quality, quantity, and duration would be improved within HMAs, with water availability improved during times of drought, including at Cadet Spring, which is an important water source for wild horses.

In areas where pinyon-juniper is removed, stream flows could increase due to reduced water uptake by pinyon-juniper; this would be beneficial to wild horses, especially during drought conditions. Downed trees could be cut into logs and logs placed into streams, slowing water flow and creating pools for use by wild horses.

Aspen Treatments

Treatments are proposed in the Simpson Park Northeast Unit, which is part of the Rocky Hills HMA. However, treatment areas have not been identified pending surveys in the unit, and thus treatment acreage is not included in **Table 3-48**. Adverse and beneficial effects from manual and mechanical treatment methods, and from the use of small, temporary exclosure fencing would be similar to those discussed under Effects Common to All Alternatives, and under Riparian Treatments.

Pinyon-juniper Treatments

About half (44,421 acres) of the pinyon-juniper treatment acres would be within HMAs (**Table 3-48**). Manual and mechanical methods and prescribed fire would be used to treat vegetation on all treatment areas within the Roberts Mountain, Rocky Hills, and Whistler Mountain HMAs; only manual and mechanical methods would be used within the Fish Creek North HMA.

Adverse Effects

Manual and mechanical treatments could temporarily reduce the amount of forage on the treatment site, and wild horses could experience short-term disturbances associated with mechanical noise and the presence of humans.

Prescribed fire could reduce the ability of the treatment area to support wild horses by removing native forbs and grasses, leading to the spread of noxious weeds and other invasive non-native vegetation and loss of forage (USDOI BLM 2007c:4-100). Wild horses are accustomed to migrating in search of food and shelter in response to climatic variation and natural disturbances that alter food supplies, however, the amount of area treated annually would comprise only a small portion of the HMAs.

Treatments could result in increased sediment loads into streams. The effects of treatments on water quality, and possibly on wild horse use, would be short-term in duration, with water quality returning to pre-disturbance conditions within several days or weeks after treatment is completed.

Beneficial Effects

Wild horses would benefit from treatments that encourage the growth of the native forbs and grasses. Treatments would also help to move the associated ecological sites toward their Potential Natural Community, since most of the acreage within the HMAs is early- to mid-seral status. If the forage amount was increased within a given HMA, wild horses would likely be better distributed within the HMA (USDOI BLM 2007c:4-101). Treatments could also improve winter forage and year-round access to water, and the ability of wild horses to move throughout the HMAs, which should result in improved genetic health.

The BLM proposes to remove pinyon-juniper in several drainages on Roberts Mountains that serve as travel corridors for Greater sage-grouse. By removing pinyon-juniper in these drainages and encouraging the establishment of grasses and forbs, the BLM would also provide forage for wild horses in these areas, and may assist wild horse movements between valley and mountain use areas.

Treatments that remove hazardous fuels and create fire and fuel breaks would also benefit wild horses by opening up additional habitat and foraging areas, as well as protecting habitat from future loss by reducing the risk of a large-scale catastrophic wildfire. The expected outcome is that a larger number of acres within HMAs would be utilized by wild horses, providing improved foraging and travel ways over the current conditions.

Sagebrush Treatments

About half of sagebrush treatments would occur within HMAs (**Table 3-48**). Over 90 percent of sagebrush treatment projects within HMAs would occur on the Rocky Hills (Rocky Hills Unit) and Roberts Mountains (Coils Creek, Nichols, and Roberts Mountain Pasture units) HMAs.

Adverse Effects

The types of adverse effects from manual and mechanical treatment methods would be similar to those discussed under Effects Common to All Alternatives, and under Pinyon-juniper Treatments. These include short-term loss of forage and effects on wild horses from noise and disturbance. The sagebrush treatment area overlaps with 6 miles of perennial streams and 16 springs (**Figure 3-22**; **Table 3-15**). Treatments near these streams and springs could impact water quality and flows and the BLM may exclude wild horses from portions of streams using small, temporary exclosure fencing.

The BLM would plant sagebrush seedlings and reseed with native grasses and forbs to encourage the establishment of sagebrush and herbaceous vegetation that would provide forage for wild horses. The BLM would use native seeds and plants whenever possible, but could also use non-native grasses such as crested wheatgrass. Crested wheatgrass provides forage for livestock and wild horses, especially during winter (Ogle 2006). However, the BLM could remove crested wheatgrass and forage kochia at the Rocky Hills Unit to enhance sagebrush cover, to the potential detriment of wild horses. While only up to 50 percent of the unit would be treated, crested wheatgrass provides more forage for wild horses than does native vegetation.

Beneficial Effects

Encroachment of pinyon-juniper and spread of noxious weeds and other invasive non-native vegetation are also factors contributing to the degraded condition of sagebrush habitats. By thinning pinyon-juniper, removing noxious weeds and other invasive non-native vegetation, and seeding and planting with native vegetation, perennial forbs and grasses would be able to achieve proper abundance, and distribution, and provide greater quantity and quality forage vegetation for wild horses. These improvements should help to facilitate wild horse movement and better distribute wild horses throughout the HMAs.

Sagebrush treatments would increase the understory cover of grasses and forbs that provide forage for wild horses. Manual and mechanical treatments could result in increased water runoff and erosion, to the possible detriment of water quality and aquatic habitat. Long-term, treatments should improve water flows and water quality to the benefit of wild horses. Treatments that reduce the risk of future catastrophic wildfire through fuels reduction, including removal of noxious weeds and other invasive non-native vegetation, would benefit wild horses. Uncontrolled, high intensity wildfires can damage large tracts of rangeland, reducing its suitability for grazing Treatments that restore and maintain fire-adapted ecosystems, such as the appropriate use of mechanical thinning and fire, and creation of fuel breaks, would decrease the effects from wildfire to rangeland plant communities and improve ecosystem resilience and sustainability.

3.17.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The types and magnitude of effects for manual, mechanical, and biological control treatments would be similar between Alternatives A and B. Because the BLM would not use fire, therefore, there would be none of the adverse effects associated with prescribed fire and wildland fire for resource benefit. In particular, prescribed fire would not contribute to degradation of wild horse habitat that could result from soil erosion, loss of forage, and spread of noxious weeds and other invasive non-native vegetation in burned areas. However, with greater reliance on mechanical methods, there may be greater disturbance to wild horses from use of mechanical equipment than would occur under Alternative A.

Acres and types of wetland and riparian habitat treated would be similar to Alternative A, and the BLM could use small, temporary exclosure fencing to protect treatment areas. However, fewer acres would be treated to slow pinyon-juniper encroachment into sagebrush and riparian communities, and fewer acres where sagebrush should occur based on ecological site description reference, desired state, or management objective would be restored. Thus, there would be fewer gains in habitat improvement and forage production outside of riparian zones.

Because fire would not be available to reduce hazardous fuel loads, Alternative B may pose a greater long-term risk for catastrophic wildfire due to the accumulation of fuels. The BLM would be limited in promoting more fire resilient and diverse vegetation on the 3 Bars Project area. Prescribed fire would not be used to remove downed wood and other hazardous fuels associated with thinning and removal of pinyon-juniper, thus increasing the risk of wildfire in pinyon-juniper treatment areas. These effects would not be beneficial to wild horses.

3.17.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would use manual and classical biological control methods to treat vegetation, and would treat about one-fourth as many acres as would occur under Alternative A. The types and magnitude of effects for manual treatments would be similar to those for the other alternatives. The consequences of not using fire under Alternative C would be the same as those discussed under Alternative B.

The BLM has not identified areas where it would use classical biological control, but if nematodes, insects, or fungi are used on the 3 Bars Project area, treatments would generally be small in size and effects would be localized, or if used on cheatgrass, could cover large areas of habitat that are little used by wild horses. Thus, the effects on wild horses from biological control would be minor and primarily restricted to those species using vegetation treated by these methods. The BLM would not use livestock to remove cheatgrass or reduce competition from crested wheatgrass and forage kochia under Alternative C.

Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. Noise and other disturbance would be less with manual methods than the other methods. Manual and biological control methods result in less land disturbance than mechanical methods and as a result, short-term adverse effects to water quality from soil erosion, and loss of non-target vegetation, would be least under this alternative.

Without the use of mechanical equipment, the BLM would not conduct stream engineering and restoration, except on a limited basis on only a few stream miles. Fewer acres of noxious weeds and other invasive non-native vegetation would be controlled and fewer acres of pinyon-juniper thinning and removal would be conducted to promote understory development, except on very small areas where this vegetation can be hand pulled or controlled using hand tools. Reseeding and replanting of restoration sites would be limited to small areas where shrubs and other vegetation would be planted by hand; and fire and fuel breaks to reduce the risk of fire spread would only be created near existing roads or aspen stands, or along a few miles of stream. There would be little reduction in the risk of a catastrophic wildfire.

Under Alternative C, the BLM would not substantially improve the native vegetation community nor stop the loss of important ecosystem components. Wild horse movements and distribution, and availability and quality of forage and water, would be less under this alternative than the other action alternatives. These effects would be most noticeable during drought periods, harsh winters, or during periods of overpopulation. Thus, there would be negligible improvement in wild horse genetic diversity.

3.17.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to wild horses from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; or restore fire as an integral part of the ecosystem. Without treatments to reduce fuel loading or to control cheatgrass establishment and spread, the risk of catastrophic wildfires would continue to increase. Such fires could potentially lead to a catastrophic loss of wild horse habitat and create additional opportunities for invasive species to invade newly burned areas. The BLM would not conduct stream engineering and riparian habitat enhancement, and thus would do little to improve water availability and quality for wild horses. Thus, this alternative would do little to return the 3 Bars ecosystem to its Potential Natural Community and improve the genetic health of wild horses.

3.17.3.4 Cumulative Effects

The CESA for wild horses is approximately 320,579 acres and includes the area encompassed by all of the HMAs that are contained within and partially overlap the 3 Bars Project area boundary (**Figure 3-1**). Approximately 98 percent of the CESA is administered by the BLM and 2 percent is privately owned. Past and present actions that have influenced wild horses in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.17.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Historic overgrazing and other natural- and human-caused factors have contributed to an increase in wildfire occurrence and intensity and to a decrease in native plant diversity, specifically in the understory of the sagebrush community. This has caused many sagebrush habitats to be far below their Potential Natural Community. These actions have led to the decrease of native forage to the detriment of wild horses, livestock, and wildlife. In addition, livestock congregation and concentrated use by overpopulations of wild horses near streams, springs, and wetlands, have contributed to the degradation of riparian habitat and forage and their ability to function properly.

The BLM would continue ongoing management reviews to ensure proper livestock management and the long-term success of the proposed treatments. Long-term, wild horse management activities would continue which includes wild horse gathers, AML reviews and adjustments, removal of excess animals, and implementation of fertility control and other population growth suppressants

These management methods would help to reduce land disturbance and restore degraded habitats, and discourage establishment and expansion of noxious weeds and other invasive non-native vegetation, to the benefit of wild horses. The BLM may also install small, temporary exclosure fencing to limit livestock and wild horse access to treatment areas, although water gaps may be incorporated into fencing along streams to allow livestock, wild horses, and wildlife to access water. These actions should help to improve water quality in affected streams, restore streams to Proper Functioning Condition, and improve riparian habitat.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and may use aerial-based herbicide applications to remove cheatgrass. The BLM would also use herbicides and other treatment methods to restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations. These treatments would occur on about 1,000 acres annually and would improve rangeland health and resiliency, improve forage and water for wild horses, move vegetation communities in areas that have been disturbed by past natural and human-caused action toward their Potential Natural Communities, and reduce the risk of catastrophic wildfire.

Five herbicides are typically used on the 3 Bars Project area—2,4-D, glyphosate, imazapyr, metsulfuron methyl, and picloram. It is likely that the BLM would also use imazapic to treat cheatgrass on the project area in the future. These herbicides, along with 13 other herbicides that could be used by the BLM, generally have negligible to low risks to wild horses at typical and maximum application rates. A more detailed discussion of the effects of herbicides on wild horses is in the 17-States PEIS (USDOI BLM 2007b:4-143).

Land development, mineral development, and oil, gas, and hydrothermal exploration and development could affect about 15,000 acres in the CESA in the reasonably foreseeable future, including about 14,200 acres of disturbance associated with the Mount Hope Project, and acreage associated with potential land sales (although it is unlikely that all of this land would be developed), materials sites, roads, and rights-of-way for roads, pipelines, and power and telephone lines.

The Mount Hope Project would have an impact on wild horses in the CESA, as discussed in the Mount Hope Project EIS (USDOI BLM 2012b:4-438 to 4-443). A perimeter fence would be constructed around the mine site to minimize direct impacts to wild horses from mining activities, including collisions with equipment. This fence would directly remove approximately 14,200 acres of wild horse habitat. The fenced area includes approximately 13,998 acres of designated HMAs, including portions of the Roberts Mountain HMA and the Whistler Mountain HMA. Roberts Mountain HMA wild horses would be excluded from about 7,836 acres, while Whistler Mountain HMA wild horses would be excluded from about 6,162 acres, as a result of the construction of the boundary fence. Project-related surface disturbance could also result in limiting wild horse access to developed and natural water sources in the mining area, and direct impacts could occur as a result of vehicular collisions along mine access roads.

Mine-related activities would result in direct impacts to the movement patterns of wild horses. The perimeter fence would exclude wild horses during mine operation and reclamation for approximately 70 years. Construction of the fence would result in wild horses moving to other parts of the HMA and potentially increasing the use of forage and water resources that may be already limited.

Noise disturbance, human presence, and increased vehicular traffic would be continuous for approximately 44 years during the mine project. Sudden loud noises, such as blasts, could cause wild horses to disperse in directions away from the sound. This behavior could send wild horses into unfamiliar terrain. Some wild horses may avoid the area while others may tolerate the noise and continue foraging and breeding activities in the vicinity of the mine. Distribution changes could result in concentrations of wild horses using vegetation resources in certain areas and increased utilization levels. For example, increased human disturbance and unavailable land in the Whistler Mountain HMA and east portion of the Roberts Mountain HMA could result in the population shifting to the west portion of the Roberts Mountain HMA, resulting in larger numbers of wild horses using smaller land areas. As a result, upland forage species could be heavily utilized. Some impacts could occur to wild horses during the peak foaling season if widespread human activity disturbs the population. As a result, new foals could be orphaned or abandoned.

In addition to the loss of vegetation associated with the Mount Hope Project, of particular concern is the potential drawdown of groundwater near the proposed Mount Hope Project. The mine project could have an impact on groundwater resources and could result in diminished surface water flows on Roberts Mountains, to the detriment of wild horses (USDOI BLM 2012b:3-438 to 3-439). In addition, the mine's perimeter fence would prohibit wild horse access to natural watering sources and forage.

As part of mitigation for the mine project, staff with the Mount Hope Project worked with the BLM to identify alternative water sources. Six locations within the Whistler Mountain and Roberts Mountain HMAs have been identified for development as water sources for wild horses and could also be used by wildlife and livestock. These sites consist of existing stock wells that are not currently functioning or do not have pumps or troughs and two new sources tapped from production wells associated with the Mount Hope Project. These sources would provide water where it has not been available previously, or where availability has been limited (USDOI BLM 2012b:3-439). These measures would help to offset potential impacts to wild horse movement, distribution, and habitat loss by providing additional water sources and improving habitat that has been underused in the past.

Upon mine closure and reclamation, the perimeter fence would be removed. The reclaimed land should have more grass and forb forage and less mature shrub forage than presently occurs. However, there would be no other actions taken to provide alternative forage for wild horses during the 70 year development, operation, and reclamation period.

Catastrophic wildfire can burn extensive acreage, particularly during drought conditions when soil and vegetation are dry. An estimated 85,000 acres would burn in the CESA during the next 20 years. To reduce this risk, hazardous fuels reduction, habitat improvement, and noxious weeds and other invasive non-native vegetation control projects would occur on about 66,000 acres within the HMAs, or about 26 percent of HMAs within the CESA (about 3 percent of the CESA annually). Treatments include stream channel restoration, removal of encroaching pinyon-juniper, thinning and removal of pinyon-juniper to stimulate development of grasses and forbs and reduce tree density, and creation of fire and fuel breaks.

Although the cumulative effects of human disturbance, mining and other development, and wildfire in the CESA would impact wild horse forage and water quality and quantity, continued management to improve forage and water quantity and quality, livestock adjustments, wild horse gathers, and reduction of hazardous fuels would help offset these effects, and improve wild horse habitat quantity and quality. Treatments also would improve the physical and genetic health of wild horse populations long-term, and lead to a better distribution of wild horses across the HMAs within the CESA. Long-term benefits from treatments would be greater under this alternative than the other alternatives.

3.17.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on wild horses would be similar to those described under Alternative A. Under Alternative B, the BLM anticipates treating about half as many acres as under Alternative A. Fewer acres would be treated to reduce wildfire risk and its impacts on wild horse forage and water quality, including use of prescribed fire and wildland fire for resource benefit to restore natural fire regimes.

Adverse effects to vegetation within the CESA would generally be the same as described for Alternative A. However, by not using fire on the 3 Bars Project area, there would be no risks to vegetation and wild horse forage from fire on several thousand acres annually within the CESA. However, long-term benefits that could be derived from prescribed fire and wildland fire for resource benefit would not occur under this alternative, including improving pinyon-juniper health, creating a mosaic of habitats, slowing pinyon-juniper encroachment, making vegetation more fire resilient, creating openings in pinyon-juniper to promote shrub, forb, and grass development, and reducing the risk of catastrophic wildfire to benefit wild horse habitat.

Hazardous fuels reduction and habitat improvement projects and other land uses would occur on about 37,000 acres within HMAs, or about 18 percent of HMA acreage within the CESA (1 percent annually). Short-term adverse and long-term beneficial effects from 3 Bars Project treatments would accumulate with those outside the project area, but not to the same extent as would occur with Alternative A. Restoration treatments would benefit vegetation long-term, and should help to offset affects from land-use actions that are detrimental to vegetation. Thus, there would be minor short-term adverse effects, and long-term beneficial effects, from 3 Bars Project actions. Although 3 Bars Project treatments would improve the physical and genetic health of wild horses and help to better distribute wild horses across the 3 Bars Project area, these benefits would be less than for Alternative A, particularly in light of the cumulative impacts to wild horse habitat loss that could be realized from implementation of the Mount Hope Project.

3.17.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on wild horses would be similar to those described under Alternative A. Under Alternative C, the BLM would only use manual and classical biological control methods to treat vegetation. As a result, the BLM anticipates treating about one-fourth as many acres under this alternative than under Alternative A.

Adverse, short-term effects to vegetation associated with the use of fire and mechanized equipment would not occur under Alternative C. The risk of wildfire and its impacts on the water and vegetation used by wild horses would likely increase on the 3 Bars Project area under this alternative. The BLM would not be able to use mechanical methods and fire to reduce hazardous fuels, create fuel breaks, thin and remove pinyon-juniper to promote more fire resilient vegetation, and remove downed wood and slash.

Under current and future authorizations, fire and mechanized equipment would be used on about 7,500 acres within other portions of the HMAs in the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire. Thus, restoration treatments would impact about 22,000 acres within HMAs, or about 9 percent of the HMAs in the CESA; less than 1 percent of the acreage on the CESA would be affected annually. These treatments would help to restore plant communities back to their Potential Natural Community and would improve the physical and genetic health of wild horses, but not to the extent that would occur under Alternatives A and B.

3.17.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on wild horses would be similar to those described under Alternative A. There would be no cumulative effects on wild horses from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage.

Based on historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually in the CESA to reduce hazardous fuel levels and improve ecosystem health, and only about a third of these treatments would occur in HMAs. Hazardous fuel levels would likely increase, and only a limited number of miles of fuel and fire breaks would be constructed under this alternative compared to the action alternatives. The BLM would restore little riparian habitat. Thus, water quality would remain degraded and water availability could be limiting, especially during droughts, for wild horses. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing wildfires in pinyon-juniper would likely increase. There would be few benefits to wild horse habitat, and their physical and genetic health, and comprehensive improvement to habitat components or movement patterns would not occur in the long-term.

3.17.3.5 Unavoidable Adverse Effects

The proposed restoration treatments would disturb wild horses and alter wild horse movements and habitat use, and cause the short-term loss of forage used by wild horses.

3.17.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

The proposed treatments would affect the availability and quality of vegetation and water. These impacts would begin to disappear within 1 to 2 growing seasons after treatment. Because only a small percentage of HMAs would be treated annually, effects would be isolated, minor, and short-term.

All treatments that successfully reduce the cover of noxious weeds and other invasive non-native vegetation, thin pinyon-juniper to encourage growth of understory vegetation, and restore native vegetation on grazed lands would benefit wild horses by increasing the number of acres available for foraging and the quality of forage and resilience of vegetation to drought and harsh winters. Horses would also benefit from riparian treatments to increase water flows and improve water quality.

Treatments that reduce the risk of future catastrophic wildfire through fuels reduction would also benefit wild horses. Uncontrolled, high intensity wildfires can remove forage from large tracts of rangeland, reducing its suitability for wild horses. Treatments that restore and maintain fire-adapted ecosystems through the appropriate use of mechanical thinning, fire, and other vegetation treatment methods would decrease the effects of wildfire on rangeland plant communities and improve ecosystem resilience and sustainability.

3.17.3.7 Irreversible and Irretrievable Commitment of Resources

3 Bars Project treatments are not expected to result in an irreversible or irretrievable commitment of resources for wild horses.

3.17.3.8 Significance of the Effects under the Alternatives

None of the treatments under all alternatives should result in a significant long-term (greater than 5 years) loss of critical habitat, forage, or water that results in adverse direct, indirect, or cumulative effects to the overall health of wild horses, or interference with the normal distribution and movement patterns of wild horses within the affected HMAs. As discussed above, BLM treatments could have short-term effects on resources needed by wild horses, but would occur on less than 3 percent of the CESA annually. Small, temporary exclosure fencing associated with this and other projects would exclude wild horse access to portions of the CESA, but most of the area that is fenced would be the 14,000 acres of sagebrush and other habitat associated with the Mount Hope Project. Under all alternatives there would be long-term improvements in forage and water resources from BLM restoration treatments, the BLM would continue to provide wild horses access to water in or near riparian zones, and small, temporary exclosure fencing would be removed as soon as treatment sites are satisfactorily restored.

3.17.4 Mitigation

Wild horses would benefit from mitigation measures identified in Section 3.18.4 (Livestock Grazing Mitigation). No mitigation or monitoring measures have been identified specifically for wild horses.

3.18 Livestock Grazing

3.18.1 Regulatory Framework

The 3 Bars Project area is utilized by livestock on 12 grazing allotments administered by the BLM under the Taylor Grazing Act of 1934, as amended, the Federal Land Policy Management Act of 1976, as amended by the Public Rangelands Improvement Act of 1978 Grazing Regulations, and Public Land Orders. The BLM revised their grazing regulations in 1995 in order to ensure that livestock grazing practices are conducted in a manner that sustains or improves the ecological health of public rangelands. The revised regulations led to the development of the Northeastern Great Basin Area Standards and Guidelines (Standards and Guidelines), which established standards of rangeland health and livestock grazing. The intention of the Standards and Guidelines is to create a balance between sustainable development and multiple use while progressing towards desired rangeland conditions. The standards developed to achieve these conditions are as follows (USDOI 2007b):

Standard 1. Upland Sites: Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, and land form.

Standard 2. Riparian and Wetland Sites: Riparian and wetland areas exhibit a properly functioning condition and achieve state water quality criteria.

Standard 3. Habitat: Habitats exhibit a healthy, productive, and diverse population of native and/or desirable plant species, appropriate to the site characteristics, to provide suitable feed, water, cover and living space for animal species and maintain ecological processes. Habitat conditions meet the life cycle requirements of threatened and endangered species.

Standard 4. Cultural Resources: Land use plans would recognize cultural resources within the context of multiple use.

Standard 5. Healthy Wild Horse and Burro Populations: Wild horses and burros exhibit characteristics of a healthy, productive, and diverse population. Age structure and sex ratios are appropriate to maintain the long-term viability of the population as a distinct group. Herd management areas are able to provide suitable feed, water, cover and living space for wild horses and burros and maintain historic patterns of habitat use.

3.18.2 Affected Environment

3.18.2.1 Study Methods and Study Area

Allotment acreage, AUMs, and livestock information (number, type, and season of use), were provided by the BLM. The study area for assessment of direct and indirect impacts to livestock and rangeland conditions is the 3 Bars Project area. The CESA for assessment of cumulative effects includes any allotment or portion of an allotment that is within the 3 Bars Project area.

3.18.2.2 Grazing Allotments

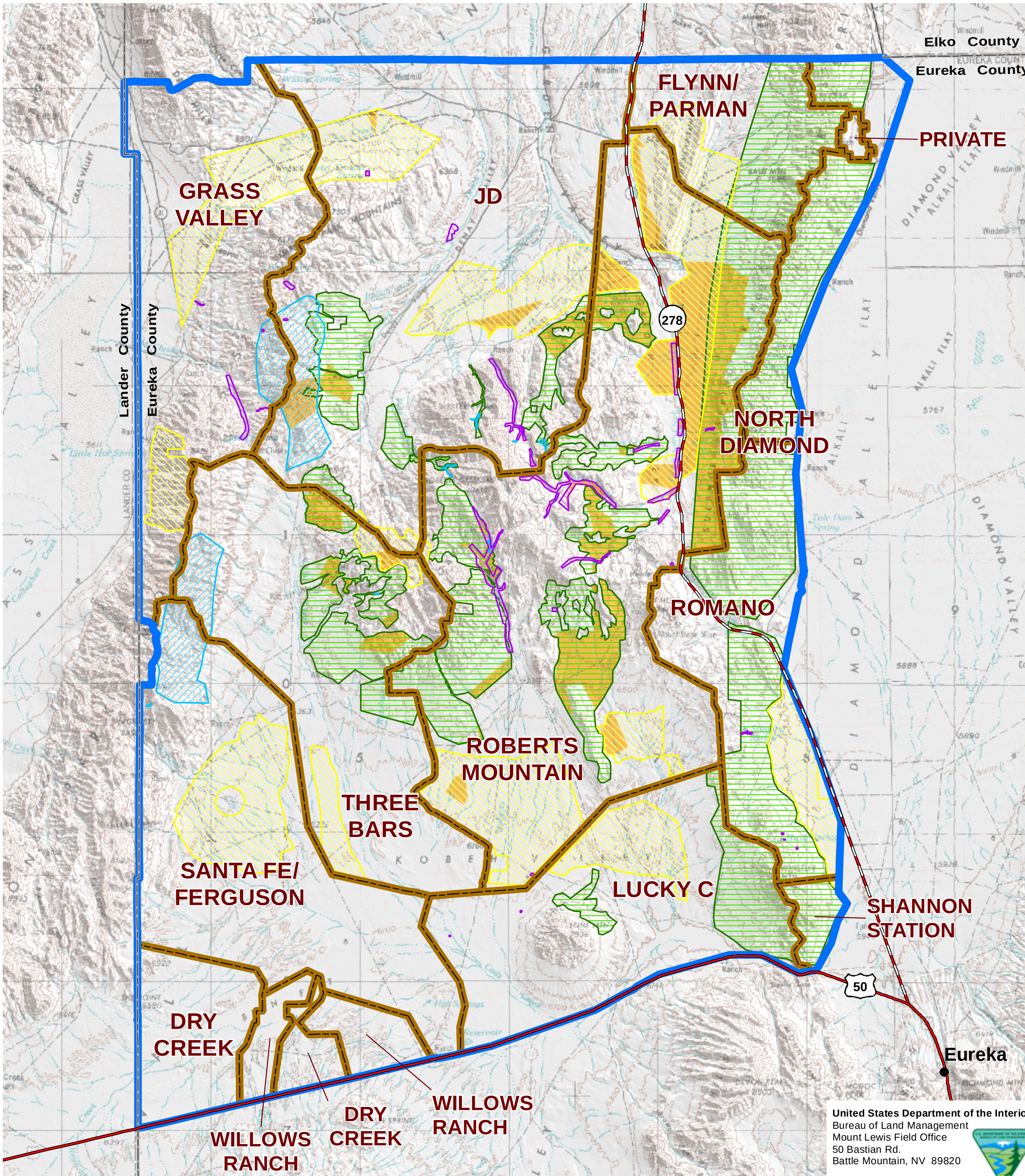
The 3 Bars Project area is made up of 12 grazing allotments on BLM-administered land (**Figure 3-44**). **Table 3-49** lists the allotments, total acreage, active AUMs, average acres per AUM, type of livestock, and season of use on the 3 Bars Project area. One AUM is the amount of forage required by an animal unit (AU) for 1 month, or the tenure of one AU for a 1-month period. If one AU grazes on an area of rangeland for 6 months, that tenure is equal to 6 AUs for 1 month or 6 AUMs. In general, the number of animal units, multiplied by the number of months they are on the range, equals the number of AUMs used (Ruyle and Ogden 1993). An AU is a standardized unit of measurement for range livestock that is equivalent to one mature cow and a calf up to 6 months, one horse, five sheep, or five goats, all over 6 months of age.

3.18.2.3 Grazing Management Systems

Grazing management systems determine how long livestock are allowed to graze in a given pasture or area. Improper livestock management can lead to the overuse of areas that are more desirable to livestock (near water sources, riparian zones, preferred vegetation types, etc.) and cause impacts. The use of various grazing rotation systems can achieve a more even use of rangelands and ensure a healthier rangeland with an increased ability to produce quality forage. Factors that are typically considered when developing a grazing rotation management system include grazing intensity, frequency, season of use, plant vigor and timing of growth, re-growth, seed production, and soil susceptibility to compaction. Fencing, salt and mineral supplements and artificial water sources can all be used to encourage livestock to utilize different areas or pastures. **Table 3-50** presents the management system for each grazing allotment within the project area. A description of grazing management systems follows (Wyman et al. 2006).

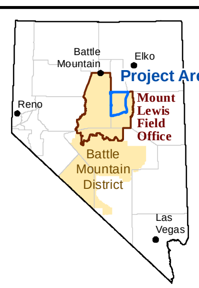
Rotation System - Scheduled movement of grazing animals from one pasture to another.

Rest-rotation System - Any grazing system that provides for the rotation of rest among pastures. The period of rest can be for a full year or more, or a portion of the growing season. The time and length of rest generally changes each successive year.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)



Legend

- Moderate to Severe Range Use
- Allotment Boundary
- 3 Bars Project Area
- Pinyon-juniper Treatment Area
- Sage Treatment Area
- Aspen Treatment Area
- Riparian Treatment Area

Source: BLM 2011g, 2013i.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-44

Range Use and Treatment Areas

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

TABLE 3-49

Grazing Allotments within the 3 Bars Ecosystem

Allotment Name - Number	3 Bars Project[1]	All Lands[2]				
	Total Acres	Total Acres	Active AUMs	Average Acres/AUM	Livestock Type	Season of Use
Three Bars - 00064	76,893	76,893	5,840	13	Cattle and Sheep	3/1-2/28
Dry Creek -10036	24,403	94,580	5,702	26	Cattle and Horse	3/1-1/31
Flynn/Parman - 10039	28,841	28,841	1,357	22	Cattle	3/15-11/30
Grass Valley - 10006	74,469	268,149	17,700	16	Cattle and Horse	1/1-1/31, 3/1-11/30
JD - 10041	140,749	140,740	7,921	12	Cattle	5/1-1/31
Lucky C - 10043	62,082	113,844	3,051	28	Cattle	4/15-2/28
North Diamond - 10034	22,846	76,950	3,579	22	Cattle	5/1-1/31
Roberts Mountain - 10046	164,079	164,079	9,624	16	Cattle and Sheep	1/1-12/31
Romano - 10047	47,829	75,847	2,887	26	Cattle	5/1-12/31
Santa Fe/Ferguson - 10049	76,514	83,480	5,202	16	Cattle and Sheep	3/1-12/1
Shannon Station - 10051	4,173	31,518	2,520	10	Cattle	4/1-2/28
Willows Ranch - 00062	10,678	51,421	3,621	18	Cattle	5/1-1/14

[1] Data reflect only the portion of the allotments on public land and do not include private lands within the 3 Bars Project area.
[2] Includes public and private lands within the 3 Bars Project area, and lands outside the project area.

TABLE 3-50

Allotment Grazing Management System and Category

Allotment	Management System	Number of Pastures	Management Category
3 Bars - 00064	Rest Rotation System	5	Improve
Dry Creek -10036	Rotation System	10	Improve
Flynn/Parman - 10039	Rest Rotation System	3	Improve
Grass Valley - 10006	Rotation System	24	Improve
JD - 10041	Rotation System	8	Maintain
Lucky C - 10043	Rotation System	4	Custodial
North Diamond - 10034	Rotation System	7	Custodial
Roberts Mountain - 10046	Rest Rotation System	19	Improve
Romano - 10047	Rotation System	10	Improve
Santa Fe/Ferguson - 10049	Voluntary Rotation System	1	Improve
Shannon Station - 10051	Rest Rotation System	8	Improve
Willow Ranch - 00062	Rest Rotation System	9	Maintain

Voluntary Rotation System - Movement of grazing animals in which the permittee volunteers to a more conservative grazing management approach that is given in the grazing management plan. This approach is developed in cooperation with the BLM to provide benefits to the permittee and to resources managed by the BLM.

3.18.2.4 Grazing Management Categories

In allotments where use areas have not been established, there may not be a requirement for the cattle to move through the allotment according to specific dates. It is up to the permittee to voluntarily rotate their cattle through the allotment in order to maintain appropriate distribution and utilization rates. Criteria used to assign each of these management approaches are as follows:

Improve - Allotments generally have the potential for increasing resource production or conditions, but are not producing at that potential. There may be conflicts or controversy involving resource conditions and uses, but there are realistic opportunities to improve resource conditions.

Maintain - Allotments are in satisfactory resource condition and are producing near their potential under existing management strategies. There are little or no known resource use conflicts or controversies.

Custodial - Allotments usually consist of relatively small acreages or parcels of public land. Acreages often intermingled with larger amounts of non-federal lands. There should be no known resource conflicts involving use or resource conditions. Typically, opportunities for positive economic returns from public investments are limited on these lands.

3.18.2.5 Range Improvements

The range improvements constructed within the project area include fencing, corrals, gates, cattle guards, and water improvement/supply projects. **Table 3-51** summarizes the improvements that occur in the affected allotments within the 3 Bars project area.

3.18.2.6 Allotment Evaluation Status

Rangeland health studies were conducted on six allotments between December 2010 and September 2011. As discussed in Section 3.12.2.3, Seventy KMAs within these allotments were assessed for their ecological status. These areas were selected because they met the following criteria:

- representative of larger areas of interest;
- contained within a single ecological site and plant community;
- contain key species; and
- capable of responding to management action that would be indicative of a response on a larger scale.

TABLE 3-51

Rangeland Improvements by Allotment

Allotment	Cattle Guard	Fencing (miles)	Corral	Gate	Spring	Man-made Water Supply[1]
Dry Creek	1	25				4
Flynn/Parman		37				
Grass Valley	4	126	1	4	36	8
JD	6	143	4	4	4	4
Lucky C		29				
North Diamond		42				
Roberts Mountain	2	159				
Romano		14				
Santa Fe / Ferguson		50	2			3
Shannon Station		<1				
Three Bars	6	67			13	1
Willows Ranch		21				1

[1] Includes reservoir, stock tank, and troughs.

The results of these studies were released in the *Final 3 Bars Ecosystem and Landscape Restoration Project Rangeland Health Report* (Eastern Nevada Landscape Coalition and AECOM 2012) and are summarized below. The analysis focused on the assessment of individual KMAs within each allotment and the condition of the KMA was extrapolated to the area within an allotment for which it represents. Within these KMAs, three parameters were used to measure overall rangeland health—production, desired dominant species, and Potential Natural Community for grass, forb, and shrub species. This EIS provides an overview assessment of rangeland health in the 3 Bars ecosystem as well as a more detailed analysis of six allotments that span the project area from the northern to southern extent. Current rangeland conditions are shown in **Figure 3-44**, and are in part based on this assessment and show that about 6 percent of the 3 Bars Project area has moderate to severe range use.

3.18.2.6.1 Flynn/Parman Allotment

The current grazing decision for the Flynn/Parman/Jiggs allotments was made on September 21, 1993. Approximately 28,841 acres of the allotment within the 3 Bars Project area are administered by the BLM. Six KMAs were studied within this allotment (**Table 3-32**). FP2 and FJ2 are within burn areas, the remaining four are not. Grass production and the desired dominant species were low or absent on five sites. Shrub production was low on five sites and the presence of desired dominant species was low or absent on five sites.

3.18.2.6.2 Roberts Mountain Allotment

The current grazing decision for the Roberts Mountain Allotment was made on October 20, 1994. Approximately 164,079 acres of the allotment are within the 3 Bars Project area and administered by the BLM. Sixteen KMAs were studied within this allotment (**Table 3-33**). RM9 and RM108 are within crested wheatgrass seeding areas and RM11 is within an herbicide treatment area. Grass production and/or Potential Natural Community were low in every KMA.

3.18.2.6.3 JD Allotment

The current grazing decision for the JD Allotment was made on September 24, 1994. Nineteen KMAs were studied within this allotment (**Table 3-34**). JD2, JD9, JD10, and JD15 are in burned areas. JD4 and JD5 are in the Willow Creek and Gabel Canyon seeding areas (1961 and 1964, respectively). The allotment has low grass production and lacks desired dominant grass species. Several areas lack desired dominant forb or shrub species.

3.18.2.6.4 Three Bars Allotment

The current grazing decision for the Three Bars Allotment was made on October 20, 1994. Approximately 76,893 acres of the allotment are within the 3 Bars Project area and administered by the BLM. Fifteen KMAs were studied within this allotment (**Table 3-35)**. Key Management Area TB19 is within the Trail Canyon Fire burn area. The allotment has low grass production and desired dominant species are low or absent. Some areas are below the Potential Natural Community for forbs and shrubs and lack the desired dominant species.

3.18.2.6.5 Romano Allotment

The current grazing decision for the Romano Allotment was made on September 27, 2004. Approximately 50 percent of the allotment (47,829 acres) is within the 3 Bars Project area and administered by the BLM. Nine KMAs were studied within the project area (**Table 3-36)**. Within this area, four seeding efforts have occurred. KMA RO7 and RO4B are within seeding areas. The allotment has low grass production and desired dominant species are low or absent. Several areas lack the desired forb species.

3.18.2.6.6 Lucky C Allotment

The current grazing decision for the Lucky C Allotment was made on September 27, 2004. Approximately 55 percent (62,082 acres) of the allotment is within the 3 Bars Project area and administered by the BLM. Of that portion, 1,078 acres are private land. Five KMAs were studied (**Table 3-37**). All are on the portion of the allotment that is within the 3 Bars Project area and administered by the BLM. Overall, the allotment has low grass production and various KMAs were rated low to absent for forb or shrub species.

3.18.2.6.7 Dry Creek Allotment

The grazing permit renewal for the Dry Creek Allotment was made on October 10, 2007. Approximately 24,403 acres of the allotment are within the 3 Bars Project area and administered by the BLM. Upland vegetation field observations indicate that appropriate perennial grass understory is lacking at all elevations. In the lower elevations, the perennial grass understory is typically limited to Sandberg’s bluegrass.

3.18.2.6.8 Grass Valley Allotment

The current grazing decision for the Grass Valley Allotment was made on June 21, 2002. Approximately 74,469 acres of the allotment is within the 3 Bars Project area and administered by the BLM. Field surveys conducted in 1998 indicated that overall production of perennial grasses was below the site potential. Shadscale production was below site potential on the majority of sites surveyed. Additionally, Wyoming big sagebrush was experiencing die-off and cheatgrass was present to varying degrees in the lower- and mid-elevation ranges. A portion of the Grass Valley Allotment burned in the 1999 Trail Canyon Fire and some burn areas are infested with cheatgrass.

3.18.2.6.9 North Diamond Allotment

The current grazing decision for the North Diamond Allotment was made on January 5, 2000. Approximately 22,846 acres of the allotment are within the 3 Bars Project area and administered by the BLM. Surveys conducted in 1998 found that over 80 percent of the desired dominant grass species were below the Potential Natural Communities for the site, however, they were present on three of the five sites surveyed. These species included Indian ricegrass, needle-and-thread, bluebunch wheatgrass, and basin wildrye. On one area, 100 percent of the antelope bitterbrush was mature or decadent and there was no recruitment. Additionally, cheatgrass was prevalent in the lower elevation understory.

3.18.2.6.10 Santa Fe/Ferguson Allotment

The current grazing decision for the Santa Fe/Ferguson Allotment was implemented by the Shoshone-Eureka RMP on November 6, 1987 and the Shoshone-Eureka Rangeland Program Summary in 1988. Approximately 76,514 acres of the allotment are within the 3 Bars Project area and administered by the BLM. This allotment has not been evaluated by the BLM.

3.18.2.6.11 Shannon Station Allotment

The current grazing decision for the Shannon Station and Spanish Gulch Allotment was made on January 5, 2000. Approximately 4,173 acres of the allotment are within the 3 Bars Project area and administered by the BLM. Surveys conducted in 1998 indicated that desired dominant grass species were present at six of nine sites surveyed. These species included Indian ricegrass, needle-and-thread, and bluebunch wheatgrass. Cheatgrass comprised approximately 25 percent of the understory community.

3.18.2.6.12 Willow Ranch Allotment

The current grazing decision for the Willow Ranch Allotment was made on May 18, 1994. Approximately 10,678 acres of the allotment are within the 3 Bars Project area and administered by the BLM. An allotment evaluation hasn’t been conducted for the Willow Ranch Allotment since 1994. At that time, it was determined that overgrazing was compromising the health of the allotment. The Final Multiple Use Decision that followed the evaluation reduced the permitted AUMs by 1,749 to 3,621.

3.18.3 Environmental Consequences

3.18.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on information in the AECC and public scoping comments, the following concerns regarding livestock grazing and rangeland conditions were identified and are discussed in this impact analysis:

- Impacts on ranching operations as a result of livestock exclusion areas.
- Effects of livestock on project reclamation areas and the ability to achieve desired goals.

3.18.3.2 Significance Criteria

Impacts to livestock would be considered significant if BLM actions resulted in:

- Long-term (greater than 10 years) change in forage availability that measurably affects livestock grazing.
- Long-term (greater than 5 years) change in access to water that measurably affects livestock grazing.

3.18.3.3 Direct and Indirect Effects

3.18.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Vegetation management activities could affect livestock by exposing them to treatments that could harm their health, interfere with their movements, cause changes in vegetation that could positively or negatively alter the carrying capacity of the allotments, or limit their access to water. Alternately, vegetation management activities could improve the amount and quality of forage, potentially increasing the carrying capacity of the allotments.

Adverse Effects

Forage Vegetation

Some treatment methods could result in a temporary loss of forage available to livestock. Even when vegetation is not physically damaged or removed, treatment areas could require a minimum of 2 growing seasons of rest if they are reseeded or replanted before they would be available to livestock (see Section 3.18.4 for mitigation measures related to livestock closures). This period could be extended if the project area experiences prolonged drought conditions. During this period, ranch operators would have to utilize other portions of the affected allotments. This could have the potential to temporarily reduce the number of livestock that an allotment could carry or necessitate providing salt and mineral supplements.

Health

It is possible that small, temporary exclusion fencing around treatment areas could cause injury to livestock if they run into the fence or try to breach the fence. Livestock could be excluded from treatment areas during the treatment to reduce risk of harm from prescribed fire and other treatments.

Movement Patterns

Under the proposed action, the BLM could use small, temporary exclosure fencing to protect treatments in riparian and aspen management units. Temporary fencing generally does not harm livestock if there is reliable water outside of the exclosure or if gaps are created in the exclosure to allow livestock to access portions of the water source. Temporary exclosure fencing could interfere with livestock use of treatment areas and could interfere with the movement patterns of livestock. Treatment areas could be closed to livestock for at least 2 growing seasons after treatment.

Water Resources

Stream treatments would result in short-term water quality degradation from soil erosion and sedimentation of streams. Small, temporary exclosure fencing could be used to exclude livestock from riparian treatment areas for at least 2 growing seasons to allow treatment areas to stabilize and to encourage growth of native vegetation. The BLM would work with the affected permittee(s) to ensure water is available for livestock.

Beneficial Effects

Forage Vegetation

Treatments that successfully improve the quality and abundance of native forbs and grasses, and reduce the cover of noxious weeds and other invasive non-native vegetation on rangelands, would benefit livestock. In addition, some noxious weeds are poisonous to livestock. The success of noxious weeds and other invasive non-native vegetation removal would determine the level of benefit of the treatments over the long-term. Treatments that reduce the risk of future catastrophic wildfire through fuels reduction and construction of fire and fuel breaks would also benefit livestock. Wildfires would result in the loss of forage and could lead to infestations of noxious weeds and other invasive non-native vegetation in burned areas.

Health and Movement Patterns

Treatments that improve woodland, rangeland, and riparian health, productivity, and functionality would benefit livestock. Risks to livestock health and movement from small, temporary exclosure fencing could be reduced by removing temporary fencing from treatment areas as soon as areas have stabilized and native vegetation has reestablished on the site.

Water Resources

The Grass Valley, JD, Lucky C, Roberts Mountain, and Romano allotments could all receive riparian treatments. Riparian treatments should help several streams achieve Proper Functioning Condition and improve water flows and quality to the benefit of livestock. Removal of pinyon-juniper near streams could increase stream flows. Treatments to reduce hazardous fuels, remove noxious weeds and other invasive non-native vegetation, and restore native, fire resilient vegetation, would reduce the risk of wildfire and its adverse impacts on forage and water quality and quantity to the benefit of livestock.

3.18.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

The BLM has identified about 3,885 acres of riparian zone treatments. Of these, about 2,731 acres of treatment would occur on the Roberts Mountain Allotment, 547 acres on the JD Allotment, and 319 acres on the Grass Valley Allotment (**Table 3-52**). Adverse effects from manual treatments would be similar to those discussed under Effects Common to All Alternatives. Use of mechanical treatments could negatively affect plants by compacting soils, creating bare ground, and uprooting desirable species, and could temporarily reduce the amount of forage on the treatment site.

Small, temporary exclosure fencing could be used to exclude livestock from riparian treatment sites for a minimum of 2 growing seasons to allow riparian conditions to stabilize. The BLM would work with the affected permittee(s) to ensure water is available for livestock.

Beneficial Effects

Beneficial effects from manual treatments and fencing would be similar to those discussed under Effects Common to All Alternatives.

All treatments would help to improve riparian habitat and forage and drinking water for livestock. Treatments would also reduce the risk of future catastrophic wildfire through removal of pinyon-juniper and creation of fire and fuel breaks to the benefit of livestock. Because of these actions, it is anticipated that riparian vegetation communities would move closer to the Potential Natural Community.

TABLE 3-52

Acreage Affected by Treatment Types for each Allotment under Alternative A

Allotment Name	Treatment Type				Total
	Riparian	Aspen	Pinyon-juniper	Sagebrush	
	Acres	Acres	Acres	Acres	Acres
Three Bars	0	0	10,909	996	11,905
Dry Creek	0	0	0	0	0
Flynn/Parman	0	0	5,361	1,538	6,899
Grass Valley	319	0	0	7,435	7,754
JD	547	62	10,009	6,091	16,709
Lucky C	4	0	8,624	1,519	10,147
North Diamond	0	0	7,157	0	7,157
Roberts Mountain	2,731	77	30,153	9,699	42,660
Romano	32	0	16,394	1,341	17,767
Santa Fe/Ferguson	8	8	0	2,680	2,696
Shannon Station	0	0	2,880	16	2,896
Willow Ranch	0	0	0	0	0
Total	3,641	147	91,487	31,315	126,590

In areas where pinyon-juniper is removed, stream flows could increase due to reduced water uptake and capture of rainfall by pinyon-juniper. This would be beneficial to livestock, especially during drought conditions. Downed trees could be cut into logs and logs placed into streams, slowing water flow and creating pools for use by livestock. Stream channel restoration, removal of pinyon-juniper, and removal of noxious weeds and other invasive non-native vegetation would allow riparian zones to function as fire breaks, helping to reduce the risk of wildfire to riparian zones and loss of forage and degradation of water quality, all of which would benefit livestock.

Aspen Treatments

Adverse and beneficial effects from manual and mechanical fire treatment methods, and from the use of small, temporary exclosure fencing, would be similar to those discussed under Effects Common to All Alternatives, and under Riparian Treatments. Treatments would occur in the JD, Roberts Mountain, and Santa/Fe Ferguson allotments.

Pinyon-juniper would be removed near aspen stands and nearby roads. These clearings would function as fire breaks, helping to reduce the risk of wildfire to aspen and nearby habitats and degradation of water quality and loss of forage to the benefit of livestock.

Pinyon-juniper Treatments

Treatments would occur on most allotments, with largest treatment acreages on the Roberts Mountain, Romano, JD, and Three Bars allotments (**Table 3-52**).

Adverse Effects

Effects from manual and mechanical treatments could be associated with loss of forage and disturbance. About 57 percent of treatments where the objective is to improve sagebrush habitat by thinning pinyon-juniper, and 37 percent of the treatments where the objective is to reduce hazardous fuels, would occur in Phase I stands. For the entire 3 Bars Project area, about 40 percent of treatments would be in Phase I stands. These treatments would have minimal impact on livestock as there would be little loss of forage that is of value to livestock, and disturbance would be localized.

The remainder of treatments would occur in Phase II and III stands. Livestock use pinyon-juniper for shelter and cover, but generally avoid Phase III stands because of the limited forage and dense cover of pinyon-juniper. Several thousand acres could be treated annually in Phase II and III stands, primarily by using prescribed fire. Prescribed fire could reduce the suitability of the treatment site to support livestock by removing native forbs and grasses. Fires could also lead to the spread of noxious weeds and other invasive non-native vegetation and loss of forage (USDOI BLM 2007c:4-100). Treatment areas would be closed to livestock for a minimum of 2 growing seasons. Based on past monitoring of prescribed fire treatment sites on the 3 Bars Project area, native vegetation should recover within a few years and establishment and spread of noxious weeds and other invasive non-native vegetation should be minimal (USDOI BLM 2011e, f).

Thirteen miles of perennial stream treatments are associated with pinyon-juniper management projects. Treatments could result in increased sediment loads into streams. The effects of treatments on water quality, and possibly on livestock use, would be short-term in duration, with water quality returning to pre-disturbance conditions within several days or weeks after treatment is completed.

Beneficial Effects

Manual and mechanical treatments would improve forage availability and quality for livestock. In pinyon-juniper treatment areas, livestock would benefit from the thinning and burning of pinyon-juniper, as these treatments would encourage growth of the native forbs and grasses favored by livestock and help to move the associated ecological sites toward their Potential Natural Community.

The BLM proposes to remove pinyon-juniper in several drainages on Roberts Mountains that serve as travel corridors for Greater sage-grouse. By removing pinyon-juniper in these drainages and encouraging the establishment of grasses and forbs, the BLM would provide forage for livestock in areas once dominated by pinyon-juniper, and may facilitate livestock movements between valley and mountain use areas. Removal of pinyon-juniper near streams and springs could lead to increased flows and improved water supply for livestock.

In many cases, prescribed fire would benefit livestock by reducing the cover of shrub and tree species, such as pinyon-juniper, which can form dense stands that preclude the establishment of desirable forage species and create physical obstructions to forage. The effect of fire on forage would vary by site. Prescribed burning conducted during the dormant season, under moist conditions, would be likely to stimulate forage production (e.g., through increasing soil temperature and nutrient availability) and favor perennial grasses with greater palatability (USDOI BLM 2007c:4-96).

Treatments that reduce the risk of future catastrophic wildfire through fuels reduction would also benefit livestock. Uncontrolled, high intensity wildfires can damage large tracts of rangeland, reducing its suitability for livestock grazing. Treatments that restore and maintain fire-adapted ecosystems, such as the appropriate use of mechanical thinning and fire, would decrease the effects of wildfire on rangeland plant communities and improve ecosystem resilience and sustainability (USDOI BLM 2007c:4-96). Manual and mechanical treatments would also be used to create many miles of fire and fuel breaks in all management types to help minimize wildfire effects and limit the spread of wildfire.

Sagebrush Treatments

About two-thirds of treatments would occur in the Roberts Mountain, Grass Valley, and JD allotments (**Table 3-52**). Sagebrush communities over most of the area are not meeting their Potential Natural Community objectives primarily due to an inadequate perennial grass and forb understory.

The BLM would thin pinyon-juniper in sagebrush communities on the Table Mountain (Roberts Mountain Allotment), Three Corners (JD and Roberts Mountain allotments), and Whistler Sage (Romano Allotment) units. These treatments would remove encroaching pinyon-juniper and promote sagebrush development.

The BLM would conduct treatments to remove non-native vegetation, including cheatgrass, crested wheatgrass, and forage kochia, using all treatment methods. Rocky Hills Unit treatments would be associated with the Grass Valley (5,477 acres) and JD (3,698 acres) allotments. Whistler Sage treatments would mostly be associated with the Romano Allotment; a few acres would be associated with the Shannon Station Allotment. All but about 5 of the 1,958 acres of treatments associated with West Simpson Park would be on the Grass Valley Allotment.

Adverse Effects

Effects from manual and mechanical treatments would be associated with loss of forage and disturbance. On the Rocky Hills Unit, the BLM would remove crested wheatgrass and forage kochia and re-seed or re-plant the area with sagebrush. This would result in the loss of forage for livestock, and may require that the BLM temporarily suspend AUMs during the treatment.

Beneficial Effects

By thinning pinyon-juniper, and removing non-native vegetation and seeding and planting with native vegetation, perennial forbs and grasses would be able to achieve proper abundance, distribution, and diversity and ecological sites would begin moving towards their Potential Natural Community. This would improve overall rangeland health and provide greater quantity and quality forage vegetation for livestock.

Approximately 5 miles of perennial stream are associated with riparian management projects that occur within the larger sagebrush management area (Lower Henderson 1 and 3 and Lower Vinini Creek units). These treatments would improve water availability and quality for livestock; treatments in riparian zones are discussed under Riparian Treatments. Another 1.3 miles of perennial stream habitat are associated exclusively with sagebrush management projects—Rocky Hills (Coils Creek) and West Simpson Park (unnamed) units. The primary treatment objectives for these units are to thin pinyon-juniper to promote understory development, using manual and mechanical methods, and to remove non-native vegetation. Manual and mechanical treatments would help to improve water flows and water quality to the benefit of livestock.

Noxious weeds and other invasive non-native vegetation infestations can greatly reduce the land's carrying capacity for livestock, which tend to avoid noxious weeds and other invasive non-native vegetation that have low palatability as a result of defenses such as spines and/or distasteful compounds (e.g., thistles; Olson 1999). Grazing can help to manage invasive plants (i.e. cheatgrass), but would have to be used in combination with other methods, such as discing and plowing, to control noxious weeds and other invasive non-native vegetation and to return vegetation to a more desirable composition.

In some treatment areas, the BLM would plant sagebrush seedlings and reseed with native grasses and forbs to encourage the establishment of sagebrush and herbaceous vegetation that would provide forage for livestock. The BLM would use native seeds and plants whenever possible, but could also use non-native plants such as crested wheatgrass and forage kochia. Crested wheatgrass provides forage for livestock, especially during winter (Ogle 2006). Non-native plantings would be limited to those areas where there is cheatgrass dominance, and where the site could be restored in the future with native vegetation.

Treatments that reduce the risk of future catastrophic wildfire through fuels reduction, including removal of noxious weeds and other invasive non-native vegetation, would benefit livestock. Uncontrolled, high intensity wildfires can damage large tracts of rangeland, reducing its suitability for grazing. Manual and mechanical treatments would be used to create many miles of fire and fuel breaks in all management types to help minimize wildfire effects and limit the spread of wildfire.

3.18.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, the BLM would not be able to use prescribed fire or wildland fire for resource benefit. As a result, the BLM anticipates treating about half as many acres under Alternative B as under Alternative A. The types and magnitude of effects for manual, mechanical, and biological control treatments would be similar between Alternatives A and B. Because the BLM would not be able to use fire, there would be none of the adverse effects associated with fire. In particular, there would be no loss of forage, degradation of water quality from soil erosion, and spread of noxious weeds and other invasive non-native vegetation in burned areas. By not using fire, permittees would likely have more flexibility in managing their herds as treatment areas would generally be smaller. Many treatments would take longer to complete, such as those where pinyon-juniper and noxious weeds and other invasive non-native species are controlled using mechanical or manual treatments instead of fire, or where stream channel and riparian habitat restoration are proposed.

The BLM would closely coordinate activities with permittees, and permittees may have to adjust their livestock stocking levels or pasture use. Because some treatments may take longer to complete, such as those where invasive species are controlled using mechanical treatments, the time that permittees would have to adjust their grazing plans could be longer than under Alternative A.

Acres and types of wetland and riparian habitat treated would be similar to Alternative A, and the BLM could use small, temporary exclosure fencing to protect treatment areas. However, less effort would be spent by the BLM on slowing pinyon-juniper encroachment into sagebrush and riparian communities, reducing the amount of Phase II and III pinyon-juniper treated, reducing the amount of habitat restored where sagebrush should occur based on ecological site descriptions, desired state, or management objective, and reducing the acres of habitat treated to improve species diversity, especially through cheatgrass control. Thus, there would be fewer gains in forage production outside of riparian zones, and greater risk of habitat loss from catastrophic wildfire, under this alternative than under Alternative A.

Because fire would not be available to reduce hazardous fuel loads, Alternative B may pose a greater long-term risk for wildfire due to the accumulation of fuels. The BLM would not be able to promote more fire resilient and diverse habitat on the 3 Bars Project area.

Under Alternative B, the BLM would improve forage and water quantity and quality and the health and resiliency of vegetation. The BLM would also make substantial gains in improving forage and water quantity and quality in riparian zones. The BLM would only treat a limited acreage to control noxious weeds and other invasive non-native vegetation, and reduce the risk of catastrophic wildfire. Thus, overall benefits to livestock from treatment actions would be less under this alternative than under Alternative A.

3.18.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation. As a result, the BLM anticipates treating about one-fourth the acreage that would be treated under Alternative A. The types and magnitude of effects for manual treatments would be similar to those for the other action alternatives. The consequences of not using fire under Alternative C would be the same as those discussed under Alternative B.

Under Alternative C, many treatments would take longer to complete, such as those where pinyon-juniper and noxious weeds and other invasive non-native species are controlled using manual treatments instead of fire and mechanical methods, or where stream channel and riparian habitat restoration are proposed. Thus, the time that permittees would have to adjust their grazing plans could be longer than under Alternative A.

Although fewer acres would be treated under Alternative C than under Alternatives A and B, the BLM would still have to closely coordinate activities with permittees and permittees may have to adjust their livestock stocking levels or pasture use. The BLM has not identified areas where it would use classical biological control, but if nematodes, insects, or fungi are used on the 3 Bars Project area, treatments would generally be small in size and effects would be localized, or if used on cheatgrass, could cover large areas of habitat. The BLM would not be able to use livestock to remove cheatgrass under Alternative C.

Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. Noise and other disturbance would be less with manual methods than the other methods. Because land disturbance would be greater using mechanical methods and fire than it would be with manual and classical biological control methods, adverse effects to livestock drinking water quality from soil erosion, and loss of non-target vegetation, would be less under this alternative than under Alternatives A and B.

By not being able to use mechanical equipment, however, the BLM would also not be able to conduct stream engineering and restoration, except on a limited basis on only a few stream miles; control noxious weeds and other invasive non-native vegetation, except on very small areas where this vegetation can be hand pulled or controlled using hand tools; reseed and replant restoration sites, except for small areas where shrubs and other vegetation would be planted by hand; remove vegetation to stimulate production of desirable forbs and grasses; or create fire and fuel breaks to reduce the risk of fire spread, except near existing roads or aspen stands, or along a few miles of stream. As a result, there would be less improvement in forage and water quantity and quality, and more risk of catastrophic wildfire than under the other action alternatives. Overall benefits to livestock from treatment actions would be less under this alternative than under Alternatives A and B. By not using fire and mechanical methods, however, permittees would likely have more flexibility in management of their herds as treatment areas would generally be smaller under this alternative than under Alternatives A and B.

3.18.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to livestock from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; thin and remove pinyon-juniper to promote growth of forbs and grasses; or restore fire as an integral part of the ecosystem. Without treatments to reduce fuel loading or to control cheatgrass establishment and spread, the risk of catastrophic wildfires would continue to increase and such fires could potentially lead to a catastrophic loss of livestock forage and create additional opportunities for noxious weeds and other invasive non-native species to invade newly burned areas. The BLM would not conduct stream engineering and riparian habitat enhancement, and thus would do little to improve water availability and quality for livestock. Thus, this alternative would do little to return the 3 Bars ecosystem to its Potential Natural Community and improve rangeland conditions for livestock.

3.18.3.4 Cumulative Effects

The CESA for livestock and rangeland management is approximately 1,312,942 acres and includes the area encompassed by all of the allotments that are contained within or partially overlap the 3 Bars Project area boundary (**Figure 3-1**)**)**. Approximately 94 percent of the area is administered by the BLM and 6 percent is privately owned. Past and present actions that have influenced livestock in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.18.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

According to utilization data, about 6 percent of the 3 Bars Project area is experiencing moderate to severe forage utilization (see Section 3.18.2.3). However, about 35 percent of proposed riparian zone treatment areas, 25 percent of pinyon-juniper treatment areas, and 48 percent of sagebrush treatment areas are experiencing moderate to severe forage utilization. About 1,600 acres within the Simpson Park Northeast Unit are experiencing moderate to severe forage utilization, although only about 150 acres would be treated within this unit. In addition, livestock often congregate near streams, springs, and wetlands, impacting riparian habitat, forage, and stream channels and their ability to function properly.

The BLM would continue ongoing management reviews to ensure proper livestock management and long-term success of the treatments.   If changes in the current terms and conditions of the grazing permit are required, they would be implemented through a separate process in accordance the grazing regulations.

The BLM would also continue to conduct wild horse gathers, conduct AML reviews and adjustments, remove excess animals and use fertility control, and implement habitat projects.

The BLM may install small, temporary exclosure fencing to exclude livestock and wild horses from treatment areas, although water gaps may be incorporated into fencing along streams to allow access to water. These actions should help to improve water quality in affected streams, restore streams to Proper Functioning Condition, and improve riparian habitat.

Land development, mineral development, and oil, gas, and hydrothermal exploration and development could affect about 15,000 acres in the CESA in the reasonably foreseeable future, including the Mount Hope Project, and acreage associated with potential land sales (although it is unlikely that all of this land would be developed), materials sites, roads, and rights-of-way for roads, pipelines, and power and telephone lines. Disturbance associated with these activities could alter livestock behavior and habitat use, and loss of native plant communities in the affected areas could reduce forage for livestock and facilitate the establishment and spread of noxious weeds and other invasive non-native vegetation.

A total of 32 AUMs in the Romano and Roberts Mountain allotments would be lost in perpetuity as a result of the 734-acre Mount Hope Project open pit. In addition, 490 AUMs in the Roberts Mountain Allotment, and 291 AUMs in the Romano Allotment, would be lost for approximately 70 years as a result of an exclusionary perimeter fence that would enclose 14,206 acres of the Mount Hope Project. The loss of AUMs represents 5 percent of the active grazing preference in the Roberts Mountain Allotment and 10 percent of the active grazing preference in the Romano Allotment.

As described in the Mount Hope Project EIS, when an area of BLM-administered land is devoted to a single public purpose, such as mineral production, AUMs are adjusted to reflect the area withdrawn from multiple uses. These AUMs are lost until such time that mining has ceased and reclamation has been successfully completed. At that time, the area would be evaluated to determine if the AUMs can be returned (USDOI BLM 2012b:3-421 to 3-422).

In addition to the loss of access to forage for the Mount Hope Project, mine project activities could result in direct impacts to the movement patterns of livestock. Noise disturbance, human presence, and increased vehicular traffic would be continuous for approximately 44 years during implementation and execution of the mine project. Sudden loud noises, such as blasts, could cause livestock to disperse in directions away from the sound.

Of particular concern is the potential drawdown of groundwater near the proposed Mount Hope Project and its effects on forage, particularly phreatophytes, and on water resources on Roberts Mountains and in the Kobeh Valley. The mine project could have a significant impact on groundwater resources and could result in diminished surface water flows on Roberts Mountains, to the detriment of livestock grazing (USDOI BLM 2012b:3-423 to 3-424).

As part of mitigation for the mine project, the mine proponent worked with the BLM to develop alternative water sources. Six locations have been identified in coordination with the BLM and would be developed as water sources for wild horses and could also be used by wildlife and livestock in areas historically used by wild horses. These sites consist of existing stock wells that are not currently functioning or do not have pumps or troughs and two new sources tapped from Mount Hope Project production wells. These sources would provide water where it has not been available previously or where availability has been limited (USDOI BLM 2012b:3-439). The mine proponent would reclaim disturbed areas during and after mining, and remove the fence after reclamation is completed. The reclaimed land would have more grass and forb forage and less shrub and pinyon-juniper cover than presently occurs. The BLM would also monitor vegetation conditions in areas that could be impacted by lower groundwater levels, and conduct seeding, with possible grazing closures, to minimize the loss of forage (USDOI BLM 2012b:3-424). The BLM felt that these actions would mitigate impacts from the mine project to less than significant. There would be no actions taken to provide alternative forage for livestock during the 70 year development, operation, and reclamation period.

Although herbicides are not proposed for use as part of the 3 Bars Project, the BLM could use herbicides applied aerially and using ground-based methods under existing authorizations. Thus, there could be risks to livestock in the CESA from being accidentally sprayed, or ingesting, herbicides that could adversely impact livestock health, although only a few hundred acres would be treated annually. Given the amount of acreage treated, noxious weeds and other invasive non-native vegetation would continue to spread to the detriment of livestock forage. Five herbicides are typically used on the 3 Bars Project area—2,4-D, glyphosate, imazapyr, metsulfuron methyl, and picloram. The BLM may also use imazapic to treat cheatgrass on the project area in the future. These herbicides, along with 12 other herbicides that could be used by the BLM, generally have negligible to low risks to livestock at typical and maximum application rates. A more detailed discussion of the effects of herbicides on livestock is in the 17-States PEIS (USDOI BLM 2007b:4-125).

Catastrophic wildfire can burn extensive vegetation, particularly during drought conditions when soil and vegetation are dry. Treatments should reduce the incidence and severity of wildfires. An estimated 84,000 acres would burn within the 3 Bars Project area within the next 20 years, and would result in loss of livestock forage and degradation of water quality.

The BLM would treat about 127,000 acres in the 3 Bars Project area, and an additional 15,000 acres under existing and reasonably foreseeable future authorizations, over the next 10 to 15 years within the CESA, or about 11 percent of the CESA. Short-term, there would be disturbance to and loss of vegetation, particularly pinyon-juniper, and there could be an increase in noxious weeds and other invasive non-native vegetation, from treatments.

Long-term, these treatments should result in vegetation that is healthier, more fire resilient, abundant, and diverse, and similar to the Potential Natural Community. The BLM would conduct stream bioengineering and plantings on about 31 miles of stream to slow stream flow and create pools and wet meadows, and to improve wetland and riparian vegetation and water flows and quality. In addition, the BLM would thin and remove pinyon-juniper and noxious weed and other invasive non-native vegetation, and create fire and fuel breaks to reduce the risk of catastrophic wildfire and its spread. These beneficial effects would help to offset some of the adverse effects to livestock from other reasonably foreseeable future actions in the CESA.

3.18.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on livestock would be similar to those described under Alternative A. Under Alternative B, less effort would be spent by the BLM on treatments to reduce wildfire risk and its impacts on livestock forage and water quality, including use of fire to restore natural fire regimes, within the 3 Bars Project area. However, by not using fire on the 3 Bars Project area, there would be no risks to vegetation from fire on several thousand acres annually within the 3 Bars Project area. However, fire could be used on other portions of the CESA outside the 3 Bars Project treatment areas.

Under this alternative, the BLM would be limited to hand pulling, discing, plowing, seeding, and using livestock to control noxious weeds and other invasive non-native vegetation on several hundred acres annually on the 3 Bars Project area. These methods could result in soil disturbance, but would also give the BLM some control over the types and amount of vegetation that are removed. The West Simpson Park Unit is on rugged terrain, and use of mechanical equipment to control cheatgrass would be difficult on this unit.

Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or about 6 percent of the CESA. Overall, there would be a net beneficial accumulation of effects from BLM treatments long-term that would help to offset adverse effects to livestock from other reasonably foreseeable future actions, but not to the same extent as would occur under Alternative A.

3.18.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on livestock would be similar to those described under Alternative A. Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation, and would treat only a fourth of the acreage that could be treated under Alternative A, within the 3 Bars Project area. However, fire and mechanized equipment would be used in other portions of the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire.

By not being able to use mechanical methods, fire, and livestock to reduce hazardous fuels, create fire and fuel breaks, and remove downed wood and slash, the risk of wildfire and its impacts on vegetation and water used by livestock would likely increase on the 3 Bars Project area.

Hazardous fuels reduction and habitat improvement projects would occur on about 32,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or about 4 percent of the acreage within the CESA. Overall, there would be a net beneficial accumulation of effects from BLM treatments long-term that would help to offset adverse effects to livestock from other reasonably foreseeable future actions, but not to the extent as would occur under Alternatives A and B.

3.18.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on livestock would be similar to those described under Alternative A. There would be no cumulative effects on livestock from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial herbicide application methods; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a limited acreage through existing and subsequent separate decisions.

Based on historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually in the CESA to reduce hazardous fuel levels and improve ecosystem health. Hazardous fuel levels would likely increase, and only a limited number of miles of fuel and fire breaks would be constructed under this alternative compared to the action alternatives. The BLM would conduct stream bioengineering and riparian habitat enhancements on only a limited area. Thus, water quality would remain degraded and water availability could be limited, especially during droughts, for livestock. The trend toward large-sized wildfires of moderate to high severity in sagebrush and large stand-replacing wildfires in pinyon-juniper would likely increase. BLM treatments would help to offset some of the effects to livestock from non-3 Bars Project actions, but not to the same extent as would occur under the action alternatives.

3.18.3.5 Unavoidable Adverse Effects

The proposed treatments could temporarily affect non-target vegetation that might provide forage, shelter, or other life requisites for livestock.

3.18.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

The proposed vegetation treatments would affect the availability and palatability of vegetation over the short-term. These impacts would begin to disappear within 1 to 2 growing seasons after treatment.

All treatments that successfully reduce the cover of noxious weeds and other invasive non-native vegetation and restore native vegetation would benefit livestock by increasing the quality of forage. In addition, treatments would remove some noxious weeds (e.g., tansy ragwort, houndstongue, Russian knapweed, and common St. Johnswort) that are harmful to livestock. The success of noxious weeds and other invasive non-native vegetation removal, and restoration of native habitats, would determine the level of benefit of the treatments over the long-term.

Treatments that reduce the risk of future catastrophic wildfire through fuels reduction would also benefit livestock. Uncontrolled, high intensity wildfires can remove forage from large tracts of rangeland, reducing its suitability for livestock in the short-term. Treatments that restore and maintain fire-adapted ecosystems through the appropriate use of mechanical thinning, fire, and other vegetation treatment methods would decrease the effects of wildfire on rangeland plant communities and improve ecosystem resilience and sustainability (USDOI BLM 2007b:4-249).

3.18.3.7 Irreversible and Irretrievable Commitment of Resources

Loss in vegetation function and quality from treatments would have a short-term impact on livestock productivity. Although some livestock could be displaced from public lands, forage could be found elsewhere, although possibly at a higher cost. As rangelands improved, their ability to support livestock use levels at or near current levels should also improve. Although this impact would represent an irreversible loss of the individual animal, the impacts to the livestock operation and industry would be reversible (USDOI BLM 2007b:4-252).

3.18.3.8 Significance of the Effects under the Alternatives

None of the 3 Bars Project alternatives should result in significant direct or indirect long-term loss of habitat, forage, or water, and these effects would not result in a significant cumulative effect. Treatments would have short-term effects on these forage and water resources needed by livestock. However, there would be long-term improvement in forage and water resources under all alternatives from the treatments.

3.18.4 Mitigation

According to utilization data, 33 percent of proposed treatment occur within areas experiencing moderate to severe forage utilization. Those areas are discussed in Section 3.18.3. Utilization data were collected on the Flynn Parman, Roberts Mountain, JD, Three Bars, Romano, and Lucky C allotments during October to December 2010 and May to July 2011, encompassing about 71 percent of the 3 Bars Project area. Data for other allotments, however, were collected during the 1990's and early 2000's, so current forage utilization may differ from past forage utilization, especially for areas that have not been surveyed for several decades. In addition, forage utilization accounts for both livestock and wild horse use.

In order to ensure treatment success and prior to treatment implementation, monitoring would be conducted to determine if proper livestock management is in place. If modification to the terms and conditions of a grazing permit are required, they would be implemented through a decision process separate from the 3 Bars Project and in accordance with the grazing regulations. Additionally, if the BLM determines that wild horses are over AML within seeding treatments, AML will be achieved prior to project implementation. Since treatments may be conducted several years from now, the BLM would not only use rangeland health data collected to date, but would also evaluate rangeland conditions at the time of treatment.

3.18.4.1 Potential Changes to Grazing Permits Prior to Treatment Implementation

1. The season of use may be modified to avoid hot season grazing (July – September).

2. The duration of grazing may be shortened to allow the riparian vegetation time to recover.

3. Average stubble height of at least 4 inches will be maintained for herbaceous riparian vegetation. If stubble height limits are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely.

4. Streambank alteration rates would be set to a level appropriate to the particular stream in accordance with Guidelines for Establishing Allowable Levels of Streambank Alteration (Cowley 2002). Based on the characteristics of the streams and the presence of Lahontan cutthroat trout, the streambank alteration rates would range from 10 to 20 percent. If designated streambank alteration rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely.

5. Utilization of woody species will not exceed 35 percent. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely (Wyman et al. 2006).

6. Existing non-functioning water developments and fences may be required to be repaired if contributing to unacceptable use patterns by livestock.

7. Temporary fences may be constructed to exclude grazing within the treatment area for a minimum of two growing seasons or until treatment objectives are obtained. Additionally, livestock closure may be required for the fenced area(s) or other treatment areas. If a livestock closure is required, it would be implemented through a decision process separate from the 3 Bars Project and in accordance with the grazing regulations.

8. The season of use within aspen treatments may be shifted to late season (beginning of September; Jones 2010).

9. Utilization of terminal leader browse on aspen branches and suckers will be less than or equal to 20 percent. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely.

10. For mountain big sagebrush communities, utilization will not exceed 45 percent on upland herbaceous species and 35 percent on upland shrub species. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely as outlined in *Range Management, Principles and Practices* (Holechek et al. 1998).

11. For Wyoming and basin big sagebrush communities, utilization will not exceed 35 percent on upland herbaceous species and 35 percent on upland shrub species. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely as outlined in Holechek et al. (1998).

12. For black sagebrush communities, utilization will not exceed 45 percent on upland herbaceous species and 35 percent on upland shrub species. If utilization rates are reached, the permittee will have 5 days to move livestock to the next pasture in the rotation or from the allotment entirely as outlined in Holechek et al. (1998).

3.19 Visual Resources

3.19.1 Regulatory Framework

Scenic quality is the measure of the visual appeal of a unit of land. Section 102 (a) of the Federal Land Policy and Management Act (1976), states that "...the public lands are to be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." Section 103(c) identifies "scenic values" as one of the resources for which public land should be managed. Section 201(a) states that "the Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including scenic values)..." Section 505(a) requires that "each ROW [rights-of-way] shall contain terms and conditions which will...minimize damage to the scenic and esthetic values..."

Section 101 (b) of the NEPA requires that measures be taken to ensure that aesthetically pleasing surroundings be retained for all Americans. Under the Federal Land Policy and Management Act, the BLM developed a standard visual assessment methodology, known as the Visual Resource Management (VRM) system, to inventory and manage scenic values on lands under its jurisdiction. Guidelines for applying the VRM system on BLM lands are described in the BLM Manual 8400, *Visual Resource Management* (USDOI BLM 1984b) and BLM Handbook H-8410-1 *Visual Resource Inventory* (USDOI BLM 1986b).

3.19.2 Affected Environment

Visual resources consist of land, water, vegetation, wildlife, and other natural or built features visible to recreation visitors, adjacent landowners, and travelers on public lands. In addition, roads, streams, and trails pass through a variety of characteristic landscapes where natural attractions can be seen and where cultural modifications are apparent. Of particular importance to visual resources in this region is the visual appeal (health and spatial diversity) of streams and ponds, and riparian, wetland, aspen, and sagebrush landscapes.

3.19.2.1 Study Methods and Study Area

The assessment of visual resources on the project area was based on a 2011 visual resource inventory (VRI) conducted for the Battle Mountain District, including the 3 Bars Project area (OTAK 2011). A follow-up site visit was made to the 3 Bars Project area to confirm OTAKS's (2011) findings.

The analysis area for the assessment of direct and indirect effects to visual resources is the 3 Bars Project area, while the CESA includes the 3 Bars Project area and the BLM visual resource management background distance zone (15 miles; **Figure 3-1**).

3.19.2.2 Visual Resource Inventory and Management

The characteristic landscape of the project area is contained within a variety of landforms in the central Great Basin of the Basin and Range physiographic province. Visual resources within the project area are influenced by topographic, vegetative, geologic, hydrologic, and land use characteristics. The topography ranges from relatively flat terrain and low rolling or flat-topped and cone-shaped hills to steep mountain ranges. Vegetation is comprised of grasses, greasewood, rabbitbrush, and sagebrush at lower elevations, and trees and shrubs including aspen, mountain mahogany, limber pine, and pinyon-juniper at higher elevations. Vegetation patterns affect color, form, line, and contrast, which shape the basis for the analysis of visual resources in the project area. Land use in the area is predominantly grazing and recreation. There is little surface water in the area except for a few perennial and intermittent streams and a few small ponds. The excellent air quality in the region promotes expansive views. The success and appeal of recreational activities such as hiking, collecting, photography, wildlife viewing, and picnicking are dependent on the settings and scenic views.

The BLM identifies and evaluates visual resource values through the VRI system (USDOI BLM 1986b). Visual resource inventory classes are based on scenic quality, sensitivity level, and distance zone criteria and indicate the overall value of landscapes. A VRI was conducted to determine the visual values of the Battle Mountain District, including the 3 Bars Project area. The components of a VRI include scenic quality evaluation, sensitivity level analysis, visibility, and distance zones.

For the scenic quality evaluation, lands are rated as Class A (19 points or more), Class B (12 to 18 points), or Class C (11 points or less). Lands are rated using seven key factors: landforms, vegetation, water, color, influence of adjacent scenery, scarcity and cultural modifications. Approximately 37 percent of the 3 Bars Project area is rated as Class A, and includes the mountainous areas of the project area, and 60 percent as Class B (**Table 3-53**). **Figure 3-45** illustrates the scenic quality classifications in the project area.

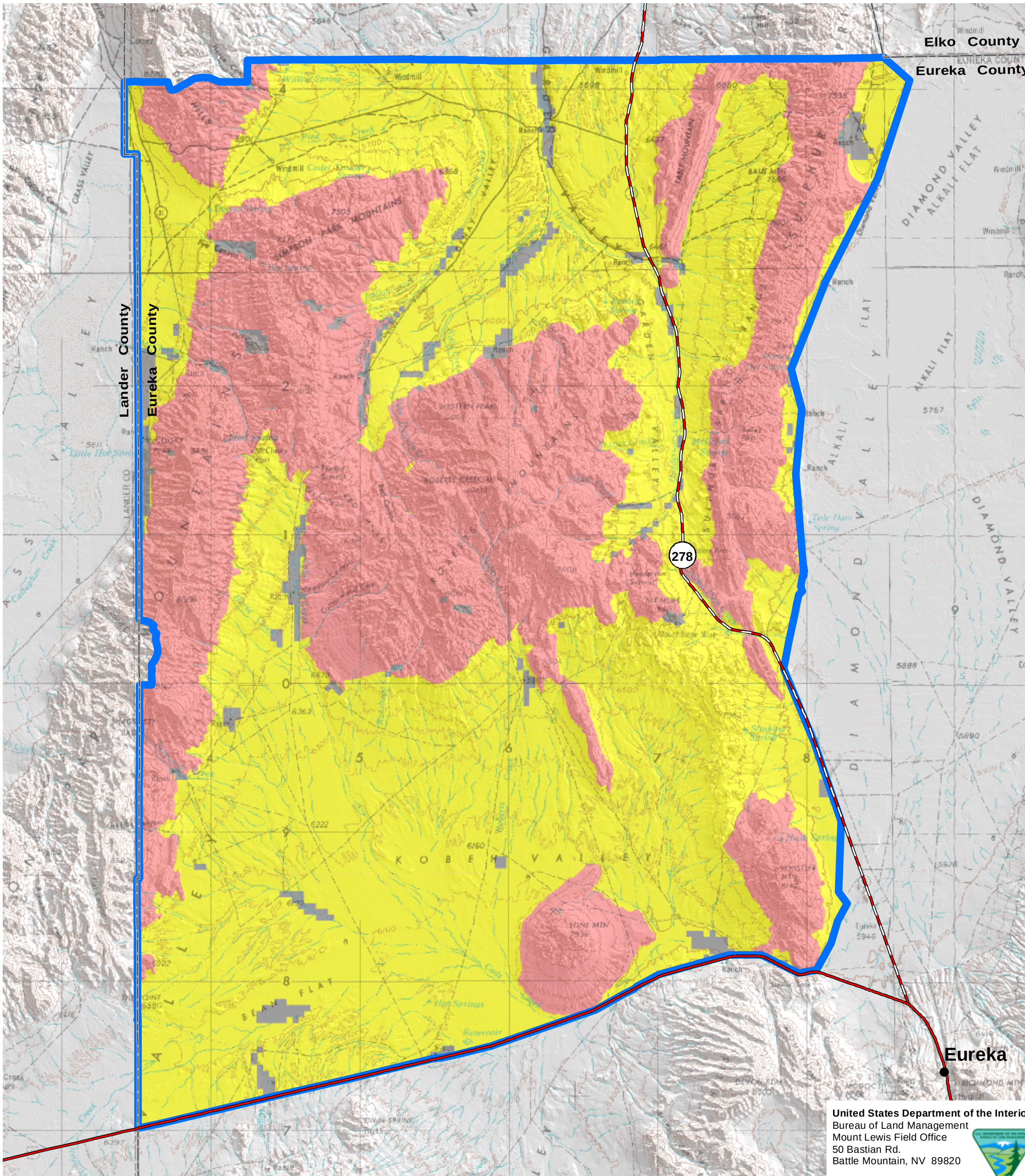
The sensitivity level analysis measures public concern for visual resources. Lands are assigned high, medium, or low sensitivity levels based on consideration of the following factors: types of users, amount of use, public interest, adjacent land uses, special areas, and other factors. Approximately 45 percent of the 3 Bars Project area is rated High, and includes much of the southern half of the project area, 30 percent is rated Moderate, and 22 percent is rated Low (**Table 3-53**). **Figure 3-46** illustrates the sensitivity levels for the sensitivity level rating units in the project area.

Distance zones are delineated to subdivide the landscape based on relative visibility from travel routes, use areas, or vantage points. The three distance zones include:

- Foreground-middleground Zone: this is the area visible within 3 to 5 miles of the viewing location.
- Background Zone: this is the visible area beyond the foreground-middleground zone, but usually within 15 miles of the viewing location.
- Seldom Seen Zone: These are areas that are rarely visible within the foreground-middleground or background zones.

Approximately 88 percent of the 3 Bars Project area is visible in the foreground-middleground, and 9 percent is seldom seen (**Table 3-53**; **Figure 3-47**). Seldom seen areas include much of Roberts Mountains, and portions of West Simpson Park and Sulphur Spring Range.

The scenic quality evaluation, sensitivity level analysis, and delineation of distance zones are combined to develop VRI classes (**Figure 3-48**), which represent the relative value of the visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV represents the least value. Approximately 64 percent of the 3 Bars Project area is rated Class II and includes most mountainous areas, and the flatter portions of the southern



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Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)

Legend

Visual Resource Inventory Scenic Quality Rating

- Class A
- Class B
- Not Inventoried
- 3 Bars Project Area

Source: OTAK 2011.

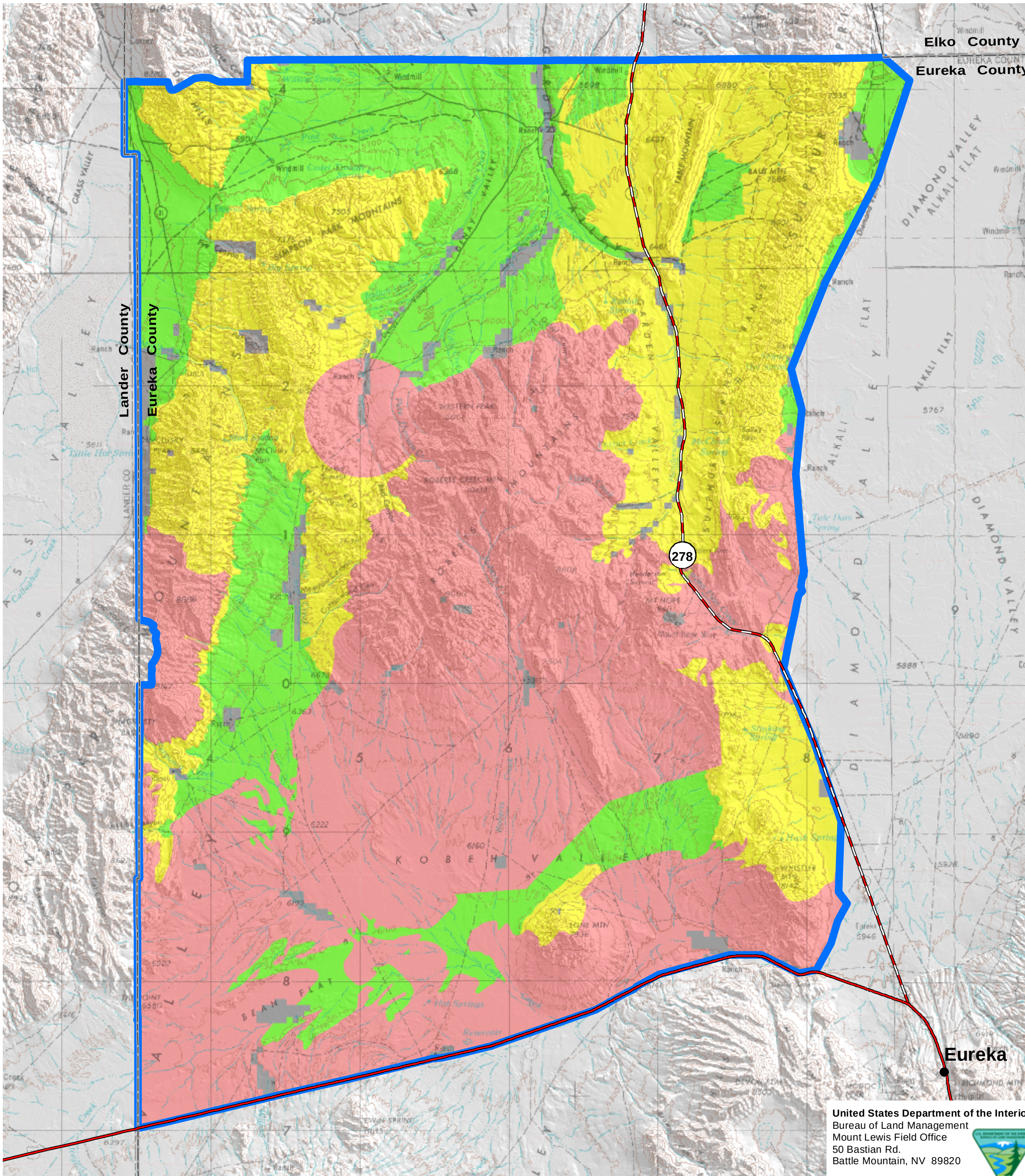
3 Bars Ecosystem and Landscape Restoration Project

Figure 3-45

Visual Resource Inventory Scenic Quality Rating

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N



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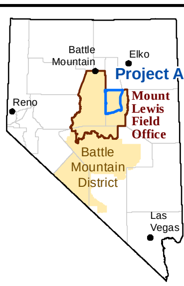


Legend

Visual Resource Inventory Sensitivity Level Rating

- High
- Moderate
- Low
- Not Inventoried
- 3 Bars Project Area

Source: OTAK 2011.

3 Bars Ecosystem and Landscape Restoration Project

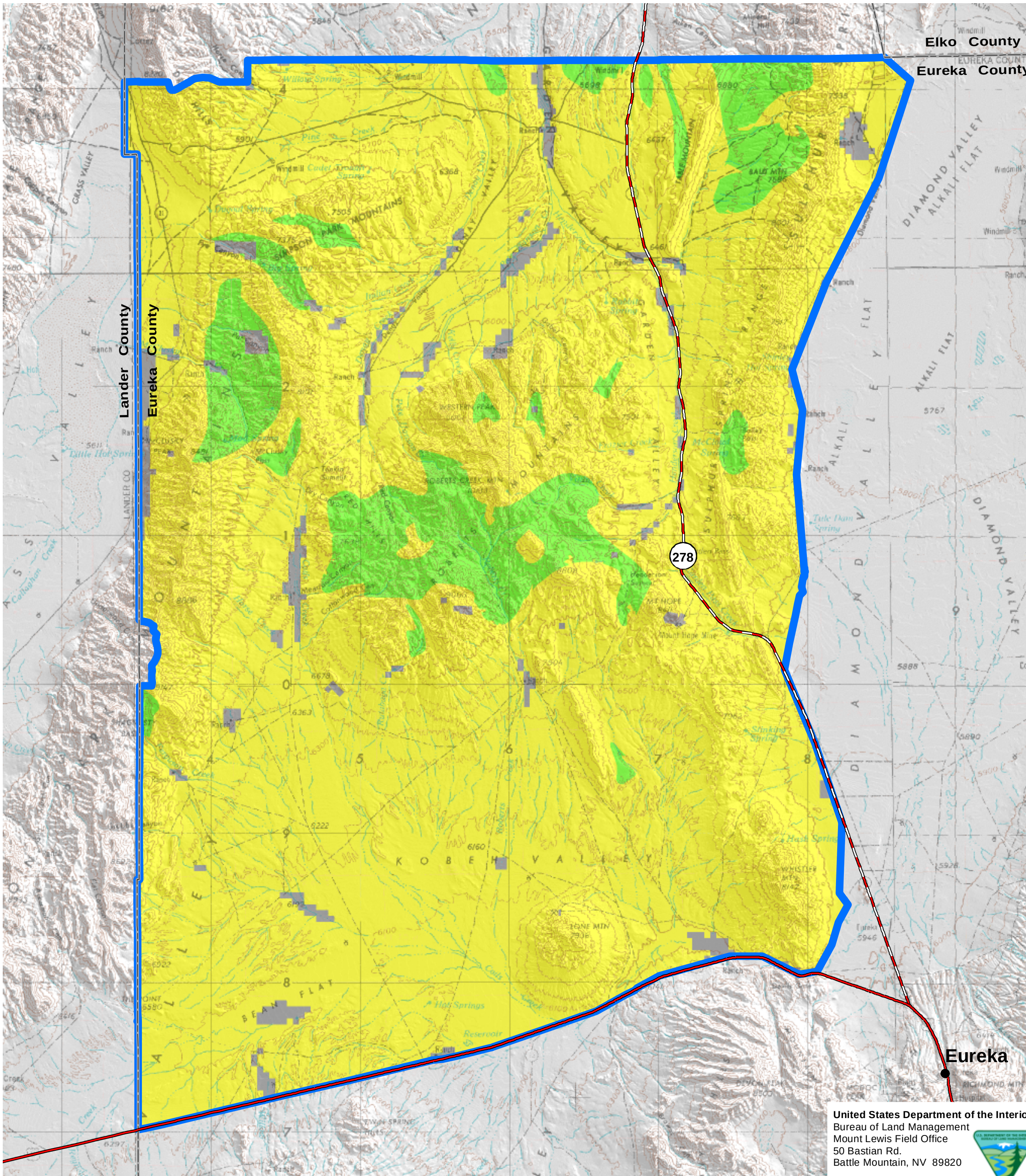
Figure 3-46

Visual Resource Inventory Sensitivity Level Rating

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N



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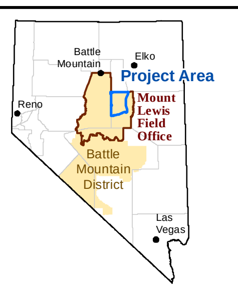


Legend

Visual Resource Inventory Visual Distance Zones

- Foreground-Middleground
- Seldom Seen
- Not Inventoried
- 3 Bars Project Area

Source: OTAK 2011.

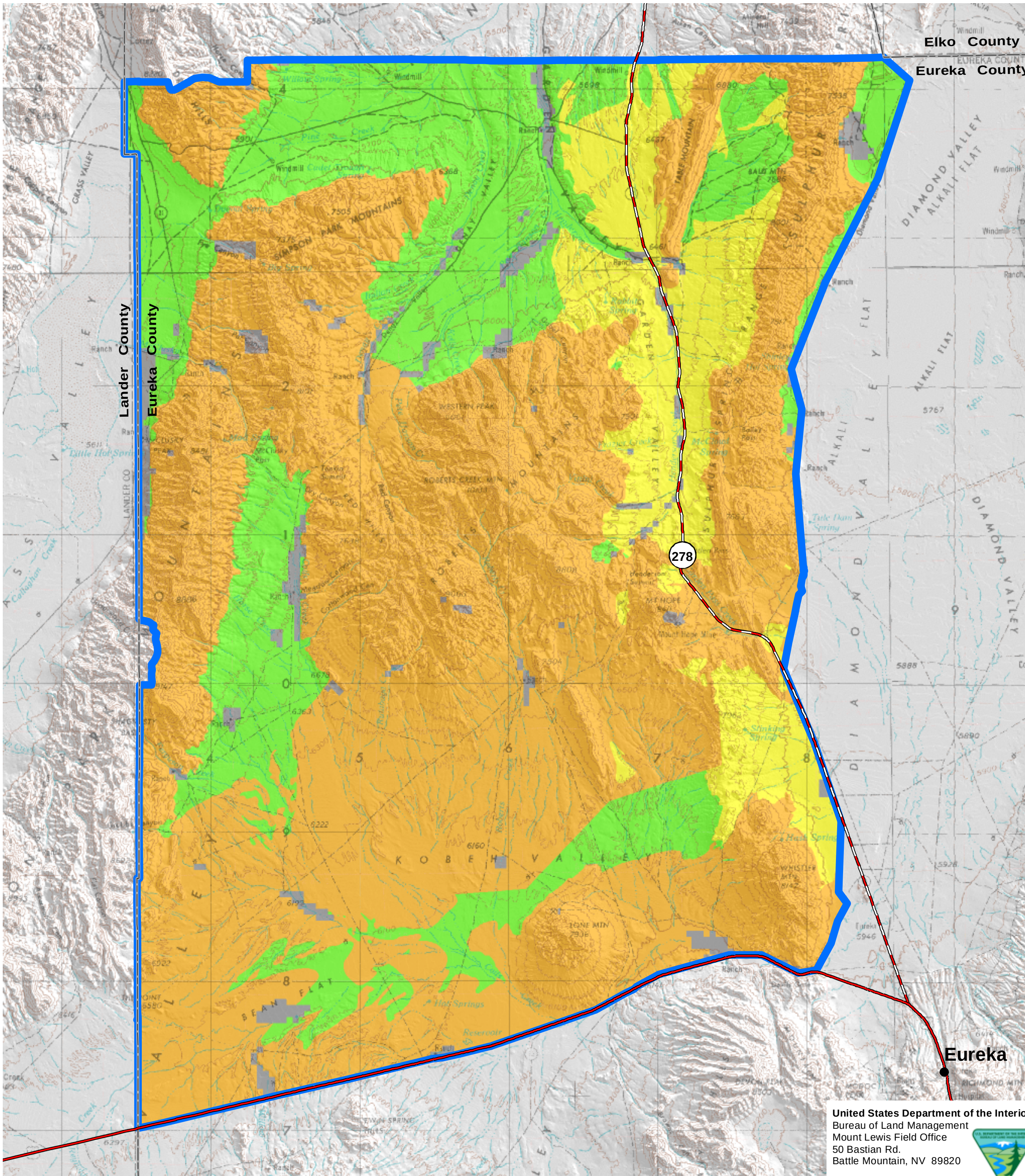
3 Bars Ecosystem and Landscape Restoration Project

Figure 3-47

Visual Resource Inventory Visual Distance Zones

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N



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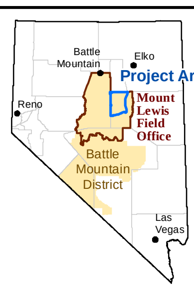


Legend

Visual Resource Inventory Classes

- Class II
- Class III
- Class IV
- Not Inventoried
- 3 Bars Project Area

Source: OTAK 2011.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-48

Visual Resource Inventory Classes

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers

N

TABLE 3-53

Visual Resource Project Area Inventory and Visual Resource Management Classes Summary

Scenic Quality Evaluation					
BLM - Class A	**BLM - Class B**	**BLM - Class C**	**Not Inventoried**	**Total**	
279,601 37%[1]	449,395 60%	190 0%	20,624 3%	749,810	
Sensitivity Level Analysis					
High	**Medium**	**Low**	**Not Inventoried**	**Total**	
337,294 45%	227,753 30%	164,138 22%	20,624 3%	749,810	
Distance Zones					
Foreground-Middleground	**Background**	**Seldom Seen**	**Not Inventoried**	**Total**	
660,709 88%	0 0%	68,447 9%	20,624 3%	749,810	
Visual Resource Inventory Classes					
VRI Class I	**VRI Class II**	**VRI Class III**	**VRI Class IV**	**Not Inventoried**	**Total**
0 0%	478,105 64%	78,868 11%	172,213 23%	20,624 3%	749,810
Visual Resource Management Classes					
VRM Class I	**VRM Class II**	**VRM Class III**	**VRM Class IV**	**Not Inventoried**	**Total**
30,073 4%	24,331 3%	45,319 6%	650,086 87%	0 0%	749,810

[1] Percent of acres within 3 Bars Project area.

half of the project area, 11 percent is rated Class III, and 23 percent is rated Class IV; there are no Class I areas on the project area (**Table 3-53**).

Visual resource inventory classes are informational in nature and provide the baseline data for considering visual values in the RMP process. Visual resource inventory classes do not establish management direction and are not used as a basis for constraining or encouraging surface-disturbing activities.

The VRM system is used by the BLM to manage visual resources on public land. Visual resource management objectives are established in RMPs in conformance with land use allocations (USDOI BLM 1984). These area-specific objectives provide the standards for planning, designing, and evaluating future management activities. BLM policy requires that all BLM land be inventoried for scenic values and be assigned a VRM Class during the land use planning process. These VRM classes are part of the land use plan decisions for a particular office and set the management standards for visual resources that activity level plans must subsequently meet. The BLM uses the VRM system to systematically identify and evaluate visual resource values and to determine the appropriate level of scenery management. The VRM process involves 1) identifying scenic values, 2) establishing management objectives for those values through the land use planning process, and 3) designing and evaluating proposed activities to analyze effects and develop mitigation measures to meet the established VRM objectives. Based on this process, the BLM designates lands into one of four VRM classes with the following objectives:

- VRM Class I – The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

- VRM Class II – The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic (design) elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

- VRM Class III – The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- VRM Class IV – The objective of this class is to provide for management activities, which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic (design) elements.

The assignment of VRM classes is based on the management decisions made in the RMP process, which must take into consideration the value of visual resources and management priorities for land uses (**Figure 3-49)**. Based on these decisions, approximately 4 percent of the 3 Bars Project area is rated VRM Class I, and includes portions of Roberts Mountains and Simpson Park Mountains, 3 percent is rated Class II, 6 percent is rated Class III, and 87 percent is rated Class IV. During the RMP process, inventory class boundaries can be adjusted as necessary to reflect resource allocation decisions made in the RMP.

Table 3-53 summarizes the acreages and percent of the project area categorized into each VRI component, the resulting VRI classes, and the VRM classes.

3.19.3 Environmental Consequences

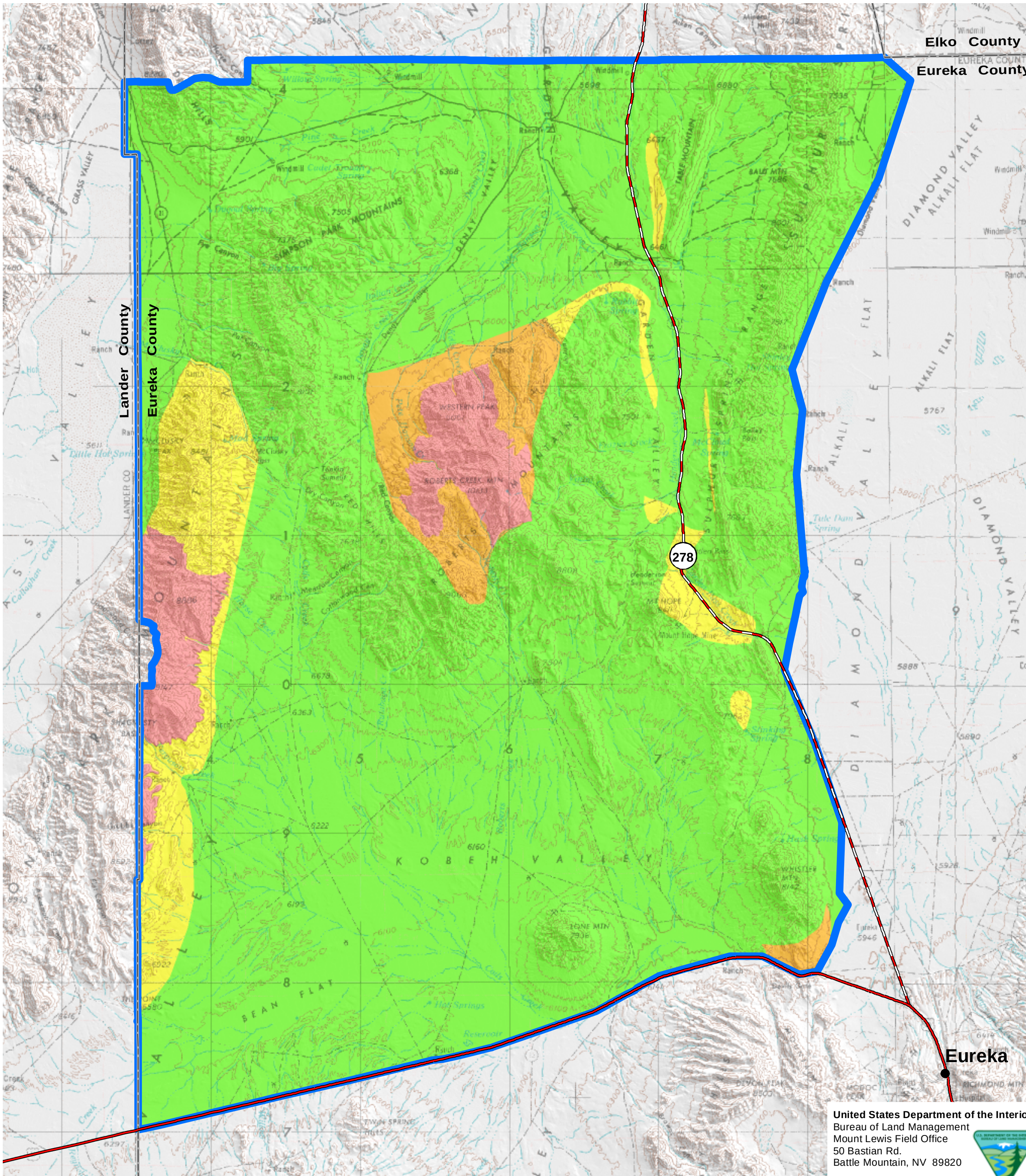
3.19.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

The only visual resources scoping comment indicated concern that the current VRM classes in the Shoshone-Eureka (USDOI BLM 1986a) may be outdated. The RMP is being updated and this analysis for the 3 Bars Project area is based on the VRI conducted by OTAK (2011) for the updated Battle Mountain District RMP.

3.19.3.2 Significance Criteria

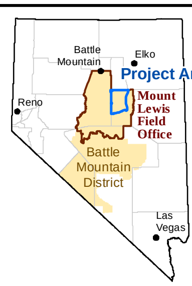
Impacts to visual resources would be considered significant if BLM actions resulted in the following:

- Strong visual contrast in the immediate foreground view from a designated recreation site, historic trail, or residence in the long-term (greater than 10 years).



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)



Legend

Visual Resource Management Classes

- Class I
- Class II
- Class III
- Class IV
- 3 Bars Project Area

Source: BLM 2012l.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-49

Visual Resource Management Classes

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

- Non-compliance with VRM objectives in the long-term (greater than 3 years for VRM objectives Classes I and II and greater than 10 years for Classes III and IV).

3.19.3.3 Direct and Indirect Effects

3.19.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Vegetation treatment activities have the potential to disturb the surface features of the landscape and impact scenic values in the short-term (less than 3 years) and long-term (greater than 10 years). The proposed vegetation treatments would affect visual resources if they changed the scenic quality of the landscape, diminished the experience of viewers with a high level of concern for scenery, or did not meet agency management objectives. In general, treatments would have short-term negative effects and long-term positive effects on visual resources.

Public sensitivity to changes in the landscape character of the area would vary relative to the level of visibility and distance from viewer activity, and viewer concern. Distance zones and impacts to viewers are listed in **Tables 3-54** to **3-56**, respectively. The BLM's VRM policy states that the extent of visual impact and compliance with management objectives must be evaluated at the project level using the visual contrast rating process.

A Contrast Rating System, as described in BLM Manual Handbook H- 8431-1, *Visual Resource Contrast Rating* (USDOI BLM 1986c), provides a systematic means to evaluate the approved VRM objectives, and to identify mitigation measures to minimize adverse visual impacts. The Contrast Rating System is designed to compare the respective features of the existing characteristic landscape with a proposed project and to identify those parts that are not in conformance. These features include the basic design elements of form, line, color, and texture that characterize the landscape. Modifications to a landscape that repeat the natural landscape's basic elements are said to be in harmony with their surroundings, while those that differ may be visually displeasing. The information generated is used to determine the amount of visual contrast created and whether the VRM objective for the area would be met, and to develop additional mitigation measures necessary to meet the VRM objective.

This process compares the amount of contrast to the form, line, color, and texture of the characteristic landscape of an area as a result of a surface-disturbing activity. The effects of vegetation treatments on the visual quality of the landscape would be most notable to travelers, sightseers, and residents situated in the immediate foreground (0.0 to 2 miles) for the first year to approximately 3 years following treatment. Visual impacts over the short- and long-term from vegetative treatments would occur from projects that 1) reduce the scenic quality rating of the treatment site, 2) result in degradation of high-sensitivity visual resources, or 3) are not in compliance with BLM management objectives.

Adverse Effects

In the short-term, removal of vegetation would affect the visual qualities of treatment sites by creating hard-edged openings and other vegetation-free areas that provide a noticeable visual contrast to the surrounding areas. In the short-term, treatments could create visually distinct areas of discolored vegetation (i.e., areas where treatments have killed vegetation), which could contrast markedly from surrounding areas of healthy vegetation. The degree of these effects would depend on the amount of area treated, the appearance of the surrounding vegetation and the vegetation being removed, the type of treatment method used, and the season of treatment. The greater the area and nearness to viewers of the vegetation treatment, the greater the visual impacts are likely to be. The effects of treatments that occur over a large portion of the landscape are more likely to be observed by people than the effects of small-scale treatments (USDOI BLM 2007c:4-112).

TABLE 3-54

Landscape Scenery Impacts

Scenic Quality	Project Visual Contrast		
	Strong	**Moderate**	**Weak**
Class A	High	High	Moderate
Class B	High	Moderate	Low
Class C	Moderate	Low	Low

TABLE 3-55

Distance Zones and Project Visibility

Distances	Project
Immediate Foreground	0 – 2 Miles
Foreground-Middleground	2 – 5 Miles
Background	5 – 15 Miles
Seldom Seen	Greater Than 15 Miles

TABLE 3-56

Impacts to Viewers

Project Visibility	Project Visual Impacts		
	High Sensitivity	**Moderate Sensitivity**	**Low Sensitivity**
0 – 2 Miles	High	Moderate	Low
2 –5 Miles	Moderate	Moderate	Low
5 – 15 Miles	Moderate	Low	Low
Greater Than 15 Miles or Seldom Seen	Low	Low	Low

Color contrasts caused by vegetation removal would be most apparent in areas dominated by homogenous patterns of vegetation and by large plants, such as conifer trees. The visual impacts would be heightened if the treatment also prevented the manifestation of seasonal changes in vegetation, such as spring flowers or fall color. The contrast between a cleared area and the surrounding vegetation would be less in sagebrush, where low-growing shrubs, and browns, grays, and earth tones dominate the landscape than in areas with pinyon-juniper. In addition, the brown colors associated with vegetation treatments would be least noticeable during the late fall and the winter, when they would blend more naturally with surrounding colors, than in the spring and summer, when the green colors of new growth are more likely to be present (USDOI BLM 2007c:4-112).

There would be negligible to weak short-term visual contrasts to the landscape as a result of manual treatments. Treatment limited to small areas (exclosure fencing, removal of small groups of trees) would be much less noticeable than the alterations caused by other treatment methods. In other cases, such as the removal of vegetation with chainsaws over many acres, the visual effects would be negative, though minor, and would last until downed trees were removed by wood gatherers, pile burned, or concealed through revegetation.

Beneficial Effects

Effects to visual resources would begin to disappear within 1 to 2 growing seasons after treatment. The regrowth of vegetation on the site would eliminate much of the stark appearance of a cleared area, and the area would develop a more natural appearance.

Impacts would last for the longest amount of time in pinyon-juniper stands where large trees and shrubs are removed. Treatments that aim to rehabilitate degraded ecosystems, if successful, would result in plant communities that are dominated by native species. Native-dominated communities tend to be more diverse, and thus, more visually appealing than plant communities that have been overtaken by the surrounding monoculture (such as pinyon-juniper encroaching on riparian zones). Treatments that reduce the risk of wildfire should reduce the visual impacts associated with large expanses of burned vegetation. Additionally, the BLM would work to mitigate the edge effect of treatments by “feathering” treatments in to adjacent vegetation communities and designing treatments in a mosaic pattern.

3.19.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

The majority of riparian zone treatment areas are rated Class A for their scenic qualities, have High sensitivity to the public, and are in the foreground-middleground zone. Approximately 75 percent of treatment areas are VRM Class III or IV, where moderate to substantial modification of the landscape is acceptable. The remaining 25 percent of the proposed treatment areas includes 9 acres of Roberts Creek, which are VRM Class I, where the objective is to preserve the existing character of the site, and 444 acres of VRM Class II at Roberts Creek, Vinini Creek, and Willow Creek, where a low level of change in the landscape character is acceptable. The three Class I/II areas are part of the Roberts Creek Unit group.

Adverse Effects

Riparian zone treatments along Roberts, Vinini, and Willow Creeks would result in a low level of change, and portions of these streams that are rated VRM Class I or II may not be treated. For example, the Roberts Creek Unit is 1,390 acres, but only 9 acres are VRM Class I; 486 acres are Class II, where a low level of change is acceptable. Nearly all of the Willow and Upper Willow Creek units are VRM Class II. Stream channel restoration would be limited to about 250 acres and a mile or two of stream annually. Use of manual and mechanical treatments to reconstruct streams and clear vegetation would be likely to remove large quantities of vegetation from a treatment site, leaving dead plant material on the ground to turn brown, and expose much soil.

Although treatment activities could be seen, they would probably not attract the attention of the casual observer as they are in somewhat secluded drainages, and would be conducted to retain or restore the natural character of the landscape.

Beneficial Effects

Riparian management treatments would focus on restoring streams that have been degraded and on slowing pinyon-juniper encroachment into riparian zones. Mechanical methods would result in strong short-term visual contrasts of form, line, color, and texture until the treatment site is revegetated. For all treatment methods, effects to visual resources would begin to disappear within 1 to 2 growing seasons after treatment. The regrowth of vegetation on the site would eliminate much of the stark appearance of a cleared area, and the area would develop a more natural appearance. Non-fire treatments can be used to avoid the visual effects associated with smoke and to integrate treated and untreated areas into a more visually appealing mosaic of vegetation types. Effects would last for the longest amount of time in woodlands and other areas where large trees and shrubs were removed.

Over the long-term, vegetation treatments would likely improve visual resources on public lands. Treatments that aim to rehabilitate degraded ecosystems, if successful, would result in plant communities that are dominated by native species. Native-dominated communities tend to be more visually appealing than areas that have been overtaken by noxious weeds and other invasive non-native vegetation, or that have been invaded by pinyon-juniper. These treatment benefits could be more noticeable in the riparian zone, as many of the treatment streams have been substantially degraded and are not meeting Proper Functioning Condition.

Treatments that restore native fire regimes, vegetation, and ecosystem processes would reduce the spread of noxious weeds and other invasive non-native vegetation that is less visually appealing than native vegetation. Noxious weeds and other invasive non-native vegetation removal, stream channel restoration, and the removal of encroaching pinyon-juniper would help to limit the spread of wildfire by enabling riparian zones to function as fuel breaks.

Aspen Treatments

The scenic quality evaluation showed that all aspen treatment units were rated Class A. The visual effects to resources from treatments would be High on all treatment units. However, only about one-third of the treatment units would be visible in the foreground-middleground (JD-A1, JD-A4, RM-A7, and RM-A9); the remaining areas would seldom be seen. Based on these assessments, all riparian management units are rated Class II.

About 40 percent of treatment acreage is rated VRM Class I, and includes the JD-A4, RM-A2, RM-A10, and SFF-A1 units. About 20 percent of acres are rated VRM Class II (JD-A1 and RM-A2), while the remaining acres are VRM Class IV, including 2 acres of RM-A2. At the JD-A4, RM-A2, and RM-A10 units, manual and mechanical methods would be used to remove pinyon-juniper trees encroaching into aspen habitats. For JD-A1, treatments would focus on treating aspen to stimulate stand suckering using mechanical and manual methods, while at SFF-A1 the BLM would erect small, temporary exclosure fencing around an aspen stand to promote sucker survival. Exclosure fencing could also be used at other sites to protect treated aspen stands from grazing.

Only about 5 acres of treatments would be visible to the public annually, thus effects of aspen treatments on the visual resources of the 3 Bars Project area would be negligible.

Pinyon-juniper Treatments

The scenic quality evaluation found that about 65 percent of treatment areas were rated Class A, and 35 percent as Class B. Treatment units where over 90 percent of the area was Class A included Birch Creek, Cottonwood/Meadow Canyon, Dry Canyon, Lone Mountain, Upper Pete Hanson, Tonkin North, and Tonkin South units.

Public concern for adverse visual effects to resources would be Low on about 6 percent of treatment areas, but about 47 percent each for Moderate and High. Treatment units where most acreage (over 75 percent) was rated High are the Atlas, Birch Creek, Upper Pete Hanson, Three Bars Ranch, Tonkin South, and Upper Roberts Creek units.

Nearly 90 percent of treatment areas would be visible in the foreground-middleground, while the remaining areas would be seldom seen. Only the Upper Pete Hanson and Upper Roberts Creek units would be relatively difficult to see by the public.

Despite the relatively high resource ratings given above, over 90 percent of the pinyon-juniper management area was rated as VRM Class IV, where substantial modification of the landscape is appropriate, while 2 percent of treatment acres were rated Class III, and 7 percent as Class II. Units with more than 100 acres rated as Class II were the Atlas, Gable, Lower Pete Hanson, Upper Pete Hanson, Upper Roberts Creek, and Whistler units, although these acres were only a small portion of the overall treatment acres except for Lower Pete Hanson and Upper Roberts, where VRM Class II lands comprised over 75 percent of the treatment unit. Only 346 acres were rated VRM Class I, and these were at the Birch Creek, Upper Pete Hanson, and a small portion (20 acres) of Upper Roberts Creek units.

Adverse Effects

Most visual resource concerns would be focused on the Birch Creek, Upper Pete Hanson, and Upper Roberts Creek units, since most of their acreage is rated VRM Class I or II. Treatments on the Upper Pete Hanson and Upper Roberts Creek units, however, would be relatively difficult for the public to see. The BLM proposes to improve sagebrush habitat by thinning pinyon-juniper to promote sagebrush growth, and create fuel breaks to reduce the damage from a wildfire. Manual and mechanical methods and prescribed fire would be used on Upper Roberts Creek, while only chainsaws would be used on the Birch Creek and Upper Pete Hanson units because treatment areas are in the Roberts Mountains WSA. The effects of manual treatments are discussed under Effects Common to All Alternatives.

Most of the pinyon-juniper on the Upper Roberts Creek Unit would be removed from Phase I stands. Because these trees have encroached into sagebrush habitat, and are widely-spaced throughout the area, removal of these trees would restore the visual character associated with sagebrush habitat and would have a minor visual effect. Limited management is allowed in VRM Class I areas, and management activities should not attract the attention of the casual observer in VRM Class II areas. The Birch Creek and Upper Pete Hanson units are small (less than 300 acres each) and manual treatments would be used to remove pinyon-juniper in all phases. If trees are removed from dense stands, there could be more visual contrast with remaining areas, but this effect would be minor because only about 20 acres would be treated annually in each unit and the BLM would manage pinyon-juniper stands to create a mosaic of habitat for wildlife.

