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Forestry Research West

August 1996

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A report for land managers on recent developments in forestry research at the four western Experiment Stations of the Forest Service, U.S. Department of Agriculture

Forestry Research West

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Western Forest Experiment Stations

Pacific Northwest Research Station (PNW)
333 S.W. First Avenue
Portland, Oregon 97204

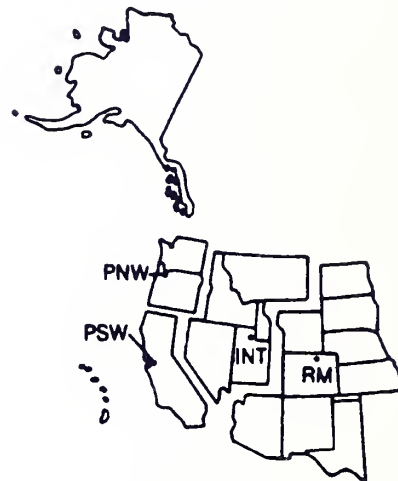
Pacific Southwest Research Station (PSW)
P.O. Box 245
Berkeley, California 94701

Intermountain Research Station (INT)
324 25th Street
Ogden, Utah 84401

Rocky Mountain Forest and Range Experiment Station (RM)
240 West Prospect Street
Fort Collins, Colorado 80526-2098

Cover

Intermountain Station Research Engineer Pete Robichaud measures the amount of organic material consumed on the soil surface by prescribed fire. He and other scientists are studying the impacts of land management activities on water quality and quantity. Details begin on page 13.



Perceptions of grazing on Forest Service land

by John Mitchell and
Rick Fletcher
Rocky Mountain Station

The subject of livestock grazing on public lands can evoke strong feelings both within and outside the ranching profession—by proponents and opponents alike. Ecological, sociological and economic considerations all have been used to drive arguments. Not since passage of the 1934 Taylor Grazing Act has there been more interest in livestock grazing on public lands. People who determine grazing policies, along with those who manage public lands according to these policies, are often assailed by those with opposing views.

Judging if or how much perceptions and attitudes of the general public differ from those of non-governmental organizations and other advocacy groups can be a difficult task for resource managers. In one recently published study, public attitudes toward federal range management practices indicated a prevailing criticism of current range policies, a belief that range condition is worsening, support for increasing grazing fees, and uncertainty about range-specific issues.

Public opinions about issues such as grazing are affected by both dispositional and situational factors. That is, visitors to public lands arrive with certain preformed ideas which are influenced by what they see and experience. Although natural resource managers have no control over visitor disposition, they can attempt to modify situational factors to ameliorate

conflicts over outcomes of ecosystem management. Any strategy for dealing with situational factors affecting range management requires information that identifies what the public experiences while visiting rangelands, how they think about grazing on public lands in general, and what the sub-issues or beliefs are that shape attitudes about grazing.

To help address these issues, the Forest Service, in cooperation with Colorado State University, conducted two studies on the Big Cimarron watershed, Ouray Ranger District, Uncompahgre National Forest in southwestern Colorado. John Mitchell, range scientist with the Rocky Mountain Station, says,

“Our study addressed two objectives: 1) we wanted to understand visitors’ perceptions of grazing on Forest Service lands managed for multiple uses; and 2) we wanted to evaluate the effects of interpretive messages on those perceptions.

Study site

Historically, the area was grazed by cattle and sheep. Timber harvesting and recreation were secondary uses. During the past 20 years, however, recreation has greatly increased on the watershed. Sheep are trailed through the allotment in early summer and late fall, but the area is grazed mostly by about 600 cows and their calves.



Sheep are trailed through the Big Cimarron study site.

Sampling methods

Visitors were surveyed between June and mid-October at both developed and dispersed recreation sites. Sampling units consisted of parties who were camping or recreating together. Completed surveys were later collected or returned by mail. Over 630 questionnaires were distributed in 1992, with 508 returned, and 619 distributed in 1993, with 478 returned. The survey consisted of five sections:

Table 1. Primary sources of perceived interference noted by visitors to the Big Cimarron watershed, Uncompahgre National Forest, Colorado during 1992 and 1993.

