U.S. Department of the Interior

Bureau of Land Management
Rock Springs Field Office
Kemmerer Field Office
Rawlins Field Office

October 1999

Environmental Assessment, Decision Record, and Finding of No Significant Impact for the IXC Communications, Inc.'s Proposed Fiber Optic Telecommunications System, Denver, Colorado, to Salt Lake City, Utah

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/WY/PL-00/001+1430

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Rock Springs Field Office
280 Highway 191 North
Rock Springs, Wyoming 82901-3448

1791 (040)
WYW-147666
IXC Fiber Optics EA

October 15, 1999

Dear Reader:

This Environmental Assessment (EA) and Finding of No Significant Impacts (FONSI) on the proposed IXC Communications, Inc.'s Fiber Optic Telecommunication System, Denver, Colorado, to Salt Lake City, Utah, is furnished for your information. The Decision Record, detailing the decision and the rationale for the decision, is also included. The decision on the proposed fiber optic right-of-way was based upon the analysis in the EA, public concerns and comments, and other multiple-use resource objectives or programs that apply to the project.

The BLM appreciates the individuals, organizations, and Federal, State, and Local Governments who participate in the environmental analysis process. Your involvement enhances the integrity of the EA and the public land manager's ability to make an informed decision.

Sincerely

John S. McKee

John S. McKee
Field Manager

DECISION RECORD

FOR

IXC COMMUNICATIONS, INC.'S

PROPOSED

FIBER OPTIC TELECOMMUNICATIONS SYSTEM

DENVER, COLORADO, TO SALT LAKE CITY, UTAH

WYW-147666

EA NUMBER WY-040-EA99-096

SUMMARY OF THE DEVELOPMENT PROPOSAL

IXC proposes to install and operate a telecommunications system from Denver, Colorado, to Salt Lake City, Utah, to provide service to these and other western cities. The approximately 611-mile long cable would cross 116 miles of federal land administered by the BLM (all within Wyoming), 1 mile of National Forest land administered by the Forest Service (all within Utah), and 494 miles of state , county, municipal, and private lands. Three 1.9-inch and three 2.4-inch high-density polyethylene conduits would be installed simultaneously and a fiber optic cable would be installed in one conduit; the other conduits would be used for future communication system upgrades. A ROW term of 30 years, with the right of renewal, would be granted.

A temporary construction ROW of 40 feet and a permanent operations and maintenance ROW of 20 feet would be required. Direct surface disturbance width would average 15 feet and would occur on areas traversed by tracked machinery used to plow the duct into the ground. Additional disturbance would result from other traffic on the ROW, trenching, and excavation and installation of splice vaults and manholes. An area of up to 40 X 40 feet would be needed at each pit for boring under roads, driveways, railroads, pipelines, canal, streams, wetlands, and endangered species habitat. Nine optical amplifiers and two regeneration stations would be built along the route. All but one amplifier site and both regeneration stations would be built on private land. Approximately 1.8 acres/mile would be disturbed. Approximately 212 acres of BLM lands would be disturbed (all in Wyoming), as would 2 acres of Forest Service lands (all in Utah), and 899 acres of state and private lands (in Colorado, Wyoming, and Utah). Total disturbance would be approximately 1,113 acres.

IXC's Proposed Action incorporated several measures to reduce or avoid impacts to the environment.

DECISION

This is a decision of the Rock Springs Field Manager to approve IXC's proposed fiber optic line. Approval allows the authorization of necessary permits and rights-of-way on public lands administered by the BLM to IXC to implement their project.

Approval is conditioned upon and subject to the following requirements:

- IXC will implement the operator committed resource protection measures described in Section 2 of the EA and the Plan of Development which will be attached to the right-of-way application. No additional mitigating measures were identified in the EA. Monitoring inspections conducted by BLM and IXC will be based upon these requirements which will be applied to all surface disturbing activities. BLM will conduct monitoring inspections of construction and rehabilitation operations through a compliance officer and/or inter-disciplinary team to ensure that these measures are effectively implemented.

- The Rock Springs Field Manager or his designee is the Authorized Officer (AO) for these projects. Mitigation and monitoring measures could be modified by the AO as necessary to further minimize impacts. Final mitigation and monitoring requirements will be determined by the AO after receiving the results of the on-site inspections by BLM, and IXC personnel and recommendations from BLM resource specialists. BLM could require additional field studies or documentation to ensure that reclamation and other resource protection goals are met.

ALTERNATIVES CONSIDERED INCLUDING THE PROPOSED ACTION

Two development alternatives (proposed action and no action) were considered and analyzed in detail.

Proposed Action - The proposed development would involve building a total of 611 miles of fiber optic line between Denver, Colorado, and Salt Lake City, Utah. A total of 1,113 acres would be disturbed with all disturbed areas, except for the area occupied by the optical amplifier and regeneration stations, being reclaimed within one year from start of construction.

No Action - The no action alternative was analyzed in detail. Current land and resource uses would continue.

ALTERNATIVES CONSIDERED BUT NOT RECEIVING FURTHER ANALYSIS

Three alternatives were considered but did not receive further analysis. These alternatives are described below.

Alternative A--Routing Alternative. This alternative followed the Enron Communications, Inc. (ECI) route in its entirety, whereas the Proposed Action deviates from the ECI route for approximately 186 miles. IXC opted to take a more easterly route through Colorado because IXC determined that the IXC route would be easier to engineer and construct. The Proposed Action also follows a more northerly route from Rawlins to Table Rock to improve access to the ROW for operations and maintenance. Other deviations from the ECI route were made based on landowner preferences.

Alternative B--Routing Alternative. Initially, IXC proposed to install cable from Piedmont, Wyoming, directly south, adjacent to Guild and Byme Reservoirs; however, this alternative was rejected because the area is known to contain abundant cultural resources.

Numerous other routing alternatives were evaluated but rejected because of difficulty in acquiring private easements or to avoid cultural resources.

Alternative C--Alternative Construction Methods. Plowing and trenching are the most expedient construction methods and would be used for much of the route. However, IXC has opted to bore, rather than plow or trench, numerous sensitive resources including perennial rivers, wetlands and riparian areas, and contributing portions of Old Highway 30 and historic railroad grades to minimize impacts to these features. Furthermore, rather than blading the ROW prior to plowing or trenching, IXC would minimize blading to those areas where it is absolutely necessary, thereby reducing overall disturbance. These alternative construction methods were incorporated into the Proposed Action and were not analyzed as separate alternatives.

MANAGEMENT CONSIDERATIONS/RATIONALE FOR DECISION

The decision to approve IXC's proposed development is based on the following factors: 1) consistency with land use and resource management plans; 2) relevant resource and economic considerations; 3) agency statutory requirements; 4) measures to avoid or minimize environmental harm; 5) finding of no significant impact; and 6) public comments.

1) Consistency with Land Use and Resource Management Plans - The decision to approve IXC's proposals is in conformance with the overall planning direction for the area. The Great Divide, Kemmerer, and Green River Resource Management Plans state that public lands in the area of the proposal are available for rights-of-way. Standard and special protective measures were identified and incorporated into the proposed action to reduce or eliminate adverse impacts.

2) Relevant Resource and Economic Considerations - Environmental impacts identified in the EA are all minor and are deemed acceptable. The economic benefit of allowing the pipeline is important to the owners of the proposed fiber optic line.

3) Agency Statutory Requirements - All pertinent statutory requirements applicable to this proposal were considered. These include consultation with the Fish and Wildlife Service regarding threatened and endangered species; consultation with the Corps of Engineers; and coordination with the State of Wyoming regarding wildlife and environmental quality

4) Measures to Avoid or Minimize Environmental Harm - The adoption of the mitigation measures identified in the proposed action and accepted in this Decision Record represent practicable means to avoid or minimize environmental harm.

5) Finding of No Significant Impact - As discussed in the EA, the direct and indirect incremental change to the environment introduced by implementation of the project on the affected resources would be minimal. The adverse impacts have been mitigated such that the net change in cumulative impacts introduced by the project--in combination with past, present, and reasonably foreseeable actions--are expected to be insignificant. The EA concludes that with the mitigation measures described in the EA and contained in this decision, the proposed action will not have any significant impacts on the human environment. Therefore, an environmental impact statement is not required.

6) Public Comments -Fourteen comment letters were received during scoping for the Environmental Analysis during the 30-day scoping period that ended July 30, 1999. Comments were received from one member of the general public, the Army Corps of Engineers, the Fish and Wildlife Service, Sweetwater Economic Development Association (SWEDA), Conoco Inc., The Lincoln Highway Association, Office of Federal Land Policy, Wyoming Game and Fish Department, State Historic Preservation Officer, Wexpro Company, and Western Area Power Administration. Their summarized comments and BLM's responses are in Appendix A.

The decision to approve IXC's proposals takes into account important management considerations, Federal Agency missions, and the public's need. The decision balances these considerations with the degree of adverse impact to the natural and physical environment. The development effort will help meet public needs for up to date communication facilities while at the same time allowing humans to coexist with nature in a way that allows the least degree of irreversible, irretrievable commitment of resources. The long-term productivity of the area would neither be lost nor substantially reduced as a result of approving IXC's proposal.

COMPLIANCE AND MONITORING

IXC and BLM will provide qualified representatives on the ground during and following construction to validate construction, reclamation, other approved design, and compliance commensurate with the provisions of this Decision Record. IXC will be required to conduct monitoring of the project in cooperation with BLM. IXC will monitor its reclamation to ensure that revegetation meets the accepted standards. Appropriate remedial action will be taken by IXC in the event unacceptable impacts are identified.

APPEAL

This decision is subject to appeal as detailed below.

INFORMATION ON TAKING APPEALS TO THE BOARD OF LAND APPEALS FOLLOWS:

DO NOT APPEAL UNLESS

1. This decision is adverse to you.

AND

2. You believe it is incorrect.

IF YOU APPEAL, THE FOLLOWING PROCEDURES MUST BE FOLLOWED:

1.	NOTICE OF APPEAL	Within 30 days file a Notice of Appeal in the office which issued this decision (see 43 CFR 4.411 and 4.413). You may state your reasons for appealing. If you desire.
2.	WHERE TO FILE NOTICE OF APPEAL	Field Manager, Rock Springs Field Office 280 Highway 191 North Rock Springs, Wyoming 82901
	ALSO SEND COPY TO SOLICITOR	Office of the Regional Solicitor Rocky Mountain Region 755 Parfet Street, Suite 151 Lakewood, Colorado 80215
3.	STATEMENT OF REASONS	Within 30 days after filing the Notice of Appeal, file a complete statement of the reasons why you are appealing. This must be filed with the United States Department of the Interior, Office of the Secretary, Board of Land Appeals, 4015 Wilson Boulevard, Arlington, Virginia 22203 (see 43 CFR 4.412 and 4.413). If you fully stated your reasons for appealing when filing the Notice of Appeal, no additional statement is necessary.
	ALSO SEND COPY TO SOLICITOR	Office of the Regional Solicitor Rocky Mountain Region 755 Parfet Street, Suite 151 Lakewood, Colorado 80215
4.	ADVERSE PARTIES	Within 15 days after each document is filed, each adverse party named in the decision and the Regional Solicitor or Field Solicitor having jurisdiction over the State in which the appeal arose must be served with a copy of: (a) the Notice of Appeal, (b) the Statement of Reasons, and (c) any other documents filed (see 43 CFR 4.413). Service will be made upon the Associate Solicitor, Division of Energy and Resources, Washington D.C. 20240, instead of the Field or Regional Solicitor when appeals are taken from decisions of the Director (WO-100).

5. PROOF OF SERVICE — Within 15 days after any document is served on an adverse party, file proof of that service with the United States Department of the Interior, Office of the Secretary, Board of Land Appeals, 4015 Wilson Boulevard, Arlington, Virginia 22203. This may consist of a certified or registered mail "Return Receipt Card" signed by the adverse party (see 43 CFR 4.401(c)(2)).

UNLESS THESE PROCEDURES ARE FOLLOWED, YOUR APPEAL WILL BE SUBJECT TO DISMISSAL (SEE 43 CFR 4.402). BE CERTAIN THAT ALL COMMUNICATIONS ARE IDENTIFIED BY SERIAL NUMBER OF THE CASE BEING APPEALED (WYW147666).

SUBPART 1821.2--OFFICE HOURS; TIME AND PLACE FOR FILING

Sec. 1821.2-1 Office Hours of State Office.
(a) State Offices and the Washington Office of the Bureau of Land Management are open to the public for the filing of documents and inspection of records during the hours specified in this paragraph on Monday through Friday of each week, with the exception of those days where the office may be closed because of a national holiday or Presidential or other administrative order. The hours during which the State Offices and the Washington Office are open to the public for inspection of records are from 10 a.m. to 4 p.m., standard time or daylight saving time, whichever is in effect at the city in which each office is located.

Sec. 1821.2-2(d) Any document required or permitted to be filed under the regulations of this chapter, which is received in the State Office or the Washington Office, either in the mail or by personal delivery when the office is not open to the public shall be deemed to be filed as of the day and hour the office opens to the public.

Sec. 1821.2-2(e) Any document required by law, regulation, or decision to be filed within a stated period, the last day of which falls on a day the State Office or the Washington Office is officially closed, shall be deemed to be timely filed if it is received in the appropriate office on the next day the office is open to the public.

Standard for Obtaining a Stay

Except as otherwise provided by law or other pertinent regulation, a petition for a stay of a decision pending appeal shall show sufficient justification based on the following standards.

1. The relative harm to the parties if the stay is granted or denied.

2. The likelihood of the appellant's success on the merits.

3. The likelihood of immediate and irreparable harm if the stay is not granted.

4. Whether the public interest favors granting the stay.

SIGNATURE

John S. McKee

John S. McKee, Rock Springs Field Manager

10/12/99

Date

APPENDIX A

SUMMARY OF COMMENTS AND BLM'S RESPONSE

TO THE EA FOR THE

IXC'S

FIBER OPTIC

TELECOMMUNICATIONS

SYSTEM

DENVER, COLORADO, TO SALT LAKE CITY, UTAH

SUMMARY OF COMMENTS AND BLM'S RESPONSE TO SCOPING FOR THE EA FOR THE IXC FIBER OPTIC LINE FROM DENVER, COLORADO, TO SALT LAKE CITY, UTAH

Fourteen comment letters were received during the 30-day scoping period that ended July 30, 1999. Comments were received from both project proponents, one member of the general public, the Army Corp of Engineers, SWEDA, Conoco Inc., the Fish and Wildlife Service, The Lincoln Highway Association, Office of Federal Land Policy, Wyoming Game and Fish Department, State Historic Preservation Officer, Wexpro, and Western Area Power Administration. Their comments are summarized below (in italics) with BLM's response to each immediately following the comment.

Wants to see the old Lincoln Highway preserved and not impacted.

Care has been taken to not impact any portions of the old Lincoln Highway that are intact and still retain their original character. Crossings will be done by boring under the highway grade.

The Army Corp of Engineers in Colorado are aware of the project and a determination that the work to be done is authorized by Department of the Army Nationwide Permit No.12.

Thank you for your comment.

Sweetwater Economic Development Association expressed support for the project.

Thank you for your comment.

Conoco Inc. expressed concern about IXC entering their existing rights-of-way. IXC was asked to enter into encroachment agreements or crossing agreements where necessary to cross Pioneer's (Conoco's) pipelines.

IXC will utilize the "one call" system to notify all utility companies 72 hours in advance of crossing their lines. Since Pioneer's pipelines will not be paralleled, just crossed, encroachments are not necessary.

The Cheyenne office of the Fish and Wildlife Service expressed their concern that buffer zones, timing stipulations, and other protective measures are safeguarded. In addition, the FWS recommended that suitable mountain plovers habitat be re-vegetated with native short grass prairie species that will maintain plover habitat.

Care will be taken to safeguard all buffer zones, timing stipulations, and other protective measures. Because the fiber optic line is going is so close to roads, the mountain plover habitat is not being re-vegetated with species that will maintain plover habitat in these areas. However, in the saltbush flats it is expected that saltbush will re-invade the right-of-way and the mountain plover habitat in these areas will not be lost. In the plains portions of the project, native grasses will be used that will maintain the plover habitat.

The Lincoln Highway Association wrote to make sure that the various re-routes of the Historic Lincoln Highway were known and protected.

Care has been taken to identify all the various routes of the Lincoln Highway and to protect those routes and the general setting of those segments that reflect the historic setting.

The Office of Federal Land Policy expressed support for the project and encouraged communication with Wyoming Game and Fish Department and Department of Environmental quality. They also stated that easements across state lands would be needed.

Thank you for your comment.

The Wyoming State Historic Preservation Office could not comment as they had not received the cultural reports yet.

Inventory reports for lands within Wyoming will be sent to the SHPO's office and the normal section 106 consultation process will be followed.

The Wyoming Game and Fish Department expressed concern for potential impacts to sage grouse breeding and nesting, and impacts to big game of any winter activity on crucial winter ranges.

Comments were noted and potential impacts mitigated by timing restrictions during the appropriate periods.

Questar requested that they be given forty-eight (48) hours notice before IXC installed the fiber optic line across their Church Buttes Unit, located in T16-17N, R112-R113 W., due to numerous lines in the area that are buried at a depth that may be impacted by IXC's activities.

IXC will give Questar forty-eight hour notice before installing fiber optic lines in the Church Buttes Unit.

Western Power Administration believes that some of their facilities may be affected by IXC's activities and wants to be kept involved.

Thank you for your comment.

Fish and Wildlife Service-Utah identified several threatened or endangered species that need to considered, especially impacts on Bonneville cutthroat trout. In addition impacts on migratory birds, wetlands, and re-vegetation with native species weed free seed were of concern.

This issues are addressed in the EA.

The Army Corp of Engineers-Omaha identified the crossing of flood plains of small drainages and streams as a concern. They also cautioned against building any of the regeneration or amplifier stations within 100-year flood plains.

Crossings of flood plains will be done in accordance with accepted practices. No buildings will be constructed within 100-year flood plains.

The Army Corp of Engineers-Cheyenne stated that a 404 permit would be required but felt that the action would be covered by the Nation Wide Permits 12 and 33.

IXC is applying for 404 permit(s) from the Army Corp of Engineers.

FINDING OF NO SIGNIFICANT IMPACT
IXC's FIBER OPTIC TELECOMMUNICATIONS SYSTEM
DENVER, COLORADO, TO SALT LAKE CITY, UTAH

Based on the review of the analysis in the Environmental Assessment for IXC Communications, INC.'s proposed fiber Optic Telecommunications System Denver, Colorado, to Salt Lake City, Utah, I have determined that the proposed action is in conformance with the approved land use plans and will not have any significant impacts on the human environment. Therefore, an environmental impact statement is not required. Further explanation of the finding is provided below.

The EA shows that all adverse impacts would be minor, short term, necessary and due impacts. Potentially substantial positive economic impacts could result for the company.

The Great Divide Resource Management Plan, the Kemmerer Resource Management Plan, and the Green River Resource Management Plan provide for the use of these public lands for rights-of-way. The Proposed Action would be in conformance with these land use plans, and no amendments to the RMPs would be necessary to implement the Proposed Action.

SIGNATURE

John S McKee

John S. McKee, Rock Springs Field Manager

10/12/99

Date

ENVIRONMENTAL ASSESSMENT FOR IXC COMMUNICATIONS, INC.'S PROPOSED FIBER OPTIC TELECOMMUNICATIONS SYSTEM DENVER, COLORADO, TO SALT LAKE CITY, UTAH

Prepared for

Bureau of Land Management
Rock Springs, Rawlins, and
Kemmerer Field Offices, Wyoming

By

TRC Mariah Associates Inc.
Laramie, Wyoming
MAI Project 25696

October 1999

ENVIRONMENTAL ASSESSMENT FOR IXC COMMUNICATIONS, INC.'S PROPOSED FIBER OPTIC TELECOMMUNICATIONS SYSTEM DENVER, COLORADO, TO SALT LAKE CITY, UTAH

Prepared for

Bureau of Land Management
Rock Springs, Rawlins, and
Kemmerer Field Offices, Wyoming

By

TRC Mariah Associates Inc.
Laramie, Wyoming
MAI Project [illegible]

October 1998

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1.0 INTRODUCTION

1.1 PURPOSE AND NEED

IXC Communications, Inc. (IXC) proposes to construct a fiber optic telecommunications system between Denver, Colorado, and Salt Lake City, Utah (Figure 1.1), to provide a transcontinental connection with the existing telecommunications network and to diversify the western telecommunications system. Fiber optic technology provides a higher quality of sound and digital data transmission than conventional copper cable systems, and it is capable of transmitting greater and more sophisticated information per cable than copper; thus it is considered state-of-the-art by telecommunications service providers and customers.

The proposed route passes through 10 counties in three states, for a total distance of approximately 611 miles. Approximately 494 miles (80.9%) would cross private, state, county, or city lands; approximately 116 miles (19.0%) would cross federal lands managed by the Bureau of Land Management (BLM) (all in Wyoming); and 1.0 mile (0.2%) would cross Wasatch National Forest land managed by the Forest Service (FS) (in Utah). There are no federal lands along the Colorado portion of the route. The proposed route would follow existing fiber optic cable, road, and pipeline ROWs for all but 32 miles (Figure 1.2; Table 1.1).

Three 1.9-inch and three 2.4-inch high-density polyethylene conduits would be installed simultaneously. Fiber optic cable, providing transmission capacity on a 144-fiber Corning Leaf Fiber system, would be threaded through one of the conduits. The other conduits would be used for future communications system upgrades. Ancillary facilities would include nine 1,200-ft^2 buildings, each housing one optical amplifier, and two 1,200-ft^2 buildings, each housing one regeneration station to boost the optical signals. Fiber optic technology requires that the light signal transmitted through the fiber be amplified using an in-line optical amplifier and that the light signal be retimed, reshaped, and regenerated at

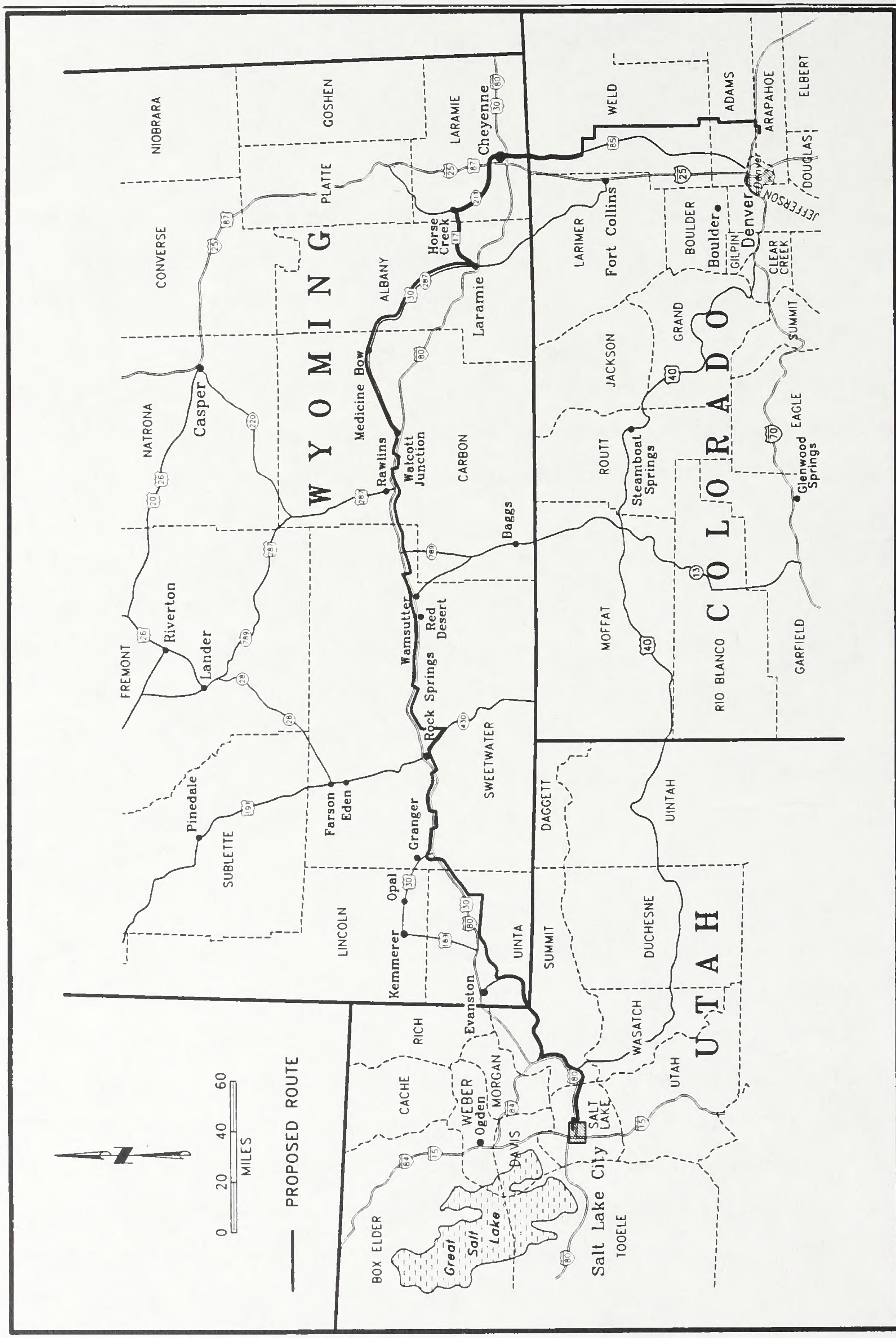


Figure 1.1 Project Location.

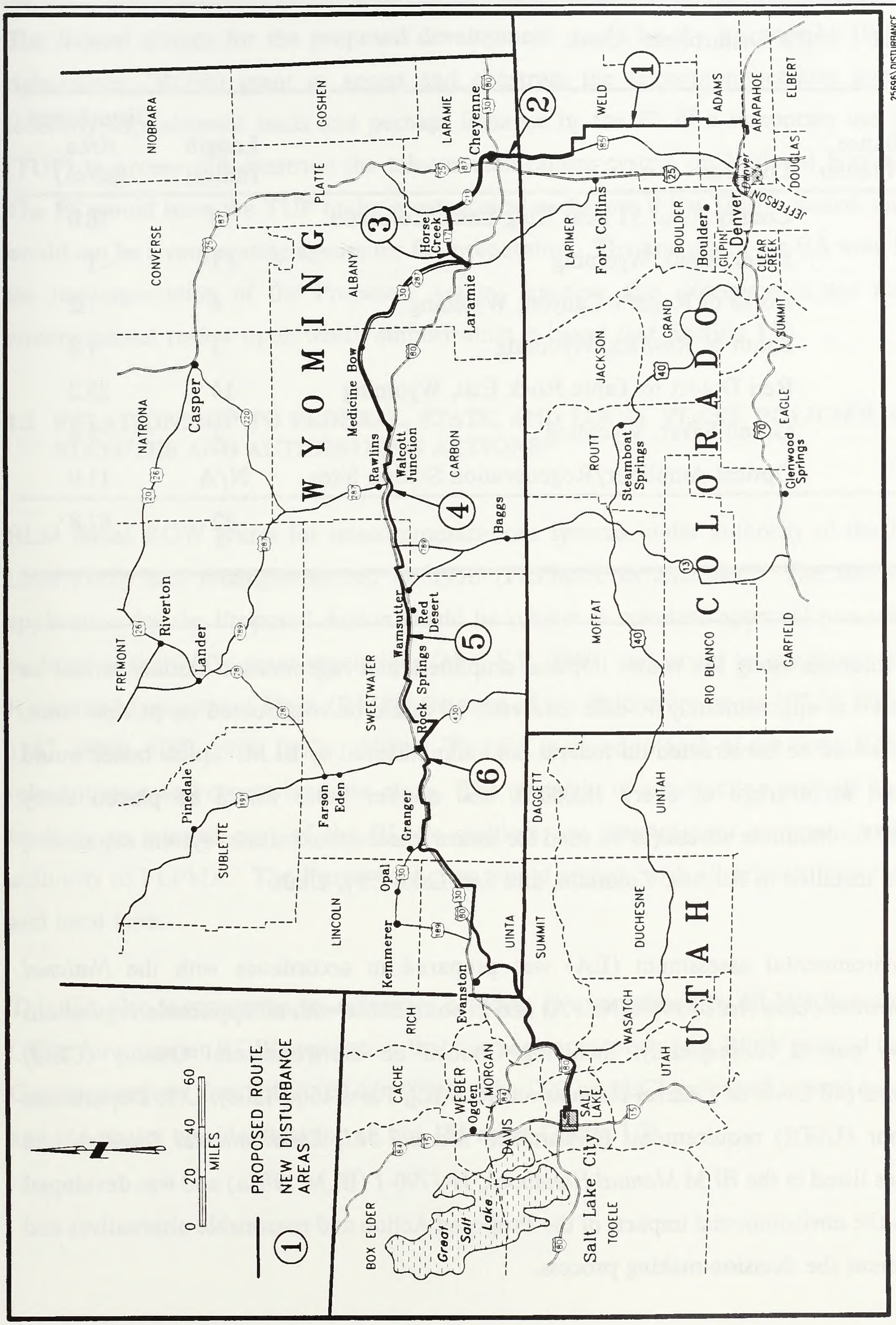


Figure 1.2 New Disturbances Areas.

Table 1.1 New Disturbance Areas.

New Disturbance Area Number	Location	Length (miles)	Disturbance Area (acres)
1	County Road 51 near Klug Lake, Colorado	10	18.0
2	Speer Road, Wyoming	<1	<1
3	North of Roger's Canyon, Wyoming	4	7.2
4	South of Rawlins, Wyoming	1	1.8
5	Red Desert to Table Rock Exit, Wyoming	14	25.2
6	Green River, Wyoming	2	3.6
N/A	Optical Amplifier/Regeneration Station Sites	N/A	11.0
Total		32	67.8

various intervals along the route. Optical amplifiers and regeneration stations would be constructed at approximately 50-mile intervals; 10 would be constructed on private lands, and one would be constructed on federal land administered by BLM. Splice boxes would be placed an average of every 18,000 ft, and marker poles would be placed every 800-1,000 ft. Manhole access (to be used for future telecommunications system expansion) would be installed in Aurora, Colorado, and Salt Lake City, Utah.

This environmental assessment (EA) was prepared in accordance with the *National Environmental Policy Act of 1969* (NEPA) and in compliance with all applicable regulations and laws passed subsequently, including Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [C.F.R.], Parts 1500-1508), U.S. Department of Interior (USDI) requirements (*Department Manual 561, Environmental Quality*), and guidelines listed in the BLM *Manual Handbook, H-1790-1* (BLM 1988a) and was developed to assess the environmental impacts of the Proposed Action and reasonable alternatives and to document the decision-making process.

The federal actions for the proposed development would be the issuance by BLM of a right-of-way (ROW) grant to access and construct the telecommunications system on federally administered lands and perhaps issuance by the FS of a temporary use permit (TUP) to access and construct the telecommunications system on National Forest lands. The FS would issue the TUP under a categorical exclusion, if the TUP is issued, and thus would not be a cooperating agency for EA preparation. The analysis in the EA would guide the implementation of the Proposed Action; however, this document is not the only environmental review upon which authorization is based (see Section 1.2).

1.2 RELATIONSHIP TO FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND STATUTES AND AUTHORIZING ACTIONS

BLM issues ROW grants for telecommunications systems under authority of the *Federal Land Policy and Management Act on 1976* (FLPMA), as amended. The ROW grant application for the Proposed Action would be subject to standard approval procedures as outlined in the ROW grant regulations (43 C.F.R. 2800) and would be consistent with the Resource Management Plans (RMPs) for each of the field office areas (BLM 1985, 1986, 1987, 1990a, 1992, 1996, 1997a, 1998b). This EA is tiered to each of the three RMPs and relevant state and county land use plans. The oversight of construction projects on public lands is an integral part of the BLM's multiple use management programs under the authority of FLPMA. The Proposed Action would comply with all relevant federal, state, and local laws.

This EA also incorporates by reference a recent EA completed by BLM's Rawlins Field Office for a similar ROW application that has been approved and a ROW granted to Enron Communications, Inc. (ECI) (BLM 1999a). The IXC and ECI proposed actions are similar and the routes are identical for all but 186 miles (Table 1.2).

Table 1.2 Deviations from the ECI Route.

Deviation Number	Location	Length (miles)
1	Aurora to Nunn, Colorado	79
2	Speer Road, Wyoming	5
3	Walcott Junction to Grenville Dome, Wyoming	15
4	Rawlins to Table Rock Exit, Wyoming	65
5	Point of Rocks, Wyoming	4
6	West of Rock Springs, Wyoming	3
7	Little America, Wyoming	8
8	Coalville to north of Wanship, Utah	7
Total		186

No new roads would be constructed as a result of this project; however, existing roads would be used during cable installation and building construction and maintenance. In limited areas, it would be necessary to drive off-road within the ROW.

Construction and operation of the proposed fiber optic system would require authorizations from several federal, state, and local agencies (Table 1.3). Some additional permits and approvals, such as road permits, franchises, railroad and other easements required at the local level, are not listed on Table 1.3 but would be secured prior to construction.

1.3 SCOPING, PUBLIC INVOLVEMENT, AND ISSUES IDENTIFIED

Issue identification was completed through formal public scoping and through a series of informal meetings and discussions between IXC and agencies with jurisdiction over the project. Public scoping notices were distributed to 665 agencies, businesses, special interest

Table 1.3 Major Federal, State, and Local Permits, Approvals, and Authorizing Actions.

Agency	Action[1]	Authority[1]
Federal		
Bureau of Land Management	EA preparation	NEPA, 40 C.F.R. 1500-1508; FLPMA (as amended), Public Law 94-579
	ROW grant	U.S. Department of the Interior/ Department of Agriculture/ Department of Transportation, Public Law 96-487 Federal Register Notice 6-3-81
	Notice to Proceed	BLM Manual H-2801-1 ROW PODs
Fish and Wildlife Service	Review of impacts to threatened, endangered, proposed threatened, and candidate species and migratory birds	*Fish and Wildlife Coordination Act of 1934*, as amended 1946, 1958, 1977 (16 U.S.C. 661-667e); *Endangered Species Act of 1973* (16 U.S.C. 1531 et seq.); *Migratory Bird Treaty Act of 1918*, as amended (16 U.S.C. 703 et seq.); *Eagle Act* (16 U.S.C. 668-668d)
Army Corps of Engineers	Section 404 permit for placement of dredged or fill materials into waters of the U.S.	Section 401, *Clean Water Act of 1977*, as amended 1987 (33 U.S.C. 1251-1376)
State		
Colorado		
Colorado Department of Transportation	Utility permit	Colorado Revised Statutes
Colorado Department of Public Health and Environment	Review of water quality certification and issuance of an air quality Notice of Intent to construct	Section 401, *Clean Water Act of 1977*, as amended 1987 (33 U.S.C. 1251-1376); *Clean Air Act*
Colorado Division of Wildlife	Review impacts to wildlife and wildlife habitat	*Fish and Wildlife Coordination Act of 1934*, as amended 1946, 1958, 1977 (16 U.S.C. 661-667e)
Colorado State Historic Preservation Office	Review impacts to cultural resources	*National Historic Preservation Act of 1966*, as amended (16 U.S.C. 470) and related acts and executive orders
Wyoming		
Wyoming State Lands Commission	Issue easement to access and construct on state lands	W.S. 36-2-107 36-9-118

Table 1.3 (Continued)

Agency	Action[1]	Authority[1]
Wyoming Department of Transportation	E-54 permit	W.S. 126-813
Wyoming Department of Environmental Quality, Water Quality Division	Review of water quality certification; issue stormwater discharge permit; notification of accidental release of hazardous substances into waters of the state	Section 401, *Clean Water Act of 1977*, as amended 1987 (33 U.S.C. 1251-1376); Wyoming Water Quality Rules and Regulations Chapter XVIII; W.S. 35-11-301 and 35-11-302
Wyoming Game and Fish Department	Review impacts to wildlife and wildlife habitat	*Fish and Wildlife Coordination Act of 1934*, as amended 1946, 1958, 1977 (16 U.S.C. 661-667e)
Wyoming State Historic Preservation Office	Review impacts to cultural resources	*National Historic Preservation Act of 1966*, as amended (16 U.S.C. 470) and related acts and executive orders
Utah		
Utah Department of Transportation	ROW encroachment permit	Utah DOT rules and regulations
Utah Department of Environmental Quality		
Division of Water Resources	Review of water quality certification; issue stormwater discharge permit	Section 401, *Clean Water Act of 1977*, as amended 1987 (33 U.S.C. 1251-1376)
Division of Wildlife Resources	Review impacts to wildlife and wildlife habitat	*Fish and Wildlife Coordination Act of 1934*, as amended 1946, 1958, 1977 (16 U.S.C. 661-667e)
Utah State Historic Society and Division of State History	Review impacts to cultural resources	*National Historic Preservation Act of 1966*, as amended (16 U.S.C. 470) and related acts and executive orders
Counties	Various permits, easements, or notifications	County rules
Cities and Towns	Various permits, easements, or notifications	City and town rules

[1] EA = environmental assessment; NEPA = *National Environmental Policy Act of 1969*; C.F.R. = Code of Federal Regulations; FLPMA = *Federal Land Policy and Management Act of 1976*; BLM = Bureau of Land Management; ROW = right-of-way; POD = Plan of Development; U.S.C. = United States Code; W.S. = Wyoming Statute; DOT = Department of Transportation.

groups, and individuals, mostly in Wyoming. Press releases were published in newspapers along the proposed route in Wyoming. Comments were provided by the following entities:

- Fish and Wildlife Service (FWS), Cheyenne;
- FWS, Salt Lake City;
- Army Corps of Engineers (Corps), Omaha;
- Corps, Cheyenne;
- Corps, Colorado;
- Office of Federal Land Policy;
- Wyoming State Historic Preservation Office;
- Wyoming Game and Fish Department (WGFD);
- Sweetwater Economic Development Association;
- The Lincoln Highway Association;
- Conoco, Inc.;
- Wexpro Company; and
- Home Point LLC.

Consultation with Native American tribal groups has identified several areas in the project area containing religious or culturally important sites. BLM would review potential impacts on a site-specific basis to determine what measures are necessary to avoid or mitigate significant impacts to these areas. Mitigation may include such actions as monitoring during and after construction by representatives of affected tribes. Tribal elders may perform ceremonies as part of this activity.

During scoping, the following issues and concerns were identified:

- protection of threatened, endangered, candidate, and state sensitive/ conservation species;
- possible effects on migratory birds;
- impacts on nesting raptors;
- protection of cultural and historic resources;

- protection of wetlands;
- prevention of cable exposure in streambeds during flooding;
- location of optical amplifiers and regeneration stations away from flood-prone areas;
- impacts to sage grouse breeding and nesting;
- impacts to big game from winter activity on crucial winter range;
- revegetation;
- damages to fences;
- protection of existing utility lines; and
- cumulative impacts.

2.0 THE PROPOSED ACTION AND ALTERNATIVES

2.1 THE PROPOSED ACTION

IXC proposes to install and operate a telecommunications system from Denver, Colorado, to Salt Lake City, Utah, to provide service to these and other western cities. The approximately 611-mile long cable would cross 116 miles of federal land administered by BLM (all within Wyoming), 1 mile of National Forest land administered by the FS (all within Utah), and 494 miles of state, county, municipal, and private lands. Three 1.9-inch and three 2.4-inch high-density polyethylene conduits would be installed simultaneously and a fiber optic cable would be installed in one conduit; the other conduits would be used for future communication system upgrades. A ROW term of 30 years, with the right of renewal, would be granted.

From Aurora, Colorado, the cable would generally follow county roads north to Nunn, where it would follow U.S. Highway 85 north to Cheyenne (Figure 1.1). It would then proceed northwest on Highway 211 to Horse Creek, then southwest to Roger's Canyon along County Road 17. At Roger's Canyon, the route would head due west where it would join Highway 30/287 a few miles north of Laramie. It would then follow Highway 30/287 to Walcott Junction where Highway 30/287 intersects Interstate 80 (I-80). The cable would follow the I-80 corridor via county and local roads and pipeline ROWs to Granger Junction. From Granger Junction, the cable would follow county and local roads and established pipeline corridors south-southwest past Church Butte and Lyman, south from Lyman to Cliff Graham Reservoir No. 3, west to Mountain View, Millburne, and Bigelow Bench, then south southwest to Piedmont, west to Aspen Creek, southwest to Hilliard, south along the western side of Hilliard Flat, then west to the Wyoming/Utah border on Chalk Creek Road. In Utah, the route would follow Chalk Creek Road to Coalville, then county roads adjacent to the I-80 corridor south and west to Parley's Canyon. The route would then follow State Highway 65 through Emigration Canyon to Salt Lake City. Except for 22 miles in Wyoming and 10 miles in Colorado (Figure 1.2, Table 1.1), the system would be placed within previously disturbed highway ROWs, county and BLM roads, two-tracks, and established pipeline corridors.

IXC would complete approximately 80% of construction in 1999, beginning in July on privately owned lands and in October on federal lands and continuing until weather prevents further construction in 1999. The remaining work would be completed after April 1 of 2000.