Prescribed fire could be used on the Upper Roberts Creek Unit. Although smoke would be visible to the public on the Upper Roberts Creek Unit, charred vegetation from burning would be difficult for the public to see as this unit is relatively isolated and not visible from the foreground-middleground.

The objective of VRM Classes I and II is to retain the existing character of the landscape. Although treatments for these three units would be limited in scope and extent, they would alter the existing characters of the landscape. However, treatments would help remove encroaching pinyon-juniper and return the sites to their more historic condition.

Beneficial Effects

Beneficial treatment effects on visual resources would be similar to those discussed under Effects Common to All Alternatives, and under Riparian Treatments. Treatments in VRM Class I and II areas would help to slow pinyon-juniper encroachment into sagebrush habitat and restore more natural conditions to these areas. Treatments on Birch Creek and Upper Peter Hanson would help to retain the visual characteristics associated with the Roberts Mountains WSA.

Treatments on other pinyon-juniper management units would also benefit visual resources on the 3 Bars Project area. Treatments that restore degraded ecosystems would result in plant communities that are dominated by native species and are more visually appealing. Prescribed fire would help to remove dead and diseased pinyon-juniper that is unattractive; reduce hazardous fuels and the risk of catastrophic wildfire; and restore native fire regimes, vegetation, and ecosystem processes. The use of prescribed fire would allow the BLM to limit the size and duration of fires in areas of high public use to minimize visual contrasts between burned and unburned vegetation and effects of smoke, and to conduct fires during the cooler times of the year when visitation by the public would be less. By using all treatment methods to reduce hazardous fuels, create fire and fuel breaks, remove noxious weeds and other invasive non-native vegetation, and promote more resilient vegetation, the BLM would reduce the risk of wildfire and its inherent impacts on the scenery.

Sagebrush Treatments

Mechanical methods have the potential to scarify the landscape and leave bare soil and dead vegetation that contrast with the surrounding colors. The effects of mechanical treatments on visual resources would be temporary, and would only last until the re-establishment of vegetation on the treatment site, typically 1 or 2 growing seasons (USDOI BLM 2007c:4-113).

The scenic quality evaluation found that about 15 percent of treatment areas were rated as Class A, while the remainder were rated Class B. On the Three Corners and West Simpson Park units, over 95 percent of the acreage is rated Class A.

Public concern for adverse visual effects to resources would be High on about 20 percent of the sagebrush treatment area, Moderate on 35 percent of the area, and Low on 45 percent of the area. On the Coils Creek, Nichols, Roberts Mountain Pasture, and Three Corners units, more than 80 percent of the treatment acres were rated High.

Based on the visibility of sites, all but about 1,000 acres would be visible in the foreground-middleground. Only the Three Corners Unit would be seldom seen by the public. None of the sagebrush treatment acreage was rated VRM Class I, and less than 1 percent was rated VRM Class II. Over 90 percent of the acreage is VRM Class IV, while 8 percent is Class III. Class II acreage is found at the Alpha and Three Corners units.

Adverse Effects

Concerns regarding effects from sagebrush management would be greatest for the Alpha, Coils Creek, Nichols, Roberts Mountain Pasture, Three Corners, and West Simpson Park units. The Alpha, Coils Creek, Nichols, and Roberts Mountain Pasture units are part of the Alpha Unit treatment group. The effects of manual and mechanical treatments on relatively flat terrain, such as for these sagebrush communities, would have less effect on visual resources than treatments on steeper terrain, such as pinyon-juniper woodlands, which would be more visible on the landscape. The effects of manual and mechanical treatments on visual resources would be temporary, and would only last until the reestablishment of vegetation on the treatment site, typically 1 or 2 growing seasons.

On the Three Corners Unit, the BLM would thin pinyon-juniper and seed and plant to increase the percent composition of native grasses, forbs, and shrubs to 50 to 75 percent of the Potential Natural Community. The Three Corners Unit is found in an area that is seldom seen by the public.

The BLM would treat cheatgrass on south-facing slopes to promote the establishment of sagebrush on the West Simpson Park Unit. Portions of this unit have been burned by wildfire in recent years. The BLM would use all methods to control cheatgrass, including pre-treatments using prescribed fire, livestock, and discing. About 1,963 acres, or half of the unit, could be treated over the life of the project. The greater the area of vegetation treatment, the greater the visual effect is likely to be. Large treatments alter a larger portion of the landscape than small treatments, and the effects are more likely to be observed by people. However, the West Simpson Park Unit consists of degraded lands of low to moderate scenic quality, resulting in a smaller visual effect from treatment and likely an improvement in the scenic quality of the land over the long-term.

Beneficial Effects

Beneficial effects from manual, mechanical, and fire treatments are discussed under Effects Common to All Alternatives and Pinyon-juniper Treatments.

In general, treatments on the West Simpson Park Unit would have long-term positive effects on visual resources. Areas dominated by non-native vegetation have been impacted by past wildfires and are some of the more degraded areas on the 3 Bars Project area. They are also vulnerable to future wildfires. Thus, efforts to restore native, fire resilient vegetation would make these areas more visually appealing, and would reduce the risk of future wildfires.

The controlled use of domestic animals to contain undesirable vegetation may create a short-term visual impact associated with trampling and consumption of vegetation. These impacts would be dealt with on a case-by-case basis and mitigated as appropriate at the project level. The visual effects caused by the containment of domestic animals would be short-term in nature and would create a positive visual effect with the regrowth of desirable vegetation in a healthy, productive condition.

3.19.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The types and magnitude of effects for manual, mechanical, and biological control treatments would be similar between Alternatives A and B. Treatments conducted under Alternative B would have short-term adverse and long-term beneficial impacts on the scenic qualities of the landscape on about 2,500 to 3,500 acres annually on lands with a Scenic Quality rating of A and Sensitivity Level Rating of High. Of the estimated 6,350 acres treated annually under Alternative B, about 5,500 acres could occur where treatments occur would be visible to the public. The BLM may have to modify management objectives on about 20 acres of VRM Class I, and 35 acres in VRM Class II treatment units annually, as these areas could be visible to the casual observer.

Without the use of fire, there would be no localized deterioration of air quality and reduced visibility caused by smoke, no blackened appearance of treated areas and blackened stumps and snags that would create a color contrast, and no spread of noxious weeds and other invasive non-native vegetation in burned areas. However, long-term improvements in pinyon-juniper stand health, replacement of pinyon-juniper stands with sagebrush, forbs, and grasses, and removal of encroaching pinyon-juniper using prescribed fire and wildland fire for resource benefit, and the resultant improvement in the visual qualities of the landscape, would not occur over several thousand acres annually.

Without the use of fire to reduce hazardous fuel loads, Alternative B could pose a greater long-term risk for wildfire due to the accumulation of fuels. The BLM would not be able to promote more fire resilient and diverse habitat on the 3 Bars Project area. The BLM would also not be able to use prescribed fire to remove downed wood and other hazardous fuels associated with thinning and removal of pinyon-juniper, thus increasing the risk of wildfire in pinyon-juniper treatment areas. An increase in wildfire risk compared to Alternative A could lead to a long-term reduction in the visual qualities of the landscape.

The BLM could use classical biological control, such as the use of nematodes, insects, and fungi to control non-native vegetation, but would more likely use cattle and goats. The use of domestic animals to contain undesirable vegetation would cause minimal effects to visual resources. The sight of domestic animals should not cause any adverse effects, as livestock are found over most of the 3 Bars Project area.

Under Alternative B, the BLM would be able to slow, but probably not reverse, habitat degradation on the 3 Bars Project area. Treatments would occur across the landscape and most projects would benefit multiple resources, but large-scale fire and herbicide treatments would not occur under this alternative. Although short-term impacts to visual resources would be less under this alternative than Alternative A, there would be less long-term improvement in the scenic quality of the 3 Bars Project area under Alternative B compared to Alternative A.

3.19.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Treatments conducted under Alternative C would have short-term adverse and long-term beneficial impacts on the scenic qualities of the landscape on about 1,500 to 2,000 acres annually of lands with a Scenic Quality Rating of A and Sensitivity Level Rating of High. Of the estimated 3,250 treated annually under Alternative C, about 3,000 acres would be visible to the public. The BLM may have to modify management objectives on about 10 acres of VRM Class I and 15 acres in VRM Class II treatment lands annually, as these areas could be visible to the casual observer.

By not being able to use mechanical equipment, there would be no adverse visual effects associated with stream channel restoration disturbance, creating openings in pinyon-juniper stands from removal of vegetation, creating long linear features for fire and fuel breaks, or causing surface disturbance from discing/tilling/harrowing to restore areas invaded by cheatgrass. The BLM would also leave less dead plant material on the ground to turn brown.

The BLM has not identified areas where it would use classical biological control, but if nematodes, insects, or fungi are used on the 3 Bars Project area, they would cause some visual alterations to the landscape. Plants attacked by these agents often show visual symptoms of disease or parasitism, which are often regarded as visually unappealing. However, these changes would only be noticeable upon close examination of the site. The overall appearance of the treatment area would likely remain relatively unchanged. Because these agents kill target species gradually, the effects would be less visibly distinct than treatments that kill a large area of vegetation all at once (USDOI BLM 2007c:4-113).

Under Alternative C, the BLM would not be able to conduct stream engineering and restoration to improve native riparian habitat, except on a limited basis on only a few stream miles; control noxious weeds and other invasive non-native vegetation, except on very small areas where this vegetation can be hand pulled or controlled using hand tools; reseed and replant restoration sites, except for small areas where shrubs and other vegetation would be planted by hand; or create fire and fuel breaks to reduce the risk of wildfire spread, except near existing roads or aspen stands, or along a few miles of stream. The BLM would only be able conduct hazardous fuels treatments and remove downed woody material from treatments on a limited acreage using manual and classical biological control treatments. Thus, the risk of catastrophic wildfire, and its effects on the visual landscape, would be greater under Alternative C than the other action alternatives.

Under Alternative C, the BLM would not substantially improve the native vegetation community nor stop the loss of important ecosystem components. As a result, there would be less improvement in the visual quality of the 3 Bars Project area under this alternative than under Alternatives A and B.

3.19.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to visual resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; use fencing to protect treatment areas; or restore fire as an integral part of the ecosystem. Without treatments to reduce fuel loading or to control cheatgrass establishment and spread, the risk of catastrophic wildfires would continue to increase. The BLM would not conduct stream engineering and riparian habitat enhancement, and thus would do little to improve visual qualities within riparian zones. This alternative would also do little to return the 3 Bars ecosystem to its Potential Natural Community and restore Proper Functioning Condition to wetlands and riparian zones, to the benefit of visual resources on the project area.

3.19.3.4 Cumulative Effects

The CESA for visual resources is approximately 2,599,851 acres and includes the 3 Bars Project area and the BLM visual resource management background distance zone (15 miles; **Figure 3-1**). Approximately 94 percent of the area is administered by the BLM and 6 percent is privately owned. Past and present actions that have influenced visual resources in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

Table 3-57 summarizes the acreages and percent of the cumulative effects analysis area categorized into each VRI component, the resulting VRI classes, and the VRM classes.

3.19.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

As demonstrated by rangeland health studies conducted for the 3 Bars Project, historic livestock grazing and other natural and human-caused factors have resulted in rangelands dominated by early- to mid-seral vegetation, indicating a need to improve the health and resiliency of native vegetation and move rangelands closer to their Potential Natural Community. In addition, livestock and wild horses often congregate near streams, springs, and wetlands, causing impacts to riparian habitat, forage, and stream channels and their ability to function properly.

To improve forage and water resources, the BLM would continue ongoing management reviews to ensure proper livestock management and the long-term success of the proposed treatments. Any required modifications to grazing permits would be completed through a decision process separate from the 3 Bars Project and in accordance with the grazing regulations.

The BLM would also continue to conduct wild horse gathers, AML reviews and adjustments, remove excess animals and use fertility control, improve water developments, and implement habitat projects. These management actions would help to improve visual resources on the 3 Bars Project area.

TABLE 3-57

Visual Resource Project Area Inventory and Visual Resource Management Classes Summary for Cumulative Effects Study Area

Scenic Quality Evaluation					
BLM - Class A	**BLM - Class B**	**BLM - Class C**	**Not Inventoried**	**Total**	
836,562[1] 32%[2]	1,107,651 43%	443,199 17%	212,438 8%	2,599,851	
Sensitivity Level Analysis					
High	**Medium**	**Low**	**Not Inventoried**	**Total**	
867,129 33%	681,443 26%	838,841 32%	212,438 8%	2,599,851	
Distance Zones					
Foreground-Middleground	**Background**	**Seldom Seen**	**Not Inventoried**	**Total**	
1,766,368 68%	71,917 3%	549,127 21%	212,438 8%	2,599,851	
Visual Resource Inventory Classes					
VRI Class I	**VRI Class II**	**VRI Class III**	**VRI Class IV**	**Not Inventoried**	**Total**
0	1,254,385 48%	167,253 6%	965,775 37%	212,438 8%	2,599,851
Visual Resource Management Classes					
VRM Class I	**VRM Class II**	**VRM Class III**	**VRM Class IV**	**Not Inventoried**	**Total**
64,545 2%	40,426 2%	334,999 13%	2,058,732 79%	101,150 4%	2,599,851

[1] Acres.

[2] Percent of acres within CESA.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based herbicide applications to remove cheatgrass, and would also use herbicides to restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. The BLM could use aerial applications to control cheatgrass on several hundred acres annually on the West Simpson Park Unit. Portions of this unit have been burned by wildfire in recent years. About half of the unit could be treated over the life of the project. In general, herbicide treatments would have short-term negative effects and long-term positive effects on visual resources. The greater the area of vegetation treatment, the greater the visual effect is likely to be. Large treatments alter a larger portion of the landscape than small treatments, and the effects are more likely to be observed by people. However, the units consists of degraded lands of low to moderate scenic quality, resulting in a smaller visual effect from treatment and likely an improvement in the scenic quality of the land over the long-term.

Land development, mineral development, and oil, gas, and hydrothermal exploration and development could affect about 10,000 acres in the CESA in the reasonably foreseeable future, including the Mount Hope Project and acreage associated with potential land sales (although it is unlikely that all of this land would be developed), materials sites and other mineral development, roads, and rights-of-ways for roads, pipelines, and power and telephone lines.

The Mount Hope Project would disturb about 8,300 acres. There would be a moderate to strong contrast in form, line, and color between the existing landscape and the post-mining landscape associated with the Mount Hope Project. Most of the area encompassed by the mine project is VRM Class IV and the changes in the landscape would conform to VRM objectives. Visual contrast would be reduced by reclamation practices, which would consist of recontouring and revegetating the waste rock and tailings storage facilities; recontouring and revegetating exploration roads; removing all buildings, structures, and equipment brought to the site; and recontouring and revegetating all building sites. Following successful reclamation, the visual contrast from the Mount Hope Project would be slightly reduced. Over the long-term, the vegetation used to restore the mine site would begin to blend with the color and texture of the existing natural landscape. However, the mine pit would still be visible to the public after mine reclamation and its visual impact on the landscape would be significant (USDOI BLM 2012b:3-327 to 3-328).

Catastrophic wildfire can burn extensive areas of vegetation. Based on acreage burned by wildfires since 1985, an estimated 140,000 acres would be burned by wildfires in the CESA during the next 20 years, and would result in a blackened landscape.

Proposed hazardous fuels reduction and habitat improvement treatments would occur on about 127,000 for the 3 Bars Project, and on about 15,000 acres in other portions of the CESA under current and reasonably foreseeable future authorizations, or collectively about 5 percent of the CESA. Proposed treatments would move vegetation communities in areas that have been disturbed by past natural and human-caused action in the CESA toward their Potential Natural Communities. As discussed under direct and indirect effects, proposed vegetation treatments would have a short-term affect on visual resources by changing the scenic quality of the landscape. Long-term, the 3 Bars Project should result in vegetation that is more fire resilient, diverse, and similar to the Potential Natural Community. Hazardous fuels treatments would remove vegetation that contributes to short return-interval fires and loss of native vegetation. These treatments would help to reduce the risk of wildfire within the CESA. In addition, the BLM would conduct stream bioengineering and plantings on about 31 miles of stream to slow stream flow and create pools and wet meadows to improve wetland and riparian vegetation. These activities would help to make the landscape more visually appealing. In the long-term, benefits to visual resources from treatments would help to offset some of the adverse effects to visual resources from other reasonably foreseeable future projects in the CESA, and to a greater extent than would occur under the other alternatives.

3.19.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on visual resources would be similar to those described under Alternative A. Under Alternative B, less effort would be spent by the BLM on treatments to reduce wildfire risk and its impacts on visual resources. By not using fire on the 3 Bars Project area, there would be no visual effects associated with fire on several thousand acres annually within the 3 Bars Project area. These include the effects of smoke, dead and dying vegetation, and a charred landscape. However, the use of fire and could occur on a few hundred acres annually outside the 3 Bars Project treatment areas.

The BLM would be limited to hand pulling, discing, plowing, seeding, and using livestock to control noxious weeds and other invasive non-native vegetation on several hundred acres annually on the 3 Bars Project area. These methods could result in more soil disturbance and erosion than would occur from the use of fire, but would also give the BLM greater control on the types and amount of vegetation that is removed and types of visual impacts from treatments. The West Simpson Park Unit is on rugged terrain, and use of mechanical equipment to control cheatgrass on this unit would be difficult. This area is predominantly Scenic Quality Class A, and visible to the public.

Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or about 3 percent of the acreage within the CESA. BLM treatments would help to offset some of the adverse effects to visual resources from other reasonably foreseeable future actions, but not to the extent as would occur under Alternative A.

3.19.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on visual resources would be similar to those described under Alternative A. Adverse, short-term effects to scenic resources, primarily vegetation, associated with the use of fire and mechanized equipment would not occur under Alternative C; fire and mechanized equipment could be used in other portions of the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire under current and reasonably foreseeable future authorizations.

By not being able to use mechanical methods, less pinyon-juniper removal, discing, plowing, shredding, and mulching that would cause a visual contrast with untreated areas would occur under this alternative compared to Alternatives A and B. The BLM, however, would be less able to create fire and fuel breaks, remove diseased and dying pinyon-juniper, thin decadent sagebrush, restore areas dominated by cheatgrass and other noxious weeds and other invasive non-native vegetation, or restore degraded stream channels and riparian zones under this alternative than under Alternative A and B, to the detriment of the scenery on the 3 Bars Project area. The BLM would also be less able to reduce hazardous fuels and construct fire and fuel breaks, and reduce the risk of catastrophic wildfire and its effects on the scenery under Alternative C than under Alternatives A and B.

Hazardous fuels reduction and habitat improvement projects could occur on about 32,000 acres within the 3 Bars Project area, and on an additional 15,000 acres within the CESA, or only about 2 percent of the acreage within the CESA. There would be a long-term net benefit from BLM treatments that would help to offset some of the adverse effects to visual resources from other reasonably foreseeable future actions, but not to the extent as would occur under Alternatives A and B.

3.19.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on visual resources would be similar to those described under Alternative A. There would be no cumulative effects on visual resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage.

Based on historic treatments in the 3 Bars Project area, only about 1,500 acres would be treated annually in the CESA to reduce hazardous fuel levels and improve ecosystem health. Hazardous fuel levels would likely increase, and only a limited number of miles of fuel and fire breaks would be constructed under this alternative compared to the action alternatives. The BLM would conduct stream bioengineering and riparian habitat enhancements on only a few miles of streams. Thus, the BLM would do little to move rangelands toward their Potential Natural Community or restore Proper Functioning Condition in wetlands and riparian zones. The trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would likely increase. As a result, visual resource conditions would likely continue to deteriorate within the CESA.

3.19.3.5 Unavoidable Adverse Effects

Over the short-term, vegetation treatments would kill or harm vegetation in the treated area, resulting in a more open, browned or blackened landscape until new plants grow. While these effects are unavoidable, they are considered short-term impacts, as the vegetation would recover and lead to improved natural conditions. Treatment areas would vary in terms of their visual appeal prior to treatment and their distance from human activity, as well as in terms of the resulting public sensitivity to the pre- and post-treatment visual character of the area. The effects of vegetation treatments on the visual quality of the landscape would be most noticeable to travelers, sightseers, and residents for the first one to several years following treatment, particularly near major roads or residential areas (USDOI BLM 2007c:4-245). The proposed vegetation treatments would not cause unavoidable adverse effects to visual resources over the long-term.

3.19.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

The proposed vegetation treatments would affect visual resources by changing the scenic quality of the landscape. Over the short-term, impacts to visual resources from all treatment methods would begin to disappear within 1 to 2 growing seasons. The regrowth of vegetation on the site would eliminate much of the stark appearance of cleared areas, and the site would develop a more natural appearance. Impacts would last for the longest amount of time in woodlands and other areas where large trees and shrubs were removed.

Over the long-term, vegetation treatments would likely improve visual resources on public lands. Treatments that aim to rehabilitate degraded ecosystems, if successful, would result in plant communities dominated by native species. Native-dominated communities tend to be more visually appealing and productive than areas that have been overtaken by noxious weeds and other invasive non-native vegetation (e.g., areas supporting a cheatgrass monoculture), or that have been invaded by woody species (e.g., sagebrush experiencing encroachment by pinyon-juniper; USDOI BLM 2007c:4-250).

3.19.3.7 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of visual resources. Although there would be short-term impacts to visual resources from vegetation treatments, loss of visual resources would not be irretrievable and could be reversed if restoration treatments were successful.

3.19.3.8 Significance of the Effects under the Alternatives

3 Bars Project treatments could contribute to scenic degradation in the short-term, but this would be negligible in the context of other adverse impacts to visual resources in the CESA and would be in conformance with VRM objectives. By themselves, none of the 3 Bars Project treatments under all alternatives should result in a significant change in Class A scenery from Class A to Class B or to Class C in the long-term (greater than 10 years), strong visual contrast in the immediate foreground view from a designated recreation site, historic trail, or residence in the long-term (greater than 10 years), or non-compliance with VRM objectives in the long-term (greater than 10 years) within the 3 Bars Project area and CESA.

3.19.4 Mitigation

No mitigation measures are proposed for visual resources.

3.20 Land Use and Access

3.20.1 Regulatory Framework

Federal and local planning documents were reviewed to gain an understanding of the regulatory guidelines in effect within the 3 Bars Project area. The Shoshone-Eureka RMP provides a regulatory framework that applies to land use and authorizations on the 3 Bars Project area. The Eureka County Master Plan, although not a regulatory document, also provides policy recommendations for land use within the 3 Bars Project area.

The Federal Land Policy and Management Act of 1976 was implemented to establish public land policy and guidelines for its administration; to provide for the management, protection, development, and enhancement of public lands; and for other purposes (USDOI BLM 1976). Several sections within the Act deal with land use actions, including sections devoted to land use planning, land acquisition, and land disposition; authorizations to grant rights-of-ways; and other administrative actions.

The BLM *Land Use Planning Handbook* (H-1601-1) provides guidance to employees for implementing the BLM land use planning requirements established by Sections 201 and 202 of the Federal Land Policy and Management Act of 1976 (USDOI BLM 2005c). Land use plans and planning decisions are the basis for every on-the-ground action the BLM undertakes. Land use plans include both RMPs and management framework plans.

Land use plans ensure that the public lands are managed in accordance with the intent of Congress as stated in the Federal Land Policy and Management Act, under the principles of multiple use and sustained yield. As required by the Federal Land Policy and Management Act and BLM policy, the public lands must be managed in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; that will provide for outdoor recreation and human occupancy and use; and that recognizes the Nation’s need for domestic sources of minerals, food, timber, and fiber from the public lands by encouraging collaboration and public participation throughout the planning process.

The *Land Use Planning Handbook* provides guidance for preparing, revising, amending, and maintaining land use plans. This handbook also provides guidance for developing subsequent implementation (activity-level and project-specific) plans and decisions. The BLM 2800 Manual/Handbook/Instructional Memorandum Series provides policy and program direction for issuing, administering, assigning, amending, renewing, and terminating rights-of-way grants under the Federal Land Policy and Management Act and other related authorities in an environmentally, socially, and economically sound manner. The Manual/Handbook/Instructional Memorandum series also provides instructions to the program managers for right-of-way policy and program management (USDOI BLM 2008m).

The Natural Resources and Federal or State Land Use Element of the Eureka County Master Plan (Natural Resource and Land Use Plan) provides policy for natural resource management and land use on federal and state administered lands in Eureka County (Eureka County 2010). The Natural Resource and Land Use Plan was expanded in response to the passing of Senate Bill 40. Senate Bill 40 is intended to give Nevada localities an opportunity to address federal land use management issues directly.

The Natural Resource and Land Use Plan provides land management objectives and describes how the County and the BLM and other land managers can work cooperatively to manage natural resources of interest. Topics covered in the Natural Resource and Land Use Plan include soil, vegetation, and watersheds; forage and livestock grazing; water quality, riparian areas, and aquatic habitats; wildlife and wildlife habitat; land tenure; minerals; cultural, historical, and paleontological resources; hunting, fishing, and outdoor recreation; WSAs; air quality; and law enforcement.

3.20.2 Affected Environment

3.20.2.1 Study Methods and Study Area

Existing land use plans, such as the Shoshone-Eureka RMP and Eureka County Master Plan, as well BLM Mount Lewis Field Office data, were reviewed to determine land ownership and land uses. Land authorizations and rights-of-way from BLM field office data were also reviewed and summarized. Lastly, the Mount Lewis Field Office provided tables that showed land ownership and land use authorizations.

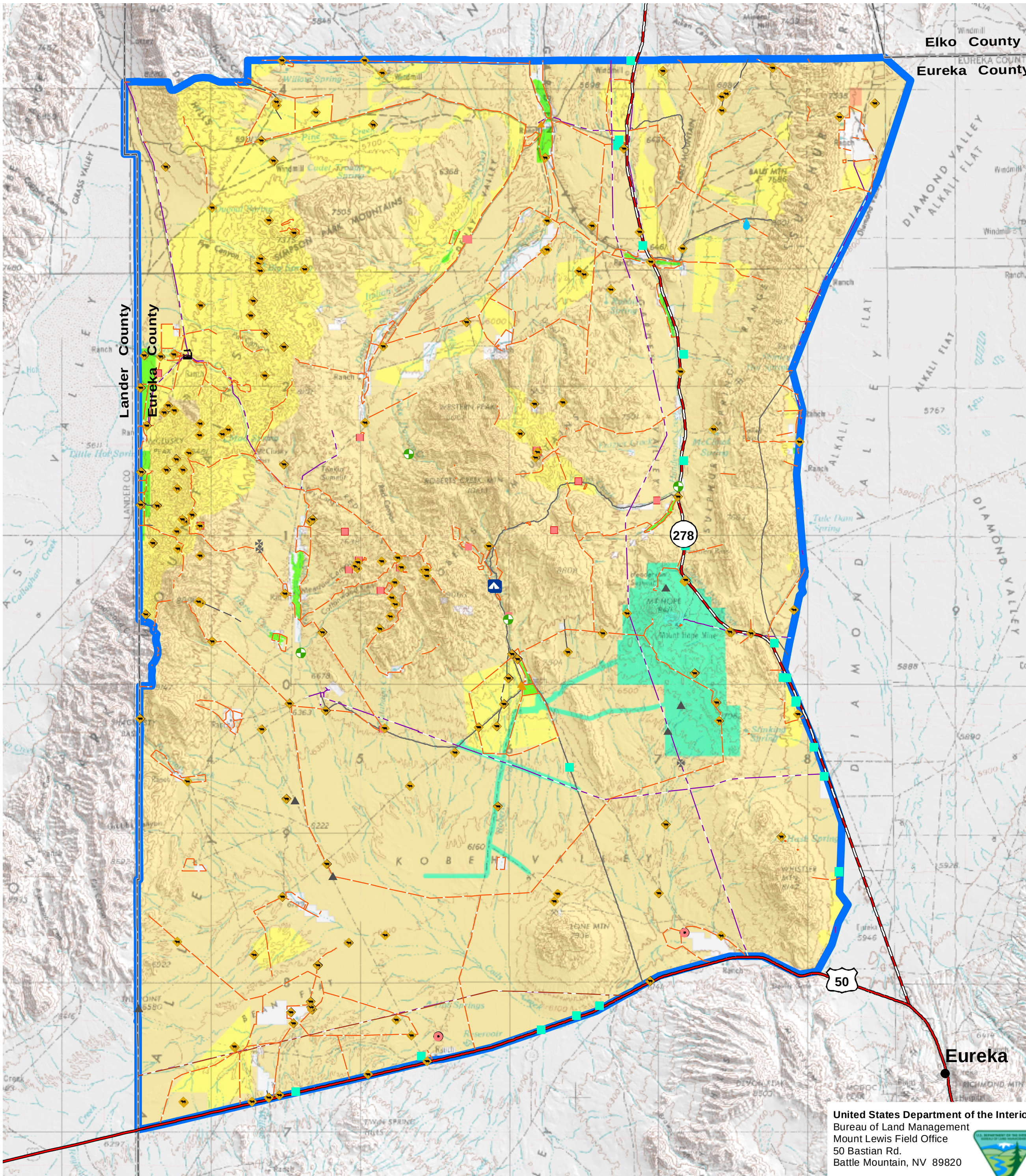
The study area for the assessment of direct, indirect, and cumulative effects for land use is the 3 Bars Project area (**Figure 3-1**).

3.20.2.2 Land Ownership and Use

The federal government is the dominant landowner within Eureka County and the project area, followed by private landowners. Federal lands within the project area are administered by the BLM. There are no U.S. Forest Service, state, or county-owned lands within the project area. **Figure 3-50** and **Tables 3-58** and **3-59** detail land ownership as well as land use authorizations within the project area.

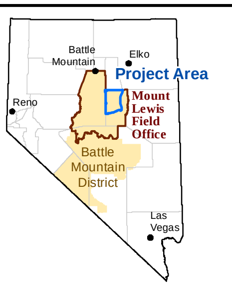
Mining and livestock grazing are the two primary land uses within the project area. As described in the Eureka Natural Resources and Land Use Plan, open space agricultural consisting of designated grazing allotments is the single greatest land use within Eureka County (2010). Open space agricultural often consists of ranching with dispersed livestock grazing on non-irrigated rangelands. Section 3.18 contains more information about livestock grazing within the project area. There are no active mines within the project area, but there are six active mines within 30-miles. In addition, the 8,300-acre Mount Hope Project is under construction and is in the southwestern portion of the project area. The Ruby Hill Mine, operated by Homestake Mining Company of California, a subsidiary of Barrick Gold Corporation, is the closest active mine to the project area, and is 4 miles southeast of the project boundary, near the town of Eureka. In addition, there are approximately 1,227 abandoned mine sites within the project area. These abandoned sites include mine shafts and quarries. Eureka County has not adopted a zoning ordinance.

There are two WSAs within the project area, Roberts Mountains WSA and Simpson Park WSA (**Figure 3-7**). Information on WSAs is included in Section 3.22. The nearest town is Eureka, located just southeast of the junction of U.S. 50 and State Route 278 and approximately 7 miles from the southeast corner of the project area.



United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Rd.
Battle Mountain, NV 89820

(Prepared by MLFO - 09/08/14)



Legend

- Communication Site
- Dump
- Monitoring Site
- Monument
- Power Facilities
- Range Improvement
- Recreation Site
- Stream Gaging Station
- Study Plot
- Water Pumping Plant
- Road
- Fence
- Pipeline
- Telephone Line
- Transmission Line
- Irrigated Crop
- Land Exchange
- Land Treatment Area
- Material Site

Land Owner

- Bureau of Land Management
- Private

Source: BLM 2013l.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-50

Land Ownership and Land-use Authorizations

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data.
Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
This product was developed through digital means and may be updated without notice.

TABLE 3-58

Land Ownership within the 3 Bars Project Area and Eureka County

Land Ownership Within the Project Area	Acreage	Percent
Bureau of Land Management	729,246	97
Private	20,564	3
Total	**749,810**	**100**
Land Ownership Within Eureka County	**Acreage**	**Percent**
Bureau of Land Management	1,969,762	74
U.S. Forest Service	142,923	5
Private Ownership	554,506	21
Eureka County	1041	<0.1
State of Nevada	19	<0.1
Total	**2,668,251**	**100**

TABLE 3-59

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Cattle Guard	NVN-000053	NA
Cattle Guard	NVN-000101	NA
Cattle Guard	NVN-000160	NA
Cattle Guard	NVN-003514	NA
Cattle Guard	NVN-003515	NA
Cattle Guard	NVN-003539	NA
Cattle Guard	NVN-004057	NA
Cattle Guard	NVN-004060	NA
Cattle Guard	NVN-004153	NA
Cattle Guard	NVN-004155	NA
Cattle Guard	NVN-004275	NA
Cattle Guard	NVN-004307	NA
Cattle Guard	NVN-004340	NA
Cattle Guard	NVN-004694	NA
Cattle Guard	NVN-004695	NA
Cattle Guard	NVN-004737	NA
Cattle Guard	NVN-004741	NA
Cattle Guard	NVN-004743	NA
Cattle Guard	NVN-004768	NA
Cattle Guard	NVN-004775	NA
Cattle Guard	NVN-004891	NA
Cattle Guard	NVN-005005	NA
Cattle Guard	NVN-005258	NA
Cattle Guard	NVN-062509	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Cattle Guard	NVN-064776	NA
Cattle Guard	NA	NA
Cattle Guard	NA	NA
Cattle Guard	NA	NA
Cattle Guard	NA	NA
Cattle Guard	NA	NA
Cattle Guard	NA	NA
Communication Site	NVN-004049	NA
Communication Site	NVN-051602	NA
Corral	NVN-000671	NA
Corral	NVN-000760	NA
Corral	NVN-000772	NA
Corral	NVN-004223	NA
Corral	NVN-040415	NA
Dump	NVN-048468	NA
Dump	NVN-048603	NA
Emergency Stabilization and Rehabilitation	NVN-004842	NA
Emergency Stabilization and Rehabilitation	NVN-059210	NA
Emergency Stabilization and Rehabilitation	NVN-595086	NA
Emergency Stabilization and Rehabilitation	NVN-595089	NA
Emergency Stabilization and Rehabilitation	NVN-595090	NA
Emergency Stabilization and Rehabilitation	NVN-595091	NA
Emergency Stabilization and Rehabilitation	NVN-595096	NA
Emergency Stabilization and Rehabilitation	NVN-595106	NA
Emergency Stabilization and Rehabilitation	NVN-595139	NA
Emergency Stabilization and Rehabilitation	NVN-595210	NA
Emergency Stabilization and Rehabilitation	NVN-595211	NA
Emergency Stabilization and Rehabilitation	NVN-595212	NA
Emergency Stabilization and Rehabilitation	NVN-595215	NA
Emergency Stabilization and Rehabilitation	NVR-004841	NA
Fence	NVN-000016	NA
Fence	NVN-000166	NA
Fence	NVN-000485	NA
Fence	NVN-004410	NA
Fence	NVR-590004	NA
Fence	NVR-590015	NA
Fence	NVR-590016	NA
Fence	NVR-590021	NA
Fence	NVR-590025	NA
Fence	NVR-590039	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Fence	NVR-590050	NA
Fence	NVR-590053	NA
Fence	NVR-590059	NA
Fence	NVR-590064	NA
Fence	NVR-590065	NA
Fence	NVR-590072	NA
Fence	NVR-590082	NA
Fence	NVR-590083	NA
Fence	NVR-590085	NA
Fence	NVR-590092	NA
Fence	NVR-590101	NA
Fence	NVR-590123	NA
Fence	NVR-590160	NA
Fence	NVR-590166	NA
Fence	NVR-590167	NA
Fence	NVR-590180	NA
Fence	NVR-590187	NA
Fence	NVR-590195	NA
Fence	NVR-590203	NA
Fence	NVR-590243	NA
Fence	NVR-590310	NA
Fence	NVR-590362	NA
Fence	NVR-590364	NA
Fence	NVR-590366	NA
Fence	NVR-590384	NA
Fence	NVR-590443	NA
Fence	NVR-590444	NA
Fence	NVR-590471	NA
Fence	NVR-590482	NA
Fence	NVR-590487	NA
Fence	NVR-590501	NA
Fence	NVR-590521	NA
Fence	NVR-590533	NA
Fence	NVR-590556	NA
Fence	NVR-590628	NA
Fence	NVR-590629	NA
Fence	NVR-590736	NA
Fence	NVR-590739	NA
Fence	NVR-590741	NA
Fence	NVR-590749	NA
Fence	NVR-590753	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Fence	NVR-590754	NA
Fence	NVR-590756	NA
Fence	NVR-590757	NA
Fence	NVR-590758	NA
Fence	NVR-590759	NA
Fence	NVR-590761	NA
Fence	NVR-590764	NA
Fence	NVR-590771	NA
Fence	NVR-590772	NA
Fence	NVR-590779	NA
Fence	NVR-591510	NA
Fence	NVR-593514	NA
Fence	NVR-593516	NA
Fence	NVR-593539	NA
Fence	NVR-593794	NA
Fence	NVR-594057	NA
Fence	NVR-594060	NA
Fence	NVR-594126	NA
Fence	NVR-594136	NA
Fence	NVR-594150	NA
Fence	NVR-594153	NA
Fence	NVR-594155	NA
Fence	NVR-594197	NA
Fence	NVR-594220	NA
Fence	NVR-594224	NA
Fence	NVR-594225	NA
Fence	NVR-594266	NA
Fence	NVR-594267	NA
Fence	NVR-594275	NA
Fence	NVR-594443	NA
Fence	NVR-594561	NA
Fence	NVR-594693	NA
Fence	NVR-594714	NA
Fence	NVR-594715	NA
Fence	NVR-594730	NA
Fence	NVR-594740	NA
Fence	NVR-594742	NA
Fence	NVR-594759	NA
Fence	NVR-594760	NA
Fence	NVR-593794	NA
Fence	NVR-594762	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Fence	NVR-594763	NA
Fence	NVR-594767	NA
Fence	NVR-594769	NA
Fence	NVR-594777	NA
Fence	NVR-594779	NA
Fence	NVR-594838	NA
Fence	NVR-594839	NA
Fence	NVR-594840	NA
Fence	NVR-594849	NA
Fence	NVR-594853	NA
Fence	NVR-594855	NA
Fence	NVR-594881	NA
Fence	NVR-594883	NA
Fence	NVR-594885	NA
Fence	NVR-594890	NA
Fence	NVR-594917	NA
Fence	NVR-594987	NA
Fence	NVR-594994	NA
Fence	NVR-595078	NA
Fence	NVR-595105	NA
Fence	NVR-595120	NA
Fence	NVR-595121	NA
Fence	NVR-595123	NA
Fence	NVR-595127	NA
Fence	NVR-595129	NA
Fence	NVR-595205	NA
Fence	NVR-595234	NA
Fence	NVR-595258	NA
Fence	NVR-595277	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
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Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Fence	NA	NA
Irrigated Crop	NVN-020395	NA
Irrigated Crop	NVN-048415	NA
Irrigated Crop	NVN-048443	NA
Land Treatment Area	NVN-000175	NA
Land Treatment Area	NVN-000281	NA
Land Treatment Area	NVN-000322	NA
Land Treatment Area	NVN-590002	NA
Land Treatment Area	NVN-590008	NA
Land Treatment Area	NVN-590019	NA
Land Treatment Area	NVN-590023	NA
Land Treatment Area	NVN-590044	NA
Land Treatment Area	NVN-590060	NA
Land Treatment Area	NVN-590114	NA
Land Treatment Area	NVN-590158	NA
Land Treatment Area	NVN-590190	NA
Land Treatment Area	NVN-590346	NA
Land Treatment Area	NVN-590368	NA
Land Treatment Area	NVN-590455	NA
Land Treatment Area	NVN-590456	NA
Land Treatment Area	NVN-590457	NA
Land Treatment Area	NVN-590491	NA
Land Treatment Area	NVN-590534	NA
Land Treatment Area	NVN-594729	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Land Treatment Area	NVN-594856	NA
Land Treatment Area	NVN-595188	NA
Land Treatment Area	NVR-000182	NA
Land Treatment Area	NVR-590357	NA
Land Treatment Area	NVR-590359	NA
Land Treatment Area	NVR-590360	NA
Land Treatment Area	NA	NA
Land Treatment Area	NA	NA
Land Treatment Area	NA	NA
Land Treatment Area	NA	NA
Land Treatment Area	NA	NA
Local Neighborhood Road, Rural Road, City Street	NVN-052399	NA
Local Neighborhood Road, Rural Road, City Street	NVN-052540	NA
Local Neighborhood Road, Rural Road, City Street	NVN-060918	NA
Material Site	NVN-001472	NA
Material Site	NVN-001473	NA
Material Site	NVN-001962	NA
Material Site	NVN-002186	NA
Material Site	NVN-002187	NA
Material Site	NVN-003420	NA
Material Site	NVN-022487	NA
Material Site	NVN-022489	NA
Material Site	NVN-022492	NA
Material Site	NVN-022499	NA
Material Site	NVN-023080	NA
Material Site	NVN-023082	NA
Material Site	NVN-030013	NA
Material Site	NVN-035593	NA
Material Site	NVN-035595	NA
Material Site	NVN-042799	NA
Material Site	NVN-051858	NA
Material Site	NVN-059954	NA
Material Site	NVN-292803	NA
Monitoring Site	NVN-089351	NA
Other Road	NVN-000005	NA
Other Road	NVN-000006	NA
Other Road	NVN-000009	NA
Other Road	NVN-036707	60

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Other Road	NVN-042812	400
Other Road	NVN-048798	NA
Other Road	NVN-052540	NA
Other Road	NVN-053379	NA
Other Road	NVN-053976	40
Other Road	NVN-078526	NA
Other Road	NA	NA
Pipeline	NVN-000087	NA
Pipeline	NVN-000176	NA
Pipeline	NVN-000239	NA
Pipeline	NVN-000245	NA
Pipeline	NVN-000326	NA
Pipeline	NVN-003545	NA
Pipeline	NVN-004046	NA
Pipeline	NVN-004093	NA
Pipeline	NVN-035075	NA
Pipeline	NVN-036566	NA
Pipeline	NVN-064738	NA
Pipeline	NVN-064805	NA
Pipeline	NVN-064806	NA
Pipeline	NVR-000107	NA
Pipeline	NVR-000741	NA
Plate Tectonic Study	NA	NA
Private Road for Service Vehicles (logging, oil fields, ranches, etc.)	NVN-052540	NA
Recreation Site	NVN-002474	NA
Reservoir	NVN-000067	NA
Reservoir	NVN-000086	NA
Reservoir	NVN-000145	NA
Reservoir	NVN-000184	NA
Reservoir	NVN-004059	NA
Reservoir	NVN-005264	NA
Reservoir	NVN-048417	NA
Reservoir	NVN-053667	660
Reservoir	NA	NA
Secondary Road	NVCC-022478	NA
Secondary Road	NVN-001471	400
Secondary Road	NVN-003794	NA
Secondary Road	NVN-042812	400
Secondary Road	NVN-043007	400
Secondary Road	NVN-048798	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Secondary Road	NVN-060918	NA
Spring	NVN-000081	NA
Spring	NVN-000083	NA
Spring	NVN-000110	NA
Spring	NVN-000143	NA
Spring	NVN-000235	NA
Spring	NVN-000350	NA
Spring	NVN-000402	NA
Spring	NVN-000403	NA
Spring	NVN-000423	NA
Spring	NVN-000425	NA
Spring	NVN-000432	NA
Spring	NVN-000451	NA
Spring	NVN-000474	NA
Spring	NVN-000492	NA
Spring	NVN-000511	NA
Spring	NVN-000532	NA
Spring	NVN-000548	NA
Spring	NVN-000584	NA
Spring	NVN-000585	NA
Spring	NVN-000586	NA
Spring	NVN-000611	NA
Spring	NVN-000612	NA
Spring	NVN-000613	NA
Spring	NVN-000614	NA
Spring	NVN-000615	NA
Spring	NVN-000616	NA
Spring	NVN-000618	NA
Spring	NVN-000619	NA
Spring	NVN-000620	NA
Spring	NVN-000621	NA
Spring	NVN-000622	NA
Spring	NVN-000737	NA
Spring	NVN-000738	NA
Spring	NVN-000740	NA
Spring	NVN-000755	NA
Spring	NVN-003505	NA
Spring	NVN-003506	NA
Spring	NVN-003507	NA
Spring	NVN-003509	NA
Spring	NVN-003510	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Spring	NVN-003513	NA
Spring	NVN-003542	NA
Spring	NVN-003543	NA
Spring	NVN-003544	NA
Spring	NVN-004094	NA
Spring	NVN-004181	NA
Spring	NVN-004248	NA
Spring	NVN-040748	NA
Spring	NA	NA
Spring	NA	NA
Spring	NA	NA
Stock Tank	NVN-048472	NA
Stream Gaging Station	NVN-088802	NA
Study Plot	NVN-004436	NA
Study Plot	NVN-004443	NA
Study Plot	NVN-004561	NA
Study Plot	NVN-004730	NA
Study Plot	NVN-004760	NA
Study Plot	NVN-004777	NA
Study Plot	NVN-004779	NA
Study Plot	NVN-004849	NA
Study Plot	NVN-004881	NA
Study Plot	NVN-004883	NA
Study Plot	NVN-004885	NA
Study Plot	NVN-004917	NA
Study Plot	NVR-004136	NA
Study Plot	NVR-064714	NA
Study Plot	NVR-064715	NA
Substation	NVN-060092	NA
Telephone Line	NVN-005253	NA
Telephone Line	NVN-007318	20
Telephone Line	NVN-051022	15
Telephone Line	NVN-056120	10
Telephone Line	NVN-058497	NA
Transmission Line	NVN-005638	NA
Transmission Line	NVN-012655	25
Transmission Line	NVN-042324	NA
Transmission Line	NVN-047781	NA
Transmission Line	NVN-048321	30
Transmission Line	NVN-060092	NA
Transmission Line	NVN-063162	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Transmission Line	NVN-088978	45
Trough	NVN-000176	NA
Trough	NVN-000212	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
Trough	NA	NA
US Mineral Monument	NVN-001758	NA
US Mineral Monument	NVN-001762	NA
US Mineral Monument	NVN-001763	NA
US Mineral Monument	NA	NA
US Mineral Monument	NA	NA
US Mineral Monument	NA	NA
Water Pumping Plant	NVN-000490	NA
Well - Other	NVN-000069	NA
Well - Other	NVN-000307	NA
Well - Other	NVN-000479	NA
Well - Other	NVN-000480	NA
Well - Other	NVN-000543	NA
Well - Other	NVN-000598	NA
Well - Other	NVN-004050	NA
Well - Other	NVN-004120	NA
Well - Other	NVN-004156	NA
Well - Other	NVN-004339	NA
Well - Other	NVN-040116	NA
Well - Other	NVN-040117	NA
Well - Other	NVN-040118	NA
Well - Other	NVN-040119	NA
Well - Other	NVN-040120	NA
Well - Other	NVN-040121	NA
Well - Other	NVN-040122	NA
Well - Other	NA	NA
Well - Other	NA	NA
Windmill	NVN-000040	NA
Windmill	NVN-000617	NA

TABLE 3-59 (Cont.)

Land Use Authorizations in the Project Area

Authorization Type	Serial Number	Total Width (feet)
Windmill	NVN-000653	NA
Windmill	NVN-000765	NA
Windmill	NVN-004745	NA
Windmill	NA	NA
Windmill	NA	NA
Withdrawal Class Reserves	NA	NA
Withdrawal Class Reserves	NA	NA

[1] Source: USDOI BLM (2012a, 2013k).
NA = Not applicable.

3.20.3 Environmental Consequences

3.20.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, two concerns specific to land use and 3 Bars ecosystem restoration were identified and are discussed in this section. These are:

- Encourage the BLM to work to balance the requirements and demands of multiple users of the land, consistent with federal multiple-use policies.
- Ensure the EIS considers the objectives of Eureka County's plans and policies.

3.20.3.2 Significance Criteria

Impacts to land use would be considered significant if BLM actions resulted in:

- Substantial conflict with existing land uses, including current land use authorizations.
- Substantial change in land use designations.
- Substantial reduction in opportunity for right-of-way authorizations and development activities.
- Substantial reduction in the opportunity for land tenure adjustments.

3.20.3.3 Direct and Indirect Effects

3.20.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse effects to land use common to all alternatives include the use of treatments that may result in short-term access limitations to land uses and current land use authorizations within the analysis area.

Treatments that reduce the risk of future catastrophic wildfire through fuels reduction would reduce the risk of loss of life, property, constructed facilities on public land, and resources on the 3 Bars Project area. Collaboration with the affected holders of a right-of-way or other authorizations and any landowners within the vicinity of the project area would be of utmost importance when implementing fire treatments. Open communication between the affected parties would limit possible negative impacts to right-of-way, other authorized development on public land, livestock, and ranch, farm, or other private properties and values (USDOI BLM 2009a).

Treatments would not result in long-term, substantial conflicts with existing land uses, changes in land use designations, or reductions in opportunity for right-of-way authorizations and development activities. Additionally, there would not be a substantial reduction in the opportunity for land tenure adjustments.

3.20.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

There are 45 land use authorizations within the riparian treatment areas, including a corral, Emergency Stabilization and Rehabilitation areas, fences, irrigated crops, land treatment areas, roads, a pipeline, a recreation site, a reservoir, spring improvements, a stream gauging station, study plots, a telephone line, and a transmission line.

Treatments could temporarily limit access to land use authorizations in localized areas. Due to the lack of permanent features, exclusion areas, or designations, riparian treatments should not preclude future rights-of-way authorizations, development activities, or land tenure adjustments.

Aspen Treatments

There are 26 land use authorizations within the aspen treatment areas, including Emergency Stabilization and Rehabilitation areas, fences, a land treatment area, roads, a pipeline, and spring improvements. Should a land use authorization occur within a treatment area, there could be short-term exclusion from use during treatment and post-treatment restoration.

Due to the lack of permanent features, exclusion areas, or designations, aspen treatments should not preclude future right-of-way authorizations, development activities, or land tenure adjustments.

Pinyon-juniper Treatments

There are 134 land use authorizations that are within pinyon-juniper treatment units, including study plots and roads, material sites, cattle guards, pipelines, corrals, Emergency Stabilization and Rehabilitation areas, fences, land treatment areas, reservoirs, spring improvements, a recreation site, a withdrawal area, a stream gauging station, powerlines, a trough, a water pumping plant, a well, and a windmill. Access restrictions may preclude access to mineral, rights-of-way, and land use authorizations during treatment and post-treatment restoration, but this preclusion would be temporary and would constitute a negligible impact.

Sagebrush Treatments

There are 83 land use authorizations within the sagebrush treatment areas, including a study plot and roads, material sites, cattle guards, pipelines, a withdrawal area, a stream gauging station, powerlines, Emergency Stabilization and Rehabilitation areas, fences, cropland, land treatment areas, a reservoir, spring improvements, a telephone line, a waterhaul, wells, and windmills. Fencing and other exclusion methods associated with this treatment area may preclude access to mineral resources, rights-of-way, and land use authorizations during treatment and post-treatment restoration, but this restriction would be temporary and would constitute a negligible impact.

Due to the lack of permanent features, exclusion areas, or designations, sagebrush treatments should not preclude future right-of-way authorizations, development activities, or land tenure adjustments.

3.20.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Because fire would not be available to reduce hazardous fuel loads and improve habitat, Alternative B may pose a greater long-term risk for wildfire than Alternative A due to the accumulation of fuels that could lead to loss of life and property. Without the use of prescribed fire, treatments could take longer, especially those needed to thin and remove Phase II and III pinyon-juniper stands, and the public may be restricted from accessing treatment sites for longer periods than if fire could be used.

There could be temporary access restrictions from treatments, but treatments would not preclude future land use authorizations within the project area, and would not conflict with county and BLM land use objectives. Because up to 6,350 acres could be treated annually, the BLM would have to closely coordinate activities with landowners within the project area and the public to ensure that landowner property and the public are not harmed by treatments.

3.20.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Because fire and mechanical methods would not be available to reduce hazardous fuel loads and improve habitat, Alternative C would pose a greater long-term risk for wildfire than Alternatives A and B due to the accumulation of fuels that could lead to loss of life and property. Without the use of fire and mechanical methods, treatments would take longer, especially those needed to thin and remove Phase II and III pinyon-juniper stands, restore lands dominated by cheatgrass and other noxious weeds and other invasive non-native vegetation, or to restore stream channels. Thus, the public may be restricted from accessing treatment sites for longer periods than if fire and mechanical methods were used.

There could be temporary access restrictions from treatments. Treatments would not preclude future land use authorizations within the project area, and would not conflict with county and BLM land use objectives. Because about 3,250 acres could be treated annually, the BLM would have to closely coordinate activities with landowners within the project area and the public to ensure that landowner property and the public are not harmed by treatments.

3.20.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to land use and access from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not take actions to reduce wildfire risk, so there would be no short-term access restrictions.

3.20.3.4 Cumulative Effects

The CESA for land uses is the 3 Bars Project area (**Figure 3-1**). Past and present actions that have influenced land use and access in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.20.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Permanent features or exclusion areas associated with the Mount Hope Project and future land development actions, in combination with 3 Bars Project activities, could impact future right-of-way authorizations, development activities, and land tenure adjustments, and conflict with Eureka County and BLM land use objectives. These effects would be greatest under Alternative A.

Catastrophic wildfire can cause extensive burns in vegetation, particularly during drought conditions when soils and vegetation are dry. Treatments should reduce the incidence and severity of wildfires. Based on past acreage burned by wildfire, an estimated 84,000 acres would burn in the CESA during the next 20 years. Wildfires could adversely affect life and property, access, and resource use, on or near the 3 Bars Project area.

The BLM is proposing to treat about 127,000 acres on the 3 Bars Project area, and about 15,000 acres under current and future authorizations, to restore ecosystem health. 3 Bars Project treatments, and potential short-term access restrictions, could occur on about 17 percent of the CESA under Alternative A. There would be no permanent features or exclusion areas associated with 3 Bars Project actions.

3.20.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on land use and access would be similar to those described under Alternative A. By not using fire on the 3 Bars Project area, there would be no land access restrictions associated with use of prescribed fire and wildland fire for resource benefit on several thousand acres annually within the 3 Bars Project area. However, by not conducting fire treatments to reduce the risk of wildfire, the potential for wildfire to adversely affect life and property, access, and resource use on or near the 3 Bars Project area would be greater than under Alternative A.

3 Bars Project treatments and potential short-term access restrictions would occur on about 63,000 acres, or about 8 percent of the CESA under Alternative B. There would be no permanent features or exclusion areas associated with 3 Bars Project actions.

3.20.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on land use and access would be similar to those described under Alternative A. Under Alternative C, less effort would be spent by the BLM on treatments to conduct hazardous fuels and habitat improvement projects to reduce wildfire risk and improve the health and resiliency of the vegetation than would occur under Alternatives A and B. By not being able to use mechanical methods and fire, the BLM would treat fewer acres to reduce hazardous fuels, create fire and fuel breaks, remove downed wood and slash, control noxious weeds and other invasive non-native vegetation, and improve vegetation health and condition to make it more resilient to wildfire. Thus, the potential for wildfire to adversely affect life and property, access, and resource use on nor near the 3 Bars Project area would be greater than under Alternatives A and B.

3 Bars Project treatments, and potential short-term access restrictions, would occur on about 32,000 acres, or 4 percent of the CESA under Alternative C. There would be no permanent features or exclusion areas associated with 3 Bars Project actions.

3.20.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on land use and access would be similar to those described under Alternative A. Under Alternative D, there would be no cumulative effects on land use and access from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage (about 1,500 acres annually), under existing and likely future authorizations. Any future authorizations would undergo environmental review before authorization. There would be potential short-term access restrictions on about 0.2 percent of the CESA under Alternative D.

3.20.3.5 Unavoidable Adverse Effects

There could be temporary access restrictions from treatments. Treatments would not preclude future land use authorizations on the project area, and would not conflict with BLM land use objectives. The BLM would closely coordinate activities with landowners on the project area and the public to ensure that they are not harmed by treatments.

3.20.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

There could be temporary access restrictions from treatments. Treatments that reduce the risk of future catastrophic wildfire through fuels reduction, however, would improve ecosystem resilience and sustainability and reduce the risk of life and property and public resources on or near the 3 Bars Project area from catastrophic wildfire.

3.20.3.7 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources associated with land use and access.

3.20.3.8 Significance of the Effects under the Alternatives

Impacts to land use and access from actions under all the alternatives, including the construction and operation of the Mount Hope Project and other oil, gas, geothermal, and other potential development projects within the CESA, would not be significant. Under the Federal Land Policy and Management Act, public lands are managed for multiple resources, including livestock grazing, recreation and other public uses, and mining and other resource development. As noted in the Shoshone-Eureka RMP ROD, livestock grazing, mineral development, land disposal, and utility corridor designations are authorized on lands within the CESA. Thus, the 3 Bars Project and other reasonably foreseeable future actions within the CESA 1) would not conflict with existing land uses and current land use authorizations; 2) would not cause a substantial change in land use designations; 3) would not cause a substantial reduction in opportunity for rights-of-way authorizations and development activities; and 4) would not cause a substantial reduction in the opportunity for land tenure adjustments.

3.20.4 Mitigation

No mitigation measures are recommended for land use and access.

3.21 Recreation

3.21.1 Regulatory Framework

The BLM's Shoshone-Eureka RMP provides the primary regulatory framework for management of recreational opportunities within the project area since nearly all lands within the area are administered by the BLM (USDOI

BLM 1987a). The Battle Mountain District Office is in the process of updating its RMP, and the updated RMP will combine the Shoshone-Eureka and Tonopah planning areas. BLM lands within the project area are managed “to encourage safe, public access and recreational use of public lands while ensuring protection of important resource values.”

There are two WSAs in the study area, Roberts Mountains WSA and Simpson Park WSA. These WSAs are discussed in more detail in Section 3.22, Wilderness Study Areas and other Special Management Areas. There are no Special Recreation Management Areas designated within the project area.

All BLM lands and recreational uses are managed as Extensive Recreation Management Areas. Extensive Recreation Management Areas are areas where management consists primarily of providing basic information and access. Dispersed recreation occurs in Extensive Recreation Management Areas, and visitors have the freedom of recreational choice with minimal regulatory constraints. Significant public recreational issues or management concerns are limited in these areas, and nominal management suffices (USDOI BLM 2007c:3-72). The Shoshone-Eureka RMP indicates that the BLM should “provide dispersed recreational opportunities” (with minimal facilities to support such activities and protect sensitive resources) within Extensive Recreation Management Areas.