Source of interference	Percent noted
Cattle	9
Other people	7
Road conditions	6
Weather	5
Insects	5
All-terrain vehicles	4
All other sources	16
No interference noted	48

1) The first part recorded trip characteristics, activities, motives for the visit, social and biophysical impacts noticed, factors affecting satisfaction or dissatisfaction with the visit, and suggested management changes that might correct sources of dissatisfaction. The second part of this section provided visitors a list of 12 categories of people and animals that use the National Forest. They were asked to indicate whether each added to,

neither added nor detracted, or detracted from their overall experience.

2) The second section was designed to measure visitors' perceptions of cattle grazing on the watershed. Responses were based upon actual encounters with livestock in order to show whether grazing-related conditions added to or detracted from their visit, and the kinds of encounters that were most and least acceptable. The next section contained a list itemizing 15 descriptors of where cattle might be found, cattle-related conditions, and facilities. Respondents were asked to indicate whether seeing or experiencing a given condition added to, neither added nor detracted, or detracted from their overall visit. Respondents were also asked under which circumstances they would least like to encounter livestock, and circumstances under which encounters would be most favorable.

3) The next section asked respondents to take a position on the overall public lands grazing issue, and then respond to 22 statements that represented pro and con viewpoints.

4) This section was designed to determine how well the public understands technical terms and ideas used in range management such as: multiple use, ecosystem, grazing allotment, habitat, riparian area, range condition, permittee and wilderness.

5) The fifth section asked respondents about the communities in which they grew up and currently reside, how often they ate meat, age, ethnicity, level of education and household income.

Results

Because of the questionnaire's format, respondents answered several open-ended questions about their visit before it became apparent to them that the study focused on grazing. Of the visitors who mentioned that

Table 2. Categories of people and animals most likely to detract from and add to overall experience of National Forest visitors (percent) in the Big Cimarron watershed, Uncompahgre National Forest, Colorado.¹ Taken from a list of 12 possible categories.

	1992 n=490 (percent)	1993 n=450 (percent)
Detracting		
Off-road vehicles	40	43
Livestock	34	26
Dogs or other pets	31	34
Other people	27	33
Mountain bikers	18	21
Horseback riders	11	8
Adding		
Wildlife	90	90
Forest Service staff	52	50
Fishers/hunters	38	36
Campground hosts	38	49
Other people	34	29
Livestock	32	30

¹ Respondents chose from answers on a five-point scale: adds a lot, adds some, neither adds nor detracts, detracts some, detracts a lot.



Cowboys herding livestock is one of the more positive encounters for the public.

something interfered with their visit (47 percent), livestock was the most frequently mentioned, followed by road conditions, other people, noise, insects, off-road vehicles, weather and other factors (table 1).

How respondents evaluated the 12 categories of people and animals that are commonly encountered on the Big Cimarron watershed is shown in table 2.

As an initial reaction, slightly more than 60 percent of all visitors were at least conditionally agreeable to grazing in the Big Cimarron area; however, about one-quarter of those with a positive reaction tied their support to some aspect of good management. About 20 percent had initial reactions opposing

livestock grazing (table 3). During both years, about three-quarters of the respondents actually encountered livestock sometime during their visit.

The most detracting kinds of encounters were related to campsites and hiking trails. Visitors did not like cattle or manure in or near campsites, nor along trails. They also felt that the presence of flies in areas where cattle congregate were detracting.

Livestock encounters that added the most to visitor experience, or were at least more acceptable, tended to be associated with rangeland scenes such as cattle in the distance, cowboys herding stock, and calves with their mothers.

Table 3. Initial reaction of visitors to livestock grazing in the Big Cimarron Watershed, Uncompahgre National Forest, Colorado (categorized from open-ended responses).

	1992 n=475 (percent)	1993 n=475 (percent)
Positive	44	48
Positive if managed for	16	16
Neutral	8	10
Negative	23	17
Unclear position ²	8	9

² An "unclear" response means one that could not be categorized as positive, neutral, or negative during content analysis.

About two-thirds of all respondents chose an agreeable or a conditionally agreeable position about allowing grazing on public lands. About one-in-five stated they did not know enough about public lands grazing to form a position.

Management implications

"More than two-thirds of the visitors who responded to the questionnaire found grazing on public lands to be at least conditionally acceptable," says Mitchell. "However, more than one-half of those predicated their support on proper management, which for many, meant actions to ensure good range condition, protect streams and lakes, and reduce conflicts with people. This should be useful information for those promoting sustainable multiple-resource management for Forest Service lands," he said.