A temporary construction ROW of 40 ft and a permanent operations and maintenance ROW of 10 ft would be required. Direct surface disturbance width would average 15 ft and would occur on areas traversed by tracked machinery used to plow the duct into the ground. Additional disturbance would result from other traffic on the ROW, trenching, and excavation and installation of splice vaults and manholes. An area of up to 40 x 40 ft would be needed at each pit for boring under roads, driveways, railroads, pipelines, canals, streams, wetlands, and endangered species habitat.

All related structures and facilities would be constructed on private land except for a 30-ft access to the Continental Divide optical amplifier and one optical amplifier building, access road, and power line at the Lookout Site (Figures 2.1 and 2.2). An estimated nine optical amplifiers (to boost the optical signals) would be constructed at 50-mile intervals along the route. Buildings housing the optical amplifiers would be 1,200 ft^2 (about 0.03 acre) in size. Two 1,200-ft^2 regeneration stations would also be constructed along the ROW. Optical amplifier and regeneration station buildings would be painted Carlsbad Canyon to blend with the surrounding landscape. Splice boxes would be installed every 18,000 ft on average, and marker poles would be installed every 800-1,000 ft. Handhole access (for future telecommunications system expansion) would be spaced every 10,000 ft. Manhole access (also for future expansion) would be installed in Aurora, Colorado, and Salt Lake City, Utah. These facilities would be constructed within the disturbance corridor for duct and cable installation and would not result in any additional disturbance.

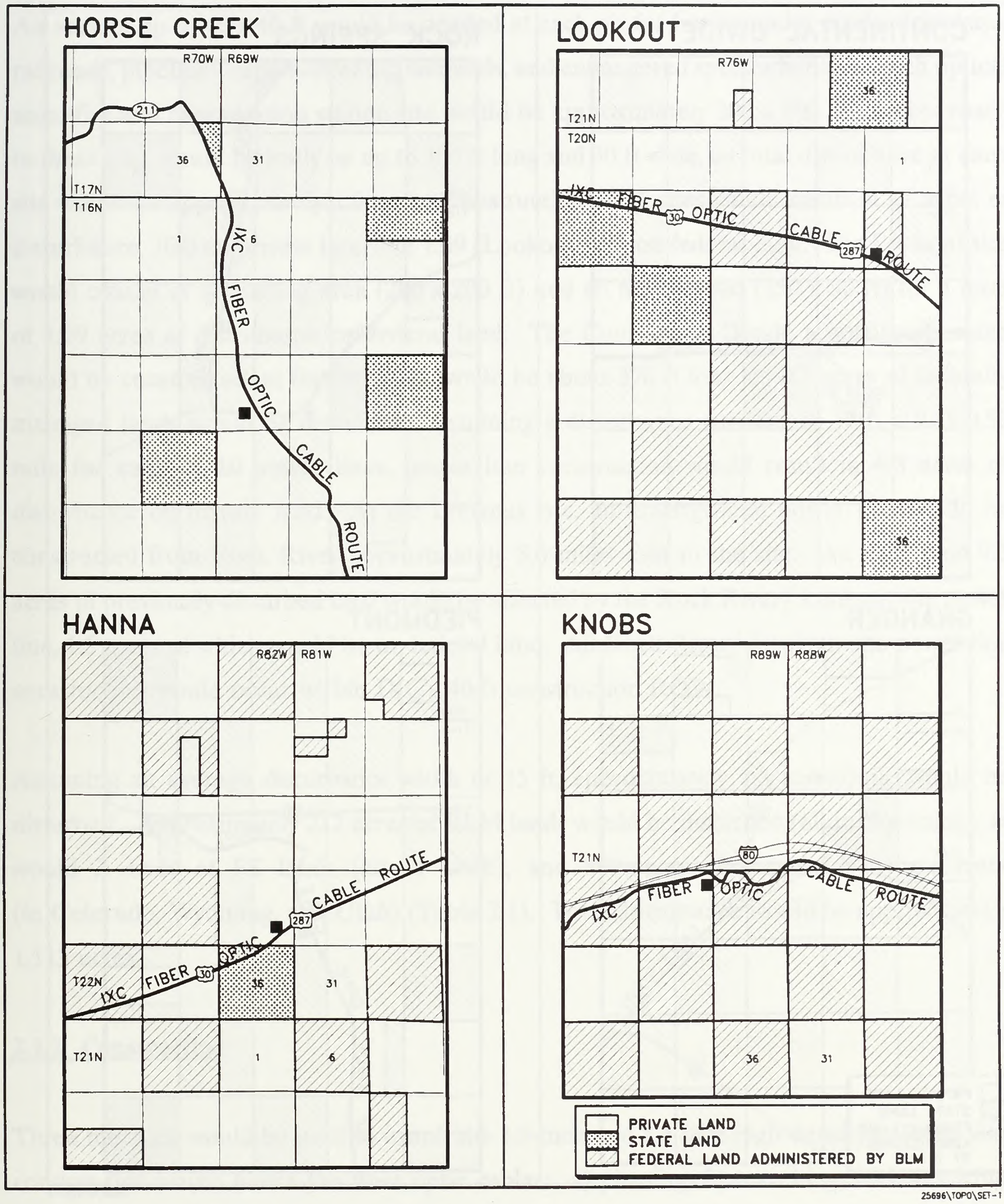


Figure 2.1 Optical Amplifier/Regeneration Station Locations and Landownership, Eastern Wyoming. (The Three Sites Occurring in Colorado and Utah Are Not Depicted Because No Federal Lands Would Be Affected in These States.)

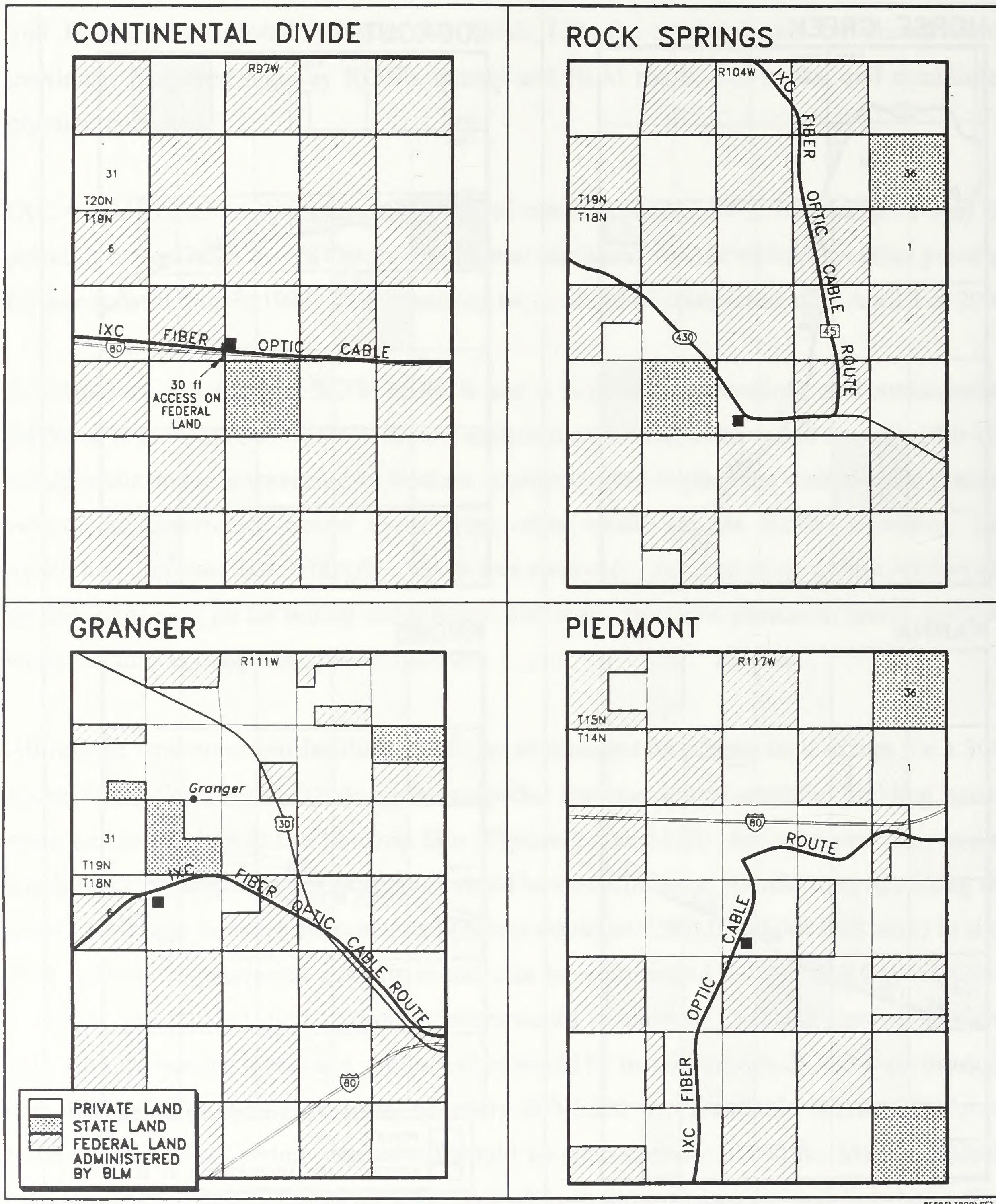


Figure 2.2 Optical Amplifier/Regeneration Station Locations and Landownership, Western Wyoming. (The Three Sites Occurring in Colorado and Utah Are Not Depicted Because No Federal Lands Would Be Affected in These States.)

An area of up to 40 x 40 ft would be needed at each pit for boring under roads, driveways, railroads, pipelines, canals, streams, wetlands, and endangered species habitat. Each optical amplifier and regeneration station site would be approximately 200 x 200 ft. Access roads to these sites would typically be up to 100 ft long and 30 ft wide, so total disturbance at each site would be approximately 1.0 acre. Construction of 11 sites would result in 11 acres of disturbance, 10.0 on private land and 1.09 (Lookout site) on federal land. The Lookout site would consist of a building area (200 x 200 ft) and an access road (250 x 30 ft) for a total of 1.09 acres of disturbance on federal land. The Continental Divide access road, which would be constructed on federal land, would be about 370 ft long, so 0.3 acres of federally managed lands would be disturbed. Assuming a disturbance corridor of 12 ft x 0.25-0.50 mile for each of 10 power lines, power line construction would result in 4-8 acres of disturbance on private land. At the Lookout site, an underground power line would be constructed from Rock River approximately 5.0 miles east to the site. An estimated 7.3 acres of previously disturbed land would be affected by the Rock River/ Lookout site power line, 1.5 acres of which would be on federal land. All Rock River/ Lookout site power line construction would occur within IXC's 40-ft construction ROW.

Assuming an average disturbance width of 15 ft, approximately 1.8 acres/mile would be disturbed. Approximately 212 acres of BLM lands would be disturbed (all in Wyoming), as would 2 acres of FS lands (all in Utah), and 899 acres of state and private lands (in Colorado, Wyoming, and Utah) (Table 2.1). Total disturbance would be approximately 1,113 acres.

2.1.1 Construction

Three methods would be used to install the 1.9-inch and 2.4-inch high-density polyethylene conduit that would house the fiber optic cables: 1) plowing; 2) trenching; and 3) boring. Plowing would be the primary method used (Figure 2.3). A typical construction sequence would be as follows:

Table 2.1 Estimated Disturbance Acreage.[1]

	Estimated Disturbance							
	Colorado		Wyoming		Utah		Total	
Landowner	(miles)	(acres)	(miles)	(acres)	(miles)	(acres)	(miles)	(acres)
Private	102	184	308	564[2]	64	115	474	863
State	0	0	20	36	0	0	20	36
Federal	0	0	116	212[3]	1	2	117	214
Total	102	184	444	812	65	117	611	1,113

[1] Calculated based on an average disturbance of 1.8 acres/mile.
[2] Includes 554 acres for duct installation and 10.0 acres for optical amplifier and regeneration station sites.
[3] Includes 209 acres for duct installation, 1.09 acres for the Lookout building site and access road, 1.5 acres for the Rock River/Lookout power line, and 0.3 acre for the Continental Divide access road.

- surveying and staking;
- clearing and grading;
- plowing, trenching, or boring duct (including railroad, road, driveway, stream, and wetland crossings);
- cable threading;
- cable splicing and joining duct;
- manhole installation; and
- optical amplifier and regeneration station construction.

2.1.1.1 Surveying and Staking

The centerline and the exterior limits of the construction ROW would be surveyed by a licensed surveyor and flagged with brightly colored lath and flagging tape. All personnel and equipment would be required to stay on the designated ROW or within designated temporary work or storage spaces.

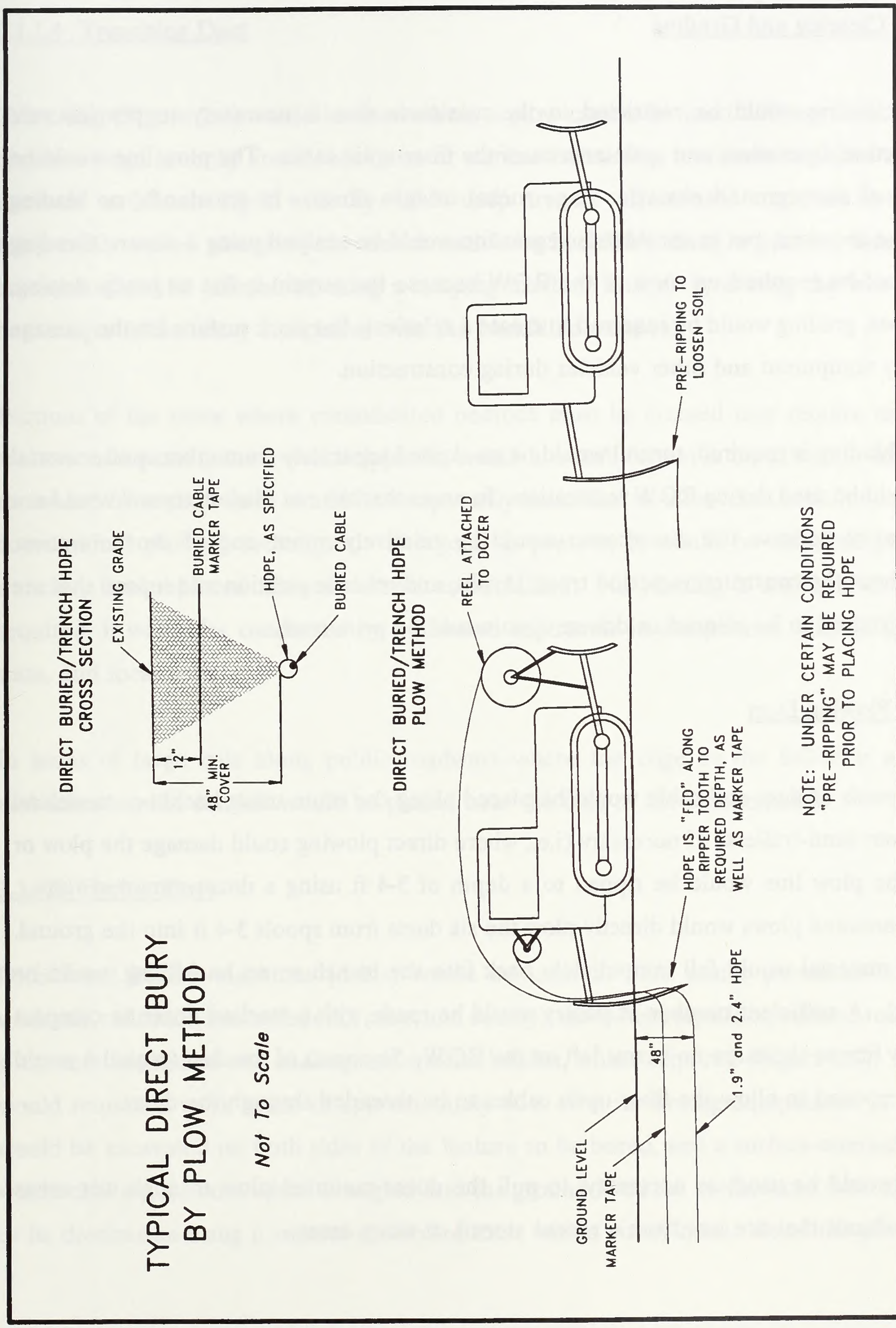


Figure 2.3 Cross Section: Plowing.

2.1.1.2 Clearing and Grading

ROW clearing would be restricted to the minimum that is necessary to provide safe construction, operation, and maintenance of the fiber optic cable. The plow line would be cleared of aboveground obstacles (e.g., rocks) using a dozer. In grasslands, no blading would be required, but in shrublands vegetation would be scalped using a dozer. Grading would not be required on most of the ROW because the terrain is flat to gently sloping. On slopes, grading would be required to create a relatively flat work surface for the passage of heavy equipment and other vehicles during construction.

Where blading is required, topsoil would be stockpiled separately from other spoil material and would be used during ROW restoration. In areas that are not bladed, topsoil would not be salvaged because the disturbance would be relatively minor and of short duration. Throughout the construction period trees, shrubs, and other vegetation and topsoil that are not designated to be cleared or driven upon would be protected.

2.1.1.3 Plowing Duct

Large spools of duct and cable would be placed along the route using backhoes to unload them from semi-trailers. If necessary (i.e., where direct plowing could damage the plow or duct), the plow line would be ripped to a depth of 3-4 ft using a dozer-mounted ripper. Dozer-mounted plows would directly plow the six ducts from spools 3-4 ft into the ground. Plowed material would fall immediately back into the trench so no backfilling would be required. A sufficient number of passes would be made with a tracked dozer to compact the plow line so there are no berms left on the ROW. Segments of the duct (pigtails) would be left exposed to allow the fiber optic cables to be threaded through the ducts.

Dozers would be used, as necessary, to pull the dozer-mounted plow through wet areas (e.g., lowlands that are wet from a recent storm) or steep areas.

2.1.1.4 Trenching Duct

Trenching (Figure 2.4) would be used where a plow cannot be used. Where trenching is required (e.g., in rocky areas), backhoes or standard trenching machines would be used to excavate a 0.7- to 1.0-ft wide by 4.0-ft deep trench. Excavated material would be temporarily stored alongside the trench and later backfilled using a grader. Backfilled material would be compacted using a tamping machine and/or by driving the wheel of a backhoe or other heavy equipment over the backfilled material.

Portions of the route where consolidated bedrock must be crossed may require use of a rocksaw or several passes with a ripper to create a trench for cable installation. Material excavated from the trench would be temporarily backfilled to allow duct installation using conventional plowing techniques. If topsoil is present, it would be salvaged prior to trenching and replaced after the trench is backfilled. No blasting is anticipated; if it is required, it would be conducted by a licensed contractor in compliance with all federal, state, and local laws.

In areas of large cuts along public roadways where the edge of the ROW is a steep embankment, the conduit would be placed near the foot of the embankment.

2.1.1.5 Boring Duct

Directional boring machines (drills) would be used to bore under perennial streams, wetlands, railroads, roads (federal, state, and county), driveways, pipelines, cultural resources sites, and threatened and endangered species habitat, where required (Figure 2.5). Boring would require a work space of approximately 40 x 40 ft for boring equipment. A trench would be excavated on both sides of the feature to be bored, and a surface-operated drill would drill a pilot bore which is angled into the ground from the surface and then directed to its destination using a remote-controlled mole with a cutter head. Once the pilot bore

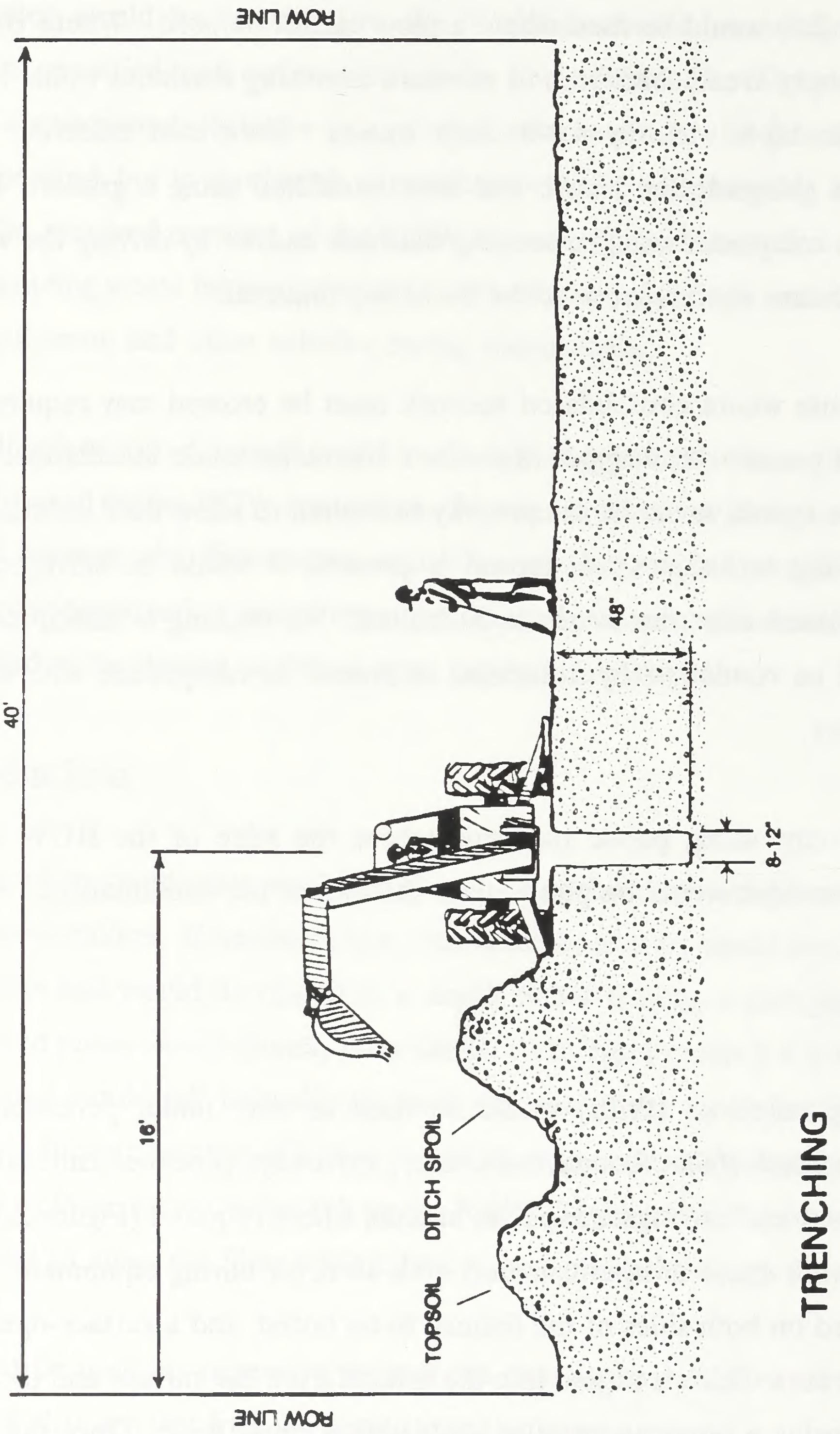


Figure 2.4 Cross Section: Trenching.

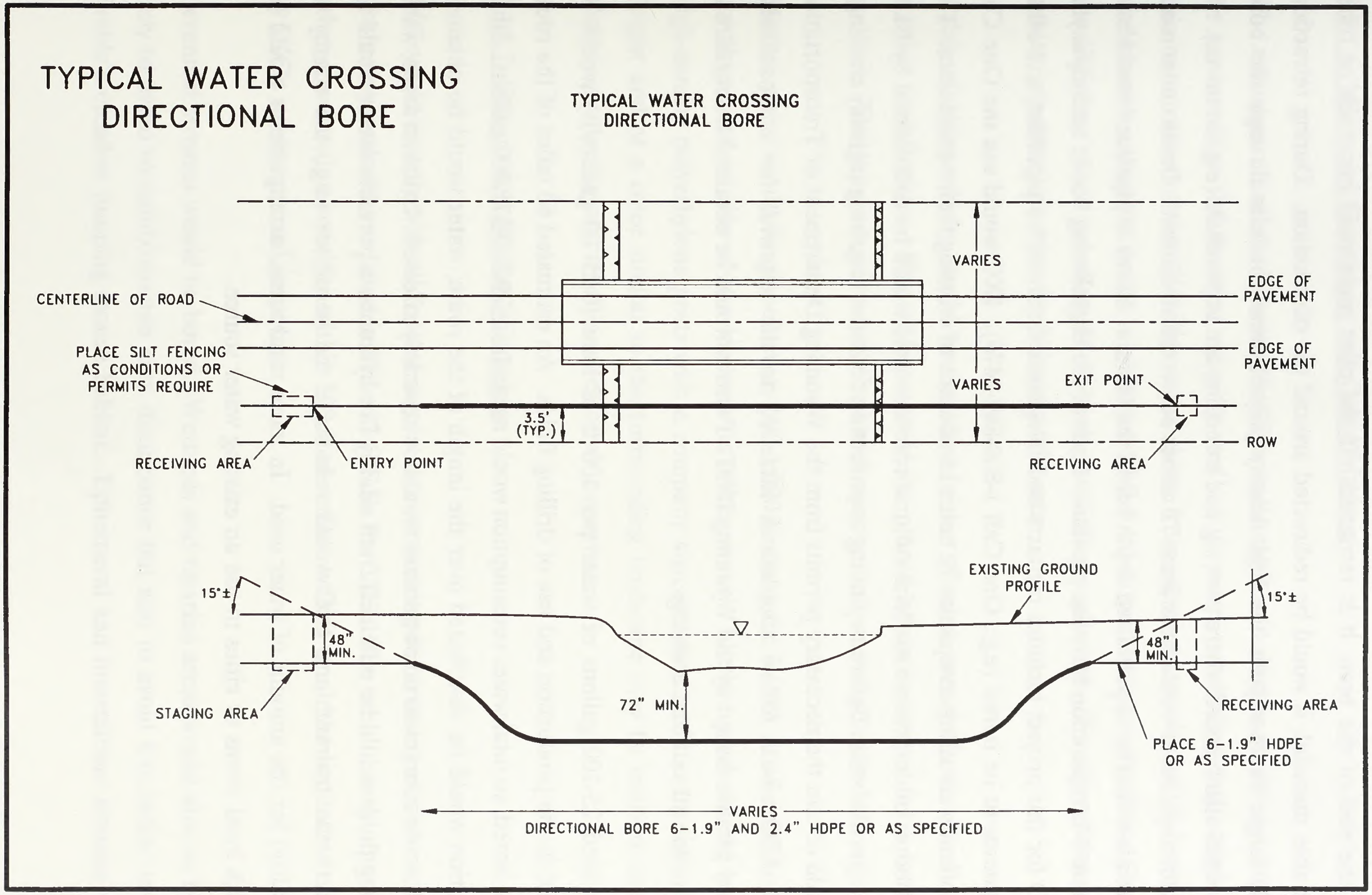


Figure 2.5 Cross Section: Water Crossing Boring. Other Borings Would Be Similar; Details Are Provided in the Plan of Development.

reaches the end of the bore, it is retracted. If the pilot mole runs into rock or other impenetrable material, it would be redirected around the obstruction. During retraction, a slightly larger reamer pulls the high-density polyethylene conduits through the bore. Boring would also be used where plowing and trenching are impractical (e.g., in towns). At stream crossings, bores would be at least 72 inches below the streambed. Bores under roads and railroads would be at permitted depth below the feature. Bores at pipelines would have a minimum 3-ft separation from the pipeline. Each of the engineering books accompanying the POD for this project includes contacts and telephone numbers for pipelines and other utility systems to be bored (e.g., One Call 1-800-849-2476). IXC would use the One Call system to notify all utility companies 72 hours in advance of crossing their buried lines. The depth of bores under known surficial cultural resource sites would be determined by BLM on a site-specific basis. Before beginning construction activities requiring highway crossings, IXC would obtain the necessary permits from the Wyoming Department of Transportation (DOT). IXC would follow stipulations attached to the approval for encroachment occupancy permits issued by the Wyoming DOT. Permits would be obtained from railroad companies for all railroad crossings.

An estimated 25-100 gallons of water per 100 ft of bore (0.25-1.0 gallon/ft) would be consumed in the production and use of drilling fluids. An estimated 60 miles of the route would be bored, so total water consumption would range from 79,200-316,800 gallons. Since consumption would be distributed over the length of the route, water would be obtained from numerous sources so no one source would be adversely affected. In urban areas, water for drilling fluids would be obtained from nearby fire hydrants; a portable meter would be attached to the hydrant, and IXC would reimburse the permittee (e.g., the county or municipality) for the amount of water used. In more rural areas, arrangements would be made with local towns or cities to use an existing water source.

2.1.1.6 Minimum Clearances and Cable Markers

The minimum clearance between the fiber optic cable and electric or other conduits would be no less than 1.0 ft when crossing and 1.5 ft when paralleling such conduits. The minimum offset of the IXC fiber optic ducts from pipelines would be 3.0 ft when boring underneath a pipeline and a minimum of 5.0 ft when paralleling a pipeline. On average, the IXC line would be offset 15 ft when paralleling a pipeline. No alterations of existing cables, pipelines, or other facilities would occur.

Cable marking ribbon would be installed (either plowed, trenched, or bored) above all conduit installations. The ribbon would be placed approximately 1.0-1.5 ft above the conduit. The tape would be inscribed with appropriate warning notations.

Marker poles would be placed every 800-1,000 ft along the ROW, at all road and pipeline crossings, and at line-of-site intervals in other areas. Marker poles would be 4-ft tall high-density polyethylene posts with a company sign attached. Marker poles of reduced height and of a color similar to the surrounding landscape may be utilized near certain historic properties and traditional cultural properties.

2.1.1.7 Stream and Wetland Crossings

IXC would comply with all federal regulations concerning the crossing of waters of the U.S. (including wetlands) as listed in Title 33 C.F.R. Part 323. The use of heavy equipment and other construction activities within 500 ft of surface waters would be conducted as directed by IXC's environmental inspector.

Perennial streams would be bored. Wetlands and riparian areas would also be bored, not only to avoid wetland/riparian area disturbance but also to avoid Ute ladies' tresses and Preble's meadow jumping mouse habitat. Ephemeral and intermittent streams would be crossed by plowing or trenching the lines through the streambed during low or no water flow. If the stream is flowing, water would be either flumed or pumped across the work area such that no flow would occur in the trenching area during cable installation. In-place erosion control measures would minimize downstream siltation. Excavation would be completed from the banks, where possible. In larger streams, the installation may be completed in two steps, where water is diverted from the working side using a coffer dam, then diverted from the other side to complete the installation. Once construction across a stream is complete, the site would be restored immediately. Any flow obstructions not present prior to construction would be removed, stream contours would be restored, and the areas stabilized and revegetated in accordance with landowner preferences.

The only possible impact to streams that are bored is the possible leakage of cutting and lubricating fluid (a non-toxic bentonite clay or similar material). The small size of the bore hole and the limited amount of fluid used reduces the risk of in-stream leakage. Fluid flow controls would be available to quickly seal the leakage, and spills would be contained in accordance with Spill Prevention, Containment, and Countermeasures (SPCC) Plans which would be prepared for all bores.

2.1.1.8 Threading Cables

Manufacturers typically include a rope within the duct to which the fiber optic cables would be attached and pulled through the duct using a winch. Alternatively, a small plug (a pig) may be attached to the cables and propelled through the duct using compressed air.

2.1.1.9 Splicing Cables and Joining Duct

Cables would be spliced in 3 x 4-ft fiberglass, concrete, or metal vaults buried 1-2 ft below the surface along the route. These vaults would be installed in pits excavated using backhoes. Individual cables would be spliced using a device to fuse glass fibers. Once the splice is completed, a locating device would be placed above the lid to facilitate relocating the vault, and the area would be backfilled. Vaults would be constructed at various intervals along the route, depending on the length of cable segments received from the manufacturer. Ducts would be connected using coupling devices.

2.1.1.10 Handhole and Manhole Installation

Handholes would be located along the route for cable splicing, pulling, and maintenance. Manholes would be installed in Aurora and Salt Lake City to enable easy access to the cables for future telecommunications system expansion. Size is the primary difference between the two structures. Handholes are relatively small and are intended to allow workers to reach the cable from the surface. Manholes are larger both in diameter and depth and incorporate various safety features because they represent a confined space that workers enter. The following discussion of manholes also applies to handholes along the route.

Manholes would be made of hard, conical plastic approximately 3 ft in diameter near the top and 2 ft in diameter at the base. It is possible that a few would be cast in place, and steel vaults may be used in urban streets. Dimensions and configurations of manholes would vary. Installation would typically require the excavation of a 12 x 9-ft hole using a backhoe; manholes would be installed flush with the ground. Cable would then be threaded through the manhole, the sides backfilled, and the manholes capped in accordance with city ordinances.

2.1.2 Optical Amplifier and Regeneration Station Construction

Prefabricated metal buildings (1,200 ft^2) would be used to house the optical amplifiers and regeneration stations (Figure 2.6). Optical amplifier and regeneration station sites would be scalped of vegetation and bladed to create a level surface for building erection. Where available, a minimum of 6 inches of topsoil would be salvaged and stockpiled on-site for use during reclamation. Concrete slabs (30 x 40 ft) approximately 2 ft thick would be poured directly on the graded surface.

Prefabricated metal buildings (1,200 ft^2) would be hauled to the optical amplifier and regeneration station sites using tractor-trailer trucks and then unloaded and assembled. Buildings would be anchored to the concrete foundation using rebar. Each regeneration station and optical amplifier building would be surrounded by a chain-link fence. They would not be manned, so no water or sanitary facilities would be required. Buildings within 2.0 miles of any sage grouse lek would be equipped with raptor antiperching devices.

The Lookout optical amplifier site would be constructed in a manner similar to that shown on Figure 2.6. The site would be located within 100 ft of the highway, so access road dimensions would be approximately 250 x 30 ft. The site would be located within 250 ft of the highway, so access road dimensions would be approximately 250 x 30 ft. The only other ancillary facilities to be constructed on federal lands would be a 370 x 30-ft wide access road to the Continental Divide site. Both roads would be located along existing two-tracks but would be upgraded to BLM road standards (e.g., crowned-and-ditched) (Figure 2.7). No culverts would be required at either site.

Power to the optical amplifier and regeneration station buildings would be supplied by local power companies via short buried power lines installed at each site. Power lines would typically be between 0.25 and 0.50 mile long. In addition, an estimated 16 48-volt batteries, a battery charger, and a liquid propane gas-fired generator would be on-site to provide power during utility power outages. Batteries would be used to maintain power for outages.

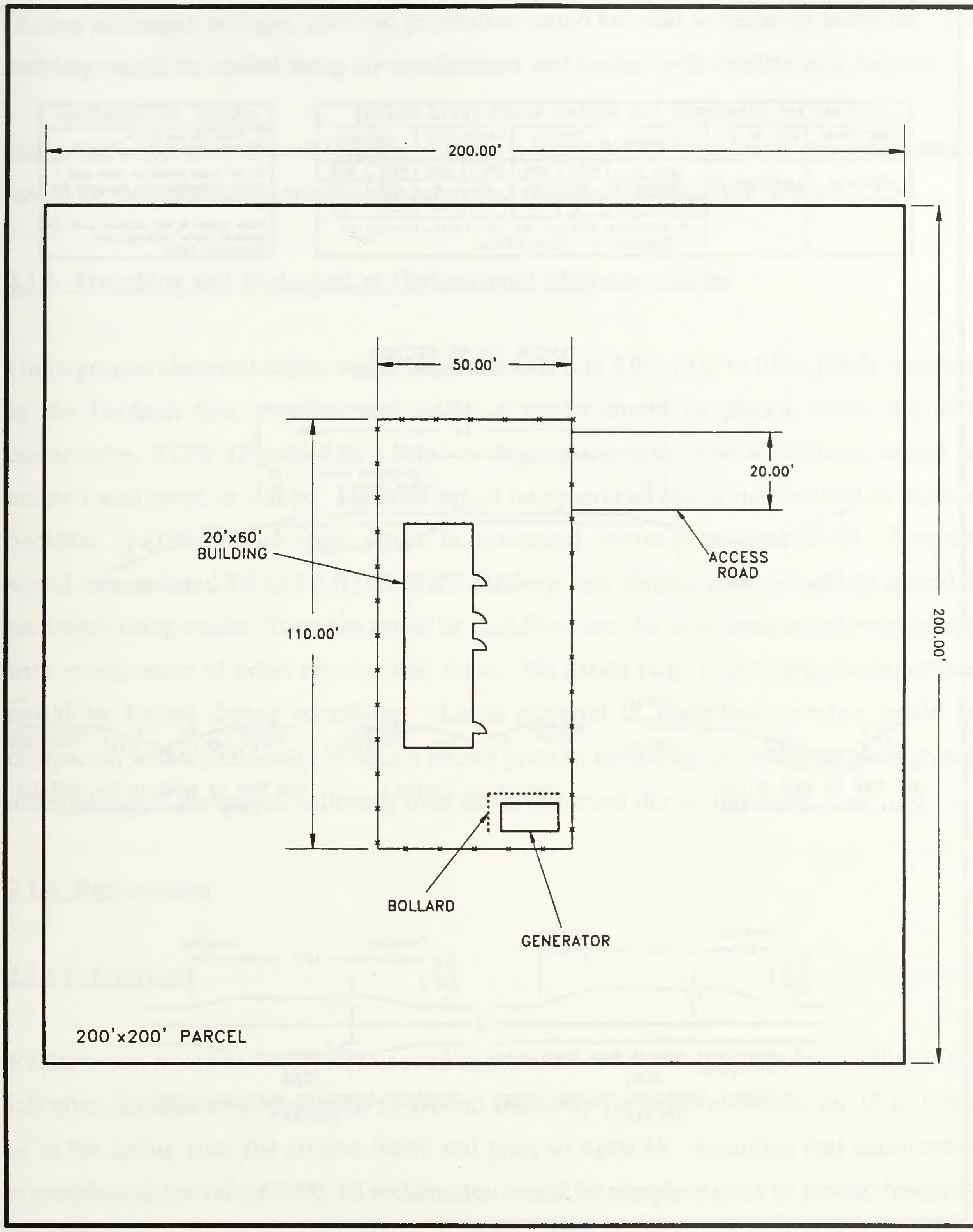
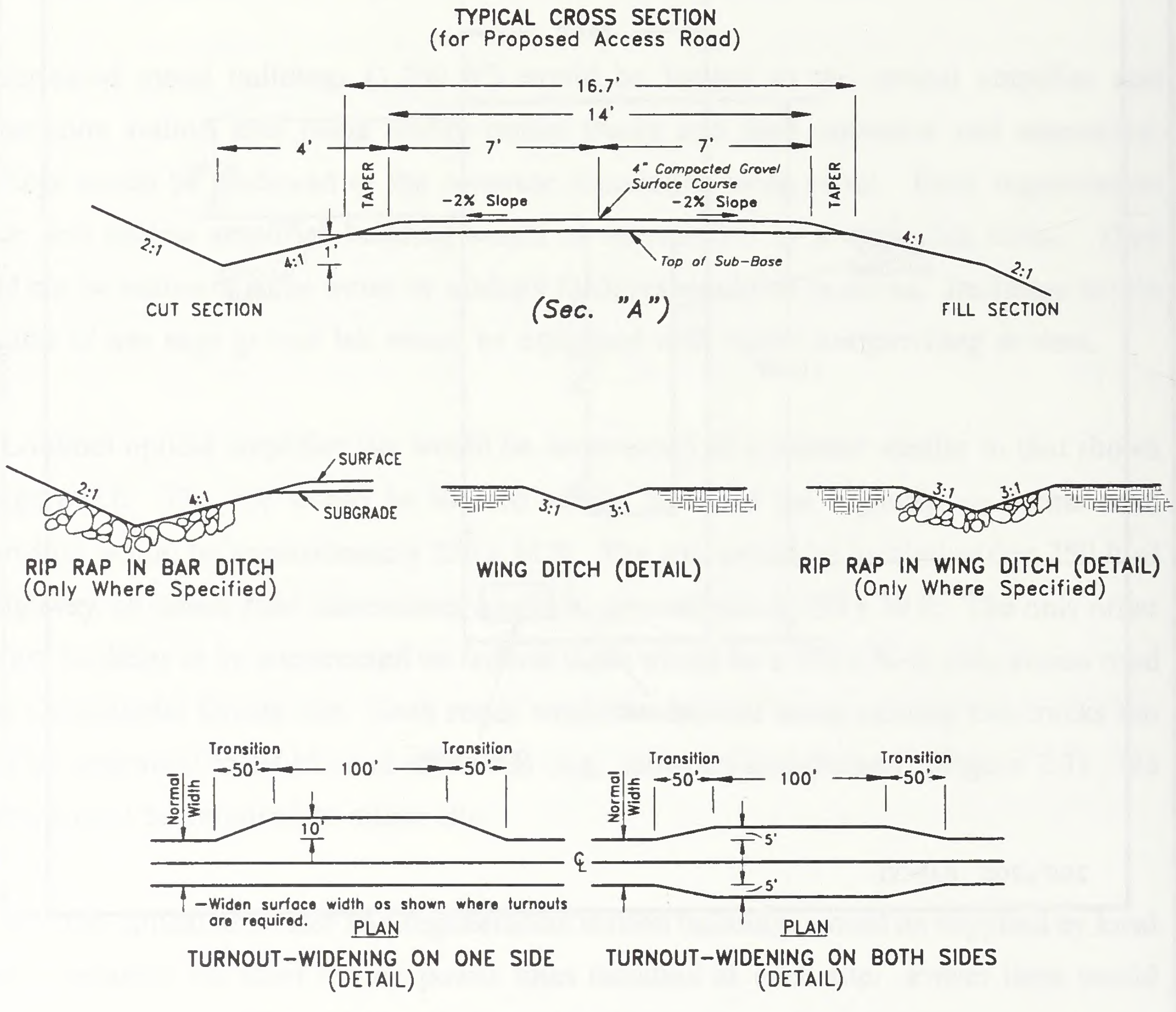


Figure 2.6 Plan View: Typical Optical Amplifier/Regeneration Station Building Site.