In addition to recreational guidance provided in the BLM RMP, BLM Manual 6280, *Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation*, provides guidance on management of the Pony Express National Historic Trail, and both Eureka County and the Nevada Statewide Comprehensive Outdoor Recreation Plan provides information, recommendations, and guidance related to the provision and management of statewide recreational opportunities (Eureka County 2010, Nevada Division of State Parks 2010, USDOI BLM 2012m).

3.21.2 Affected Environment

3.21.2.1 Study Methods and Study Area

Sources of recreational-related information used in this EIS include federal, state, and local land management plans (with recreational elements), visitor and activity-specific use estimates, published literature and studies, including the Mount Hope Project EIS (USDOI BLM 2012b), and personal communications with BLM staff. The proposed action and alternatives were then compared to these existing conditions to determine the potential for and expected severity of conflict with existing and planned recreational uses of the project area.

The study area for the assessment of direct and indirect effects for recreation is the 3 Bars Project area. The cumulative effects study area extends 15 miles from the project area boundary (**Figure 3-1**).

3.21.2.2 Recreation Activities and Use Levels

From October 2009 through September 2011, the BLM estimated that recreational use in the Mount Lewis Field Office planning area accounted for approximately 229,000 visitor days, of which dispersed use accounted for about 164,000 days (72 percent; USDOI BLM 2012m). Developed recreation generally occurs at constructed and/or specifically designated recreational sites and areas, while dispersed recreational use occurs away from these constructed/designated recreational sites and areas. It is unknown how much of this use occurred within the study area, though BLM staff describe project area use levels as low (around 100 visitors on a typical day across the study area, though the number of visitors can frequently be much lower and occasionally higher), and typical of more remote, rural areas. While most of this use is likely from locals, a portion is also from visitors from other parts of the state, as well as from out-of-state visitors.

The most common recreational activities in the project area include hunting, fishing, wildlife viewing, off-highway vehicle use, horseback riding, sightseeing, mountain biking, hiking, and rock collecting (USDOI BLM 2012m, o). This range of recreational opportunities is possible because most BLM lands within the project area are open and accessible to public use via roads and trails. In most cases, activity-specific use estimates are not available for the study area.

There are a variety of hunting opportunities within the study area and region. Common species hunted include mule deer, pronghorn antelope, mountain lion, rabbits, Greater sage-grouse, chukar partridge, quail, mourning dove, and waterfowl. Big game hunt statistics for desert bighorn sheep, pronghorn antelope, and mule deer for the hunt units that are within or that overlap the analysis area are shown in **Table 3-60**. The hunt unit statistics reflect the average number of animals harvested in each unit. This is a result of the statistics being divided by multiple hunt unit groups provided in the NDOW harvest data. In addition, 172 elk hunting tags were issued and 72 elk were killed in 2011, for hunt units 161, 162, 164, 171, and 173 combined (NDOW 2012f).

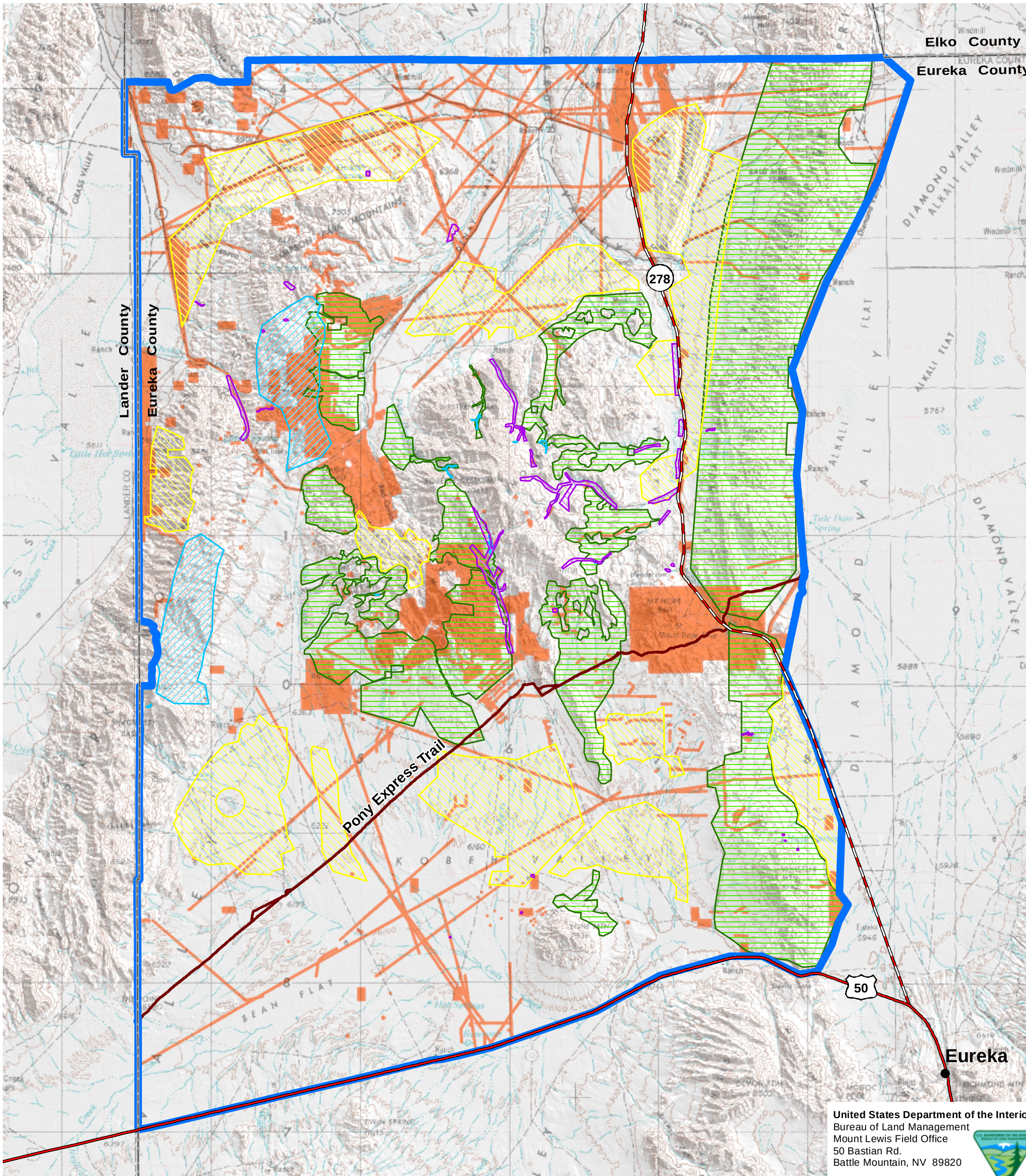
Fishing use within the 3 Bars Project area occurs primarily along Pete Hanson Creek, Birch Creek, Roberts Creek, and in the Tonkin Reservoir. The Roberts Creek Reservoir and Vinini Creek are no longer fishable and JD Ponds and Denay Creek are on private lands with restricted access. These creeks and other water bodies have trout and other sport fisheries that are popular with locals and visitors. **Table 3-61** displays annual average use estimates for creeks and water bodies in the study area (NDOW 2012f).

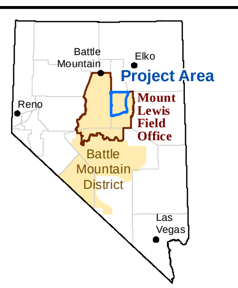
There are very few special recreational permits given out by the Mount Lewis Field Office for recreational activities within the project area. While the BLM permits occasional hunting related outfitting/guiding services that may occur in the project area, the primary annual permit is for XP Rides to conduct an organized ride on the Pony Express National Historic Trail (**Figure 3-51)**. This annual event, typically conducted in June, involves re-riding the entire, multi-state length of the Pony Express National Historic Trail. Additionally, there is informal recreational use of the Pony Express National Historic Trail through visits by individual users or small groups (Kreutzer 2013).

3.21.2.3 Recreation Management and Use Areas

BLM lands without special designations within the project area are currently managed as an Extensive Recreation Management Area. Dispersed types of recreation are the predominate uses within the project area, as well as the surrounding rural region. Since dispersed uses tend to require minimal constructed or developed facilities, there are few developed or designated recreational sites within the project area. There is an existing network of roads and trails that provide access to dispersed recreational opportunities throughout the study area (USDOI BLM 2012m, o).

Roberts Mountains are one of the primary recreational destinations within the project area. The Roberts Mountains have several creeks (Roberts, Pete Hanson, and Tonkin Springs) that are popular fishing spots for both locals and visitors. Other recreational opportunities in the Roberts Mountains include hiking, camping, wildlife viewing, and hunting. This area and its diverse opportunities serve as an important local recreational asset given the proximity of the Roberts Mountains to nearby towns in Eureka County and the existing network of access roads and trails throughout the study area (USDOI BLM 2012m, o).





Legend

- Pony Express Trail
- Cultural Resource Inventory
- 3 Bars Project Area
- Pinyon-juniper Treatment Area
- Sage Treatment Area
- Aspen Treatment Area
- Riparian Treatment Area

Source: BLM 2012g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-51

Cultural Resource Inventory

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

TABLE 3-60

2011 Harvest by Hunt Unit and Group

<table>
<tr><th colspan="4">Desert Bighorn Sheet</th><th colspan="4">Pronghorn Antelope</th><th colspan="4">Mule Deer</th></tr>
<tr><th>Hunt Unit / Group</th><th>Tags</th><th>Number Killed</th><th>Percent Success</th><th>Hunt Unit / Group</th><th>Tags</th><th>Number Killed</th><th>Percent Success</th><th>Hunt Unit / Group</th><th>Tags</th><th>Number Killed</th><th>Percent Success</th></tr>
<tr><td>161</td><td>11</td><td>9</td><td>82</td><td>065</td><td rowspan="3">41</td><td rowspan="3">24</td><td rowspan="3">59</td><td>065</td><td>58</td><td>43</td><td>74</td></tr>
<tr><td>162-163</td><td>4</td><td>4</td><td>100</td><td>142</td><td>141</td><td></td><td>69</td><td></td></tr>
<tr><td colspan="4" rowspan="15"></td><td>144</td><td>142</td><td></td><td>19</td><td></td></tr>
<tr><td>141</td><td rowspan="6">151</td><td rowspan="6">105</td><td rowspan="6">70</td><td>143</td><td></td><td>34</td><td></td></tr>
<tr><td>143</td><td>144</td><td></td><td>90</td><td></td></tr>
<tr><td>151</td><td>145</td><td></td><td>26</td><td></td></tr>
<tr><td>152</td><td>Management Area 14</td><td>554</td><td>238</td><td>43</td></tr>
<tr><td>154</td><td>151</td><td></td><td>77</td><td></td></tr>
<tr><td>155</td><td>152</td><td></td><td>70</td><td></td></tr>
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<tr><td>163</td><td>Management Area 15</td><td>548</td><td>235</td><td>43</td></tr>
<tr><td>164</td><td>161</td><td></td><td>97</td><td></td></tr>
<tr><td>161</td><td rowspan="2">27</td><td rowspan="2">24</td><td rowspan="2">89</td><td>162</td><td></td><td>73</td><td></td></tr>
<tr><td>162</td><td>163</td><td></td><td>26</td><td></td></tr>
<tr><td colspan="4" rowspan="2"></td><td>164</td><td></td><td>10</td><td></td></tr>
<tr><td>Management Area 16</td><td>501</td><td>206</td><td>41</td></tr>
</table>

Source: NDOW (2012f).

TABLE 3-61

Annual Average Fishing Use in the Study Area (1980-2010)

Creek/Water Body	Annual Average Number of Anglers (minimum/maximum)	Annual Average Angler Days (minimum/maximum)
Roberts Creek	42 (0 / 106)	126 (0 / 606)
Roberts Creek Reservoir	3 (0 / 71)	3 (0 / 71)
Pete Hanson Creek	4 (0 / 30)	7 (0 /60)
Vinini Creek	1 (0 / 20)	1 (0 / 20)
JD Ponds	10 (0 / 56)	24 (0 / 184)
Denay Creek	3 (0 / 46)	7 (0 / 184)
Tonkin Reservoir	90 (11 / 463)	220 (11 / 1,246)

Source: NDOW (2012g).

The Pony Express National Historic Trail crosses the project area (**Figure 3-51**). This national trail follows the historic route used by the Pony Express and links St. Joseph, Missouri, to Sacramento, California. While the Pony Express was only in operation for 18 months (April 1860 through October 1861), it has come to represent the Old West in each of the eight states (California, Colorado, Kansas, Missouri, Nebraska, Nevada, Utah, and Wyoming) it passes through. The section of the trail that passes through the project area is part of the Overland Canyon to Simpson Park Station High Potential Segment of the Pony Express National Historic Trail. The National Trails System Act defines a High Potential Segment as "those segments of a trail which would afford high quality recreational experience in a portion of the route having greater than average scenic values or affording an opportunity to vicariously share the experience of the original users of a historic route." The BLM has direct management responsibility and authority for the trail within its jurisdictional boundaries, and the USDOI National Park Service is the trailwide administrator for programmatic, planning, and co-ordination purposes (USDOI National Park Service 1999, 2012, Kreutzer 2013).

3.21.3 Environmental Consequences

3.21.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on information in the AECC and public scoping comments the following concerns regarding recreation were identified and are discussed in this impact analysis.

- Off-highway vehicle use could damage and/or jeopardize completed restoration work.
- Treatments could promote additional off-highway vehicle use and new routes.
- If recreational opportunities are lost as a result of restoration efforts, there could be associated impacts to the local and regional economy.
- Roads and livestock facilities near roads are contributors to fire.

These and other recreational-related issues (e.g., access, visitor experiences, etc.) were considered during the evaluation of consequences that could reasonably be anticipated under the proposed restoration effort.

3.21.3.2 Significance Criteria

The proposed action and alternatives were assessed within the existing recreation management frameworks that guide recreational opportunities in the 3 Bars ecosystem and vicinity, including the Shoshone-Eureka RMP, Eureka County, Nevada Division of State Parks, and other relevant plans. For purposes of this assessment, the proposed action and alternatives are considered to have a significant effect on recreation if they meet one or more of the following significance criteria:

1. The action conflicts with formally established recreation and other appropriate public uses (i.e., would the action limit and/or restrict existing and/or future recreation and public use?).
2. The action substantially degrades or reduces the quantity or quality of the area available for existing or future recreational opportunities (i.e., would the action degrade visitor satisfaction with and/or overall quality of the recreational experience?).
3. The action results in the permanent damage or impairment of a unique, nationally significant recreational resource (i.e., would the action result in the loss of a recreational resource of regional and/or national importance?).

Impacts to historic trails would be considered significant if the proposed action or alternatives resulted in any of the following:

1. Changes to the landscape adjacent to an historic trail that cannot be mitigated to a BLM Class II VRM objective, as outline in BLM Instructional Memorandum NV-2004-004.
2. Permanent or long-term limitation of use of an identified portion of a national historic trail.

3.21.3.3 Direct and Indirect Effects

3.21.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

In general, the potentially affected lands in the 3 Bars ecosystem do not offer unique recreational opportunities (WSAs are addressed separately in Section 3.22). The Pony Express National Historic Trail is the only recreational resource of national significance within the 3 Bars Project area. However, these lands do play an important role in the local provision of recreational opportunities, with a focus on dispersed uses (e.g., off-highway vehicle use, hunting, fishing, wildlife observation, etc.). As such, the restoration actions proposed under each of the alternatives would not affect developed or other areas of highly concentrated recreational use. Instead, the proposed actions would primarily influence undeveloped recreational opportunities and the users of those areas. Given the size of the 3 Bars Project area (about 750,000 acres) and relatively low levels of use (about 100 visitors on a typical day), the proposed restoration treatments would affect only a small number of visitors.

The 3 Bars ecosystem area is managed as an Extensive Recreation Management Area and open to multiple types of dispersed recreational activities. Per the proposed restoration actions, recreation and specifically off-highway vehicle use, would continue to be allowed throughout the 3 Bars Project area, although periodic closures of specific areas are anticipated to help the restoration effort and minimize human health risks. Under all treatment methods, the size of closed areas and duration of the temporary closures would be the most pronounced and potentially significant effects on recreation.

Adverse Effects

There would be some short-term scenic degradation, as well as distractions to users (e.g., noise from machinery), from treatments. Some areas would be off-limits to recreational activities as a result of treatments, for periods ranging from a few hours to days, or even 1 full growing season or longer, depending on the treatment. In most cases, recreationists would be able to find alternative sites offering the same amenities, although a lessened experience could result from more concentrated use in these alternative sites.

In the short-term (less than 3 years) general recreational impacts would be negative and include the following:

- Temporary closure and loss of recreational uses of dispersed areas during treatment implementation.
- Disturbance from workers, equipment, and/or movement of people and equipment associated with treatments.
- Temporary displacement of wildlife for both consumptive (e.g., hunting, fishing, etc.) and non-consumptive (e.g., wildlife viewing, photography, etc.) users.

The temporary closure of specific areas would be the most direct effect on recreation during the implementation of treatments proposed under each of the alternatives. Visitors would be restricted from accessing the treatment areas during implementation and possibly during post-implementation. This would generally degrade the visitor experience (in particular for those visitors who intended to visit an area closed for treatment), and displace visitors to other dispersed use areas within the 3 Bars ecosystem and/or other regional areas.

In addition to displacing visitors, the proposed treatments could also temporarily displace wildlife. However, this could increase the availability of wildlife in adjacent areas that do not have access or public use restrictions. While both visitors and wildlife could be displaced during the proposed treatments, there could also be more wildlife-related opportunities in areas not affected by closures (e.g., a higher density of game animals in non-treatment areas). So, while temporary displacement of visitors and wildlife could be considered a negative effect, there could also be a related beneficial impact to wildlife-dependent recreational opportunities and experiences in nearby areas not affected by the treatments.

Recreational users of the Pony Express National Historic Trail could potentially be impacted by treatment activity and noise during implementation of the treatments and the visual aspects of the recreational experience of the trail may be affected in the short-term until vegetation recovers to the point where it no longer appears that it has been manipulated.

Beneficial Effects

Long-term, the effects of treatments on recreation would be positive and would include the following:

- Restoration of the historic landscape that would be beneficial to the visitor experience, including the Pony Express National Historic Trail retracement experience.
- Improved habitat and associated wildlife.
- A reduction in the presence and number of noxious weeds and other invasive non-native vegetation.
- A reduction in the risk of a large-scale, catastrophic wildfire.

Improved habitat and associated wildlife and a reduction in noxious weeds and other invasive non-native vegetation should contribute to an enhanced recreational experience in the 3 Bars ecosystem. Improved fish and game habitat and populations should provide additional and/or improved hunting and fishing opportunities. Improved habitat should enhance the overall scenic quality of the area, while removal of noxious weeds and other invasive non-native vegetation would reduce the likelihood of visitors being harmed or inconvenienced by these plants, and could influence the visitor experience. Additionally, a reduction in wildfire risk should lead to fewer temporary closures to protect human safety (i.e., fewer public access constraints from fires).

3.21.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Adverse Effects

Short-term effects would generally be negative, and include temporary closures or lack of access to fishing sites, visitor displacement (to other fishing sites), and potential degradation in the visitor experience, both from the temporary closures and visual disturbances associated with the various treatment methods.

While temporary closures would be likely during manual treatments, this type of treatment would result in the fewest impacts to recreation. Since manual treatments tend to be most feasible on smaller-scales, only small areas would be subject to temporary recreation and public use closures. During manual treatments, there could be some distractions from additional staff and equipment, though given the scale of these efforts, these distractions would not likely overly degrade scenic quality.

Mechanical treatments would be used to restore stream channel functionality. Activities at treatment sites could distract visitors, and large equipment used to restore stream channels could be heard for several miles. Direct habitat alteration or loss of habitat could occur in Lahontan cutthroat trout and other game fish streams (Birch, Pete Hanson, and Willow Creeks) and cause reduced fishing opportunities for fishermen.

Small, temporary exclosure fencing could be used to exclude livestock, wild horses, and other wild ungulates from riparian zone treatment areas for a minimum of 2 growing seasons. Although visitors could likely scale fences to access treatment sites, if desired, fences could discourage recreational use of the area.

Beneficial Effects

Treatments would improve the aesthetic and visual qualities of recreational areas for hikers, birdwatchers, and other public land users; reduce the risk of recreationists coming into contact with noxious weeds and other invasive non-native vegetation; increase the abundance and quality of plants harvested from public lands; and improve habitat for fish and wildlife sought after by fishermen and hunters.

Given the location of proposed riparian treatments along stream corridors and along other waterbodies, in particular in several areas that are popular for fishing, the effects of riparian projects on recreation would likely be more pronounced for anglers compared to other visitors. The enhancements to riparian zones and game fish habitat would also improve the recreational experience (e.g., cohesive visual landscape, healthier fish populations and potential catch rates, etc.).

Removal of pinyon-juniper in the riparian zone for all treatments groups, except the Black Spring and Denay Pond groups, would enhance its capabilities to function as a fire or fuel break. These treatments would reduce the spread of future wildfires on public lands used for recreation. As a result, recreationists would be provided with safer conditions, and there would be less of a chance that a wildfire would destroy a large acreage of lands used for recreation. Severe wildfires are capable of causing damage to recreational resources over large areas that subsequently require long periods of time for recovery. In addition, treatments that reduce the risk of wildfire would reduce the likelihood of recreationists being displaced from their favorite hunting, fishing, and camping sites by wildfires.

Aspen Treatments

Aspen treatments could result in wildlife habitat enhancements that have the potential to beneficially influence the recreational experience in the long-term in these areas. Aspen stands are unique, and quite beautiful in the fall when the leaves change colors, and efforts to preserve and enhance these stands would benefit sightseers.

Most pinyon-juniper removal would occur near roads to promote development of fire breaks near aspen stands. Fire breaks would help to protect aspen stands, and other woodland and rangeland habitat from wildfire. Protection of 3 Bars Project resources would be beneficial to users of these resources, and reduce the amount of area that would be closed to recreational users due to emergency stabilization and rehabilitation of burned areas.

Pinyon-juniper Treatments

Adverse Effects

Pinyon-juniper treatment projects would affect off-highway vehicle use, hunting, and other dispersed uses that occur in the 3 Bars ecosystem. Additionally, several of the pinyon-juniper treatment projects are proposed along creeks that provide fishing opportunities. Anglers who use these creeks would be affected by the treatments. In the short-term, temporary closures, distractions and changes in the scenic integrity of the landscape, and degradation of the experience would negatively affect recreational users.

Recreationists likely would not be excluded from Phase I areas where pinyon-juniper removal is primarily done using manual methods, especially if the treatments do not result in substantial soil disturbance and reseeding is not necessary. Low-intensity treatments such as thinning would generally be less restrictive to recreational uses than treatments such as discing. People recreating in nearby areas would be able to hear the motorized equipment and could be exposed to some exhaust smells, but these effects would last only as long as the treatment itself. After the completion of treatments, vegetation would be absent from large portions of the landscape and bare soil would be exposed, making the site less desirable for recreation. The use of heavy machinery would disrupt the treatment area, breaking limbs and disturbing soil. It is also likely that some large debris would be left behind, creating obstacles for certain types of recreational uses (USDOI BLM 2007c:4-120).

Prescribed burns would require the closure of burn areas to visitors during burn activities. People recreating in nearby areas would be able to see and perhaps smell smoke. The potential for smoke inhalation could result in some health risks to these users (see Section 3.26, Human Health and Safety), depending on their vicinity and position (i.e., upwind or downwind) in relation to the fire. Because smoke impairs visibility, views of the landscape could be blocked during burning. These effects would reduce the recreational experience, but would typically last only as long as the burn treatment itself. After a fire, the burned area would appear blackened, and some residual vegetation would be charred, making the area undesirable for most recreational uses for a period of 1 or more years. Four-wheel drive vehicles and other off-highway vehicles could be excluded from areas treated with fire to minimize damage to these sites while they revegetate. Low impact uses such as camping and hiking would generally not be restricted, but it is likely that burned areas would be avoided by users engaging in these types of activities. Visitation to a prescribed burn area would decline drastically or cease altogether in the short-term (USDOI BLM 2007c:4-120).

As a result of thinning and removal treatments, the number of pinyon pine and juniper trees within woodland products harvest areas would be reduced. Treatments would affect approximately 26 percent of the total designated woodland products harvest area, including Christmas tree, green wood, and commercial and public pine nut harvest areas. Removal of pinyon pines and juniper from these areas would eliminate or limit the ability to harvest woodland products there, although most of the project area would not be affected.

Beneficial Effects

Pinyon-juniper treatments would improve woodland health, productivity, and functionality; slow the expansion of pinyon-juniper into sagebrush and riparian plant communities; increase pine nut production; and reduce the risk of catastrophic wildfire, to the benefit of recreational users. Treatments could also lead to increased forage for wildlife, and water for fish, and increase the capacity of the land to support game fish and wildlife and increased hunting and fishing opportunities. However, these gains may not be realized for a decade or more, or until treated areas have fully recovered.

The BLM allows firewood and Christmas tree harvesting, greenwood cutting, and pine nut gathering on the 3 Bars Project area, and would continue to do so in the future in treatment and non-treatment areas. The BLM would also allow the public to cut live pinyon-juniper trees in areas where pinyon-juniper trees are tightly spaced and harming the growth of herbaceous vegetation and sagebrush, in order to help slow pinyon-juniper encroachment into riparian, aspen, and sagebrush habitats. These actions would promote recreation, by promoting a healthier woodland and rangeland that in turn would promote woodland recreational activities, healthy populations of fish and game, and an enhanced scenic quality. By thinning and removing pinyon-juniper, competition among remaining trees for water and other resources would decline, and the remaining pinyon pines should be able to produce more nuts for use by the public. Downed logs would also be placed in streams to benefit game fish habitat.

Fuels reduction treatments would reduce the severity of future wildfires on public lands used for recreation. As a result, recreationists would be provided with safer conditions, and there would be less of a chance that a wildfire would destroy a large acreage of lands used for recreation. Wildfires are capable of causing damage to recreational resources over large areas that subsequently require long periods of time for recovery. In addition, treatments that reduce the risk of wildfire would reduce the likelihood of recreationists being displaced from their favorite hunting, fishing, and camping sites by wildfires (USDOI BLM 2007c:4-122).

Sagebrush Treatments

Adverse Effects

Recreationists likely would not be excluded from areas such as those in the Alpha Unit group and Table Mountain 1 and Three Corners units, where Phase I and Phase II pinyon-juniper would be thinned to promote forb, grass, and sagebrush development using manual and mechanical equipment.

Prescribed fire, along with other treatment methods, could be used to manage noxious weeds and other invasive non-native vegetation on the West Simpson Park Unit. Recreationists would be excluded from prescribed fire areas during the burn, but would be allowed into the burn area when the BLM deems it is safe for re-entry. Treatment sites would be posted to inform the public of any access restrictions. During treatments, there would be some scenic degradation and distractions to users (noise from machinery and crews), but given the small amount of area treated annually, these effects should be minor.

Biological control has been identified for use on the 3 Bars Project area. Grazing may be used to maintain firebreaks and to help reduce wildfire risk in this area. Grazing can contribute to the spread of noxious weeds and other invasive non-native vegetation through preferential grazing of native vegetation over weeds, and by movement of noxious weeds and other invasive non-native vegetation into uninfested areas in livestock feces (USDOI BLM 2009b). The spread of noxious weeds and other invasive non-native vegetation could degrade recreational resources on the 3 Bars Project area.

Much of the focus of treatments on sagebrush treatment units to improve habitat for fish and game species of importance to sportsmen. Manual and mechanical treatments could result in increased water runoff and erosion, and spills of fuels and lubricants, to the possible detriment of game fish populations in these creeks.

Beneficial Effects

Treatments that restore native vegetation and natural fire regimes and ecosystem processes would be beneficial to recreationists. Treatments would reduce the risk of recreationists coming into contact with noxious weeds and other invasive non-native vegetation; increase the abundance and quality of plants harvested from public lands; and improve habitat for fish and wildlife sought after by fishermen and hunters and the recreational experience through improved scenery and increased populations of fish and game species.

Over 85 percent of the acres treated would occur where the BLM has determined that pronghorn antelope habitat is declining, nearly 65 percent of acres treated would occur where Greater sage-grouse habitat is declining, and 45 percent of the acres treated would occur where mule deer habitat is declining. Manual and mechanical treatments would create a grass-shrub mosaic favored by Greater sage-grouse, pronghorn antelope, mule deer, and other wildlife that could be harvested by hunters.

Removal of pinyon-juniper through thinning, and seeding and planting, should enhance the visitor experience. By removing pinyon-juniper to promote the reestablishment of grasses, forbs, and sagebrush, habitat for wildlife and game species would improve (Lauer and Peek 1976, Willms et al. 1981, Payne and Bryant 1998).

Efforts to restore areas dominated by non-native vegetation would make these areas more visually appealing and better suited for fish and wildlife, and would reduce the risk of future wildfires, all of which benefit the recreationist.

3.21.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The types and magnitude of effects for manual, mechanical, and biological control treatments would be similar between Alternatives A and B. Because the BLM would not be able to use fire, however, there would be none of the adverse effects associated with this treatment type. In particular, there would be no harm to recreationists from prescribed fire and wildland fire for resource benefit. However, with greater reliance on mechanical methods, there may be greater disturbance to the public from the use of mechanical equipment than would occur under Alternative A.

Acres and types of wetland and riparian habitat treated would be similar to Alternative A, and the BLM would use small, temporary exclosure fencing to protect treatment areas. However, the BLM would not use fire to slow pinyon-juniper encroachment into sagebrush and riparian communities, or treat Phase II and III pinyon-juniper to improve woodland health and reduce hazardous fuels. Thus, there would be fewer gains in wildlife forage production outside of riparian zones, and greater risk of habitat loss from catastrophic wildfire, under this alternative than under Alternative A, to the detriment of recreational resources and the public.

Some treatments to improve historic pinyon-juniper communities would occur, which could benefit future pine nut harvest in these areas long-term, but the acreage benefiting from these treatments would be substantially less than under Alternative A.

3.21.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation. The consequences of not using fire under Alternative C would be the same as those discussed under Alternative B.

Effects to visitors from noise and disturbance associated with mechanical treatment equipment would not occur under this alternative. By not being able to use mechanical equipment, however, the BLM would also not be able to conduct stream engineering and restoration, except on a limited basis on only a few stream miles; control noxious weeds and other invasive non-native vegetation, except on very small areas where this vegetation can be hand pulled or controlled using hand tools; reseed and replant restoration sites, except for small areas where shrubs and other vegetation would be planted by hand; or create fire and fuel breaks to reduce the risk of fire spread, except near existing roads or aspen stands, or along a few miles of stream. As a result, there would be less improvement in vegetation and water quantity and quality, and more risk of catastrophic wildfire, than under Alternatives A and B, to the detriment of the recreational user.

The BLM has not identified areas where it would use classical biological control on the 3 Bars Project area. The use of biological control agents would have few effects on recreational areas and visitors to public lands since they would be used on a limited number of acres and to specifically control undesirable species without disturbing desirable vegetation or the land. During the release of biological control agents, there would be some workers present that could cause a minor distraction to visitors in the area.

Under Alternative C, the BLM would not substantially improve the native vegetation community nor stop the loss of important ecosystem components. As a result, the visitor use experience could decline long-term.

3.21.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct or indirect effects on recreation from 3 Bars Project treatments as no treatments would be authorized under this alternative. Thus, long-term loss of recreational opportunities and deterioration in the visitor experience would be greatest under Alternative D.

3.21.3.4 Cumulative Effects

The CESA for recreation is approximately 2,599,851 acres and includes the 3 Bars Project area and the BLM visual resource management background distance zone (15 miles; **Figure 3-1**). This area was selected based on the anticipated increase in population and corresponding demand for recreational opportunities by residents in the project vicinity (e.g., Eureka, Battle Mountain, etc.), as well as the location of other nearby recreational resources (e.g., Hickison Petroglyph Recreation Site). Approximately 94 percent of the area is administered by the BLM and 6 percent is privately owned. Past and present actions that have influenced land use and access in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.21.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

In general, while there are locally important recreational resources in the CESA, the types of dispersed recreational resources available in the area are not of regional or national significance except the Pony Express National Historic Trail, which has been Congressionally designated as a recreational resource. Recreational use within the CESA is thus likely to increase proportionally to changes in the regional population. As recreational use increases over time, there tends to be an inevitable increase in public demand for recreational opportunities and a corresponding increase in expectations about the quality of the recreational experience. The cumulative effects from the proposed 3 Bars Project, as well as past, present, and reasonably foreseeable future actions are considered within this context of increasing population and recreational demand, including potential changes in recreational resources and experiences.

The BLM would continue ongoing management reviews to ensure proper livestock management and long-term success of treatments. The BLM would also continue to conduct wild horse gathers, AML reviews and adjustments, remove excess animals and use fertility control, improve water developments, and implement habitat projects. Efforts to better distribute livestock and wild horses across the rangeland should provide for a more natural visitor experience and reduce the potential for livestock/wild horse/visitor conflicts.

The BLM could apply herbicides using ground-based methods under existing authorizations. These treatments would be small and have few visitor impacts. The BLM could also use aerial herbicide applications to control cheatgrass on several hundred or more acres annually on the West Simpson Park Unit. There could be short-term visitor access restrictions in treatment areas. However, the units consist of degraded lands of low recreational value.

The population within southern Eureka County is projected to increase by 50 percent during construction and operation of the Mount Hope Project. With an increase in population in the CESA due to population growth, and employment opportunities such as the Mount Hope Project, the number of recreational users in the CESA should increase. Recreational users in the 3 Bars analysis area can spread noxious weeds and other invasive non-native vegetation that attaches itself to vehicles or to clothing or shoes, and can later cause new noxious weeds and other invasive non-native vegetation infestations, possibly impacting other land uses within the CESA.

Land, mineral, oil, gas, geothermal, and other development would increase levels of land disturbance and spread of noxious weeds and other invasive non-native vegetation within the 3 Bars Project and nearby areas. Development would lead to additional human activity in the area, and possible degradation of other land uses within the analysis area. Past mining activities associated with the Atlas Gold Bar Mine degraded rangeland resources on about 1,300 acres within the CESA. The proposed Mount Hope Project would disturb about 8,300 acres, and fencing would be used to restrict public access on an additional 6,000 acres. As noted in the Mount Hope Project EIS, mining could substantially alter the groundwater level near the mine pit, causing a drawdown in water that could affect surface water flows, groundwater levels, and vegetation on Roberts Mountains and in Kobeh Valley and Diamond Valley, to the detriment of native vegetation and fish and wildlife habitat (USDOI BLM 2012b:3-74 to 3-90). In addition, removal of Mount Hope would have an impact on the historic setting of the Pony Express National Historic Trail. The mountain is visible for miles and its removal will alter the character of the trail and the ability of recreationists to experience the trail as it existed in 1860-61. In addition, access would be virtually eliminated for a segment of the trail that passes within the mine boundary. The 3 Bars Project would not significantly add to this impact since none of the proposed treatments would further limit access to any portion of the trail within the 3 Bars Project Area. These effects could degrade the recreational experience within the CESA.

Catastrophic wildfire can burn extensive areas of vegetation. Based on acreage burned by wildfires since 1985, an estimated 140,000 acres would be burned by wildfires in the CESA during the next 20 years. To reduce the risk of catastrophic wildfire and to restore the health and resiliency of native vegetation, the BLM would treat up to 127,000 acres to reduce hazardous fuels. The BLM also proposes to treat hazardous fuels on an additional 15,000 acres under current authorizations in high to very high fire risk areas within the CESA. Recreational access to treatment areas could be restricted during the treatment period, and it is likely that the treated area would have few recreational values, for several years after treatments. Over time, this reduction in fuels, however, would allow for more natural forage within the project area, benefiting game populations and hunting opportunities, and improve the health of pinyon-juniper stands, which could benefit nut production. In addition, treatments would reduce the risk of catastrophic wildfire, which would benefit native plant communities and fish and game.

3 Bars Project treatments would occur on only about 5 percent of the CESA. Treatments would result in localized effects and would not substantially alter the availability of dispersed recreational opportunities in the CESA or larger region. However, by nature, many types of dispersed uses (e.g., off-highway vehicle use, hunting, wildlife viewing, etc.) require large tracts of undeveloped or little used natural areas. Actions that permanently alter and fragment the landscape (e.g., energy development, mining, land development, etc.), as well as similar unforeseen future actions, could eventually affect both the availability of dispersed use opportunities and experiences.

3.21.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on recreation would be similar to those described under Alternative A. By not using fire, the amount of area disturbed by treatments would generally be smaller, and have less impact on fish and wildlife resources, and scenery, than other treatment methods.

However, fewer acres would also be treated to restore landscape health and habitat for fish and game, and reduce the risk of catastrophic wildfire, and would not likely offset the increased potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area.

About 63,000 acres of vegetation and 31 miles of stream would be disturbed from the 3 Bars Project, or only about 2 percent of the CESA. Treatments would result in localized effects and would not substantially alter the availability of dispersed recreational opportunities in the CESA or larger region. Still, there would be a long-term net benefit from BLM treatments that would help to offset some of the adverse effects to recreational resources from other reasonably foreseeable future actions. Actions would provide more recreational opportunities for a growing population, but not to the extent as would occur under Alternative A.

3.21.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on recreation would be similar to those described under Alternative A. By not being able to use mechanical methods there would be less disturbance to public from treatments compared to Alternatives A and B. Without mechanical methods, however, the BLM would be less able to reduce hazardous fuels, remove noxious weeds and other invasive non-native vegetation, thin and remove vegetation to encourage understory development, create fire and fuel breaks, and remove downed wood and slash. The risk of wildfire and its effects on recreation would likely increase, while there would be few benefits to fish and game, under this alternative compared to Alternatives A and B.

About 32,000 acres of vegetation and 8 miles of stream would be disturbed from the 3 Bars Project, or only about 1 percent of the CESA. Treatments would result in localized effects and would not substantially alter the availability of dispersed recreational opportunities in the CESA or larger region. Still, there would be a minor long-term net benefit from BLM treatments that would help to offset some of the adverse effects to recreational resources from other reasonably foreseeable future actions. Actions would provide more recreational opportunities for a growing population, but not to the extent as would occur under Alternatives A and B.

3.21.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on recreation would be similar to those described under Alternative A. There would be no cumulative effects on recreation from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage (about 1,500 acres annually; less than 0.1 percent of the CESA). Thus, benefits to the recreating public would be substantially less under this alternative than under the action alternatives.

3.21.3.5 Unavoidable Adverse Effects

There would be some scenic degradation, as well as distractions to users (e.g., noise from machinery), from treatments. In addition, there would be some human health risks to recreationists associated with exposure to smoke from fire. Finally, some areas would be off-limits to recreational activities as a result of treatments. These effects would be localized and short-term.

3.21.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

There would be some scenic degradation, as well as distractions to users (e.g., noise from machinery), from treatments. These effects would be localized and short-term. Treatments that restore native vegetation and natural fire regimes and other ecosystem processes would be beneficial to recreationists. Treatments would improve the aesthetic and visual qualities of recreational areas for hikers, bikers, horseback riders, and other public land users; reduce the risk of recreationists coming into contact with noxious weeds and other invasive non-native vegetation; increase the abundance and quality of plants harvested from public lands; and improve habitat for fish and wildlife sought by fishermen and hunters. These benefits would be long-term and improve the productivity of land resources and their ability to provide recreational values (USDOI BLM 2007c:4-250).

3.21.3.7 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of recreational resources. Although there would be short-term impacts to recreational resources from vegetation treatments, these impacts would not be irretrievable and could be reversed if restoration treatments were successful.

3.21.3.8 Significance of the Effects under the Alternatives

Under all the alternatives, direct and indirect effects of 3 Bars Project treatments, along with effects from other actions within the CESA, would not have a significant permanent conflict with formally established recreation and other appropriate public uses over the long-term. Public access to the Mount Hope Project would be limited until the mine was reclaimed, and there may be access restrictions in other areas with resource development. As discussed in the Mount Hope Project EIS and ROD, few permanent restrictions are anticipated from the mine project (USDOI BLM 2012b:4-81) and there would be no permanent access restrictions associated with the 3 Bars Project.

Under all the alternatives, direct and indirect effects of 3 Bars Project treatments would not result in long-term changes to the landscape adjacent to the Pony Express National Historic Trail that cannot be mitigated to a BLM Class II Visual Resource Management objective, as outline in BLM Instructional Memorandum NV-2004-004, or in permanent or long-term limitation of use of an identified portion of the trail. The BLM would follow guidance in BLM Manual 6280, *Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation*, to ensure proper management of the Pony Express National Historic Trail (USDOI BLM 2012n).

In the long-term, actions that would occur within the CESA would not significantly degrade or reduce the quantity or quality of the area that is available for existing or future recreational opportunities. 3 Bars Project restoration treatments could degrade or reduce recreational opportunities in the short-term (< 5 years), but treatments should result in a healthy and functional landscape that provides additional recreational opportunities. Up to 15,000 acres could be off-limits to the public due to mining and other land uses for up to 70 years, but these areas are subject to reclamation requirements and would have minimal long-term effects on recreational opportunities in the CESA (USDOI BLM 2012b:4-81).

3.21.4 Mitigation

No mitigation measures are recommended for recreation.

3.22 Wilderness Study Areas, Special Management Areas, and Lands with Wilderness Character

3.22.1 Regulatory Framework

The BLM manages certain lands under its jurisdiction that possess unique and important historical, anthropological, ecological, biological, geological, and paleontological features. These features include undisturbed wilderness tracts, critical habitat, natural environments, open spaces, scenic landscapes, historic locations, cultural landmarks, and paleontological-rich regions. Special management is administered with the intent to preserve, protect, and evaluate these significant components of our national heritage. Most special areas are either designated by an Act of Congress or by Presidential Proclamation, or are created under BLM administrative procedures.

The National Landscape Conservation System is the primary management framework for these specially designated lands. The National Landscape Conservation System was created in June 2000 by the BLM to bring into a single system some of the agency's premier areas. National Landscape Conservation System designations include National Monuments, National Conservation Areas, Designated Wilderness and WSAs, National Scenic and Historic Trails, and Wild, Scenic, and Recreational Rivers (USDOI BLM 2007c:3-70).

The only lands within the National Landscape Conservation System that are on the 3 Bars Project area are the Roberts Mountains WSA and a portion of the Simpson Park WSA, and the Pony Express National Historical Trail.

Wilderness Study Areas have been designated by the BLM as having wilderness characteristics, thus making them worthy of consideration by Congress for wilderness designation. While Congress considers whether to designate a WSA as permanent wilderness, the BLM manages the area to prevent impairment of its suitability for wilderness designation. BLM Manual 6330, *Management of BLM Wilderness Study Areas,* guides management decisions made for specific areas of public lands under wilderness review by Congress (USDOI BLM 2012p). The policy applies to the following: 1) WSAs identified by the wilderness review required by Section 603 of the Federal Land Policy and Management Act; 2) WSAs established by Congress; and 3) WSAs identified through the land use planning process in Section 202 of Federal Land Policy and Management Act. The purpose of the manual is to prevent impairment of the wilderness values, described in Section 2(c) of the Wilderness Act of 1964 (Public Law 88/577). The manual allows for actions that clearly benefit a WSA by protecting or enhancing these characteristics even if they are impairing, though they must still be carried out in the manner that is least disturbing to the site. Wilderness Study Areas are managed under the manual until such time as Congress makes a determination regarding wilderness designation; the manual would apply to the WSAs in the project area.

The Eureka County Natural Resource and Land Use Plan is an executable policy for natural resource management and land use on federal- and state-administered lands in Eureka County (Eureka County 2010). The Natural Resource and Land Use Plan was expanded in response to the passing of Nevada Senate Bill 40. Senate Bill 40 is intended to give Nevada localities an opportunity to address federal land use management issues directly. This bill requires that "A Plan or statement of policy must be approved by the governing bodies of the county and cities affected by it, and by the governor before it is put into effect."

As stated in the Natural Resources and Land Use Plan, a goal pertaining to Wilderness Areas, WSAs, and other special management areas is to "Seek immediate Congressional designation action on all WSAs and other restrictive land classifications based on Eureka County policy to release these areas for multiple use management and in the interim prevent, minimize or mitigate impairment or degradation of such areas to the extent that Congressional actions are not pre-empted." Similarly, an objective is to "Develop comprehensive guidance to Congress seeking release of all WSAs deemed by the Department of Interior to be unsuitable for wilderness designation to multiple use management."

Approximately 41 miles of the Pony Express National Historical Trail are within the 3 Bars Project area. This national trail follows the historic route used by the Pony Express and links St. Joseph, Missouri, to Sacramento, California. While the Pony Express was only in operation for 18 months (April 1860 through October 1861), it has come to represent the Old West in each of the eight states (California, Colorado, Kansas, Missouri, Nebraska, Nevada, Utah, and Wyoming) it passes through. The section of the trail that passes through the project area is part of the Overland Canyon to Simpson Park Station High Potential Segment of the Pony Express National Historic Trail. The National Trails System Act defines a High Potential Segment as "those segments of a trail which would afford high quality recreation experience in a portion of the route having greater than average scenic values or affording an opportunity to vicariously share the experience of the original users of a historic route." The BLM has direct management responsibility and authority for the trail within its jurisdictional boundaries, and the USDOI National Park Service is the trailwide administrator for programmatic, planning, and co-ordination purposes (USDOI National Park Service 1999, 2012, Kreutzer 2013).

In 2009 as part of a National Historic Trail feasibility study under Omnibus Public Land Management Act, Congress identified the Central Overland Trail as a potential National Historic Trail. This trail would occur within the 3 Bars Project area. The National Park Service is currently studying the feasibility, suitability, and desirability of adding this and other routes to the existing California National Historic Trail. The Central Overland Trail largely corresponds to the Pony Express National Historic Trail, but the two trails do vary in places, mostly over short distances.

3.22.2 Affected Environment

3.22.2.1 Study Methods and Study Area

Land use plans such as the Shoshone-Eureka RMP, Eureka County Natural Resources and Land Use Plan, and Mount Hope Project EIS, and online BLM sources were reviewed to determine wilderness and special management areas within the project area.

The study area for the assessment of direct and indirect effects is the 3 Bars Project area, while the cumulative effects study area is the 3 Bars Project area and that portion of the Simpson Park WSA that is outside of the project area (**Figure 3-1**).

3.22.2.2 Special Management Areas

There are no National Monuments, National Conservation Areas, Designated Wilderness Areas, or Wild, Scenic, and Recreational Rivers on the 3 Bars Project area. The Pony Express National Historic Trail is within the 3 Bars Project area. The route of the Pony Express National Historic Trail crosses the southern portion of the 3 Bars Project area, and three stations and one water source known to have been used by the Pony Express are within or immediately adjacent to the project boundary. From east to west, these are located at Sulphur Spring, Roberts Creek, Goodwin, and Grubbs Well. Additional stops in the project vicinity are Diamond Springs (Diamond City), on the east side of Diamond Valley, and Dry Creek, situated at the base of the Simpson Park Range.

In the 1999 Comprehensive Management Plan/EIS developed for the Pony Express, California, Oregon, and Mormon Pioneer national historic trails, the National Park Service identified the route from the mouth of Overland Canyon at Huntington Valley (Eureka County) to Simpson Park Station, northeast of Austin (Lander County), as a high potential segment of the National Historic Trail. This segment crosses the project area. BLM Manual 6280, *Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation*, which guides management of national historic trails crossing BLM jurisdiction, requires NEPA analyses of "the extent to which the proposed action would affect the Federal Protection Components, including high-potential historic sites or high-potential route segments located on public land" (USDOI BLM 2012n). No high potential historic sites are identified along the Overland Canyon to Simpson Park Station High Potential Segment (Kreutzer 2013).

There are two WSAs within the project area, Roberts Mountains WSA and Simpson Park WSA (**Figure 3-7)**. Roberts Mountains WSA is wholly contained within the project area, while Simpson Park WSA is partially contained within the project area. The Roberts Mountains WSA includes 15,090 acres of public land and consists of rugged mountainous areas and contains three prominent peaks. Vegetation includes willow, cottonwood, aspen, birch, and dogwood. Mountain mahogany trees and limber pine are found in isolated stands on the barren rock ridges The Roberts Mountains WSA is generally in a natural state, provides an outstanding opportunity for solitude, and offers opportunities for primitive and unconfined recreation such as cross-country skiing, horseback riding, rock hounding, hiking, and hunting. About 487 people use the Roberts Mountains WSA annually (USDOI BLM 2012b:3-471).

Roberts Mountains are the type locality (the geologic point of first recognition) of the Roberts Mountains Thrust, which is a major geologic structure in western North America. The area has been referred to as "the Window of the World" because of the unique view it gives of the complex geologic structure of the region and has been studied by professional geologists and students from across the nation because of its rare qualities and geologic importance (USDOI BLM 2012b).

The Simpson Park WSA includes 49,119 acres of public land and 147 acres of privately owned in-holdings; 14,872 acres of public lands and 22 acres of private in-holdings are within the 3 Bars Project area. The WSA consists of mountainous country with scattered stands of aspen and mountain mahogany. The Simpson Park WSA is generally in a natural state, provides limited to good opportunities for solitude, and offers outstanding opportunities for hiking, horseback riding, and hunting. About 150 people use the Simpson Park WSA annually (USDOI BLM 2012b:3-476).

3.22.2.3 Lands with Wilderness Character

An inventory of Lands with Wilderness Characteristics was completed in 2012 for Battle Mountain District, as part of the Resource Management Plan Revision in progress for the District. That inventory did not show any areas meeting the criteria for Lands with Wilderness Character in the 3 Bars Project area, thefore Lands with Wilderness Character are "not present, not effected" and the proposed land treatments and project activities as part of the 3 Bars Project should not impact any Lands with Wilderness Character. Future project activities in upcoming years may be subject to additional and appropriate site-specific review under NEPA, and the inventory may be updated at that time as part of such site-specific review. The inventory also will be updated as the Resource Management Plan Revision further progresses for the whole Battle Mountain District.

3.22.3 Environmental Consequences

3.22.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, one concern specific to WSAs and other Special Management Areas and 3 Bars ecosystem restoration was identified and is discussed in this section. This concern was that the expanded ease of livestock movement in cleared country may shift and intensify livestock use on adjacent wilderness lands, which could impair their naturalness characteristics.

3.22.3.2 Significance Criteria

Impacts to WSAs would be considered significant if BLM actions resulted in nonconformance with BLM Manual 6330, *Management of BLM Wilderness Study Areas* (USDOI BLM 2012p).

Impacts to historic trails would be considered significant if the Proposed Action or alternatives result in any of the following:

- Long-term changes to the landscape adjacent to a historic trail that cannot be mitigated to a BLM Class II VRM objective, as outlined in BLM Instructional Memorandum NV-2004-004.
- Permanent or long-term limitation of use of an identified portion of a national historic trail.

3.22.3.3 Direct and Indirect Effects

3.22.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

The BLM proposes to restore up to 393 acres on the Roberts Mountains WSA and 8 acres on the Simpson Park WSA, or less than 1 percent of the acreage in WSAs on the 3 Bars Project area. The BLM may also treat additional aspen habitat in the Simpson Park WSA in the future after site-specific aspen inventories are completed.

Treatments within the Roberts Mountains and Simpson Park WSAs could temporarily impair the wilderness characteristics of solitude, naturalness, and primitive and unconfined recreation within and adjacent to these areas. The overall effect of treatments on the WSAs would depend on whether the end condition of the treatment site (considering both long-term benefits and short-term effects) was an improvement in wilderness characteristics. In many cases (e.g., an eradication of a small population of an incipient pest, a prescribed fire that mimicked historical fire), communities in the treatment area would quickly recover, and the overall effect would be positive.

Manual treatments would be the least obtrusive method to use in WSAs and the most appropriate. Manual treatment methods are typically focused on small areas, which would have localized impacts on naturalness, solitude, and primitive and unconfined recreation. Manual treatment methods would also result in fewer effects on naturalness from short-term effects from mechanized equipment and intrusions, noise, and other disturbances.

It is possible that treatment activity would be visible or audible to visitors on the WSAs or Pony Express National Historic Trail during the treatment period, but such activity would not significantly adversely affect the visitor's recreational/historical experience. In addition, the treatment would not adversely affect the historical character and scenic value of the trail landscape, or any artifacts or National Register-eligible historic properties associated with the

Pony Express National Historic Trail. It is possible that treatment sites could be accessed using roads that overlie the trail, but access would not occur via the historic trail. The BLM cultural resources specialist would evaluate each proposed treatment at the time of implementation and, in coordination with the National Park Service as appropriate, would make a recommendation to the authorized officer for an appropriate buffer width around the trail based on the type of treatment to be used, the integrity of the potentially affected trail segment, and other factors as necessary.

3.22.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Under the proposed action, the BLM would treat up to 9 acres along Roberts Creek within the Roberts Mountains WSA. There would be no riparian treatments within the Simpson Park WSA or on or near the Pony Express National Historic Trail.

Adverse Effects

Mechanical treatments within WSAs are allowed for the enhancement of wilderness characteristics in accordance with BLM Manual 6330. Thinning and removal of vegetation are allowed in WSAs where prescribed fire in the WSA will inevitably cause unacceptable risks to life, property, or natural resources outside the WSA; or where natural successional processes have been disrupted by past human activity to the extent that intervention is necessary in order to return the ecosystem to a condition where natural processes can function; or where non-native species have altered the fire regime so that wildfires pose an undue risk to the native ecosystem.

Treatment methods would result in ground disturbance, noise, and other disturbances that may temporarily degrade the naturalness of the treatment area, and opportunities for solitude and primitive and unconfined recreation within the area. These effects would occur on a small area (up to 9 acres) over a short period of time (a few months) and would temporarily result in a negligible adverse effect.

Beneficial Effects

Beneficial effects would include enhancing the naturalness and primitive and unconfined recreation of the WSAs after restoration was completed. In WSAs, treatments would only be allowed in order to improve the natural condition of these areas. Although stream enhancement could result in substantial ground disturbance on up to 9 acres, treatments would restore native vegetation within the riparian zone and improve stream habitat for Lahontan cutthroat trout and game fish. The reduction of hazardous fuels and noxious weeds and other invasive non-native vegetation on lands adjacent to or near wilderness and special areas would provide long-term benefits by reducing the likelihood that noxious weeds and other invasive non-native vegetation would spread onto these unique areas, or that a catastrophic wildfire would burn through them and degrade their unique qualities.

Aspen Treatments

The BLM has identified approximately 62 acres within the Roberts Mountains WSA for aspen treatments. The BLM may also treat additional aspen habitat in the Simpson Park WSA in the future after site-specific aspen inventories are completed. No aspen treatments would be or near the Pony Express National Historic Trail. Aspen treatments would focus on improving the health of aspen stands by removing pinyon-juniper to reduce tree competition at JD-A4 (23 acres), RM-A2 (11 acres), and RM-A10 (28 acres) within the Roberts Mountains WSA, and constructing small, temporary exclosure fencing to promote aspen sucker survival at SFF-A1 (8 acres) within the Simpson Park WSA; exclosure fencing could also be used to protect treatment sites within the Roberts Mountains WSA.

Adverse Effects

Treatment methods would result in short-term ground disturbance, noise, and other disturbances that may temporarily degrade the naturalness of the treatment area, and opportunities for solitude and primitive and unconfined recreation within the area. Felling of pinyon-juniper and construction of small, temporary exclosure fencing would impact the visual qualities of the treatment area. These effects would be lessened by chipping or removing downed pinyon-junipers and using downed logs to create stream habitat, and removing fencing once aspen stands are restored.

Beneficial Effects

Removal of pinyon-juniper trees in aspen stands has the potential to damage or disturb aspen. However, aspen respond well to disturbance, which stimulates suckering. Removal of conifers would allow sunlight to reach the woodland floor and warm the soil, thereby stimulating aspen sprouting, and could also create conditions that allow aspen to expand onto surrounding areas and restore the naturalness of the treatment area. Removal of encroaching pinyon-juniper near roads would enable roads near aspen stands to function as fire breaks, and would help to limit the spread of wildfire, to the benefit of the WSAs.

Small, temporary exclosure fencing and ensuring proper livestock management would benefit areas that contain aspen. Fencing should have substantial benefit for aspen, as past studies have observed that aspen stands that are protected from grazing successfully regenerate and form multi-aged stands without using fire or other disturbance (Kay 2001, 2002, 2003). Thus, these actions would benefit the natural qualities of the treatment area.

Pinyon-juniper Treatments

The BLM has identified approximately 323 acres within the Roberts Mountains WSA for pinyon-juniper treatments. Treatments would occur on the Birch Creek (175 acres), Upper Pete Hanson (126 acres), and Upper Roberts Creek (21 acres) units. The Henderson, Three Bars Ranch, and Sulphur Spring Wildfire Management units overlap the Pony Express National Historic Trail. However, the BLM cultural resources specialist would evaluate each proposed treatment at the time of implementation and, in coordination with the National Park Service as appropriate, would make a recommendation to the authorized officer for an appropriate buffer width around the trail based on the type of treatment to be used, the integrity of the potentially affected trail segment, and other factors as necessary.

Adverse Effects

Treatment methods would result in short-term ground disturbance, noise, and other disturbances that may temporarily degrade the naturalness of the treatment area and opportunities for solitude and primitive and unconfined recreation within the area. Most of the pinyon-juniper on the Upper Roberts Creek and Upper Pete Hanson units would be removed from Phase I stands using chainsaws. Because these trees have encroached into sagebrush habitat, and are widely-spaced throughout the area, removal of these trees would restore the natural characters associated with sagebrush habitat and would have a minor visual effect. Manual treatments would be the least obtrusive method for use in the Roberts Mountains WSA. Because this method of vegetation removal is very selective, damage to non-target vegetation would be minimized. Although an appropriate buffer would be applied to minimize impacts to the Pony Express National Historic Trail, users of the trail may still detect activity and noise during project implementation and the effects of the treatments may be visible from the trail until the vegetation no longer shows signs of treatment.

Beneficial Effects

Removal of pinyon-juniper on the Birch Creek, Upper Pete Hanson, and Upper Roberts Creek units would encourage shrub and riparian vegetation growth and restore the natural condition of these units. All but 3 acres within these units are rated "High" for their scenic qualities. Treatments would maintain or improve the wilderness qualities of an area without causing effects that are incompatible with established wilderness principles.

The creation of fuel breaks on or near the Roberts Mountains WSA would provide long-term benefits by reducing the likelihood that a catastrophic wildfire would burn through the WSA and degrade its unique qualities.

Sagebrush Treatments

No sagebrush treatments are proposed for WSAs. The Roberts Mountain Pasture and Coils Creek units overlap the Pony Express National Historic Trail. The BLM cultural resources specialist would evaluate each proposed treatment at the time of implementation and, in coordination with the National Park Service as appropriate, would make a recommendation to the authorized officer for an appropriate buffer width around the trail based on the type of treatment to be used, the integrity of the potentially affected trail segment, and other factors as necessary. Although an appropriate buffer would be applied to minimize impacts to the Pony Express National Historic Trail, users of the trail may still detect activity and noise during project implementation and the effects of the treatments may be visible from the trail until the vegetation no longer shows signs of treatment.