Campgrounds are sites where livestock are not welcomed by most visitors.

When the findings are compared to those of a recent nationwide survey, one important difference emerges. One-third from the nationwide survey agreed that grazing should be banned on federal rangelands, while only 14 percent of the visitors to the Big Cimarron area found cattle grazing to be totally unacceptable. Mitchell says that the distinction probably results from differences in the two sampling populations. People who actually visit Forest Service lands may be somewhat more likely to identify with a policy that allows grazing than does the general public.

“Individuals and groups who interpret this as being sympathetic to grazing should also keep the following points in

mind,” says Mitchell. “First, our study took place in an area that had a relatively high percentage of local and regional visitors who are likely to be more familiar with livestock as part of their everyday environment than other visitors. Second, the study site was a montane area in relatively good overall range condition. Scientists believe that additional studies in other areas will be needed to gain a more complete perspective of the sentiments of those who witness grazing on public lands.

Suggestions for range and recreation managers

Allotment analysis and allotment

management plans (AMP's) tend to focus on environmental factors such as range condition, wildlife needs, and watershed condition. With increasing visitor use, **AMP's could include a number of social-impact criteria** that can be used to moderate potential conflicts between livestock and visitors.

The timing of allotment activities is important, as well. Moving cattle along roadways and onto or away from an allotment could occur during weekdays and periods of lower visitation. When livestock are moved, it may be important to adjust visitor expectations, such as posting signs announcing this activity.

Minimizing the time that higher densities of cattle are found near visitor-use areas as cattle are brought into or shipped from the allotment may reduce perceived impacts to the visitor experience. During peak visitation periods, it may be worthwhile to **have riders moving livestock away from lakes, streams, and other visitor sites.** This can reduce the encounters with livestock near camps, trailheads, streams and lakes.

The location of recreation facilities and livestock handling facilities, including fences, watering structures and salt, is a pertinent consideration. **The location of recreational use areas might also be considered in the AMP.**

Riparian zones are of special importance to visitors.

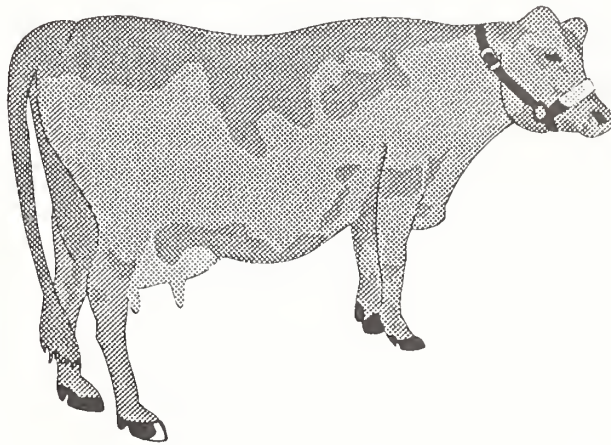
Monitoring that uses both social and biophysical indicators in riparian areas may be most efficient in controlling visitor-livestock conflicts.

Information and education can be important tools to affect visitor perceptions and

attitudes. Results show that the predominant position on grazing selected by respondents is one where support for grazing hinges on the person's knowing that good management is occurring or that improvements are being made. However, providing interpretative materials that explain about rangeland health will only succeed if management actions have led to, or are

heading toward, satisfactory range condition.

Additional details about this study and its findings are available in a new publication titled *Visitor Perceptions About Grazing on a Forest Service Cattle Allotment*, Research Paper RM-321. It can be ordered from the Rocky Mountain Station.



Forest restoration research in the Hawaiian Islands

by Eugene Conrad (retired) and Connie R. Gill
Pacific Southwest Station

The islands of Hawaii are characterized by a limited resource base that continues to be exploited, and limited knowledge of how these resources should be managed. Plant species have become extinct before they could be identified and studied, soils have been depleted or eroded, streams and coastal areas silted, fisheries destroyed or polluted, and forests converted to non-forest vegetation.

The Pacific Southwest Station's Institute of Pacific Islands Forestry in Honolulu provides public and private land owners in Hawaii with technology needed to maintain and restore the ability of forest lands to produce raw forest products that employ citizens of Hawaii, to provide habitat for plants and birds, and to assure a supply of clean water.