GEOMETRIC STANDARDS FOR BUREAU ROADS (9113 ROADS)								
FUNCTIONAL CLASSIFICATION	EST 20 YR. ADT	TERRAIN	DESIGN SPEED		TRAVELWAY WIDTH		MAXIMUM GRADE	
Resource	Less than 20	Level to	PREF.	MIN.	PREF.	MIN.	PREF.	MAX.
		Rolling	30	•	30	•	30	30
		Mountainous	15	•	15	•	15	15
		• Variance Allowed By The Chief, Branch of Engineering (State Office)						

GRAVEL SPECIFICATION:
3" minus pit run gravel (AASHTO M145-49 A-1-a Soil)
Do not place gravel on road until Inspector/Engineer has approved the sub-grade.
Place gravel to full widened width on turnouts, curve widening, and intersection flares.



25696\FIGURE\RD-STANDARDS

Figure 2.7 Typical Road Cross Section for Access Roads on BLM Lands.

During prolonged outages, gas-fired generators would be used to recharge batteries. The building would be cooled using air conditioners and heated with electric strip heaters.

Disturbed areas around each building that are not needed for operations and maintenance would be reclaimed according to the approved reclamation plan (see Section 2.1.3).

2.1.3 Trenching and Placement of Underground Electrical Cables

Underground electrical cables would be placed in 2.0- to 3.0-ft (0.6- to 0.9-m) wide trenches; at the Lookout Site, trenches and electrical cables would be placed within the 40-ft construction ROW (Figure 2.8). Prior to digging trenches, trench locations would be marked with paint or stakes. Material would be excavated with a rubber-tired or tracked backhoe. Suitable trench spoils would be processed on-site to be used as fill. Trenches would be excavated 3.0 to 4.0 ft (0.9 to 1.2 m) deep, and electric cables would be placed in the trench using trucks. Trenches would be backfilled and the area revegetated concurrently with revegetation of other construction areas. No debris (e.g., brush, large rocks, refuse) would be buried during backfilling. Loose material in backfilled trenches would be compacted with a bulldozer. Within a month prior to reseeding, all available plant growth material would be spread uniformly over areas disturbed during trenching.

2.1.4 Reclamation

2.1.4.1 Overview

Reclamation would be completed as soon as practicable following construction either in the fall after September 15 and prior to ground freeze-up (or prior to November 15 in Utah) or in the spring after the ground thaws and prior to April 15. Assuming that construction is complete in the fall of 2000, all reclamation would be complete prior to ground freeze-up in 2000.

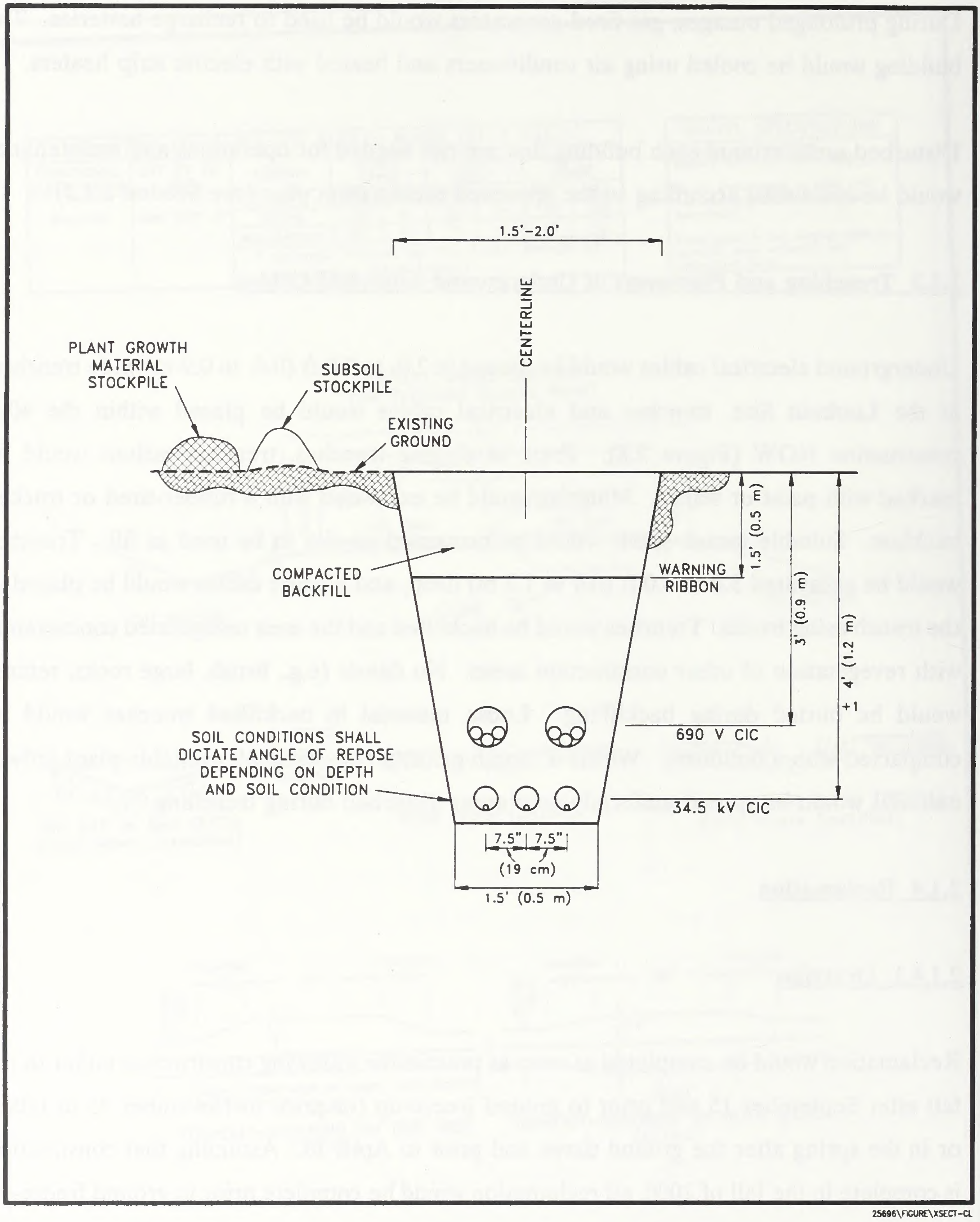


Figure 2.8 Typical Electrical Trench Detail.

Reclamation would be conducted on all disturbed areas to comply with the BLM Wyoming policy on reclamation (BLM 1990b) unless otherwise specified by private landowners. The short-term goal of reclamation would be to stabilize disturbed areas as rapidly as possible, thereby protecting sites and adjacent undisturbed areas from erosion. The long-term goal would be to return the land to approximate predisturbance conditions through the establishment of an ecologically sustainable vegetation community.

2.1.4.2 Regrading and Seedbed Preparation

Typically, regrading would not be required over the plow line because the surface would remain in its approximate original contour. These areas would be left rough, broadcast seeded, and raked with a chain or harrow to cover seed.

Areas that have been bladed during construction would require regrading, the objective of which would be to establish overall slope stability and reestablish local drainage patterns. These areas would be graded to the approximate original contour and ripped to a depth of approximately 8 inches to roughen surfaces and create cohesion between surfaces and topsoil. Topsoil, where available, would be spread uniformly to a depth of approximately 6-12 inches over all surfaces to be reclaimed. All surfaces would then be harrowed or disced to loosen crusts and close air pockets. Ripping and tilling operations would also serve to loosen compacted soils.

Fertilizers, certified weed free hay or straw mulch, and erosion control blankets would be used as shown in Table 2.2.

2.1.4.3 Seed Mixtures and Seeding Methods

Seed mixtures (Table 2.3) contain species that are well-adapted to the various environments along the route (e.g., short-grass prairie, sagebrush steppe) and would help stabilize

Table 2.2 Fertilizer and Mulch.

Segment	Fertilizer[1]	Mulch
Aurora to Galeton[2]	N:P (2:3) applied at a rate of 27 lbs available N/acre and 69 lbs available P/acre	1.5 tons/acre native hay, mechanically crimped
Galeton to Colorado/Wyoming state line[2]	N:P (2:3) applied at a rate of 27 lbs available N/acre and 69 lbs available P/acre	1.5 tons/acre native hay, mechanically crimped
Colorado/Wyoming state line to Wyoming/Utah state line[3]	None	Slopes 3:1 or flatter: 1.5 tons/acre certified weed free straw or grass hay, mechanically crimped; slopes >3:1: erosion control blanket
Wyoming/Utah state line to Salt Lake City[4]	None	None

1 N = nitrogen; P = phosphorus; K = potassium.
2 Provided by Dennis Loose, August 3, 1999, Colorado DOT.
3 Provided by John Samson, August 2, 1999, Wyoming DOT.
4 Provided by Wayne Grzymkowski, August 4, 1999, Utah DOT. A seed certification report would be supplied to Utah DOT, Region Two Maintenance Division in compliance with the *Utah Noxious Weed Act*.

disturbed areas and establish a self-perpetuating plant community that would support existing land uses along the route. These species may be established via direct seeding and have excellent tolerance for the climatic conditions in the region.

The seed mixtures may be modified if certain species become unavailable or if it is determined through monitoring that certain species are not successful by BLM, the state, or private landowners. The seed mixtures would not contain noxious weed seed. If commercial seeds are used, the seed would be certified and seed viability would be tested within 9 months of the planting date. Native seed would be collected from plants that are adapted to similar conditions (e.g., soils, aspect, and adjacent plant communities) as the area to be revegetated. Seed mixture containers would be labeled and available for inspection by the Authorized Officer (AO).

Table 2.3 Seed Mixtures.

Segment	Species Common Name *Scientific Name* (Variety/Cultivar)	Pounds/Acre (Pure Live Seed)
Aurora to Galeton [1]	Western wheatgrass *Elymus smithii* (Arriba)	4.0
	Sideoats grama *Bouteloua curtipendula* (Vaughn)	2.0
	Purple prairie clover *Petalostomum purpurea* (Kanab)	0.5
	Prairie sandreed *Calimovilfa longifolia* (Goshen)	2.0
	Thickspike wheatgrass *Elymus lanceolatus* (Critana)	2.5
	Switchgrass *Panicum virgatum* (Nebraska 28)	1.0
	Sand bluestem *Andropogon hallii* (Elida)	2.0
	Indiangrass *Sorghastrum nutans* (Holt)	1.5
Total		15.5
Galeton to Colorado/ Wyoming state line [1]	Blue grama *Bouteloua gracilis* (Hachita)	0.5
	Green needlegrass *Stipa viridula* (Lodorm)	2.0
	Western wheatgrass *Elymus smithii* (Arriba)	6.0
	Sideoats grama *Bouteloua curtipendula* (Vaughn)	3.0
	Buffalograss *Buchloe dactyloides* (Texoka)	7.5
	Purple prairie clover *Petalostemum purpurea* (Kaneb)	0.5
Total		19.5
Colorado/Wyoming state line to Rawlins (Milepost 216) [2]	Western wheatgrass *Elymus smithii* (Rosana)	4.0
	Bluebunch wheatgrass *Elymus spicatus* (Secar)	4.0

Table 2.3 (Continued)

Segment	Species Common Name *Scientific Name* (Variety/Cultivar)	Pounds/Acre (Pure Live Seed)
	Mountain bromegrass *Bromus marginatus* (Bromar)	5.0
	Big bluegrass *Poa juncifolia* (Sherman)	1.5
	Rocky Mountain penstemon *Penstemon strictus*	0.5
	Cicer milkvetch *Astragalus cicer*[3] (Monarch)	3.0
	Winterfat *Kraschenninnikovia lanata*	1.0
	Gardner saltbush *Atriplex gardneri*	1.0
Total		20.0
Rawlins (Milepost 216) to Wyoming/Utah state line[2]	Western wheatgrass *Elymus smithii* (Rosana)	5.0
	Bottlebrush squirreltail *Sitanion hystrix*	4.0
	Indian ricegrass *Oryzopsis hymenoides* (Nezpar)	4.0
	Canby bluegrass *Poa canbyi* (Canbar)	2.0
	Western yarrow *Achillea millifolium*	0.25
	Winterfat *Kraschenninikovia lanata*	1.0
	Gardner saltbush *Atriplex gardneri*	1.0
Total		17.25
Wyoming/Utah state line to Salt Lake City[3]	Western wheatgrass *Elymus smithii* (Rosana)	7.0
	Mountain bromegrass *Bromus marginatus* (Bromar)	6.0
	Sheep fescue *Festuca ovina* (Durar)	5.0
Total		18.0

1 Provided by Dennis Loose, August 3, 1999, Colorado DOT.
2 Provided by John Samson, August 2, 1999, Wyoming DOT.
3 Provided by Wayne Grzymkowski, August 4, 1999, Utah DOT.

Seeds would be planted with range drills equipped with depth regulators and agitators to promote uniform seed distribution. Seeds would be planted 0.25 to 0.50 inch deep, and drill rows would be 8 to 10 inches apart. Drilling would be done on contour in areas where equipment can be safely operated on contour. Winterfat seed, because it is fluffy, would be broadcast over a roughened seedbed after to drill seeding other species. Seed would be broadcast on all slopes $\geq$25%.

In areas to be broadcast-seeded (i.e., in areas where it is unsafe to operate a range drill or terrain might damage the drill), a cyclone or similar-type broadcast seeder would be used. Seeding rates would be doubled and the area raked with a chain or harrow to cover seed.

2.1.4.4 Postseeding Maintenance

Shrub debris (if any) would be scattered on disturbed surfaces for erosion control. Rocks would be placed at the base of slopes to reduce runoff and erosion. If landowners prefer removal of all debris, these materials would be taken directly to a certified landfill or placed in dumpsters in temporary work areas which would be serviced by a locally licensed sanitation company. Vehicles would be prohibited from all reclaimed areas which would be clearly marked with signs.

Noxious weeds would be controlled either mechanically or chemically. If herbicides or pesticides must be used to control weeds or pests, only BLM-approved herbicides or pesticides would be used, and they would be applied by a permitted contractor in compliance with all federal, state, and local regulations.

2.1.4.5 Revegetation Monitoring

Revegetation success would be monitored annually by an IXC-sponsored revegetation specialist and inspected by the AO or other BLM representative. Erosion condition would be rated using BLM's Erosion Condition Classification. Reclamation monitoring results would be documented annually and provided to the AO. Revegetation measures would be repeated, if necessary, until soils are stabilized and a sustainable vegetation community is established. Operations and maintenance personnel would report any severe erosion, slope movements, or damage to erosion control devices to appropriate authorities with 24 hours of discovery.

2.1.5 Hazardous Materials

Hazardous material used during telecommunications system construction would include petroleum products typically required for heavy equipment operation (e.g., gasoline, diesel fuel, lubricants, and coolants), which contain several hazardous and extremely hazardous materials identified in the Environmental Protection Agency's (EPA's) *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act of 1986* (SARA) and 40 C.F.R. 355 (Table 2.4). Project construction and maintenance operations would comply with all relevant federal and state laws regarding hazardous materials.

Vehicles would be maintained and operated to prevent accidental leaks or spills. To minimize adverse environmental impacts from spills, the following measures would be taken.

- All spills would be reported immediately to the construction foreman or inspector who would direct clean-up and notify appropriate agency officials.
- Some construction equipment would be equipped with spill control kits (e.g., shovels, plastic bags, portable dams, absorbent material).
- Accidental leaks would be cleaned up immediately and contaminated material would be disposed of at an approved facility.
- Servicing, refueling, and storing of fuels and lubricants would occur in staging areas or off-site at an appropriate facility and would not occur within 300 ft of any ephemeral or perennial streams or within 100 ft of any listed plant

Table 2.4 Hazardous and Extremely Hazardous Materials Used During Telecommunications System Construction, Operations, and Maintenance.

Material		Hazardous Substances	CAS #
Emissions			
	Gases	Formaldehyde	50-00-0
		NO_x	10102-44-0[1]
		Ozone[2]	10028-15-6
		Sulfur dioxide[2]	7446-09-5
		Sulfur trioxide[2]	7446-11-9
	Particulates	Barium	7440-39-3
		Cadmium	7440-43-9
		Copper	7440-50-8
		Fine mineral fibers	–
		Lead	7439-92-1
		Manganese	7439-96-5
		Nickel	7440-02-2
		POM	–
		Zinc	7440-66-6
	VOCs	Benzene	71-43-2
		Ethylbenzene	100-41-4
		n-Hexane	100-54-3
		PAHs	–
		Toluene	108-88-3
		m-Xylene	108-38-3
		o-Xylene	95-47-6
		p-Xylene	106-42-3
Fuels			
	Diesel fuel	Benzene	71-43-2
		Cumene	98-82-8
		Ethylbenzene	100-41-4
		Methyl tert-butyl ether	1634-04-4
		Naphthalene	91-20-3
		PAHs[3]	–
		POM[4]	–
		Toluene	108-88-3
		m-Xylene	108-38-3
		o-Xylene	95-47-6
		p-Xylene	106-42-3
	Gasoline	Benzene	71-43-2
		Cumene	98-82-8
		Cyclohexane	110-82-7
		Ethylbenzene	100-41-4

Table 2.4 (Continued)

Material	Hazardous Substances	CAS #
Fuels (cont.)		
Gasoline (cont.)	n-Hexane	110-54-3
	Methyl tert-butyl ether	1634-04-4
	Naphthalene	91-20-3
	PAHs	–
	POM	–
	Tetraethyl lead[2]	78-00-2
	Toluene	108-88-3
	m-Xylene	108-38-3
	o-Xylene	95-47-6
	p-Xylene	106-42-3
Miscellaneous Materials		
Antifreeze	Acrolein	107-02-8
	Cupric sulfate	7758-38-7
	Ethylene glycol	107-21-1
	Freon	76-13-1
	Phosphoric acid	766-38-2
	Potassium hydroxide	1310-58-3
	Sodium hydroxide	1310-73-2
	Triethylene glycol	112-27-6
Batteries	Cadmium	7440-43-9
	Cadmium oxide	1306-19-0
	Lead	7439-92-1
	Nickel hydroxide	7440-02-0
	Potassium hydroxide	1310-58-3
	Sulfuric acid	7664-93-9
Cleaners	Hydrochloric acid	7647-01-0
Fertilizers	Unknown	
Herbicides	Unknown	
Lead-free thread compound	Copper	7440-50-8
	Zinc	7440-66-6
Lubricants	1,2,4-trimethylbenzene	95-63-6
	Barium	7440-39-3
	Cadmium	7440-43-9
	Copper	7440-50-8
	n-Hexane	110-54-3
	Lead	7439-92-1
	Manganese	7439-96-5
	Nickel	7440-02-0
	PAHs	–

Table 2.4 (Continued)

Material	Hazardous Substances	CAS #
Miscellaneous Materials (cont.)		
Lubricants (cont.)	**POM**	–
	Zinc	7440-66-6
Motor oil	**Zinc compounds**	–
Paints	**Aluminum**	7429-90-5
	Barium	7440-39-3
	n-Butyl alcohol	71-36-3
	Cobalt	7440-48-4
	Lead	7439-92-1
	Manganese	7439-96-5
	PAHs	–
	POM	–
	Sulfuric acid	7664-93-9
	Toluene	108-88-3
	Triethylamine	121-44-8
	Xylene	1330-20-7
Sealants	**1,1,1-trichloroethane**	71-55-6
	n-Hexane	110-54-3
	PAHs	–
	POM	–
Solvents	1,1,1-trichloroethane	71-55-6
	Acetone	67-64-1
	t-Butyl alcohol	75-65-0
	Carbon tetrachloride	56-23-5
	Isopropyl alcohol	67-63-0
	Methyl ethyl ketone	108-10-1
	Methanol	67-56-1
	PAHs	–
	POM	–
	Toluene	108-88-3
	Xylene	1330-20-7
Starting fluid	**Ethyl ether**	60-29-7

[1] CAS # for nitrogen dioxide, an extremely hazardous material.
[2] Extremely hazardous material.
[3] PAHs = polynuclear aromatic hydrocarbons.
[4] POM = polycyclic organic matter.

species. Used oil or unused lubricants would be stored in appropriate containers, removed from the site daily, and disposed of at an approved facility. Service truck operators would not allow residual fuels or lubricants to drain onto the ground.

- When not in used, construction equipment would be stored in staging areas or off-site at appropriate facilities.

Thus, accidental leaks would not result in violations of any federal or state hazardous material or waste regulations.

IXC would conform with provisions of the *Toxic Substances Control Act of 1976*, as amended (15 United States Code [U.S.C.] 2601, et seq.) with regard to any toxic substances that are used, generated, or stored on the ROW or on facilities authorized under ROW grants (see 40 C.F.R. 702-799 and especially provisions on polychlorinated biphenyl--40 C.F.R. 761.1-761.193). Any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity as established by 40 C.F.R. 117.3 would be reported as required by the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, Section 102 B. Copies of reports required by federal or state agencies for a release or spill of any hazardous material would be furnished to the AO within 5 working days of occurrence.

IXC would not generate any hazardous waste during the construction or operation of the proposed project.

IXC would hire a contractor to provide an adequate number of portable toilets at the construction site. IXC would ensure that sanitary wastes were removed and disposed of at an approved facility in accordance with state and local laws. Contractors would also provide trash barrels or dumpsters to collect construction site trash (e.g., lunch wrappers); solid wastes would routinely be removed and disposed of at an approved facility.

2.1.6 Operations and Maintenance

Little or no activity would occur on the ROW during operations and maintenance. The cables, and ducts, once installed, do not require maintenance unless a break occurs, at which time an alarm system would immediately indicate the approximate location of the break. The exact location would be determined by using a reflectometer which uses a light signal to detect the break's exact location. A small (5 x 5-ft) area over the break would be excavated using a backhoe, the break would be spliced, and the excavated area would be backfilled.

Technicians would visit the regeneration stations and optical amplifiers once per week.

The operations and maintenance work force would include approximately three field technicians for the life-of-project. Operations and maintenance would also include up to 10 full-time personnel at IXC's headquarters in Austin, who would monitor the system electronically.

If it is necessary for IXC to perform maintenance or repair work on a portion of the fiber optic line located under a bored area; IXC will conduct all activities at the ends of the bore areas unless the repair work is a result of damage caused by a third party. In those instances, the repair may have to take place at the point the damage occurred. IXC would notify BLM and/or FWS of these locations when work must be done within a bored area established to avoid cultural resources or sensitive wildlife habitat.

2.1.7 Work Force

An estimated five construction units would be operating simultaneously along any one segment of the route during cable installation. In addition to heavy equipment operators, laborers, and supervisors, crews utilizing four-wheel-drive pickups would provide manual labor for fencing, spool attachment, splicing, reclamation, etc. Each construction spread would require a work force of approximately 15 workers, so an estimated 75 workers would be employed in the third and fourth quarters of 1999 and the second and third quarters of 2000.

The operations and maintenance work force would include approximately three field technicians for the life-of-project. Operations and maintenance would also include up to 10 full-time personnel at IXC's headquarters in Austin, who would monitor the system electronically.

2.1.8 Access, Equipment, and Traffic

No new or reconstructed access roads would be necessary for this project. Existing roads, fences, structures, or drainage facilities that are damaged during construction would be replaced or repaired to a condition equal to or better than that which existed before construction. The width and alignment of existing roads would not be altered. Roads would not be used if deep rutting (in excess of 4 inches) could occur. Off-road travel would be required, but all off-road traffic would remain within the 40-ft construction ROW.

IXC would comply with existing federal, state, and county requirements and restrictions developed to protect road networks and the traveling public. Arrangements would be made with the Wyoming DOT, as required, to transport oversized loads to the project. Otherwise, load limits would be observed at all times to prevent damage to existing road surfaces. No dust control measures would be necessary. Project activities would be suspended during wet conditions that would cause vehicle tracking of sediment onto paved roads.

During construction, a maximum of 19 vehicles would be on the ROW at any one time (Table 2.5). Only the pickup trucks and the refueling trucks would make daily round trips to a given construction spread, so there would be an estimated six round trips per day

Table 2.5 Construction Equipment.

Task	Equipment Needed
Site preparation	Bulldozer[1]
	Backhoe[1]
	10-yard dump truck[1]
	Front-end loader
	Pavement saw
Site excavation (in areas where ripping or trenching are required)	Bulldozer[1]
	Backhoe[1]
	Trencher
	Rock wheel
	10-yard dump truck[1]
	Jackhammer/rock saw
Plowing	Bulldozer with plow implement
	Backhoe[1]
	Tractor-trailer (cable reel transportation)
Boring	Boring machine
	Truck and trailer for boring machine
	Backhoe[1]
	5,000-gallon boring fluid truck
Duct and cable installation	Duct truck
	Tractor trailer (delivery of duct and cable reels)
Backfilling, grading, and restoration	Bulldozer[1]
	Backhoe[1]
	Asphalt truck
	Drum rollers
All operations	Pickup trucks (4)[2]
	Refueling trucks (2)[2]
Total number of construction vehicles at any one construction site	19[3]

[1] One piece of this type of equipment would be used for multiple tasks on each construction spread, so the number of vehicles at any construction spread would be minimized.

[2] An estimated four pickup trucks and two refueling trucks would be required at each construction site.

[3] Excludes boring machine and boring support equipment since boring would occur at specific locations where plowing/trenching equipment would not be operating. Also excludes restoration equipment since construction and restoration would occur sequentially.

(36 per week assuming a 6-day work week) during construction. Tractor-trailer trucks would deliver supplies (e.g., duct, cable) to the spread about every other day, so there would be an estimated three tractor-trailer round trips per week, so construction traffic would result in an estimated 39 round trips per week. During mobilization and demobilization, all vehicles listed in Table 2.5 would make one round trip, for a total of 23 round trips. All proposed access to the ROW (i.e., approved existing roads and IXC's ROW corridor) would adequately convey this volume of traffic without safety problems. An estimated three pickup trucks would be used for operations and maintenance.

2.1.9 Abandonment

The conduit and cable would be abandoned in place, and all aboveground features would be removed and disposed of at a suitable location. Any remaining surface disturbance would be reclaimed and revegetated according to landowner specifications.

2.1.10 Project-wide Mitigation

2.1.10.1 Air Quality

Water or other dust suppressants would be used as needed for dust control at all construction sites. Equipment would be properly maintained to minimize emissions.

2.1.10.2 Paleontology

If important fossils are discovered during construction, work would cease within 100 ft of the discovery, and the find would be evaluated by a BLM-approved paleontologist. Construction would not resume until the site was avoided or otherwise mitigated to BLM's satisfaction. Vertebrate fossils, or plant or invertebrate fossils that could contribute to the scientific knowledge of ancient and modern ecosystems, are considered important.

2.1.10.3 Streams and Wetlands

The following measures would be implemented to protect streams and wetlands. Stream and wetland crossings would be completed as described in Section 2.1.1.7. IXC would comply with all federal regulations concerning the crossing of waters of the U.S. (including wetlands) as listed in Title 33 C.F.R. Part 323. The project meets the criteria for coverage under the Nationwide 12 permit for compliance with the *Clean Water Act*. The use of heavy equipment and other construction activities within 500 ft of surface waters would be conducted as directed by IXC's environmental inspector, in consultation with BLM.

- Stream banks to be placed or trenched would be stabilized to prevent slumping.
- Boring entry and exit points would be located outside of riparian areas.
- Refueling and staging would occur at least 300 ft from the edge of a stream or stream bank at all stream channels.
- Sediment control measures would be utilized, as needed, at all stream crossings.
- Where streams would be trenched, stream banks would be restabilized with large angular rock. Riprap would be placed from the channel bottom to the normal high water mark on the bank.
- If a vertical bank is cut back, it would be restored to its original contour and stabilized.
- Construction vehicles would not cross vertically sloped channels.
- Stabilizing vegetation would not be removed unless absolutely necessary. Most streams crossed would be ephemeral, where stream-side vegetation would be composed of upland species. Many of these streams would be plowed or trenched. Stream-side vegetation would be reestablished immediately following completion of the crossing. Riparian areas would be bored, so stream-side vegetation would not be affected.
- Streams would be crossed at right angles to the channel when possible to minimize in-stream disturbance.

2.1.10.4 Soils

The following measures would be implemented to minimize impacts to soils.

- No construction or routine maintenance activities would be conducted when soil is too wet to adequately support construction equipment (i.e., if such equipment creates ruts in excess of 4.0 inches deep).
- Certified weed free straw mulches, certified weed free hay bale barriers, silt fences, and water bars would be used to control soil erosion.
- Soil erosion control measures would be monitored, especially after storms, and repaired or replaced if needed.
- Disturbance would be limited to that which is necessary for safe and efficient system installation.
- All disturbed areas would be restored to the original contour and reclaimed as described in Section 2.1.3.

2.1.10.5 Noise

All equipment would be properly muffled, and construction would occur only during daylight hours.

2.1.10.6 Vegetation

The following measures would be implemented to minimize impacts to vegetation.

- Disturbance would be limited to that which is necessary for safe and efficient system installation.
- All disturbed areas would be restored to the approximate original contour and reclaimed as described in Section 2.1.3.
- Weeds would be mechanically controlled in all disturbed areas. If herbicides are needed to control weeds, BLM would be consulted and herbicides applied

by a licensed contractor. Equipment would be washed at a commercial facility prior to any construction and during construction if noxious weeds are encountered along the route.

2.1.10.7 Wildlife

The following measures would be implemented to minimize impacts to wildlife.

- Electrical distribution lines to the regeneration station and optical amplifier buildings would be buried, where practicable.
- Any aboveground lines would be constructed in accordance with *Suggested Practices for Raptor Protection on Power Lines, State of the Art in 1996* (Avian Power Line Interaction Committee 1996).
- In the vicinity of prairie dog colonies and sage grouse leks, aboveground power poles would be equipped with raptor antiperching devices.
- Disturbance would be minimized to that which is necessary for safe and efficient system installation.
- Construction would not occur within 0.5 mile of any active raptor nest (or within 1.0 mile of any active ferruginous hawk or listed species) during the nesting season (February 1 through July 31) (see Table 2.6).
- All areas disturbed by cable plowing and trenching would be restored to their original contour and reclaimed as described in Section 2.1.3.
- Surveys for raptor nesting sites and roosting areas would be completed for all segments of the route where construction would take place during the nesting season (February 1 to July 31).
- During the nesting season, the BLM would be notified of all active raptor nests within 0.5 mile of construction areas. The FWS would be notified of all T&E raptor species nests found within 1.0 mile of the route. The FWS would be notified prior to construction, if any waivers of the raptor nest protection stipulations are granted by the BLM.

- Construction would not occur in big game crucial winter range during critical winter periods (November 15 through April 30) (see Table 2.6).
- All perennial streams and their associated riparian areas would be bored. Distance of the bore from the stream channel would vary depending on the width of the riparian area; bores would be made in uplands.

2.1.10.8 Threatened, Endangered, Candidate, and Sensitive (TEC&S) Species

Surveys have been conducted on all segments of the ROW not previously inventoried to determine if any TEC&S animals and plants or their habitats occur within or adjacent to the ROW. The following mitigation measures would be implemented.

- Construction activities would not occur or would be minimized in areas of known critical or sensitive habitat.
- Construction would not occur within 1.0 mile of any active bald eagle, peregrine falcon, or ferruginous hawk nest from February 1 through July 31 (see Table 2.6).
- Potential Preble's meadow jumping mouse and Ute ladies' tresses habitat would be bored.
- Surveys for bald eagle nesting sites and roosting areas would be completed in the Bear River drainage if construction would take place during the nesting season (February 1 to July 31).
- Prairie dog colonies with 0.5 mile of the ROW may be surveyed for burrowing owls during the nesting season prior to construction.

Only mountain plover have the potential to be impacted by project construction. Mountain plover would be affected if project construction, operations, or maintenance results in plover mortality due to collisions or nest destruction or abandonment. Direct mortality due to vehicle-plover collisions would be rare and thus impacts would not be significant. Much of the construction in Colorado, where most of the route is plover habitat, would occur outside of the nesting season (i.e., after July 31) so no effects due to nest destruction or abandonment are anticipated in Colorado. There is little plover habitat in Utah, and construction would occur outside of the nesting season, so construction along the Utah portion of the route would not significantly impact plover. In Wyoming, however, construction would occur in potential nesting habitat during the nesting season. Mountain plover habitat would be mapped prior to construction in 2000 in all areas that were not constructed in 1999. Where plovers would be disturbed during nesting, the following mitigation measures (which follow FWS 1999 Mountain Plover Survey Guidelines [FWS 1999]) (Appendix B) would be implemented.

- Mountain plover surveys would be conducted between May 1 and June 15 in suitable habitat to determine plover presence/absence. Potential habitat would be mapped after IXC completes construction in 1999 or prior to construction in the spring of 2000. Construction in plover habitat in the fall 1999 would not affect plovers because the breeding and nesting season is over for the year and plovers would have migrated to wintering areas elsewhere.
- Detailed visual observation of the area within 656 ft (200 m) of a proposed disturbance would be made to detect the presence of plovers. All plovers located would be observed long enough to determine if a nest is present. Where possible, these observations would be made from a stationary vehicle, as plovers do not appear to fear vehicles.
- If no visual observations are made from the vehicle, the area would be surveyed using all-terrain vehicles.
- Three surveys, separated by 14 days, would be conducted during the survey period.
- If an active nest is found, development activities would be delayed 37 days or 1 week post-hatching. If a brood of flightless chicks is found, activities would be delayed at least 7 days.

- Grading activities would be minimized during the period from May 25 through June 30 to lessen hazards to early developing chicks.
- No new surface-disturbing activities would be allowed during the reproductive period April 1 through June 30 within 656 ft (200 m) of identified mountain plover concentration areas. These are defined as areas where broods and/or adults have been documented in at least 2 of the past 3 years.

These measures would adequately mitigate potential impacts, so project impacts would be negligible.

If any other TE&C species are discovered along the route during construction, BLM and the FWS would be notified immediately, and appropriate steps would be taken to minimize impacts and maintain compliance with the *Endangered Species Act*. No mitigation (other than construction site management practices to minimize disturbance) is required for sensitive species because impacts would be negligible.

2.1.10.9 Cultural Resources

In Wyoming, Class III cultural resource surveys have been completed on all segments of the ROW not previously surveyed, and reports have been submitted to obtain clearances from BLM and the State Historic Preservation Offices (SHPO). In Colorado, surveys have been completed within all state highway ROWs in accordance with Colorado DOT requirements. In Utah, surveys have been completed on FS lands and within all state highway ROWs. If, during construction, any previously undiscovered cultural resources are encountered in Wyoming, work would immediately cease in the area of the find and the BLM's AO would be contacted. If any cultural resources are encountered in Colorado or Utah, the appropriate SHPO would be contacted. Work would not resume until approved by the AO (in Wyoming) or an authorized SHPO representative (in Colorado or Utah). To avoid impacting contributing portions of the Lincoln Highway and Old Highway 30 road grades, crossings would be bored. The costs of any cultural resources mitigation work would be borne by IXC. Construction would occur as agreed to by BLM, SHPO, and IXC during the Section 106 consultation process.

Mitigation for Native American cultural concerns would include such actions as monitoring during and after construction by representatives of affected tribes as agreed to during consultation. Tribal elders may perform ceremonies as part of this activity.

2.1.10.10 Visual Resources

All semi-permanent and permanent facilities would be painted to blend with the existing surroundings in compliance with the appropriate visual resource management (VRM) objectives. Optical amplifier and regeneration station buildings would be painted Carlsbad Canyon.

2.1.10.11 Miscellaneous

Ditches and Culverts. All irrigation, overflow, and roadway ditches; lead-offs from culverts or cut sections; and lead-in ditches crossed by the project would be cleared of any material which could obstruct water flow. The work would be accomplished so that reasonable conformance to the previous line, grade, and cross section is achieved. If any culverts clog due to project activities, the pipe would be thoroughly cleaned to provide an unobstructed flow to and through the pipe. Any loose material on the backslope adjacent to the entrance of culverts would be removed.

Fire Control. During construction, IXC would notify the AO of any fires and would comply with all rules and regulations administered by the AO concerning the use, prevention, and suppression of fires on federal lands.

In the event of a fire, IXC or its contractors would initiate fire suppression actions in the work area. Suppression would continue until the fire is out or until the crew is relieved by an authorized representative of the agency or landowner on whose land the fire occurred. Heavy equipment would not be used for fire suppression outside the ROW without prior approval of the AO unless there is imminent danger to life or property. IXC or its contractors would be responsible for all costs associated with the fire suppression and the rehabilitation of fire damage resulting from their operations.

IXC would designate a representative for fire control during construction to ensure that each construction crew has fire-fighting tools and equipment available at all times, including extinguishers, shovels, and axes. The number of tools needed would depend on the number of persons working in the area. IXC would ensure that spark arresters are maintained on internal combustion engines during construction, operation, and maintenance.

Litter. Construction vehicles would be equipped with litter disposal containers. Contractors would be informed that any littering within the project area could result in their immediate dismissal. Disposal of garbage and other refuse would be in authorized disposal sites or landfills. Construction sites would be maintained in a sanitary condition at all times.

Spill Prevention, Containment, and Countermeasure Plan. SPCC Plans have been prepared for all bore locations and would be located on-site in all construction areas as well as in the construction contractor's offices.

Stormwater Pollution Prevention (SWPP) Plan. SWPP Plans, to ensure that erosion is minimized during storm events, have been prepared and would be located on-site at all construction sites as well as in the construction contractor's offices.

Survey Monuments and Markers. IXC would protect all survey monuments and markers within the ROW. If any markers or monuments are destroyed during construction, operation, or maintenance, IXC would report the incident in writing to the appropriate regulatory agency and take responsibility for restoration at the direction of that regulatory agency.

Traffic and Public Safety. Construction would result in minor transportation-related impacts such as traffic delays (especially in urban areas) where construction occurs in busy road ROWs, increased traffic at construction sites, and increased tractor-trailer traffic to and from the ROW. Impacts would be temporary and limited in area. Construction, operation, and maintenance are not expected to cause safety hazards or to notably inconvenience motorists or other adjacent users because IXC would implement the following measures to mitigate impacts to traffic.

- Construction-related traffic would be restricted to routes approved by BLM or private landowners. Temporary use permits for access to federal, state, and county road use would be obtained prior to construction.
- Existing, BLM-approved roads would be used to access the ROW so no new road construction is anticipated. Construction equipment would be restricted to the ROW and to BLM-approved roads.
- Specified roads would be bored.
- All intersecting streets and alleys, public and private drives, and business entrances would be kept open, except as absolutely required to install cable across the feature. The necessary permits for closures would be acquired.
- At no time would construction, operations, or maintenance inhibit emergency vehicle passage.
- IXC would provide signs, flags, and flaggers as required by the *Manual on Uniform Traffic Control Devices for Streets and Highways* (Federal Highway Administration 1978) and applicable state DOT standards.

- In the unlikely event that existing traffic controls must be modified during construction, a traffic control plan, approved by the state DOT, would be implemented.
- Traffic delays would be minimized. The maximum traffic delay at any location would be 10 minutes or as otherwise directed by the state DOT.

2.2 ALTERNATIVES

2.2.1 Alternatives Considered but Not Evaluated in Detail

The proposed route (see Figure 1.1) was selected to follow existing ROWs so that little new disturbance would occur. Several alternative routes were evaluated but are not analyzed in detail in this EA due to environmental or easement concerns associated with those alternatives.

Alternative A--Routing Alternative. This alternative followed the ECI route in its entirety, whereas the Proposed Action deviates from the ECI route for approximately 186 miles. IXC has opted to take a more easterly route through Colorado because IXC has determined that the IXC route would be easier to engineer and construct. The Proposed Action also follows a more northerly route from Rawlins to Table Rock to improve access to the ROW for operations and maintenance. Other deviations from the ECI route were made based on landowner preferences.