3.22.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The BLM anticipates treating about half as many acres (about 200 acres) within WSAs under Alternative B as under Alternative A. The types and magnitude of effects for manual and mechanical treatments within WSAs would be similar between Alternatives B and A. Because the BLM would not be able to use fire, there would be none of the adverse effects to the wilderness experience associated with the use of fire. Without the use of fire, there would be no localized deterioration of air quality and reduced visibility caused by smoke, no disturbance, and no blackened appearance that could affect the naturalness of treatment areas. As noted under Alternative A, no fire treatments would be conducted in WSAs for any of the alternatives.

3.22.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would only be able to use manual and classical biological control methods to treat vegetation. The types and magnitude of effects for manual treatments would be similar to those for the other alternatives, although the BLM would likely treat substantially fewer acres in WSAs under this alternative than under Alternatives A and B.

3.22.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct or indirect effects on WSAs and the Pony Express Trail from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM, however, would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire, which could have adverse effects on WSAs and the Pony Express Trail. Long-term, there would be less chance of improvement of WSAs under this alternative than under the action alternatives.

3.22.3.4 Cumulative Effects

The CESA for WSAs is approximately 784,182 acres and includes the 3 Bars Project area and that portion of the Simpson Park WSA that is outside the 3 Bars Project boundary (**Figure 3-1**). Approximately 97 percent of the CESA is administered by the BLM and 3 percent is privately owned. Past and present actions that have influenced land use and access in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.22.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Historic livestock grazing and wild horse use have led to the degradation of riparian and aspen habitat, establishment and spread of noxious weeds and other invasive non-native vegetation, and expansion of pinyon-juniper beyond its historical ranges in portions of the WSAs. To improve forage and water resources, the BLM would continue ongoing management reviews to ensure proper livestock management and long-term success of treatments.

The BLM would also continue to conduct wild horse gathers, AML reviews and adjustments, remove excess animals and use fertility control, improve water developments, and implement habitat projects. There are no HMAs that overlap with WSAs, but wild horses do move onto the Roberts Mountains during the summer and use the Roberts Mountains WSA. Efforts to distribute wild horses more evenly across the rangeland should help to reduce grazing pressure on the Roberts Mountain WSA. However, the Mount Hope Project would exclude wild horses from about 14,000 acres for up to 70 years, and as a result wild horses may spend more time in the Roberts Mountains WSA in search of food and water. The BLM would provide alternate water sources for wild horses in Kobeh Valley (USDOI BLM 2012b:3-439). By developing additional water sources, wild horses would be able to use foraging areas that are currently underutilized in Kobeh Valley.

The BLM would treat noxious weeds and other invasive non-native vegetation within WSAs under existing authorizations. New infestations would typically be found in newly burned or disturbed areas, and in areas where livestock and wild horses congregate. Treating infestations while they are small and reducing the amount of area covered by existing large infestations, would result in fewer effects on the WSAs.

The population within southern Eureka County is predicted to increase by 50 percent during construction and operation of the Mount Hope Project. With an increase in population and employment opportunities, the number of users of WSAs should increase. Users could spread noxious weeds and other invasive non-native vegetation that attaches itself to clothing or shoes.

The Mount Hope Project would disturb about 8,300 acres, but would have no direct impact on WSAs, although it will be visible from the WSAs. Potential indirect impacts to the Roberts Mountains WSA could occur if groundwater pumping activities decrease the flows in Roberts Creek or other streams associated with the Roberts Mountains WSA). Removal of Mount Hope would have an impact on the historic setting of the Pony Express National Historic Trail. The mountain is visible for miles and its removal would alter the character of the trail and the ability of recreationists to experience the trail as it existed in 1860-61. In addition, access would be virtually eliminated for a segment of the trail that passes within the mine boundary. The 3 Bars Project would not significantly add to this impact since none of the proposed treatments would further limit access to any portion of the trail within the 3 Bars Project Area. These effects could degrade the recreational experience within the CESA.

Wildfire has been relatively uncommon on the Roberts Mountains, but the 106,479-acre Trail Fire in 1999, and several other fires that have burned tens to hundreds of acres, have occurred on or near the Simpson Park WSA (see **Figure 3-33**). An estimated 84,000 acres could burn from wildfires during the next 20 years, based on wildfire occurrence since 1985.

To reduce wildfire risk and improve ecosystem health, approximately 127,000 acres would be treated on the 3 Bars Project area, and an additional 15,000 acres could be treated under current and future authorizations within the CESA, or about 16 percent of the CESA, but only on about 1 percent of WSAs. Although the acreage treated within WSAs would be minor, treatments elsewhere in the CESA would help to reduce hazardous fuels and improve ecosystem health, and reduce the potential for catastrophic wildfire that could have substantial adverse effects on WSAs and lands adjacent to the Pony Express Trail.

3.22.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on WSAs and the Pony Express Trail would be similar to those described under Alternative A. Fire would not be used on WSAs under any of the alternatives. However, fire could not be used under this alternative on about 78,000 acres elsewhere in the CESA under the 3 Bars Project and current and reasonably foreseeable future authorizations, or about 8 percent of the CESA. Without being able to use of fire on other portions of the CESA, the BLM would be less successful in reducing the risk of catastrophic wildfire within the CESA, and would not likely offset the increased potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area compared to Alternative A. As demonstrated by wildfires in 1999, wildfires can have substantial effects on WSAs and could also affect the scenery near the Pony Express Trail.

3.22.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on WSAs and the Pony Express Trail would be similar to those described under Alternative A. Adverse, short-term effects to wilderness characteristics, primarily solitude and visual qualities, associated with the use of fire and mechanized equipment would not occur under Alternative C. However, fire and mechanical treatments would be little used under Alternatives A and B, so the cumulative effects associated with WSA treatments among the action alternatives would show few differences.

The BLM would treat only about 10 acres annually in the WSAs, and about 33,000 acres within the remainder of the CESA, or about 4 percent of the CESA. By not being able to use mechanical methods, fire, and livestock to reduce hazardous fuels, create fire and fuel breaks, stimulate development of understory vegetation, and remove downed wood and slash, however, the risk of wildfire and its adverse impacts on WSAs and lands near the Pony Express Trail would likely be greater on the CESA under Alternative C than under Alternatives A and B.

3.22.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on WSAs and the Pony Express Trail would be similar to those described under Alternative A. There would be no cumulative effects on WSAs or the Pony Express Trail from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage (about 1,500 acres annually). Thus, benefits to the WSAs and the Pony Express Trail would be less under this alternative than under the action alternatives.

3.22.3.5 Unavoidable Adverse Effects

Use of manual and mechanical treatments could potentially cause the loss of non-target native vegetation.

3.22.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Impacts to resources within WSAs would begin to disappear within 1 to 2 growing seasons after treatment, regardless of the treatment method. The regrowth of vegetation on the site would eliminate much of the stark appearance of cleared areas, and the site would develop a more natural appearance. The longest lasting impacts would occur in woodlands and other areas where large trees and shrubs are removed. Benefits to plants and animals in terms of ecosystem function and improved forage and cover would occur as the treated area recovered.

Over the long-term, vegetation treatments would likely improve resources on WSAs. Treatments that aim to rehabilitate degraded ecosystems would result in plant communities that are dominated by native species (see Section 3.12, Native and Non-invasive Vegetation Resources, for more information). Native-dominated communities often provide better habitat for fish and wildlife, including species of concern, than communities dominated by noxious weeds and other invasive non-native vegetation.

3.22.3.7 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of resources. Although there would be short-term impacts to wilderness and special area resources from vegetation treatments, impacts would not be irretrievable and could be reversed if restoration treatments are successful.

3.22.3.8 Significance of the Effects under the Alternatives

There would be negligible to minor impacts to solitude and other wilderness opportunities from 3 Bars Project treatments under all alternatives, but these actions would affect less than 0.1 percent of WSAs annually, and would last only a few years. The BLM would ensure that treatment actions conform to guidance in BLM Manual 6330, *Management of BLM Wilderness Study Areas* (USDOI BLM 2012p).

Under all the alternatives, direct and indirect effects of 3 Bars Project treatments would not result in long-term changes to the landscape adjacent to the Pony Express National Historic Trail that cannot be mitigated to a BLM Class II Visual Resource Management objective, as outlined in BLM Instructional Memorandum NV-2004-004, or in permanent or long-term limitation of use of an identified portion of the trail. Treatments would also not permanently impact the solitude and scenic value of the trail or the ability of visitors to vicariously share the 19th century Pony Express experience. The BLM would follow guidance in BLM Manual 6280, *Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation*, to ensure proper management of the Pony Express National Historic Trail (USDOI BLM 2012n).

3.22.4 Mitigation

No mitigation measures for WSAs are recommended.

3.23 Cultural Resources

The following discussion provides an overview of the cultural resources that have been identified and can be expected to be found on the 3 Bars Project area. A cultural resource is any defined location of past human activity, occupation, or use, identifiable through field investigation, historical documentation, or oral histories. Cultural resources include prehistoric, historic, ethnohistoric, or architectural sites, structures, places, objects, and artifacts (USDOI BLM 1999b). Cultural resources in the 3 Bars Project area are divided into three groups: prehistoric archaeological resources, historic archaeological and architectural resources (discussed in this section), and Traditional Cultural Properties, which are discussed in Section 3.24, Native American Traditional/Cultural Values, Practices, and Resources. Historic properties are those historic or prehistoric cultural resources that, through consultation with the Nevada State Historic Preservation Officer and Advisory Council on Historic Preservation, have been determined to be eligible for inclusion in the National Register of Historic Places (NRHP).

3.23.1 Regulatory Framework

There are several laws and acts that pertain to the protection of historic and cultural resources and the rights of Native American tribes. The Historic Sites Act of 1935 provides for the preservation of historic American sites, buildings, objects, and antiquities of national significance. The National Historic Preservation Act of 1966 (16 USC § 470 et seq.) requires federal agencies to take into account the potential effects of their actions on properties that are listed or are eligible for listing on the NRHP, and to consult with State Historic Preservation Officers, Native American tribes, and local governments regarding the effects of federal actions on historic properties. The Archeological Resources Protection Act of 1979 prohibits the excavation, removal, damage, or other alteration or defacement of archaeological resources on federal or Native American lands without a permit. The American Indian Religious Freedom Act of 1978 (Public Law 95-341) requires federal land managers to include consultation with traditional Native American religious leaders in their management plans. The Native American Graves Protection and Repatriation Act of 1990 recognizes the property rights of Native Americans in certain cultural items, including Native American human remains and sacred objects.

Executive Order 13084, Consultation and Coordination with Indian Tribal Governments, directs federal agencies to respect tribal self-government and sovereignty, tribal rights, and tribal responsibilities whenever they formulate policies that "significantly or uniquely affect Indian tribal governments."

3.23.2 Affected Environment

3.23.2.1 Study Methods and Study Area

Mount Lewis Field Office databases consisting of Geographic Information System shapefiles and a Microsoft Access database with information about cultural resources, studies, and investigations that have been conducted within and in the vicinity of the 3 Bars Project area were reviewed. These were supplemented with information from the Nevada Cultural Resources Information System. These baseline data provided the framework for determining the types of cultural resources that are found within the project area, and an assessment of impacts that may result from implementation of the project alternatives. These data were also used to prepare a *Cultural Context 3 Bars Ecosystem* *and Landscape Restoration Project* report that described the cultural resources and cultural setting of the 3 Bars project area (AECOM 2012).

The study area for the assessment of direct and indirect effects for cultural resources is the 3 Bars project area. The cumulative effects study area for cultural resources includes the project area and a 5-mile buffer around the project area (**Figure 3-1**).

3.23.2.2 Cultural Setting

The 3 Bars Project area and its vicinity are known to contain numerous traces of past human activity ranging from early Native American sites and artifacts to the remains of early trails and transportation and communication routes (including the route of the Pony Express), mining, charcoal production, and ranching and agriculture. Such materials can be found at many locations on the landscape and represent the traces of human activities that in some cases extend as far back as 10,000 to 8,000 years before the present (BP).

3.23.2.2.1 Prehistory

The project area is in central Nevada within the western area of the Great Basin, as defined by Elston (1986). The most pertinent cultural chronology of this portion of the western Great Basin can be derived from data resulting from excavations conducted at the Gatecliff Shelter (Thomas 1983a). Additional information has been provided by d'Azevedo (1986), Jennings (1986), Janetski and Madsen (1990), Grayson (1993), Madsen and Rhode (1994), Beck and Jones (1997 *cited in* Beck 1999), Kelly (1997), Madsen and Simms (1998), and Beck (1999). Additional information from surveys conducted within the Reese River and Monitor Valleys by Thomas and Bettinger (1976) and Thomas (1983b, 1988) are also relevant. Within the broader context defined by the Early, Middle, and Late Archaic Periods, five chronological phases have been defined by Thomas (1983b): Clipper Gap (5500–4500 BP), Devils Gate (4550–3550 BP), Reveille (3550 BP–1300 BP), Underdown (1300–600 BP), and Yankee Blade (600 BP–historic). Elston (1986) postulates a Grass Valley Phase (*circa* [*ca*.] 10,000–8000 BP) for the Paleoarchaic Period and a hiatus in occupation between 8000 and 5500 BP. These phases are summarized below.

Paleoarchaic Period (ca. 10,000–8000 BP)

Paleoarchaic (or "Pre-Archaic") sites dating to as early as 11,000 years BP are known from eastern Nevada such as those documented at the Ely Airport (BLM Report CRR 8111 [NV 040] 2005-1512), Sunshine Well (Jones et al. 1996), and Giroux Wash (Stoner et al. 2000). One of the main characteristics distinguishing Paleoarchaic sites from other prehistoric cultural manifestations is the presence of fluted implements such as Clovis and Folsom projectile points and distinctive nonfluted Plano projectile point forms, crescent-shaped implements, choppers, gravers, punches, and an assemblage of steep-edged scrapers, which are primarily unifacial. Paleoarchaic assemblages are most often found in surface contexts associated with late Pleistocene and early Holocene pluvial lake and lacustrine environments of the region; therefore, researchers have concluded that they are the remains of a settlement pattern geared toward the exploitation of marsh and lake-edge resources in valley floors or in riparian corridors (Elston et al. 1981, Elston 1982, Madsen 1982, Davis and Rusco 1987, Beck and Jones 1988 *cited in* Beck 1999).

Although Thomas (1982a) postulated a lack of occupation before 8000 BP in the central Great Basin, Elston (1986) indicated that the Pre-Archaic period is marked by the Grass Valley Phase between *ca.* 10,000 and 8000 BP as indicated by the presence of Western Stemmed series and fluted points. The Western Stemmed series is represented by leaf-shaped, Lake Mohave stemmed, and lanceolate projectile points, usually found in surface contexts. Associated constituents consist of flake tools, thick triangular scrapers, bifacially flaked knife-choppers, and steep-sided hafted scrapers.

Early Archaic Period (8000–5000 BP)

At the end of the Paleoarchaic Period, shifting land-use patterns, subsistence systems, and the emergence of a wide variety of implement types marked the beginning of the Archaic Period (Bryan 1979, Elston et al. 1979, Aikens and Madsen 1986, Jennings 1986, Jones et al. 1996). Site locations from the earlier years of the Archaic Period suggest continued adaptations to lakeshore environments (Madsen 1982, Jones et al. 1996, Stoner et al. 2000), although the variety of implements and types of materials used appears to have increased. Projectile point styles consisted of Stemmed, Pinto, and Lake Mojave types. The people of the Early Archaic Period seem to have inhabited a much more diverse landscape with a more flexible subsistence system than the Paleoarchaic peoples who preceded them. They utilized not only valley floors and lake margins, but cave sites and upland areas as well.

Elston (1986) suggested a hiatus in occupation within central Nevada between 8000 and 5500 BP. Thomas (1982a) indicated that the later portion of the Early Archaic is represented by the Clipper Gap Phase (*ca.* 5500–4500 BP), which is characterized by artifacts similar to those used during the Pre-Archaic. Based on observations from Monitor Valley, this period also appears to be characterized by large, wide, concave-base projectile points called “Triple T.” Limited assemblages of artifacts from this time period suggest that the area was sparsely inhabited, possibly by small groups.

Middle Archaic Period (5000–1300 BP)

As during the earlier portion of the Archaic Period, remains of larger game tend to be found in archaeological contexts during the Middle Archaic Period, which is divided into the Devils Gate Phase (*ca.* 4500–3500 BP) and the later Reveille Phase (*ca.* 3500–1300 BP). The Middle Archaic Period is marked by the presence of large side-notched Gatecliff and Elko series projectile points, which slowly replaced the earlier Pinto and stemmed point forms. The use and exploitation of upland environments intensified during this time period, possibly in association with the exploitation of pinyon pine, which is postulated to have been introduced in the area around 6000 BP (Thomas 1982a:164).

Evidence from Gatecliff Shelter (Thomas 1983a) and Mount Jefferson (Thomas 1982b) indicates that the hunting of large game remained a dominant subsistence activity, as interpreted from the large numbers of Elko-style projectile points. However, more intense exploitation of a broad range of resources, possibly resulting from increased population, may have caused an increase in the presence of seed processing equipment. Incised stones are present in the Monitor Valley assemblages, and the appearance of exotic obsidian and marine shell beads suggests the presence of regional exchange (Thomas 1983a).

Divergence from the Middle and Late Archaic patterns is seen in the emergence in Utah and extreme eastern Nevada of the Fremont “cultures” during the Fremont/Parowan Period, *ca.* 1600 BP (Marwitt 1986). However, the degree of influence of the Fremont cultures with peoples in central Nevada is uncertain.

Late Archaic Period (1300 BP–Contact)

The Late Archaic Period is represented by the Underdown Phase (*ca.* 1300–600 BP) and the Yankee Blade Phase (600 BP–historic). This period is marked by important technological changes, which included the introduction of bow and arrow technology, as indicated by the presence of small corner-notched and basally notched projectile points designated as part of the Rosegate series (Thomas 1981a). Because of the association of basally notched points with Fremont cultures, Thomas (1997) suggested that these artifacts may indicate a Fremont influence. During this time period occupation appears to be less intense, as marked by a decrease in overall numbers of artifacts and the production of bifaces at Gatecliff Shelter (Thomas 1983a).

The Yankee Blade Phase shows a marked divergence from earlier patterns. Projectile points from this phase are small Desert side-notched and Cottonwood series. Other than at the Alta Toquima residence sites (Thomas 1982b), these point forms are rarer in the Monitor Valley than the earlier Eastgate basally notched, Rose Spring corner-notched, and Elko forms. Resource exploitation intensified during this phase, with an increased focus on seeds, including pinyon pine. The discovery of more permanent habitation sites at higher altitudes indicates that groups became more sedentary, and that residences became established at locations that had served as temporary hunting camps during the preceding periods (Elston 1986). There is an increase in the size of houses and settlements. In the case of the Western Shoshone, large settlements appear in valley floors during the ethnohistoric (contact) period.

As noted above, a shift from the Middle and Late Archaic patterns is seen in the emergence of the Fremont “cultures” described by Marwitt (1986). No evidence of extensive use of the project area exists; however, southeast of the project area, Fremont style ceramics have been found near Cabin Spring, approximately 30 miles south of the project area (Russell 2004).

Small villages, ceramics, and some reliance on horticulture characterized the Parowan Fremont culture. As rainfall (necessary for agriculture) became more unpredictable, the Fremont may have abandoned agriculture in favor of a hunting-gathering adaptive strategy in the pinyon-juniper woodlands of western Utah and eastern Nevada, with a terminal date of *ca.* 650 BP (Wilde and Soper 1999:7). Another scenario proposed by Wilde and Soper (1999:7), based on evidence from Janetski (1994) and Madsen and Simms (1998), suggested that competition from foragers also may have been a factor in the shift to a more hunter-gatherer strategy.

It is also during this period that some see the arrival of *Newe* (Numic speakers and ancestral Shoshone). This period is marked by the presence of brownware ceramics, twined and coiled basketry, and small side-notched (Desert side-notched) projectile points. This is contrary to ethnographic accounts and oral tradition that indicate that the Western Shoshone have inhabited the region for a much greater period of time. The timing of the arrival of the *Newe* and the area from which they moved is widely debated (see Madsen and Rhode 1994), but current evidence suggests that they may have arrived *ca*. 1000 BP.

3.23.2.2.2 Historic Setting

The beginning of the historic-era in the Eureka County region is determined using rather arbitrary temporal and cultural markers. Although contact between European and American traders, trappers and explorers and the ethnographic Shoshone had been taking place since at least the early decades of the 19th century, sustained contact between Native and Euro-American populations did not occur until the 1850s and 1860s (Bailey 1966, James 1981).

As the population of Euro-American settlers and entrepreneurs increased in the Eureka County region, particularly following the Ruby Valley Treaty in 1863, several predominant economic patterns and themes of historical development emerged during the middle of the 19th century. The themes of particular relevance to Eureka County in general, and the 3 Bars Project area specifically, consist of early exploration, transportation and communication, early settlement, mining, charcoal production, and ranching and agriculture. Each of these topics is discussed below.

3.23.2.2.3 Early Exploration

The earliest recorded routes through Nevada were those made by fur trappers, and traders. American trapper Jedediah Smith, representing the Rocky Mountain Fur Company, struck out from the Great Salt Lake to Los Angeles in the summer of 1826, a journey that took him south along the Colorado River, then to the Mojave Valley, and finally into California (Elliot 1987, McBride 2002:2-4). In 1826, Peter Skene Ogden of the British-owned Hudson's Bay Company passed through northeastern Nevada in a prelude to his later exploration of the Humboldt River in 1828. In search of beaver hides, Ogden and his men left the Columbia River basin and traveled southeast until they discovered an "unknown" river, later named the Humboldt River, near Winnemucca. This route later became the main emigration corridor across Nevada (McBride 2002:2).

As the fur trading business declined, the U.S. government started taking an active interest in the West and began sponsoring explorations of the area. From 1843 through 1845, John C. Fremont, a lieutenant in the Army Topographical Corps, led several expeditions into Nevada as part of this government-sponsored program of exploration. During the expeditions, Fremont recognized that the area had interior drainage and understood its physiographical features, and thus named it the Great Basin (McBride 2002:7). In 1845, his route continued through the Diamond Mountains and through Diamond and Kobeh Valleys, a path that would have bisected the current project area.

In 1859, James Simpson, who had previously explored the area, led an expedition through central Nevada, from Camp Floyd, Utah, to Genoa, Nevada. Simpson noted that this route was not suitable for a railroad but would work well for wagons (Welch 1979:6, Vlasich 1981:228, McBride 2002:10–11). This route was later called the Central Route (also known as the Central Overland Trail and Egan-Simpson Wagon Route).

3.23.2.2.4 Transportation and Communication

As with virtually every other economic endeavor in Nevada, industries dealing with transportation and communication activities were established, at least initially, in reaction to the booming California and later Nevada mining industry in the middle 1800s. Emigrant and shipping routes were established early on for settlers and California-bound gold miners, but in large part these were intended only to provide passage through the state, and not to bring or support settlers. As Nevada's mining industry boomed, the state became a destination for travelers to the West.

3.23.2.2.5 Early Mail Delivery

Beginning in 1855, Major Howard Egan of the Mormon Battalion first traversed a route through central Nevada; 3 years later he surveyed the route for Major George Chorpenning. In 1859, this route was quickly adopted by Chorpenning's mail line, which used mules. Informally known as the "Jack-ass Mail," the operation was first established along the Humboldt River (Goetzmann 1966:293 *cited in* Bowers and Muessig 1982). By December 1859, Chorpenning had built several stations along the new route (Godfrey 1994). It is not known whether stations had been established within the project area. At the same time, Russell, Majors, and Waddell, owners of the Central Overland California & Pikes Peak Express Company (COC&PP Express Company), had been actively soliciting the U.S. Congress for the establishment of a 10-day mail service by pony express between Sacramento, California, and St. Joseph, Missouri, while at the same time laying out and establishing stations along the same route used by Chorpenning (Townley 1986:7–8, Godfrey 1994). In the wake of cash flow problems, Chorpenning's mail contract was terminated in May 1860, and was promptly awarded to the COC&PP Express Company. Russell, Majors, and

Waddell hoped that by demonstrating "that the central route offered the best opportunity for mail or stage…the firm could inherit the *(proposed route of the)* Pacific Railroad" (Townley 1986:8). This new subsidiary venture, more commonly known as the Pony Express Mail Service, began in April 1860.

Although short-lived (1860–1861), the Pony Express demonstrated the importance of a central route, which became even more important after the seizure of Butterfield's southern route by the Confederate army in January 1861 (Townley 1986:13). Although it was replaced by the telegraph just 18 months after it began, during its brief existence the Pony Express helped to deliver important information during a time of civil unrest.

The route of the Pony Express crosses the southern portion of the 3 Bars Project area, and three stations and one water source known to have been used by the Pony Express are within or immediately adjacent to the project boundary. From east to west, these are located at Sulphur Spring, Roberts Creek, Goodwin, and Grubbs Well. Additional stops in the project vicinity are Diamond Springs (Diamond City), on the east side of Diamond Valley, and Dry Creek, situated at the base of the Simpson Park Range.

3.23.2.2.6 Overland Stage

After the disbandment of the Pony Express, competition for government mail and passenger service contracts over the central route ensued between the COC&PP Express Company and Butterfield's Overland Mail Company. As a compromise, Congress awarded the COC&PP Express Company the eastern portion of the route from the Missouri River to Salt Lake City, where post and passengers were transferred to the Overland Mail Company (Overland Stage), which completed the first run to San Francisco on July 18, 1861 (Townley 1986:13, Hafen 2004 [1926]).

By the spring of 1862, the COC&PP Express Company had become financially stressed as a result of difficulties encountered with the management of the eastern end of the route, and its finances were in the hands of the courts. Finally, as a result of heavy indebtedness, the company was sold to Ben Holladay and the name was changed to the Overland Stage (Hafen 2004 [1926]:227–232).

A map of the Overland Stage and Pony Express routes across Nevada (Townley 1986:10–11) indicates that the Overland Stage followed the same route as the Pony Express through the project area. Within the project area, stations were located at Sulphur Spring, Roberts Creek, and Grubbs Well, with a watering stop at Goodwin.

In the latter part of 1866, Holladay disposed of his entire overland mail holdings, which included the Holladay Overland Mail and Express Company, the Overland Mail Company, and the Pioneer Stage Company. These were all absorbed by Wells, Fargo and Company, which had been founded in 1852 by Henry Wells, William G. Fargo, John Livingston, D. N. Barney, and others to conduct an express and banking business (Hafen 2004 [1926]:232–235).

As the Transcontinental Railroad neared completion, mail and coach service decreased, and even the Overland Telegraph was rerouted along the railroad, following the joining of the Central Pacific and Union Pacific railroads in May 1869. After the completion of the railroad, the central route for mail and passenger service was soon abandoned, with only interconnecting service between railheads remaining.

3.23.2.2.7 Transcontinental Telegraph

The telegraph line basically followed the route of the Overland Stage. Like the stage, its existence along the central route was short lived. Upon completion of the Transcontinental Railroad, the telegraph was quickly rerouted along the

Central Pacific Railroad. Service to southern Eureka County was provided by a line from Palisade along the Eureka and Palisade Railroad (E&PRR) to Eureka with additional service to mining camps surrounding Eureka.

3.23.2.2.8 Eureka and Palisade Railroad

With the completion of the Transcontinental Railroad through northern Eureka County, overland transportation took a dramatic turn. The largely isolated nature of central and eastern Nevada was rapidly coming to an end, and new markets for the industrial and agricultural/ranch products of the region soon emerged. At first wagon roads connected the area to the railroad. Later the E&PRR linked Palisade (a stop along the Central Pacific) and southern Eureka County, providing easy transportation to other population centers such as Salt Lake City.

As with most transportation development in the 19th century, the E&PRR was established in response to the development of mining. Upon establishment of the town of Eureka in 1870 and the development of mining, the lucrative, high-yielding lead and silver ore was transported by a fast wagon freight operation to the recently established Central Pacific railhead at Palisade (Paher 1970:181).

In 1874, a consortium of Isaac Requa, D.O. Mills, William Sharon, Thomas Bell, and Edgar Mills, who represented the Bank of California, the Virginia and Truckee Railroad, and various Comstock mining operations, took over the railroad (Myrick 1992:90). During the next 10 years the railroad was extremely prosperous, with connecting freight service to Belmont, Hamilton, Austin, Ward, and Pioche, Nevada, and plans were made to expand the line south. In the late 1880s mining began to fail in the Eureka area (Myrick 1992:107). Mark Requa, the son of Isaac, made a valiant effort to acquire additional business from other mines in the area, including the profitable copper mines near Ely, and at one point even contemplated extending the route east over four mountain ranges. A brief boom period occurred in 1905, however this short period of prosperity suffered a major blow in 1910 when major floods caused extensive damage to the line. In 1921, George Whittle purchased and reorganized the operation under the name of the Eureka-Nevada Railway Company. The line, operated under the leadership of John E. Sexton, made three runs per week. However, revenues began to decline in 1927 as a result of competition from growing highway traffic, and the railroad made its last run in September of 1938 (Myrick 1992:111).

Two sidings and two stations were located within the 3 Bars Project area. The sidings, Cedar and Oak, were used from 1934 to 1938 (Hall 1994). Pine Station is located just outside of Alpha. The Summit Station was a water stop located at the top of Garden Pass Summit.

3.23.2.2.9 Highway Development

As the 20th century progressed, railroads remained the primary means of moving people and goods within and through Nevada, but the automobile was fast becoming a major player on the transportation scene. However, in 1914, only 262 miles of Nevada's 12,812 miles of roadway were paved, and Nevada had a long way to go to provide for the automobile. An exception was the establishment in 1913 of the Lincoln Highway, which was one of America's first transcontinental automobile routes, beginning in Times Square in New York City and ending at the Palace of the Legion of Honor in San Francisco (USDOI National Park Service 2004).

The early route of the Lincoln Highway was determined primarily by the geography of Utah, where the Great Salt Lake Desert blocked the way west from Salt Lake City and limited funds were available for construction of a raised roadway across the barren salt flats. Because of this, the early route was routed around the south end of the desert to Ely, then on to Eureka. However, the popularity of this route began to decline after 1919. The final blow to the route through Eureka County was in 1927, when the Lincoln Highway Association abandoned the route through Ely and

Eureka for the Wendover Road. As a result, Nevada built an 80-mile route south to link up with the Lincoln Highway south of County Road 18 north of Ely. By the time the route was completed in 1930, the more direct Victory Highway (U.S. Highway 40) along the Humboldt River Valley had been improved sufficiently to capture most of the traffic traveling across the Great Basin.

3.23.2.2.10 Early Settlement

Early settlement within and in the vicinity of the 3 Bars Project was limited to scattered ranches consisting of Denay, Pennsylvania (currently known as the McClusky Ranch), Grubb Meadows Ranch (currently known as the 3 Bar Ranch), and the Addinton Ranch. Of these early ranches, the 3 Bar and McClusky Ranches were established and are still in the western portion of the project area. The initial operations of these early ranches were geared primarily toward trapping mustangs and driving them to California (Wooley 1999).

3.23.2.2.11 Mining

The economic and social development of central Nevada during the 19th century was more closely associated with the emergence of the mining industry than with any other activity. In fact, the existence of Nevada as an independent state is primarily the result of the wealth of the Comstock Lode, which helped convince the U.S. Congress and President Abraham Lincoln to create this new territory from the western section of Utah in 1861. After the Civil War, and throughout the latter decades of the 19th century, mining continued to be the single most important economic endeavor throughout the state, although the boom-and-bust cycles intrinsic to the industry kept the population of much of Nevada at a very low level until the early 20th century (Hulse 1990).

Roberts and Montgomery (1967) depict five mining districts—Alpha, Lone Mountain, Mount Hope, Antelope, and Roberts—within the project area, and another six to the north and southeast. Several smaller areas of mining activity also existed historically; all are discussed below. Those in the project area vicinity include the Cortez/Mill Canyon, Buckhorn, Mineral Hill, and Union Districts to the north and the Eureka and Fish Creek Districts to the south. Although mining is represented within the project area, historically it does not compare in size and scope to operations at Eureka and Ruby Hill south and southeast of the 3 Bars Project area, and the Mineral Hill and Cortez Districts north of the project area.

3.23.2.2.12 Charcoal Production

The production of charcoal and cordwood was one of the area's most significant industries historically, and it resulted in substantial changes to the environment as it existed before 1850. The furnaces of the Eureka mining district, as well as those at other mines in the area, required tremendous quantities of charcoal. In addition, cordwood and lumber were needed for other mining and industrial purposes such as construction. Pinyon-juniper cordwood was also used for fuel by the E&PRR until 1890, when the railroad switched to coal (Zeier 1985:18).

By far the largest single consumer of charcoal was the Eureka mills. In 1880, at the height of mining within the Eureka District, the mills consumed a total of 1.25 million bushels of charcoal. Young and Budy (1979:117 *cited in* Zeier 1985:18) stated that "the demand for charcoal was so great that deforestation became a severe problem" with 4,000 to 5,000 acres of woodland cut annually. By 1878, the average hauling distance from (charcoal) pit to smelter was 35 miles.

3.23.2.2.13 Ranching and Agriculture

Given the region's generally arid climate and landscape, traditional crop farming was never a major industry in Eureka and surrounding counties, and growing fruits and vegetables never expanded much beyond small-scale local operations. Early settlers in the area were actively engaged in rounding up mustangs, an endeavor that continued into the 20th century. However, cattle and sheep ranching proved to be highly profitable endeavors, especially during the boom periods of the mining industry, when tens of thousands of hungry miners flooded the region during the middle and latter decades of the 19th century.

Ranching

Cattle and sheep grazing have long been the mainstays of the agricultural industry in central Nevada. However, they occur within a marginal environment where severe weather conditions, particularly in the winter, and rangeland vegetation that can only support a few head per acre limit the scope and degree to which grazing can be supported (Bowers and Muessig 1982:77). The first domestic cattle documented as having at least passed through eastern Nevada came with the Bartelson-Bidwell party in 1841, but as an industry, cattle ranching did not develop in central Nevada until after the Civil War. By the mid-1860s, stockmen were driving thousands of head into the region (Mack and Sawyer 1965 *cited in* James 1981; Patterson 1965). However, as with mining in Eureka and surrounding counties, cattle-raising went through its own boom-and-bust cycles.

The first sheep to enter Nevada followed the Old Spanish Trail from New Mexico through southern Nevada into California. This drive, consisting of 25,000 head, was organized by Miguel Otero, a rich landowner whose son would later become the governor of New Mexico, and Jose Luna, one of the richest sheep owners in the state. The second sheep drive was organized by "Uncle Dick" Wootton, with 9,000 head that took a northerly route along the Humboldt River in 1852 (Georgetta 1972:7-15).

Beginning in the 1870s, Scandinavian, Irish, and Scottish immigrants became engaged in the raising of sheep, which greatly intensified in the 1890s with the arrival of the Basque, who had moved from California following a period of drought. Because of their competition for grazing land, cattle ranches sought to control sheep grazing through the creation of grazing laws (Creel 1964). The fact that sheep cropped the land so closely caused former ranges to lose their plant growth, thereby rendering areas useless for cattle grazing (James 1981:258–260). It was not until 1934 with the passage of the Taylor Grazing Act that the management problem was adequately addressed. In 1946, the BLM was organized from the Grazing Service and General Land Office (Clawson 1950:100). Sheep grazing within the 3 Bars Project area specifically was conducted by the Damele Brothers (Georgetta 1972:442).

Agriculture

Because of the limited availability of water, the remoteness of the area, and harsh winter conditions, agriculture has always been conducted on a limited basis in most areas of Nevada, including Eureka County, and even then has primarily been geared toward serving local markets such as mining camps and towns. Bowers and Muessig (1982) provide numerous examples from the Reese River area, the Monitor and Big Smoky Valleys, and the current project area of crops that met local demands, alleviating the high cost of importing fruits and vegetables from California, Utah, or the valleys of western Nevada. In 1879-1880, the Eureka County Assessor reported production of onions, cabbage, corn, potatoes, carrots, parsnips, tomatoes, beets, and turnips (Nevada Surveyor General and State Land Register 1880:34–35 *cited in* Bowers and Muessig 1982:78). However, this trend in the production of local vegetables decreased during the 1880s as the first mining boom came to an end (Hardman and Mason 1949:24 *cited in* Bowers and Muessig 1982:78–79). Hardman and Mason (1949:24) indicated that as the early boom period in mining declined, so did the acreage used in the production of fruits and vegetables. They attribute this to the lack of irrigation, the remoteness of the area, and the high cost of transportation to markets outside of the area.

Wild Horse Industry

The trapping of wild horses has been a continuing industry since settlers began arriving in the 1850s, and at first met the large demand for horses in California during the Gold Rush. Those who were engaged in the capture of mustangs became known as mustangers.

In the late 1890s it was estimated that 80,000 wild horses roamed in eastern Nevada within the area encompassed by White Pine, Lander, Elko, Nye, and Eureka Counties (Amaral 1976:20). Shortly thereafter, there was a large demand for horses from the Quartermaster Remount Service. Established in 1908 to procure horses for military transportation, the service procured approximately 571,000 horses during World War I. Agents from the Quartermaster Remount Service were stationed in Austin, Battle Mountain, and Elko, as well as other Nevada locations.

After World War I, the demand for horses for use as pet food increased, and large numbers were captured and shipped via rail to the East Coast for processing. Horse meat originally canned for pet food was also known to have been consumed by humans during the Great Depression. After World War II, the pet food industry continued to expand to the point that the wild horse population was decimated. Finally, in 1971 legislation was passed that ended both the legal and the unregulated roundup of wild horses. Since then the BLM has developed a program of range management that is designed to keep the population of wild horses in check.

3.23.2.3 Documented Cultural Resources

3.23.2.3.1 Previous Studies and Surveys

A total of 345 cultural resource investigations have been conducted within the vicinity of the project area. With the exception of linear cultural resource surveys, these investigations have primarily been focused within the Roberts and Simpson Park Mountains, and constitute approximately 16 percent (121,845 acres) of the project area (**Figure 3-51**).

Cultural remains have been found at many locations on the landscape and demonstrate that people—indigenous peoples followed by European-Americans—have resided in the 3 Bars Project region for at least 8,000 years. A detailed summary of the documented resources by theme is presented in *Cultural Context 3 Bars Ecosystem and Landscape Restoration Project* (AECOM 2012).

Within the 3 Bars Project area, investigations have resulted in the documentation of 1,109 resources, 354 of which are isolated finds. The remaining 755 cultural resource sites, summarized in **Table 3-62**, have varying characteristics and have been subjected to various levels of significance assessment; approximately 36 percent of the sites have not been evaluated for NRHP eligibility.

- 536 sites reflect early Native American sites and artifacts, including 7 resources that appear to represent ethnohistoric usage including 6 with prehistoric and historic components.
- 219 sites reflect historic-era land use. These sites consist of the remains of early trails, transportation routes, and communication systems and reminders of historic-era mining and related charcoal production and ranching and sheepherding activities.

- 52 sites contain evidence of both prehistoric and historic-era land uses.

3.23.2.3.2 Documented Prehistoric Sites, Features, and Artifacts

The area is known to contain evidence of activities that occurred from the Early Archaic Period through the more recent Native American (Western Shoshone) period. Resources identified by prehistoric temporal periods are summarized in **Table 3-63**. The resources are discussed by temporal period; numerous cultural sites contain the remains of prehistoric occupations that span multiple periods of time over several temporal periods.

Early Archaic

Based on the presence of Pinto and stemmed projectile points, seven Early Archaic sites or site components have been identified within the project area. With the exception of 26EU1272, which is just north of U.S. Highway 50, all are within or immediately north of Roberts Mountains. Two of these sites have not been evaluated for eligibility for listing in the NRHP, three have been recommended as not eligible, and two appear eligible for inclusion in the NRHP.

TABLE 3-62

Summary of Documented Resources

Site Type	Eligible Sites	Not-Eligible Sites	Unevaluated Sites	Total
Prehistoric	85	240	152	477
Prehistoric/Historic	27	8	17	52
Total Prehistoric Sites	**112**	**248**	**169**	**529**
Ethnohistoric/Prehistoric	4	0	0	4
Ethnohistoric/Historic	2	0	0	2
Ethnohistoric	0	0	1	1
Total Ethnohistoric Sites	**6**	**0**	**1**	**7**
Historic	76	54	89	219
Grand Totals	**194**	**302**	**259**	**755**

Middle Archaic

Of the sites that can be associated with a particular prehistoric period, the majority (116) contain Middle Archaic markers, Elko and Gatecliff style projectile points. Given the large number of sites dating to this time period, it appears that this time frame shows a large increase in the intensity of prehistoric land use during the Middle Archaic, and most likely an associated increase in population. Almost half of these resources (51) have been recommended as eligible for inclusion in the NRHP, 37 appear not to be eligible, and 28 are unevaluated. With the exception of five sites located in the southern portion of the project area, north of U.S. Highway 50, the remaining sites are distributed along the upper fans and higher elevations within Roberts Mountains and the southern end of the Simpson Park Mountains. Three of these sites also contain Early Archaic components, indicating some reuse of locations from the earlier time period. The vast majority of the 116 sites (97 sites) consist entirely of lithics, 11 sites also contain ground stone, 6 appear to represent at least short-term habitation based on the presence of fire-cracked-rock and/or hearth features, and lithics with rock circles are present at two sites.

Late Archaic

A total of 54 Late Archaic sites defined by the presence of Rose Spring and Eastgate style projectile points have been defined primarily within the Roberts Mountains area, although a small number are also located north of U.S. Highway 50 in the southern portion of the project area. More than half of these sites (28) also contain Middle Archaic components, indicating reuse of locations from the earlier period, and the remaining 26 sites represent expansion of land uses and the assumed increase in the intensity of resource procurement. The majority of these sites (27 sites) appear eligible for listing in the NRHP, 9 are unevaluated, and 18 have been recommended as not eligible.

TABLE 3-63

Summary of Documented Prehistoric Cultural Sites

Site Type	Eligible	Not Eligible	Not Evaluated	Total
Early Archaic	2	3	2	7
Middle Archaic	51	37	28	116
Late Archaic	27	18	9	54
Numic Occupation	7	11	14	32
Unknown Prehistoric	39	192	118	349
Totals	**126**	**261**	**171**	**558**[1]

[1] Multiple occupations/time periods are represented at 34 sites.

Numic Occupation

Numic occupation, implied from the presence of desert series projectile points and/or brownware ceramics, is present at 32 locations. With the exception of site 26EU353, which is at the southern end of the project area, these sites tend to be located within the pinyon-juniper zone of Roberts Mountains. Seven of these sites have been recommended as eligible for listing in the NRHP, 11 as not eligible, and 14 have not been evaluated. Reuse of locations from the Middle Archaic Period and/or earlier part of the Late Archaic Period is documented at 14 of these 32 sites. As with sites from the Middle and Early portions of the Late Archaic Period, 19 of these sites consist of lithic materials only. Complex constituents, including hearths (suggesting campsites), are located at three sites; three resources contain lithics and ground stone, seven contain brownware ceramics, and one site has an associated rock ring.

Unknown Prehistoric

A total of 353 prehistoric sites or site components lacking temporal markers that would place them within a specific time frame have been identified and documented. The majority (328) contain only flaked stone. Five of these sites appear to be opportunistic quarry locations, and eight sites possess flaked and ground stone artifacts. The remaining 24 sites consist of hunting blinds (4 sites), rock rings or flaked stone with rock ring features (7 sites), lithics and burned bone and/or hearth features (5 sites), lithics and bedrock mortars (1 site), and one complex rock shelter site with flaked stone, fire-cracked rock, and ground stone. Approximately one-third (118) of these sites have not been evaluated, more than half (192) have been recommended as not eligible for listing in the NRHP, 39 resources have been recommended as eligible, with the evaluation pending additional assessment at 4 of these sites. This resource type is primarily clustered within the Roberts Mountains area.

3.23.2.3.3 Documented Historic-era Sites and Features

Historic-era enterprises in the region have also left their marks on the landscape, such as the routes of the Pony Express, Overland Stage and Transcontinental Telegraph, and the E&PRR, and various mining ventures and associated charcoal production, and ranching operations, some of which date to early settlement of the region (**Table 3-64**). A review of these and other important developments provides a cultural background against which to define the context for the historic-era events that shaped the natural environment into the mosaic that exists today. Cultural resource sites that reflect early exploration have not been identified within the project area.

TABLE 3-64

Summary of Documented Historic-era Cultural Sites

Site Type	Eligible	Not Eligible	Unevaluated/Incomplete Evaluations	Total
Pony Express/Overland Stage/Telegraph Route	0	0	7[1]	7
Transportation	6	7	2	15
Communication	2	0	2	4
Early Settlement/Ranching	2	0	12	14
Mining	5	12	1	18
Charcoal Production	81	4	28	113
Ranching and Agriculture	5	6	8	19
Unassociated Historic Sites	0	39	40	79
Totals	**101**	**68**	**100**	**269[2]**

[1] The Pony Express National Historic Trail is considered nationally significant and only segments are unevaluated/incomplete.
[2] Includes 50 sites with prehistoric or ethnohistoric components.

3.23.2.3.4 Summary of Identified Resources - Transportation and Communication

This theme is represented by the routes of the Pony Express, Overland Stage, Lincoln Highway/Austin-to-Eureka Stage, Transcontinental Telegraph, and the E&PRR, and historic roads, telegraph and telephone alignments. Seven resources associated with the Pony Express/Overland Stage and Transcontinental Telegraph route have been documented in the southern portion of the project area, and all are classified as unevaluated. The route of the Austin-to-Eureka Stage and Lincoln Highway is immediately north and south of U.S. Highway 50, and has been recommended as not eligible for listing in the NRHP. Three of the four historic road segments are situated on the southwest flank of Roberts Mountains and are also listed as not eligible. An alignment of the Old State Route 21 is near the northern boundary of the project area and is listed as eligible.

As part of the mitigation to offset indirect visual impacts and direct impacts on the remains of the E&PRR resulting from construction of the Falcon transmission line project, Summit Envirosolutions, Inc., documented nearly the entire length of the E&PRR (McQueen et al. 2009). Within the project area the route is represented by the railroad line, workcamps with historic refuse, an historic structure, and the remains of Chimney's (Alpha) Station, Summit Station, and Deep Wells Station. The historic structure and Chimney's Station have not been evaluated, the Deep Wells site has been recommended as not eligible for listing in the NRHP, and the remaining elements of the route have been recommended as contributing elements. Four additional resources include the remains of telegraph and telephone lines, one of which is unevaluated, and one is the remains of the McClusky Peak toll station line, which along the western project area boundary and has not been evaluated for eligibility. The other two resources include the remains of the telephone line extending to the Three Bars Ranch, which has been recommended as eligible for listing; the remaining site consists of three unevaluated segments of a telegraph line that parallels the west side of Tonkin Road near the northern end of the project area. Although no remains of the transcontinental telegraph have been documented, the route most likely paralleled the route of the Pony Express/Overland Stage.

3.23.2.3.5 Summary of Documented Resources - Early Settlement/Ranching

The archaeological manifestations of early settlement are represented by signs of early ranching within the project area and consist of 14 resources. Ten sites documented in the project area reflect named early settlements/ranches—the Sadler, Tonkin, and Willow Creek ranches, Walti Hot Springs, Bartine Ranch, Indian Ranch, and Peretti's, Ferguson, Andrew Louck, and Isaacs ranches. In addition, the remains of four other unnamed resources appear to be the remains of early ranches/settlements. With the exceptions of the dugout with historic refuse and Andrew Louck's Ranch, which have been recommended as eligible for inclusion in the NRHP, the remaining ranches or remains of ranches have not been evaluated.

3.23.2.3.6 Summary of Documented Resources - Mining

A review of the previously documented sites indicates that the remains of 18 mines or mining-associated cultural resources have been documented within the project area. These resources are somewhat clustered in the vicinity of Mount Hope, with the remainder consisting of one on the southwest flank of Roberts Mountains, one in the Simpson Park Mountains, and another at Lone Mountain. Mines and mining camps, including the remains of the Mount Hope and Keystone Mines, represent ten of the documented resources. The Mount Hope Project and another resource consisting of adits and tailings have been recommended as not eligible for listing in the NRHP; the remaining sites are unevaluated.

The remaining eight sites consist of prospect pits, refuse deposits (one of which appears to be associated with a Chinese occupation), cairns, a quarry, and a trail. With the exception of the trail that has not been evaluated and the quarry and Chinese occupation site, which have been recommended as eligible, all of the remaining mining resources have been recommended as not eligible for inclusion in the NRHP.

3.23.2.3.7 Summary of Identified Resources - Charcoal Production

Consisting of 113 resources, the remains of charcoal production are well represented in the 3 Bars Project area. The majority of these resources are in the southern Roberts Mountains, and the remaining sites are scattered in the uplands throughout the northern half of the project area. With the exception of seven resources consisting of associated refuse, a road, a logging skid trail, and piles of ax-cut wood, all of these documented resources contain the remains of charcoal platforms, and 26 sites appear to be the remains of camps. The majority of the sites (81 sites) appear eligible for inclusion in the NRHP, 28 have either not been or are only partially evaluated, and 4 sites remain unevaluated.

A treatment plan was developed and implemented to mitigate adverse effects on 13 historic properties located within the Gold Bar II Mine Project, which were determined by the Nevada State Office of Historic Preservation to be contributing elements to the Roberts Mountains Carbonari District, part of the Eureka Charcoal District. This treatment plan consisted of detailed documentation of 31 charcoal platforms, 9 distinct habitation loci, and 1 trash dump (Reno et al. 1994:i–ii).

3.23.2.3.8 Summary of Cultural Resources - Ranching and Agriculture

Although ranching, sheepherding, and the wild horse industry are represented by documented cultural resources within the project area, resources specifically associated with agriculture have not been identified. As mentioned above, "Early Settlement" is represented by the ranches or the remains of early ranching settlements at 14 locations. The remaining 15 ranching-related resources consist of fences and rock walls (4 sites), ranching-related refuse (3 sites), 2 roads, and 6 miscellaneous ranching-related features (e.g., depressions, corrals, a well, a sheep camp, and log troughs). Five of these sites have been recommended as not eligible for listing in the NRHP and the remaining ten either have been recommended as not eligible (six) or have not been evaluated (four).

Two sites with aspen tree carvings associated with Basque sheepherding have been documented within the project area. Both sites are located within the Simpson Park Mountains in the western portion of the project area, and have been recommended as not eligible for listing in the NRHP.

Two horse traps or blinds have been documented within the project area. One, located on the northwest flank of Roberts Mountains, appears eligible for listing in the NRHP; the other, in Pine Valley, has not been evaluated.

3.23.2.3.9 Summary of Cultural Resources - Unassociated Historic Sites

A total of 79 documented historic cultural resources sites are lacking the data necessary to determine their association with historic-era themes. The majority (65) of these 79 sites consists of historic-era refuse; none of these sites have been recommended as eligible for listing in the NRHP, 29 appear not eligible, and 36 are unevaluated. The remaining 14 resources consist of features such as spring improvements, wagon parts, a fence, a boundary line, a historic campsite, rock walls, logging isolates, a rock shelter with stacked rocks, a log building, rock rings, a schoolhouse, a stone dam, a structure of unknown function, and wooden poles. With the exception of the log building, schoolhouse, wooden poles, and the unknown structure that have not been evaluated (four sites), the remaining ten sites have been recommended as not eligible for listing in the NRHP.

3.23.3 Environmental Consequences

3.23.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Several issues of concern have been identified by the BLM in the AECC and through scoping. These would not be addressed directly by the restoration treatments, but could be dealt with indirectly through surveys and studies conducted on treatment areas prior to treatment. These are:

- Site management is currently "piecemeal," resulting in fracturing of the historic landscape and loss of integrity of cultural resources.

- Approximately 84 percent of the 3 Bars ecosystem has not been inventoried for the presence of prehistoric and historic-era resources that may be eligible for inclusion in the NRHP or which may be contributing elements to a historic cultural landscape.
- A large number of previously identified cultural resources have not been evaluated for inclusion in the NRHP.
- The physical, historic remnants of the Pony Express Trail have not been fully inventoried or evaluated to identify related segments or sites that may eligible for the NRHP.

3.23.3.2 Significance Criteria

Federal historic preservation legislation provides a legal environment for the documentation, evaluation, and protection of archaeological and historic sites that may be affected by federal undertakings, by private undertakings operating under federal license, or on federally managed lands. The significance criterion used to evaluate the impacts of the alternatives on cultural resources is whether any action would adversely affect historic properties unevaluated or eligible for inclusion in the NRHP.

The NRHP eligibility of cultural resources is determined by applying the criteria outlined in 36 CFR § 60.4 (see Regulatory Background Section 3.23.1). In addition to having eligibility related to one of the four criteria, a cultural resource must also retain sufficient physical integrity to convey its importance. The National Register has defined seven elements of integrity—Location, Design, Setting, Materials, Workmanship, Feeling, and Association.

For the 3 Bars Project, the NRHP eligibility criteria were further refined into research domains for prehistoric and historic-era sites. Five research themes were defined for the prehistoric period resources and consisted of Paleoenvironment, Geomorphology and Chronology, Lithic Technology, Settlement and Subsistence, and External Relations and Exchange (AECOM 2012). For historic-era properties, the themes consist of Early Exploration, Transportation and Communication, Early Settlement, Mining and Associated Charcoal Production, and Ranching and Agriculture.

Impacts to cultural resources were assessed in light of the degree to which the project may adversely affect cultural resources eligible for listing in the NRHP, or unevaluated resources that may potentially be eligible for listing. Under 36 CFR Part 800 (regulations for implementing the National Historic Preservation Act), "An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association." Adverse effects can include physical disturbance or alteration of a property or its setting, visual, atmospheric, and auditory intrusions, removal of a building or structure from its historic location, and deterioration through neglect. Any adverse effect identified under the National Historic Preservation Act criteria is also considered to be a significant adverse impact under NEPA.

3.23.3.3 Direct and Indirect Effects

3.23.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

Historically, there have been potential direct conflicts between land restoration treatments and archaeological/cultural resources, and specific impacts to known and undiscovered cultural resources can be severe. For example, surface-disturbing activities may destroy spatial context as well as damage or destroy individual artifacts, features, and structures. Cultural properties consisting only of surface manifestations could be destroyed or severely affected during surface-disturbing activities.

Beneficial Effects

Stabilization and restoration of riparian systems would reduce streambank erosion and would ensure that buried cultural and paleontological resources adjacent to streams remained intact. Surveys would be conducted to identify the locations of cultural and traditional resources prior to treatment activities to ensure that these resources would be protected.

3.23.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Cultural resource investigations have been conducted on the Black Spring, Indian Creek Headwaters Middle, Mud Spring, Garden Spring, Roberts Mountain Spring, Trail Spring, Lower Henderson 1, Vinini Creek, Upper Vinini Creek, Upper Willow, Roberts Creek, Willow Creek, Denay Pond, Lone Spring, and Treasure Well units. Fifteen investigations have resulted in the identification of 23 cultural sites. Seventeen sites have either been determined eligible for inclusion in the NRHP or have not been evaluated for NRHP eligibility. The remaining six sites have been determined not eligible for NRHP listing.

Adverse Effects

Manual methods would result in general surface disturbance that could disrupt the spatial context of archaeological constituents, mulching with organic materials would compromise radiometric dating, and the use of hard-edged tools could damage artifacts. There is also the potential for unauthorized collection of artifacts by workers. Although the removal of vegetation has the potential to expose archaeological components, and thereby increase the possibility of vandalism and/or unauthorized collection of artifacts, monitoring during project implementation would significantly reduce the risk of unauthorized collection. Cultural inventories conducted in accordance with the *Programmatic Agreement between the Mount Lewis Field Office of the Bureau of Land Management and the Nevada State Historic Preservation Officer regarding National Historic Preservation Act Compliance for the 3 Bars Ecosystem and Landscape Restoration Project, Eureka County, Nevada* (Programmatic Agreement) would result in the identification of historic properties, thereby allowing avoidance (see **Appendix B**). Because inventory and site assessment would be conducted prior to project implementation and all eligible or unevaluated resources would be avoided, there would be no direct adverse effects to cultural resources.

Use of chainsaws to remove pinyon-juniper should have little or no effect on cultural resources. Because of the limited scope and small size of the acreage that would be treated with manual methods, however, manual methods may do little to reduce the potential for wildfires that could result in severe impacts to cultural resources either from the fire, fire suppression activities, or the indirect effects associated with the increased potential for erosion as a result of catastrophic wildfire, and which have the potential to more significantly compromise the integrity of archaeological deposits.

The use of a track hoe or back hoe for stream channel restoration would result in surface and shallow subsurface disturbances that would likely introduce organic materials to lower soil layers, thereby contaminating any surface or shallow subsurface cultural resource sites that contain early historic or prehistoric datable organics, such as charcoal, wood, or preserved plant materials. Surface and shallow subsurface impacts would also include horizontal and vertical displacement of the upper portion of soils where archaeological resources could be contained, potentially compromising depositional context and integrity, and damaging or destroying artifacts (USDOI BLM 2007c:4-107).

Beneficial Effects

Stabilization and restoration of riparian systems would reduce streambank erosion and ensure that cultural and paleontological resources buried near streams remained intact. Uncontrolled wildfire has the potential to significantly impact cultural resources, and the reduction of fuels that would contribute to such events is one of the goals of the 3 Bars Project. Stream channel restoration and removal of pinyon-juniper and noxious weeds and other invasive non-native vegetation from riparian zones would improve stream functionality and encourage the growth of fire-resilient vegetation, which would enhance the ability of the riparian zone to function as a fuel break.

Aspen Treatments

An inventory conducted at RM-A2 documented a site with historic features and prehistoric flaked stone that has been recommended as eligible for inclusion in the NRHP.

A Class III cultural resource inventory would be conducted prior to treatment to reduce the potential for treatments to adversely affect historic properties. Inventory, assessments of NRHP eligibility, and avoidance of adverse effects are outlined in the stipulations of the Programmatic Agreement prepared for the 3 Bars Project, and would meet the requirements of Section 106. Improvement in the health of aspen stands, and removal of pinyon-juniper near aspen stands to create fire breaks, would help to reduce the risk of wildfire spread. These treatments, however, would do little to reduce the long-term risk to archaeological and other cultural resources from wildfire as few acres would be treated annually in aspen stands.