Alternative B--Routing Alternative. Initially, IXC proposed to install cable from Piedmont, Wyoming, directly south, adjacent to Guild and Byme Reservoirs; however, this alternative was rejected because the area is known to contain abundant cultural resources.

Numerous other routing alternatives were evaluated but rejected because of difficulty in acquiring private easements or to avoid cultural resources.

Alternative C--Alternative Construction Methods. Plowing and trenching are the most expedient construction methods and would be used for much of the route. However, IXC has opted to bore, rather than plow or trench, numerous sensitive resources including perennial rivers, wetlands and riparian areas, and contributing portions of Old Highway 30 and historic railroad grades to minimize impacts to these features. Furthermore, rather than blading the ROW prior to plowing or trenching, IXC would minimize blading to those areas where it is absolutely necessary, thereby reducing overall disturbance. These alternative construction methods were incorporated into the Proposed Action and are not analyzed as separate alternatives.

2.2.2 No Action Alternative

Under the No Action Alternative, a ROW permit would not be granted to IXC by BLM and the proposed telecommunications system would not be constructed.

Table 2.6 presents a summary of environmental consequences and mitigation measures.

Table 2.6 Summary of Environmental Consequences and Mitigation Measures.

Resource	Proposed Action	No Action	Mitigation
Air quality	Temporary short-term construction-related increases in dust and exhaust emissions	No impacts	Dust suppression during construction; proper maintenance of construction equipment
Geologic hazards	No impacts	No impacts	No mitigation is necessary
Paleontological resources	Remote but possible inadvertent destruction of important fossils during construction on 61 acres of previously undisturbed land	No impacts	Survey previously undisturbed areas on the White River, Wind River, Hanna, and Fort Union formations and on rocks of the Mesaverde Group
Surface water	Consumption of an estimated 79,200-316,800 gallons of water	No impacts	Obtain water from currently permitted sources (e.g., municipalities); bore perennial streams; construct during periods of low or no flow
Soils	Disturbance of 1,100 acres of soils, 1,039 acres of which have previously been disturbed	No impacts	Minimize disturbance; implement soil erosion practices until sites are permanently reclaimed; prompt stabilization and reclamation
Noise	Construction-related, temporary increases in noise	No impacts	Work only during daylight hours in residential areas; properly muffle all construction equipment
Vegetation	Disturbance of 1,100 acres of vegetation, 1,039 acres of which have been previously disturbed	No impacts	Minimize disturbance; avoid grading the ROW; prompt revegetation with native, adapted species
Wetlands	No impacts	No impacts	Bore all wetlands
Wildlife	Unlikely direct effects from collision-related mortality; indirect effects of 1,100 acres of vegetation loss, 1,039 of which have been previously disturbed	No impacts	Comply with all seasonal stipulations for wildlife protection unless otherwise authorized by the AO; minimize disturbance; reclaim disturbed areas promptly
Threatened, endangered, candidate, and state-sensitive species	No impacts to TE&C species; possible direct effects (e.g., collision-related mortality) on certain state-sensitive species (e.g., mollusks) or inadvertent destruction of sensitive plants	No impacts	Complete surveys along entire route; avoid TEC&S species habitat; bore habitat for Preble's meadow jumping mouse and Ute ladies' tresses
Cultural resources	Possible inadvertent destruction of eligible cultural resources; construction adjacent to the Lincoln Highway and other historical routes and construction in noncontributing portions of historical routes	No impacts	Complete surveys of all areas to be disturbed; mitigate possible impacts on a case-by-case basis through the Section 106 consultation process
Socioeconomics	Temporary and minimal beneficial impacts to local, state, county, and federal economies; improve telecommunications systems in urban areas; potential for rural area links to the system	No impacts	No mitigation is necessary
Visual resources	Short-term visual effects during construction, 577 miles of which has already been disturbed; no violations of VRM objectives	No impacts	Minimize disturbance; reclaim all disturbed areas promptly

3.0 AFFECTED ENVIRONMENT

Critical elements of the human environment (BLM 1988), their status in the project area, and their potential to be affected by the proposed project are listed in Table 3.1. Three critical element (areas of critical environmental concern, wild and scenic rivers, and wilderness) are not present on the route and are not discussed in this EA. In addition to the critical elements, this EA discusses potential effects of the proposed project on other physical and biological resources, surface ownership and use, socioeconomics and environmental justice, and visual resources.

3.1 PHYSICAL RESOURCES

3.1.1 Air Quality

Air quality along the proposed route is generally good and is in compliance with state and national ambient air quality standards except near Denver, which is a nonattainment area for carbon monoxide, PM_{10} (particulate matter of less than 10 microns in diameter), and sulfur dioxide and Salt Lake City, which is a nonattainment area for carbon dioxide and PM_{10} (BLM 1999a). The principal air quality pollutants along the more rural portions of the route are particulates (BLM 1997:157, 1999a). Fugitive dust (uncontrolled wind-carried particles) from natural sources, surface coal mines, oil and gas fields, highway construction, roads, and other types of development or disturbances (e.g., recreation and livestock grazing) increase the ambient level of suspended particulates along the route, especially during dry windy periods (BLM 1987). Visibility in the region is typically very good (greater than 70 miles), and fine particles are considered to be the main source of visibility degradation (BLM 1997b).

Table 3.1 Critical Elements of the Human Environment Along the Proposed ROW.

Element[1]	Status on Project Area	Addressed in Text of EA
Air quality	Potentially affected	Yes
Areas of critical environmental concern	None present	No
Cultural remains	Potentially affected	Yes
Environmental justice	No effects anticipated	Yes
Farmlands (prime or unique)	No effects anticipated	Yes
Floodplains	No effects anticipated	Yes
Invasive non-native species	Potentially affected	Yes
Native American religious concerns	Potentially affected	Yes
Threatened and endangered species	No effects anticipated	Yes
Wastes, hazardous or solid	No effects anticipated	Yes
Water quality (surface and ground)	No effects anticipated	Yes
Wetlands/riparian zones	No effects anticipated	Yes
Wild and scenic rivers	None present	No
Wilderness	None present	No

[1] As listed in BLM *NEPA Handbook H-1790-1* (BLM 1988).

3.1.2 Geologic Hazards

Fiber optic cable installation and construction of ancillary facilities would occur in areas of stabilized sand dunes, especially in the Red Desert Basin in T19N, R97W and R98W and in T18N, R110W; T18N, R111W; T17N, R113W; and T16N, R114W near the Sweetwater/ Uinta County line (Case and Boyd 1987). There are no known active faults along the proposed route although it passes adjacent to a cluster of faults near Evanston, Wyoming (Case et al. 1990), and one Quaternary fault 6 miles east of Upton, Utah (Hecker 1993). Middle- to late-Pleistocene faults also occur on the eastern edge of Salt Lake City (Hecker

1993). Several historic earthquake epicenters occur adjacent to the route, and earthquakes are a potential hazard. No known landslides occur between Aurora, Colorado, and Fort Steele, Wyoming (personal communication, June 1999, with Jim Case, Wyoming Geological Survey). Landslides occur on the proposed route in the vicinity of Sulphur Creek Reservoir (Section 30, T14N, R118W) and approximately 1 mile west of the Bear River near the Wyoming/Utah state line (Sections 9 and 10, T12N, R120W). The route intersects less than 1 mile (total) of potential landslides in these areas. In Utah, potential landslide areas occur adjacent to the route primarily between the Wyoming state line and Coalville, and a few landslides occur between Coalville and Salt Lake City (Harty 1991).

The route crosses numerous floodplains, especially associated with perennial streams such as the South Platte, North Platte, Laramie, Medicine Bow, Black's Fork, and Green Rivers, and numerous creeks (e.g., Crow, Owl, Lodgepole, Rock, and Bitter Creeks) where flooding may be a hazard. Failure of the Wanship Dam near Wanship, Utah, could result in flooding along the route between Wanship and Coalville (Harty et al. 1988). Closer to Salt Lake City, several county dams and natural lakes are considered high hazards for failure that would inundate the route along I-80.

3.1.3 Paleontological Resources

In Colorado and Utah and in much of Wyoming, the cable would be installed on previously disturbed lands where construction would not affect paleontological resources. Previously undisturbed areas along the route and at optical amplifier and regeneration station sites are underlain by a variety of rock formations, many of which are known to be rich in important fossils (Table 3.2).

The Cretaceous Laramie formation is known to be fossil rich in the Colorado plains area. The Tertiary Denver formation contains birds, mammals, reptiles, plants, invertebrates, and trace fossils.

Table 3.2 New Disturbance Area Paleontological Potential.

New Disturbance Location	Rock Formation[1]	Paleontological Potential	BLM Condition[2]	Area to Be Disturbed (acres)
Along the Route				
Klug Lake, Colorado	Tertiary Denver formation, Laramie formation, modern alluvium and aeolian deposits	Low to high	2	18.0
Speer Road, Wyoming	Ogallala formation	Moderate	2	<1
North of Roger's Canyon, Wyoming	Permian/Triassic Goose Egg formation; Triassic Chugwater formation	Low to moderate	2 and 3	7.2
South of Rawlins, Wyoming	Tertiary Brown's Park formation	Moderate	2	1.8
Red Desert to Table Rock Exit, Wyoming	Quaternary alluvium, colluvium, playa lake and other lacustrine deposits, and dune sand and loess; Tertiary Main Body of the Wasatch formation; Luman Tongue of the Green River formation	Low to high	2 and 3	25.2
Green River	Tertiary Wilkens Peak member of the Green River formation	High	2	3.6
At Optical Amplifier/Regeneration Station Sites[3]				
Kersey: Sec. 32, T11N, R66W	Cretaceous Laramie formation	High	2	1.0
Rockport: Sec. 19, T4N, R64W	Cretaceous Laramie formation	High	2	1.0
Horse Creek: Sec. 18, T16N, R69W	Tertiary White River formation	High	2	1.0
Lookout: Sec. 35, T20N, R75W	Cretaceous Mesaverde Group	High	2	1.0
Hanna: Sec. 25, T22N, R82W	Tertiary Hanna formation	High	2	1.0
Knobs: Sec. 23, T21N, R89W	Tertiary Fort Union formation	High	1	1.0
Continental Divide: Sec. 9, T29N, R97W	Main body of Wasatch formation	Low to moderate	2	1.0
Rock Springs: Sec. 15, T18N, R104W	Cretaceous Baxter Shale and Blair formation of the Mesaverde Group	Low	3	1.0
Granger: Sec. 4, T18N, R111W	Tertiary Bridger formation	Moderate to high	1 or 2	1.0
Piedmont: Sec. 7, T14N, R117W	Terrace gravels and Laney Member of the Green River formation	Low to high	2	1.0
Coalville: Sec. 25, T2N, R5W	Cretaceous Frontier formation	Low to moderate	3	1.0

[1] Love and Christiansen (1985).

[2] Condition 1 = Areas that are know to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. Consideration of paleontological resources would be necessary if the field office review of available information indicates that such fossils are present in the area.
Condition 2 = Areas with exposures of geologic units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. The presence of geologic units from which such fossils have been recovered elsewhere may require further assessment of these same units where they are exposed in the area of consideration.
Condition 3 = Areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils based on their surficial geology, igneous or metamorphic rocks, extremely young alluvium, colluvium or aeolian deposits, or the presence of deep soils. However, if possible it should be noted at what depth bedrock may be expected in order to determine if fossiliferous deposits may be uncovered during surface-disturbing activities.

[3] Assumes power lines would be located on the same formations as the building sites or in previously disturbed areas (i.e., the Rock River/Lookout site power line).

The Ogallala formation, which underlies the Speer Road portion of the route is known to contain mammals, reptiles, and birds.

The Goose Egg formation includes red beds and limestones of Permian and Triassic age in southeastern Wyoming. This formation is essentially barren of fossils except for a few poorly preserved gastropids and scaphopids, algae, and fragmentary, unidentifiable fossils (Boyd 1993; Thomas 1934).

Known fossils from the Chugwater formation (now divided into four formations) include small reptile footprints, bivalves, fish scales, reptiles (*Corosaurus alcovensis*, a semi-aquatic reptile; an undescribed theodont; and a phytosaur), and stromatolites (Carini 1964; Case 1936; Lull 1942; Love 1948; Picard 1967; Cavoroc and Flores 1991). The Bridger formation is well-known for producing scientifically significant vertebrate fossils including insectivores, primates, rodents, carnivores, condylarths, artiodactyls, perissodactyls, fish, lizards, snakes, and crocodiles.

The Brown's Park formation is known to contain significant vertebrate and invertebrate fossils in south-central Wyoming and northern Colorado where the fossils of mastodont, rhinocerous, procyonid, chalicothere, camel, oreodont, and antelope have been discovered. In the Saratoga valley, remains of horses, camels, oreodonts, merycodonts, rabbits, bears, antelope, and beaver have been found (McGrew 1976; Montagne 1991). In addition to mammal fossils, the formation has produced the remains of freshwater algae, gastropods, diatoms, and pollen.

A variety of unconsolidated or semi-consolidated sediments of Quaternary age, including alluvium, colluvium, terrace gravel, dune sand, loess, playa lake, and other lake deposits, occur at the surface in the Wamsutter area (Love and Christiansen 1985; Love et al. 1993; Grasso 1990; Mears 1987). No fossil vertebrates have been identified in these deposits to date because they are newly recognized, but they have the potential to contain Pleistocene mega- and microfauna. Remains of animals such as horses, camels, deer, pronghorn, bison, mammoths, and others occur in these types of deposits throughout Wyoming (Anderson 1968, 1970; Hay 1924; Hager 1972; Irwin 1962; Knight 1903; Long 1971; Zeimans and Walker 1994). Fish, reptile, and bird remains are also known from some locations. Most of these remains have been identified from well-known cave (i.e., Little Box Elder Cave, Bell Cave, Horned Owl Cave) and natural animal trap (i.e., Chimney Rock Animal Trap, Natural Trap Cave) localities but isolated finds have occurred and are possible in the Wamsutter area.

Rocks in the Wasatch formation contain abundant fossils, including mammals, reptiles, birds, mollusks, arthropods, and insects, as well as numerous other vertebrate and invertebrate species (Breithaupt 1990; Roehler et al. 1988; Simnacher 1970; McKenna 1955).

The Green River formation contains fossils from each of the five biological kingdoms and is well-known for its abundant fish fossils (Grande 1984). Mammalian fossils are not common since Green River fossils are predominantly from lake bed deposition; however, reptile (crocodiles, alligators, a boa constrictor), amphibian (frogs, salamanders), bird (erlicans grouse), and invertebrate fossils (insects) are abundant. The fossil flora from the Green River formation includes a diverse mixture of trees, shrubs, and flowers.

The White River and Wind River formations may be very rich in fossil vertebrates, invertebrates, and plants (Emery et al. 1987; Beckwith 1942; Blackstone 1975; Moor 1960; Davidson 1987; Eaton et al. 1978; Prichinello 1971). The Hanna formation is known to contain the remains of terrestrial vertebrates, invertebrates, and plants (Gill et al. 1970; Ryan 1977; Lillegraven 1995; Secord 1996). Prior to the 1970s, the only vertebrate fossils reported from the Hanna formation were fish scales, turtle fragments, and the fragmentary jaw of a condylarth (*Claenodon*). During the late 1970s, a nearly complete lower jaw of a phenacodont condylarth (*Tetraclaenodon*) was discovered fossil vertebrates from the Hanna formation. The Hanna formation is now known to include a wide variety of mammals, reptiles, and fish of Paleocene age.

The Fort Union formation is known to contain significant vertebrates, invertebrates, plants, and trace fossils (Rigby 1980; Winterfeld 1978, 1982, 1999). The Baxter Shale and Blair formation of the Mesaverde Group have yielded only invertebrates and trace fossils (Cobban 1995; Roehler 1993; Horne et al. 1980; Shannon 1985; Hendricks 1979. The Mesaverde Group, however, contains significant vertebrates, invertebrates, plants, and trace fossils (Breithaupt 1985; Case 1987; Clemens et al. 1979; Clemens and Lillegraven 1986; Lillegraven and McKenna 1986; Merewether 1990).

The Cretaceous Frontier formation near Coalville, Utah, contains plants, vertebrates, invertebrates, and trace fossils.

3.1.4 Mineral Resources

Mineral resources occurring along the route include coal, oil, gas, coalbed methane, granite, limestone, dolomite, alluvial sand and gravel, bentonite, scoria, pumice, and clay (DeBruin and Boyd 1991; Harris and Meyer 1986; Harris et al. 1985; Jones 1991). No economically recoverable deposits of precious metals or uranium are known to occur along the route (Hausel et al. 1992). No active quarries or mines occur along the route.

Since the cable would be installed along existing transportation and utility corridors, any potential for developing mineral resources has already been precluded; therefore, the project would not affect mineral resources, and they are not discussed further in this EA.

3.1.5 Surface and Ground Water

Over 500 ephemeral, intermittent, and perennial streams and wetlands would be crossed during cable installation. The primary perennial streams along the route are the South Platte River, Laramie River, Rock Creek, and Medicine Bow, North Platte, Green, Black's Fork, Smith's Fork, and Bear Rivers.

Surface water quality is typically poor because most of the streams along the route have high concentrations of total dissolved solids. All perennial streams and intermittent or ephemeral streams with well-defined beds and banks would be bored under, and stream channels would not be affected. Floodplains adjacent to these streams would also be bored and thus would not be affected. Effects due to potential spills of boring fluids would be mitigated as described in Section 2.1.1.7.

The route also crosses the watersheds that supply drinking water to Salt Lake City's occupants (Figure 3.1). The watersheds traversed by the proposed fiber optic cable include Parley's Canyon and Emigration Canyon. Both Salt Lake City and Salt Lake County have extensive water rights to surface runoff from these and other watersheds north and east of Salt Lake City. Canyon waters are extremely valuable because they are the city's closest high-quality water supply, water from canyon streams can be delivered to most city customers by gravity flow without pumping, and water used for snowmaking at local ski areas affords a degree of storage as it is usually the last to melt. Surface water runoff is treated prior to entering the municipal water system.

Ground water would not be affected by the proposed project and is not discussed further in this EA.

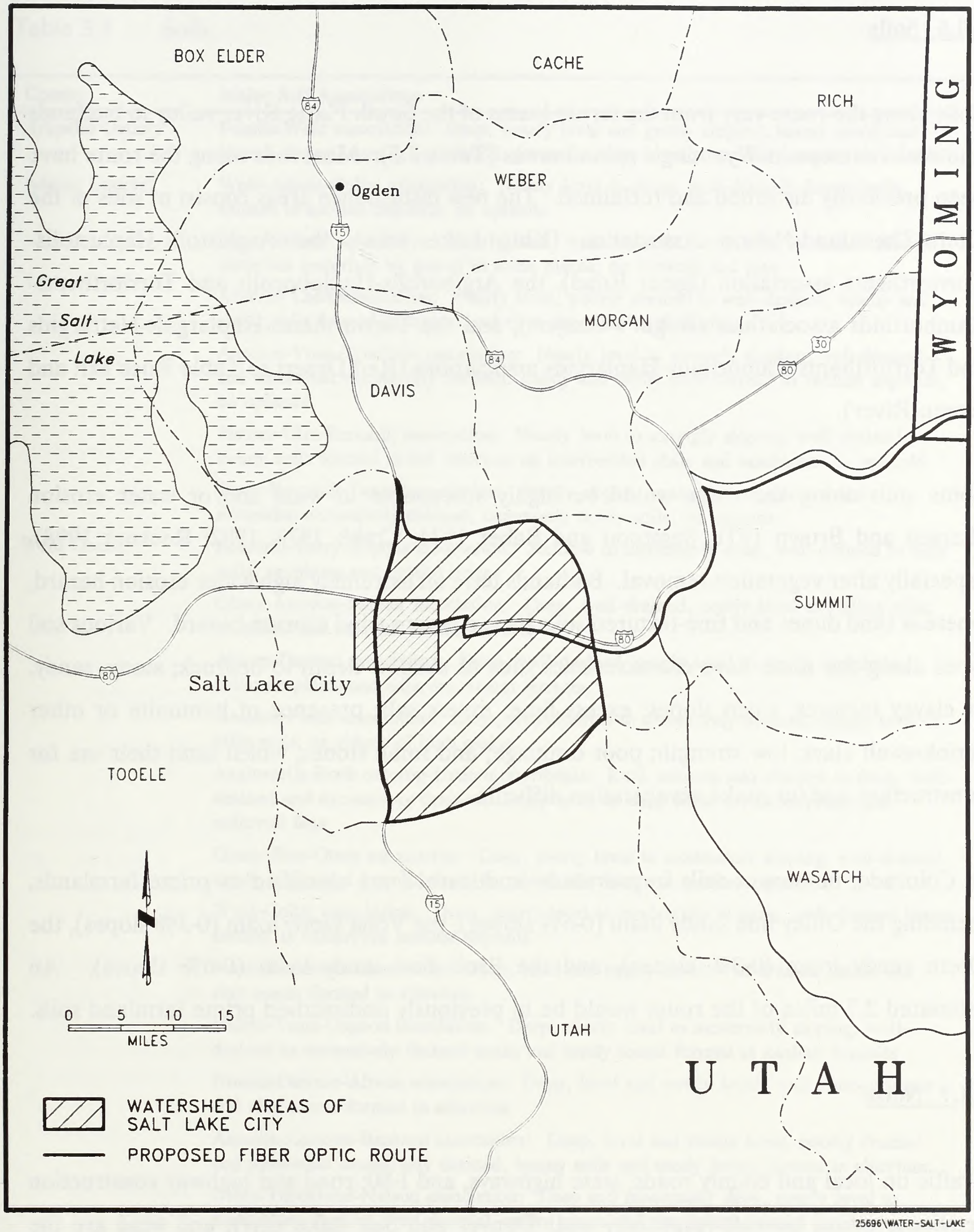


Figure 3.1 Salt Lake City Watersheds.

3.1.6 Soils

Soils along the route vary from the fertile loams of the South Platte River valley to badlands and rock outcrops in Wyoming's upland areas (Table 3.3). Most soils along the route have been previously disturbed and reclaimed. The new disturbance areas consist of soils of the Otero-Thedalund-Nelson Association (Klug Lake area), the Argiustolls-Haplustolls-Torriorthents association (Speer Road), the Argiborolls-Haploborolls and Torriorthents-Camborthids associations (Roger's Canyon), and the Torriorthents-Haplargids-Natrargids and Torriorthents-Camorthids-Haplargids associations (Red Desert to Table Rock exit and Green River).

Some soils along the route would be highly susceptible to wind and/or water erosion (Larsen and Brown 1971; Sampson and Baber 1974; Crabb 1979, 1982; Reckner 1998), especially after vegetation removal. Badlands have an extremely high water erosion hazard, whereas sand dunes and fine-textured soils have a severe wind erosion hazard. Various soil types along the route have characteristics such as shallow depth to bedrock; stony, sandy, or clayey textures; steep slopes; excess lime; excess salt; presence of bentonite or other shrink-swell clays; low strength; poor drainage; and small stones, which limit their use for construction and/or make revegetation difficult.

In Colorado, numerous soils in previously undisturbed are classified as prime farmlands, including the Olney fine sandy loam (0-6% slopes), the Vona sandy loam (0-3% slopes), the Otero sandy loam (0-3% slopes), and the Paoli fine sandy loam (0-6% slopes). An estimated 2.7 miles of the route would be in previously undisturbed prime farmland soils.

3.1.7 Noise

Traffic on local and county roads, state highways, and I-80; road and highway construction activities; trains; aircraft (especially near Denver and Salt Lake City); and wind are the

Table 3.3 Soils.

County	Major Soil Associations
Arapaho County[1]	Fondis-Weld association: Deep, nearly level and gently sloping, loamy sands that have a clayey layer in the subsoil; formed mainly in silty, aeolian material on foothills
Adams County[2]	Weld-Adena-Colby association: Nearly level to steep, well-drained, loamy soils formed in aeolian deposits; on uplands
	Nunn-Satanta association: Nearly level, well-drained, loamy soils formed in alluvial materials underlain by gravel in some places; on terraces and fans
	Alluvial Land association: Nearly level, poorly drained to well-drained, loamy and sandy soils formed in stream and river deposits; on floodplains
	Ascalon-Vona-Truckton association: Nearly level to strongly sloping, well-drained and somewhat excessively drained, loamy and sandy soils formed in aeolian deposits; on uplands
	Platner-Ulm-Renohill association: Nearly level to strongly sloping, well-drained, loamy soils formed in old alluvium on interbedded shale and sandstone; on uplands
	Terry-Renohill-Tassel association: Gently sloping to steep, well-drained and somewhat excessively drained, commonly sandy soils; on uplands
Weld County[3]	Renohill-Terry-Shingle association: Shallow to moderately deep, well-drained to hilly soils; on plains and upland ridges
	Olney-Ascalon-Platner association: Deep, well-drained, nearly level to rolling soils; on plains and adjacent stream terraces
	Altvan-Dacono association: Deep, well-drained, nearly level to gently undulating soils; on plains and adjacent stream terraces
	Ascalon-Peetz association: Deep, well-drained to excessively drained, nearly level to hilly soils; on ridges of high plains
	Argiustolls-Rock outcrop-Ustic torriorthents: Rock outcrop and shallow to deep, well-drained and excessively drained, nearly level to steep soils; on escarpments and colluvial fans
	Olney-Kim-Otera association: Deep, nearly level to moderately sloping, well-drained sandy loams and loams formed in mixed alluvium and aeolian deposits
	Weld-Colby association: Deep, nearly level to moderately sloping, well-drained loams formed in calcareous aeolian deposits
	Nunn-Haverson association: Deep, level and nearly level, well-drained loams and clay loams formed in alluvium
	Valent-Vona-Osgood association: Deep, nearly level to moderately sloping, well-drained to excessively drained sands and sandy loams formed in aeolian deposits
	Numm-Dacono-Altvan association: Deep, level and nearly level, well-drained loams and clay loams formed in alluvium
	Aquolls-Aquents-Bankard association: Deep, level and nearly level, poorly drained and somewhat excessively drained, loamy soils and sandy loams formed in alluvium
	Otero-Thedalund-Nelson association: Deep and moderately deep, nearly level to moderately sloping, well-drained, sandy loams and clay loams formed in alluvium and aeolian deposits and in residuum from shale and limestone

Table 3.3 (Continued)

County	Major Soil Associations
Laramie County[4]	Argiustolls-Haplustolls-Torriorthents association: Dark- and light-colored soils on upland plains, terraces, and fans which are usually moist in some parts during summer; nearly level to rolling uplands; formed from alluvium and residuum
	Torriorthents, shallow association: Dark- and light-colored soils on upland plains, terraces, and fans which are usually moist in some parts during summer; formed in residuum on steep uplands
	Argiborolls-Haploborolls association: dominantly dark-colored soils of the mountains and mountain valleys that are usually moist in some parts during the summer; formed from residuum
Albany County[5]	Boyle-Lininger-Rock Outcrop association: Very shallow to moderately deep, well-drained, nearly level to moderately steep soils and rock outcrop on foothills and mountain slopes
	Rogert-Rock Outcrop association: Shallow, well-drained, gently sloping to very steep soils and rock outcrop on foothills and mountain slopes
	Cheadle-Nathale-Rock Outcrop association: Shallow or moderately deep, well-drained, gently sloping to very steep soils and rock outcrop on ridges, canyon sides, and mountain slopes
	Pilot Peak-Canwall-Rock Outcrop association: Very shallow to moderately deep, well-drained, gently sloping to steep soils and rock outcrop on cuesta dip slopes, structural benches, and canyon sides
	Wycolo-Tieside-Fiveoh association: Shallow, moderately deep, or very deep, well-drained, nearly level to moderately steep soils on cuestas, hills, structural benches, alluvial fans, and terraces
	Forelle-Poposhia-Diamondville association: Moderately deep or very deep, well-drained, nearly level to moderately steep soils on terraces, fan aprons, hills, and ridges
	Gerdrum Family-Tisworth-Elkol association: Very deep, well-drained, nearly level to gently sloping soils on fan terraces, stream terraces, and hillslopes
Carbon County[4]	Torriorthents, shallow torriorthents association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from residual materials
	Torrifluvents-Fluvaquents-Haplaquepts association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from transported materials
	Torriorthents-Haplargids-Natrargids association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from residuum

Table 3.3 (Continued)

County	Major Soil Associations
Sweetwater County[4]	Torriorthents-Camborthids-Haplargids association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from residuum
	Torriorthents-Haplargids-Natrargids association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from residuum
	Torriorthents, alkali association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from transported materials
	Cryoborolls-Cryorthents association: Dark- and light-colored soils of the high mountains that are usually moist; formed from residuum
	Torrifluvents-Fluvaquents-Haplaquepts association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from transported materials
Uinta County[4]	Torriorthents-Haplargids-Natrargids association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from residuum
	Torrifluvents-Fluvaquents-Haplaquepts association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry or may be moist in some parts during the summer; formed from transported materials
	Cryoborolls-Cryaqents association: Dark- and light-colored soils of the high mountains that are usually moist; formed from transported materials
	Cryoborolls-Cryorthents association: Dark- and light-colored soils of the high mountains that are usually moist; formed from residuum
	Calciorthids-Torriorthents association: Dominantly light-colored soils of basins, terraces, and fans which are usually dry; formed from residuum
Summit and Salt Lake Counties[6]	Harkers-Wallsburg-Lucky Star-Gappmayer association: Deep to shallow soils derived from mixed sedimentary rocks on high mountains
	Emigration-Brad-Rock land association: Dominantly shallow soils and rock land derived from mixed sedimentary rocks on low mountains

[1] Larsen and Brown (1971).
[2] Sampson and Baber (1974).
[3] Crabb (1979, 1982).
[4] Kronenberger et al. (1977).
[5] Reckner (1998).
[6] Woodward et al. (1974).

primary sources of noise along the proposed route. The A-weighted sound pressure level, or A-scale, is used extensively in the U.S. for the measurement of community and transportation noise and is a measure of noise, in A-weighted decibels (dBA), which is directly correlated with some commonly heard sounds (Table 3.4). Noise-sensitive areas along the route include residences, recreational areas, occupied raptor nests, sage grouse leks during the breeding and nesting season, and crucial winter range for big game species during critical winter periods.

Ambient noise levels on rural portions of the route are around 30-40 dBA in the morning and evening and 50-60 dBA in the afternoon when wind speeds are typically greatest (BLM 1995a; 1995b). Farm valley areas, such as farmlands adjacent to the route in Colorado, typically have ambient noise levels of 30-40 dBA (EPA 1971; Mestre and Wooten 1980). In urban residential areas, typical daytime noise levels are between 50 and 60 dBA, and suburban and small town noise levels are typically 40-50 dBA. Peak levels may be in the range of 80 to over 90 dBA (e.g., in the vicinity of an airport while an aircraft is landing). These levels correspond to noise levels of a soft whisper (30 dBA), a library (40 dBA), a quiet office (50 dBA), normal conversation (60 dBA), a factory (80 dBA), and heavy truck traffic (90 dBA).

3.2 BIOLOGICAL RESOURCES

3.2.1 Vegetation

3.2.1.1 Plant Communities

Much of the land on which the cables would be installed has been previously disturbed and reclaimed. Characteristics of vegetation to be disturbed during construction varies depending on the seed mixtures used during previous reclamation and the degree of invasion by native species from adjacent undisturbed areas. Adjacent native vegetation consists of grasslands, shrublands, and forests (Figure 3.2).

Table 3.4 Comparison of Measured Noise Levels with Commonly Heard Sounds.

Source	dBA	Description
Normal breathing	10	Barely audible
Rustling leaves	20	
Soft whisper [at 16 ft (5 m)]	30	Very quiet
Library	40	
Quiet office	50	Quiet
Normal conversation [at 3 ft (1 m)]	60	
Busy traffic	70	
Noisy office with machines; factory	80	
Heavy truck [at 49 ft (15 m)]	90	Constant exposure endangers hearing

In Colorado, much of the land adjacent to the route is farmed (Larsen and Brown 1971; Sampson and Baber 1974; Crabb 1979, 1982; personal communication, June 1999, with Dave Weber, Colorado Division of Wildlife [CDOW]), and primary crops include winter wheat, barley, sorghum feeds, corn, and sugar beets. Both dryland and irrigation farming techniques are used.

Native vegetation in central Colorado is typical of mid-grass prairie, where dominant species include sand, big, and little bluestem; western wheatgrass; blue and sideoats grama; switchgrass; prairie sandreed; needle-and-thread grass; sand dropseed; sand sage; buffalograss; and sedges (Larsen and Brown 1971; Sampson and Baber 1974; Crabb 1979, 1982). To the north, mid-grass prairie grades into short-grass prairie which is dominated by blue grama and buffalograss. Mixed-grass prairie, which covers most of eastern Wyoming, is dominated by needle-and-thread grass, western wheatgrass, blue grama, Sandberg bluegrass, threadleaf sedge, needleleaf sedge, Junegrass, Indian ricegrass, prickly pear cactus, scarlet globemallow, fringed sagewort, Hood's phlox, and various species of milkvetch and locoweed.

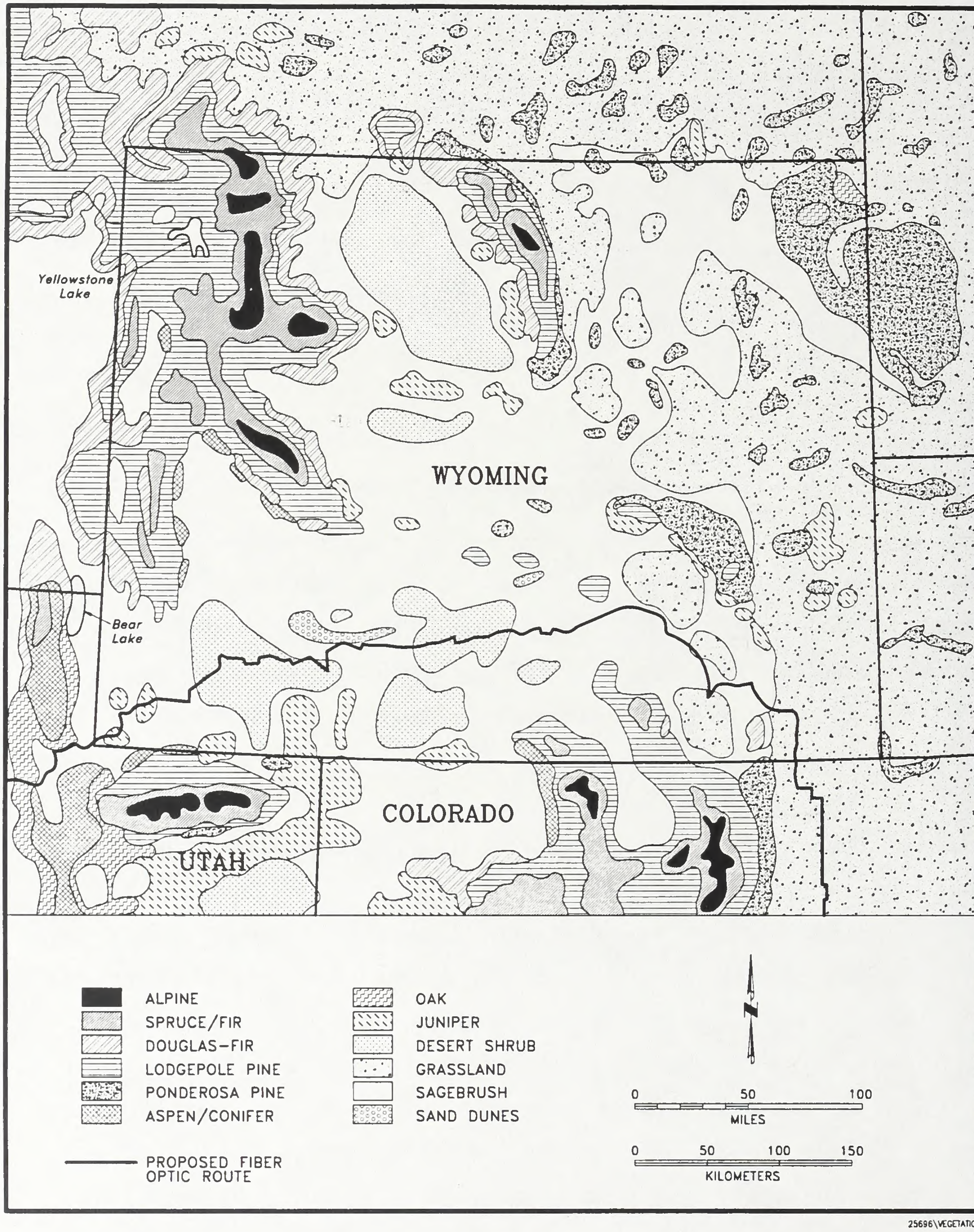


Figure 3.2 Vegetation.

The route intersects a small portion of ponderosa pine vegetation southeast of Horse Creek, Wyoming, where ponderosa pine, Douglas fir, aspen, and limber pine are the dominant trees (Knight 1994). Common shrubs include antelope bitterbrush, chokecherry, common juniper, rose, and Saskatoon serviceberry. Dominant grasses, grasslike species, and forbs are bluebunch wheatgrass, Idaho fescue, and king spike fescue, elk sedge, Ross sedge, arrowleaf balsamroot, bear berry, bedstraw, and heartleaf arnica.

Most of the route in Wyoming crosses sagebrush steppe, a mosaic of shrublands typically dominated by Wyoming big sagebrush (Knight 1994). Other common shrubs include black sagebrush, greasewood, Gardner's saltbush, basin big sagebrush, and silver sagebrush. Understory species include western wheatgrass, Junegrass, needle-and-thread grass, Sandberg bluegrass, prickly pear cactus, scarlet globemallow, and rabbitbrush.

In the Red Desert area and between Rock Springs and Granger the route passes through desert shrub vegetation where greasewood, shadscale, fourwing saltbush, Gardner saltbush, winterfat, spiny hopsage, and kochia are the most common shrubs. Common grasses and forbs include alkali sacaton, alkaligrass, blue grama, bluebunch wheatgrass, bottlebrush squirreltail, foxtail barley, Indian ricegrass, needle-and-thread grass, salin wildrye, saltgrass, Sandberg bluegrass, western wheatgrass, fringed sage goosefoot, greenmolly summercypress, halogeton, Hood's phlox, Hooker sandwort, monolepic, pepperweed, pricklypear cactus, salicornia, scarlet globemallow, sea blight, spiny aster, wild onion, and yellow beeplant.

In the far western portion of Wyoming, the route passes through juniper vegetation dominated by Utah juniper or Rocky Mountain juniper (Knight 1994). Other common species include true and curlleaf mountain mahogany, black sagebrush, big sagebrush, Douglas rabbitbrush, rubber rabbitbrush, Wood's rose, blue grama, bluebunch wheatgrass, king spikefescue, Junegrass, fringed sage, hairy goldenaster, Hooker sandwort, Lambert locoweed, mouse-ear chickweed, prickly pear cactus, pussytoes, sulfurflower buckwheat, yarrow, limber pine, and ponderosa pine.

In Utah, the route passes through sagebrush steppe and juniper vegetation types, which are described above.

Weeds known to exist along the route include hoary cress, houndstongue, black henbane, Canada thistle, Russian thistle, and halogeton.

3.2.1.2 Wetlands

Wetlands--including ponds, reservoirs, and streams--occur in riparian areas adjacent to streams, springs, and wet meadows along the route. Wetland vegetation in the region is typically dominated by grasses and grasslike species, with forbs and woody plants being much less abundant. Common wetland grass and grasslike species include common spike-rush, baltic rush, alkali grass, Nebraska sedge, foxtail barley, slender muhly, tufted hairgrass, and sedges. Common forb species include deep-root poverty-weed, western yellowcress, and buttercup species, whereas common shrub species include silver sage, willow, and rose.

The primary functional values of wetlands in the area include ground water recharge, nutrient retention and removal, and sediment trapping (Salvesen 1990). Other important functional values include ground water discharge, food chain support, and wildlife habitat.

3.2.2 Wildlife

3.2.2.1 Big Game

Five big game species occur along the proposed route: pronghorn, mule deer, white-tailed deer, elk, and moose (Appendix A) (BLM 1999; UDWR 1999). In Colorado, the route would cross three big game herd units: 87, 94, and 104 (personal communication, August 1999, with Gene Schoonveld, CDOW). Unit 87 supports an estimated 2,000-3,000 pronghorn, 200 mule deer, and a few white-tailed deer. Unit 94 contains few pronghorn and about 500 each of mule deer and white-tailed deer. Unit 104 supports about 50 pronghorn and 100 each of mule deer and white-tailed deer.

In Wyoming, the route would cross 14 pronghorn herd units, which support between 500 and 46,800 animals, depending on the unit. Populations for four units are above WGFD population objectives; the remaining 10 herd units are below population objectives, suggesting that pronghorn populations across the state are slightly depressed (Table 3.5). Mule deer populations are above objective in four of 12 herd units crossed by the proposed ROW. The white-tailed deer population objective in southeast Wyoming is 1,750, and there are presently about 1,000 white-tailed deer in the area. Elk populations are above objective in 10 of 11 herd units. Moose populations are at objective in three of four herd units (100, 120, and 890 animals) and below objective by 10% (1,350 rather than 1,500 animals) in the fourth.

Herd unit data were not available for Utah, but the route crosses habitat for all five big game species. The Chalk Creek drainage in Utah is considered high value summer habitat for moose (UDWR 1999).

In Colorado, approximately 25 miles of the route (from the Wyoming/Colorado border south) is pronghorn severe winter range and 10 miles (in the same area) is a winter concentration area (www.ndis.nrel.colostate.edu). No other big game critical habitat occurs in Colorado.

In Wyoming, approximately 22% of the proposed route (134 miles) is considered pronghorn crucial winter or crucial winter/yearlong range. Approximately 6% of the proposed route (32 miles) is considered crucial winter/yearlong mule deer range. Crucial winter or winter/yearlong range is defined as range that is a determining factor in the ability of a big game population to maintain itself at a desired level over the long term (WGFD n.d.). Construction would not occur in crucial winter range during winter, so pronghorn would not

Table 3.5 Big Game Herd Units, Population Objectives, and Estimated Population Sizes.

Herd Units	Population Objective	Estimated Population	Percent of Objective
Pronghorn			
Unit 87	--	2,000-3,000	--
Unit 94	--	Few	--
Unit 104	--	50	--
Chalk Bluffs	450	500	111
Iron Mountain	13,000	16,792	129
Cooper Lake	3,000	4,394	146
Medicine Bow	45,000	31,196	69
Elk Mountain	5,000	4,736	95
Iron Springs	12,000	9,275	77
South Ferris	6,500	5,900	91
Baggs	9,000	5,100	57
Red Desert	15,000	11,625	78
Bitter Creek	25,000	16,600	66
Sublette	48,000	46,800	98
South Rock Springs	8,000	5,800	73
Uinta/Cedar Mountain	10,000	8,700	87
Carter Lease	6,000	11,000	183
Mule Deer			
Unit 87	--	200	--
Unit 94	--	500	--
Unit 104	--	100	--
Goshen Rim	14,500	19,622	135
Iron Mountain	15,000	15,960	106
Laramie Peak	14,000	13,773	98
Sheep Mountain	15,000	18,733	125
Shirley Mountain	10,000	4,365	44
Platte Valley	20,000	17,286	86
Baggs	18,700	20,000	107
Chain Lakes	500	450	90

Table 3.5 (Continued)

Herd Units	Population Objective	Estimated Population	Percent of Objective
Steamboat	4,000	2,100	53
South Rock Springs	12,000	7,500	63
Uinta	20,000	16,800	84
Wyoming Range	50,000	40,000	80
<u>White-tailed Deer</u>			
Unit 87	--	Few	--
Unit 94	--	500	--
Unit 104	--	100	--
Southeast Wyoming	1,750	1,000	59
<u>Elk</u>[1]			
Iron Mountain	1,800	2,008	112
Snowy Range	6,000	6,704	112
Laramie Peak/Muddy Mountain	2,550	4,000	157
Ferris	350	510	146
Sierra Madre	4,200	8,000	190
Shamrock	75	220	293
Steamboat	500	1,100	220
Petition	300	350	117
South Rock Springs	1,000	1,100	110
Uinta	600	500	83
West Green River	3,100	3,783	122
<u>Moose</u>[2]			
Snowy Range	100	100	100
Uinta	900	890	99
Lincoln	1,500	1,350	90
Bear River Divide	120	120	100

[1] Elk rarely, if ever, occur along the route in Colorado.
[2] Moose are not known to occur along the route in Colorado.

be displaced from crucial winter range during critical winter periods. In Wyoming, crucial winter/yearlong elk range covers approximately 1% of the route (9 miles). Much of the available elk habitat along the route is winter range, which is generally associated with foothills, rugged terrain, and washes located in sagebrush-grassland habitats (Lyon and Ward 1982).

In Utah, the route would pass through approximately 8 miles of moose critical winter habitat. No other big game crucial winter habitat is known to occur on the Utah segment.

No white-tailed deer crucial winter range occurs along the route.

3.2.2.2 Other Mammals

Based on observation records (Wyoming Natural Diversity Database [WNDD] 1999; Colorado Natural Heritage Program [CNHP] 1999; personal communication, June 1999, with Jim Weber, CDOW; Utah Division of Wildlife Resources [UDWR] 1999) and range and habitat preference (Clark and Stromberg 1987; WGFD 1992), numerous mammal species are known to occur or are likely to occur on or adjacent to the route (Appendix A).

3.2.2.3 Raptors

All raptors and their nests are protected from take or disturbance under the *Migratory Bird Treaty Act* (16 U.S.C. 703-711) and Wyoming statutes (Wyoming Statute [W.S.] 23-1-101 and 23-3-108). Certain species are also afforded protection under the *Bald Eagle Protection Act* (16 U.S.C. 668-688d) and the *Endangered Species Act* (16 U.S.C. 1513-1543). An estimated 28 raptor species are known to occur along the route (see Appendix A).

In the Colorado and Utah portions of the route, construction is scheduled outside of the raptor nesting season, so no raptor nest location maps are presented. Very few raptor nests occur along the route in Colorado. The area is monitored by CDOW for nesting golden eagles and sensitive raptor species, and no nests for these species occur along the route (personal communication, August 1999, with Jerry Craig, CDOW). Swainson's hawk, kestrel, and great horned owl nests may occur in lone trees along the route. Burrowing owls were observed within prairie dog colonies during surveys of the route (TRC Mariah Associates Inc. 1999). In Wyoming, a total of 280 known raptor nests are located within 0.75-1.0 mile of the proposed route (Table 3.6). Of these nests, eight were known to be active in 1999, although it is likely that a much larger number were active. The majority (52%, or 146 nests, plus 14 artificial structures) were ferruginous hawk nests. Other raptor species known to nest in the vicinity of the route include red tailed hawk (31 nests), golden eagle (30 nests), Swainson's hawk (10 nests), prairie falcon (36 nests), great horned owl (8 nests), burrowing owl (3 nests), merlin (1 nest), and kestrel (1 nest). Most raptor nests are located in topographically diverse areas along the route, but the entire route is suitable raptor nesting habitat. The route is also suitable raptor foraging and perching habitat.

BLM has identified three raptor concentration areas (RCAs) along the route: 1) the Medicine Bow; 2) Red Rim; and 3) Cherokee RCAs (BLM 1987a:205-207). The Medicine Bow RCA intersects the route, whereas the other two RCAs occur within a mile or two of the route. These RCAs contain nesting concentrations of ferruginous hawks, golden eagles, and/or prairie falcons.

3.2.2.4 Upland Game Birds

Ten upland game bird species--ring-necked pheasant, mourning dove, sharp-tailed grouse, quail, blue grouse, ruffed grouse, chukkar, Hungarian partridge, sage grouse, and California quail--occur in the vicinity of the route. Ring-necked pheasant, sharp-tailed grouse, quail, and mourning dove occur in the cultivated fields adjacent to the route in Colorado (personal communication, August 1999, with Rick Hoffman, CDOW). Mourning dove is also a common summer resident in Wyoming habitats. This species is highly adaptive, but prefers

Table 3.6 Known Raptor Nests[1] and Sage Grouse Leks[2] Along the Route.

	Map Name (1:100,000 Scale BLM Maps)								
Resource	Laramie	Rock River	Medicine Bow	Rawlins	Red Desert Basin	Rock Springs	Kemmerer	Evanston	Total
Raptor Nests									
Ferruginous hawk (1.0-mile buffer)									
Total no. of nests	--[3]	4	19	86	31	4	2	--	146
No. known active	--	--	1	1	--	--	1	--	3
Ferruginous hawk artificial nest (1.0-mile buffer)[1]									
No. of structures	--	--	--	14	--	--	--	--	14
Known active structures	--	--	--	2	--	--	--	--	2
Red-tailed hawk (0.75-mile buffer)									
Total no. of nests	--	3	2	1	15	10	--	--	31
No. known active	--	--	1	--	--	--	--	--	1
Golden eagle (0.75-mile buffer)									
Total no. of nests	--	2	6	1	11	9	1	--	30
No. known active	--	--	--	--	--	--	1	--	1
Swainson's hawk (0.75-mile buffer)									
Total no. of nests	--	5	5	--	--	--	--	--	10
No. known active	--	--	--	--	--	--	--	--	--
Prairie falcon (0.75-mile buffer)									
Total no. of nests	--	3	--	--	19	14	--	--	36
No. known active	--	--	--	--	--	--	--	--	--
Great horned owl (0.75-mile buffer)									
Total no. of nests	--	1	--	--	5	2	--	--	8
No. known active	--	--	--	--	--	--	--	--	--

Table 3.6 (Continued)

	Map Name (1:100,000 Scale BLM Maps)								
Resource	Laramie	Rock River	Medicine Bow	Rawlins	Red Desert Basin	Rock Springs	Kemmerer	Evanston	Total
Burrowing owl (0.75-mile buffer)									
Total no. of nests	--	--	--	--	2	--	1	--	3
No. known active	--	--	--	--	--	--	1	--	1
Merlin (0.75-mile buffer)									
Total no. of nests	--	--	--	--	1	--	--	--	1
No. known active	--	--	--	--	--	--	--	--	--
Kestrel (0.75-mile buffer)									
Total no. of nests	--	--	--	--	1	--	--	--	1
No. known active	--	--	--	--	--	--	--	--	--
Total raptor nests									
Total no. of nests	--	18	32	102	85	39	4	--	280
No. known active	--	--	2	3	--	--	3	--	8
Sage Grouse Leks (2.0-mile buffer)									
Total no. of leks[2]	3	--	21	4	--	3	--	7	38
No. known active[1]	--	--	15	--	--	--	--	2	17

[1] BLM (unpublished data).
[2] BLM (unpublished data); WGFD (unpublished data).
[3] -- = none recorded.

open land with scattered vegetation and requires trees or some type of structure for nesting. Mourning dove concentrations are usually highest near power lines, buildings, and other areas of human disturbance, and these areas are common along the route.

The Utah portion of the route is considered yearlong habitat for ruffed grouse, which summer in clearings in open woods and winter in coniferous forest (Robbins et al. 1983). Blue grouse habitat (woodlands and mountainous forest) also occur along the route in Utah. Chukkar yearlong habitat (open, rocky, barren areas) occurs on the route near Salt Lake City. California quail habitat (mixed woodlands) occurs between Coalville and Wanship, and Hungarian partridge yearlong habitat occurs in the Coalville vicinity.

Sage grouse habitat is characterized by an interspersed mixture of sagebrush and grassland. In winter, sage grouse use tall dense stands of sagebrush that remain relatively exposed through deep snow (Greer n.d.); low sagebrush on windswept knolls are also used as feeding sites (Hupp and Braun 1989). During spring, sage grouse gather on breeding grounds (leks), which are characterized by open areas (e.g., meadows, low sagebrush zones) surrounded by denser sagebrush cover (Greer n.d.). Sage grouse often return year after year to these leks, although their exact location may vary from year to year.

Thirty-eight sage grouse lek locations have been identified within 2.0 miles of the route (Table 3.6). Seventeen (45%) of these leks are known to have been active at least 1 of the past 3 years. The area within 0.25 mile of a lek center is considered potential breeding habitat. Breeding habitat is protected from surface disturbance from February 1 to May 15. Sage grouse tend to nest within 2.0 miles of the lek center (BLM 1987a:202); this area is considered probable nesting habitat and is protected from surface disturbance from April 1 to July 1. Approximately 38 miles (6%) of the route is considered potential sage grouse nesting habitat.

3.2.2.5 Other Birds

A estimated 264 other bird species potentially occur along the route (Appendix A), and most of the route contains habitat for any number of these species.

3.2.2.6 Amphibians and Reptiles

Approximately 49 amphibian and reptile species potentially occur along the route (Appendix A), and much of the route contains suitable habitat for any number of these species.

3.2.2.7 Fisheries

Fourteen streams along the route are capable of supporting game fisheries or support important aquatic resource values: the South Platte, Laramie, Medicine Bow, North Platte, Green, Black's Fork, and Bear Rivers and Rock, Wagonhound, Fourmile, Bitter, Little Bitter, Sulphur, and Yellow Creeks. These larger rivers support a variety of trout (rainbow, brown, cutthroat) and other game fish species. Other fish species potentially occur in some of the smaller perennial streams, including redside shiner, speckled dace, and fathead minnow. The remaining streams, draws, and washes within the along the route are intermittent or ephemeral and are not known to support permanent fish populations.

All perennial stream crossings would be bored, so no impacts to fisheries would occur; therefore, fisheries are not discussed further in this EA.

3.2.3 Threatened, Endangered, Candidate, and State-Sensitive Species

The FWS offices in Denver, Cheyenne, and Salt Lake City were contacted to initiate informal consultation and obtain lists of threatened, endangered, and candidate (TE&C)

species potentially present along the route (personal communication, June 1999, with Clay Ronish, FWS, Denver; May 1999, with Michael Long, FWS, Cheyenne; and May 1999, with Reed Harris, FWS Salt Lake City). In addition, observation records of threatened and endangered (T&E), candidate, and state-sensitive species were requested from the CNHP (1999), CDOW (1999), UDWR (1999), and WNDD (1999).

The *Endangered Species Act* (16 U.S.C. 1531-1543) protects listed T&E plant and animal species and their critical habitats. T&E, candidate species, and special status species are those that have been specifically designated as such by the FWS, BLM, FS, or state governments. An estimated 178 such species may occur along the route (Table 3.7).

3.2.3.1 Federal Threatened and Endangered Species

T&E species potentially occurring along the route include black-footed ferret (BFF) (endangered), Preble's meadow jumping mouse (endangered), bald eagle (threatened), peregrine falcon (endangered), whooping crane (endangered), Mexican spotted owl (threatened), southwestern willow flycatcher (threatened), eskimo curlew (endangered), piping plover (threatened), June sucker (endangered), and Ute ladies' tresses (threatened) (FWS 1999a, 1999b, 1999c). In addition to T&E species, Canada lynx, mountain plover, and Colorado butterfly plant are proposed threatened species and swift fox is a candidate species potentially occurring in the along the route. Special status species likely to occur along the route include a variety of mammals, birds, fish, and plants (Table 3.7).

Black-footed Ferret. The BFF was once distributed throughout the high plains of the Rocky Mountain and western Great Plans regions (Forrest et al. 1985). Prairie dogs are the main food source of BFFs (Sheets et al. 1972), and few ferrets have been historically collected away from prairie dog colonies (Forrest et al. 1985). BFFs were considered extinct until a small population was discovered near Meeteetse, Wyoming, in 1981. In Colorado, the CNHP documents BFF occurrences in T3S, R66W, and T10N, R66W. The WNDD (1999)

Table 3.7 Threatened, Endangered, Candidate, and State-Sensitive Species Known to Occur or with Potential to Occur in the Route Vicinity.

Scientific Name	Common Name	Federal Status[1]	Global/ Trinomial Rank[2]	State Rank[3,4]
Wyoming				
Mammals				
Myotis evotis	Long-eared myotis	–	G5	S1B, S1?N
Myotis thysanodes	Fringed myotis	–	G5	S1B, S1N
Myotis volans	Long-legged myotis	–	G5	S3B, SZN
Lasionycteris noctivagans	Silver-haired bat	–	G5	S3B, SZ?N
Lasiurus cinereus	Hoary bat	–	G5	S2B, SZ?N
Plecotus townsendii	Townsend's big-eared bat	–	G4	S1B, S2N
Antrozous pallidus	Pallid bat	–	G5	S1B, SZ?N
Brachylagus idahoensis	Pygmy rabbit	–	G4	S2
Thomomys clusius	Wyoming pocket gopher	–	G2	S1, S2
Perognathus parvus	Great basin pocket mouse	–	G5	S2
Zapus hudsonius preblei	Preble's meadow jumping mouse	E	G5, T2	S1
Vulpes velox	Swift fox	C	G3	S2, S3
Ursus arctos	Grizzly or brown bear	E, T, NL	G4	S2
Mustela nigripes	Black-footed ferret	E, XN	G1	S1
Lynx canadensis (AKA *Felis lynx canadensis*)	Canada lynx (AKA North American lynx)	PT	G5	S1
Birds				
Gavia immer	Common loon	–	G5	S2B, SZN
Pelecanus erythrorhynchos	American white pelican	–	G3	S1B, SZN
Nycticorax nycticorax	Black-crowned night-heron	–	G5	S3B, SZN
Buteo regalis	Ferruginous hawk	–	G4	S3B, S3N
Falco columbarius	Merlin	–	G5	S2B, SZN
Falco peregrinis	Peregrine falcon	E		
Charadrius alexandrinus	Snowy plover	–	G4	S1B, S2?N
Charadrius montanus	Mountain plover	PT	G2	S2B, SZN
Haliaeetus leucocephalus	Bald eagle	T		
Numenius americanus	Long-billed curlew	–	G5	S3B, SZN
Larus californicus	California gull	–	G5	S2?B, SZN
Athene cunicularia	Burrowing owl	–	G4	S3B, SZN
Sayornis phoebe	Eastern phoebe	–	G5	S1B, SZN
Icterus parisorum	Scott's oriole	–	G5	S1?B, SZN
Amphibians				
Ambystoma tigrinum	Tiger salamander	–	G5	S3, S4
Bufo hemiophrys baxteri	Wyoming toad	E	G4, T1	S1
Rana pipiens	Northern leopard frog	–	G5	S3

Table 3.7 (Continued)

Scientific Name	Common Name	Federal Status[1]	Global/ Trinomial Rank[2]	State Rank[3,4]
Reptiles				
Crotalus viridis concolor	Midget faded rattlesnake	–	G5, T3	S1, S2
Fish				
Oncorhynchus clarki pleuriticus	Colorado River cutthroat trout	–	G4, T2, T3	S2
Gila copei	Leatherside chub	–	G3, G4	S2
Gila cypha	Humpback chub	–	G1	SX
Gila robusta	Roundtail chub (bonytail)	–	G3, G4	S2?
Nocomis biguttatus	Hornyhead chub	–	G5	S2
Catostomus discobolus	Bluehead sucker	–	G4	S2, S3
Catostomus latipinnis	Flannelmouth sucker	–	G3, G4	S3
Plants				
Aquilegia laramiensis	Laramie columbine	–	G2	S2
Arabis pendulina var. *russeola*	Daggett rock cress	–	G5, T3?	S3
Arabis selbyi	Selby rock cress	–	G4?, Q	S1
Astragalus coltonii var. *moabensis*	Moab milkvetch	–	G4, T3?	S1
Astragalus nelsonianus	Nelson's milkvetch	–	G2	S2
Astragalus racemosus var. *treleasei*	Trelease's racemose milkvetch	–	G5, T3	S1
Astragalus simplicifolius	Bun milkvetch	–	G3	S3
Astragalus tridactylicus	Three-fingered milkvetch	–	G4	S2
Brickellia microphylla var. *scabra*	Little-leaved brickell brush	–	G4, G5, T4?	S1
Carex crawei	Crawe sedge	–	G5	S1
Cirsium ownbeyi	Ownbey's thistle	–	G3	S2
Cryptantha gracilis	Slender cryptantha	–	G5	S1
Cryptantha rollinsii	Rollins' catseye	–	G3	S1
Cymopterus lapidosus	Echo spring-parsley	–	G3	S2, S3
Descurainia pinnata ssp. *paysonii*	Payson's tansymustard	–	G5, T3?	S2
Eriogonum divaricatum	Divergent wild buckwheat	–	G4, G5	S1
Eriogonum hookeri	Hooker wild buckwheat	–	G5	S1
Gaura neomexicana ssp. *coloradensis*	Colorado butterfly plant	PT	G3, T2	S2
Glossopetalon spinescens var. *meionandrum*	Utah greasebush	–	G5, T3	S1
Haplopappus wardii	Ward's goldenweed	–	G2	S2
Lesquerella prostrata	Prostrate bladderpod	–	G3	S1
Monolepis pusilla	Red poverty-weed	–	G5	S1
Muhlenbergia torreyi	Ring muhly	–	G4	S1
Oxytropis besseyi obnapiformis	Maybell locoweed	–	G5, T3	S1
Penstemon paysoniorum	Payson beardtongue	–	G3	S3
Penstemon watsonii	Watson beardtongue	–	G5	SH
Phacelia glandulosa var. *deserta*	Desert glandular phacelia	–	G4, T1, T2	S1?

Table 3.7 (Continued)

Scientific Name	Common Name	Federal Status[1]	Global/ Trinomial Rank[2]	State Rank[3,4]
Phacelia incana	Western phacelia	–	G3	S1
Phacelia neomexicana var. *alba*	White scorpion-weed	–	G4, G5	S1
Phlox opalensis	Opal phlox[2]		G3	S3
Physaria condensata	Tufted twinpod[2]	–	G2	S2
Potamogeton nodosus	Longleaf pondweed	–	G5	S1
Potamogeton strictifolius	Strict-leaved pondweed	–	G5	S1
Rorippa calycina	Persistent sepal watercress	–	G3	S2, S3
Senecio pseudaureus var. *flavulus*	Groundsel	–	G5, T?	S1
Silphium integrifolium var. *laeve*	Rosinweed	–	G4, G5, T4?	S1
Spiranthes diluvialis	Ute ladies' tresses	T	G2	S2
Thelesperma caespitosum	Green river greenthread	–	G1	S1
<u>Colorado</u>				
Mammals				
Mustela nigripes	Black-footed ferret	E, XN	G1	SH
Zapus hudsonius preblei	Preble's meadow jumping mouse	E	G5, T2	S1
Birds				
Buteo regalis	Ferruginous hawk	–	G4	S3B, S4N
Calcarius mccownii	McCown's longspur	–	G5	S2B, SZN
Calcarius ornatus	Chestnut-collared longspur	–	G5	S1B, SZN
Charadrius melodus	Piping plover	T	–	–
Charadrius montanus	Mountain plover	PT	G2	S2B, SZN
Falco peregrinus	Peregrine falcon	E	–	–
Haliaeetus leucocephalus	Bald eagle	T	–	–
Grus americana	Whooping crane	E	–	–
Numenius borealis	Eskimo curlew	E	–	–
Sterna antillarum	Least tern	E	–	–
Strix occidentalis lucida	Mexican spotted owl	T	–	–
Amphibians				
Rana pipiens	Northern leopard frog	–	G5	S3
Fish				
Nocomis biguttatus	Hornyhead chub	–	G5	SX
Plants				
Gaura neomexicana ssp. *coloradensis*	Colorado butterfly plant	PT	G3, T2	S1
Eustoma grandiflorum	Showy prairie gentian	–	G5	S3, S4
Spiranthes diluvialis	Ute ladies' tresses	T	G2	S2

Table 3.7 (Continued)

Scientific Name	Common Name	Federal Status[1]	Global/ Trinomial Rank[2]	State Rank[3,4]
Utah				
Mammals				
Chaetodipus intermedius	Rock pocket mouse	–	N/A	S1 (SD)[4]
Cynomys parvidens	Utah prairie dog	E	N/A	S1, S2 (T)
Euderma maculatum	Spotted bat	–	N/A	S2
Glaucomys sabrinus	Northern flying squirrel	–	N/A	S3 (SD)
Gulo gulo	Wolverine	–	N/A	S1 (T)
Idionycteris phyllotis	Allen's big-eared bat	–	N/A	S1
Lasiurus blossevillii	Western redbat	–	N/A	S1
Lynx canadensis (AKA *Felis lynx canadensis*)	Canada lynx (AKA North American lynx)	–	N/A	S1
Martes americana	Marten	–	N/A	S2 (SD)
Microtus mexicanus	Mexican vole	–	N/A	S1 (SP/SD)
Microtus montanus rivularis	Virgin River montane mole	–	N/A	S2 (SP/SD)
Mustela nigripes	Black-footed ferret	E	N/A	(E)
Myotis thysanodes	Fringed myotis	–	N/A	S3
Myotis ciliolabrum	Western small-footed myotis	–	N/A	S3, S4
Neotoma stephensi	Stephen's woodrat	–	N/A	S1 (SP/SD)
Nyctinomops macrotis	Big free-tailed bat	–	N/A	S2
Ochotona princeps	Pika	–	N/A	S2 (SD)
Perognathus fasciatus	Olive-backed pocket mouse	–	N/A	S1, S2 (SD)
Peromyscus nasutus	Northern rock mouse	–	N/A	S1 (SP/SD)
Plecotus townsendii	Townsend's big-eared bat	–	N/A	–
Spermophilus elegans	Wyoming ground squirrel	–	N/A	S2, S3 (SD)
Spermophilus spilosoma	Spotted ground squirrel	–	N/A	S2, S3 (SD)
Spermophilus tridecemlineatus	Thirteen-lined ground squirrel	–	N/A	S3 (SD)
Tadarida brasiliensis mexicana	Brazilian free-tailed bat	–	N/A	S3, S4
Tamias amoenus	Yellow pine chipmunk	–	N/A	S2 (SD)
Birds				
Accipiter gentilis	Northern goshawk	–	N/A	S3 (SP)
Ammodramus savannarum	Grasshopper sparrow	–	N/A	(SP/SD)
Asio flammeus	Short-eared owl	–	N/A	S2, S3 (SP)
Buteo swainsoni	Swainson's hawk	–	N/A	S3B (SP)
Centrocerus urophasianus	Sage grouse	–	N/A	S2, S3 (SP/SD)
Charadrius montanus	Mountain plover	PT	N/A	S1B (SP/SD)

Table 3.7 (Continued)

Scientific Name	Common Name	Federal Status[1]	Global/ Trinomial Rank[2]	State Rank[3,4]
Cypseloides niger	Black swift	–	N/A	S1B (SP/SD)
Dolichonyx oryzivorus	Bobolink	–	N/A	S2, S3B (SP/SD)
Empidonax traillii extimus	Southwestern willow flycatcher	T	N/A	E
Falco peregrinus	Peregrine falcon	E	N/A	S2
Geothlypis trichas	Common yellowthroat	–	N/A	S3B (SP)
Grus americana	Whooping crane	E	N/A	–
Grus canadensis	Sandhill crane	–	N/A	–
Guiraca caerulea	Blue grosbeak	–	N/A	S3, S4B (SP/SD)
Haliaeetus leucocephalus	Bald eagle	T	N/A	–
Melanerpes lewis	Lewis' woodpecker	–	N/A	S2, S3 (SP/SD)
Numenius americanus	Long-billed curlew	–	N/A	23B (SP/SD)
Pelecanus erythrorhynchos	American white pelican	–	N/A	S2B (SD)
Picoides tridactylus	Three-toed woodpecker	–	N/A	S2, S3 (SD)
Promenetus exacuous	Sharp sprite	–	N/A	–
Setophaga ruticilla	American redstart	–	N/A	–
Strix occidentalis lucida	Mexican spotted owl	T	N/A	T
Toxostoma crissale	Crissal thrasher	–	N/A	S2 (SP/SD)
Tympanuchus phasianellus columbianus	Sharp-tailed grouse	–	N/A	S1, S2 (SD)
Vireo bellii	Bell's vireo	–	N/A	S1, S2B (SP/SD)
Amphibians				
Bufo boreas boreas	Boreal toad	C	N/A	S2 (SP)
Bufo microscaphus microscaphus	Arizona toad	–	N/A	S2 (SP)
Pseudacris regilla	Pacific chorus frog	–	N/A	(SD)
Rana pretiosa	Spotted frog	C	N/A	S1, conservation species
Rana yavapaiensis	Lowland leopard frog	–	N/A	S1, S2 (SP)
Reptiles				
Elaphe guttata emoryi	Great Plains ratsnake	–	N/A	(SP/SD)
Lampropeltis getula californiae	California kingsnake	–	N/A	S3
Lampropeltis pyromelana infralabialis	Utah mountain kingsnake	–	N/A	S2, S3 (SP)
Lampropeltis triangulum taylori	Utah milksnake	–	N/A	S2, S3 (SP)
Opheodrys vernalis	Smooth greensnake	–	N/A	S2 (SP/SD)

Table 3.7 (Continued)

Scientific Name	Common Name	Federal Status[1]	Global/ Trinomial Rank[2]	State Rank[3,4]
Mollusks				
Anodota californiensis	California floater	–	N/A	(T)
Fossaria rustica	No common name	–	N/A	–
Margaritifera falcata	Western pearlshell	–	N/A	–
Oreohelix eurekensis eurekensis	Eureka mountainsnail	–	N/A	(SD)
Oreohelix haydeni haydeni	Lyrate mountainsnail	–	N/A	(SD)
Oreohelix subrudis	Subalpine mountainsnail	–	N/A	–
Oreohelix peripherica wasatchensis	Ogden Rocky Mountain snail	–	N/A	(SD)
Oreohelix yavapai	Yavapai mountainsnail	–	N/A	(SD)
Oxyloma haydeni kanabensis	Ambersnail, Kanub	–	N/A	(E)
Physella utahensis	Utah physa (Utah bubblesnail)	–	N/A	(SP/SD)
Physella zionis	Wet-rock physa (Zion Canyon snail)	–	N/A	(SD)
Pristiloma subrupicola	Clinton Cave snail	–	N/A	(SD)
Pyrgulopsis kolobensis	Toquerville springsnail	–	N/A	–
Stagnicola montanensis	Mountain marshsnail	–	N/A	–
Valvata humeralis	Roundmouth valvata	–	na	(SP)
Valvata utahensis	Utah valvatasnail	E	na	(E)
Fish				
Chamistes liorus	June sucker	E	N/A	S1 (E)
Plants				
Arabis glabra var. *furcatipilis*	Towermustard rockcress	–	N/A	–
Arctomecon humilus	Dwarf bear-poppy	–	N/A	(E)
Asclepias welshii	Welsh's milkweed	–	N/A	(T)
Astragalus montii	Heliotrope milkvetch	–	N/A	(T)
Carex specuicola	Navajo sedge	–	N/A	(T)
Cymopterus lapidosus	Spring parsley	–	N/A	–
Erigeron arenarioides	Utah fleabane	–	N/A	–
Erigeron maguirei	Maguire daisy	–	N/A	(T)
Lepidium barnebyanum	Barneby ridge-cress (peppercress)	–	N/A	(E)
Lesquerella tumulosa	Kodachrome bladderpod	–	N/A	(E)
Penstemon platyphyllus	Broadleaf penstemon	–	N/A	–
Phacelia argillacea	Clay phacelia	–	N/A	(E)
Primula maguirei	Maguire primrose	–	N/A	(T)
Ranunculus acriformis var. *aestivalis*	Autumn buttercup	–	N/A	(E)
Spiranthes diluvialis	Ute ladies' tresses	T	N/A	(T)

Table 3.7 (Continued)

[1] **Federal status definitions:** E = endangered, defined in the *Endangered Species Act* as a species, subspecies, or variety in danger of extinction throughout all or a significant portion of its range; T = threatened, defined in the *Endangered Species Act* as a species, subspecies, or variety likely to become endangered in the foreseeable future throughout all or a significant portion of its range; C = candidate, species for which current information supports the biological appropriateness of proposing to list as endangered or threatened, but proposed rules have not yet been issued; PT = proposed threatened, taxa formally proposed for listing as threatened; NL = not listed (in certain areas, e.g., Alaska); XN = experimental, nonessential population.

[2] **Global rank definitions:** G = global rank, refers to rangewide status of a species; T = trinomial rank, refers to rangewide status of subspecies or variety; 1 = critically imperiled because of extreme rarity (often know from five or fewer extant occurrences or very few remaining individuals; 2 = imperiled because of rarity (often known from six to 20 occurrences) or because of factors demonstrably making a species vulnerable to extinction; 3 = rare or local throughout is range of found locally in a restricted range (usually known from 21 to 100 occurrences); 4 = apparently secure, although the species may be quite rare in parts of its range, especially at the periphery; 5 = demonstrably secure, although the species may be rare in parts of its range, especially on the periphery; ? = questions exist regarding the assigned G or T rank of a taxon; Q = questions exist regarding the taxonomic validity of a species, subspecies, or variety; N/A = not applicable.

[3] **State rank definitions for Wyoming, Colorado, and Utah:** S = state rank, refers to the state status of the taxon (species or subspecies), state rank differs from state to state; 1 = critically imperiled because of extreme rarity (often know from five or fewer extant occurrences or very few remaining individuals; 2 = imperiled because of rarity (often known from six to 20 occurrences) or because of factors demonstrably making a species vulnerable to extinction; 3 = rare or local throughout is range of found locally in a restricted range (usually known from 21 to 100 occurrences); 4 = apparently secure, although the species may be quite rare in parts of its range, especially at the periphery; 5 = demonstrably secure, although the species may be rare in parts of its range, especially on the periphery; B = breeding rank, a state rank modifier indicating the status of a migratory species during the breeding season (used mostly for migratory birds and bats); N = nonbreeding rank, a state rank modifier indicating the status of a migratory species during the nonbreeding season (used mostly for migratory birds and bats; ZN = taxa that are not of significant concern during the nonbreeding season, such taxa are often not encountered in the same locations from year to year; H = known only from historical records, 1950 is the cutoff for plants, 1970 is the cutoff for animals; X = believed to be extinct; ? = questions exist regarding the assigned S rank of a taxon; conservation species = meets Utah criteria of endangered, threatened, or of special concern but is currently receiving sufficient special management under conservation agreements.

[4] **Special Utah designations (in parentheses)**: SD = species of special concern, has experienced a substantial decrease in population, distribution, or habitat availability; SP = species of special concern, occurs in limited areas and/or numbers due to a restricted or specialized habitat; T = Utah threatened, any wildlife species or subspecies which is likely to become an endangered species within the foreseeable future throughout all or a significant part of its range in Utah or the world; E = Utah endangered, any wildlife species or subspecies which is threatened with extirpation from Utah or extinction resulting from low or declining numbers, alteration and/or reduction of habitat, detrimental environmental changes, or any combination of the above.

lists three potential occurrences within 1.0 mile of the proposed route in Section 21, T16N, R73W; Section 34, T19N, R96W; and Section 12, T19N, R98W. Approximately 32 miles of the route occurs within the BFF Primary Management Zone (PMZ) 2. PMZs are areas designated by the WGFD, BLM, and FWS to assist in the management of the BFF reintroduction effort. PMZ1 (Shirley Basin) was established as the preferred release site; PMZ2 (Medicine Bow) was designated as a secondary release site, although no ferrets have been released in PMZ2.

In Wyoming, the area south and east of the North Platte River was declared ferret-free prior to the reintroduction of ferrets in Shirley Basin (WGFD and BLM 1991); thus, BFF searches would not be required along the route east of the North Platte River to the Wyoming/Colorado state line due to the experimental/nonessential designation and management guidelines presented in the ferret plan. In Colorado, two prairie dog colonies between 75 and 100 acres in size occur along the route, but, since construction would occur within road ROWs, no burrows would be affected and ferret searches are not required. In Wyoming, there are two prairie dog colonies fitting the criteria for suitable BFF habitat (Sections 17 and 20, T18N, R112W). If the FWS determines that ferret surveys are necessary, surveys would be completed prior to construction in accordance with FWS ferret survey protocols. No prairie dog colonies were observed along the route in Utah. BFFs are not likely to be adversely affected by the proposed project; therefore, this species is not discussed further in this EA.

Preble's Meadow Jumping Mouse. Preble's meadow jumping mouse is a small rodent that occurs in low undergrowth consisting of grasses, forbs, or a mixture of grasses and forbs in wet meadows and riparian corridors and where tall shrubs and low trees provide adequate cover. It also prefers lush vegetation along watercourses or herbaceous understories in wooded areas with close proximity to water. Along the proposed ROW, potential Preble's meadow jumping mouse habitat occurs from Laramie to Aurora in numerous wet meadows and riparian areas (Table 3.8). It has recently been documented in Laramie, Albany, and

Table 3.8 Preble's Meadow Jumping Mouse Protection and Potential Protection Areas.[1]

State/ Watershed	Stream Name	Reach	County
Wyoming			
South Platte[2]	Crow Creek (all forks)	Upstream of Hereford Ranch to montane	Laramie
South Platte[2]	Lodgepole Creek (all forks)	From County Road (CR) 214 upstream to 2.5 miles downstream of Highway 85	Laramie
South Platte[2]	Lodgepole Creek (all forks)	From 2.5 miles upstream of Highway 85 to montane	Laramie/ Albany
South Platte[2]	Lone Tree Creek (all forks)	Portions from Colorado border upstream to head	Laramie
South Platte[2]	Dale Creek (all forks)	Portions from Colorado border upstream to head	Albany
North Platte[2]	Horse Creek (all forks)	CR 128-2 to head	Laramie
South Platte[3]	Crow Creek	1.0 mile upstream and 1.0 mile downstream of SWSE, Sec. 26, T14N, R67W	Laramie
South Platte[3]	Crow Creek	1.0 mile upstream and 1.0 mile downstream of NESE, Sec. 27, T14N, R67W	Laramie
South Platte[3]	Crow Creek	1.0 mile upstream and 1.0 mile downstream of NWNE, Sec. 27, T14N, R67W	Laramie
South Platte[3]	Crow Creek	1.0 mile upstream and 1.0 mile downstream of SWNE, Sec. 27, T14N, R67W	Laramie
South Platte[3]	Crow Creek	1.0 mile upstream and 1.0 mile downstream of NENW, Sec. 27, T14N, R67W	Laramie
South Platte[3]	Lodgepole Creek	1.0 mile upstream and 1.0 mile downstream of NWNE, Sec. 29, T16N, R69W	Laramie
North Platte[3]	Horse Creek	1.0 mile upstream and 1.0 mile downstream of NWNE, Sec. 25, T17N, R70W	Laramie
North Platte[3]	South Fork of Horse Creek	1.0 mile upstream and 1.0 mile downstream of SWSE, Sec. 25, T17N, R70W	Laramie
Colorado			
South Platte[2]	Owl Creek	SWSWSW, Sec. 9, T11N, R66W to NWNWNE, Sec. 17, T11N, R66W	Weld

1 Source: www.r6.fws.gov/preble/wympa.htm; www.r6.fws.gov/preble/compa.htm.
2 Potential mouse protection area.
3 Mouse protection area.

Weld Counties (BLM 1999b; CNHP 1999), as well as along Horse and Lone Tree Creeks near the route (BLM 1999b).

All potential Preble's meadow jumping mouse habitat would be bored; therefore, the mouse and its habitat are not likely to be adversely affected by the proposed project, and it is not discussed further in this EA.

Peregrine Falcon. Peregrine falcons nest on tall cliffs, usually within 1.0 mile of a stream, river, or extensive brush or woodlands which provide concentrated food sources and open areas to hunt (Call 1978; Snow 1972). Peregrine falcons nest on substantial rock outcrops (usually with southern exposures) in small caves or on overhanging ledges large enough to accommodate three to four full-grown nestlings. Peregrine falcons feed almost exclusively on birds, many of which are associated with riparian zones and large bodies of water (i.e., waterfowl). No peregrine falcons have been documented along the route (CNHP 1999; WNDD 1999; UDOW 1999), but they have been observed in the Foote Creek Rim and Simpson Ridge areas south of Highway 30/287 (BLM 1995a, 1995b; Western Ecosystems Technology, Inc. 1998). They may occasionally forage anywhere along the route. Project construction is not likely to adversely affect any peregrine falcon or its habitat so this species is not discussed further in this EA.

Bald Eagle. Bald eagles have been proposed for delisting, but for the purposes of this analysis it will be treated as a threatened species. Bald eagles are known to nest near Horse Creek Reservoir in Colorado (personal communication, June 1999, with Dave Weber, CDOW), Medicine Bow (BLM 1995), and Bear (BLM 1999b) Rivers and Rock Creek (Western Ecosystems Technology, Inc. 1998) drainages near the proposed ROW. The nearest known nest is located approximately 1.25 miles from the route along the Bear River in Wyoming (BLM 1999b). They typically require cliffs, large trees, or sheltered canyons associated with concentrated food sources (e.g., fisheries or waterfowl concentration areas) for nesting and/or roosting areas (Edwards 1969; Snow 1973; Call 1978; Steenhof 1978; Peterson 1986).

Bald eagles forage widely during the nonnesting season (i.e., fall and winter) and scavenge on animal carcasses such as deer and elk. In Colorado, several pairs of bald eagles occur in the vicinity of the route and eagles winter in and around the several reservoirs near the route (personal communication, August 1999, with Jerry Craig, CDOW). Potential roosting sites and wintering areas, associated with the larger rivers, occur sporadically along the route, and a roost site was documented in 1990 near the route along Chalk Creek in Utah. Two eagle observations have occurred within 1.0 mile of the route, in 1988 and 1990 (BLM 1999b). Since no known nests or roosts occur near the route and because bald eagles would only rarely forage on the route, the proposed project would not affect bald eagles and this species is not discussed further in this EA.

Whooping Crane. Whooping crane breeds in marshes, sloughs, prairie potholes, and lake margins with abundant emergent vegetation in isolated undisturbed areas. Foraging may occur in adjacent uplands. Nesting typically occurs from late April through mid-July. Whooping cranes winter in salt marshes and barriers islands in Texas and New Mexico. During migration (mid-September), this species feeds in croplands and prefers to roost in large wetlands or on sandbars in wide unobstructed channels, isolated from human disturbance.