Pinyon-juniper Treatments

Twelve cultural resources investigations have been conducted within portions of the Atlas, Cottonwood/Meadow Canyons, Dry Canyon, Gable Corridor, Henderson Corridor, Sulphur Spring Wildfire Management, Three Bars Ranch, Tonkin North and South, Upper Roberts Creek, Vinini Corridor, and Whistler units. These resulted in the documentation of 189 cultural sites, of which 71 were recommended and/or determined to be not eligible for inclusion in the NRHP, 71 were determined eligible, and 47 were unevaluated. Dominant cultural resources include prehistoric open lithic scatters and historic resources associated with charcoal production. Historic-era resources represent all themes including the built environment consisting of historic structures and ranches. A segment of the Pony Express Trail is within the Henderson Corridor Unit.

Adverse Effects

The types of adverse effects from manual, mechanical, and prescribed fire treatment methods, and from the use of small, temporary exclosure fencing, would be similar to those discussed under Effects Common to All Alternatives, and under Riparian Treatments. The greatest risks to cultural resources would be from mechanical and fire treatments.

Root plowing, tilling and drill seeding, mowing, roller chopping and cutting, blading, grubbing, and feller-bunching could damage surface and subsurface cultural resources if the sites were not avoided. Treatments could compromise depositional context and integrity, and damage or destroy artifacts.

Several thousand acres could be burned annually using prescribed fire and wildland fire for resource benefit. The effects of fire on cultural resources would vary depending on temperature and duration of exposure to heat. Generally, higher temperature and/or longer exposure to heat increases the potential for damage to cultural resources. As a general rule, fire does not affect buried cultural materials. Studies show that even a few inches of soil cover are sufficient to protect cultural materials. However, there are times when conditions do carry heat below the surface, with the potential to affect buried materials.

Stumps that smolder and burn have the potential to affect nearby buried materials. Heavy duff, surface logs, and roots that smolder and burn have the potential to expose subsurface materials to heat over a period of time, and hence have the potential to affect cultural materials. Fires that burn hot and fast through a site may have less of an effect on certain types of cultural materials than fires that smolder in the duff, or than logs that burn for a period of time (USDOI BLM 2007c:4-104). Fire can cause physical damage to sites from snags/trees falling on them, and can indirectly lead to loss of archaeological data due to increased damage from rain, changes in drainage patterns, soil erosion, and flooding (USDOI BLM 2007c:4-107).

Wildfire is generally more destructive to cultural resources than prescribed fire, since it results in effects from both uncontrolled fire and fire suppression. Management decisions may need to balance the potential effects of a prescribed burn with the risk of damage from an uncontrolled wildfire. Because prescribed fire can be controlled, cultural resource specialists could work with fire managers to determine the predicted temperature and duration of a fire through an area, and possibly to modify burn plans to minimize effects to cultural resources. The emergency nature of wildfires can lessen management's ability to prioritize conservation of cultural resources.

Protecting cultural resources during fire would begin with fire management planning. During planning, the BLM would define vulnerable cultural resources by classes of site-types and specific sites, identify appropriate protection measures for them, and identify appropriate management responses with regard to cultural resources in the event of fire. Consultation with State Historic Preservation Office, Tribes, and other appropriate entities should be part of the project planning process, especially when designing fire-specific protocols for identification and protection of potentially affected cultural resources (USDOI BLM 2007c:4-105).

Beneficial Effects

Cultural inventories conducted in accordance with the Programmatic Agreement established for this project would result in the identification and avoidance of historic properties. This assessment would also include determination of eligibility of a portion of the Pony Express route mentioned above. The Pony Express route is Congressionally designated as a National Historic Trail, thus it is anticipated that the NRHP assessment may include consultation and concurrence with the National Park Service. Because inventory and site assessment would be conducted prior to project implementation and all resources would be avoided, there would be no direct adverse effects to cultural resources. Although the removal of vegetation has the potential to expose archaeological components, and could thereby increase the possibility of vandalism and/or unauthorized collection of artifacts, monitoring during project implementation would significantly reduce the risk of unauthorized collection.

Given the large number of acres that would be subject to treatment, together these methods would significantly reduce hazardous fuels and the risk of an uncontrolled catastrophic wildfire that could adversely affect historic properties. Therefore, pinyon-juniper treatments would result in significant long-term benefits and protection of cultural resources from catastrophic wildfire.

Sagebrush Treatments

Eleven investigations have been conducted on portions of the Alpha, Coils Creek, Kobeh East, Nichols, Roberts Mountain Pasture, Rocky Hills, South Simpson, Table Mountain, Three Corners, West Simpson Park, and Whistler Sage units. These studies have documented 27 cultural sites, of which 5 have been determined not eligible, 3 have been determined eligible, and 19, including a portion of the Pony Express route, have not been evaluated for NRHP eligibility. Two of the eligible sites are components of the E&PRR, which has been completely documented. These sites would require mitigation if it is not possible to avoid them during project implementation.

Adverse Effects

Manual and mechanical treatments could be used in all areas and the potential for adverse effects would be the same as Effects Common to All Alternatives and effects from pinyon-juniper treatments.

Livestock could to be used on the 3 Bars Project area to remove cheatgrass. While grazing animals could displace and damage artifacts and generally compromise the integrity of surface archaeological deposits, use of livestock would be limited to small treatment areas and would most likely not affect historic properties.

Beneficial Effects

Adherence to the stipulations outlined in the Programmatic Agreement would ensure that historic properties are not subject to adverse effects. The greatest inadvertent threat to cultural resources would be associated with uncontrolled wildfire, and these effects have the potential to be severe. However, treatments would reduce fuel loads and fuel breaks would aid in protecting historic properties from uncontrolled catastrophic wildfire, resulting in long-term beneficial effects.

3.23.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Mechanical and fire treatments have the greatest potential for harming cultural resources. The number of acres treated using manual and mechanical equipment would be similar to that under Alternative A. Prescribed fire and wildland fire for resource benefit would not be used on several thousand acres annually, as they would under Alternative A. Fire has the potential to cause inadvertent effects to cultural sites. By removing fire under this alternative, these risks would be substantially less under Alternative B than under Alternative A.

Under Alternative B, the BLM would be unable to restore fire as an integral part of the ecosystem. It is unlikely that the BLM would be able to slow the spread of noxious weeds and other invasive non-native vegetation, including cheatgrass. Cheatgrass is a major contributor to providing fuel for wildfire. It is unlikely the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse in the long-term, which would continue to be a threat to historic properties.

3.23.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Given that mechanical and fire treatments, and to a lesser extent biological treatments using livestock, have the greatest potential to harm cultural sites, these risks would be eliminated under this alternative. However, large numbers of workers and their vehicles would be needed to accomplish proposed treatments under this alternative. Vehicle miles traveled would likely be greatest under this alternative and vehicles could crush cultural materials. Increased numbers of workers could increase the potential for looting. Downed trees and slash material from treatments would be difficult to remove without mechanical equipment or pile burning. Some downed wood and slash could be sold or made available to the public as firewood.

The number of miles of fire and fuel breaks created under this alternative would be substantially less than under Alternatives A and B as the BLM would not be able to use mechanical equipment, such as bulldozers, mowers, and mulchers, and prescribed fire to create fire and fuel breaks. Fire and fuel break treatments would primarily be limited to stream and aspen habitats, or near roads, where pinyon-juniper would be removed to enhance or create new breaks.

Under Alternative C, it is unlikely the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse long-term, and wildfire would continue to be a threat to historic properties.

3.23.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects on cultural resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Thus, long-term threat to historic resources from wildfire would be greatest under Alternative D.

3.23.3.4 Cumulative Effects

The CESA for cultural resources is approximately 1,267,997 acres and includes the 3 Bars Project area and a 5-mile buffer around the 3 Bars Project area that encompasses the viewshed of the Pony Express Trail and Eureka Palisade Stage lines that traverse the entire project area (**Figure 3-1**). Approximately 94 percent of the area is administered by the BLM, 5 percent is privately owned, and 1 percent is administered by the U.S. Forest Service. Past and present actions that have influenced land use and access in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.23.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

The BLM would treat noxious weeds and other invasive non-native vegetation under existing authorizations. New infestations would typically be found in newly burned or disturbed areas, and in areas where livestock and wild horses congregate. Treating infestations while they are small and reducing the amount of area covered by existing large infestations, would result in few effects, if any, to historic resources. There could be some risk associated with discing soil to remove cheatgrass, and possibly drill seeding, but these risks would be negligible. Surveys would be conducted prior to treatments to determine whether there are additional cultural sites in these areas which could be impacted by treatment actions. Existing and newly-found sites would be mitigated in accordance with the Programmatic Agreement before restoration work begins.

Road and utility construction, land development, and mineral, oil, gas, and geothermal leasing and development projects could affect cultural resources, but their impacts to these resources would be evaluated based on plans submitted by the developer or lessee. Cultural resources surveys completed for the Mount Hope Project documented 242 cultural sites within the mine project footprint, including 80 prehistoric and 142 historic sites, and an additional 352 sites within the larger area of potential effects, which includes a portion of the 3 Bars Project area. Implementation of the Mount Hope Project would result in adverse impacts to 83 eligible sites. Under the Programmatic Agreement developed between the mine proponent and State Historic Preservation Office, the proponent would develop, and submit to the BLM for approval, a treatment plan to address the potential direct impacts to the 83 officially eligible sites. The proponent would implement the treatment plan prior to any surface disturbance of eligible sites within the area of direct impacts. All adverse effects under the National Historic Preservation Act and direct and indirect impacts under the NEPA to known eligible properties identified within the project area, and properties discovered during construction activities, would be mitigated in accordance with the Programmatic Agreement and the treatment plan prepared for the project (USDOI BLM 2012b:3-604). The BLM concluded that mine activities would not significantly impact cultural areas outside of the mine footprint (USDOI BLM 2012b:4-605). There would also be cumulative short-term visual effects from the Mount Hope Project, but these effects would be somewhat offset by improvement to the visual landscape from the 3 Bars Project.

Since 1985, wildfires have burned an average of about 7,000 acres annually within the CESA. Assuming a similar rate in the future, about 140,000 acres would burn from wildfires during the next 20 years. In addition to the 127,000 acres treated on the 3 Bars Project area to reduce hazardous fuels and improve ecosystem health, an additional 15,000 acres could be treated under current and reasonably foreseeable future authorizations within the CESA, totaling about 11 percent of the CESA. The BLM would conduct surveys prior to treatments to determine whether there are additional cultural sites in these areas that could be impacted by treatment actions and existing and newly-found sites would be mitigated in accordance with the Programmatic Agreement before hazardous fuel treatment work begins.

There could be adverse effects to eligible historic properties from fuels and other vegetation treatments within the CESA. Physical effects to eligible historic properties would be avoided where possible, but visual effects from treatments may not be fully avoided. Long-term, the 3 Bars Project and other restoration treatments should result in a landscape that is more fire resilient and similar to the Potential Natural Community. Noxious weeds and other invasive non-native vegetation treatments would remove vegetation that contributes to short return-interval fires and loss of native vegetation and could cause adverse effects to eligible historic sites. In addition, the BLM would conduct stream bioengineering and plantings on about 31 miles of stream to slow stream flow and create pools and wet meadows, and remove encroaching pinyon-juniper to improve wetland and riparian vegetation. These activities would help to reduce the potential for streambank erosion and potential loss of cultural materials.

3.23.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on cultural resources would be similar to those described under Alternative A. Adverse effects to cultural resources within the CESA would generally be the same as described for Alternative A. Although use of fire would not occur within the 3 Bars Project area, the use of fire could occur on several hundred acres annually in the remainder of the CESA. By not using fire to reduce hazardous fuels and improve vegetation resiliency to fire, there would be greater potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area under this alternative as compared to Alternative A.

Because 3 Bars Project actions would affect only about 6,350 acres annually, or 1 percent of the CESA, and treatment areas would be surveyed prior to treatment to avoid or reduce impacts to cultural sites, there would be a negligible cumulative effects to cultural resources from 3 Bars Project actions. These effects would be less than under Alternative A, but greater than under Alternative C.

3.23.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on cultural resources would be similar to those described under Alternative A. Adverse, short-term effects to cultural resources associated with the use of fire and mechanized equipment would not occur under Alternative C. However, fire and mechanized equipment could be used on about 1,500 acres annually in other portions of the CESA and outside of 3 Bars Project areas to improve habitat, remove hazardous fuels, and reduce the risk of wildfire, and could affect cultural resources in those areas.

Because 3 Bars Project actions would affect only about 3,200 acres annually (less than 0.5 percent of the CESA), and the BLM would conduct pre-treatment surveys for cultural resources to reduce the potential for effects to eligible sites, effects to cultural resources within the CESA would be negligible.

3.23.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on cultural resources would be similar to those described under Alternative A. There would be no cumulative effects on cultural resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage (about 1,500 acres annually; less than 0.1 percent of the CESA). Thus, adverse effects and benefits to cultural resources would be less under this alternative than under the action alternatives.

3.23.3.5 Unavoidable Adverse Effects

Because cultural resources are nonrenewable and their locations are for the most part unknown, project-related treatments have the potential to adversely impact historic properties, including those eligible for inclusion in the NRHP. Surveys, inventories, assessments of affect, and treatments designed to mitigate adverse effects conducted prior to project implementation would result in avoidance, which is the mitigation measure preferred by the BLM, or some other treatment (e.g., data recovery), that would reduce adverse effects. These measures, however, may only reduce cumulative effects. In addition, adoption of an unanticipated discovery plan would effectively mitigate effects either through avoidance or data recovery. While implementation of archaeological excavation as part of a data recovery plan could result in the partial or total destruction of the site, the recovered data would effectively mitigate for this destruction. Therefore, project implementation under all four alternatives would not result in unavoidable adverse effects under NEPA.

3.23.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Any destruction of cultural resources that are eligible for inclusion in the NRHP would represent long-term loss of data. In the event that avoidance of archaeological resources is not feasible, other mitigation measures may include archaeological data recovery carried out under an approved treatment and data recovery plan. Such a plan could result in the partial or total destruction of the site. However, any investigations of cultural resources made during inventories or investigations required prior to restoration treatments would enhance the knowledge of the historic-era and prehistory of the region and serve to effectively mitigate any adverse effects (USDOI BLM 2007c:4-249).

Due to the build-up of fuels, historic properties within the 3 Bars Project could be compromised either directly or indirectly by catastrophic wildfire. For example, the loss of vegetation would expose archaeological sites to an increased risk from erosion, or direct effects could compromise the vertical and horizontal integrity of historic-era and prehistoric archaeological sites, and obsidian hydration rims for prehistoric resources, thereby limiting the ability to place prehistoric site constituents within a relative chronology. Catastrophic wildfire would also result in substantial damage or complete destruction of wooden buildings and structures that have been determined to be eligible for NRHP listing.

3.23.3.7 Irreversible and Irretrievable Commitment of Resources

Cultural resources are nonrenewable, so any impacts that may result from treatments would be irreversible, and the integrity of the affected resource would be irretrievable. Therefore, impacts to near surface archaeological sites from treatments could result in partial or complete destruction of the resource, and such loss of scientific data would be irreversible and irretrievable. Although archaeological investigations carried out under an approved treatment and data recovery plan could result in partial or complete destruction of the site, the recovered scientific data would effectively mitigate for this destruction. These investigations carried out prior to vegetation treatments would enhance and fill gaps in the body of knowledge as it relates to the history and prehistory of the region, and would serve to effectively mitigate further potential effects of activities in the area (USDOI BLM 2007c:4-249).

3.23.3.8 Significance of the Effects under the Alternatives

The significance criterion used to evaluate the impacts of the alternatives on cultural resources is whether any action would adversely affect historic properties eligible or unevaluated for inclusion in the NRHP. The Mount Hope Project could have direct and indirect impacts to 83 NRHP-eligible sites. Direct and indirect impacts to known eligible properties within the area of potential effects would be mitigated in accordance with the programmatic agreement and treatment plan developed cooperatively by the Mount Hope Project proponent, BLM, and State Historic Preservation Office. Any previously unknown eligible properties that may be discovered during construction activities would be mitigated in accordance with the Programmatic Agreement.

For 3 Bars Project treatments, most ground-based equipment would disturb only the upper few inches of soil and in most cases would be confined to previously disturbed areas such as roadways, trails, and rights-of-ways. Cultural resources on the surface should be discovered during pretreatment surveys. All treatment methods could cause indirect loss of cultural resources as a result of erosion and soil disturbance, but these effects should be minimal. Potential effects would be further reduced because the BLM has inventoried, or would conduct inventories for, cultural resources in treatment areas to lessen the chance that they would be inadvertently impacted by BLM vegetation restoration treatments. Thus, there should be a negligible cumulative loss of cultural resources on public lands due to herbicide and other vegetation treatment methods under all alternatives.

The BLM and State Historic Preservation Office have entered into a Programmatic Agreement that outlines the stipulations that will be followed to insure compliance with Section 106 of the National Historic Preservation Act for each phase of the 3 Bars Project. According to the Programmatic Agreement, all treatments shall be conducted in a manner consistent with the BLM and State Historic Preservation Office protocol. The BLM, in consultation with the State Historic Preservation Office, shall ensure that effects to historic properties are avoided through design, or redesign, or by other means in a manner consistent with the BLM and State Historic Preservation Office protocol. When avoidance is not feasible, the BLM, in consultation with the State Historic Preservation Office, Native American tribes, and interested persons, shall develop, or ensure that an appropriate treatment plan is designed to lessen or mitigate project-related effects to historic properties. For properties eligible under criteria (a) through (c) (36 CFR § 60.4), mitigation, other than data recovery, may be considered in the treatment plan (for example, Historic

American Buildings Survey/Historic American Engineering Survey recordation, oral history, historic markers, exhibits, interpretive brochures or publications, etc.). Where appropriate, treatment plans shall include provisions (content and number of copies) for a publication intended for dissemination to the general public. When data recovery is required as a condition of approval, the BLM, in consultation with the State Historic Preservation Office, shall develop, or ensure development of a data recovery plan that is consistent with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 CFR § 44716-37) and *Treatment of Historic Properties: A Handbook* (Advisory Council on Historic Preservation 1980). By following the Programmatic Agreement, the BLM would ensure that there are no significant direct, indirect, or cumulative effects to cultural resources under all alternatives from 3 Bars Project actions.

3.23.4 Mitigation

Under all alternatives, the BLM shall implement the following measures in accordance with the Programmatic Agreement prepared for the 3 Bars Project.

- Consult with local Tribes in accordance with Stipulation III (A) of the *Programmatic Agreement between the Mount Lewis Field Office of the Bureau of Land Management and the Nevada State Historic Preservation Officer regarding National Historic Preservation Act Compliance for the 3Bars Ecosystem and Landscape Restoration Project, Eureka County, Nevada* (**Appendix B**).
- For each phase of the undertaking, the BLM shall evaluate cultural resources for NRHP eligibility, and consult with local Tribes or tribal members regarding areas of cultural or traditional religious importance, and consult with the State Historic Preservation Office and local Tribes regarding the NRHP determinations per Stipulation III(B) of the Programmatic Agreement.
- Develop and implement appropriate treatment measures to mitigate adverse effects to historic properties, i.e., those resources determined eligible for inclusion in the NRHP, in accordance with Stipulation III(C) of the Programmatic Agreement.
- Monitor treatment implementation according to the protocols outlined in Stipulation VII of the Programmatic Agreement, to insure that there are no inadvertent impacts to plant and wildlife of importance to traditional lifeways.
- Human remains and burial items are sacred to the local Native American tribes. Therefore, the BLM shall provide training to all BLM and contract personnel to insure compliance with the Archaeological Resource Protection Act of 1979 (16 USC § 470), as amended, and insure that the remains and associated grave goods are treated with respect and are handled according to the provisions.

3.24 Native American Traditional/Cultural Values, Practices, and Resources

3.24.1 Regulatory Framework

Federally recognized tribes have a unique legal and political relationship with the government of the United States, as defined by the U.S. Constitution, treaties, statutes, court decisions, and executive orders. These definitive authorities also serve as the basis for the federal government's obligation to acknowledge the status of federally recognized tribes.

The BLM formally consults with federally recognized tribes before making decisions or undertaking activities that will have a substantial direct effect on federally recognized tribes, or their assets, rights, services, or programs.

Laws and Orders that require agency consultation with tribes include the:

- National Environmental Protection Act
- National Historic Preservation Act as amended
- American Indian Religious Freedom Act
- Native American Graves Protection and Repatriation Act
- Archaeological Resource Protection Act
- Executive Order 13007, Indian Sacred Sites
- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
- Secretarial Order 3317, Consultation with Indian Tribes

The NEPA requires federal agencies to consult with tribes to identify a proposed action's potential to conflict with a tribe's use of the environment for cultural, religious, and economic purposes, and to work with tribes to seek alternatives that would resolve the potential conflicts.

When the National Historic Preservation Act was amended in 1992, Section 101(d)(6)(a) was added stating that "properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined to be eligible for inclusion in the National Register."

The American Indian Religious Freedom Act was passed in 1978 to establish a policy of federal protection for traditional Native American religious freedoms and required a review of agency programs in consultation with Native American religious leaders. Consultation efforts have been directed at identifying the concerns of Native American religious practitioners when considering agency actions. This law requires consultation with the practitioner of the native religion, not political leaders or academicians.

The Native American Graves Repatriation Act requires consultation between federal agencies and tribes to determine affiliation and disposition of the specific kinds of "cultural items" defined in the Act, which include Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony. The Act also provides for inadvertent discoveries. The lead agency must also consult with any affected tribe before issuing a permit to excavate or remove remains and associated funerary objects from public land.

The Archaeological Resource Protection Act provides felony-level penalties for the unauthorized excavation, removal, damage, alteration, defacement, or the attempted unauthorized removal, damage, alteration, or defacement of any archaeological resource, more than 100 years of age, found on public lands or Native American lands. The Act also prohibits the sale, purchase, exchange, transportation, receipt, or offering of any archaeological resource obtained from public lands or Native American lands in violation of any provision, or local law.

Executive Order 13007 requires federal agencies to consult with tribes to determine whether proposed land management actions would restrict practitioners' access to and ceremonial use of Native American sacred sites on federal lands, or adversely affect the physical integrity of Native American sacred sites on federal lands. If such impacts could occur, the agency must then seek alternatives that would resolve potential conflicts.

For the 3 Bars Project the BLM and the Nevada State Historic Preservation Officer have signed a Programmatic Agreement that outlines the protocols to be completed as part of Section 106 compliance including Native American consultation, and procedures that will be used to assess both unanticipated discoveries and impacts that may occur during project implementation (**Appendix B**). Seven tribes—the Battle Mountain Band Council, Duckwater Shoshone Tribe, Elko Band Council, Ely Shoshone Tribe, South Fork Band Council, Te-Moak Tribe of Western Shoshone, and the Yomba Shoshone Tribe—are concurring parties to this agreement.

3.24.2 Affected Environment

3.24.2.1 Study Methods and Study Area

Information on Native American traditional values is based on the following ethnographic assessments produced for the 3 Bars Project and other projects within and near the project area.

- *A Report on Ethnographic Study Conducted to Assist the Bureau of Land Management in the Evaluation of Traditional Cultural Properties in the Mt. Tenabo Area*. Prepared for Cortez Gold Mines, Inc., Beowawe, Nevada, by Summit Envirosolutions, Inc, Carson City (Rucks 2000).
- *Background Ethnographic Study for Cortez Joint Venture*. Prepared for JBR Environmental, Reno Nevada (Rusco 2000).
- *Report on Ethnographic Study Conducted to Facilitate Consultation with Western Shoshone Tribal Governments of Central Nevada for the Sierra Pacific Power Falcon to Gonder 324kV Transmission Line*. Report Prepared by Summit Envirosolutions, Inc., Carson City, Nevada (Rucks 2011).
- *Northern Paiute and Western Shoshone Land Use in Northern Nevada: A Class I Ethnographic/ Ethnohistoric Overview*. Cultural Resource Series No. 12. U.S. Bureau of Land Management, Nevada State Office, Reno, Nevada (Bengston 2003).
- *Ethnographic for Pediment Project.* Report prepared by Summit Envirosolutions, Carson City, Nevada (Rucks 2003).
- *Mount Tenabo Properties of Cultural and Religious Importance Determinations of Eligibility to the National Register of Historic Places*. BLM Report No. 6-2352-1 (Dixon and McGonagle 2004).
- *An Ethnographic Study Completed for the Cortez Gold Mines Pediment Project*. Report prepared by Summit Envirosolutions, Inc., Carson City, Nevada (Rucks 2004).
- *Ethnographic Assessment for the Newe (Western Shoshone): Proposed Ruby Pipeline Project in Nevada*. Report prepared by Bengston Consulting, Inc., Sparks, Nevada (Bengston 2010).
- *3 Bars Ecosystem and Land Restoration Project: Native American Contacts Review*. Report prepared by Bengston Consulting, Inc., Sparks, Nevada (Bengston Consulting 2012).

Information presented in the following sections is based on the results of the ethnographic assessments and the ongoing government-to-government consultation process with interested tribes. BLM consultation to date includes ongoing engagement with the seven tribal entities that have expressed interest in the 3 Bars Project. These are the

Duckwater Shoshone Tribe, the South Fork Band Council, the Elko Band Council, the Te-Moak Tribe of Western Shoshone, the Battle Mountain Band Council, the Yomba Shoshone Tribe, and the Ely Shoshone Tribe. In addition, the 3 Bars Project is discussed during regularly scheduled meetings designed to inform the tribes of the project status.

The analysis area for the assessment of direct and indirect effects for Native American Traditional/Cultural Values, Practices, and Resources is the 3 Bars Project area. The analysis area for cumulative effects also includes traditional tribal rounds on or adjacent to the 3 Bars Project area, as shown on **Figure 3-1**.

3.24.2.2 Ethnography

The 3 Bars Project is situated within the traditional homeland of native peoples referred to as the Western Shoshone (*Newe*), who inhabit a region extending from Death Valley in California through the mountainous terrain of central Nevada, and into northwestern Utah and southern Idaho (Thomas et al. 1986:262–264, Sewall 1999). However, the limits of Western Shoshone territory, like those of many early Native American groups, tended to be somewhat variable over time (Kroeber 1925, Driver 1937, Malouf 1950 [1940], Steward 1970 [1938], and Grosscup 1977 *cited in* Thomas et al. 1986:262).

3.24.2.2.1 Social and Political Organization

According to Steward, the Western Shoshone social structure and practices could best be characterized as "quantitative simplicity" in that the Western Shoshone lacked many of the cultural institutions often typical of the majority of Native American groups. These included an absence of significant and clearly defined linguistic differences between them and neighboring groups, a lack of gender- or age-based societies, or political organization beyond the local village level. Although inferring a certain degree of environmental determinism, Steward posited that the Western Shoshone social system was "…the inevitable response to areas of meager resources, low population density, and an annual cycle of nomadism" (Steward 1970 [1938]:115).

Relatively little appears to be known regarding ethnographic-period groups residing specifically within the 3 Bars Project area. Rucks (2004:3) suggested that this general paucity of information may have resulted because Julian Steward (one of the primary sources of early ethnographic data on the Western Shoshone) avoided some portions of the project area and vicinity because of heavy historic-era mining. One exception consists of the *Pasiatekkaa*. Steward stated that their home district—the Diamond, Pine Creek, and Little Smoky Valleys—was not particularly fertile except at the base of Roberts Mountains and Sulphur Spring Range where various seeds, root vegetables, and especially pinyon nuts were harvested (Steward 1970 [1938]:141–144). Steward documented village sites or groups of encampments, including *Bauwiyoi*, *Tupagandʊ̈*, and *To:dzanadʊ̈* that were at the base of the mountains, where water was more abundant than on the valley floors. Steward (1970 [1938]:142) noted that most of the information gathered regarding subsistence activities and the social and political structure was derived from the inhabitants of *To:dzanadʊ̈*; however, it can be inferred that they were applicable to the other village groups situated at Pine Creek north of Roberts Mountains and in the Diamond Valley.

3.24.2.2.2 Kinship and Marriage

For the Western Shoshone, kinship terms and status reflect a fundamental division of labor, with men mostly hunting and women almost exclusively gathering floral foodstuffs or smaller animals. Consequently, marriage was a critical economic institution just as much as it was an emotional or spiritual one. In this system, particularly successful hunters could take more than one wife, although the oldest sisters were typically married off first. Bride prices or dowries, although common among many Western Shoshone groups, were quite uncommon or unknown altogether among those peoples residing east of the Humboldt River and west of the Reese River Valley. Marriages typically resulted in strong family bonds; the highest level of Western Shoshone social and political structure was the immediate family or small family groups, and armed conflict was a rare occurrence (Steward 1941:311, Cappannari 1960 *cited in* Thomas et al. 1986:277).

Although Western Shoshone marriage practices (an important mechanism for regional and intergroup contact and interactions) have been well documented for many regions within their traditional territory, the Kobeh and Diamond Valleys within and adjacent to the 3 Bars Project area have not been subjected to the kind of intensive ethnographic observations and research characteristic of other regions. Regardless, marriage customs (and other social practices) in the project area were likely similar to those in better-studied areas such as the Reese River, Big Smoky, Spring, Snake, and Little Smoky Valleys, where most marriages were contracted with a “frequency relative to the distance separating groups” (Steward 1970 [1938]). Population density also appears to have played a role in very specific marriage and group interaction practices during the ethnographic period. Although marriages between related kin were prohibited among the Western Shoshone, marriage between cross cousins and “pseudo cross cousins” (mother’s brother’s stepchildren or father’s sister’s stepchildren) was practiced in the nearby Big Smoky and Little Smoky Valley regions (Steward 1970 [1938]). Marriage between cross cousins (a closer familiar relationship) was practiced in the Steptoe, Ruby Valley, and Elko regions (Delacorte et al. 1992:24). Eggan (1980 *cited in* Delacorte et al. 1992:24) noted that cross cousin marriage increased bonds within groups while reducing ties with outside populations. Eggan posits this was a consequence of the ecologically rich setting of places like the Ruby Valley, where there was little need to go outside the local group for marriage purposes, thereby strengthening local bonds and deemphasizing ties with distant groups.

3.24.2.2.3 Group Social Interaction

In the most arid regions of Western Shoshone territory with the least prolific and predictable resources, social groups were residentially mobile and the kinship system functioned more as a social network and communication system than as an economic foundation. However, with subsistence being potentially tenuous in such areas as Death Valley, this networking served the critical function of a communication system broadcasting the locations and value of resource patches in a marginal environment. Conversely, Eggan (1980:177 *cited in* Thomas et al. 1986:278) noted that the unpredictability of resources, particularly in arid regions, resulted in the development of pronounced intergroup sharing restrictions, with women essentially “owning” critical seed harvests. This was especially manifest in winter camps, where the women were responsible for the general welfare of the immediate family but there was no obligation to share often scarce resources with the larger group.

In the more ecologically diverse and resource-rich landscapes of the Western Shoshone territory, social practices tended to differ from those expressed in areas such as Death Valley, Panamint, or Little Smoky Valley situated just southeast of the project area. In the well-watered settings such as those found in the Reese River, Spring, Snake, Antelope, and Ruby Valleys, vast stands of pinyon pine, dense patches of seed-bearing grasses and other plants, and plentiful large game promoted greater social and residential stability and higher population densities than in the more arid regions. In these resource-rich areas, there was less need for the social systems employed in marginal settings to provide networks for monitoring ecological conditions and sharing information about the location and quality of resources (Thomas et al. 1986:279). Groups inhabiting these areas developed social systems designed to increase local group integrity, with a marriage alliance system increasing broader community bonds. In effect, as dense and varied resources allowed for more residential stability, the social system correspondingly shifted away from the immediate family level and toward structures that encouraged and increased the more generalized and widespread group integration.

3.24.2.2.4 Subsistence and Resource Management

Research conducted by Steward (1941, 1943, 1970 [1938]), Fowler (1977, 1982 *cited in* Fowler 1986), and Thomas (1981b, 1983a) forms the core of what is presently known regarding the Western Shoshone subsistence economy. A great deal of variation in this economic structure existed within the Western Shoshone territory during ethnographic times; however, common resources, procurement methods, and preparation techniques link the widespread Western Shoshone groups.

The labor often invested in sustaining specific floral and faunal resources clearly indicates that certain areas were subject to repeated visits over long periods of time. Rights to those maintained resources essentially resulted in a claim of control, although not necessarily “ownership” in the present-day sense of the word. Rucks’ (2004) informants agreed that these rights to particular gathering areas and campsites were recognized by outside groups based on evidence of management and consistent use.

As with their exploitation of many important foodstuffs on their lands, the Western Shoshone attached a certain degree of spirituality to their procurement. The harvesting of pinyon nuts, once the most prominent staple among the Western Shoshone and many other tribes in the region, was not only an important subsistence activity but an important cultural event, and to some extent is still today. Harvests were provided with a spiritual leader who arranged and presided over a pinyon nut harvest dance before gathering. This several-day celebration constituted a major social event and included prayers, songs, dances, gaming and sporting events, and feasting. New group leaders were chosen, marriages were arranged, and people exchanged information about resources, harvesting techniques, and political affairs. Plans for subsequent harvests and social alliances were developed. The largest celebrations and harvests in the project area occurred on the Roberts Mountains and Sulphur Spring Range with smaller events in the Mount Tenabo area (Rucks 2004:12). To a great extent, the size of these celebrations was the result of an increased population in these areas, supported by the diverse and dense resources present in them. For example, according to Rucks (2004:6), the present-day Western Shoshone still refer to Roberts Mountains as a resource-rich area (especially pinyon) that Steward (1970 [1938]:141) noted as being capable of supporting up to 60 households, a far larger population than in many surrounding parts of Western Shoshone territory.

The BLM has met with the Western Shoshone on several occasions during the past 3 years to better understand their concerns. The results of these meetings are summarized in the *3 Bars Ecosystem and Land Restoration Project: Native American Contacts Review* (Bengston Consulting 2012). Based on these discussions, several plant and animal species of importance to local tribes were identified. Specific plants and their ethnographic use are:

- Basin wildrye – food source
- Bunchgrass (Indian ricegrass) – food source
- Camas (Yomba) – food source
- Large sage – purifying, medicinal tea, and the manufacture of wooden implements and textiles
- Mint – food source
- Mormon (Indian) tea – medicinal tea
- Mountain mahogany – medicinal, wooden implements, and fuel
- Pinyon pine – food source
- Utah juniper - medicinal

- Watercress – food source
- Wild onion – food source
- Willow – basket weaving

In addition, the tribes use fish, sage-grouse, jackrabbit, pygmy rabbit, pronghorn antelope, mule deer, and other wildlife for food.

3.24.2.2.5 Ethnobotanical and Ethnoecological Perspective

Cutting live trees for firewood is frowned upon by many present-day Western Shoshone and only dead wood is cut, a practice that does not harm trees or reduce potential future nut harvests. Although pinyon nuts no longer constitute a major staple food for the Western Shoshone, they are consumed on special occasions, such as when a tribal member enlisted in the U.S. armed forces is going overseas or off to war (George 2000:38).

George (2000:39) also noted that her Western Shoshone (Duckwater Reservation) consultants universally expressed disapproval of commercial pinyon nut pickers. To many Western Shoshone maintaining traditional cultural norms, commercial pickers are seen as greedy intruders who strip trees bare of their cones and take an important traditional food source away from their people with no consideration of the ecological or cultural implications of their actions. Comparable situations have developed in Western Shoshone territory where, for strictly commercial purposes, non-native harvesting has nearly eliminated bear grass, an important traditional basketry material.

As part of the Mount Hope ethnographic assessment (Bengston 2007), three culturally significant areas within the 3 Bars project area were identified. These are Kobeh Valley, Roberts Mountains, and the Sulphur Spring Range. Tribal representatives indicated that the northern side of Mount Hope was a favored pine nut gathering area (Bengston Consulting 2012:23). During the current study, tribal representatives stated that Roberts Mountains was and still is used for hunting and plant gathering, and that there are *Newe* who went into the mountains to offer prayers. A tribal elder from Duck Valley mentioned that two types of minerals, *abe* (a white chalk used in ceremonies) and a red mineral, are still collected in the Roberts Mountains, but did not state the specific location.

3.24.2.2.6 Hunting

Important faunal species taken by the Western Shoshone included bighorn sheep and pronghorn antelope. Bighorn sheep were hunted during both the winter season and also during the warmer months, when their diurnal movements could be easily tracked, and were sometimes procured through the use of permanent hunting blinds or with dogs assisting in their pursuit (Muir 1894:322, Lowie 1924:195, Steward 1941:220–221 *cited in* Thomas et al. 1986:267). During the winter months, bighorn sheep hunting shifted to higher elevations, with hunters hiding behind previously constructed rock walls, cairns, and blinds. These were particularly common alongside canyons that served to guide the sheep into restricted areas where the kill would be easier. Generally, bighorn sheep procurement among the Western Shoshone was an individual pursuit, with a single hunter typically taking one sheep at a time. However, Steward (1970 [1938]:148) documented communal sheep hunts in the Ruby Valley that were the only ones of their kind among the Western Shoshone.

Pronghorn antelope, although hunted individually as well, were typically procured through the use of large communal drives. Steward (1970 [1938]) and Bengston (2003:Figure 2.5) noted that antelope drives occurred in the Diamond Valley just north of Eureka and in the general vicinity of two winter villages, one at the eastern edge of the Sulphur

Spring Range and another just south of present-day Eureka (Egan 1917:240 *cited in* Thomas et al. 1986:267, Steward 1970 [1938]:33).

Rabbits, another important species procured for their meat and skins, were also hunted primarily through the use of communal drives. Just like the antelope hunts, fall rabbit hunts, conducted following the pinyon harvest and in conjunction with the fall festival (Steward 1970 [1938]:105), were significant social occasions, attracting families from a broad geographic area. Rabbit drives certainly occurred with some regularity throughout the project area, although Steward (1970 [1938]) and Bengston (2003:Figure 2.3) noted one such site in the southern Diamond Valley just north of the town of Eureka. As with the pronghorn antelope hunts, rabbit drives were also accompanied by those with recognized shamanistic abilities. In addition to bighorn sheep, pronghorn antelope, and rabbits, a wide variety of other animal species were also hunted, trapped, or otherwise captured for food, fur, feathers, or other materials.

3.24.2.2.7 Spirituality and World View

According to Miller (1983), three basic principles constitute the foundation of the Western Shoshone world view and are largely common to indigenous cultures throughout the world. The first and foremost, referred to by the Western Shoshone (and their Northern Paiute neighbors) as the *puha*, perceives an all-compassing and ever-present life force or consciousness that animates virtually everything in the universe—rocks, plants, animals, water, people—and is characterized by Miller (1983:73 *cited in* Rucks 2004:22) as "…life-force energy…not static or concrete, but rather kinetic, always moving and flowing through the cosmos, underpinning all facets of the universe…" The second principle is that of the intimate relationship between people and land in which they reside. The third, like the second, is derived from the *puha*, and relates to the personalized nature of spiritual experience and its integration into everyday life.

Western Shoshone spiritual tradition holds that *puha* permeates the world and has been in existence since the "myth-age" when animals were people before the Shoshone became human (Deaver 1993 *cited in* Rucks 2004:24, Rucks 2004:22). Western Shoshone creation myths state that in the beginning the earth was covered with water, but during the "drying time" when the floodwaters receded, the first people moved down-slope from Mount Tenabo to live near the numerous springs found at lower elevations. They were told by the Creator "Anything that comes into the world after the drying up of the water will be your relative" (Tom Austin as told to Lowie [1924] *cited in* Rucks 2004:24). This particularly illustrates the second foundational principle of the Western Shoshone world view—that of the intimate relationship between the Western Shoshone people and their land.

According to Miller (1983:337 *cited in* Rucks 2004:22), although *puha* is universally present, it is concentrated in certain landscape features and natural objects, moving in "web-like currents linked to mountain peaks and water sources." Such places are known to and accessed by traditional medical practitioners who engage the power through various means for healing and encouraging various natural phenomena.

3.24.2.3 Documented Ethnographic Sites and Traditional Cultural Properties

Seven ethnohistoric resources dating to the protohistoric/ethnographic period have been identified thus far within the project area. The first ethnohistoric site consists of unevaluated stocked logs that could be the remains of a Shoshone structure located in Sheep Corral Canyon, near the western boundary of the project area. The remaining six sites have been recommended eligible for inclusion in the NHRP, and consist of another possible structure located slightly north of Sheep Corral Canyon, two resources in the vicinity of Indian Ranch that appear to be a temporary Shoshone woodcutters' camps, another camp that may have been associated with ranching, a camp possibly associated with charcoal manufacturing, and two camps associated with springs on the north flank of Roberts Mountains.

Although no Traditional Cultural Properties are situated directly within the project area, the Mount Tenabo Traditional Cultural Property is immediately adjacent to the northwestern corner of the project boundary.

3.24.2.4 Native American Consultation

The BLM continues to engage the seven tribal entities that have expressed interest in the 3 Bars Project. The 3 Bars Project is discussed during regularly scheduled project status meetings with the tribes, and the tribal entities were consulting parties during the preparation of a *Programmatic Agreement between the Mount Lewis Field Office of the Bureau of Land Management and the Nevada State Historic Preservation Officer regarding National Historic Preservation Act Compliance for the 3 Bars Ecosystem and Landscape Restoration Project, Eureka County, Nevada* for the 3 Bars Project (**Appendix B**).

3.24.3 Environmental Consequences

3.24.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Key issues of concern pertaining to Native American traditional/cultural values, practices, and resources were identified in the AECC and during scoping. These are:

- Decline in distribution and abundance of traditional, edible, and medicinal plants.
- Decreased pine nut production and tree vigor.
- Decline in wild game species.

3.24.3.2 Significance Criteria

The American Indian Religious Freedom Act, as amended, and Executive Order 13007 (Sections 3.6.1.1 and 3.6.1.2) apply to sites used for religious ceremonies and/or documented sacred sites. These statutes do not specify criteria for determining whether a project would affect such places, however for the purposes of analysis in this EIS, sites used for religious ceremonies as referred to in the American Indian Religious Freedom Act and sacred sites referred to in Executive Order 13007, a project effect is considered significant if it restricts access to such sites, in some way impedes the exercise of ceremonies at such sites, or affects the physical integrity of such sites. In addition, effects on Traditional Cultural Properties that are eligible for listing in the NRHP because of their traditional religious or cultural values would be assessed for impacts under 36 CFR § 800.9 of Section 106 of the National Historic Preservation Act.

Implementation of vegetation management practices may result in impacts to traditional plant resources or ceremonial sites. For example, the treatment could result negative health effects or destruction to traditional edible or ceremonial plants and prescribed or wildland fire may destroy traditional edible plants and/or basket weaving materials. A site would be considered susceptible to a significant effect under one (or more) of the following project-related situations:

- Access is reduced or lost (Executive Order 13007).
- Physical destruction or disturbance (Executive Order 13007 and National Historic Preservation Act).

- Alteration of setting (American Indian Religious Freedom Act and National Historic Preservation Act).
- Introduction of visual, noise, or atmospheric elements that are out of character with the religious ceremonies or that compromise the sacred values (American Indian Religious Freedom Act, Executive Order 13007, and National Historic Preservation Act).

3.24.3.3 Direct and Indirect Effects

3.24.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Historically, there have been direct conflicts between vegetation treatments and resources that are of importance in maintaining Native people's lifeways and/or spiritual values. The following discussion of the various vegetation treatment options and effects on resources that may be of importance in maintaining Native people's lifeways is adapted from the 17-States PER (USDOI BLM 2007c). This section also includes effects unique to the 3 Bars project that have been identified through scoping, consultation between the BLM and the seven tribes, and ethnographic studies conducted by Bengston Consulting for this project and others listed above in Section 3.24.2.1. In addition, the reader is encouraged to read the Native and Non-invasive Vegetation Resources (Section 3.12), Fish and other Aquatic Resources (Section 3.15), Wildlife Resources (Section 3.16), and Human Health (Section 3.26) sections of this EIS for more information on resources and issues of interest to local tribes.

Adverse Effects

Treatment activities that remove vegetation or alter the distribution, health, and welfare of plants and animals used by Native peoples would have the greatest potential to harm natural resources with associated traditional values. During treatments, the BLM would have limited ability to avoid plants identified by Native peoples as being important in traditional subsistence, religious, or other cultural practices.

Beneficial Effects

Treatments to enhance riparian vegetation and increase the number of miles of BLM-administered streams that are classified as "Proper Functioning" would provide good habitat for fish that are harvested by Native peoples. Improvements in habitat quality would increase the carrying capacity of the landscape and allow it to support larger and healthier wildlife populations. In particular, treatments would benefit mule deer, pronghorn antelope, and Greater sage-grouse by removing vegetation (pinyon-juniper) that is degrading habitat or thinning vegetation (pinyon-juniper and sagebrush) to allow more desirable vegetation, such as forbs and grasses, to better compete and thrive. Thinning and removing vegetation would also benefit local and seasonal movement of wildlife, including mule deer and Greater sage-grouse. Because water is scarce on the 3 Bars Project area, the BLM would implement stream and riparian restoration projects to improve water availability for fish and wildlife.

Treatments that remove hazardous fuels from public lands would be expected to benefit the health of plant and animal communities in which natural fire cycles have been altered, and to improve accessibility for tribal cultural practices. Treatments that control populations of non-native species on public lands would be expected to aid in the reestablishment of native plant species. Treatments to control non-native species would benefit game species and plants used for traditional/cultural values and practices, including species associated with shrubland habitats (e.g., Greater sage-grouse, sharp-tailed grouse, quail), where most treatments would occur (USDOI BLM 2007c:4-109).

3.24.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Adverse Effects

Mechanical methods consisting of a track-hoe, backhoe, and dump trucks have the potential to affect a broad range of plant resources, some of which may be of importance to Native peoples. There could be short-term loss of fish habitat and fish resources during stream reconstruction. As opposed to mechanical methods, manual treatment is highly selective and would have less of an effect on plants with traditional/cultural practices and values such as willow, basin wildrye, mint, watercress, wild onions, and bunchgrass that can be found in riparian zones.

Riparian treatments are proposed to occur in areas identified as harvest units for Christmas trees, greenwood, and pine nuts. Within riparian treatment areas, only pinyon-juniper removal would be expected to affect woodland products. Pinyon-juniper removal would occur over a very small portion of designated harvest areas for Christmas trees, pine nuts, and greenwood. These treatments would affect a small percentage of the total woodland products harvest acreage within the 3 Bars Project area, and would not constitute a measurable reduction in special woodland products available for harvest.

The use of small, temporary exclosure fencing to protect treatment sites could limit Native American access to fish and wildlife harvest areas.

Beneficial Effects

Treatment activities would include streambank bioengineering, grade stabilization, and vegetation plantings to initiate stream restoration on up to 31 miles of stream. The habitat improvements would be beneficial to macroinvertebrates, which represent an important food source for fish species, and to Lahontan cutthroat trout (occupied and recovery streams) and game fish species used by local tribes. Habitat improvements in the Lahontan cutthroat trout recovery streams may assist in the reintroduction of this species into habitats that were used historically.

Riparian treatments would enhance water quality and quantity for wildlife used by the tribes, while also promoting improved habitat conditions that would lead to higher quality forage and cover. Approximately 85 percent of riparian treatment acreage is within mule deer summer or winter range habitat, while over 80 percent of the riparian treatment acreage is within the summer or winter range for Greater sage-grouse. Proposed treatments would help to restore degraded riparian habitat, including about 1,250 acres of mule deer habitat, 177 acres of pronghorn antelope habitat, and 1,300 acres of Greater sage-grouse habitat that are degraded due to pinyon-juniper encroachment.

Encroachment of non-native plant species, and displacement of native plant species that serve as important sources of food, reduces the suitability of the habitat for these wildlife species (USDOI BLM 2007b:4-119). Removal of noxious weeds and other invasive non-native vegetation would also promote streambank stability and allow native species to recolonize degraded areas and provide fish and wildlife habitat.

Vegetation treatments that reduce hazardous fuels and create fire breaks would benefit Native American resources by reducing the chances that a large, uncontrolled wildfire would destroy a large amount of high quality vegetation and fish and wildlife and their habitats. The restoration of natural fire regimes and native ecosystems would have long-term benefits associated with increasing the presence and abundance of native plant, fish and wildlife resources important to maintaining Native American traditional lifeways.

Aspen Treatments

Plant species of interest to Native Americans within aspen management units would be similar to those found within riparian treatment zones. Adverse and beneficial effects would be the same as Effects Common to All Alternatives and for Riparian Treatments. The initial acreage of aspen identified for treatment is low (151 acres over 10 years). Therefore, potential loss of Native American traditional resources initially would be localized to very small areas in the Roberts Mountain, JD, 3 Bars, and Santa Fe allotments. In later years, a similar acreage could be treated in the Simpson Park East and Northeast areas.

Pinyon-juniper Treatments

With the exception of Sulphur Spring Wildfire Management Unit, Whistler, Lone Mountain, and Tonkin North and South units, all of the proposed treatment units are within the Roberts Mountains. As stated in the Riparian Treatments section, ethnographic documentation indicates that the Roberts Mountains have been identified by Native American consultants as an important hunting and plant gathering area, particularly for pinyon pine nuts. Pinyon nuts played a significant role in the subsistence, resource management, seasonal migration patterns, spiritual practices, and world view of the Western Shoshone. Other ethnographic plant species identified by Bengston Consulting (2012) that may be found within pinyon-juniper woodlands consist of large sagebrush, basin wild rye, Indian ricegrass, and possibly Mormon tea and wild onions. Historically, the base of the Roberts Mountains was important for the Western Shoshone because of the abundance of root vegetables and seeds, especially pinyon pine, that were harvested there. These resources were also abundant at the base of the Sulphur Spring Range, where the BLM proposes to use wildland fire for resource benefit to manage pinyon-juniper. These environments also provide habitat for various species of wildlife that are important to Native Americans, including pygmy rabbit and Greater sage-grouse.

Adverse Effects

Because of ground disturbance associated with the use of mechanical treatments and the effects associated with prescribed and wildland fire for resource benefit, the potential inadvertent and short-term adverse effects to traditional plant and fish and wildlife resources would be similar to the Effects Common to All Alternatives and Riparian Treatments.

Dense stands of pinyon-juniper provide habitat for mule deer during severe winter weather because of the reduced snow cover and increased thermal cover in these areas. Removal of pinyon-juniper in Phase II and III stands could mean a loss of this wildlife benefit. Pinyon-juniper woodlands also provide habitat structure that would be lost if woodlands were converted to grasslands (Maser and Gashwiler 1978).

Treatments would reduce fuel loads, and fuel breaks to be constructed around old-growth pinyon-juniper woodlands would reduce the risk from catastrophic wildfire. For example, treatment areas on the west slope of the Roberts Mountains have not experienced a large-scale wildfire in over 100 years. As a result, these units have a high to very high or very high to extreme risk for a catastrophic wildfire.

The BLM does not plan to conduct burns in Phase I stands, but would conduct stand-replacement burns that could cover several thousand acres annually in Phase II and III pinyon-juniper stands. About 60 percent of treatments would occur in Phase II and III stands. Prescribed fires would open up pinyon-juniper stands and stimulate the growth of native forbs and grasses to benefit wildlife, but there could also be a minor loss of Wyoming big sagebrush and of other shrubs desirable for Greater sage-grouse, pronghorn antelope, and mule deer hunted by Native Americans. It is likely that large, older pinyon-juniper trees that provide juniper berries and pinyon nuts for mule deer and other wildlife would also be lost. Fire may top-kill some plants used by Native Americans, including Basin wild rye, camas, Indian ricegrass, and Mormon tea, but fire has been shown to enhance their long-term health and development (Howard 1993, Tirmenstein 1999, Anderson 2002, 2004).

Concerns have been expressed by local tribes regarding traditional pine nut harvesting in general and the removal of pinyon pine. Some seed bearing trees would be destroyed or removed by mechanical or hand treatments and fire, and prescribed and wildland fires would require the construction of fuel breaks, which could also compromise plant species of importance to Native American lifeways. Treatments would affect approximately 26 percent of the total designated woodland products harvest area, including 28 percent of the pine nut harvest area. Removal of pinyon pines and juniper from these areas would eliminate or limit the ability to harvest woodland products there, although a large portion of the project area would not be affected. Additionally, other nearby areas in the Battle Mountain District, which make up a substantial portion of the annual harvest area, would not be affected by treatments under the 3 Bars Project.

Beneficial Effects

A key project goal is to increase the distribution and abundance of traditional, edible, and medicinal plants by improving the relative abundance of desirable plant species in previously identified locations (obtained through Native American consultation). This would include sustaining the regeneration and recruitment of desirable species such as aspen, bitterbrush, and curl-leaf mountain mahogany. Although the majority of pinyon-juniper management is focused on hazardous fuels reduction, treatments associated with the Atlas Unit group would involve removal of pinyon-juniper to encourage shrub and riparian species growth. Plants used by local tribes that could benefit from these treatments include basin wildrye, Indian ricegrass, Mormon tea, and sagebrush.

Manual, mechanical, and fire treatments in pinyon-juniper management areas would improve aquatic habitat by increasing stream flows and using downed logs and other wood in streams to create pools and other fish habitat. These treatments would benefit Lahontan cutthroat trout and game fish habitat in Birch, Pete Hanson, and Willow Creeks.

Treatments would help to improve big game habitat, especially in areas with degraded habitat. All of the pinyon-juniper treatment sites are within mule deer summer or winter range, 60 percent of sites are within pronghorn summer or winter range, while nearly 95 percent of the treatment area is within the summer or winter range for Greater sage-grouse. Over 70 percent of acres targeted for treatment occur where the BLM has determined that mule deer or Greater sage-grouse habitat is declining, and nearly 60 percent of the treated acreage would be in areas where pronghorn antelope habitat is declining.

Treatments in the Atlas, Frazier, Gable, Henderson, Upper Roberts, and Vinini units would primarily benefit Greater sage-grouse, but would also open up pathways in drainages, and provide forage for other wildlife by promoting development of native grasses, forbs, and shrubs through removal of pinyon-juniper. These areas also provide important year-round habitat for pronghorn antelope and crucial summer range for mule deer.

Pinyon-juniper encroachment has adversely impacted pygmy rabbit populations (Grayson 2006). Although pygmy rabbits will use areas with limited pinyon-juniper cover, stands with 40 percent or greater cover provide only marginal habitat for pygmy rabbits (USDOI BLM 2003c). The Atlas and Henderson units provide habitat for pygmy rabbits. Pygmy rabbits forage primarily on sagebrush, so treatments that remove pinyon-juniper and stimulate the growth of shrubs and herbaceous vegetation would benefit pygmy rabbits in the long-term.

A large amount of downed logs and woody debris would result from pinyon-juniper management and could be used for firewood. By thinning and removing pinyon-juniper, competition among remaining trees for water and other resources would decline, and the remaining pinyon pines should be able to produce more nuts.

Although there is the low potential for short-term adverse effects to traditional use resources and Native American health, the restoration of natural fire regimes and native ecosystems would have long-term benefits to the presence and abundance of native plant, fish, and wildlife resources important to maintaining traditional lifeways.

Sagebrush Treatments

Adverse Effects

Because of ground disturbance associated with the use of manual and mechanical treatments, the potential inadvertent and short-term adverse effects to traditional plant and terrestrial resources would be similar to the Effects Common to All Alternatives and Pinyon-juniper Treatments. The BLM would use manual and mechanical treatments to seed and plant sagebrush and perennial grasses within sagebrush communities, and control noxious weeds and other invasive non-native vegetation. Kobeh Valley was identified by Bengston (2007) as a culturally significant area within the 3 Bars Project area.

Prescribed fire could be used to remove cheatgrass and other non-native vegetation on the West Simpson Park Unit. As it is unlikely that plants favored by local tribes would be found in areas dominated by non-native vegetation, the effects of prescribed fire on traditional plant and terrestrial resources should be negligible.

Only 1.3 miles of perennial stream habitat are associated exclusively with sagebrush management projects—Rocky Hills (Coils Creek), Table Mountain (Henderson and Vinini Creeks), and West Simpson Park (unnamed streams) units. Lahontan cutthroat trout occurs in Henderson and Vinini Creeks, while native fish (speckled dace) have been reported in Coils Creek. Manual and mechanical treatments could result in increased water runoff and erosion, and spills of fuels and lubricants, to the possible detriment of water quality and aquatic habitat.

Beneficial Effects

Treatments should lead to improved and increased sagebrush habitat and sagebrush resiliency to fire, and open up the sagebrush canopy to slow wildfire spread and promote the development of an herbaceous understory including those plant species mentioned above and of importance to Native American traditional lifeways. In intact sagebrush communities, only 20 percent of the area would be treated and the BLM would create a mosaic of sagebrush and herbaceous vegetation that would retard the spread of wildfire and provide habitat for Greater sage-grouse, another traditionally important species identified in consultation with the Native American community (Bengston Consulting 2012). While there is the potential for short-term adverse effects, the long-term benefits associated with the planting of native perennial vegetation and improved Greater sage-grouse habitat would result in substantial long-term benefits by restoring native sagebrush habitat.

The beneficial effects of sagebrush treatments would include improvements in aquatic and riparian habitats and a reduction in wildfire risk. Trees that are removed as part of this treatment could be placed in streams to expand the stream width and help create or expand pool habitats. The woody structures also would provide additional instream cover for game fish and organic material to the stream environment.

The primary focus of 3 Bars Project sagebrush treatments is to improve habitat for nesting Greater sage-grouse. Approximately 98 percent of proposed treatment acres are within pronghorn antelope summer or winter range, 65 percent are within summer or winter range for Greater sage-grouse, and 55 percent are within mule deer summer or winter range. Loss and degradation of sagebrush habitat has occurred on the 3 Bars Project area, and proposed treatments would focus on restoring sagebrush habitat. Over 85 percent of the acres treated would occur where the BLM has determined that pronghorn antelope habitat is declining, nearly 65 percent of acres treated would occur where Greater sage-grouse habitat is declining, and 45 percent of the acres treated would occur where mule deer habitat is declining. These include treatments on the Rocky Hills and West Simpson Park units, where the BLM would control non-native vegetation to encourage sagebrush development in areas with active or historic Greater sage-grouse leks.

Pinyon-juniper encroachment has impacted pygmy rabbit populations (Grayson 2006), especially where pinyon-juniper cover exceeds 40 percent. Pinyon-juniper removal projects at the Three Corners and Whistler Sage units could benefit pygmy rabbits, although treatments would occur in Phase I stands, where pinyon-juniper cover is less than 40 percent.

3.24.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The types and magnitude of effects for manual, mechanical, and biological control treatments would be similar between Alternatives A and B. Because the BLM would not be able to use fire, however, there would be none of the adverse or beneficial impacts associated with this treatment method. In particular, there would be no harm to or loss of native vegetation or fish and wildlife habitat from prescribed fire and wildland fire for resource benefit. There would also be no risk of a prescribed fire spreading beyond treatment boundaries and impacting native plants and fauna of interest to the Native American community, which could be the case under Alternative A. The few native plants and wildlife that are found in dense stands of pinyon-juniper may not experience habitat loss under this alternative.