Although none have been documented along the route, whooping cranes may migrate across it. However, none of the proposed route is isolated from human disturbance, so whooping cranes are unlikely to utilize the limited cropland or few wetlands along the route during migration. Therefore, this species is not likely to be adversely affected by the proposed project and is not discussed further in this EA.

Eskimo Curlew. Eskimo curlew could occur in Adams and Weld Counties, but none have been documented along the route (CNHP 1999; CDOW 1999; BLM 1999; TRC Mariah Associates Inc. 1999). Their spring migration route extends north from South and Central America and through the Great Plains states, generally east of Colorado. Based on their documented migration patterns, their presence in the project vicinity is extremely unlikely, and they are not likely to be adversely affected by the proposed project. Eskimo curlew are not addressed further in this EA.

Least Tern. Least tern may occur in Weld County, Colorado (BLM 1999b), but none have been documented along the route. Preferred habitat includes bare river sandbars with adjacent open reaches of river which occurs along the South Platte near the route. The South Platte River and adjacent sandbars would be bored, so no habitat would be affected. Direct mortality is unlikely, so the project is not likely to adversely affect least tern, and it is not addressed further in this EA.

Piping Plover. Piping plover may occur in Weld County, but none have been observed along the route. Preferred habitat includes dry portions of sparsely vegetated sandy areas along rivers and reservoirs; areas adjacent to the South Platte River may contain suitable habitat. Because the South Platte River and the adjacent riparian areas would be bored, the project is not likely to adversely affect piping plover. Piping plover are not discussed further in this EA.

June Sucker. The June sucker is endemic to Utah Lake and its drainages; critical habitat occurs in the Provo River approximately 45 miles south of the proposed project (personal communication, June 1999, with Jim Muck, FWS, Utah Field Office). Since the project would not affect Utah Lake, its drainages, or the Provo River, no impacts to the June sucker would occur as a result of project construction, operation, or maintenance. June sucker are not discussed further in this EA.

Ute Ladies' Tresses. Ute ladies' tresses was first identified in Wyoming in August 1993 (BLM 1994), and it is suspected to occur throughout southern Wyoming in appropriate habitats. This species grows along streams, rivers, ponds, reservoirs, wetlands, and other riparian areas which occur at intervals along the entire route.

In Colorado, all documented populations of Ute ladies' tresses occur west of the proposed ROW, although suitable habitat may occur along First and Second Creeks and the south Platte and Poudre Rivers (BLM 1999b). It has been documented in T5N, R64W, east of the proposed ROW (CNHP 1999). All wetland crossings appear to be unsuitable habitat for this species because of excessive alkaline conditions or dense overstory of trees and/or shrubs (TRC Mariah Associates Inc. 1999). In Wyoming, approximately 25 miles of the route would cross FWS-designated Category 1 areas where Ute ladies' tresses have been documented and surveys have been completed, including Dry Creek, Tromley Gulch, the headwaters and the South Fork of Horse Creek, and Schoolhouse Creek (BLM 1999b). Other drainages may also provide suitable habitat for this species. In Utah, no known populations occur along the route (BLM 1999b).

All potential Ute ladies' tresses habitat would be bored or otherwise avoided (a list of stream crossings and crossing methods is provided in Appendix A in the POD for this project); therefore, this species would not be adversely affected by the proposed project, and it is not discussed further in this EA.

Mexican Spotted Owl. The mixed coniferous forests required by this species are not present along the Colorado portion of the route. Furthermore, the northern extent of Mexican spotted owl range terminates south of the southern extent of the proposed cable. Therefore, this species is not likely to be adversely affected by the project and is not discussed further in this EA.

3.2.3.2 Proposed Threatened Species

Three proposed threatened species may occur along the proposed route: Canada lynx, mountain plover, and Colorado butterfly plant.

Canada Lynx. Canada lynx are typically found at elevations above 4,000 ft in a mosaic of forest conditions, ranging from early successional to mature coniferous and deciduous stands (Koehler et al. 1979). Snowshoe hare is their primary prey, and hunting habitat includes dense young vegetation. Tree squirrels, voles, and mice are also preyed on (Ruggiero et al. 1994).

High elevation forests occur along the route northwest of Cheyenne, Wyoming, and in northeastern Utah. Canada lynx has been documented near the route in Section 16, T12N, R20W. Since limited habitat disturbance would occur, the proposed project is not likely to adversely affect this species, and it is not discussed further in this EA.

Mountain Plover. The mountain plover inhabits the high dry shortgrass plains along the route (Figure 3.2). The focus of breeding activity appears to be northeastern Colorado (Graul and Webster 1976), and shortgrass prairie and disturbed areas on and adjacent to the route in Colorado is good mountain plover habitat. Parrish et al. (1993) noted that mountain plover nests in Wyoming were found in areas of short (<4 inches) vegetation on slopes of less than 3%; any short grass, very short shrub, or cushion plant vegetation type could be considered nesting habitat. In western Wyoming, it occurs along ROWs and in areas with Gardner's saltbush (personal communication, August 1999, with Vicki Herren, BLM, Kemmerer). They are well-documented in Carbon County south of the proposed route (TRC Mariah Associates Inc. 1995; Western Ecosystems Technology, Inc. 1999). Thus, mountain plover habitat is scattered along the entire route.

Breeding bird surveys between 1966 and 1987 show an overall decline in the continental population of mountain plovers (FS 1994a). Surveys completed in 1991 indicate that only 4,360 to 5,610 mountain plovers remain on the North American continent (FS 1994b). Probably the most important reason for the decline of the mountain plover is degradation of wintering habitats (e.g., southern Texas, California) (Knopf 1994). Loss of breeding habitat due to cultivation and prey-base declines resulting from pesticide use also threaten mountain plover survival (Wiens and Dyer 1975). However, cattle often maintain the open blue grama/buffalo grass habitat favored by mountain plovers, so livestock grazing may benefit the species (Klipple and Costello 1960). Impacts to mountain plover would be mitigated to negligible levels using the project-wide mitigation measures described is Section 2.1.9, so this species is not discussed further in this EA.

Colorado Butterfly Plant. In Colorado, Colorado butterfly plant has been documented in Section 32, T12N, R66W, northeast of Carr in Weld County--the route passes through this section. Habitat along Crow and Diamond Creeks on and adjacent to F.E. Warren Air Force Base near Cheyenne has been designated the Butterfly Plant Research Natural Area (FWS Proposed Rule, 50 C.F.R. Part 17), and Colorado butterfly plant has been documented in the vicinity of Horse Creek Road in Laramie County. Potential habitat includes wetlands and riparian habitats. All potential habitat would be bored or otherwise avoided; therefore, this species would not be impacted and is not discussed further in this EA.

3.2.3.3 Candidate Species

The only candidate species potentially occurring along the route is swift fox, which inhabits eastern Great Plains grasslands, occasionally utilizing agricultural lands and irrigated native hay meadows. No swift fox have been observed along the route (WNDD 1999; CNHP 1999; CDOW 1999; BLM 1999b; TRC Mariah Associates Inc. 1999), and while individuals may occasionally cross the route, the potential for impacts is extremely remote. Therefore, swift fox would not be adversely affected by the proposed project, and it is not addressed further in this EA.

3.2.3.4 State-Sensitive Species

Database searches indicate that 178 state-sensitive species occur or potentially occur along the route (Table 3.7). During field surveys opal phlox, Payson's beardtongue, and loggerhead shrike were observed.

3.2.4 Wild Horses

Wild horses inhabit the prairies in central and western Wyoming, but are not known to occur on lands crossed by the route in Colorado or Utah. Because wild horses tend to avoid areas of human activity, they are not likely to occur in the immediate vicinity of the route (which is largely adjacent to roads near the busy I-80 corridor) and would not be affected by the proposed project. Wild horses are not discussed further in this EA.

3.3 CULTURAL RESOURCES

The cultural and historic setting of the proposed ROW is described in detail in the Wasatch Reach Fiber Optic Installation EA (BLM 1999a). Additional cultural resources database literature (Class I) and field (Class III) surveys were conducted along those portions of IXC's route that deviate from the Wasatch Reach.

The surveys completed for the Wasatch Reach revealed 204 cultural resource sites and 51 isolated finds. Ninety-eight of the sites were recommended as eligible for the National Register of Historic Places (NRHP). These sites included the following: multiple segments of the Lincoln Highway and Old Highway 30; multiple crossings of the California-Mormon, Emigrant, and Overland Trails; historic canals and railroads; the original Little America site;

numerous culverts on the 1868 transcontinental rail grade; historic railroad camps; the townsite, cemetery, and kilns of Piedmont; the Fort Halleck Road; the Rawlins to Baggs Road; the Rawlins wood pipeline; and numerous prehistoric sites.

Twenty-four sites were found in the areas where IXC route deviates from the Wasatch Reach. Fourteen of these sites were recommended to be eligible for inclusion on the NRHP, and 10 sites are not eligible. The 14 eligible sites include the 1868 Transcontinental Railroad, multiple segments of the Lincoln Highway and Old Highway 30, the Overland Trail, and numerous prehistoric sites.

Five Native American tribes have expressed interest in several sites along the route. Native American consultation is being conducted by BLM; it has been completed for the Walcott to Table Rock portion of the route and is ongoing for the remainder of the route.

3.4 LANDOWNERSHIP AND USE

3.4.1 Landownership

The fiber optic cable would be installed on a mixture of federal (116 miles [19.0%] of BLM-managed lands and 1.0 mile [0.2%] of FS-managed lands), state (20 miles [3.0%]), and private (474 miles [78.0%]) lands. IXC has procured the necessary easements to access and construct on state and private lands. The federal authorizations are pending successful completion of the environmental review process. Landownership would not change as a result of the Proposed Action or No Action Alternative so it is not discussed further in this EA.

3.4.2 Land Use

The principal land uses within the proposed ROW are transportation (local, county, state, and federal roadways) and utilities (telecommunications systems, pipelines). Adjacent land uses include cropland, livestock grazing land, residential areas, municipalities, oil and gas fields, recreation, and wildlife habitat. Existing land uses would not be affected by the Proposed Action or No Action Alternatives and thus are not discussed further in this EA.

3.4.3 Recreation

A variety of dispersed recreational activities occur along the route, predominantly hunting, sight-seeing, and off-highway vehicle travel. Since most of the route is along highways and other roads, most recreation takes place from vehicles.

3.5 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The proposed telecommunications system would pass through three states, 11 counties, and numerous cities and towns. Demographic conditions along the route range from densely populated urban areas (e.g., Salt Lake City, with 950.2 people per square mile) to rural areas (e.g., Carbon County, with 2.1 people per square mile) (Table 3.9).

All counties except Weld County, Colorado, and Albany County, Wyoming, are more prosperous than the state(s) as a whole. Minorities make up less than 10% of county populations along the entire route. Telecommunications system installation would not unduly affect low-income or minority populations; therefore, environmental justice is not discussed further in this EA.

Table 3.9 Project Area Socioeconomic Data.

State/County	1990 Population[1]	Percent Change (1980-1990)[1]	Median Household Income (1989)[1]	Per Capita Income (1989)[1]	Population Density (no./mi^2)[1]	Unemployment Rate (1989)[1]	Percent of Population Below Poverty Level (1989)[2]
Colorado	3,294,394	14.0	30,104	14,821	31.6	6.0	11.7
Arapahoe	391,511	33.5	37,234	18,777	487.6	4.4	5.9
Adams	265,038	7.8	30,522	12,615	220.9	6.8	10.4
Weld	131,821	6.8	25,642	11,350	32.8	6.0	15.4
Wyoming	453,588	-3.4	27,096	12,311	4.7	6.2	11.9
Laramie	73,142	6.5	27,571	12,932	27.2	6.5	10.6
Albany	30,797	6.0	20,715	11,825	7.2	5.2	19.8
Carbon	16,659	-2.4	27,109	11,592	2.1	5.6	10.0
Sweetwater	38,823	-7.0	36,210	13,698	3.7	5.4	8.0
Uinta	18,705	44.7	33,259	12,245	9.0	6.1	8.6
Utah	1,722,850	17.9	29,470	11,029	21.0	5.6	11.4
Summit	15,518	52.2	36,756	16,739	8.4	6.6	7.2
Salt Lake	725,956	17.3	30,149	12,222	950.2	5.0	9.9

1 BLM (1999a).
2 BLM (1999c); www.census.gov.

3.6 VISUAL RESOURCES

Landscapes along the route range from those that are heavily influenced by man (e.g., the urban areas of Aurora, Cheyenne, Laramie, Salt Lake City, etc.) to very scenic vistas with little human intrusion (e.g., Roger's Canyon, Red Desert Basin, Wasatch National Forest). Accordingly, visual quality along the route ranges from poor to excellent.

The BLM's VRM system seeks to maintain scenic values and visual quality on federal lands. VRM classes represent the visual management objective of acceptable visual change within a characteristic landscape (Table 3.10). A class is based on three factors: scenic quality evaluation, sensitivity analysis, and delineation of distance zones. VRM Classes I and II are most valued, Class III is of moderate value, and Class IV is of least value.

The FS has a similar set of visual quality objectives (VQOs) defined as preservation, wherein management decisions must preserve the visual quality of a given area; retention, where management activities are usually not evident after 1 year; partial retention, where management activities should be subordinate to the surrounding landscape within 1 year; and modification, where management activities dominate but blend with the landscape.

In Colorado, private lands along the route do not fall within any federal VRM classification system (FS 1997). The entire system would be installed in existing road ROWs, and thus would be compatible with the existing landscape. Across Wyoming, the route would cross primarily Class III and Class IV landscapes (Figure 3.3). Approximately 15 miles of the route, in the vicinity of Mountain View, Wyoming, would be in Class II areas.

In Utah, the Chalk Creek Road portion of the route, between the Wyoming/Utah state line and Coalville, is classified by the FS as a partial retention area. The remainder of the route (i.e., along the I-80 corridor from Coalville to Parley's Canyon and along State Highway 64 through Emigration Canyon to Salt Lake City) is classified as retention in the foreground

Table 3.10 BLM's VRM Class Objectives.

Class	Description
I	Preserve the existing character of the landscape; although this class provides mainly for natural ecological change, limited development activity may be allowed in some areas, if the level of change to the characteristic landscape is very low and nearly unnoticeable. This class includes primitive (wilderness) areas, some natural areas, wild sections of national wild and scenic rivers, and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape.
II	Retain the existing character of the landscape; management activities may be seen, but should not attract the attention of the casual observer. Changes to the characteristic landscape should be low, and changes must repeat the basic elements (i.e., form, line, color, texture) found in the predominant natural features of the existing landscape.
III	Partially retain the existing character of the landscape; moderate changes to the existing landscape are allowed, although management activities associated with these changes should not dominate the view of the casual observer. As in Class II, changes should repeat the basic elements of the characteristic landscape.
IV	Provide for management activities that require major modification of the existing character of the landscape. Although management activities may dominate the view and be the major focus of viewer attention, every attempt should be made to minimize the impact of these activities through careful location selection, minimal disturbance, and repetition of the basic elements of the characteristic landscape. The relative change to the characteristic landscape can be high.

and partial retention in the middle- and backgrounds (personal communication, July 1999, with Larry Gillham, FS).

The previously undisturbed portions of the route fall into the following VRM classes:

- Klug Lake, Colorado--no VRM classification;
- Speer Road, Wyoming--VRM Class III;
- North of Roger's Canyon, Wyoming--VRM Class III;
- South of Rawlins, Wyoming--VRM Class III;
- Red Desert to Table Rock Exit, Wyoming--VRM Class IV; and
- Green River--VRM Class III.

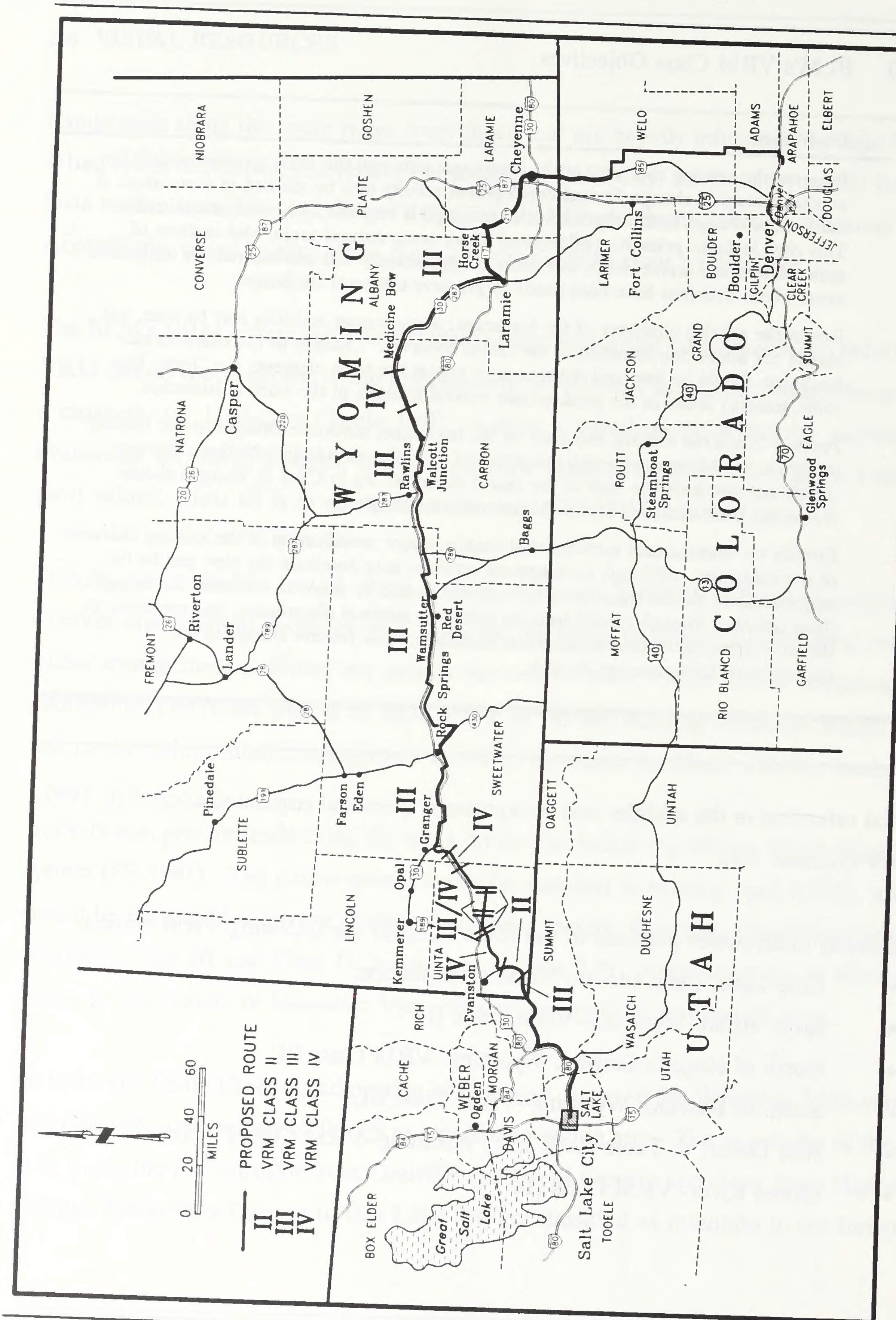


Figure 3.3 VRM Classes Along the Route.

4.0 ENVIRONMENTAL CONSEQUENCES

Environmental consequences of construction, operation, and maintenance of the proposed telecommunication system are discussed below for each potentially affected resource for the Proposed Action and No Action Alternatives. Discussions of impacts that can be reasonably expected from project implementation are included, and mitigation measures and residual impacts are discussed, where appropriate. Project-wide mitigation measures, presented in Section 2.1.9, are part of the Proposed Action, and impact analyses assume that these mitigation measures would be effectively implemented. Additional mitigation measures are recommended for some resources to further minimize impacts and are evaluated assuming a maximum new disturbance area of 68 acres and a total disturbance of 1,113 acres, including previously disturbed ROW.

An environmental consequence or impact is defined as a modification of the existing environment brought about by development activities. Impacts can be a primary result of the action (direct) or a secondary result (indirect) and can be permanent or long-lasting (long-term) or temporary and of short duration (short-term). Impacts can vary from only slightly discernible to a total change in the environment.

Short-term impacts occur during and immediately after construction and are usually obvious and disruptive. For this project, short-term impacts are defined as lasting 5 years or less. Long-term impacts are project-related changes made in the environment that remain longer than 5 years.

Cumulative impacts result from the incremental impacts of the proposed project added to past, present, and reasonably foreseeable future actions. This project would be constructed in previously disturbed corridors--new disturbance would total approximately 68 acres. Existing disturbances along the corridor include farming; road construction; utility system ROWs, especially the recent construction of the ECI, Williams Communications, Inc.

(Williams), and Level 3 Communications, Inc. (Level 3) telecommunications systems (Figure 4.1); the Pioneer Pipeline project; oil and gas field development; cities; towns; and residences which have caused thousands of acres of disturbance. Reasonably foreseeable development include highway reconstruction, pipeline construction, oil and gas field development projects, and range improvements. BLM determined that no significant cumulative impacts would occur due to the ECI, Williams, and Level 3 projects (BLM 1999a, 1999c). New disturbance of approximately 68 acres would contribute to cumulative impacts but at a level that would be unnoticeable given the current disturbance. Redisturbance of approximately 1,045 acres would only minimally create impacts that are overlain on rather than added to past, present, and reasonably foreseeable future actions--these are addressed for each resource below, as appropriate.

4.1 PHYSICAL RESOURCES

4.1.1 Air Quality

4.1.1.1 Proposed Action

Construction would result in an increase in particulate emissions (including PM_{10} in dust) which would minimally and temporarily affect air quality in the immediate area. Exposed soils would also be subject to wind erosion which would cause slight increases in particulates until disturbed areas are revegetated. Construction vehicle operation would result in the emission of pollutants such as carbon monoxide, carbon dioxide, sulfur dioxide, volatile organic hydrocarbons, and nitrogen oxides. In Denver and Salt Lake City, emissions would add incrementally to the already-exceeded levels of carbon monoxide, carbon dioxide, sulfur dioxide, and PM_{10}.

Particulate emissions would be minimized by limiting disturbance to that which is required for system construction and using water for dust control, as needed. Vehicles would be

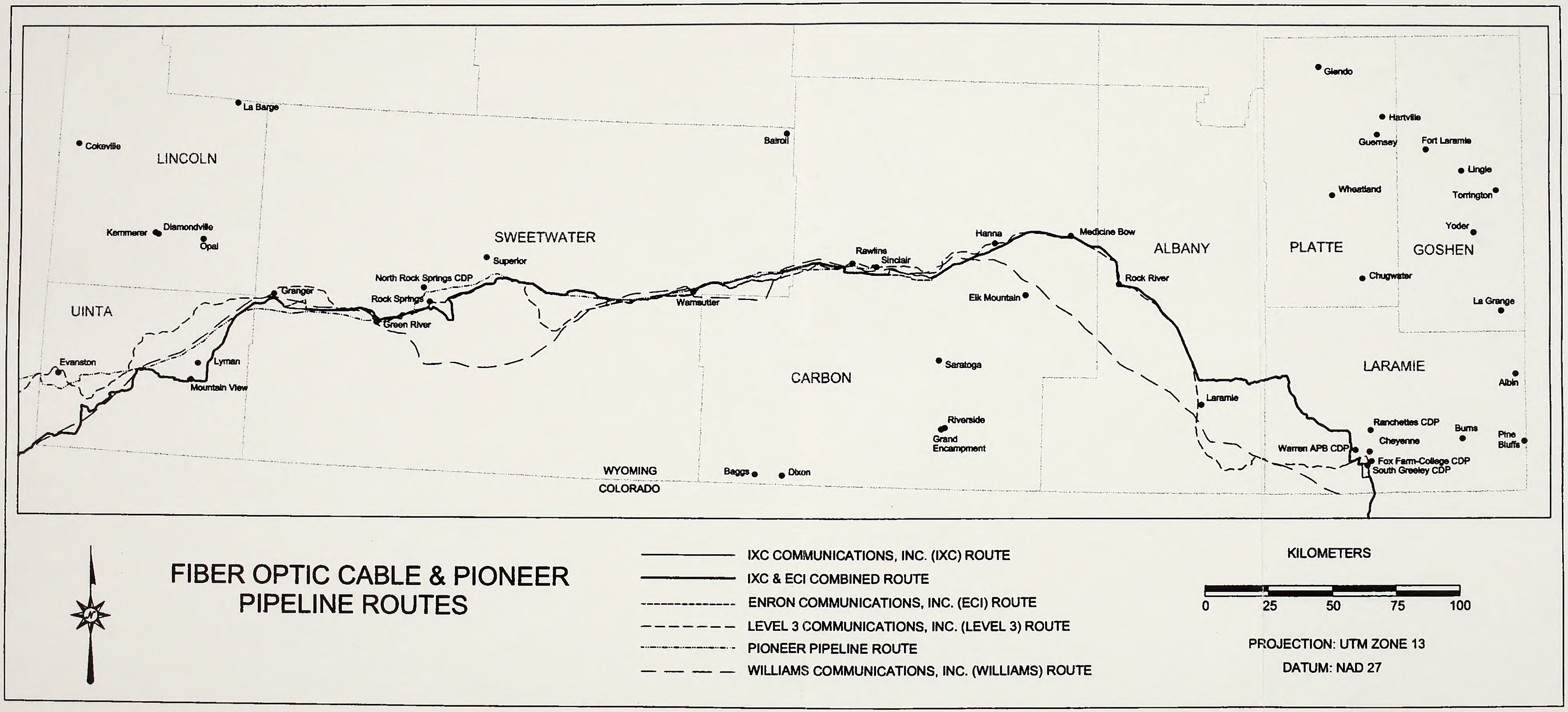


Figure 4.1 IXC, ECI, Williams, and Level 3 Fiber Optic Cable Routes and Pioneer Pipeline Route.

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properly maintained to minimize pollutant emissions. None of the anticipated emissions would cause violations of state or federal air quality standards in attainment areas and would negligibly contribute to pollution problems in nonattainment areas, so impacts would not be significant.

4.1.1.2 No Action Alternative

Under the No Action Alternative, no additional air quality impacts, above and beyond those resulting from existing land uses, would occur. All federal and state air quality standards would continue to be met except in Denver and in Salt Lake City, which are nonattainment areas for one or more of the following (see Section 3.1.1): carbon monoxide, carbon dioxide, sulfur dioxide, and/or PM_{10}.

4.1.1.3 Mitigation

No additional mitigation is required.

4.1.1.4 Cumulative Impacts

The project would add incrementally to the emissions of the pollutants for which Denver and Salt Lake City are nonattainment areas. The increases would not likely be measurable and would be temporary, so would not contribute noticeably to the nonattainment status of these areas. Project construction, operation, and maintenance, combined with other air pollutant emissions (e.g., cities, towns, oil and gas fields, coal mines, traffic on unpaved roads, exhaust emissions, livestock grazing), would not cause any violations of federal or state air quality standards so cumulative impacts would not be significant.

4.1.2 Geologic Hazards

4.1.2.1 Proposed Action

Construction would not occur in flooded areas, and ducts would be buried sufficiently deep beneath channels to prevent exposure during floods. Optical amplifier/regeneration station buildings and power lines would not be located in flood-prone areas. No impacts from flooding are anticipated. Duct and fiber optic cables are flexible and could withstand even large earthquakes. Optical amplifier and regeneration station buildings would be constructed to withstand moderate earthquakes (up to 6.0 on the Richter Scale), so earthquake-related impacts would be minimal. The proposed route does not cross any subsidence areas, and optical amplifier/regeneration buildings would not be located on or near subsidence areas, so no subsidence-related impacts would occur.

No cable, optical amplifier/regeneration station building sites, or power lines would be located in known landslide areas.

Where construction would disturb sand dunes, potential exists to reactivate dune movement. During cable installation, large dune complexes in central and southwestern Wyoming would be plowed, unless trenching is absolutely necessary, to minimize disturbance. Construction site management would include limiting the number of vehicles on site, limiting the number of vehicle trips across the site, and minimizing disturbance to only that which is necessary to complete duct and cable installation. No optical amplifier/regeneration station buildings would be constructed in dune areas. IXC would implement stringent erosion control measures when constructing on dunes and would stabilize and revegetate these areas immediately following construction. No significant impacts would occur.

4.1.2.2 No Action Alternative

Under the No Action Alternative, geologic hazards would continue to pose current levels of minor risks to life and property.

4.1.2.3 Mitigation

No additional mitigation is required.

4.1.2.4 Cumulative Impacts

Potential effects from geologic hazards are mitigated on a case-by-case basis by avoiding known hazard areas and/or using geotechnical techniques to enable safe construction and operation of facilities within and adjacent to hazards. Thus, facilities along the route are not at unacceptable risk, and the cumulative effects of the proposed project in conjunction with other facilities along the route would be minimal or none.

4.1.3 Paleontological Resources

4.1.3.1 Proposed Action

Some new disturbance would occur in areas where the surface formations have high potential to yield important paleontological resources that could be destroyed during construction. Because disturbance would be minimal, the potential to accidentally destroy important fossils during cable installation or optical amplifier/regeneration station construction is very low. IXC would complete predisturbance surveys and construction monitoring to avoid accidental fossil destruction if required by BLM or FS. Otherwise, IXC would mitigate any impacts on the site in consultation with BLM. If important fossils are discovered during construction, all excavation activities within 100 ft of the discovery would cease until the site has been evaluated by a BLM-approved paleontologist and avoidance or mitigation measures have been implemented. Therefore, impacts would not be significant.

4.1.3.2 No Action Alternative

Under the No Action Alternative, no new disturbance would occur due to cable installation or building and power line construction, so paleontological resources would not be affected.

4.1.3.3 Mitigation

No additional mitigation is required.

4.1.3.4 Cumulative Impacts

Substantial development is occurring throughout the Front Range of Colorado, across Wyoming, and along the Wasatch Front in Utah, some of which could lead to the loss of important fossil resources. For construction in areas with high paleontologic potential, BLM and FS may require predisturbance surveys and construction monitoring to avoid accidental fossil destruction. Since high potential areas would be presurveyed, if necessary, and effects mitigated, and the standard paleontological protection stipulations would also be applied, cumulative loss of paleontologic resources would be minimal.

4.1.4 Surface Water

4.1.4.1 Proposed Action

Cable installation and building and power line construction could cause erosion and sedimentation in surface waters along the proposed ROW, thereby adversely affecting surface water quality. IXC would bore all live streams, and bore pits would be sufficiently distant from the center of the stream and sufficiently barricaded with erosion control to prevent excavated material or disturbed soils from entering surface water. Wetlands would also be bored and similarly protected from sedimentation. Disturbance would be limited to that which is necessary for system construction.

Pollution prevention practices, such as minimizing disturbance; installing straw bale dams, sediment fences, rock check dams, etc.; and prompt stabilization and reclamation of all disturbed areas would be implemented along the entire route, including the Salt Lake City watersheds. A covering of geotextile, chicken wire, or other material would be used to protect straw bales from grazing by livestock or wildlife. With these and the aforementioned mitigations, impacts to surface water quality would be negligible.

An estimated 25-100 gallons of water per 100 ft of bore (0.25-1.0 gallon/ft) would be consumed in the production and use of drilling fluids. An estimated 60 miles of the route would be bored, so total water consumption would range from 79,200-316,800 gallons. Since consumption would be distributed over the length of the route, water would be obtained from numerous sources so no one source would be adversely affected. In urban areas, water for drilling fluids would be obtained from nearby fire hydrants; a portable meter would be attached to the hydrant, and IXC would reimburse the permittee (e.g., the county or municipality) for the amount of water used. In more rural areas, arrangements would be made with local towns or cities to use an existing water source.

4.1.4.2 No Action Alternative

If the ROW is not granted, no effects on surface water quality or quantity would occur due to fiber optic cable installation or building and power line construction.

4.1.4.3 Mitigation

No additional mitigation would be required.

4.1.4.4 Cumulative Impacts

Existing disturbances and land uses along the corridor inevitably contribute to surface water pollution, primarily sediments but also occasional spills. However, stringent surface water quality protection measures are in place and are enforced such that runoff from developments meets specific water quality standards and surface water quality is maintained for its designated uses. Thus no cumulative surface water quality effects are anticipated. Surface water is used extensively along the route (e.g., irrigated croplands, roads, cities, towns, oil and gas fields), and the proposed project would result in consumption of an additional 79,200-316,800 gallons over about 1 year. Use is regulated, primarily by state authorities, such that the overall hydrologic integrity of surface water systems is not adversely affected; therefore, cumulative effects would not be significant.

4.1.5 Soils

4.1.5.1 Proposed Action

Telecommunications system construction (cable installation and building construction) would result in new disturbance of approximately 68 acres of soils, although total disturbance would be approximately 1,113 acres. An estimated 4.9 acres of prime farmland would also be disturbed. Soil fertility and structure would be disrupted temporarily, and disturbed soils would be subject to accelerated wind and water erosion. Temporary soil compaction would be caused by heavy equipment traffic during construction. Erosion, compaction, and surface crusting due to raindrop impact may result in reduced productivity, decreased infiltration, and decreased water storage capacity.

Impacts to soils would be minimized by limiting disturbance and through timely and rigorous application of erosion control and reclamation measures. Where soils have been compacted along trenching or boring sites, they would be adequately ripped and tilled prior to reseeding. Plowed areas would not be ripped because ripping would result in unnecessary additional disturbance. Revegetation and soil stabilization measures would be implemented and repeated, if necessary, until vegetation is reestablished and/or erosion is minimized. Short-term soils impacts due to construction may be moderate, but long-term impacts would be negligible.

Soils impacts due to operations would be minimal because operations traffic would be limited to roads accessing the optical amplifiers and regeneration stations. Maintenance (i.e., repairing a break) would include minimal soil disturbance, but because maintenance activities would occur infrequently (possibly never) and repair sites would be reclaimed, these impacts would be negligible.

Proper containment of oil and fuel in storage areas and regular maintenance of equipment would minimize potential soil contamination due to spills during construction, operation, and maintenance. Contaminated soil from accidental spills would be cleaned up immediately as required by regulation.

4.1.5.2 No Action Alternative

Under the No Action Alternative, no new soil disturbance would occur and soils previously affected would not be redisturbed due to fiber optic cable installation or building construction, operations, and maintenance.

4.1.5.3 Mitigation

No additional mitigation is required.

4.1.5.4 Cumulative Impacts

Because new disturbance would be limited to 68 acres, the proposed project would only minimally contribute to the cumulative impacts to soils disturbed by farming, urban development, road construction, oil and gas development, and other activities occurring along the corridor. Redisturbance of an estimated 1,045 acres of soils would contribute minimally to soil transportation from disturbed areas to adjacent areas because such soils would be stabilized as soon as practicable. Therefore, cumulative impacts to soils would not be significant.

4.1.6 Noise

4.1.6.1 Proposed Action

The Proposed Action would result in temporarily increased noise levels in and adjacent to the construction areas due to equipment operation. The *Noise Control Act of 1972* suggests that noise levels below 70 dBA do not cause hearing loss in humans and levels below 55 dBA, in general, do not cause adverse impacts. Trucks and heavy equipment typically generate noise levels of 85-88 dBA at a distance of 50 ft (Cunniff 1997). Equipment operation would occur during daylight hours only. Equipment would be properly muffled.

On rural portions of the route, truck and heavy equipment operation would be well above ambient levels (which are 30-40 dBA in the morning and evening and 50-60 dBA in the afternoon). In farmed areas, construction noise would also be above ambient levels (which are 30-40 dBA). The anticipated 85-88 dBA generated during construction would also be slightly above ambient levels in urban residential areas (which are 50 and 60 dBA) and in suburban areas and small towns (which are 40-50 dBA).

During electric power outages, batteries would be used to operate the optical amplifiers and regeneration stations, and propane generators would occasionally engage to provide power to recharge the batteries. Since the optical amplifier and regeneration sites would be located near roads, noise from occasional generator operation would be similar to or less noisy than occasional traffic.

Sensitive receptors would include nearby residents, patrons and employees of nearby businesses, recreationists, and wildlife. Residents and business associates may hear construction noise for up to a day or two, but it is not likely to adversely affect any residents, patrons, or employees. Recreationists in areas adjacent to the construction area would also hear additional noise, but most recreationists seeking quiet would be further from roads, so no significant adverse effects are anticipated. Wildlife would be temporarily displaced from construction areas due to increased noise. Generator noise may also occasionally and temporarily cause wildlife displacement from optical amplifier and regeneration station sites.

4.1.6.2 No Action Alternative

No impacts from noise from IXC's development would occur under the No Action Alternative.

4.1.6.3 Mitigation

No additional mitigation is required.

4.1.6.4 Cumulative Impacts

Cumulative effects would be negligible because construction would be temporary.

4.2 BIOLOGICAL RESOURCES

4.2.1 Vegetation

4.2.1.1 Plant Communities

Proposed Action. The proposed project would result in disturbance of approximately 68 acres of native vegetation and 1,045 acres of previously disturbed vegetation. Vegetation removal and temporary changes in vegetation types in new disturbance areas (e.g., shrubland to grassland conversions during reclamation) and weed infestations constitute short- and possibly long-term impacts. Mitigation measures to limit vegetation impacts would include minimizing the extent of disturbance, using weed control practices as deemed appropriate by BLM, and implementing prompt revegetation. Impacts due to building construction would include long-term vegetation removal under building foundations (approximately 0.2 acres total), but these sites would eventually be reclaimed. Power line construction would result in an additional 0.4-0.8 acres of disturbance. No impacts on vegetation from maintenance would occur unless the line is repaired, and disturbance at the repair site would be reclaimed so that impacts to vegetation would be temporary and negligible.

No Action Alternative. No impacts to vegetation from IXC's development would occur under the No Action Alternative.

Mitigation. No additional mitigation is required.

Cumulative Impacts. Cumulative effects would be negligible because only about 68 acres of disturbance to previously undisturbed vegetation would occur due to the Proposed Action.

4.2.1.2 Wetlands

Proposed Action. Wetlands would be bored and thus would not be affected by the Proposed Action. The only possible impact to wetlands that are bored would be the possible leakage of cutting and lubricating fluid (a nontoxic bentonite clay or similar material). The small size of the bore hole and the limited amount of fluid used would reduce the risk of in-stream leakage. Fluid flow controls would be available to quickly seal the leakage, and spills would be contained in accordance with SPCC Plans.

Optical amplifier and regeneration station buildings and power lines would not be constructed within 100 ft of any wetland. Operation and maintenance activities would not adversely affect wetlands.

No Action Alternative. No impacts on wetlands would occur due to IXC's proposal under the No Action Alternative.

Mitigation. No additional mitigation is required.

Cumulative Impacts. Since the proposed project would not affect wetlands, it would not contribute to cumulative impacts to this resource.

4.2.2 Wildlife

4.2.2.1 Proposed Action

Big Game. Direct impacts to big game would include potential collision-related mortality. Under the Proposed Action, the potential for such direct mortality is slight.

Indirect effects would include habitat loss due to vegetation removal and big game displacement from areas where construction is occurring. Up to 68 acres of new disturbance would occur in habitat for pronghorn, mule deer, and elk and an additional 1,045 acres of previously disturbed habitat for pronghorn, mule deer, elk, and moose would be impacted. These habitat losses represent a very small fraction of the available habitat in the various herd units affected. Because the entire route is on or near roads, many of which are fairly busy, big game are already somewhat displaced from the route; therefore, project construction would result in minimal and temporary additional displacement.

The route crosses crucial winter range for pronghorn, mule deer, elk, and moose; construction would not occur in big game crucial winter range from November 15 to April 30 unless otherwise permitted by the AO. The Lookout, Continental Divide, and Granger building sites are within pronghorn crucial winter range. The Piedmont building site is within mule deer winter range. Since roadways are often seeded with species that are not attractive to big game, loss of roadside vegetation in winter range would not impact overall crucial winter range habitat effectiveness.

Other Mammals, Reptiles, and Amphibians. Direct mortality due to collisions with vehicles or inadvertent burial in a trench would occur infrequently if at all, so direct impacts on other mammals, reptiles, and amphibians would be minimal. The indirect effects of up to 1,113 acres of lost habitat also would be negligible because adjacent habitats would be available.

Raptors. Direct impacts to raptors during duct installation and building construction could include the very unlikely potential for collision-related mortality and nest failure mortality due to disturbance during the nesting season. Breeding and nesting birds could be adversely affected by noise and human activity associated with construction if it causes adults to abandon nests or young. Duct installation and building construction would not occur within

0.5 mile of any active raptor nest or within 1.0 mile of any active bald eagle nest during the nesting season (February 1 - July 31) unless otherwise permitted by the AO.

The Lookout building site is within 0.25 mile of a ferruginous hawk and prairie falcon nest. The Rock River/Lookout site underground power line route would be located within 0.5 mile of eight raptor nests and within 1.0 mile of one additional nest. The Hanna building site is within 0.5 mile of a ferruginous hawk nest and 1.0 mile of a Swainson's hawk nest. The Knob's site is within 1.0 mile of seven ferruginous hawk nests and the Red Rim and Shamrock Hills RCAs.

Indirect impacts could include habitat loss and a reduction in available prey due to prey habitat loss. An estimated 68 acres of new disturbance would occur in potential foraging habitat. The previously disturbed portions of the route may provide good foraging habitat because shrubs have usually been cleared and thus prey are easier to see. Project construction impacts to raptors would be minimal. Operation and maintenance activities are not expected to adversely affect raptors.

<u>Upland Game Birds</u>. Direct impacts to upland game birds could include collision-related mortality. Indirect effects could include habitat loss, displacement from construction areas, and disruption during the breeding and nesting season.

Upland game bird mortality due to collisions with project-related vehicles is unlikely so no direct impacts are anticipated. Since upland game birds tend to avoid areas of human activity, disturbance in the roadways along the route would minimally affect habitat availability. Furthermore, roadside vegetation is poor habitat for upland game birds because it usually consists of species that are unattractive to birds and because roadsides are frequently mowed, eliminating cover. Disturbance along pipeline or other utility ROWs would result in minimal and temporary habitat loss, and these indirect effects would not be significant. The Hanna building site is within 2.0 miles of four sage grouse leks, and the

Piedmont site is within 2.0 miles of one lek. Noise from occasional generator operation would be similar to or less than the occasional traffic along the adjacent roads. Birds on leks or nests may hear generators but they are not likely to adversely affect them any more than existing traffic. Upland game birds would be disturbed slightly during operation and maintenance due to vehicles on the ROW.

No surface-disturbing activities would occur within 0.25 mile of an active sage grouse lek from February 1 to May 15 or within 2.0 miles of a lek from April 1 to July 1 unless otherwise permitted by the AO.

Other Birds. Collision-related mortality of other birds (e.g., songbirds, waterfowl, shorebirds, waders) would constitute a direct impact, but is unlikely and would not result in a significant impact. The indirect effect of habitat loss would not be significant.

Amphibians and Reptiles. Amphibians and reptiles would be directly affected via collision-related mortality or burial but these effects would not be significant. Indirect effects would include habitat loss and displacement from construction areas, but these effects would be minimal.

4.2.2.2 No Action Alternative

Impacts to wildlife would continue at present levels (e.g., infrequent mortality due to collisions with vehicles, habitat loss from existing disturbances, displacement due to noise and human activity) under the No Action Alternative.

4.2.2.3 Mitigation

No additional mitigation is required.

4.2.2.4 Cumulative Impacts

Wildlife are being affected by a large number of developments along the route, most notably by urban development along the Front Range of Colorado and the Wasatch Front in Utah. Federal undertakings such as oil and gas field development, livestock grazing, coal mining, and the installation of three other telecommunications systems and the Pioneer Pipeline also have/would have widespread effects on wildlife, some of which may be significant (e.g., BLM determined that turbine-related avian mortality from windpower development would constitute a significant impact). However, the effects of IXC's proposal on wildlife are so minimal that project effects combined with other developments would be imperceptible and temporary. The project would not add to significant cumulative impacts on wildlife.

4.2.3 State-Sensitive Species

4.2.3.1 Proposed Action

Direct impacts to state-sensitive species would include collision-related mortality and, for birds, mortality due to nest destruction or abandonment. Collision-related mortality would occur rarely, if ever, so these direct impacts would be negligible. Animals such as mollusks, reptiles, and amphibians would be at higher risk of collision-related mortality because they are not as mobile as mammals and birds.

Indirect effects due to habitat loss would be negligible because the project would result in little new disturbance. Again, effects would be greatest for the less mobile species but are not expected to be significant for any species.

Mortality due to nest destruction or abandonment is also unlikely because construction in Colorado and Utah would occur outside the nesting season.

Wyoming state-sensitive raptors (i.e., ferruginous hawk, merlin, and burrowing owl) would be protected by avoiding construction within 1.0 mile of active nests during the nesting season. Prairie dog colonies within 0.5 mile of the route may be surveyed for burrowing owls during the nesting season prior to construction. Direct impacts to these species due to collision-related mortality is unlikely. Indirect effects caused by nest abandonment would be mitigated as described above. The small amount of habitat loss is not likely to adversely effect these species. No significant impacts to state-sensitive raptors are anticipated.

The Wyoming state-sensitive waterfowl, shorebirds, and waders would not be affected because major streams and wetlands along the route would be bored. The remaining species (snowy plover, long-billed curlew, California gull, eastern phoebe, and Scott's oriole) could experience rare mortality and minor habitat loss, but effects would not be significant.

Impacts to state-sensitive plant species could include inadvertent destruction of individuals and habitat loss. Two state-sensitive plant species (i.e., opal phlox and Payson's beardtongue) were observed along the route--these individuals are located outside the existing disturbance and would be avoided. Other state-sensitive plants and habitat are likely to occur along the route. However, because all but 68 acres of the route have been previously disturbed, those individuals present either tolerate or prefer disturbed habitat, so additional disturbance, while it could cause loss of individuals, would not adversely affect habitat. Disturbance in the 68 acres of previously undisturbed areas could result in both individual and habitat loss, but since the disturbance area would be small and adjacent available habitat, impacts would not be significant.

4.2.3.2 No Action Alternative

Under the No Action Alternative, no impacts to state-sensitive species would occur due to IXC's proposed project.

4.2.3.3 Mitigation

No additional mitigation is required.

4.2.3.4 Cumulative Impacts

State-sensitive species are being affected throughout Colorado, Wyoming, and Utah by urban development, road construction, oil and gas development, coal mining, etc. The Proposed Action would affect these species minimally if at all, and thus would imperceptibly add to cumulative effects.

4.3 CULTURAL RESOURCES

4.3.1 Proposed Action

The proposed alignment was selected in part to minimize impacts to cultural resources based on the results of the ECI project and a preliminary file search. Where the route diverges from the ECI project, existing two-track or improved roads would be followed and the IXC cable would be installed, at least partly, within disturbed ROW. Several sites that are eligible or potentially eligible for inclusion on the NRHP occur within the area of potential effect of the Proposed Action. The potential impacts to each of those sites are discussed below, as are recommendations to avoid or mitigate those impacts.

- The 1868 Transcontinental Railroad grade is eligible for inclusion on the NRHP. The Proposed Action would parallel the grade and cross it at five locations to the west of Rawlins, Wyoming. Each crossing would occur within a noncontributing portion of the grade in areas of road or pipeline disturbance. Because each crossing would occur within a disturbed area, the Proposed Action would not adversely effect the historic property. Portions of the route that parallel the grade near Rawlins would be marked with unobtrusive signage after construction to minimize visual impacts. The Proposed Action follows the 1868 Transcontinental Railroad grade for a number of miles in Uinta County in southwestern Wyoming. The grade has been extensively modified for current use as a county road. Crossings of the grade would be done by boring to avoid impacts. Due to ongoing disturbance and use as a road, the Proposed Action would not adversely effect the historic property. Numerous culverts within the Transcontinental Railroad grade would be avoided by the Proposed Action.

- The Proposed Action would intersect numerous NRHP-eligible historic trails including multiple crossings of the California-Mormon Trail, Emigrant Trail, and Overland Trail. Each crossing of a significant trail by the Proposed Action would occur within an area of disturbance along an existing road. In most cases, any evidence of the original trail has been removed by road disturbance. The Proposed Action would not adversely effect historic trails.

- The Lincoln Highway and Old Highway 30 are eligible for inclusion on the NRHP. The Proposed Action would cross or parallel the two historic roads in numerous locations across southern Wyoming. Where the route parallels a contributing portion of either road, the IXC cable would be buried within or immediately adjacent to area disturbed by initial grade construction. To avoid impacting contributing portions of either road grade, crossings would be bored rather than plowed. Unobtrusive signage would be used to mark the ROW to minimize visual impacts.

- Two historic railroad camps near Thayer Junction, Wyoming, and the original Little America site are eligible for inclusion on the NRHP. Significant portions of these sites would be avoided either by rerouting through disturbed or noncontributing areas or by boring below the sites.

- Numerous cultural properties of prehistoric age that are eligible for inclusion on the NRHP occur near the Proposed Action. Most of these sites occur adjacent to existing roads and have been partially disturbed. Disturbed noncontributing portions would be crossed by the Proposed Action at most sites. Undisturbed portions of the sites that contain significant cultural deposits would be avoided by realignment of the cable route or by boring below the sites.

Effects to traditional cultural properties would be minimized by rerouting the Proposed Action to avoid physical impacts and lessen visual impacts. Protective barricades would be used during construction to protect traditional properties located near the route.

The optical amplifier and regeneration station building sites would be located to avoid cultural resources so no impacts due to building construction would occur. Power lines to these facilities would be aligned to avoid impacts to significant cultural resources.

Because none of the known significant cultural resources sites would be affected, the Proposed Action would not affect cultural resources. In the event that cultural resources are discovered during cable installation or building construction in Wyoming, activities within 200 ft of the discovery would cease and the discovery would be evaluated by a BLM-approved archaeologist. If any cultural resources are encountered in Colorado or Utah, the appropriate SHPO would be contacted. Appropriate avoidance or mitigation procedures would be implemented prior to continuing construction.

4.3.2 No Action Alternative

If the ROW grant is denied, no impacts to cultural resources would occur as a result of IXC's proposed project.

4.3.3 Mitigation

No additional mitigation is required.

4.3.4 Cumulative Impacts

For projects that involve federal lands or federal permits, all cultural resources impacts would be mitigated in accordance with the *National Historic Preservation Act* and related acts and executive orders, so cumulative impacts to cultural resources from past, present, and reasonably foreseeable future developments would not be significant. Impacts to setting for sites that qualify for inclusion on the NRHP under Criteria A, B, and C cannot be mitigated but only reduced. There is limited potential that the project may contribute to cumulative impacts in those areas where there would be new disturbance.

4.4 SOCIOECONOMICS

4.4.1 Proposed Action

The proposed project would not affect local, county, or state populations.

Construction would provide employment to contract workers for several months in 1999 and 2000, which would minimally benefit local economies. Of the 40 contract workers to be employed during construction, approximately 25% (10 workers) would be Colorado, Wyoming, and Utah residents. Employment would be temporary, so project construction would only minimally and temporarily improve employment rates.

Operations and maintenance would require three full-time field personnel and several people in IXC's Austin headquarters.

Workers from outside the area would use local accommodations including hotels, camp grounds, and recreational vehicle parks. Because construction crews would be spread along different segments of the route, local accommodations would be adequate. Local workers would spend much of their incomes in local economies; out-of-state workers would purchase goods and services during the construction period, both of which would only minimally and temporarily provide additional revenues to local economies.

IXC would pay property taxes on each optical amplifier and regeneration station site, the amount of which would vary depending on location. Assuming an average assessment of 0.065 mills, assuming that each optical amplifier site is valued at $175,000, and assuming each regeneration station is valued at $250,000, annual property taxes would be approximately $1,080.00 for each optical amplifier and $1,544.00 for each regeneration station.

IXC would pay sales taxes for equipment, goods, and services purchased in Colorado, Wyoming, and Utah, which would minimally and temporarily benefit state and local economies. Most of the system (e.g., duct, cable, prefabricated buildings, electronics, splice boxes, man holes, markers) would be manufactured and purchased out-of-state. Goods such as concrete (for the optical amplifier and regeneration station building foundations), electric power lines, batteries, generators, and liquid propane gas would likely be purchased locally, so the economic benefits to local businesses and communities would be minimal. IXC would also pay an annual rental fee for the BLM ROW, which would minimally benefit the federal government.

Private landowners along the route would benefit monetarily from granting easements for cable installation and optical amplifier and regeneration station land sales.

No long-term socioeconomic impacts, either beneficial or adverse, would occur, except that the urban areas being connected would benefit from the extension of fiber optic facilities resulting in improved services and internet access. Local telecommunications providers would have opportunities to interconnect with the cable to provide these services to Wyoming customers.

4.4.2 No Action Alternative

Socioeconomic conditions along the route would not be affected if the ROW is denied.

4.4.3 Mitigation

No additional mitigation is required.

4.4.4 Cumulative Impacts

Cumulatively, construction of four telecommunications systems would have little impact on state, county, or local populations, economies, or infrastructure. Pioneer Pipeline construction would require considerably more resources and thus would have a longer term beneficial socioeconomic effect (to be analyzed in an EA currently being prepared by BLM with the Rock Springs Field Office as lead). Cumulative socioeconomic impacts would generally be beneficial but would not be significant.

4.5 RECREATION

Project construction would minimally affect recreational users along the roads that parallel the route because it would disrupt dispersed recreation travel patterns. Where construction occurs in fall, hunters may encounter construction equipment on roads used to access hunt areas, which would be a minor inconvenience. Similarly, off-road vehicle users and sight-seers may encounter construction equipment and would be inconvenienced or may choose to avoid construction areas due to human activity.

4.6 VISUAL RESOURCES

4.6.1 Proposed Action

Because the project would be constructed in existing ROWs that have already been disturbed by linear developments, the visual quality of the route would be affected only temporarily due to surface disturbance. Once the route is reclaimed, the corridor would look as it does at present, with the exception of the nine regeneration stations and optical amplifier buildings. These would be painted Carlsbad Canyon to blend with the existing landscape. The estimated 68 acres of new disturbance would occur in VRM Class III and IV areas which allow for moderate changes to the landscape as long as they do not attract the casual viewer's attention and they repeat the landscape's basic form, line, color, and texture. Fiber optic cable installation, building erection, and power line construction would be in conformance with VRM objectives along the entire route, so impacts would not be significant.

4.6.2 No Action Alternative

Under the No Action Alternative, the landscape would not be disturbed by IXC's proposed project, and visual quality of the corridor would continue to be affected by the presence of existing and proposed linear disturbances and other human-related intrusions.

4.6.3 Mitigation

No additional mitigation is required.

4.6.4 Cumulative Impacts

Since the project would be constructed within existing linear disturbances for all but about 68 acres, most of the route would not contribute to cumulative visual impacts. The 68 acres of new disturbance would result in a minor increase in landscape disruption caused by linear facilities but the new disturbance would be near other disturbances and thus would repeat the landscape's overall form, line, color, and texture. Cumulative visual impacts would not be significant.

4.7 UNAVOIDABLE ADVERSE EFFECTS

4.7.1 Proposed Action

Unavoidable adverse impacts--residual impacts that would likely remain after mitigation--would include the following.

- Some additional accidental damage to or illegal collection of paleontological and cultural resources may occur.
- Up to 68 acres of new disturbance and up to 1,113 acres of total disturbance would occur, resulting in increase erosion rates until disturbed areas are successfully reclaimed.
- Up to 68 acres of previously undisturbed vegetation would be disturbed or removed.
- Some additional emissions of fugitive dust, sulfur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, and volatile organic compounds would occur.
- Fossil fuels and water would be consumed temporarily during construction and periodically during operation and maintenance.

4.7.2 No Action Alternative

Unavoidable adverse impacts resulting from the No Action Alternative would include the following.

- Loss of paleontological and cultural resources from vandalism and accidental disturbances would continue at present levels.
- Soil loss would continue at present levels.

5.0 CONSULTATION AND PREPARERS

Personnel contacted or consulted during EA preparation are listed in Table 5.1. The BLM interdisciplinary teams are presented in Table 5.2, and the list of other preparers and participants is given in Table 5.3.

Table 5.1 Personnel Consulted.

Agency/Organization	Individual	Position
Federal		
Bureau of Land Management		
Utah State Office	Rob Bolanger	Wildlife Biologist
Army Corps of Engineers		
Colorado Regulatory Office	Terry McKee	Project Manager
Wyoming Regulatory Office	Tom Johnson	Project Manager
Utah Regulatory Office	Michelle Waltz	Project Manager
Fish and Wildlife Service		
Colorado Field Office	LeRoy Carlson	Colorado Field Supervisor
	Clay Ronish	Wildlife Biologist
Wyoming Field Office	Michael Long	Wyoming Field Supervisor
	Bradley Rogers	Wildlife Biologist
Utah Field Office	Reed Harris	Field Office Supervisor
Natural Resources Conservation Service	Roger Cox	Soil Scientist
	Mary Gerkin	Soil Conservation Technician
	Daryl Trickler	Soil Scientist
Forest Service		
Wasatch National Forest	Larry Gillman	NEPA Coordinator
	Wayne Paggett	Wildlife Biologist

Table 5.1 (Continued)

Agency/Organization	Individual	Position
State of Colorado		
Division of Wildlife Resources	Dave Weber	Wildlife Biologist
	Jerry Craig	Wildlife Researcher/State Raptor Biologist
	Rick Hoffman	Wildlife Researcher
	Gene Schoonveld	Wildlife Biologist
	Francie Pusateri	Wildlife Biologist
Natural Heritage Program	John Armstrong	Environmental Review Coordinator
State Historic Preservation Office	Jerry Green	Archaeologist
State of Wyoming		
Game and Fish Department	Tom Christensen	Wildlife Biologist
	Rich Guenzel	Wildlife Biologist
	Greg Hiatt	Wildlife Biologist
	Kerry Olson	Wildlife Biologist
	Steve Loose	Wildlife Biologist
	Tim Wooley	Wildlife Biologist
State Historic Preservation Office	Judy Wolf	Deputy SHPO
Department of Environmental Quality		
Water Quality Division	Todd Parfitt	Senior Analyst
State of Utah		
Division of Wildlife Resources	Alan Ward	Wildlife Biologist
	Lou Cornicelli	Wildlife Biologist
Department of Transportation	Mike Donivan	Encroachment Permits Officer
State Historic Preservation Office	James Dykmann	Archaeologist
Salt Lake City	Russell Hone	Watershed Program Administrator

Table 5.2 BLM Interdisciplinary Teams.

Resource	Rock Springs Field Office	Rawlins Field Office	Kemmerer Field Office
Surface and ground water	Dennis Doncaster	N/A	N/A
Soils	John MacDonald	Susan Foley	N/A
Wildlife	Jim Dunder John Hendersen	Larry Apple	Vicki Herren
Threatened, endangered, and candidate species and species of concern	Jim Dunder Jim Glennon	N/A	Vicki Herren
Cultural resources	Terry Del Bene	Gary DeMarcay	Lynn Harrell
Realty	Becky Heick	Larry Jackson Janelle Wrigley	Mark Hatchell
Livestock and grazing management	Thor Stephenson	N/A	Pat Netherly
Recreation	Andy Tenney	Krystal Clair	Wally Mierzewjewski
NEPA coordinator	Arlan Hiner	Larry Jackson	Mark Hatchell

Table 5.3 Other Preparers and Participants.

Name	EA Responsibility
TRC Mariah Associates Inc.	
Karyn Coppinger	Project Management, Air Quality, Water Resources, Geology, Soils, Noise, Vegetation, TEC&S Plants, Land Use, Visual Resources
Tiger Adolf	Data Collection
Genial DeCastro	Document Production
Jan Hart	Wetlands
Carolyn Hayden	Document Production
Craig Kling	Wildlife, TEC&S Wildlife, Quality Assurance
Tamara Linse	Document Production, Technical Editing
Elisa Lockhart	Geographic Information System /AutoCAD Mapping
Suzanne Luhr	Drafting/AutoCAD
Kelly Miller	Document Production
Phyllis Ranz	Drafting
Thomas Reust	Cultural Resources
Roger Schoumacher	Quality Assurance
Craig Smith	Cultural Resources
Erathem-Vanir Geological Consultants	
Gustav Winterfeld	Paleontology
Mountain West Environmental	
Bob Dorn	TEC&S Plants and Wildlife

6.0 LITERATURE CITED

Anderson, E. 1968. Fauna of the Little Box Elder Cave, Converse County, Wyoming. Pages 1-59 *In* The Carnivora. University of Colorado Studies, Series in Earth Sciences 6.

_____. 1970. Quaternary Evolution of the Genus *Martes* (Carnivora, Mustelidae). Acta Zoologica Fennica 130:1-132.

Avian Power Line Interaction Committee. 1996. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996. Edison Electric Institute/Raptor Research Foundation, Washington, D.C. 125 pp. + append.

Beckwith, R.H. 1942. Structure of the Upper Laramie River Valley, Colorado-Wyoming. Geological Society of America Bulletin 53:1491-1532.

Blackstone, D.L., Jr. 1975. Late Cretaceous and Cenozoic History of the Laramie Basin Region, Southeast Wyoming. Pages 249-279 *In* B.F. Curtis, editor. Cenozoic History of the Southern Rock Mountains. Geological Society of America Memoir 144.

Boyd, D.W. 1993. Paleozoic History of Wyoming. Pages 164-187 *In* A.W. Snole, J.R. Steidtmann, and S.M. Roberts, editors. Geology of Wyoming. Geological Survey of Wyoming Memoir No. 5.

Breithaupt, B.H. 1985. Non-mammalian Vertebrate Faunas from the Late Cretaceous of Wyoming. Pages 159-175 *In* G.E. Nelson, editor. Cretaceous of Wyoming, Wyoming Geological Association 36th Annual Field Conference Guidebook.

_____. 1990. Early Tertiary Fossils and Environments of Wyoming-Jackson to Fossil Butte National Monument: Field Trip No. 2. Pages 56-72 *In* S. Roberts, editor. Geologic Field Tours of Western Wyoming and Parts of Adjacent Idaho, Montana, and Utah. Geological Survey of Wyoming, Public Information Circular No. 29:191.

Bureau of Land Management. 1985. Draft Resource Management Plan/ Environmental Impact Statement for the Kemmerer Resource Area. U.S. Department of the Interior, Bureau of Land Management. 316 pp.

_____. 1986. Record of Decision for the Kemmerer Resource Management Plan and Rangeland Program Summary Document. Kemmerer Resource Area, Rock Springs District. U.S. Department of the Interior, Bureau of Land Management. 100 pp.

_____. 1987. Draft Resource Management Plan/Environmental Impact Statement for the Medicine Bow-Great Divide Resource Area, Rawlins District, Wyoming, BLM-WY-ES-87-008-4410. U.S. Department of the Interior, Bureau of Land Management. 500 pp.

_____. 1988a. National Environmental Policy Act Handbook, H-1790-1. U.S. Department of the Interior, Bureau of Land Management.

_____. 1988b. Final Resource Management Plan/Environmental Impact Statement for the Medicine Bow-Great Divide Resource Area, Rawlins District, Wyoming, BLM-WY-ES-88-015-4410. U.S. Department of the Interior, Bureau of Land Management. 249 pp.

_____. 1990a. Great Divide Resource Area Record of Decision and Approved Resource Management Plan, BLM-WY-PT-91-010-4410. U.S. Department of the Interior, Bureau of Land Management, Great Divide Resource Area, Rawlins District, Wyoming. 74 pp.

_____. 1990b. Wyoming Policy on Reclamation. U.S. Department of the Interior, Bureau of Land Management, Rawlins District Office, Wyoming. February 2, 1990.

_____. 1992. Draft Resource Management Plan/Environmental Impact Statement for the Green River Resource Area. U.S. Department of the Interior, Bureau of Land Management.

_____. 1995a. Draft KENETECH/PacifiCorp Windpower Project Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Rawlins District, Rawlins, Wyoming. DES-95-2.

_____. 1995b. Final KENETECH/PacifiCorp Windpower Project Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Rawlins District, Rawlins, Wyoming. FES 95-29.

_____. 1996. Final Resource Management Plan/Environmental Impact Statement, Green River Resource Area. U.S. Department of the Interior, Bureau of Land Management.

_____. 1997a. Record of Decision for the Green River Resource Area Management Plan. Green River Resource Area, Rock Springs District. U.S. Department of the Interior, Bureau of Land Management.

_____. 1997b. Draft Environmental Impact Statement Jonah Field II Natural Gas Project. U.S. Department of the Interior, Bureau of Land Management. BLM-WY-PL-97/015+1310.

_____. 1999a. Environmental Assessment for Enron Communications, Inc. Wasatch Reach Fiber Optic Installation. U.S. Department of Interior, Bureau of Land Management, Wyoming State Office, Cheyenne.

_____. 1999b. Biological Assessment for the Enron Communications, Inc. Wasatch Reach Fiber Optic Cable Installation, Salt Lake City, Utah, to Denver, Colorado. Prepared by David Evans and Associates, Inc., Bellevue, Washington. 20 pp. + append.

_____. 1999c. Environmental Assessment for Williams Communications, Inc. Midwest Cross Phase IIIB Communications System Project. U.S. Department of Interior, Bureau of Land Management, Kemmerer, Rock Springs, and Rawlins Field Offices. WYW-145426.

Call, M.W. 1978. Nesting Habitats and Surveying Techniques for Common Western Raptors. U.S. Department of the Interior, Bureau of Land Management, Technical Note No. 316. 115 pp.

Carini, G.F. 1964. Regional Petrographic and Paleontologic Analysis of the Triassic Alcova Limestone Member in Central Wyoming. Ph.D. dissertation. Columbia University of Missouri. 165 pp.

Case, E.C. 1936. A Nothosaur from the Triassic of Wyoming. Contributions of the Museum of Paleontology, University of Michigan 5:1-36.

Case, G.R. 1987. A New Selachian Fauna from the Late Campanian of Wyoming (Teapot Sandstone Member, Mesaverde Formation, Big Horn Basin). Palaeontographica. Abteilung A@Palaeozoologie-stratigraphie 197:1-37.

Case, J.C. 1986. Earthquake and Related Geologic Hazards in Wyoming. Geological Survey of Wyoming, Public Information Circular No. 26. 22 pp.

Case, J.C., and C.S. Boyd. 1987. Preliminary Map of Wind Blown Sand Areas in Wyoming. Geological Survey of Wyoming Open File Report 87-9.

Case, J.C., L.L. Larson, C.S. Boyd, and J.C. Cannia. 1990. Earthquake Epicenters and Suspected Active Faults with Surficial Expression in Wyoming. Geological Survey of Wyoming Open File Report 90-10. Map.

Cavoroc, V.V., and R.M. Flores. 1991. Red Beds of the Triassic Chugwater Group, Southwestern Powder River Basin, Wyoming. U.S. Geological Survey Bulletin 1917:E1-E17.

Clark, T.W., and M.R. Stromberg. 1987. Mammals in Wyoming. University of Kansas, Museum of Natural History, Public Education Series No. 10. 314 pp.

Clemens, W.A., and J.A. Lillegraven. 1986. New Late Cretaceous, North American Advanced Therian Mammals that Fit Neither the Marsupial nor Eutherian Molds. Pages 55-85 *In* K.M. Flanagan and J.A. Lillegraven, editors. Vertebrates, Phylogeny, and Philosophy. University of Wyoming Contributions to Geology Special Paper 3.

Clemens, W.A., J.A. Lillegraven, E.H. Lindsay, and G.G. Simpson. 1979. Where, When, and What: A Survey of Known Mesozoic Mammal Distribution. Pages 7-58 *In* J.A. Lillegraven, Z. Kielan-Jawarowska, and W.A. Clemens, editors. Mesozoic Mammals - the First Two-Thirds of Mammalian History. University of California Press, Berkeley.

Cobban, W.A. 1995. Occurrences of the Free-swimming Upper Cretaceous Crinoids Uintacrinus and Marsupites in the Western Interior of the United States in Shorter Contributions to the Stratigraphy and Geochronology of Upper Cretaceous Rocks in the Western Interior of the United States. U.S. Geological Survey Bulletin 2113:C1-C6.

Colorado Natural Heritage Program. 1999. Database Search for Threatened, Endangered, Candidate, and Sensitive Species for the Colorado Portion of IXC Communications, Inc. Denver to Salt Lake City Telecommunications System. Unpublished data.

Crabb, J. 1979. Soil Survey of Weld County, Colorado, Southern Part. U.S. Department of Agriculture, Soil Conservation Service. U.S. Government Printing Office, Washington, D.C. 135 pp. + append.

Crabb, J.A. 1982. Soil Survey of Weld County, Northern Part. U.S. Department of Agriculture Soil, Conservation Service. U.S. Government Printing Office, Washington, D.C. 145 pp. + append.

Davidson, J.R. 1987. Geology and Mammalian Paleontology of the Wind River Formation, Laramie Basin, Southeastern Wyoming. Contributions to Geology, University of Wyoming 25:103-132.

DeBruin, R.H., and C.S. Boyd. 1991. Oil and Gas Map of Wyoming. Geological Survey of Wyoming. Map.

Department of Transportation, Federal Highway Administration. 1978. Manual on Uniform Traffic Control Devices for Streets and Highways. U.S. Government Printing Office.

Eaton, J.G., G.F. Winterfeld, and J.B. Conard. 1976-1978. Unpublished collections from Cooper Creek Basin. Graduate students, University of Wyoming.

Edwards, C.C. 1969. Winter Behavior and Population Dynamics of American Eagles in Utah. Ph.D. dissertation, Brigham Young University, Provo, Utah. 156 pp.

Emery, R.J., P.R. Bjork, and L.S. Russell. 1987. The Chadronian, Orellan, and Whitneyan North American Land Mammal Ages. Pages 118-152 *In* M.O. Woodburne, editor. Cenozoic Mammals of North America: Geochronology and Biostratigraphy. University of California Press, Berkeley.

Environmental Protection Agency. 1971. Community Noise. Prepared for U.S. Environmental Protection Agency, Office of Noise Abatement and Control by Wyle Laboratories, Washington, D.C. NTID300.3.

Fish and Wildlife Service. 1999. Mountain Plover Survey Guidelines. 6 pp.

Forest Service. 1994a. Record of Decision for the Mountain Plover Management Strategy. U.S. Department of Agriculture, Forest Service, Pawnee National Grassland, Arapaho and Roosevelt National Forests, Weld County, Colorado. 23 pp.

_____. 1994b. Final Environmental Impact Statement for Management Strategy for Mountain Plover. U.S. Department of Agriculture, Forest Service, Pawnee National Grassland, Arapaho and Roosevelt National Forests, Weld County, Colorado.

_____. 1997. 1997 Revision of the Land and Resource Management Plan. Arapaho and Roosevelt National Forests and Pawnee National Grassland. U.S. Department of Agriculture, Forest Service, Rocky Mountain Region. 405 pp. + append.

Forrest, S.C., T.W. Clark, L. Richardson, and T.M. Campbell III. 1985. Black-footed Ferret Habitat: Some Management and Reintroduction Considerations. Wyoming Bureau of Land Management Wildlife Technical Bulletin No. 2. 49 pp.

Gill, J.R., E.A. Merewether, and W.A. Cobban. 1970. Stratigraphy and Nomenclature of Some Upper Cretaceous and Lower Tertiary Rocks in South-central Wyoming. U.S. Geological Survey Professional Paper 667. 50 pp.

Grande, L. 1984. Paleontology of the Green River Formation, with a Review of the Fish Fauna, 2nd Ed. Geological Survey of Wyoming Bulletin 63. p. 333.

Grasso, D.R. 1990. Recognition and Paleogeography of Quaternary Lake Wamsutter (A Proposed Lake in Wyoming's Great Divide Basin) Combining Landsat Remote Sensing and Digital Elevation Modeling. Ph.D. dissertation. Department of Geology and Geophysics, Laramie, Wyoming. August 1990.

Graul, W.D., and L.E. Webster. 1976. Breeding Status of the Mountain Plover. Condor 78:265-267.

Greer, R. n.d. Sage Grouse Habitat Requirements and Development. Wyoming Game and Fish Department, Habitat Extension Services, Habitat Extension Bulletin No. 31. 6 pp.

Hagar, M.W. 1972. A Late Wisconsin--Recent Vertebrate Fauna from the Chimney Rock Animal Trap, Larimer County, Colorado. Contributions to Geology, University of Wyoming 11:63-72.

Harris, R.E., and J.E. Meyer. 1986. Construction Materials Map of Wyoming. Geological Survey of Wyoming. Map.

Harris, R.E., W.D. Hausel, and J.E. Meyer. 1985. Metallic and Industrial Minerals Map of Wyoming. Geological Survey of Wyoming. Map Series 14.

Harty, K.M. 1991. Landslide Map of Utah. Utah Geological and Mineral Survey. Map 133. 28 pp.

Harty, K.M., and G.E. Christenson. 1988. Flood Hazard from Lakes and Failure of Dams in Utah. Utah Geological and Mineral Survey Map 111. 8 pp.

Hausel, W.D., G.G. Marlatt, E.L. Nielsen, and R.W. Gregory. 1992. Preliminary Study of Metals and Precious Stones Along the Union Pacific Right-of-way, Southern Wyoming. Geological Survey of Wyoming Open File Report 92-5. 79 pp.

Hay, O.P. 1924. The Pleistocene of the Middle Region of North America and Its Vertebrate Animals. Carnegie Institute of Washington, Publication 322A:1-385.

Hecker, S. 1993. Quaternary Tectonics of Utah with Emphasis on Earthquake-hazard Characterization. Utah Geological Survey Bulletin 127. 157 pp.

Hendricks, M.L. 1979. Blair and Rock Springs Formations; East Flank of the Rock Springs Uplift. Pages 1-49 *In* H. Roehler, J. Horne, R. Levey, M. Hendricks, M. Van Horn, C. Land, and B. Weimer (Leaders). Field Trip; Cretaceous of the Rock Springs Uplift, Wyoming. Soc. Econ. Paleont. and Mineral., Rocky Mt. Sect. Wyoming, United States.

Horne, J.C., L.L. McKenna, R.A. Levey, and T.V. Petronoff. 1980. Wave-dominated Deltas; an Important Economic Depositional Model for Upper Cretaceous of Southwestern Wyoming in Proceedings of the Fourth Symposium on the Geology of Rocky Mountain Coal.

Hupp, J.W., and C.E. Braun. 1989. Topographic Distribution of Sage Grouse Foraging in Winter. Journal of Wildlife Management 53(3):823-829.

Irwin, H. 1962. Archaeological Investigations at the Union Pacific Mammoth Kill Site, Wyoming. National Geographic Society Research Reports 1961-1962, pp. 123-125.

Jones, R.W. 1991. Coal Map of Wyoming. Wyoming Geological Survey, Map Series 34.

Klipple, G.E., and D.F. Costello. 1960. Vegetation and Cattle Responses to Different Intensities of Grazing on Short-grass Ranges on the Central Great Plains. U.S. Department of Agriculture Technical Bulletin 1216. 82 pp.

Knight, D.H. 1994. Mountains and Plains, the Ecology of Wyoming Landscapes. Yale University Press, New Haven, Connecticut. 338 pp.

Knight, W.C. 1903. Remains of Elephants in Wyoming. Science 17:828-829.

Knopf, F.L. 1994. Avian assemblages on altered grasslands. Studies in Avian Biology 15:247-257.

Koehler, G.M., M.G. Hornocker, and H.S. Hash. 1979. Lynx Movements and Habitat Use in Montana. Canadian Field Naturalist 93:441-442.

Kronenberger, R.C., J.F. Young, J.R. Stephens, and C.J. Fowkes. 1977. Wyoming General Soil Map. U.S. Soil Conservation Service Research Journal 117. 40 pp.

Larsen, L.S., and J.B. Brown. 1971. Soil Survey of Arapahoe County, Colorado. U.S. Department of Agriculture, Soil Conservation Service, U.S. Government Printing Office, Washington, D.C. 78 pp. + append.

Lillegraven, J.A., and M.C. McKenna. 1986. Fossil Mammals from the "Mesaverde" Formation (Late Cretaceous, Judithian) of the Big Horn and Wind River Basins, Wyoming, with Definition of Late Cretraceous North American Land-Mammal "Ages". American Museum Novitates 2840. 68 pp.

Long, C.A. 1971. Significance of Late Pleistocene Fauna from the Little Box Elder Cave, Wyoming, to Studies of Zoogeography of Recent Mammals. Great Basin Naturalist 31:93-105.

Love, J.D. 1948. Mesozoic Stratigraphy of the Wind River Basin, Central Wyoming. Wyoming Geological Association 12th Annual Field Conference Guidebook. Pp. 96-111.

Love, J.D., and A.C. Christiansen. 1985 (compilers). Geologic Map of Wyoming. U.S. Geological Survey Map, Scale 1:500,000.

Love, J.D., A.C. Christiansen, and A.J. Ver Ploeg. 1993 (compilers). Stratigraphic Chart Showing Phanerozoic Nomenclature for the State of Wyoming. The Geological Survey of Wyoming. Map Series 41.

Lull, R.S. 1942. Chugwater Footprints from Wyoming. American Journal of Science 240:500-504.

Lyon, L.J., and A.L. Ward. 1982. Elk and Land Management. Pages 443-477 *In* J.W. Thomas and D.E. Toweill, editors. Elk of North America: Ecology and Management. Stackpole Books, Harrisburg, Pennsylvania. 698 pp.

Mears, B., Jr. 1987. Late Pleistocene Periglacial Wedge Sites in Wyoming: An Illustrated Compendium. The Geological Survey of Wyoming Memoir 3:77.

McKenna, M.C. 1955. Earliest Eocene Vertebrates from the Sand Wash Basin, Northwest Colorado. Guidebook to the Geology of Northwest Colorado. Internation Association of Petroleum Geologists-Rocky Mountain Association of Geologists Joint Field Conference, 1955.

Merewether, E.A. 1990. Cretaceous Formation of the Hanna Basin Southcentral Wyoming (abstract). AAPG Bulletin 74:1337.

Mestre, V.E., and D.C. Wooten. 1980. Noise Impact Analysis. *In* J.G. Rau and D.C. Wooten, editors. Environmental Impact Analysis Handbook. McGraw-Hill Inc.

Moore, F.E. 1960. Summary of Cenozoic History, Southern Laramie Range, Wyoming and Colorado. Pages 217-222 *In* R.J. Weimer and J.D. Haun, editors. Guide to the Geology of Colorado. Rocky Mountain Association of Geology.

Parrish, T.L., S.H. Anderson, and W.F. Oelklaus. 1993. Mountain Plover Habitat Selection in the Powder River Basin, Wyoming. Prairie Naturalist 25(3):219-226.

Peterson, A. 1986. Habitat Suitability Index Models: Bald Eagle (Breeding Season). U.S. Fish and Wildlife Service Biological Report 82(10.126). 25 pp.

Picard, M.D. 1967. Stratigraphy and Depositional Environments of the Red Peak Member, Chugwater Formation (Triassic) Southeastern Wyoming. Contributions to Geology 8:1-7.

Prichinello, K.A. 1971. Earliest Eocene Mammalian Fossils from the Laramie Basin of Southeast Wyoming. University of Wyoming Contributions to Geology 10:73-87.

Reckner, R. 1998. Soil Survey of Albany County Area, Wyoming. U.S. Department of Agriculture, Natural Resources Conservation Service. U.S. Government Printing Office, Washington, D.C. 540 pp. + append.

Rigby, J.K., Jr. 1980. Swain Quarry of the Fort Union Formation, Middle Paleocene (Torrejonian), Carbon County, Wyoming: Geologic Setting and Mammalian Fauna. Evolutionary Monographs 3. 179 pp.

Robbins, C.S., B. Bruun, and H.S. Zim. 1983. A Guide to Field Identification: Birds of North America. Golden Press, New York. 360 pp.

Roehler, H.W. 1993. Coastal Sedimentation Along a Segment of the Interior Seaway of North America, Upper Cretaceous Baxter Shale, and Blair and Rock Springs Formations, Rock Springs Uplift, Southwest Wyoming. U.S. Geological Survey Bulletin 2051:31.

Roehler, H.W., J.H. Hanley, and J.G. Honey. 1988. Geology and Paleoecology of the Cottonwood Creek Delta in the Eocene Tipton Tongue of the Green River Formation and a Mammalian Fauna from the Eocene Cathedral Bluffs Tongue of the Wasatch Formation, Southeast Washakie Basin, Wyoming. U.S. Geological Survey Bulletin 1669.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski (editors). 1994. The Scientific Basis for Conserving Forest Carnivores: American Martin, Fishes, Lynx and Wolverine in the Western United States. General Technical Report RM-254. U.S. Department of Agriculture, Forest Service, Intermountain and Northern Regions, Fort Collins, Colorado.

Salvesen, D. 1990. Wetlands: Mitigating and Regulating Development Impacts. The Urban Land Institute, Washington, D.C. 115 pp.

Sampson, J.J., and T.G. Baber. 1974. Soil Survey of Adams County, Colorado. U.S. Department of Agriculture, Soil Conservation Service. U.S. Government Printing Office, Washington, D.C. 72 pp. + append.

Shannon, L.T. 1985. Stratigraphy of Blair Formation, an Upper Cretaceous Slope and Basin Deposit, Eastern Flank of the Rock Springs Uplift, Wyoming. In AAPG Rocky Mountain Section meeting. AAPG Bulletin 69(5). 866 pp.

Sheets, R.G., R.L. Linder, and R.B. Dahlgren. 1972. Food Habits of Two Litters of Black-footed Ferrets in South Dakota. American Midland Naturalist 87:249-251.

Simnacher, F. 1970. Stratigraphy, Depositional Environments, and Paleontology of the Cathedral Bluffs Tongue of the Wasatch Formation, Parnell Creek Area, Sweetwater County, Wyoming. Unpublished Master's thesis. Department of Geology, University of Wyoming. 101 pp.