Acres and types of wetland and riparian habitat and miles of stream restored would be similar to Alternative A. However, less effort would be spent by the BLM on slowing pinyon-juniper encroachment into sagebrush and riparian communities, removing Phase II and III pinyon-juniper, restoring historic sagebrush habitat, and controlling noxious weeds and other invasive non-native vegetation that is adversely impacting native vegetation and fish and wildlife habitat.

Under Alternative B, the BLM would be limited to manual and mechanical methods for removing noxious weeds and other invasive non-native vegetation and replanting and reseeding to promote the growth of native forbs and grasses. However, the West Simpson Park Unit is on rugged terrain, and use of mechanical equipment to control cheatgrass would be difficult on this unit.

The inability to use prescribed fire and wildland fire for resource benefit would probably have few short-term effects. By not using fire, risks to non-target vegetation, including plants used by local tribes, from treatments would be negligible. Long-term, however, native vegetation and fish and game species would experience fewer of the benefits associated both with creating openings in dense pinyon-juniper habitat and creating a mosaic of pinyon-juniper and sagebrush habitat.

Under Alternative B, riparian restoration treatments would primarily be limited to manual treatments (placing logs and rocks in streams to slow water flows, using small, temporary exclosure fencing to exclude livestock, wild horses, and other wild ungulates, and stimulating aspen regeneration) that would help to create wet meadows and enhance riparian vegetation and fish and wildlife habitat. Because fire would not be available to reduce hazardous fuel loads, Alternative B may pose a greater long-term risk for wildfire due to the accumulation of fuels. Without the use of prescribed fire and wildland fire for resource benefit, the BLM would be unable to restore fire as an integral part of the ecosystem. It is unlikely that the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse in the long-term, and catastrophic wildfire would continue to be a threat to traditional pine nut gathering locations, and plants such as basin wild rye and Indian ricegrass that are found in sagebrush and pinyon-juniper habitats.

Under Alternative B, Native American traditional/cultural values, practices, and resources would benefit from treatments, but not to the extent that would occur under Alternative A.

3.24.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

The types and magnitude of effects for manual treatments on Native American resources would be similar to those for the other alternatives. The BLM has not identified areas where it would use classical biological control, but if nematodes, insects, or fungi are used on the 3 Bars Project area, treatments would generally be small in size and effects would be localized, or if used on cheatgrass, could cover large areas of habitat that support little native vegetation or wildlife. Thus, the effects on Native American resources from classical biological control would be minor and primarily restricted to those species using vegetation treated by these methods.

Most of the treatments under this alternative would be to thin and remove pinyon-juniper using chainsaws where it is encroaching into riparian, aspen, and sagebrush habitats. There would be fewer direct impacts to plants and animals used by Native Americans from treatments under this alternative than the other alternatives, because adverse impacts, such as harm to or death of plants and wildlife, and noise and other disturbance, would be much less with manual methods than with the other methods. Since fewer acres would be treated, however, there would be fewer benefits to Native American resources under this alternative than under Alternatives A and B. Manual treatments would be small in scale and mostly targeted to pinyon-juniper stands. By not being able to use mechanical equipment, the BLM would have limited capabilities to benefit Native American resources by:

- Conducting stream bioengineering and restoration, except on a limited basis on only a few stream miles, to benefit Lahontan cutthroat trout, other game fish, Greater sage-grouse, and native riparian vegetation.
- Controlling noxious weeds and other invasive non-native vegetation, except on very small areas where this vegetation can be hand pulled or controlled using hand tools, to benefit native vegetation and wildlife, including Greater sage-grouse, pygmy rabbit, pronghorn antelope, and mule deer.
- Reseeding and replanting restoration sites, except for small areas where shrubs and other vegetation would be planted by hand, to the benefit of a variety of Native American resources.
- Creating fire and fuel breaks to reduce the risk of fire spread, except near existing roads or aspen stands, or along a few miles of stream, and using manual methods to reduce hazardous fuels and wildfire risk.

Under Alternative C, the BLM would not substantially improve the native vegetation community nor stop the loss of important ecosystem components, including native vegetation and fish and wildlife habitat. As a result, the health and abundance of Native American traditional/cultural resources would be expected to decline from current levels.

3.24.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct or indirect effects on Native American traditional/cultural values, practices, and resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire that could be detrimental to Native American resources. Under Alternative D, the BLM would not improve the native vegetation community nor stop the loss of important ecosystem components, including native vegetation and fish and wildlife habitat. As a result, Native American traditional/cultural values, practices, and resources would not see benefits under this alternative.

3.24.3.4 Cumulative Effects

The CESA for Native American traditional/cultural values, practices, and resources is approximately 3,202,529 acres and includes the 3 Bars Project area and an area of north-central Nevada that encompasses the Kobeh Valley on the south, the Tuscarora Mountains on the north, the Shoshone Range on the west, and the Pinon Range on the east, based on consultation with local tribes for the Mount Hope Project and other projects in the region (USDOI BLM 2012b:4-9; **Figure 3-1**). Approximately 72 percent of the area is administered by the BLM, 27 percent is privately owned, and less than 1 percent is administered by the USDOI Bureau of Reclamation. Past and present actions that have influenced land use and access in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.24.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Historic livestock grazing practices and wild horse overpopulation have contributed to the degradation of riparian and aspen habitat, establishment and spread of noxious weeds and other invasive non-native vegetation, and the expansion of pinyon-juniper beyond its historical ranges, to the detriment of fish and wildlife used by Native Americans on Roberts Mountains and elsewhere in the CESA. To improve forage and water resources, the BLM would continue ongoing management reviews to ensure proper livestock management and long-term treatment success.

The BLM would also continue to conduct wild horse gathers, AML reviews and adjustments, remove excess animals and use fertility control, improve water developments, and implement habitat projects. A small portion of the Roberts Mountain HMA is on Roberts Mountains, and wild horses use portions of Roberts Mountains that are outside of the HMA, especially when the wild horse population exceeds the AML. Efforts to distribute wild horses more evenly across the rangeland should help to reduce grazing pressure on Roberts Mountains. However, the Mount Hope Project would exclude wild horses from about 14,000 acres for up to 70 years, and as a result wild horses may spend more time in the Roberts Mountains in search of food and water, potentially to the detriment of vegetation used by Native Americans.

The BLM would treat noxious weeds and other invasive non-native vegetation on about 1,000 acres annually within the CESA. New infestations would typically be found in newly burned or disturbed areas, and in areas where livestock and wild horses congregate. These areas provide poor habitat for plants and animals used by local tribes. Tribal members could be impacted by herbicides, through indirect contact or consumption of treated foliage, but the BLM would post treatment areas and notify the tribes and public of proposed herbicide treatments to avoid or minimize impacts to human health. The risks to Native Americans are discussed in more detail in the 17-States PEIS (USDOI BLM 2007c: 4-149). Restoration of these areas using a combination of methods should help to restore these lands back toward their Potential Natural Community (primarily sagebrush). As treatment areas recover, native game, including Greater sage-grouse, mule deer, pronghorn antelope, and pygmy rabbit, should return to these areas.

Public and private lands are used for a variety of recreation uses. Of most interest to local tribes would be the removal of vegetation that is used by tribes for traditional purposes, and the harvest of fish and game on public lands within the CESA. Recreational activities such as off-road travel could disturb native game and adversely affect Native American traditional practices. Use of public lands within the CESA is expected to increase due to normal population growth and from an influx of workers needed to support the Mount Hope Project and other reasonably foreseeable future projects.

Agriculture, land development, and mineral, oil, gas, and hydrothermal exploration and development could affect about 15,000 acres in the reasonably foreseeable future, including acreage associated with potential land sales (although it is unlikely that all of this land would be developed), new croplands, roads, and rights-of-way for power and telephone lines. These actions would affect traditional/cultural resources and values and would be of concern if they occurred on Roberts Mountains or on the Sulphur Spring Range, or in Kobeh Valley, three culturally significant areas within the 3 Bars Project area (Bengston 2007). In particular, there could be loss of vegetation used by local tribes, and of fish and wildlife and their habitats that are important to local tribes.

Approximately 8,300 acres would be disturbed by the Mount Hope Project, and another 6,000 acres fenced to exclude the public. Thus, about 14,000 acres used by large and small game would be made unavailable for use by local tribes for hunting. In addition, the mine could affect groundwater levels in the vicinity of the mine, potentially impacting vegetation on the Kobeh and Diamond Valleys, and affecting surface water flows on Roberts Mountains; these are culturally important areas to the Western Shoshone (Bengston 2007). These effects could last 70 years or more, and could impact plant, fish, and wildlife resources of importance to local tribes (USDOI BLM 2012b:4-69). The mine project would impact less than 1 percent of pinyon pines in the CESA. The mine site would be reclaimed, but habitat for big game and pygmy rabbit may be inaccessible or unavailable for 40 years or more. The mine proponent, BLM, and State Historic Preservation Office have developed a Programmatic Agreement to address many of these concerns.

The buildup of hazardous fuels and the spread of noxious weeds and other invasive non-native vegetation have increased both the risk of wildfire and the displacement of plants and animals that are important to Native peoples for maintaining their traditional/cultural practices and values. Although fire is being reintroduced to undeveloped areas in the West that were historically burned by Native peoples to maintain early successional plant species and improve habitat for game species, natural disturbance regimes have not been restored over much of the West. Encroachment by non-native species into natural ecosystems continues, to the detriment of many native species of importance to Native peoples.

Since 1985, wildfires have burned about 15,000 acres annually in the CESA, although the acreage burned annually can be quite variable. The risks to Native American traditional/cultural values from wildfire are much greater than for prescribed fires, as wildfires tend to be hotter and burn larger areas. Wildfires kill vegetation, and harm or displace the native fish and wildlife used by local tribes. In addition, it is often difficult to restore burned lands, due to their remote location and uneven terrain, and noxious weeds and other invasive non-native vegetation often out-compete and displace native vegetation, to the long-term detriment of resources used by Native Americans. Treatments that remove hazardous fuels, including decadent and diseased pinyon-juniper and cheatgrass and other non-native vegetation, and construction of fire and fuel breaks, would be expected to reduce the risk of catastrophic wildfire, to the benefit of Native American resources.

In addition to the approximately 127,000 acres that could be treated on the 3 Bars Project area to reduce hazardous fuels and restore ecosystem health, the BLM also proposes to treat hazardous fuels and improve habitat on an additional 15,000 acres under current or reasonably foreseeable future authorizations in high to very high fire risk areas, or collectively on about 4 percent of lands within the CESA. Most of these treatments would occur within pinyon-juniper and sagebrush management areas, including on Roberts Mountains and Sulphur Spring Range, areas with ethnographic significance to the Western Shoshone. As discussed under direct and indirect effects, hazardous fuel treatments could adversely impact traditional/cultural resources and values within the CESA, including singleleaf pinyon pines and Utah juniper that are used for their seeds and berries. Treatments could also impact fish and game resources, including mule deer, pronghorn antelope, and pygmy rabbit, which are used for food by local tribes. As discussed under Native and Non-invasive Vegetation Resources (Section 3.12) and Wildlife Resources (Section 3.16), treatments would have short-term effects on vegetation and wildlife habitat and displace game species, but within a few years conditions within treatment areas should improve and provide improved vegetation and fish and wildlife habitat. The beneficial effects of treatments would be greatest under Alternative A.

3.24.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on Native American traditional/cultural values, practices, or resources would be similar to those described under Alternative A. Under Alternative B, less effort would be spent by the BLM on treatments to reduce wildfire risk and its impacts on vegetation and fish and game habitat, including use of fire to restore natural fire regimes.

Adverse effects to Native American traditional/cultural values, practices, and resources within the CESA would generally be the same as described for Alternative A. By not using fire on the 3 Bars Project area, however there would be no risks to vegetation from fire on up to several thousand acres annually within the project area. Fire could be used on a few hundred acres annually outside the 3 Bars Project area.

By not using fire to reduce hazardous fuels and improve vegetation resiliency to fire, there would be greater potential for more extensive and intense wildfires to occur in place of controlled burns on the 3 Bars Project area under this alternative compared to Alternative A. This could lead to loss of vegetation and fish and wildlife habitat of importance to local tribes. 3 Bars Project actions would only affect about 63,500 acres, or 2 percent of the CESA. The BLM would consult with local tribes, and treatment areas would be surveyed, prior to treatment to avoid or reduce impacts to Native American traditional/cultural values, practices, and resources. Thus, there should be negligible cumulative effects to these resources from 3 Bars Project actions. These effects would be less than under Alternative A, but greater than under Alternative C.

3.24.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on Native American traditional/cultural values, practices, or resources would be similar to those described under Alternative A. Adverse, short-term effects to vegetation associated with the use of fire and mechanized equipment would not occur under Alternative C. However, fire and mechanized equipment would be used in other portions of the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire.

By not being able to use mechanical methods and fire to reduce hazardous fuels, improve vegetation resiliency to fire, create fire and fuel breaks, and remove downed wood and slash, however, the risk of wildfire and its impacts on

Native American traditional/cultural values, practices, or resources would likely increase on the 3 Bars Project area, to the potential detriment of vegetation and fish and wildlife and their habitats within the CESA.

About 32,000 acres would be treated on the 3 Bars Project area, and another 15,000 acres in other portions of the CESA, to reduce hazardous fuels and to improve ecosystem health, or only about 1 percent of the CESA. The BLM would consult with local tribes, and treatment areas would be surveyed, prior to treatment to avoid or reduce impacts to Native American traditional/cultural values, practices, and resources. Thus, there should be negligible cumulative effects to these resources from 3 Bars Project actions and effects would be less than under Alternatives A and B.

3.24.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on Native American traditional/cultural values, practices, or resources would be similar to those described under Alternative A. There would be no cumulative effects on Native American traditional/cultural values, practices, and resources from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage (about 1,500 acres annually; or about 0.03 percent of the CESA annually). Thus, benefits to Native American traditional/cultural values, practices, and resources would be negligible and least among the alternatives.

3.24.3.5 Unavoidable Adverse Effects

Unavoidable adverse effects could occur through inadvertent actions such as accidental removal of culturally significant plant species during mechanical methods or loss of important game habitat from burning. Treatments could also discourage or prohibit Native peoples from using these areas. However, all of these impacts would be short-term and would be far outweighed by the beneficial effects associated with long-term effects resulting from treatments that result in an increase in the abundance and diversity of native plant, wildlife, and aquatic resources.

3.24.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Vegetation treatments under all alternatives could have short-term impacts on vegetation used for traditional lifeways. Manual treatment methods have the least potential to impact plant species of importance to Native American traditional/cultural values, practices, or resources. These methods would be used to thin pinyon groves and, while there could be a short-term adverse effect from treatments, there would be a long-term benefit in pine nut harvesting associated with increased production; this would far outweigh the short-term effects. Biological treatments would have the least impact on short-term use, while prescribed and wildland fire and mechanical treatments have the potential to have the greatest effect on short-term use. Fire treatments could displace Native peoples from traditional use areas until the area is safe to reenter, or desirable vegetation was reestablished. However, the long-term restoration of native plant communities and natural ecosystem processes that benefit traditional plant and animal resources should compensate for the short-term losses in use and access.

3.24.3.7 Irreversible and Irretrievable Commitment of Resources

The use of treatments could inadvertently harm desirable edible plants, fish, and other fauna used for traditional lifeways or basketweaving. Prescribed burning and use of wildland fire for resource benefit would result in short-term habitat degradation and loss of plants and animals. However, these losses would be reversible as habitats would improve (USDOI BLM 2007c:251-252). Inadvertent impacts would only affect a small percentage of the treated acreage, and these impacts would be reversible. Further, the long-term benefits associated with all treatments that reduce the cover of noxious weeds and other invasive non-native vegetation, restore native vegetation, restore natural fire regimes, and restore long-term ecosystem health would substantially improve the diversity and quantity of traditional flora and fauna of importance to maintaining Native American traditional/cultural values, practices, or resources.

3.24.3.8 Significance of the Effects under the Alternatives

3 Bars Project and other actions in the CESA could have a significant impact on Native American traditional/cultural values, practices, or resources if the actions restrict access to sites used for religious ceremonies and/or documented sacred sites, in some way impede the exercise of ceremonies at such sites, or affect the physical integrity of such sites; impacts traditional plant resources or ceremonial sites; alter the setting of sites; or introduce visual, noise, or atmospheric elements that are out of character with the religious ceremonies or that compromise the sacred values.

The only Traditional Cultural Property within the CESA is the Mount Tenabo Traditional Cultural Property, which is immediately northwest of the 3 Bars Project area. It is probably the single most culturally important landscape feature on the homeland of the Western Shoshone (Fowler 1986). No reasonably foreseeable actions are proposed for this area, thus, effects from reasonably foreseeable future actions within the CESA would not be significant under all alternatives.

Based on the number of acres treated, short-term impacts to plants, as well as habitats used by fish and wildlife, that are important to Native peoples would be greatest under Alternative A and least under Alternative D. However, as the long-term objective of treatments is to restore native plant communities and habitats, including those of traditional importance to Native peoples, these effects to traditional plant resources would not be significant under the alternatives, especially given the likelihood of greater risk of catastrophic wildfire, and loss of plant and animal resources used by local tribes, that would occur without the treatments.

The BLM and State Historic Preservation Office have entered into a Programmatic Agreement that outlines the stipulations that will be followed to ensure compliance with Section 106 of the National Historic Preservation Act for each phase of the 3 Bars Project (see **Appendix B**). According to the Programmatic Agreement, all treatments shall be conducted in a manner consistent with the BLM and State Historic Preservation Office Protocol. The BLM, in consultation with the State Historic Preservation Office, shall ensure that effects to cultural resources and properties of traditional religious and cultural importance are avoided through design, or redesign, or by other means in a manner consistent with the BLM and State Historic Preservation Office protocol. When avoidance is not feasible, the BLM, in consultation with State Historic Preservation Office, Native American Tribes, and interested persons, shall develop, or ensure that, an appropriate treatment plan is designed to lessen or mitigate project-related effects to these resources and properties. By following the Programmatic Agreement, the BLM would ensure that there are no significant direct, indirect, or cumulative effects to cultural resources and properties of traditional religious and cultural importance under all alternatives from 3 Bars Project actions. A similar Programmatic Agreement was prepared for the Mount Hope Project, and the BLM and other federal agencies with land interests within the CESA would develop similar agreements, if needed, before conducting actions within the CESA that could impact cultural resources and properties of traditional religious and cultural importance.

3.24.4 Mitigation

Under all alternatives, the BLM shall implement the following measures in accordance with the Programmatic Agreement prepared for the 3 Bars Project and as discussed in Section 3.23.4, Cultural Resources, Mitigation.

3.25 Social and Economic Values and Environmental Justice

3.25.1 Regulatory Framework

The NEPA requires consideration of local plans and policies in the assessment of the social and economic effects of proposed activities involving federal lands (43 CFR § 1506.2). Federal, state, and local plans and guidelines that apply to social and economic values within the analysis area include the Eureka County 2010 Master Plan, including the updated Natural Resources, Federal or State Land Use, and Economic Development Elements; the Shoshone-Eureka RMP; and the Land and Resource Management Plan for the Toiyabe National Forest.

Chapter 6 of the Eureka County Master Plan, Natural Resource and Land Use Element, is designed to: 1) protect the human and natural environment of Eureka County, 2) facilitate federal agency efforts to resolve inconsistencies between federal land use decisions and County policy, and 3) provide strategies and policies for progressive land and resource management. The updated Growth Management, Public Facilities and Services, Economic Development, Land Use, and Housing Elements of the Eureka County Master Plan outline specific goals that pertain to the project. Guidance and input for this assessment have also been provided by Eureka County staff, the Board of Eureka County Commissioners, and the Eureka County NEPA Committee (Eureka County 2010).

On February 11, 1994, President Clinton issued Executive Order12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Executive Order 12898 tasks “each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, instructs federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children, and to ensure that their policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks.

3.25.2 Affected Environment

3.25.2.1 Study Methods and Study Area

Information for this section is drawn from the Mount Hope Project EIS (USDOI BLM 2012b) and other sources as indicated. Where necessary, baseline socioeconomic data from the Mount Hope Project EIS has been updated, drawing from published sources as cited and from information provided by Eureka County.

Public concerns expressed during scoping included potential effects on the area's agricultural community and effects related to a temporary work force associated with project implementation. These issues and concerns were considered in developing the description of the Affected Environment.

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (CEQ 1998). The assessment of environmental justice reflects USEPA's Guidance for Incorporating Environmental Justice Concerns in USEPA's NEPA Compliance Analyses (USEPA 1998). That guidance suggests a two-step screening process to identify environmental justice concerns. This two-step process defines criteria for this issue, as follows:

1. Does the potentially affected community include a substantial minority and/or low-income population?
2. Are there potentially high and adverse environmental or human health effects associated with the proposed action?

If either of these criteria are unmet, there is little likelihood of environmental justice effects occurring. If the two-step process indicates a potential exists for environment justice effects to occur, further analyses are conducted to consider the following:

- whether the potential exists for these effects to fall disproportionately on minority or low-income members of the community or on tribal resources;
- whether the affected communities have had the opportunity to be sufficiently involved in the decision-making process; and
- whether communities currently suffer, or have historically suffered, from environmental and health risks and hazards.

The study area for direct, indirect, and cumulative social, economic, and environmental justice effects is the southern portion of Eureka County, from the BLM Elko District boundary to the Nye County line (**Figure 3-1**). Eureka County is long and narrow, approximately 128 miles from north to south, between 22 and 42 miles wide, and contains 4,182 square miles. Eureka County government provides public services throughout the County. There are no incorporated towns in Eureka County. The town of Eureka, the County seat and largest community in the County, and Crescent Valley, the other town within the County, are unincorporated towns as defined by Nevada statutes.[5] The town of Eureka is approximately 10 miles south of the southeast corner of the 3 Bars project area and the town of Crescent Valley is approximately 10 miles north (via unpaved road) from the project area's northwest corner. The community of Beowawe is also in the northern part of Eureka County, approximately 14 miles north of Crescent Valley and 6 miles south of Interstate 80.

[5] Nevada Revised Statute § 269.520. "Unincorporated town" or "town" means a specific area within a county in which one or more governmental services are provided by the county in addition to those services provided in the general unincorporated area of the county, for which the residents of such area pay through ad valorem taxes or for which other revenue is secured from within the area.

3.25.2.2 Minority Populations and Poverty

The number of residents in Eureka County that describe themselves as a member of a racial or ethnic minority and the incidence of poverty are both a lower percentage of the total population than comparable statewide and national levels (**Table 3-65**). No tribally owned lands, or mineral resources or lands or minerals held in trust for Native American Tribes by the federal government, are within or near the project area.

TABLE 3-65

Minority Population and the Incidence of Poverty in Eureka County, 2010

Geographic Area	Percent Racial or Ethnic Minority Population	Proportion of Population Below Poverty Level
United States	29.5	15.3
Nevada	45.9	14.8
Eureka County	15.9	10.1

Note: Racial minorities include all persons identifying themselves in the census as a non-white race, including “Black or African American,” “American Indian and Alaska Native,” “Asian,” “Native Hawaiian and Other Pacific Islander,” “Some other race alone,” and “Two or more races.” Ethnic minorities include persons who identify themselves as Hispanic or Latino. Persons of Hispanic or Latino origin can identify themselves as part of any race (including white) and as persons of Hispanic or Latino origin.
Source: U.S. Census Bureau (2011a, b, c, 2012).

Comparing the screening criteria outlined above to the local settlement patterns, demographics, and poverty characteristics of the resident population in the County, and absence of major construction or other activity having direct effects that would extend beyond the project area, suggests no need for further assessment of potential environmental justice concerns as related to the proposed 3 Bars Project. The BLM is conducting government-to-government consultations with local tribes. If environmental justice concerns are identified during consultations, they will be addressed during the EIS process.

3.25.2.3 Economic and Social Setting

Eureka County is the second least populous county in Nevada with a 2011 estimated population of 1,994 and a 2011 average population density of 0.48 residents per square mile (Nevada State Demographer 2012a). The 2011 population estimate is virtually unchanged from the 1,987 residents reported for the County in the 2010 census.

The town of Eureka initially developed in conjunction with the mining industry, but has been sustained through the years by the agricultural industry and local government. Farm and ranch households live on agricultural operations on private lands across the county, most of which are in the central portion of the county in the vicinity of Nevada State Route 278 (Eureka County 2010).

Eureka County’s economy is predominately natural resource-based. Mining, farming and ranching, tourism, and many forms of outdoor recreation rely on the land and its resources. Agriculture, primarily growing high quality alfalfa and hay for sale and winter feed and cattle and sheep ranching, has historically served as a base for the Eureka County economy, with mining responsible for periods of economic prosperity and decline.

Mining plays a vital and complex role in the economy and culture of Eureka County. The two largest gold mining operations in the state, Barrick Gold’s Goldstrike Complex and Newmont Mining’s Carlin Trend Complex, are located in northern Eureka County. However, most of the economic activity associated with these mines accrues to Elko County, which is also home to most of the employees. These and other mines provide substantial tax revenue for Eureka County, which is used in part to provide public services and facilities throughout the County.

Land ownership and management also factor prominently in Eureka County's economic and social setting. The federal government manages 79 percent of all land in Eureka County, providing habitat and other environmental functions and supporting a variety of consumptive and non-consumptive uses. About 21 percent of the land is privately owned, including lands in the "checkerboard" along the Union Pacific Railroad mainline in the northern portion of the county. State- and County-managed lands together comprise less than one-half percent of the total.

3.25.2.4 Population and Demography

Eureka County's population peaked at more than 7,000 residents in 1880, fell to a low of 767 residents in 1960, then trended upward through the 1990s. Between 2000 and 2005, the County's population declined by nearly 200 residents, but subsequently gained more than 500 residents to 1,987 in 2010. The decline in the County's population between 2000 and 2005 coincided with a suspension of operations at the Ruby Hill Mine.

Between 2000 and 2011, population trends in Eureka County's unincorporated towns and outlying areas mirrored both those of the entire County and employment trends in the mining industry. During this period, just over two-thirds of the County's residents lived in the town of Eureka and nearby rural areas in the southern portion of the County. In 2011, the town of Eureka had 611 residents, with 396 in Crescent Valley and 987 living elsewhere in the County (**Table 3-66)**.

In 2011, the average household size in southern Eureka County was 2.38 persons, which is smaller than the statewide average of 2.65 individuals (U.S. Census Bureau 2011a).

The racial composition of the resident population in southern Eureka County is more predominately white than that of the state as a whole. In 2010, 89.6 percent of area residents identified themselves as white, alone or in combination with one or more other races. That compares to 66.2 percent at the statewide level (U.S. Census Bureau 2011a).

The Nevada State Demographer prepares population estimates and population projections for Nevada's counties, cities, and unincorporated towns. The forecasts released in April 2012 anticipate a net gain of approximately 300 residents in Eureka County by 2020, with a further gain of 200 residents by 2030. The projected population gains initially parallel anticipated gains of 400 jobs in the County, on a place of work basis. Population growth is projected to slow thereafter (Nevada State Demographer 2012b).

TABLE 3-66

Eureka County Population, Selected Years, 2000 to 2011

Area	2000	2005	2011
Eureka County	1,651	1,485	1,994
Eureka Town	499	440	611
Crescent Valley	330	311	396
Remainder of the County	822	734	987

Source: U.S. Census Bureau (2011a, b), and Nevada State Demographer (2012a).

3.25.2.5 Economy and Employment

Mining dominates the Eureka County economy in terms of employment and earnings. Total employment in the County topped 5,300 jobs in 1997, nearly 4,400 of which were in mining. The concentration of employment in the mining sector is the result of the expansion of several gold mines along the Carlin Trend[6] in the northern part of the County, and whose employees reside, for the most part, outside of the County.

Data on the resident labor force and employment by place of residence are more reflective of the much smaller and more recent mining presence in southern Eureka County. Barrick Gold's Ruby Hill Mine is just outside the town of Eureka, and provides an economic and employment boost for southern Eureka County. Since 2006, the Ruby Hill Mine has been recovering gold from the East Archimedes ore body, and recently announced additional reserves which may support mining for several more years.

Eureka County's labor market conditions generally parallel trends in the mining industry, although they are more closely tied to activities in the southern part of the County. In 2005, when construction of the East Archimedes expansion of the Ruby Hill Mine was underway, the labor force stood at 674 and unemployment at 3.6 percent. The resident labor force has subsequently expanded to nearly 1,100, 65 percent over the 2005 levels, while unemployment remains relatively low 6.4 percent in February 2012 (**Table 3-67**).

TABLE 3-67

Eureka County Labor Force, Unemployed, and Unemployment Rate, Selected Years

	2007	**2008**	**2009**	**2010**	**2011**	**2012 (Feb)**
Labor Force	793	845	906	1,082	1,115	1,081
Unemployed	59	46	62	82	67	69
Unemployment Rate (%)	4.3	5.5	6.8	7.6	6.0	6.4

Source: U.S. Department of Labor Bureau of Labor Statistics (2012).

Based on the strength of Eureka County's economy, local unemployment rates are consistently lower than both the statewide and national averages; 6.0 percent in Eureka County for 2011, as compared to 13.5 percent statewide and 8.9 percent for the nation.

Eureka County personal income data by place of work statistics reflect the presence of the Barrick and Newmont mines in the northern part of the County, whereby most of the labor earnings paid by Eureka County employers flow out of the local economy. Over the 3-year period 2008 to 2010, more than 80 percent of the total wages and salaries paid by employers in Eureka County were to workers living outside the county. After additional adjustments, social security deductions, and other income such as interest and dividends, the total personal income of residents averaged approximately $66 million (**Table 3-68**).

[6] The Carlin Trend, one of the world's most productive gold mining districts, is a northwest trending belt of mineral deposits over 50 miles long and 5 miles wide extending through northern Eureka County into Elko County on the northwest and southeast.

TABLE 3-68

Eureka County Personal Income by Place of Residence, Selected Years (in millions of dollars)

	2008[1]	2009[1]	2010[1]
Earnings by Place of Work	441.1	463.9	453.6
Net Residency Adjustment	-347.8	-369.4	-357.3
Social Security Deductions	-43.9	-48.7	-48.0
Other Income to Residents	16.8	16.9	17.3
Total Personal Income - Residents	66.2	62.7	65.7
Per Capita Income	$37,227	$32,577	$32,876

[1]A negative residency adjustment reflects the net earnings of workers employed in Eureka County, but who reside elsewhere, primarily in Elko County, that are in excess of the earnings of Eureka County residents employed outside the County.
Source: U.S. Bureau of Economic Analysis (2012a).

Prior to the late 1990s, per capita personal income of Eureka County residents was higher than that for Nevada and the U.S. Eureka County residents have trailed the state and national norms since 2000. In 2010, the variance was 11 percent below the statewide average and nearly 18 percent below the national average (**Table 3-69**). A substantial decline in farm income between 2008 and 2009 was largely accountable for a decrease of more than $4,600 in per capita personal income (U.S. Bureau of Economic Analysis 2012b).

Although the mining industry is the dominant employer in the county, other sectors play important roles in supporting the County's economy, particularly in the southern portion of the County. These sectors include government and public education, retail trade and services, construction, and agriculture. The levels of economic activity and employment in sectors other than agriculture, particularly construction, have historically reflected changes in mining activity.

TABLE 3-69

Per Capita Personal Income, Eureka County, Nevada, and the United States

	2008	2009	2010
Eureka	$37,227	$32,577	$32,876
Nevada	$39,879	$36,533	$36,938
United States	$40,947	$38,846	$39,937

Source: U.S. Bureau of Economic Analysis (2012c).

Public sector employment, which includes federal, state, and local government and public school employment, increased through much of the 1990s, eventually peaking at approximately 275 (U.S. Bureau of Economic Analysis 2012d). Public sector employment subsequently fell to 166 in 2003 before climbing to 250 in 2011 (Nevada Department of Employment, Training and Rehabilitation 2012). Most of the public sector employment in Eureka County is based in the town of Eureka due to the location of the County administrative and other functions, the Eureka County School District, and some state agencies within the town. Farm employment accounted for 3.3 percent of all employment.

The local business sector in the town of Eureka is limited in diversity and scale, focused primarily on essential consumer, building, and automotive goods and services. Retail shopping opportunities include groceries, hardware and lumber, auto parts/fuel/supplies, and novelties and gifts targeted at tourists. There are also several restaurants and other food service establishments, two bars, and a casino in town. Residents use the internet or travel to Elko, Reno, or elsewhere to access a wider selection of goods, financial services, and a broader range of medical and dental care (USDOI BLM 2012b).

The local business sector in Crescent Valley includes a convenience/gas store, a restaurant and bar, a trailer park, and a contractor and tire, lube and equipment rental establishment (Eureka County 2012). Tourism, recreation activities, attractions, and events in Eureka County include big and small-game hunting, fishing, sightseeing, off-highway vehicle use, visits to the Eureka Opera House and Sentinel Museum, general interest in the historic mining character of the community, and events such as the county fair, county youth fair, high school rodeo, and special events (e.g., car show and drag race, and shooting and archery tournaments [Eureka County 2012, USDOI BLM 2012b]). Travelers along U.S. Highway 50, including bicyclists and motorcyclists, contribute to the Eureka County economy. The economic stimulus generated by recreation and tourism cuts across several retail and service industries; as a result, data regarding the levels of activity are not readily available.

Closely aligned with recreational activity on public lands is the harvest and collection of resources for personal use and enjoyment. Eligible resources include flowers, berries, pinyon and other nuts, seeds, cones, and other plant parts, campfire wood, rocks, mineral specimens, petrified wood, Christmas trees, semiprecious gemstones, and common invertebrate fossils. Harvesting of berries, nuts, and other plants and plant material is an important customary and traditional use of public lands for Native Americans.

3.25.2.6 Farming and Ranching

Local agriculture is an important element of the area’s economic base. Although agriculture’s importance may not always be reflected on a strict accounting basis and farm income is sensitive to outside influences and varies year to year, farming and ranching provide livelihoods for many households, support local government and public education by contributing to the local tax base, and indirectly support other local businesses through purchases of farm equipment, fuel, veterinary services, and other goods and services. Since members of agricultural households often work “off the ranch” for additional income, they are also a source of labor for other employers. A study of economic linkages in Eureka County reported that each direct job on local farms and ranches supported between 0.28 and 0.68 jobs elsewhere in the local economy, and that every $1 in economic output resulted in another $0.66 to $1.02 in secondary economic impact (Fadali et al. 2005). Examples of such linkages include local purchases of diesel fuel, lubricants, tools, other farm supplies, and groceries from local merchants and service providers, as well as electrical power used for irrigation purchased from Mt. Wheeler Power. Furthermore, the farm-based population tends to be connected to the land in ways that anchors it to the area more so than households associated with other elements of the economy.

Farm employment in Eureka County has experienced some volatility since 2000, declining for several years at the beginning of the decade, but increasing thereafter. As a consequence, farm employment in 2010 was reported at 163, a net increase of 30 farm jobs, or 23 percent, as compared to 2000.

The USDA National Agricultural Statistics Service (2009) reported 86 farms and ranches in Eureka County in 2007, up from 73 in 2002. Together those 86 operations reported operating a total of 783,440 acres, which corresponds to an average farm size of 9,110 acres.[7] Eureka County farmers and ranchers reported just under $27 million in livestock, commodity, and other agricultural product sales in 2007 and out of 17 counties in Nevada, Eureka County was ranked fourth in the state in terms of crop value. The combined sales of livestock and products rose to $32 million in 2008, declining to $24.1 million in 2010. Revenue derived from livestock sales generally accounts for about one-third of the aggregate sales by local farms and ranches, and receipts from crop sales account for about two-thirds of the total. Cattle account for most of the livestock raised in Eureka County with sheep and horses accounting for most of the remainder. Approximately 35,000 acres of farmland are devoted to forage production (U.S. Bureau of Economic Analysis 2012b).

Eureka County growers are known to raise high quality alfalfa and other hay that is marketed out-of-state to dairies and horse breeders, as well as exported internationally. Data for Eureka County in 2011 indicated a total of approximately 42,400 acres devoted to raising crops; hay (31,200 acres) and alfalfa (10,400 acres) being the two primary crops (USDA National Agricultural Statistics Service 2012a). More than 70 percent of the total land planted in crops was in the Diamond Valley and elsewhere in southern Eureka County. As shown in **Figure 3-52**, Eureka County alfalfa production has ranged from a 2004 low of slightly over 60,000 tons, to a peak in 2007 of over 100,000 tons. Production in 2011 was 77,000 tons, comparable to the annual average for the period 1995 to 2011. Weather, including an extended period of drought, was largely responsible for much of the year-to-year variation in hay production over the past decade.

Eureka County livestock production over the past 11 years peaked at 37,000 units in 1999 and 2000, but has since decreased to 25,000 units in 2011 (see **Figure 3-53**)[8]. As in the case of hay production, some of the changes in the number of cattle produced reflect the effects of drought, as some ranchers adjusted to the availability of hay. Historically, substantial numbers of both sheep and cattle were raised in Eureka County but more recently cattle have become predominant. **Table 3-70** summarizes farm income and expenses from 2007 to 2010 for farms in the study area.

It is not uncommon for households dependent on agriculture to derive income from multiple sources, with one member engaged in farming/ranching and another working in education, government, or mining, for example. In fact, some residents note that having an “off-the-ranch” income is economically imperative, particularly recently when agricultural production and income have been adversely affected by the extended drought.

[7] The 783,440 acres in farms in 2007 is over 500,000 acres more than was reported in 2002 and exceeds the approximate total of 550,000 acres of privately owned land reported by Eureka County (2010). The reason for this discrepancy is unclear.

[8] The information regarding livestock production for 2007 to 2011 is of questionable reliability due to cutbacks in federal funding that has affected data collection, analysis, and reporting of agricultural production.

3.25.2.7 Housing

Eureka County had a total of 1,076 housing units in 2010, a net increase of 51 units compared to the 2000 Census (U.S. Census Bureau 2002; 2011a). Most of the net change was in multi-family units built in the town of Eureka. According to the Census Bureau, just over half of all units were single family residences, mobile homes accounted for 40 percent of all homes, and multi-family units about 7 percent. Vacancy rates are low across the County. The County is working with the Nevada Rural Housing Authority to develop new housing and commercial development in the Eureka Canyon subdivision located on the north end of the town of Eureka.

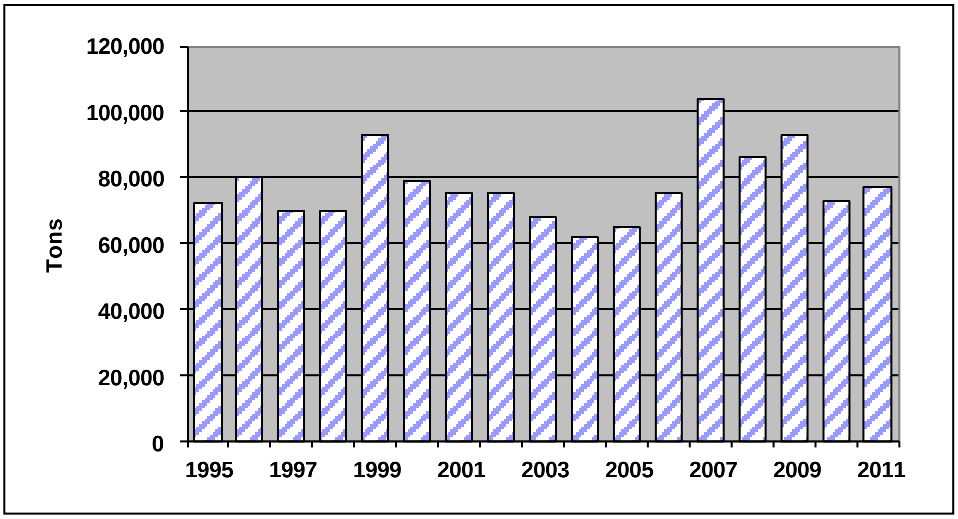
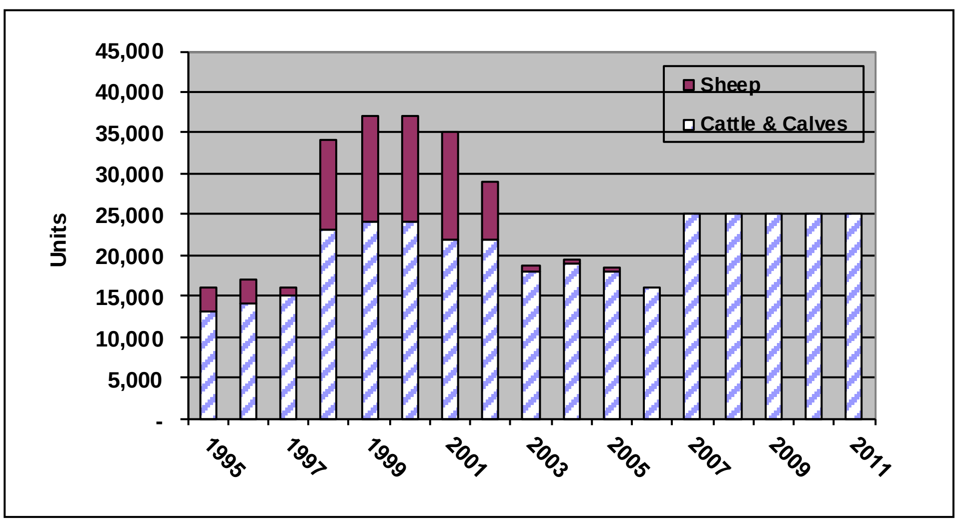


Figure 3-52. Eureka County Alfalfa Production 1995 – 2011.



Source: USDA National Agricultural Statistics Service (2012a).

Figure 3-53. Eureka County Livestock Production 1995 – 2011.
Source: USDA National Agricultural Statistics Service (2012b).

TABLE 3-70

Farm Income and Expenses, Eureka County 2007 to 2010 (x $1,000)

	2007	2008	2009	2010
Cash receipts from livestock and products	$ 9,460	$ 7,965	$ 7,878	$ 9,000
Cash receipts from crops	17,341	24,056	17,808	15,124
Other income	1,344	880	1,675	1,084
Production expenses	22,325	23,216	23,888	23,001
Value of inventory change	-3,063	-412	517	-121
Net income of corporate farms	629	1,484	457	390
Net farm proprietors income	2,128	7,789	3,533	1,696

Source: U.S. Bureau of Economic Analysis (2012b).

Accommodations for tourists and visitors, including four motels offering a total of 88 rooms, are in the town of Eureka (Eureka County 2010). Four mobile home and recreational vehicle parks provide nearly 100 spaces for short- and long-term rental. During the peak summer travel and hunting seasons, the short-term accommodations are frequently at or near full occupancy. A 36-space mobile home park in the town of Eureka was refurbished by Eureka Moly Limited Liability Corporation (LLC), and two additional recreational vehicle parks were recently refurbished or built. Much of the recent housing activity is being prompted by the potential development of the Mount Hope Project north of Eureka, in the vicinity of the 3 Bars Project area (USDOI BLM 2012b). There is one recreational vehicle park in Crescent Valley.

3.25.2.8 Eureka County Facilities, Services, and Public Utilities

Eureka County is governed by a three member Board of County Commissioners elected at-large to overlapping 4-year terms. Each year the Board selects one of its members to serve as Chairperson. County government provides a broad range of services to the two unincorporated towns and to the County as a whole. To provide these services, Eureka County employed 92 full-time employees and 45 casual employees in fiscal year 2011. The County also uses contractors and various service vendors. Within the County, the three largest functions in terms of full-time employees were public works (25), public safety (22), and general government (18). Public works includes the County's road and bridge department, as well as staff associated with water and wastewater utilities, solid waste control, fairgrounds, and county buildings and grounds (Eureka County 2011).

3.25.2.8.1 Law Enforcement and Criminal Justice

The Eureka County Sheriff's Office is based in the town of Eureka and provides law enforcement for the entire County, operates the County's detention facilities, and provides dispatch services for all County public safety functions including police, emergency medical, and fire suppression activities. The District Attorney, District Court, and Juvenile Probation office are also based in the town of Eureka.

3.25.2.8.2 Emergency Response

Emergency response includes fire protection and emergency medical/ambulance services. Eureka County funds an emergency management services coordinator to oversee emergency planning, response, and management among the various local service providers, serves as a liaison with various statewide entities, and directs the volunteer ambulance/emergency medical service in Eureka.

3.25.2.8.3 Fire Protection

Eureka County funds six local volunteer fire departments. In addition to departments in the town of Eureka and Diamond Valley, volunteer fire departments are located in Beowawe, Crescent Valley, Dunphy, and Pine Valley.

The Eureka Volunteer Fire Service (VFS) and the Diamond Valley VFS service southern Eureka County. The Eureka VFS provides fire suppression service in and around the town of Eureka and accompanies the ambulance on motor vehicle accident calls. During dry years, the VSF frequently responds to calls to fight wildfires. The Eureka VFS is staffed by volunteers and is housed in a two-story, seven-bay fire station commissioned in late 2009.

The Diamond Valley VFS located on 11th Street in Diamond Valley. The Diamond Valley VFS maintains a three-bay fire station that accommodates five vehicles including an ambulance. Most calls to the VFS are for vehicle accidents along State Route 278 and for wildfires (USDOI BLM 2012b).

These departments, along with the Nevada Department of Forestry and BLM, maintain mutual-aid agreements to augment the capacities of any given department when the need arises. Eureka County provides funds to the Nevada Department of Forestry to help fund its fire suppression activities.

3.25.2.8.4 Emergency Medical/Ambulance Services

Emergency medical care and transportation in the County are provided by the Eureka County Emergency Medical Service, a volunteer ambulance service. In the southern part of the County, the Emergency Medical Service is staffed by the full-time paid Eureka County Emergency Medical Service Coordinator and volunteers. Two ambulances and a search and rescue vehicle are housed in the town of Eureka. An older ambulance is stationed in Diamond Valley. The ambulances have radio communication with Northeast Nevada Regional Hospital in Elko, where most patients are transported. Fixed-wing and helicopter emergency medical air transportation is available to hospitals in Elko and Reno, Nevada, and Salt Lake City, Utah (USDOI BLM 2012b).

3.25.2.8.5 Health Care

Primary health care in southern Eureka County is provided at the Eureka Medical Clinic in the town of Eureka and operated by the Nevada Health Centers, Inc. The Eureka Medical Clinic facility was constructed in 1998 with funding from Eureka County. When fully staffed, the clinic employs a physician, a physician’s assistant/clinic coordinator, two medical assistants, and an administrative employee. The clinic provides a full range of basic and emergency medical services.

Another health care clinic is in Crescent Valley. It is open on a part-time basis, staffed by practitioners from the Eureka Medical clinic who travel to the facility. Most patients requiring hospitalization use the Northeastern Nevada Regional Hospital in Elko. Patients requiring specialized care often choose to access facilities in Reno (USDOI BLM 2012b).

3.25.2.8.6 Public Education

Public education (kindergarten through 12th grade) in Eureka County is provided by the Eureka County School District, headquartered in the town of Eureka. In addition to administrative offices, the Eureka County School District operates an elementary school and a junior/senior high school in Eureka, which serve the southern portion of the County. The Eureka County School District also operates an elementary school in Crescent Valley, serving the Crescent Valley/Beowawe area. The Eureka County School District sends junior and senior high school students from the Crescent Valley/Beowawe area to the Lander County School District's schools in Battle Mountain and sends some Pine Valley area students to the Elko County School District Combined School in Carlin. Public school enrollment in grades kindergarten through 12th grade totaled 235 students in the fall of 2012, an increase of 6 students compared to the preceding year (Nevada Department of Education 2012).

3.25.2.8.7 Other Public Facilities and Services

Eureka County provides social and senior services from offices in Eureka. The County fairgrounds, a library, swimming pool, and other recreational facilities are also in Eureka.

Eureka County maintains and operates three water systems in the southern part of the County, the Eureka Town Water System and two general improvement district systems in the Devils Gate subdivision about 4 miles north of Eureka. The County also operates a water system in Crescent Valley.

Wastewater collection and treatment services in the town of Eureka are provided by a central system, with a multiple-cell, aerated, evaporative lagoon wastewater treatment facility managed by the County public works department. Developments in Crescent Valley and elsewhere in the County rely on septic systems.

Eureka County operates the Class II-rated Whiskey Flat Landfill north of the town of Eureka. The landfill is staffed by two County public works employees. The County has long-term plans to open a new landfill (USDOI BLM 2012b).

Mt. Wheeler Power provides electric power to central and southern Eureka County including the town of Eureka and the project area. Nevada Energy provides power to the Crescent Valley area. Residential and commercial gas is provided by private propane vendors. Conventional landline telephone service is provided by AT&T. Cellular phone coverage is available across much of the County except in Pine Valley along State Route 278.

3.25.2.9 Fiscal Conditions

Eureka County has a solid fiscal foundation. That strength derives from a combination of substantial revenues generated by the mining industry, a relatively low service population, and local governance policies focused on using revenues to fund essential countywide services and maintaining a strong reserve fund during periods of prosperity which can be used to cushion the budgetary impacts of mine closures or declining net proceeds or assessments.

Total County revenues have risen by nearly $10 million per year over the past 5 years, from $22.6 million in fiscal year 2006/2007 to $32.4 million in fiscal year 2010/2011 (**Table 3-71**). Eureka County's primary revenue sources are ad valorem taxes and intergovernmental revenues. These two categories of revenue have accounted for more than 85 percent of the County's total revenues in each of the past 3 years.

Ad valorem taxes are a function of the tax rate and assessed valuation. Local ad valorem tax rates are consistently the lowest or among the lowest rates in Nevada. In 2010/2011, the tax rate on property in the town of Eureka was $1.9896 per $100 of assessed valuation, 45 percent less than the state-mandated maximum of $3.64 per $100. All property owners benefit from the relatively low tax rates. Recognizing the potential volatility in revenues associated with mining activity, the Board of Eureka County Commissioners has a long-standing a policy to maintain relatively steady property tax rates, funding reserve accounts during periods of prosperity that can be used to cushion the budgetary impacts of mine closures or declining net proceeds or assessments (USDOI BLM 2012b).

Over the past decade, Eureka County's total assessed valuation has grown dramatically as a result of capital investment in mining, higher production, and record high gold prices. In 2008/2009, the County's total assessed value reached $1.51 billion, more than a 150 percent increase in just 3 years. Driven by the increases in gold prices, the total valuation doubled to more than $3.1 billion for the 2010/2011 tax year and primarily the result of a large jump in net proceeds (**Table 3-72**).

In fiscal year 2010-11, agricultural lands and improvements accounted for approximately 1.9 percent of Eureka County's total assessed value, if the net proceeds from mining are excluded. If net proceeds of mining are included, agriculture's share is 0.5 percent (Nevada Department of Taxation 2012).

As a result of the growth in assessed value, ad valorem taxes levied by Eureka County increased from $7.1 million in fiscal year 2006/2007 to $18.5 million in fiscal year 2010/2011. The latter is a record high. Combining the real and personal property valuations associated with the mining industry and net proceeds reveals that the mining industry accounts for approximately 90 percent of the total ad valorem tax base of the County and Eureka County School District.

TABLE 3-71

Eureka County Budget Summary, Fiscal Years 2007 to 2011

	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
Total Revenues	$22,566,806	$24,495,445	$32,088,413	$29,242,039	$32,362,380
Total Expenditures	14,439,988	21,468,845	24,651,142	28,202,042	27,824,071
Net Current Revenue	8,126,818	3,026,600	7,437,271	1,039,997	4,538,309
Reserve Fund Balance (Ending)	46,551,069	49,592,669	57,036,340	56,326,337	59,625,419

Source: Eureka County (2011).

TABLE 3-72

Eureka County Assessed Value, Fiscal Years 2005/2006 through 2010/2011 (in millions of dollars)

Fiscal Year	Secured[1]	Unsecured, Including Net Proceeds of Mines[1]	Total
2005/2006	$273.4	$322.6	$596.0
2006/2007	333.8	488.9	822.7
2007/2008	381.9	653.0	1,034.9
2008/2009	473.1	1034.4	1,507.5
2009/2010	583.7	832.6	1,416.3
2010/2011	546.2	2,627.2	3,173.4

[1] Secured property generally refers to real property, mobile homes placed on foundations, and some improvements held by a title. Unsecured property generally refers to personal property, mobile homes not placed on foundation, and other property interest subject to property tax.

Source: Nevada Department of Taxation (2012).

Intergovernmental revenues, the second major category of revenues for Eureka County, increased from $11.6 million in fiscal year 2005/2006 to $13.3 million in fiscal year 2009/2010, falling to $9.7 million in fiscal year 2010/2011. Intergovernmental revenues from the state include the Basic County-City Relief Tax, Supplemental County-City Relief Tax, motor vehicle property taxes, and fuel taxes. Basic County-City Relief Tax and Supplemental County-City Relief Tax are statewide sales and use taxes enacted to provide property tax relief. Intergovernmental revenues also include various federal payments and grants, including receipts of federal Payments in Lieu of Taxes. In 2010, federal Payments in Lieu of Taxes payments totaled $275,208, based on 2,156,915 acres of qualifying federal lands (USDOI BLM 2012b).

Eureka County expenditures have also increased in recent years from $14.4 million in 2006/2007 to $27.8 million in 2010/2011, the rise generally tracking the growth in revenues over time (**Table 3-71**). Budgeted expenditures increased across all major functions/departments. Much of the increase is accounted for by non-recurring outlays for facility and road improvements funded from current revenues and the County's accumulated reserves for such purposes. Eureka County completed several major capital improvement projects in recent years. These projects included a new Eureka Fire House, water storage and distribution projects in Eureka, a Main Street water/sewer project in Eureka, arsenic treatment projects in the Devils Gate and Crescent Valley water systems, and a Countywide chip seal project.

Net current revenues, defined as total revenues less total expenditures, ranged between $1.0 and $8.1 million over the past 5 years (**Table 3-71**). For fiscal year 2010/2011, the net current revenue was $4.5 million. After accounting for other financing sources or outlays, the residual net revenue was transferred to the County's reserve funds. The County's combined reserve fund balances stood at $59.6 million at the end of the 2010/2011 fiscal year.

A small portion of the reserve fund is held as a reserve against an outstanding note receivable; however, the majority of the funds is unreserved, and are held for potential use in meeting future general fund needs, capital projects, and other special needs as established by the County Commission. The County had no bonded debt as of June 30, 2011.

3.25.2.10 Social Conditions and Affected Publics

This section generally describes existing social conditions in Eureka County and groups that could be affected by the 3 Bars Project. Information for this section was obtained from interviews (between 2006 and 2008) with local officials, County staff and local residents, and from a review of secondary sources (Blankenship Consulting LLC and Sammons/Dutton LLC 2008).

Southern Eureka County, including the town of Eureka and Diamond Valley, is a close-knit community where many residents know each other because of their long association with the community. There are a number of multi-generational families in the community, some whose roots date back to the original settlement of the area by people of European descent. Many southern Eureka County residents are deeply involved in the community. It is not uncommon for an individual to be a hay grower or business person, serve as an elected official or be an appointed member of a board or committee, and also serve as a member of a volunteer fire department, search and rescue team, or other civic organization.

Although the town of Eureka hosts tourists and highway travelers during summer months and experiences periodic influxes of mine workers from area mines, it endeavors to maintain its small town traditions and lifestyles. Many residents enjoy knowing many of their neighbors and value the low crime rate and the casual atmosphere of the town.

On the other hand, some community members are concerned that many of the community's youth move away to find suitable employment and would like to have a somewhat larger student body at the high school to support a broader curriculum. The limited range of commercial, dining, and entertainment options, is a drawback for some residents.

Specific public and groups identified during scoping and interviews as potentially affected by development and operation of the mine include:

- Eureka County ranchers who hold grazing permits for the allotments within the 3 Bars Project area.
- Individuals and businesses that provide goods and services to the agricultural sector.
- Individuals and businesses that may provide goods and services to contractors or the BLM personnel involved in the restoration efforts.
- Recreational users of the 3 Bars Project area. These users mainly include hunters, some off-highway vehicle users (all-terrain vehicle and snowmobile) and visitors, and re-enactors and supporters interested in the Pony Express National Historic Trail, which traverses the project area.
- Individuals and businesses that provide goods and services to outdoor recreational users of the 3 Bars Project area.

3.25.3 Environmental Consequences

Public lands play an important role in the economy, social structure, and quality of life for area residents as well as for tourists and other visitors to the area. The economic contributions derived from use of public lands, including expenditures by local and non-local recreational users, provide support for local ranching, mining, and other natural resource uses. The "wide open spaces" that are common across the West and that are comprised largely of public lands also contribute to the "sense of place" that is important to residents and nonresidents alike. Because of the important ties between public lands and communities and residents, actions that affect public lands, including landscape restoration activities, may have social and economic consequences in the region.

Implementation of the proposed vegetation treatment program would create temporary and long-term effects on land use patterns, resulting in short-term socioeconomic effects. However, effects would also result from non-action, although the timing, extent, and location of these effects are subject to a higher degree of uncertainty. Consequently, the socioeconomic assessment seeks to describe the trade-offs involved between action and no action.

3.25.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Specific stakeholder groups identified during scoping as potentially affected by the restoration initiatives include:

- Individuals and businesses providing goods and services to the BLM in conjunction with the landscape restoration projects.
- Farmers and ranchers in the Kobeh and Diamond Valleys, who raise livestock and grow alfalfa, hay, or other grasses, including high quality dairy and export grade hay.
- Grazing operators who manage cattle on BLM grazing allotments in the 3 Bars Project area.
- Businesses that provide goods and services to local farming and ranching operations.

- Recreational users of the area around the 3 Bars Project, including hunters, anglers, off-highway vehicle users, sightseers, and re-enactors and supporters of the Pony Express National Historic Trail, which traverses the 3 Bars Project area.

The key issues of concern regarding socioeconomics identified by stakeholders during scoping include:

- Recognize the contributions of the existing agriculture industry to the economic and social structure of Eureka County.
- Recognize the economic and social benefits of other land uses and activities that occur in the area.
- Consider the potential short- and long-term economic effects of the treatment alternatives on ranch operators.
- Consider the local job opportunities and economic development effects supported by the landscape treatment alternatives.
- Plan and schedule vegetation treatments and coordinate with grazing permittees to limit the extent of short-term economic disruptions.
- Consider the overall cost of the restoration project and how the project would be funded.

3.25.3.2 Significance Criteria

The NEPA (Section 1508.14) states that "...economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement would discuss all of these effects on the human environment." This means that social or economic differences are not enough to result in a potentially significant adverse effect, but need to manifest themselves with some physical change, as described in the NEPA (Section 1508.8[b]), "...effects may include growth inducing impacts and other effects related to induced changes in the pattern of land use, population density or growth rate."