Snow, C. 1972. Habitat Management Series for Endangered Species. Report No. 1: American Peregrine Falcon (*Falco peregrinus anatum*) and Arctic Peregrine Falcon (*F. p. anatum*). U.S. Department of the Interior, Bureau of Land Management, Technical Note No. 167. 35 pp.

Steenhof, K. 1978. Management of Wintering Bald Eagles. U.S. Fish and Wildlife Service FWS/OBS-78/79. 59 pp.

Thomas, H.D. 1934. Phosphora and Dinwoody Tongues in Lower Chugwater Formation of Central and Southeastern Wyoming. AAPG Bulletin 18:1,655-1,697.

TRC Mariah Associates Inc. 1999. Surveys for Threatened, Endangered, Candidate, and Sensitive Species, IXC Communications, Inc. Denver to Salt Lake City Telecommunications System. Unpublished data.

Utah Division of Wildlife Resources. 1999. Database Search for Threatened, Endangered, Candidate, and Sensitive Species for the Utah Portion of IXC Communications, Inc. Denver to Salt Lake City Telecommunications System. Unpublished data.

Western Ecosystems Technology, Inc. 1998. Wildlife Monitoring Studies, SeaWest Windpower Plant, Carbon County, Wyoming, 1995-1997. Final Report. Prepared for SeaWest Energy Corporation, San Diego, California and Bureau of Land Management, Rawlins, Wyoming. 184 pp.

Wiens, J.A., and M.I. Dyer. 1975. Rangeland Avifaunas: Their Composition, Energetics, and Role in the Ecosystem. Pages 146-181 *In* D.R. Smith, Technical Coordinator. Symposium on Management of Forest and Range Habitat for Nongame Birds. U.S. Forest Service General Technical Report WO-1.

Winterfeld, G.F. 1978. Unpublished Field Surveys of the Late Cretaceous Strata in the Black Buttes Area, Sweetwater County, Wyoming. Completed as a graduate student, University of Wyoming.

_____. 1982. Mammalian Paleontology of the Fort Union Formation (Paleocene), Eastern Rock Springs Uplift, Sweetwater County, Wyoming. University of Wyoming Contributions to Geology 21:73-111.

_____. 1999. Unpublished Paleontologic Works in Progress, Fort Union Formation, Sweetwater County, Wyoming.

Woodward, L., J.L. Harvey, K.M. Donaldson, J.J. Shiozaka, G.W. Leishman, and J.H. Broderick. 1974. Soil Survey of Salt Lake Area, Utah. U.S. Department of Agriculture, Soil Conservation Service. 132 pp. + append.

Wyoming Game and Fish Department. n.d. Standardized Definitions for Seasonal Wildlife Ranges. Mimeograph. 2 pp.

Wyoming Game and Fish Department and U.S. Bureau of Land Management. 1991. A Cooperative Management Plan for Black-footed Ferrets, Shirley Basin/Medicine Bow, Wyoming. Prepared by Shirley Basin/Medicine Bow Black-footed Ferret Working Group. Published by Wyoming Game and Fish Department, Cheyenne, Wyoming.

Wyoming Natural Diversity Database. 1999. Database Search for Threatened, Endangered, Candidate, and Sensitive Species for the Wyoming Portion of IXC Communications, Inc. Denver to Salt Lake City Telecommunications System. Unpublished data.

Zeimans, G., and D.N. Walker. 1994. Bell Cave, Wyoming: Preliminary Archaeological and Paleontological Investigations. Pages 88-90 *In* M. Wilson, editor. Applied Geology and Archaeology: The Holocene History of Wyoming. Geological Survey of Wyoming, Report of Investigations No. 10.

APPENDIX A:
SPECIES LIST

Species List[1]

Common Name	Scientific Name
Mammals	
Moose	*Alces alces*
White-tailed antelope squirrel	*Ammospermophilus leucurus*
Pronghorn	*Antilocapra americana*
Pallid bat	*Antrozous pallidus*
Pygmy rabbit	*Brachylagus idahoensis*
Coyote	*Canis latrans*
Beaver	*Castor canadensis*
American Elk	*Cervus elaphus*
Rock pocket mouse	*Chaetodipus intermedius*
Common hog-nosed skunk	*Conepatus mesoleucus*
Gunnison's prairie dog	*Cynomys gunnisoni*
White-tailed prairie dog	*C. leucurus*
Utah prairie dog	*C. parvidens*
Ord's kangaroo rat	*Dipodomys ordii evexus, D. o. longipes, D. o. montanus, D. o. nexilis, D. o. priscus D. o. sanrafaeli*
Big brown bat	*Eptesicus fuscus*
Porcupine	*Erethizon dorsatum*
Spotted bat	*Euderma maculatum*
Mountain lion	*Felis concolor*
Bobcat	*F. rufus*
Northern flying squirrel	*Glaucomys sabrinus*
Wolverine	*Gulo gulo*
Allen's big-eared bat	*Idionycteris phyllotis*
Silver-haired bat	*Lasionycteris noctivagans*
Western redbat	*Lasiurus blossevilli*
Red bat	*L. borealis*
Hoary bat	*L. cinereus*
Sagebrush vole	*Lemmiscus curtatus*
White-tailed jackrabbit	*Lepus townsendii*
Northern river otter	*Lutra canadensis*
Canada lynx (AKA North American Lynx)	*Lynx canadensis (AKA Felis lynx canadensis)*

Species List (Continued)

Common Name	Scientific Name
Yellow-bellied marmot	*Marmota flaviventris*
Marten	*Martes americana*
Striped skunk	*Mephitis mephitis*
Long-tailed vole	*Microtus longicaudus*
Mexican vole	*M. mexicanus*
Montane vole	*M. montanus*
Virgin River montane vole	*M. montanus rivularis*
Prairie vole	*M. ochrogaster*
Meadow vole	*M. pennsylvanicus*
Ermine	*Mustela erminea*
Long-tailed weasel	*M. frenata*
Black-footed ferret	*M. nigripes*
Mink	*M. vison*
Western small-footed myotis	*Myotis ciliolabrum*
Long-eared myotis	*M. evotis*
Little brown myotis	*M. lucifugus*
Fringed myotis	*M. thysanodes*
Long-legged myotis	*M. volans*
Yuma myotis	*M. yumanensis*
White-throated woodrat	*Neotoma albigula brevicauda*
Bushy-tailed woodrat	*N. cinerea*
Southern plains woodrat	*N. micropus*
Stephen's woodrat	*N. stephensi*
Desert shrew	*Notiosorex crawfordi*
Big free-tailed bat	*Nyctinomops macrotis*
Pika	*Ochotona princeps*
Mule deer	*Odocoileus hemionus*
White-tailed deer	*O. virginianus*
Muskrat	*Ondatra zibethicus*
Northern grasshopper mouse	*Onychomys leucogaster*
Mountain goat	*Oreamnos americanus*
Bighorn sheep	*Ovis canadensis*
Olive-backed pocket mouse	*Perognathus fasciatus*

Species List (Continued)

Common Name	Scientific Name
Plains pocket mouse	*P. flavescens relictus*
Silky pocket mouse	*P. flavus hopiensis, P. flavus sanluisi*
Great Basin pocket mouse	*P. parvus*
Deer mouse	*Peromyscus maniculatus*
White-footed mouse	*P. leucopus*
Northern rock mouse	*P. nasutus*
Heather volesnake	*Phenacomys intermedius*
Townsend's big-eared bat	*Plecotus townsendii pallescens*
Raccoon	*Procyon lotor*
Western harvest mouse	*Reithrodontomys megalotis megalotis*
Plains harvest mouse	*R. montanus montanus*
Eastern mole	*Scalopus aquaticus*
Masked shrew	*Sorex cinereus*
Pygmy shrew	*S. hoyi montanus*
Merriam's shrew	*S. merriami*
Dusky shrew	*S. monticolus*
Dwarf shrew	*S. nanus*
Water shrew	*S. palustris*
Wyoming ground squirrel	*Spermophilus elegans*
Spotted ground squirrel	*S. spilosoma*
Thirteen-lined ground squirrel	*S. tridecemlineatus*
Golden-mantled ground squirrel	*S. lateralis*
Western spotted skunk	*Spilogale gracilis*
Eastern spotted skunk	*S. putorius interrupta*
Mountain (Nuttall's) cottontail	*Sylvilagus nuttallii*
Desert cottontail	*S. audubonii*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Yellow pine chipmunk	*Tamias amoenus*
Cliff chipmunk	*T. dorsalis*
Least chipmunk	*T. minimus*
Red squirrel	*Tamiasciurus hudsonicus*
Badger	*Taxidea taxus*
Botta's pocket gopher	*Thomomys bottae*

Species List (Continued)

Common Name	Scientific Name
Wyoming pocket gopher	*T. clusius*
Northern pocket gopher	*T. talpoides*
Black bear	*Ursus americanus*
Grizzly or brown bear	*U. arctos*
Kit fox	*Vulpes macrotis*
Swift fox	*V. velox*
Red fox	*V. vulpes*
Preble's Meadow jumping mouse	*Zapus hudsonius preblei*
Western jumping mouse	*Z. princeps*
Birds	
Common loon	*Gavia immer*
Pied-billed grebe	*Podilymbus podiceps*
Horned grebe	*Podiceps auritus*
Eared grebe	*P. nigricollis*
Sharp sprite	*Promenetus exacuous*
Western grebe	*Aechmophorus occidentalis*
Clark's grebe	*A. clarkii*
American white pelican	*Pelecanus erythrorhynchos*
Double-crested cormorant	*Phalacrocorax auritus*
American bittern	*Botaurus lentiginosus*
Least bittern	*Ixobrychus exilis*
Great egret	*Ardea albus*
Great blue heron	*A. herodias*
Snowy egret	*Egretta thula*
Cattle egret	*Bubulcus ibis*
Green-backed heron	*Butorides striatus*
Green heron	*B. virescens*
Yellow-crowned night-heron	*Nyctanassa violacea*
Black-crowned night-heron	*Nycticorax nycticorax*
White-faced ibis	*Plegadis chihi*
Tundra swan	*Cygnus columbianus*
Trumpeter swan	*C. buccinator*

Species List (Continued)

Common Name	Scientific Name
Snow goose	*Chen caerulescens*
Canada goose	*Branta canadensis*
Wood duck	*Aix sponsa*
Northern pintail	*Anas acuta*
American wigeon	*A. americana*
Northern shoveler	*A. clypeata*
Green-winged teal	*A. crecca*
Cinnamon teal	*A. cyanoptera*
Blue-winged teal	*A. discors*
Mallard	*A. platyrhynchos*
Gadwall	*A. strepera*
Lesser scaup	*Aythya affinis*
Redhead	*A. americana*
Ring-necked duck	*A. collaris*
Canvasback	*A. valisineria*
Bufflehead	*Bucephala albeola*
Common goldeneye	*B. clangula*
Barrow's goldeneye	*B. islandica*
Harlequin duck	*Histrionicus histrionicus*
Hooded merganser	*Lophodytes cucullatus*
Common merganser	*Mergus merganser*
Red-breasted merganser	*M. serrator*
Ruddy duck	*Oxyura jamaicensis*
Turkey vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Bald eagle	*Haliaeetus leucocephalus*
Northern harrier	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*A. cooperii*
Northern goshawk	*A. gentilis*
Red-tailed hawk	*Buteo jamaicensis*
Rough-legged hawk	*B. lagopus*
Broad-winged hawk	*B. platypterus*

Species List (Continued)

Common Name	Scientific Name
Ferruginous hawk	*B. regalis*
Swainson's hawk	*B. swainsoni*
Golden eagle	*Aquila chrysaetos*
American kestrel	*Falco sparverius*
Merlin	*F. columbarius*
Peregrine falcon	*F. peregrinus*
Artic peregrine falcon	*F. peregrinus tundrius*
Prairie falcon	*F. mexicanus*
Ruffed grouse	*Bonasa umbellus*
Sage grouse	*Centrocercus urophasianus urophasianus*
Blue grouse	*Dendragapus obscurus*
White-tailed ptarmigan	*Lagopus leucurus altipetens*
Ring-necked pheasant	*Phasianus colchicus*
Greater prairie-chicken	*Tympanuchus cupido pinnatus*
Lesser prairie-chicken	*T. pallidicinctus*
Columbian sharp-tailed grouse	*T. phasianellus columbianus*
Plains sharp-tailed grouse	*T. phasianellus jamesii*
Wild turkey	*Meleagris gallopavo*
Merriam's wild turkey	*Meleagris gallopavo merriami*
Virginia rail	*Rallus limicola*
Sora	*Porzana carolina*
American coot	*Fulica americana*
Whooping crane	*Grus americana*
Lesser sandhill crane	*G. canadensis canadensis*
Greater sandhill crane	*G. canadensis tabida*
Black-bellied plover	*Pluvialis squatarola*
Lesser golden plover	*P. dominica*
Snowy plover	*Charadrius alexandrinus*
Piping plover	*C. melodus*
Mountain plover	*C. montanus*
Semipalmated plover	*C. semipalmatus*
Killdeer	*C. vociferus*
Black-necked stilt	*Himantopus mexicanus*

Species List (Continued)

Common Name	Scientific Name
American avocet	*Recurvirostra americana*
Greater yellowlegs	*Tringa melanoleuca*
Lesser yellowlegs	*T. flavipes*
Solitary sandpiper	*T. solitaria*
Willet	*Catoptrophorus semipalmatus inornatus*
Spotted sandpiper	*Actitus macularia*
Upland sandpiper	*Bartramia longicauda*
Long-billed curlew	*Numenius americanus*
Eskimo curlew	*N. borealis*
Marbled godwit	*Limosa fedoa*
Sanderling	*Calidris alba*
Semipalmated sandpiper	*C. pusilla*
Western sandpiper	*C. mauri*
Least sandpiper	*C. minutilla*
Baird's sandpiper	*C. bairdii*
Pectoral sandpiper	*C. melanotos*
Stilt sandpiper	*C. himantopus*
Long-billed dowitcher	*Limnodromus scolopaceus*
Common snipe	*Gallinago gallinago*
Wilson's phalarope	*Phalaropus tricolor*
Red-necked phalarope	*P. lobatus*
Franklin's gull	*Larus pipixcan*
Bonaparte's gull	*L. philadelphia*
Ring-billed gull	*L. delawarensis*
California gull	*L. californicus*
Herring gull	*L. argentatus*
Least tern	*Sterna antillarum*
Caspian tern	*S. caspia*
Forster's tern	*S. forsteri*
Black tern	*Chlidonias niger*
Rock dove	*Columba livia*
Northern bobwhite	*Colinus virginianus*
Mourning dove	*Zenaida macroura*

Species List (Continued)

Common Name	Scientific Name
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*
Black-billed cuckoo	*C. erythropthalmus*
Northern saw-whet owl	*Aegolius acadicus*
Boreal owl	*A. funereus*
Long-eared owl	*Asio otus*
Short-eared owl	*A. flammeus*
Burrowing owl	*Athene cunicularia*
Great horned owl	*Bubo virginianus*
Eastern screech owl	*Otus asio*
Flammulated owl	*O. flammeolus*
Mexican spotted owl	*Strix occidentalis lucida*
Barn owl	*Tyto alba*
Common nighthawk	*Chordeiles minor*
Common poorwill	*Phalaenoptilus nuttallii*
White-throated swift	*Aeronautes saxatalis*
Black swift	*Cypseloides niger*
Broad-tailed hummingbird	*Selasphorus platycercus*
Rufous hummingbird	*S. rufus*
Belted kingfisher	*Ceryle alcyon*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Lewis' woodpecker	*M. lewis*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Williamson's sapsucker	*S. thyroideus*
Downy woodpecker	*Picoides pubescens*
Ladder-backed woodpecker	*P. scalaris*
Three-toed woodpecker	*P. tridactylus*
Hairy woodpecker	*P. villosus*
Northern flicker	*Colaptes auratus*
Olive-sided flycatcher	*Contopus borealis*
Western wood-pewee	*C. sordidulus*
Hammond's flycatcher	*Empidonax hammondii*
Least flycatcher	*E. minimus*
Dusky flycatcher	*E. oberholseri*

Species List (Continued)

Common Name	Scientific Name
Cordilleran flycatcher	*E. occidentalis*
Willow flycatcher	*E. traillii*
Southwestern willow flycatcher	*E. traillii extimus*
Eastern phoebe	*Sayornis phoebe*
Say's phoebe	*S. saya*
Ash-throated flycatcher	*Myiarchus cinerascens*
Scissor-tailed flycatcher	*Tyrannus forficatus*
Eastern kingbird	*T. tyrannus*
Western kingbird	*T. verticalis*
Horned lark	*Eremophila alpestris*
Purple martin	*Progne subis*
Tree swallow	*Tachycineta bicolor*
Violet-green swallow	*T. thalassina*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Bank swallow	*Riparia riparia*
Cliff swallow	*Hirundo pyrrhonota*
Barn swallow	*H. rustica*
Gray jay	*Perisoreus canadensis*
Steller's jay	*Cyanocitta stelleri*
Blue jay	*C. cristata*
Scrub jay	*Aphelocoma coerulescens*
Pinyon jay	*Gymnorhinus cyanocephalus*
Clark's nutcracker	*Nucifraga columbiana*
Black-billed magpie	*Pica pica*
American crow	*Corvus brachyrhynchos*
Common raven	*C. corax*
Black-capped chickadee	*Parus atricapillus*
Mountain chickadee	*P. gambeli*
Chestnut-backed chickadee	*P. rufescens*
Plain titmouse	*P. inornatus*
Bushtit	*Psaltriparus minimus*
Red-breasted nuthatch	*Sitta canadensis*
White-breasted nuthatch	*S. carolinensis*

Species List (Continued)

Common Name	Scientific Name
Pygmy nuthatch	*S. pygmaea*
Brown creeper	*Certhia americana*
Rock wren	*Salpinctes obsoletus*
Canyon wren	*Catherpes mexicanus*
Bewick's wren	*Thryomanes bewickii*
Carolina wren	*Thryothorus ludovicianus*
House wren	*Troglodytes aedon*
Marsh wren	*Cistothorus palustris*
American dipper	*Cinclus mexicanus*
Golden-crowned kinglet	*Regulus satrapa*
Ruby-crowned kinglet	*R. calendula*
Blue-gray gnatcatcher	*Polioptila caerulea*
Eastern bluebird	*Sialia sialis*
Western bluebird	*S. mexicana*
Mountain bluebird	*S. currucoides*
Townsend's solitaire	*Myadestes townsendi*
Veery	*Catharus fuscescens*
Swainson's thrush	*C. ustulatus*
Hermit thrush	*C. guttatus*
American robin	*Turdus migratorius*
Gray catbird	*Dumetella carolinensis*
Northern mockingbird	*Mimus polyglottos*
Sage thrasher	*Oreoscoptes montanus*
Crissal thrasher	*Toxostoma crissale*
Brown thrasher	*T. rufum*
American pipit	*Anthus rubescens*
Bohemian waxwing	*Bombycilla garrulus*
Cedar waxwing	*B. cedrorum*
Northern shrike	*Lanius excubitor*
Loggerhead shrike	*L. ludovicianus*
European starling	*Sturnus vulgaris*
Bell's vireo	*Vireo bellii*
Warbling vireo	*V. gilvus*

Species List (Continued)

Common Name	Scientific Name
Red-eyed vireo	*V. olivaceus*
Solitary vireo	*V. solitarius*
Gray vireo	*V. vicinior*
Tennessee warbler	*Vermivora peregrina*
Orange-crowned warbler	*V. celata*
Virginia's warbler	*V. virginiae*
Yellow-rumped warbler	*Dendroica coronata*
Grace's warbler	*D. graciae*
Black-throated gray warbler	*D. nigrescens*
Chestnut-collared warbler	*D. pensylvanica*
Yellow warbler	*D. petechia*
Blackpoll warbler	*D. striata*
Townsend's warbler	*D. townsendi*
Black-and-white warbler	*Mniotilta varia*
American redstart	*Setophaga ruticilla*
Ovenbird	*Seiurus aurocapillus*
Northern waterthrush	*S. noveboracensis*
MacGillivray's warbler	*Oporornis tolmiei*
Common yellowthroat	*Geothlypis trichas*
Wilson's warbler	*Wilsonia pusilla*
Yellow-breasted chat	*Icteria virens*
Hepatic tanager	*Piranga flava*
Western tanager	*P. ludoviciana*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Black-headed grosbeak	*P. melanocephalus*
Blue grosbeak	*Guiraca caerulea*
Lazuli bunting	*Passerina amoena*
Indigo bunting	*P. cyanea*
Dickcissel	*Spiza americana*
Green-tailed towhee	*Pipilo chlorurus*
Rufous-sided towhee	*P. erythrophthalmus*
Cassin's sparrow	*Aimophila cassinii*
Rufous-crowned sparrow	*A. ruficeps*

Species List (Continued)

Common Name	Scientific Name
Sage sparrow	*Amphispiza belli*
American tree sparrow	*Spizella arborea*
Brewer's sparrow	*S. breweri*
Clay-colored sparrow	*S. pallida*
Chipping sparrow	*S. passerina*
Field sparrow	*S. pusilla*
Vesper sparrow	*Pooecetes gramineus*
Lark sparrow	*Chondestes grammacus*
Black-throated sparrow	*Amphispiza bilineata*
Sage sparrow	*A. belli*
Lark bunting	*Calamospiza melanocorys*
Savannah sparrow	*Passerculus sandwichensis*
Baird's sparrow	*Ammodramus bairdii*
Grasshopper sparrow	*A. savannarum*
Fox sparrow	*Passerella iliaca*
Song sparrow	*Melospiza melodia*
Lincoln's sparrow	*M. lincolnii*
White-throated sparrow	*Zonotrichia albicollis*
White-crowned sparrow	*Z. leucophrys*
Dark-eyed junco	*Junco hyemalis*
Lapland longspur	*Calcarius lapponicus*
McCown's longspur	*C. mccownii*
Chestnut-collared longspur	*C. ornatus*
Snow bunting	*Plectrophenax nivalis*
Bobolink	*Dolichonyx oryzivorus*
Red-winged blackbird	*Agelaius phoeniceus*
Western meadowlark	*Sturnella neglecta*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
Rusty blackbird	*Euphagus carolinus*
Brewer's blackbird	*E. cyanocephalus*
Common grackle	*Quiscalus quiscula*
Brown-headed cowbird	*Molothrus ater*
Northern oriole Baltimore oriole	*Icterus galbula*

Species List (Continued)

Common Name	Scientific Name
Scott's oriole	*I. parisorum*
Orchard oriole	*I. spurius*
Mississippi kite	*Ictinia mississippiensis*
Rosy finch	*Leucosticte arctoa*
Pine grosbeak	*Pinicola enucleator*
Purple finch	*Carpodacus purpureus*
Cassin's finch	*C. cassinii*
House finch	*C. mexicanus*
Red crossbill	*Loxia curvirostra*
White-winged crossbill	*L. leucoptera*
Common redpoll	*Carduelis flammea*
Pine siskin	*C. pinus*
Lesser goldfinch	*C. psaltria*
American goldfinch	*C. tristis*
Evening grosbeak	*Coccothraustes vespertinus*
House sparrow	*Passer domesticus*
<u>Amphibians and Reptiles</u>	
Northern cricket frog	*Acris crepitans*
Tiger salamander	*Ambystoma tigrinum*
Western toad (Boreal toad)	*Bufo boreas boreas*
Great Plains toad	*B. cognatus*
Green toad	*B. debilis*
Wyoming toad	*B. hemiophrys baxteri*
Arizona toad	*B. microscaphus microscaphus*
Red-spotted toad	*B. punctatus*
Racer	*Coluber constrictor*
Midget faded rattlesnake	*Crotalus viridis concolor*
Ringneck snake	*Diadophis punctatus*
Many-lined skink	*Eumeces multivirgatus*
Great Plains rattlesnake	*Elaphe guttata emoryi*
Longnose leopard lizard	*Gambelia wislizenii*
Great Plains narrowmouth toad	*Gastrophryne olivacea*
Night snake	*Hypsiglena torquata*

Species List (Continued)

Common Name	Scientific Name
Canyon treefrog	*Hyla arenicolor*
Yellow mud turtle	*Kinosternon flavescens*
Common kingsnake	*Lampropeltis getula*
California kingsnake	*L. getula californiae*
Utah mountain kingsnake	*L. pyromelana infralabialis*
Milk snake	*L. triangulum*
Utah milk snake	*L. triangulum taylori*
Texas blind snake	*Leptotyphlops dulcis*
Smooth green snake	*Opheodrys vernalis*
Texas horned lizard	*Phrynosoma cornutum*
Easten short-horned lizard	*P. douglassi brevirostre*
Short-horned lizard	*P. hernandezi*
Pacific chorus frog	*P. regilla*
Chorus frog	*Pseudacris triseriata*
Plains leopard frog	*Rana blairi*
Northern Leopard frog	*R. pipiens*
Spotted frog	*R. pretiosa*
Wood frog	*R. sylvatica*
Lowland leopard frog	*R. yavapaiensis*
Longnose snake	*Rhinocheilus lecontei*
Couch's spadefoot	*Scaphiopus couchii*
Sagebrush lizard	*Sceloporus graciosus*
Desert spiny lizard	*S. magister*
Eastern fence lizard	*S. undulatus*
Massasauga	*Sistrurus catenatus*
Ground snake	*Sonora semiannulata*
Plains spadefoot	*Spea bombifrons*
Great Basin spadefoot	*S. intermontana*
New Mexico spadefoot	*S. multiplicata*
Southwestern blackhead snake	*Tantilla hobartsmithi*
Blackneck garter snake	*Thamnophis cyrtopsis*
Western terrestrial garter snake	*T. elegans*
Common garter snake	*T. sirtalis*
Lined snake	*Tropidoclonion lineatum*

Species List (Continued)

Common Name	Scientific Name
Fish	
River carpsucker	*Carpiodes carpio*
Longnose sucker	*Catostomus catostomus*
White sucker	*C. commersoni*
Bluehead sucker	*C. discobolus*
Flannelmouth sucker	*C. latipinnis*
Mountain sucker	*C. platyrhynchus*
Rio Grande sucker	*C. plebeius*
June sucker	*Chamistes liorus*
Paiute sculpin	*Cottus beldingi*
Lake chub	*Couesius plumbeus*
Common carp	*Cyprinus carpio*
Arkansas darter	*Etheostoma cragini*
Iowa darter	*E. exile*
Johnny darter	*E. nigrum*
Orangethroat darter	*E. spectabile*
Plains topminnow	*Fundulus sciadicus*
Leatherside chub	*Gila copei*
Humpback chub	*G. cypha*
Bonytail	*G. elegans*
Rio Grande chub	*G. pandora*
Roundtail chub	*G. robusta*
Brassy minnow	*Hybognathus hankinsoni*
Plains minnow	*H. placitus*
Common shiner	*Luxilus cornutus*
Speckled chub	*Macrhybopsis aestivalis*
Hornyhead chub	*Nocomis biguttatus*
Emerald shiner	*Notropis atherinoides*
River shiner	*N. blennius*
Sand shiner	*N. stramineus*
Stonecat	*Noturus flavus*
Cutthroat trout (Yellowstone subspecies)	*Oncorhynchus clarki*
Colorado River cutthroat trout	*O. clarki pleuriticus*

Species List (Continued)

Common Name	Scientific Name
Greenback cutthroat trout	*O. clarki stomias*
Rio Grande cutthroat trout	*O. clarki virginialis*
Rainbow trout	*O. mykiss*
Suckermouth minnow	*Phenacobius mirabilis*
Northern redbelly dace	*Phoxinus eos*
Southern redbelly dace	*P. erythrogaster*
Flathead chub	*Platygobio gracilis*
Mountain whitefish	*Prosopium williamsoni*
Colorado squawfish	*Ptychocheilus lucius*
Longnose dace	*Rhinichthys cataractae*
Brown trout	*Salmo trutta*
Brook trout	*Salvelinus fontinalis*
Creek chub	*Semotilus atromaculatus*
Walleye	*Stizostedion vitreum*
Razorback sucker	*Xyrauchen texanus*
<u>**Mollusks**</u>	
California floater	*Anodota californiensis*
No common name	*Fossaria rustica*
Western pearlshell	*Margaritifera falcata*
Eureka mountainsnail	*Oreohelix eurekensis eurekensis*
Lyrate mountainsnail	*Oreohelix haydeni haydeni*
Subalpine mountainsnail	*Oreohelix subrudis*
Ogden Rocky Mountain snail	*Oreohelix peripherica wasatchensis*
Yavapai mountainsnail	*Oreohelix yavapai*
Ambersnail, Kanub	*Oxyloma haydeni kanabensis*
Utah physa (Utah bubblesnail)	*Physella utahensis*
Wet-rock physa (Zion Canyon snail)	*Physella zionis*
Clinton Cave snail	*Pristiloma subrupicola*
Toquerville springsnail	*Pyrgulopsis kolobensis*
Mountain marshsnail	*Stagnicola montanensis*
Roundmouth valvata	*Valvata humeralis*
Utah valvata	*Valvata utahensis*

Species List (Continued)

Common Name	Scientific Name
Plants	
Laramie columbine	*Aquilegia laramiensis*
Towermustard rockcress	*Arabis glabra* var. *furcatipilis*
Daggett rock cress	*A. pendulina* var. *russeola*
Selby rock cress	*A. selbyi*
Dwarf bear-poppy	*Arctomecon humilus*
Welsh's milkweed	*Asclepias welshii*
Heliotrope milkvetch	*Astragalus montii*
Moab milkvetch	*Astragalus coltonii* var. *moabensis*
Nelson's milkvetch	*A. nelsonianus*
Trelease's racemose milkvetch	*A. racemosus* var. *treleasei*
Bun milkvetch	*A. simplicifolius*
Three-fingered milkvetch	*A. tridactylicus*
Little-leaved brickell brush	*Brickellia microphylla* var. *scabra*
Crawe sedge	*Carex crawei*
Navajo sedge	*C. specuicola*
Ownbey's thistle	*Cirsium ownbeyi*
Slender cryptantha	*Cryptantha gracilis*
Rollins' catseye	*C. rollinsii*
Echo spring-parsley	*Cymopterus lapidosus*
Payson's tansymustard	*Descurainia pinnata* ssp. *paysonii*
Utah fleabane	*Eriogonum arenarioides*
Divergent wild buckwheat	*E. divaricatum*
Hooker wild buckwheat	*E. hookeri*
Maguire daisy	*E. maguire*
Showy prairie gentian	*Eustoma grandiflorum*
Colorado butterfly plant	*Gaura neomexicana* ssp. *coloradensis*
Utah greasebush	*Glossopetalon spinescens* var. *meionandrum*
Ward's goldenweed	*Haplopappus wardii*
Barneby ridge-cress (peppercress)	*Lepidium barnebyanum*
Prostrate bladderpod	*Lesquerella prostrata*
Kodachrome bladderpod	*L. tumulosa*

Species List (Continued)

Common Name	Scientific Name
Red poverty-weed	*Monolepis pusilla*
Ring muhly	*Muhlenbergia torreyi*
Maybell locoweed	*Oxytropis besseyi obnapiformis*
Payson beardtongue	*Penstemon paysoniorum*
Broadleaf penstemon	*P. platyphyllus*
Watson beardtongue	*P. watsonii*
Clay phacelia	*Phacelia argillacea*
Desert glandular phacelia	*P. glandulosa* var. *deserta*
Western phacelia	*P. incana*
White scorpion-weed	*P. neomexicana* var. *alba*
Opal phlox	*Phlox opalensis*
Tufted twinpod	*Physaria condensata*
Longleaf pondweed	*Potamogeton nodosus*
Strict-leaved pondweed	*P. strictifolius*
Maguire primrose	*Primula maguirei*
Autumn buttercup	*Ranunculus acriformis* var. *aestivalis*
Persistent sepal wateyrcress	*Rorippa calycina*
Groundsel	*Senecio pseudaureus* var. *flavulus*
Rosinweed	*Silphium integrifolium* var. *laeve*
Ute ladies' tresses	*Spiranthes diluvialis*
Green River greenthread	*Thelesperma caespitosum*

[1] Based on range, habitat characteristics, and actual field observations (Clark and Stromberg 1987; WGFD 1992; BLM 1995a; Scott 1987; Russell 1990; Stebbins 1966; Baxter and Stone 1985; Smith and Brodie 1982; Baxter and Simon 1970; Oberholtzer 1985; American Fisheries Society 1991; CNHP 1999; WNDD 1999; UDWR 1999; and <www.ndis.nrel.colostate.edu1999>.

APPENDIX B:

FISH AND WILDLIFE SERVICE, MOUNTAIN PLOVER SURVEY GUIDELINES

MOUNTAIN PLOVER SURVEY GUIDELINES
U.S. Fish and Wildlife Service
1999

The mountain plover (*Charadrius montanus*) is a small bird (17.5 cm, 7 in.) about the size of a killdeer (*C. vociferus*). It is light brown above with a lighter colored breast, but lacks the contrasting dark breast-belt common to many other plovers. During the breeding season it has a white forehead and a dark line between the beak and eye, which contrasts with the dark crown.

Mountain plover breeding habitat is known to include short-grass prairie and shrub-steppe landscapes; dryland, cultivated farms; and prairie dog towns. Plovers usually nest on sites where vegetation is sparse or absent, due to disturbance by herbivores, including domestic livestock and prairie dogs. Vegetation at shortgrass prairie sites is less than 4 inches tall, while shrubs visually predominate nest sites within the shrub-steppe landscape. Usually, nest sites within the shrub-steppe are on active prairie dog towns. Nests are commonly located near a manure pile or rock. In addition to disturbance by prairie dogs or livestock, they have also been found on oil drill pads. Mountain plovers are rarely found near water. They may be found on heavily grazed pastures throughout their breeding range and may selectively nest in or near prairie dog towns. Positive indicators for mountain plovers therefore include level terrain, prairie dogs, bare ground, *Opuntia* pads, cattle, widely spaced plants, and horned larks. It would be unusual to find mountain plovers on sites characterized by irregular or rolling terrain; dense, matted vegetation; grass taller than 4 inches, wet soils, or the presence of killdeer .

These guidelines were developed by Service biologists Pat Deibert, Lou Hanebury, and Bob Leachman, and Dr. Fritz Knopf, USGS-BRD. Keep in mind these are guidelines - please call Bob Leachman at 970-243-2778 if you have any suggestions.

GENERAL GUIDELINES FOR SURVEYS

On February 16, 1999, the Service proposed the mountain plover for federal listing as threatened. Because listing of this species is proposed, the Service may recommend surveys for mountain plovers to better define nesting areas, and minimize potential negative impacts. The Service recommends surveys for mountain plovers in all suitable habitat, as well as avoidance of nesting areas, to minimize impact to plovers in a site planned for development. While the Service believes that plover surveys, avoidance of nesting and brood rearing areas, and timing restrictions (avoidance of important areas during nesting) will lessen the chance of direct impacts to and mortality of individual mountain plovers in the area, these restrictions do nothing to mitigate indirect effects, including changes in habitat suitability and habitat loss. Surveys are, however, a necessary starting point. The Service has developed the following 2 survey guidelines, depending on whether the intent is to determine the presence or absence of plovers at a site during the nesting season, or to determine the density of nesting plovers.

Survey Protocol

Two types of surveys may be conducted: 1) surveys to determine the presence/absence of breeding plovers (i.e., displaying males and foraging adults), or 2) surveys to determine nest density. The survey type chosen for a project and the extent of the survey area (i.e., beyond the edge of the construction or operational ROW) will depend on the type of project activity being analyzed (e.g., construction, operation) and the users intent. One methodology outlines a breeding survey that was used in northeastern Colorado to establish the density of occupied territories, based on displaying male plovers or foraging adults. The other was developed to only determine whether plovers occupy an area.

Techniques Common to Each Survey Method

- Conduct surveys during early courtship and territorial establishment. Throughout the breeding range, this period extends from approximately mid-April through early July. However, the specific breeding period depends on latitude, elevation, and weather.
- Conduct surveys between local sunrise and 1000 and from 1730 to sunset (periods of horizontal light to facilitate spotting the white breast of the adult plovers).
- Drive transects within the project area to minimize early flushing. Flushing distances for mountain plovers may be within 3 meters for vehicles, but plovers often flush at 50 to 100 meters when approached by humans on foot.
- Use of a 4-wheel drive vehicle is preferable; however, fallow agricultural fields present an access problem. Use of ATVs has proven highly successful in observing and recording displaying males.
- Stay in or close to the vehicle when scanning. Use binoculars to scan and spotting scopes to confirm sightings. Do not use scopes to scan.
- Do not conduct surveys in poor weather (i.e., high wind, precipitation, etc.).

- Surveys conducted during the courtship period should focus on identifying displaying or calling males, which would signify breeding territories.

- For all breeding birds observed, conduct additional surveys immediately prior to construction activities to search for active nest sites.

- If an active nest is located, an appropriate buffer area should be established to prevent direct loss of the nest or indirect impacts from human-related disturbance. The appropriate buffer distance will vary, depending on topography, type of activity proposed, and duration of disturbance. For disturbances including pedestrian foot traffic and continual equipment operations, a 200-meter buffer is recommended.

SURVEY TO DETERMINE PRESENCE/ABSENCE

1. Conduct the survey between May 1 and June 15, throughout the breeding range.

2. Visual observation of the area should be made within 200 m of the proposed action to detect the presence of plovers. All plovers located should be observed long enough to determine if a nest is present. These observations should be made from within a stationary vehicle, as plovers do not appear to be wary of vehicles.

3. If no visual observations are made from vehicles, the area should be surveyed on ATV's. Extreme care should be exercised in locating plovers due to their highly secretive and quiet nature. Surveys by foot are not recommended because plovers tend to flush at greater distances when approached using this method. Finding nests during foot surveys is more difficult because of the greater flushing distance.

4. A site must be surveyed 3 times during the survey window, with each survey separated by at least 14 days.

5. Initiation of the project should occur as near to completion of the survey as possible. For example, seismic exploration should begin with 2 days of survey completion. A 14 day period may be appropriate for other projects.

6. If an active nest is found in the survey area, the planned activity should be delayed 37 days, or one week post-hatching. If a brood of flightless chicks is observed, activities should be delayed at least seven days.

SURVEY TO DETERMINE DENSITY OF NESTING MOUNTAIN PLOVERS

We are assuming people will have received training on point counts in general before using this specialized point count technique adapted to mountain plovers.

Establishing Transects

1. Identify appropriate habitat and habitat of interest within geographic areas of interest.

2. Upon arriving in appropriate habitat, drive to a previously determined random starting point.

3. For subsequent points, drive a previously determined random distance of 0.3, 0.4 or 0.5 miles.

4. Each transect of point counts should contain a minimum of 20 points.

Conducting The Point Counts

1. Conduct counts between last week in June to July 4th at eastern plains elevation in Colorado.

2. Only 1 counter is used. Do not use a counter and recorder or other combinations of field help. Drivers are okay as long as they don't help spot plovers.

3. If an adult mountain plover is observed, plot occupied territories on a minimum of 1:24,000 scale map and on a ROW diagram or site grid (see attached). The ROW diagram will be at a greater level of detail, depicting the location of breeding birds (and possible nest sites) relative to ROW centerline, construction boundary, and applicable access roads.

4. Estimate or measure distances (in meters) to all mountain plovers. Method used should be noted, e.g., estimates w/distance training, estimates w/o distance training, rangefinder or measured with tape measure, etc.

5. Record "fly-overs" as "FO" in the distance column of the data sheet.

6. If you disturb a mountain plover while approaching the point, estimate the distance from point-center to the spot from which the bird was flushed.

7. Conduct counts for 5 minutes with a 3 minute subsample to standardize with BBS.

8. Stay close to your vehicle while scanning.

Recording Data

Record the following information AT EVERY POINT, EVERY DAY.

- start time
- unique point code (don't duplicate within a field crew or across dates)
- number of mountain plovers and distance to each
- land use and/or habitat type (e.g., fallow wheat, plowed, shortgrass)
- temperature, Beaufort wind, and sky conditions (clear, partly cloudy, overcast)
- Information on the data sheet somewhere.
- your name and address
- date
- Record for each point at some point during the census.
- detailed location description of each point count including road number, distance to important intersections.
- record transect and point locations on USGS county maps.
- Universal Transverse Mercator from maps or GPS are useful.

GENERAL HABITAT INDICATORS

Positive habitat images

Stock tank (non-leaking, leaking tanks often attract killdeer)

Flat (level or "tilted) terrain

Burned field/prairie/pasture

Bare ground (minimum of 30 percent)

"Spaced" grass plants

Prairie dog colonies

Horned larks

Cattle

Heavily grazed pastures

Opuntia pads visible

Negative habitat images

Killdeer present (indicating less than optimal habitat)

Hillsides or steep slope

Prominent, obvious low ridge

Leaky stock tanks

Vegetation greater than 4 inches in height

Increasing presence of tall shrubs

Matted grass (i.e., minimal bare ground)

Lark buntings