The proposed action would be considered to have a significant effect on social and economic values if the following occurred:

- Substantial long-term change in any sector of the local economy, such as major expansion or contraction of employment, output, or diversity.
- An increase in temporary or resident populations that would unduly strain the ability of affected communities to provide housing and services or otherwise adapt to growth-related social and economic changes.
- An aggregate change in public sector revenue and/or expenditure flow likely to either compromise the ability of affected units of government to maintain public services and facilities at established service levels, or to compromise their ability to allow for improved services without increasing the tax burdens on existing taxpayers.
- Permanent displacement of residents or users of affected areas that would result from project induced changes in or conflicts with existing uses or ways of life.

The significance threshold would be triggered if any one of the above criteria were satisfied.

3.25.3.3. Direct and Indirect Effects

3.25.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

Because the 3 Bars Project area is rural and largely undeveloped, potential adverse social effects related to restoration would be indirect and largely intangible, and would most likely affect general degrees of satisfaction or dissatisfaction of individuals, families, and various stakeholders. In general, the social and economic effects associated with the management types and treatment methods would be similar in type, varying in degree based on the cost of treatment and the acres of area treated.

There could be short-term reductions in authorized grazing levels and subsequent downward pressure on ranch income as a result of grazing restrictions and increases in the required amount of livestock management. It is estimated that the total economic cost to ranchers and the local economy would be $69.57 per AUM, much of which would accrue to the regional economy of northeastern Nevada. This value differs from the $53.40 (1999 dollars) and $73.75 (2012 dollars) values given in the Mount Hope Project Final EIS. Those values were based on the Nevada Grazing Statistics Report and Economic Analysis for Federal Lands in Nevada (Resource Concepts, Inc. 2001) and an adjustment for general inflation. However, the original $53.40 value was determined to be incorrect because of double-counting of the industry's labor income and value-added when Resource Concepts, Inc., reported total output as defined by the Impact Analysis for Planning (IMPLAN) model. By adding the three lines items together, all other things remaining the same, the net result is that the economic values of an AUM to regional output were overestimated in the Mount Hope Project Final EIS. To correct the issues associated with the Resource Concepts, Inc., values, the updated value of $69.57 per AUM was derived based on average beef prices over the period January 2004 to January 2013, as compared to the 1999 base value used by Resource Concepts, Inc. (USDA National Agricultural Statistics Service 2013), and an updated local economic output multiplier of 2.02 as compared to the statewide multiplier of 1.82 reported by Resource Concepts, Inc. (Fadali 2005).

The BLM would experience short-term, and possibly long-term, reductions in annual grazing fees as a result of reductions in the level of authorized grazing use during and following treatment. Existing linkages between grazing and ranch families in the Diamond and Kobeh Valleys, public lands and public lands management, and the Eureka community would continue, with short-term uncertainties regarding the timing and effectiveness of implementation, and potential long-term reduction in uncertainty regarding future grazing levels.

Social effects would include effects on ranchers, outfitters, individual recreationists, some business owners, local law enforcement and fire departments in Eureka County, and others affected directly and indirectly by changes in access, temporary closures, or other restrictions associated with the mechanical and fire treatments. These effects would manifest themselves in terms of concerns for social and economic well-being, increased satisfaction or dissatisfaction with public lands management by the Mount Lewis Field Office, and quality of life in general. Some individuals may also experience dissatisfaction with the types and locations of treatments proposed.

Treatments could occur within designated harvest units for woodland products, as discussed in Section 3.12. There is a large degree of overlap between harvest units and pinyon-juniper treatment areas. As a result of thinning treatments, the number of pinyon pine and juniper trees within harvest areas would be reduced, although woodland products would still be available over portions of treatment areas. Treatments would affect approximately 26 percent of the total designated woodland products harvest area during the life of the project. Removal of pinyon pines and juniper from these areas would eliminate or limit the ability to harvest woodland products there, although a large portion of the potential treatment area would not be affected. Additionally, other nearby areas in the Battle Mountain District, which make up a substantial portion of the annual harvest area, would not be affected by treatments under the 3 Bars Project.

None of the action alternatives would cause substantive changes to existing patterns and trends in local population and demographic conditions in Eureka County. The employment opportunities associated with implementation of the restoration initiative would generally be temporary and unlikely to substantially affect migration to or from the region.

Beneficial Effects

The project would generate a short-term temporary local economic stimulus (e.g., purchases of materials and supplies, equipment-related rentals and leases, and retail and lodging expenditures) associated with BLM and contractor efforts and jobs. Locally, these benefits would accrue primarily to residents and businesses in southern Eureka County. At a national level, the short-term effects on employment and income would not necessarily represent benefits, but rather transfers funded through the BLM's budget process.

In addition, pinyon-juniper trees with potential for use as fence posts or for firewood could be gathered up and offered for sale to the public, providing additional benefits to residents, local businesses, and landowners, including farmers and ranchers. Potential long-term benefits associated with future increases in the level of authorized grazing use would be dependent on the successful achievement of the treatment objectives.

It is assumed that restoration treatments would meet, to varying degrees, the identified need for reducing the risk of wildfire and improving ecosystem health. Restoration treatments would reduce the amount and concentration of hazardous fuels. As a result, the number, size, and severity of wildfires would be reduced, as would the cost of wildfire suppression and the risk of loss of life and property. The reduction in risk of a large-scale reduction in wildfire would benefit nearby private property owners and facilities constructed on public land, including facilities for mining and infrastructure, reducing the risk of property damage and interference with operations. Treatments that improve ecosystem health could increase or improve the amount and quality of commercial and casual uses of public lands, improve or maintain market and non-market values of public land resources, and reduce the cost of operations on public lands (USDOI BLM 2007c:4-124).

3.25.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

The BLM would treat on average about 127,000 acres annually using all available methods under Alternative A. The 2- to 4-fold increase in acres treated compared to Alternatives B and C, respectively, reflects the BLM’s ability to use lower cost treatment methods under Alternative A. For example, the BLM would be able to use prescribed fire (approximately $50 per acre) under this alternative, but not under Alternatives B and C. This is less than the costs associated with manual (cutting trees with a chainsaw, $200-1,000 per acre) and mechanical (mowing or chopping, $90 per acre; shredding, $300-350 per acre) treatment methods (**Table 3-73**).

Riparian Treatments

Riparian treatments would be relatively expensive on a per-acre basis, and would be completed using construction equipment and substantial levels of labor to complete stream channel reconstruction, rock placement for channel stabilization, and to install fencing to prevent access to treated sites by livestock, wild horses, and other wild ungulates. Based on stream restoration work done by NDOW, it could cost about $250,000 per mile for stream channel restoration and plantings, and another $5,000 per mile for temporary fencing (**Table 3-73**; Lee 2013). Trees could be removed using chainsaws, and piled or used for stream restoration, at a cost of about $550, or shredded at a cost of about $300 to $350 per acre. If trees are piled and burned, this would add an additional $250 per acre.

TABLE 3-73

Estimated Treatment Costs per Acre

Treatment Method	Estimated Cost per Acre[1]
Manual	
Chainsaw and leave trees in place	$200[2]
Chainsaw, pile trees, and burn	$600 - $1,000 ($800)[2]
Pipe rail fencing	$9.39 per lineal foot ($4,957 per mile) [2]
Mechanical	
Sagebrush mowing or chopping	$90[2]
Drill seeding	$90[2]
Shred trees and shrubs	$300 - $350 ($325)[2]
Hand planting	$600[2]
Fire	
Prescribed fire	$50[2]
Pile burning	$200- $300[2]
Biological	
Insect, pathogen, and nematode	$80 - $300 ($150)[3]
Livestock	$15[2]

[1] Value in parentheses is the average value use to calculate costs of treatment methods.
[2] Source: Mount Lewis Field Office.
[3] Source: 17- States PEIS and PER (USDOI BLM 2007b, c). Cost estimates from 2005.

Adverse Effects

Short-term adverse socioeconomic effects include additional management efforts for ranchers associated with grazing management and with the potential need to establish and maintain new water sources for livestock.

Beneficial Effects

Stream channel restoration and bioengineering treatments would improve riparian habitat and stream water quality. These effects could benefit livestock, wild horses, and other wild ungulates, to the benefit of ranchers and the public. Removal of pinyon-juniper near streams and within floodplains would help to reduce wildfire risk and associated wildfire suppression costs and the risk of loss of life and property.

Aspen Treatments

Adverse Effects

Aspen treatments would be relatively expensive on a per acre basis, in part due to their small size, use of some mechanized equipment, substantial levels of labor, and the costs associated with the distribution of pinyon-juniper slash. It would cost about $200 per acre to use chainsaws to stimulate root suckering, and about $800 per acre to use chainsaws to remove pinyon-juniper to slow encroachment and create fire breaks. Some of the slash from pinyon-juniper removal would be left in place to stimulate aspen root suckering and would lessen treatment costs compared to pile burning of trees.

Short-term adverse socioeconomic effects include additional cost and effort for ranchers associated with grazing management due to the placement of small, temporary exclosure fencing, and/or changes in season of use. Short-term reductions in the authorized level of grazing, and thus the potential for adverse effects on production and income from livestock, would be a function of the size of each treated area and the aggregate total of such areas treated within a specific allotment.

Beneficial Effects

Short-term benefits would include seasonal employment opportunities with the BLM, contracting opportunities for local residents and contractors, and income potential for businesses that support construction for lodging, eating, and drinking establishments, and for specialized aerial application contractors. Removal of pinyon-juniper near roads associated with aspen stands would help to reduce wildfire risk and associated wildfire suppression costs and the risk of loss of life and property.

Pinyon-juniper Treatments

Adverse Effects

Short-term adverse socioeconomic effects include cost and management effort for ranchers associated with grazing management in preparation for prescribed fires and mechanized treatments, changes in rest/rotation/seasons of use, and possibly the need for provisions to relocate or provide alternative livestock water. Short-term reductions in the authorized level of grazing, and thus the potential for adverse effects on production and income from livestock, would be a function of the size of individual treated areas, and the aggregate total of such areas treated within a specific allotment.

Beneficial Effects

Short-term benefits would include seasonal employment opportunities with the BLM, contracting opportunities for local residents and contractors, and income potential for businesses that support construction for lodging, eating, and drinking establishments. Economic benefits would occur to the local community from pinyon-juniper treatments. Additional economic benefit could come from the sale of pinyon-juniper trees with commercial market potential for fence posts and firewood.

Sagebrush Treatments

Adverse Effects

Short-term adverse socioeconomic effects would include additional cost and effort for ranchers associated with grazing management in preparation for prescribed fires and mechanized treatments, installing small, temporary exclosure fencing, changes in rest/rotation/seasons of use, and possibly the need for provisions to relocate or provide alternative sources of water to livestock. Short-term reductions in the authorized level of grazing, and thus the potential for adverse effects on production and income from livestock, would be a function of the size of individual treatment areas, and the aggregate total of such areas treated within a specific allotment.

Beneficial Effects

Short-term benefits would include seasonal employment opportunities with the BLM, contracting opportunities for local residents and contractors, and income potential for businesses that support construction for lodging, eating, and drinking establishments. Additional economic benefit could come from the sale of pinyon-juniper trees with commercial market potential for fence posts and firewood.

3.25.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The cost per acre of treatment would be greater under Alternative B than under Alternative A. This reflects, in part, the higher expenditures associated with manual and mechanical treatments, which generally cost about 2 times or more per acre to implement than do fire treatments (**Table 3-73**).

Such outlays could increase the annual level of expenditures and the associated short-term employment and income and business revenue benefits associated with landscape restoration in the 3 Bars Project area. The level of financial and other resources devoted to implementation of actions under Alternative B would be minor relative to the overall economy in the 3 Bars Project area and surroundings.

Grazing permittees would experience short-term reductions in income in conjunction with the proposed treatments, particularly the pinyon-juniper treatments, which could necessitate reductions in herd size, the need to purchase additional private pasture or feed, and increases in management efforts and costs. The actual reductions would vary over time in response to the actual acreages treated in any given year. The BLM could experience reductions in grazing fee receipts as a result of the temporary reductions in grazing use, although the effects on grazing fee receipts are unknown due to uncertainties regarding the magnitude in reductions in grazing due to restoration efforts and future decisions regarding the allocation of available forage to competing uses.

Temporary and long-term social effects under Alternative B would be similar to those for Alternative A, although some individuals and stakeholder groups would be more or less satisfied by the preclusion of prescribed fire.

3.25.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

The cost per acre of treatment would be greater under Alternative C than under Alternatives A and B. This reflects, in part, the higher expenditures associated with manual and classical biological control treatments, which generally cost 3 to 5 times or more per acre to implement than do fire and mechanical treatments (**Table 3-73**).

Due to the reduction in acres treated, the temporary reductions in grazing use associated with treatments would be lower, and the potential for other reductions due to declining rangeland health would persist. The actual reductions would vary over time in response to the actual acreages treated in any given year. The BLM would experience reductions in grazing fee receipts as a result of the temporary reductions in grazing use, although the effects on grazing fee receipts are unknown due to uncertainties regarding the magnitude in reductions in grazing due to restoration efforts and future decisions regarding the allocation of available forage to competing uses.

Over the long-term, treatments would do little to slow the declines in rangeland health and promote a stabilization of future grazing levels and support for rural lifestyles. Treatments would do little to improve habitat for fish and wildlife, conditions of woodland stands to the benefit of pine nut production and other woodland products, and aesthetic qualities of the landscape for the recreational and commercial resource users.

3.25.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects on social and economic values from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire that could be detrimental to public resources. Treatments to improve 3 Bars ecosystem health and increase or improve the amount and quality of commercial and casual uses of public lands, improve or maintain market and non-market values of public land resources, and reduce the cost of operations on public lands, would not occur under this alternative.

3.25.3.4 Cumulative Effects

The CESA for social and economic cumulative effects is the southern portion of Eureka County, from the BLM Elko District boundary to the Nye County line, and includes the town of Eureka (**Figure 3-1**). The area is approximately 1,692,238 acres and approximately 86 percent of the area is administered by the BLM, 9 percent is administered by the Forest Service, and 5 percent is privately owned. Past and present actions that have influenced land use and access in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.25.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Agriculture, land development, and mineral, oil, gas, and hydrothermal exploration and development could affect lands within the CESA in the reasonably foreseeable future, including land sales, new croplands, roads, and rights-of-way for power and telephone lines. These actions would provide economic benefits to the local community, but would also result in loss of fish and wildlife habitat, and possibly recreational opportunities.

The Mount Hope Project would directly disturb approximately 8,300 acres over the long-term and another 6,000 acres would be fenced to exclude the public and livestock. The proposed mine project would have economic costs and benefits. Economic costs would include the loss of 32 AUMs in perpetuity due to construction of the mine pit. In addition, another 781 AUMs would be lost for approximately 70 years due to the mine project. The total economic cost from these reductions is estimated at $56,560 annually during the 70 year period ($69.57 multiplied by 813 AUMs), and $2,226 in perpetuity thereafter, all other things remaining the same. More than 70,000 AUMs of livestock grazing are supported annually on public lands in the 3 Bars Project area and nearby areas of the CESA around the Mount Hope Project area. Consequently, the loss of grazing associated with the mine project would represent about 1 percent of the AUMS in the surrounding area and less than 1 percent of total grazing levels within Eureka County. In addition, there could be some impact to property values from the loss of AUMs, but this loss is difficult to quantify. While this impact may not be significant to the ranching community, the impact may be important to individual ranch operations. This loss of income was considered potentially significant in the Mount Hope Project EIS (USDOI BLM 2012b:3-421 to 3-422). In addition, there would be losses of AUMs associated with the 3 Bars Project, although annual losses would vary depending upon the amount of acreage treated, and where. These losses would occur at the same time as those for the Mount Hope Project, and would be a cumulative effect.

Construction employment for the Mount Hope Project would peak at about 600 workers, with about 455 workers needed for mine operations. There would be a similar level of indirect employment as a result of the mine project. Thus, the number of workers within Eureka County could increase by 50 percent from current levels due to the mine project. Annual mine payroll is projected to be $33.4 million at full production, about half of which is projected to accrue to Eureka County residents. The increase in income would be equal to about 28 percent of the income realized by local residents in 2008. Mining taxes over the life of the project are estimated at $384 million, while sales and use tax revenues would total about $63.9 million during construction through year 10 of operation. Additional information on mine-related revenues and costs, and their effects on housing, social conditions, and the affected public, is available in the Mount Hope Project EIS (USDOI BLM 2012b:Section 3.17).

3 Bars Project treatments would have little impact on population growth, as most work would be done by local or outside contractors for short periods each year. The Mount Hope Project, however, would significantly impact the local population. The population of southern Eureka County is expected to increase by about 50 percent during the construction phase, and decrease slightly from this during mine operations (USDOI BLM 2012b:3-540 to 3-541).

Public and private lands in the CESA are used for a variety of recreational uses. It is expected that recreation activity would reflect population growth in Eureka County over the life of the project.

Since 1985, wildfires have burned about 7,000 acres annually in the 3 Bars Project Area CESA, at an estimated annual cost of $1,890,000, including costs for fire suppression and burned area rehabilitation (USDOI BLM 2007c:4-131). Wildfires degrade fish and wildlife habitat, and may destroy human property, at substantial cost to recreation users and landowners. In addition, it is difficult to restore some burned lands, due to their remote location and uneven terrain, and noxious weeds and other invasive non-native vegetation often out-compete and displace native vegetation, to the long-term detriment of resources used by the public. Based on past acreage burned by wildfires, approximately 140,000 acres would burn over the next 20 years in the CESA, at an estimated cost of $37.8 million for fire suppression and burned area rehabilitation costs.

To reduce the risk of wildfire and improve 3 Bars ecosystem health, the BLM proposes to treat 127,000 acres under the 3 Bar Project, and about an additional 15,000 acres under current and reasonably foreseeable future authorizations within the CESA, including in high to very high wildfire risk areas within the CESA. These include treatments of noxious weeds and other invasive non-native vegetation on up to about 1,000 acres annually within the CESA. New infestations would typically be found in newly burned or disturbed areas, and in areas where livestock and wild horses congregate. Herbicide treatments generally cost about $50 per acre or less, so the economic benefits would be negligible. Treatments that remove hazardous fuels, including decadent and diseased pinyon-juniper and cheatgrass and other non-native vegetation, and construction of fire breaks, would be expected to reduce the risk of catastrophic wildfire and its associated costs on about 8 percent of the CESA.

3 Bars Project and other BLM actions within the CESA would have little effect on the social and economic conditions within the CESA. The growth in economic activity and social trends, and stakeholder perceptions and concerns regarding various issues related to rangeland health, including grazing use, the allocation of forage for wildlife, wild horses, and grazing, would generally be greatest under Alternative A.

3.25.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

The effects from non-3 Bars Project reasonably foreseeable future actions on social and economic values would be similar to those described under Alternative A The social and economic benefits from actions under Alternative B would be limited in scale compared to those from the Mount Hope Project and other proposed infrastructure development projects and agricultural in the reasonably foreseeable future.

The BLM would conduct treatments on approximately 63,000 acres on the 3 Bars Project area, and about another 15,000 acres on other portions of the CESA, or collectively about 4 percent of the CESA, to reduce hazardous fuels and improve fish and wildlife habitat. The types of risks and benefits to social and economic resources under Alternative B would be similar to those for Alternative A within the CESA. The economic costs and benefits to social and economic resources under Alternative B would be about one-half those for Alternative A within the CESA. 3 Bars Project and other BLM actions within the CESA would have negligible effect on the social and economic conditions within the CESA. The growth in economic activity and social trends, and stakeholder perceptions and concerns regarding various issues related to rangeland health, including grazing use, the allocation of forage for wildlife, wild horses, and grazing, would generally be less under Alternative B than under Alternative A.

3.25.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

The effects from non-3 Bars Project reasonably foreseeable future actions on social and economic values would be similar to those described under Alternative A. The types of risks and benefits to social and economic resources under Alternative C also would be similar to those for Alternative A within the CESA.

The BLM would conduct treatments on approximately 32,000 acres on the 3 Bars Project area, and about another 15,000 acres on other portions of the CESA, or collectively about 2 percent of the CESA, to reduce hazardous fuels and improve fish and wildlife habitat. The economic costs and benefits to social and economic resources under Alternative C would be about one-fourth those for Alternative A within the CESA. 3 Bars Project and other BLM actions within the CESA would have negligible effect on the social and economic conditions within the CESA. The growth in economic activity and social trends, and stakeholder perceptions and concerns regarding various issues related to rangeland health, including grazing use, the allocation of forage for wildlife, wild horses, and grazing, would generally be less under Alternative C than under Alternatives A and B.

3.25.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on social and economic values would be similar to those described under Alternative A. There would be no cumulative effects on social and economic values and environmental justice from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildfire under current and reasonably foreseeable future authorized actions, but on a very limited acreage (about 1,500 acres annually). Thus, benefits to social and economic values and environmental justice would be negligible and least among the alternatives.

3.25.3.5 Unavoidable Adverse Effects

Implementation of the 3 Bars Project would result in short-term adverse effects on livestock grazing, outdoor recreation, and wildfire risk, which would have economic and social manifestations affecting individual ranchers and the local economy. The economic effects would include reductions in ranch income, higher management costs for ranchers, and adverse effects on local businesses and tax revenues. Adverse social effects could include changes in recreation experience (quality of life) and stress for individuals and households engaged in the ranching industry. Closures of treatment areas for extended periods of time could temporarily affect some recreational uses and commercial activities.

3.25.3.6 Relationship between Local Short-term Uses and Long-term Productivity

Restoration treatments would adversely affect use of treated areas over the short-term. Any restrictions on the use of treated lands could cause social and economic hardship to affected parties. However, individuals and industries involved in the restoration of native ecosystems on public lands would benefit.

Over the long-term, most users of public lands, and those with interests near public lands, would likely benefit. An important goal of treatments is to restore ecosystem health so that public lands can provide sustainable and predictable products and services. In addition, treatments would reduce risks associated with large-scale wildfire, improve ecosystem health to the benefit of recreational and other public land users, and emphasize employment- and income-producing management activities near those communities most in need of economic support and stimulus. The enhancement in long-term productivity of public lands and in the ability of the land to provide for social and economic needs would reflect not only the success or failure of treatments, but also the influence of outside forces (e.g., economy, lifestyle changes, climate) over which the BLM and other federal agencies have no control (USDOI BLM 2007b:4-250).

3.25.3.7 Irreversible and Irretrievable Commitment of Resources

Implementation of the 3 Bars Landscape Project would require the commitment of natural, human, engineered, and monetary resources, as well as the resource commitment associated with subsequent changes to existing natural resources (e.g., existing pinyon-juniper stands). Once completed, most of the resource investments would be irretrievable and their use for this project would preclude or foreclose their use for other purposes. The latter characteristic serves to make these resource commitments largely irreversible from a social and economic perspective. However, because of the environmental restoration objectives associated with the landscape restoration initiative, the long-term environmental and potential social and economic effects of the resource commitments are viewed as positive.

3.25.3.8 Significance of the Effects under the Alternatives

Based on the criteria used to determine if social and economic values and environmental justice effects are significant, none of the alternatives would have significant direct, indirect, or cumulative effects.

3.25.4 Mitigation

No mitigation measures are proposed for social and economic values and environmental justice effects.

3.26 Human Health and Safety

3.26.1 Regulatory Framework

3.26.1.1 Federal Laws

The BLM must comply with laws and regulations that are protective of human health and safety. Numerous federal statutes, including the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, and the Resource Conservation and Recovery Act have been established to regulate actions that may directly pose human health risks through degradation of air and water quality and land pollution.

Under the Clean Air Act, the USEPA sets limits on air pollution and certain air pollutants, including sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An interim policy to address public health and welfare impacts caused by wildland and prescribed fires that are managed to achieve was adopted by the USEPA in May 1998. Visibility impairment and ambient air quality worse than the national ambient air quality standards for particulate matter are used as the principal indicators of public welfare impacts. The USEPA policy is interim until further recommendations from the U.S. Department of Agriculture's Air Quality Task Force and final rules for implementing USEPA's Regional Haze Program are adopted.

The Clean Water Act regulates discharges of pollutants and sets water quality standards for all contaminants in surface waters of the U.S. The Safe Drinking Water Act was established to protect the quality of drinking water in the U.S., including all surface or underground waters sources that may potentially be designated for drinking use.

The generation, transportation, treatment, storage, and disposal of hazardous waste is regulated by the Resource Conservation and Recovery Act, as administered by the USEPA. In the case of spills of hazardous materials, requirements for agency notification and clean-up procedures are regulated under the Comprehensive Environmental Response, Compensation, and Liability Act also administered by the USEPA.

Under the Occupational Safety and Health Act (OSHA) of 1970, employers are responsible for providing a safe and healthful workplace. In addition to complying with all applicable OSHA standards, employers must also comply with the General Duty Clause of the OSHA, which requires employers to keep their workplace free of serious recognized hazards.

3.26.1.2 Nevada Laws

Nevada State regulations related to water and to air are outlined in Nevada Administrative Code and Nevada Revised Statutes 100-955 and 445B 100-445 B.845, respectively.

The State of Nevada's Division of Environmental Protection is authorized to implement air pollution control requirements in Eureka County. The State of Nevada's standards for ambient air quality differ from the USEPA's established National Ambient Air Quality Standards for criteria pollutions including the notable addition of standards for carbon monoxide at elevations at or greater than 5,000 feet amsl. In order to meet the USEPA's interim air quality policy on wildland and prescribed burns, the Bureau of Air Quality Planning's Mobile, Smoke and Area Sources Branch coordinates and facilitates the management of prescribed outdoor burning in Nevada.

Nevada's laws regarding occupational diseases and occupational safety and health are set forth in Nevada Administrative Code and Nevada Revised Statutes § 617 and 618 respectively.

3.26.2 Affected Environment

3.26.2.1 Study Methods and Study Area

Background information pertinent to human health issues for the 3 Bars Project area has been compiled from various public agencies and other data sources, including the State of Nevada Health Division, U.S. Census Bureau, U.S. Department of Labor, American Cancer Society, and the National Centers for Disease Control and Prevention, Injury Prevention and Control, and Health Statistics. Data on motor vehicle injuries and death was obtained from the U.S. Department of Transportation National Highway Traffic Safety Administration.

Information about occupational health issues and risk was obtained from the State of Nevada and National Institute for Occupational Safety and Health Administration and the Bureau of Labor Statistics. Information pertinent to wildfires and associated health issues was obtained from the USEPA, the National Interagency Fire Center, the Western Greater Basin Coordination Center, the National Wildfire Coordinating Group, the U.S. Fire Administration, the Nevada BLM, and the State of Nevada Division of Environmental Protection Bureau of Air Quality Planning.

The study area for direct, indirect, and cumulative human health and safety effects is the southern portion of Eureka County, from the BLM Elko District boundary to the Nye County line (**Figure 3-1**).

3.26.2.2 Health Risks

The leading causes of deaths in Nevada and Eureka County are presented in **Table 3-74**. The most common causes of death in Nevada include heart disease, cancer, chronic lower respiratory disease, accidents, cerebrovascular diseases (strokes), and suicide. The four leading causes of death in Eureka County are heart disease, cancer, accidents, and respiratory disease. Strokes and intentional harm (suicide) are equally ranked as the fifth leading cause of death.

Eureka County has higher than average mortality rates for heart disease and accidents and slightly higher than average incidences of suicide, compared to averages compiled for the entire state of Nevada. Eureka County has low to average mortality rates for cancer, respiratory, and cerebrovascular (stroke) diseases.

TABLE 3-74

Leading Causes of Death in Nevada and Eureka County, 2000 to 2008

Cause of Death	Percent of Total Deaths	
	Eureka County	Nevada
Heart Disease	40	25.7
Cancer	19	22.6
Chronic Lower Respiratory Disease	5	6.4
Accidents/Injuries	9	5.3
Cerebrovascular Disease (Stroke)	3	5.2
Intentional Harm (Suicide)	3	2.5
All other causes of death	21	32.3

Source: Nevada State Health Division (2011a).

3.26.2.2.1 Risks from Diseases

As the nation’s leading cause of death, heart disease results in approximately one in every four deaths (26 percent) in the U.S. Lifestyle and certain medical conditions, such as high cholesterol and blood pressure levels, diabetes, smoking, obesity, physical inactivity, poor nutrition, and alcohol use contribute to increased risk of heart disease. Heart disease is also the leading cause of death for both men and women in Eureka County. Forty percent of the total deaths in Eureka County between 2000 and 2007 were attributed to coronary heart disease, which is 1.5 times higher than the mortality rate for heart disease in Nevada and the U.S.

Cancer is the second leading cause of death in the United States, Nevada, and Eureka County. According to the American Cancer Society, the probability of developing cancer during a person’s life is 1 in 2 for men and 1 in 3 for women. There are many causes of cancer development, including lifestyle conditions (smoking, obesity, and poor nutrition), as well as occupational exposure to carcinogens, environmental contaminants, and substances in food. In the U.S., one-third of all cancers are attributed to tobacco smoking. Occupational exposures were previously estimated to account for approximately 4 percent of cancer deaths in the U.S. Further studies indicate that the burden of occupational cancer is actually higher, and some workers have a proportional increase in mortality before age 65, compared to those without occupational exposures.

3.26.2.2.2 Risks from Injuries

In Nevada, injury is a leading cause of death for children, teens, and young adults. For older adults, aged 45 years and greater, other medical conditions, such as heart disease and cancer, result in more deaths than injury (Nevada State Health Division 2011b).

Motor vehicle crashes are the leading cause of injury in Nevada, and account for more than 46 percent of all unintentional injury deaths in the state (Nevada Health Division 2005). More than 53 percent of reported trauma injuries in Nevada were attributed to motor vehicle, motorcycle, and pedal cycle crashes (Nevada State Health Division 2005).

Unintentional falls are the second leading cause of injury in Nevada, and rank among the most serious injuries facing the elderly. Falls represented 12 percent of all reported trauma injuries in the Nevada from 2000 to 2002. Falls are the second leading cause of occupational injury-related fatalities, after transportation-related deaths (Chino et. al 2010).

Other causes of injury include stabbings, assaults, and fights, pedestrian injuries (11 percent of reported injuries), gunshot wounds (7 percent), and all other injuries (7 percent; Nevada State Health Division 2005). Gunshot wounds account for the second highest number of unintentional injury deaths in the State.

3.26.2.2.3 Motor Vehicle Mortality

Motor vehicle crashes are the leading cause of death and injury for Nevadans aged 5 to 34 years. In 2006, 62,225 motor vehicle crashes resulted in 32,669 injuries and 423 deaths. Most motor vehicle accidents occur during daylight hours in clear weather conditions. More males than females are injured in motor vehicle crashes, and in 2006, alcohol was involved in 10 percent of non-fatal and 30 percent of fatal motor vehicle crashes in 2006 (Chino et. al 2010).

Rural communities are at a much higher risk for motor vehicle injury and death. Higher vehicle speeds, fewer traffic control devices, and/or longer distances to emergency medical care facilities may factor into the higher motor vehicle fatalities rates in rural areas. In Nevada, Eureka County has the second highest rate of motor vehicle fatalities, at 47.2 per 100,000 people (age adjusted for the combined years 2000 through 2008; U.S. Department of Transportation 2010a). This rate is more than triple the median rate of 17.1 for all U.S. counties, as estimated by the U.S. Department of Transportation National Highway Traffic Safety Administration.

3.26.2.2.4 Occupational Fatalities and Injury

An occupational fatality or injury is death or bodily damage, respectively, resulting from working. The fatality or injury may result from a single event (e.g., a fall from a building), or it may represent a physical injury which results from repeated use or exposure.

In 2010, the highest number of fatal work injuries in the U.S. occurred in the transportation and material moving occupations (U.S. Department of Labor Bureau of Labor Statistics 2011a, b). However the highest reported fatal work injury rate (25.3 per 100,000 full-time equivalent workers) was for the farming, fishing, and forestry occupation groups. The transportation and construction industries had the second and third highest fatal work injury rates (14.2 and 11.5, respectively).

During the period 2003 to 2008, there were 324 occupational injury-related deaths, primarily involving males, in Nevada (Chino et al. 2010). During this period, Nevada's occupational injury fatality rate was 1.8 per 100,000 people, slightly higher that U.S. rate of 1.4 per 100,000 people. In 2010, Nevada's non-fatal occupational injury and illness total recordable case incidence rate was 3.8 per 100 full-time workers in private industries and state and local governments, which was slightly higher than the national rate of 3.5 (U.S. Department of Labor Bureau of Labor Statistics 2011a, b).

Forty-two percent of all occupational injury-related fatalities in Nevada result from transportation incidents. Construction and mining injuries involving falls represent 20 percent of all occupational fatalities. Contact with equipment is also common, while occupational injury fatalities resulting from violence and exposure to harmful substances or environments occur less frequently (Chino et. al 2010). Over 90 percent of non-fatal occupational cases are attributed to injuries. Five percent are attributed to illnesses associated with repetitive motion cases, systemic diseases and disorders, skin diseases, hearing loss, respiratory conditions, and poisoning (U.S. Department of Labor Bureau of Labor Statistics 2011 a, b).

In 2010, the non-fatal occupational injury rate of 4.5 reported for the agricultural, forestry, fishing, and hunting industry was higher than the national rate of 3.5 per 100 workers. However the rate of non-fatal incidents resulting from crop and animal production and other support activities for agricultural and forestry was greater than the rate of those directly associated with natural resources and mining, forestry and logging.

Within the BLM, the national injury rate (total accidents and illnesses) for 2009 to 2011 was 8.4 per 100 workers, which is the same as the injury rate for the Nevada BLM during the same period. Within the Battle Mountain District, the injury rate was lower, at 5.3. Lost time injury rates in the Battle Mountain District for 2009 to 2011 averaged 1.64, compared to 2.4 for the Nevada BLM and 2.1 for the BLM nationally (USDOI BLM 2012q).

From 2009 to 2011, the most common types of injuries in the BLM Battle Mountain District were falls, followed by slips/twists/trips and weather exposure. For the BLM statewide, the most common injuries were unclassified, slips/twists/trips, manual labor, and equipment (USDOI BLM 2012q). Hazards associated with poisonous plants and insects, dangerous wildlife, falling objects, including trees, protruding branches and twigs, and other obstacles on the ground that may cause slips and falls may be encountered by workers during BLM activities. Extreme and adverse weather conditions may lead to workers suffering heat-related illness or hypothermia.

The operation of tools and equipment, such as chainsaws and mowers, may present inherent risks, such as exposure to hazardous fuels and lubricants used in the mechanized equipment, sharp tool edges, and loud noise that could result in hearing damage to workers. Nearby workers and the public can be struck by flying debris around some equipment. Equipment operators could also be injured from improperly operating or losing control of the machinery on steep or slippery terrain. Some injuries and fatalities have occurred during use of all-terrain vehicles.

Injuries can vary from minor cuts, sprains, bruises, and abrasions to major arterial bleeding, compound bone fractures, serious brain concussions, and death. Manual and mechanical methods treatment methods also present potential ergonomic hazards related to lifting and carrying equipment, and when pulling vegetation. Improper body mechanics may lead to muscular-skeletal injuries. Some chronic disorders associated with repeated trauma are directly linked to the nature of the work. For example, a large proportion of workers regularly using hand-held power tools, such as chippers, grinders, chainsaws and jackhammers, often suffer from the effects of vibration syndrome, which causes blanching and reduced sensitivity in the fingers.

3.26.2.2.5 Risks from Fire

Wildfires cause the loss of life and property. According to compiled data reported by the National Interagency Coordination Center, over 74,000 wildfires burned more than 8,700,000 acres in the U.S. in 2011 (National Interagency Coordination Center 2011). More than 86 percent of all reported fires in the nation were caused by humans.

According to the U.S. Fire Administration, 81 U.S. firefighters died while on duty in 2010. Ten on-duty firefighters died in association with wildfires, the lowest number of annual firefighters associated with wildfires since 1996. Heart attacks were responsible for the deaths of 48 firefighters (59 percent) in 2011. Fifty-four percent of all firefighter fatalities occurred while performing emergency duties. Only three firefighters were killed in vehicle collisions.

For the past decade, the leading cause of all USDOI/USDA wildland firefighter fatalities has been aviation accidents (50 percent; National Wildfire Coordinating Group 2010). Additional leading causes of wildland firefighter fatalities include burnovers/entrapments (20 percent), driving accidents (13 percent), heart attacks (7 percent), and hazard trees (6 percent).

Smoke from wildfires is a mixture of gases that may cause irritation to the throat and eyes. Although the main components of smoke are water vapor and carbon dioxide, other pollutants and fine particulate matter are also present. Fine particulate matter is the primary human health concern for smoke management. Because of its small size (similar to a pollen grain), smoke can easily penetrate deep into lung tissues causing severe respiratory and cardiovascular disease.

The average exposure to smoke and its most likely hazards, acrolein, benzene, carbon monoxide, formaldehyde and $PM_{2.5}$, among 200 firefighters at prescribed burns in the Pacific Northwest, was studied by the USDA Forest Service, Pacific Northwest Research Station and Radian Corporation between 1991 and 19, and acrolien) and 2 percent of the carbon monoxide exposures exceeded permissible exposures limits set by the OSHA. Average exposures were highest during line holding, line supervision, and direct attack activities during the fire (Reinhardt et al. 2000). In most cases, the unexposed time spent traveling and setting up the prescribed burn reduced the overall work shift exposure to levels below the permissible exposure limits. Benzene exposure was found to not be significant.

Persons with heart or lung disease may be more suspect to irritation from exposure to smoke. Particulate matter in smoke can also significantly reduce visibility on highways by scattering and absorbing light, thus compromising safe driving conditions.

3.26.3 Environmental Consequences

3.26.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

No issues of concern pertaining to human health and safety were identified during scoping, except for treatments using herbicides. The BLM does not propose to use herbicides under the alternatives.

3.26.3.2 Significance Criteria

The following would have a significant adverse effect on human health and safety:

- Loss of life, or moderate to severe injuries which may require hospitalization.
- Exposure of workers or the public to chemicals, contaminants, or smoke at levels that would cause adverse health effects.
- Violation of any laws or regulations implemented to protect worker or public health and safety.

3.26.3.3 Direct and Indirect Effects

3.26.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

This analysis assumes that the SOPs, which have been designed expressly to protect worker and public health and safety, would be effective at preventing most accidents and injuries (see **Appendix C**). However, it is also assumed that some injuries could still occur, particularly if workers do not follow the SOPs closely.

Under all alternatives, and for all treatment methods, workers conducting the treatments could be at risk for adverse effects from walking on uneven ground, on broken terrain, and in dense vegetation. Other potential adverse effects associated with the proposed treatments would vary by treatment method, as there are human health risks unique to each method.

Treatments that remove noxious and poisonous weeds and other harmful vegetation near public use sites and facilities would benefit public health and welfare and would involve all treatment methods. Treatments that reduce the risk of catastrophic wildfire on public lands would have similar benefits to human health and safety. These benefits are discussed in the 17-States PER (USDOI BLM 2007c:4-139). Benefits would include reduced threats to public health and safety, as well as to air quality, firefighters, and property.

3.26.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Adverse Effects

Manual treatments utilized in riparian zones (installation of small, temporary exclosure fencing and plantings) should not adversely affect public health or physical well-being, as appropriate safety zones around work areas would prevent public access. The greatest risks to human health and safety from manual treatments would be to workers performing the treatments. These risks are discussed in the 17-States PER (USDOI BLM 2007c:4-137). Risks include exposure to plant irritants, biting and sucking insects, poisonous snakes, physical exertion, falls, use of hand tools, and noise and exhaust from motorized equipment. The SOPs designed to protect worker health and safety would minimize risks for severe injuries, as well as most minor injuries. Appropriate first aid treatment on site would also help to minimize the risk of infection or other long-term effects from minor injuries. Provided SOPs are followed, no laws or regulations implemented to protect worker or public health or safety would be violated, and the risk of injuries resulting in loss of life or hospitalization would be minimized. Nonetheless, it is possible that moderate to severe injuries could result from use of hand tools such as chainsaws.

Similar to manual treatments, the greatest health and safety risks associated with mechanical treatments would be to workers performing the treatments, rather than to the public. The public would be at a slight risk of injury from flying debris, but these risks would be minimized by maintaining safety buffers around mechanical treatment areas. Risks to workers from mechanical treatments are discussed in the 17-States PER (USDOI BLM 2007c:4-137). These risks include injuries associated with use of heavy equipment, contact with sharp cutting blades, exposure to rocks and other flying debris, loss of control of equipment, high noise levels, and vehicle exhaust. Risks would be greatest for project groups with the most extensive mechanical treatment component, involving streambank earthworks and pinyon-juniper removal (Garden Spring Group and Frazier Creek Group). For the Denay Pond group, risks would be lower, since only fence installation would occur. For all mechanical treatments, risks would be minimized through the use of appropriate SOPs.

Beneficial Effects

Treatments would help reduce the risks to human health from wildfire smoke and fire. Additionally, treatments that improve the physical and ecological processes of creeks and that improve water quality in water bodies designated for beneficial uses (such as fisheries, irrigation, and drinking water) would be likely to benefit human health by providing cleaner water for drinking and for aquatic species that are consumed by the public.

Aspen Treatments

Aspen treatments would consist of manual and mechanical methods and may include small, temporary exclosures/changes in livestock use. Risks associated with creating exclosures or changing livestock use would be minimal, provided SOPs were followed. The initial acreage of aspen identified for treatment is low (451 acres over the life of the project). Therefore, associated health and safety risks initially would be localized to very small areas in the Roberts Mountain, JD, 3 Bars, and Santa Fe allotments.

Pinyon-juniper Treatments

Adverse Effects

The number of people potentially exposed to treatment projects could be relatively high for pinyon-juniper enhancement projects, given the size of treatments and the geographic area covered. Risks to workers and the public from treatments in these areas would be similar to those described for aspen enhancement projects.

The potential effects associated with use of prescribed fire are discussed in the 17-States PER USDOI BLM (2007c:4-135). Workers and the public would be at risk for fatality or injury as a result of the fire itself, from inhalation exposure from combustion products. Standard Operating Procedures would be implemented to protect workers and the public from fire-related injuries. Smoke inhalation could result in health risks, particularly for those exposed to smoke repeatedly over a long period, such as firefighters. Of greatest toxicological concern are polynuclear aromatic hydrocarbons, which contain multiple carcinogenic materials. A human health risk assessment was completed in 2007 (and also used for the 17-States PEIS and PER) estimated that cancer risks to workers and the public from polynuclear aromatic hydrocarbons found in wood smoke are very low (USDOI BLM 2007b:4-136).

Recreational users near treatment sites could be exposed to smoke from prescribed fire. Advance notice to the public and posting treatment areas would warn recreational users about potential smoke related impacts so that they could avoid use of nearby recreation sites.

Fires can affect public safety by reducing visibility and create hazardous driving conditions on nearby roads. The Sulphur Spring Wildfire Management Unit (62,000 acres) and the Whistler Unit (23,000 acres), in particular, are adjacent to State Route 278 and U.S. Highway 50, where the risks to motorists from reduced visibility would likely be greatest. Prescribed fires in the Whistler Unit would generally be 5 to 50 acres in size. Wildland fires managed for resource benefit in the Sulphur Spring Wildfire Management Unit would be 1,000 acres or less. When there are potential visibility issues on public roadways, the BLM utilizes traffic control measures and road signing, as appropriate, to reduce safety risks to motorists (USDOI BLM 2002).

To limit air quality impacts and the associated potential human health effects from smoke inhalation, the BLM would implement site-specific fire prescriptions to minimize impacts to air quality. These prescriptions could include timing the fire to minimize smoke, procedures to limit the smoldering stage, and procedures to reduce fire intensity (USDOI BLM 2002). Most risks associated with prescribed fire would be offset by reductions in the incidence of wildfires, which would be expected to release more smoke and affect people over a larger geographic area than prescribed fires.

Wildland fire for resource benefit would be used in addition to prescribed fire, which does not allow the same degree of pre-planning to reduce smoke impacts as prescribed fire. The BLM would measure air parameters and take appropriate action to reduce these emissions if these parameters are exceeded. Fires near roadways could affect human health and safety by reducing driving visibility and increasing the risk of an accident.

Beneficial Effects

Much of the focus of pinyon-juniper management is to reduce the risk of catastrophic wildfire. Creating and enhancing fuel breaks in pinyon-juniper stands associated with the Atlas Unit group would break up of the continuity of fuels, moderate fire behavior, and reduce the risk of loss of life and property from a catastrophic wildfire. On the Cottonwood/Meadow Canyon, Dry Canyon, Lower Pete Hanson, Three Bars Ranch, Tonkin North, and Whistler units, the focus of treatments would be on hazardous fuels reduction using manual and mechanical methods and prescribed fire. Much of the west slope of Roberts Mountains has not experienced a large-scale wildfire in over 100 years. These units have been identified as having high to very high risk of catastrophic wildfire, or in the case of the Tonkin North, Lower Pete Hanson, and Whistler units, very high to extreme wildfire risk (**Figure 3-36**). The Three Bars Ranch is at the base of Roberts Mountains.

Pathogens and pests, including mistletoe, have led to unhealthy pinyon-juniper stands in the Tonkin North and South units and a build-up of hazardous fuels. The BLM proposes to remove up to half of the trees using manual and mechanical means and prescribed fire. These projects would enhance the health and resilience of pinyon-juniper woodlands and reduce the amount of hazardous fuels and wildfire risk.

The BLM would restore fire as an integral part of the ecosystem, improve species diversity, and reduce hazardous fuels on the Sulphur Spring Wildfire Management Unit by using wildland fire for resource benefit. The BLM would allow fire to burn on about 20 to 40 percent of the area. Several wildfires have occurred in this area in recent years due to dense fuel accumulations and pinyon-juniper cover. As discussed above, the Sulphur Spring Wildfire Management Unit is near State Route 278.

Over the long-term, hazardous fuels reduction and other actions to reduce wildfire occurrence would lead to substantial benefits as far as reducing human exposure to smoke. Unplanned or unwanted fires, such as catastrophic wildfires, can pose serious threats to public health and safety, as well as to air quality. Because these fires are uncontrolled, they can pose significant threats to the safety of firefighters and the general public and destroy property.

The intense or extended periods of smoke associated with uncontrolled wildfires can cause serious health problems and decrease visibility. Wildfires also cause the loss of life and property.

Prescribed fires and fire use for resource benefit, on the other hand, are used to restore natural fire cycles, reduce the buildup of hazardous fuels, and restore native vegetation and natural ecosystem processes. Scheduling burning during favorable weather conditions and controlling the amount of fuel and acreage burned can minimize emissions and adverse effects of smoke on public health and the environment. As part of this effort to manage smoke and its health effects, the BLM would use alternative treatments to fire, including mechanical and manual treatments, and reduce fuel levels before burning. Mechanical thinning and biomass utilization are part of the suite of treatments the BLM would use in areas where fire presents an unacceptable risk (USDOI BLM 2007c:4-13).

Sagebrush Treatments

Adverse Effects

Human health and safety risks associated with biological control would be minimal, and are discussed in the 17-States PER (USDOI BLM 2007c 4-138). They primarily include physical injuries to workers from livestock, and injuries associated with use of equipment to release biological control agents at treatment sites. Risks for these injuries would be reduced by following standard SOPs, such as wearing appropriate personal protective equipment and using equipment that is maintained properly.

Prescribed fire would be used to control cheatgrass on the West Simpson Park Unit. The more predominant health and safety risk factors in sagebrush treatment unit would be to workers using mechanical equipment.

Beneficial Effects

Much of the focus of sagebrush treatments is to reduce the risk of catastrophic wildfire. Treatments to reseed and replant to promote sagebrush and perennial grass cover, and reduce the occurrence of cheatgrass and other noxious weeds and other invasive non-native vegetation on the Rocky Hills and West Simpson Park units, should reduce this risk.

3.26.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The human health and safety risks associated with exposure to smoke from prescribed fire would not be present under this alternative. The acreage of land treated using mechanical methods, and the associated level of risk to worker safety associated with this treatment method, would be similar to that under Alternative A. Risks to workers and the public would continue to be minimized through implementation of SOPs, which would prevent worker deaths or severe injuries. It is expected that the rate of accidents associated with manual and mechanical treatments would be similar to that under Alternative A.

The effectiveness of treatments at reducing catastrophic wildfire potential would likely be less under Alternative B than under Alternative A. While mechanical treatments can be used to remove fuels, in some instances a combination of treatments (mechanical plus fire) might produce better results. Therefore, wildfire risk reduction and associated health and safety benefits would likely be less under this alternative than under Alternative A.

3.26.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under this alternative, only manual and classical biological control methods would be used. Workers and the public would not be at risk for exposure to smoke, or for accidents associated with operation of heavy equipment. Risks associated with manual methods and classical biological control would be minimal, and SOPs for operation of hand-held equipment would help prevent accidents associated with using this equipment. Out of all the action alternatives, short-term health and safety risks associated with project treatments would be lowest under Alternative C. However the long-term health and safety benefits associated with reducing catastrophic wildfire risk would be lower than under the other alternatives because the least amount of hazardous fuel removal would occur.

3.26.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects on human health and safety from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire that could be detrimental to human health and safety.

3.26.3.4 Cumulative Effects

The study area for direct, indirect, and cumulative human health and safety effects is the southern portion of Eureka County, from the BLM Elko District boundary to the Nye County line (**Figure 3-1**). This area is approximately 1,692,238 acres. Approximately 86 percent of the area is administered by the BLM, 9 percent is administered by the Forest Service, and 5 percent is privately owned. Past and present actions that have influenced land use and access in the 3 Bars ecosystem are discussed in Section 3.3.2.3.3.

3.26.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Members of the public who visit or drive through the 3 Bars Project area may also visit or drive through areas shown on **Figures 3-2** to **3-6**, where other projects are occurring. Additionally, workers who implement the BLM's 3 Bars treatment projects may live in the vicinity of other projects, may visit or drive through areas where other projects are occurring, or may be hired to implement other projects that have been identified. Therefore, it is likely that both workers and members of the public who would potentially be exposed to 3 Bars project treatments would also be exposed to human health and safety risks associated with other reasonably foreseeable future actions, resulting in cumulative health and safety risks.

Grazing, agriculture, woodland product harvest activities, and recreation are associated with health and safety risks, including risks of injury from livestock; installing and maintaining range improvements; applying pesticides on cropland; using saws and other hand tools to harvest woodland products; exposure to poisonous vegetation or vegetation with thorns; exposure to harmful snakes and other wildlife; or accidents from recreation activities such as off-highway vehicle use. The safety of members of the public who harvest woodland products would be dependent on each individual's personal responsibility for his or her own safety. Commercial harvest would follow the health and safety guidance of the responsible commercial entity, which should include policies and procedures for protecting human health and safety.

Projects associated with utilities construction and distribution include road development, powerlines, communication sites, wind generation facilities, railroads, and related projects. All of these projects have associated occupational and public health and safety risks during the construction phase, and some would have associated risks during the operational phase. It is assumed that industry standard SOPs and other procedures would be implemented to minimize health and safety risks. Road development is expected to be limited to dirt roads created by recreational use of public lands. However, traffic volumes on U.S. Highway 50 and State Route 58, as well as other roads are predicted to increase as a result of increased economic activity and population growth. New roads and increased traffic would increase the risk of injuries from motor vehicle crashes, which is the leading cause of death and injury for Nevadans aged 5 to 34 years (Chino et al. 2010), and is already very high in Eureka County (U.S. Department of Transportation 2010a, b).

Land development, mineral development, and oil, gas and geothermal leasing and development could all have associated health and safety risks. All types of development in the CESA are expected to bring more people into the area, which would increase the number of people potentially exposed to smoke from the proposed treatments. Additionally, there are numerous health and safety risks associated with resource extraction activities. Workers and the public could be exposed to these risks, in addition to the risks associated with the 3 Bars Project. It is expected that all of the future development and resource extraction in the region would involve industry standard safety protocols designed to minimize health and safety risks to workers and the public.

Approximately 7,000 acres burn annually within the CESA, although acreage burned each year by wildfire is quite variable. Wildfires would lead to potential exposure to smoke by the public and firefighters, risk of accidents due to low visibility on roadways, and risk of loss of life and damage to property from the fire itself.

The BLM would treat about 142,000 acres (127,000 on the 3 Bars Project area, and 15,000 on other areas within the CESA), or about 8 percent of the CESA, to restore natural fire regimes and encourage the growth of native vegetation that is more resilient to wildfire, reducing the risk of wildfire. This includes the use of herbicides on several hundred acres annually under existing authorizations. Human health concerns are associated with herbicide exposure scenarios, including direct spray, dermal contact with foliage, swimming, and ingestion scenarios for public exposure, and some occupational exposures that predominantly involve contact with accidental releases of herbicides. Herbicides that could be used by the BLM generally have negligible or minor risks to workers and the public, as discussed in the 17-States PEIS (USDOI BLM 2007b:4-174 to 4-196). In all cases, human health risks can be avoided by following SOPs including to apply herbicides with appropriate protective equipment, prevent spills and other accidental releases, and prevent public access to sprayed areas for the appropriate time interval.

If plant community structure, species composition, and disturbance regimes return to near historical ranges, then disturbances should have effects that are similar to historical effects, which would be less severe, and result in less wildfire danger and risks to the public, than at present.

3.26.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

The effects from non-3 Bars Project reasonably foreseeable future actions on human health and safety would be similar to those described under Alternative A. Because fire would not be used on the project area, risks associated with exposure to fire and smoke would not contribute to cumulative health effects.

Hazardous fuels reduction and habitat improvement projects could occur on about 63,000 acres within the 3 Bars Project area, and on up to 15,000 acres within the CESA, or about 4 percent of acreage within the CESA. The BLM would be limited to hand pulling, discing, plowing, and using livestock to control non-native vegetation on the 3 Bars Project area, and using chainsaws and mechanical equipment, instead of prescribed fire and wildland fire for resource benefit, to manage pinyon-juniper. The cumulative risks to workers from these treatments could be greater from manual and mechanical methods than from fire treatments. Over the long-term, cumulative effects to health and safety associated with wildfire would be greater than under Alternative B than under Alternative A, since the acreage treated for fuels reduction would be less and treatments would likely not be as effective.

3.26.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

The effects from non-3 Bars Project reasonably foreseeable future actions on human health and safety would be similar to those described under Alternative A. Under Alternative C, the BLM would only be able to use manual and classical biological control methods to restore the 3 Bars ecosystem. Adverse, short-term effects to human health and safety with the use of fire and mechanized equipment would not occur under Alternative C. However, fire and mechanized equipment would be used in other portions of the CESA to improve habitat, remove hazardous fuels, and reduce the risk of wildfire.

By not being able to use mechanical methods and fire to reduce hazardous fuels, restore ecosystem health, create fire and fuel breaks, and remove downed wood and slash, however, the risk of wildfire and its impacts on human health and safety would likely increase on the 3 Bars Project area. About 48,000 acres would be treated in the CESA to reduce hazardous fuels, but only 32,000 acres would be treated in the 3 Bars Project area. This would be less than 2 percent of the land within the CESA and within the 3 Bars Project area.

Under Alternative C, the acreage treated would be less than under Alternatives B and C, and only manual and classical biological treatment methods would be used. Therefore, short-term cumulative health and safety risks would likely be lowest under Alternative C. Over the long-term, cumulative effects to human health and safety associated with wildfire would be greater than under the other action alternatives, as the least amount of hazardous fuel removal would occur under Alternative C.

3.26.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on human health and safety would be similar to those described under Alternative A. There would be no cumulative effects on human health and safety from 3 Bars Project treatments as no treatments would be authorized under this alternative. The BLM could create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation using ground-based and aerial application methods of herbicides, especially cheatgrass; restore fire as an integral part of the ecosystem; and reduce the risk of a large-scale wildland fire under current and reasonably foreseeable future authorized actions, but on a very limited acreage (about 1,500 acres annually). Thus, benefits to human health and safety would be negligible and least among the alternatives.

3.26.3.5 Unavoidable Adverse Effects

All treatment methods have the potential to harm workers or the public. The health and safety of workers could be at risk from working on uneven ground, on broken terrain, and in dense vegetation; from the use of hand and power tools; from exposure to falling debris; from exposure to smoke from fires; and from other accidental situations. Although the BLM would implement numerous SOPs to minimize health and safety risks, not all injuries would be avoided.

Members of the public could be at risk from flying debris if they were near an area where manual or mechanical equipment was being used. Risks would be minimized by establishment of safe zones around work areas, provided the public complied with restrictions on entry into these areas. Particulate matter and other harmful materials associated with fire treatments could harm the public outside of treatment areas. However, it is expected that these exposures would be kept to minimum levels by following fire prescriptions, and conducting treatments during climatic conditions that minimize drift of smoke.

3.26.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

The proposed vegetation treatments could harm the health of workers and the public over the short-term, particularly if SOPs to protect health were not followed. Adverse reactions to smoke could cause minor to severe discomfort to sensitive individuals, but most symptoms would go away in a few hours. If serious injury or death resulted from treatments, the effects on the health of the affected individual would be long-term, or in the case of death, permanent.

Proposed treatments to reduce the buildup of hazardous fuels and restore native vegetation would help restore natural fire regimes and improve ecosystem health. If treatments are successful, there would be a long-term reduction in the risk of wildfire, which would benefit public health by resulting in a reduced exposure to smoke and a reduced risk of adverse human health effects from fires.

3.26.3.7 Irreversible and Irretrievable Commitment of Resources

Serious injury or death caused by vegetation treatments could be irreversible and irretrievable. However, risk of death and serious injury is very unlikely based on the current rate of injury (very low) and death (none) associated with BLM vegetation treatments during the past decade. It is likely that a few people would experience minor discomfort from fire treatments, but these effects would be short-term and reversible.

3.26.3.8 Significance of the Effects under the Alternatives

The BLM's SOPs to protect worker and public safety substantially reduce the risks for accidents and injuries during vegetation treatments. Many employers, especially those involved with agricultural and mining operations, have health and safety plans to protect worker health. However, there is some risk for injury and adverse health impacts associated with all working conditions, such as those associated with operation of chainsaws and heavy equipment, working on uneven terrain, and managing fires. Accidents would be possible. If workers do not follow SOPs closely, severe injuries could occur. While SOPs provide the maximum amount of realistic prevention of injury, it is not possible to state that death or moderate to severe injury would not occur. Exposure of workers to chemicals, contaminants, and smoke is possible, but the health effects of these exposures should be limited to insignificant levels through SOPs to limit exposure, use of Personal Protective Equipment, and establishing safety buffers around treatment sites. Standard Operating Procedures also would ensure that the BLM's treatment program did not violate any laws or regulations implemented to protect worker or public health and safety. Based on the BLM's past safety record for vegetation treatments, there has been a very low rate of injury and no deaths associated with vegetation treatment programs. Therefore, direct, indirect, and cumulative effects to human health and safety from 3 Bars Project actions are unlikely to be significant.

3.26.4 Mitigation

Given that BLM SOPs for the various treatment methods are already highly protective of public and worker health and safety, no additional mitigation is recommended.