An important research endeavor, currently underway, focuses on restoring ecosystem structure and function to degraded forest lands.

The Hawaiian islands are an isolated archipelago, a few million years old, and are surrounded by thousands of miles of ocean. Isolation and youth of the land have given Hawaii the distinction of being home to more endemic plants than any other state in the United States. Hawaii's plant communities contained 1,094 native plant taxa (species and subspecies). Today, at least 107



Two-year-old koa tree planted in the Hakalau Forest National Wildlife Refuge at 6,500 feet on the windward side of Mauna Kea.

of those are extinct. Hawaii also has more threatened and endangered plant species than any other state (the last federal listing revealed 280), and is home to 30 of the nation's endangered birds.

Since the arrival of people, less than 2,000 years ago, 869 introduced plant taxa have established in the wild—most since 1778. Thousands more have failed to establish, and introductions continue at an alarming rate. No other state compares with Hawaii, where nearly half of the plant species, and almost all of the mammals, have been introduced in the last 200 years.

Impacts

Biological: Isolation and

geologic youth result in many opportunities for new and aggressive weeds to find a niche and occupy it. Native species find themselves competing with aggressive alien plants that have few, if any, natural enemies. Reduced growth and regeneration of native species is one direct outcome of such competition.

Economic: At present, the premier endemic tree in Hawaii is koa. Reduced productivity may affect several hundred jobs in the State, and take nearly a \$40 million bite out of the economy. Forest managers need fast growing forests in order to meet the demand of local makers of furniture and crafts like ukuleles, guitars, bowls, baskets, picture frames, and rocking chairs. Products stamped "grown and made in Hawaii" fetch the highest prices. But native forest wood resources are scarce. Increasing the supply is a long-term proposition, and with the demise of the sugar and pineapple industry, many thousands of acres of former forest land are available for growing trees. Whether koa and other native species can be grown in plantations is not known.

High-quality, fast-growing, non-indigenous trees may have a place in restoring forest ecosystem processes to abandoned agricultural land, and could provide raw materials for forest industries. They would also lessen pressure on native

species and native ecosystems, allowing recovery from past overuse.

Tourism: Hawaii had 6,455,000 visitors in 1994; 83 percent came for pleasure, spending more than \$18.9 billion and generating 213,000 jobs. A sizeable number of visitors were “nature-based” tourists who spent an estimated \$413.2 million.

Nature-based visitors are not traditional urban- or park-tourists, but rather travel to see that part of Hawaii that is truly natural and native. Few want to look at a forest of introduced species. The mystic and cultural value of a Hawaiian experience are often threatened when native forests and associated ecosystems decline.

Prevention

Weeds are in Hawaii because of people, and only people can bring about the control of this invasion. It will take an integrated approach using cultural, biological, mechanical, and chemical methods. Cooperation among organizations is the keystone of prevention and control. State and Federal agencies, private owners of forest and agricultural land, and the general public are essential participants in the battle against forest weeds. One such cooperative effort started more than 12 years ago when five agencies, including the USDA Forest Service, agreed to

develop biological weapons to combat forest weeds.

Techniques

Scientists at the Institute of Pacific Islands Forestry use their specialized knowledge of forest ecology, silviculture, and insects on cultural and restoration biological techniques. The cultural focus develops techniques for restoring forest health by helping native species compete with introduced species. Reintroducing koa and other native plants to land that was converted from forest to pasture is part of that approach. Improving survival of planted trees is another. For example,

researchers provided guidance to the USDI Fish and Wildlife Service staff at the Hakalau Forest National Wildlife Refuge to plant almost 150,000 koa seedlings. After 1 to 8 years most of the koa trees planted below 6,000 feet elevation were vigorous and growing rapidly.

Research on ecological and physiological functions provides needed knowledge about interactions between the trees and their habitat. For example, killing frost is a major cause of koa seedling losses at elevations above 6,000 feet. Providing partial shade from early morning sunlight has prevented seedling death caused by high energy sunlight exposure just after a



Koa seedlings established after this abandoned pasture was scarified by a bulldozer-pulled disk harrow. The seeds, which lay dormant in the soil for decades, probably came from the large fallen koa at right.

predawn freeze. At minimal cost, first- and second-year survival has increased from less than 40 to more than 80 percent. Once the trees are six to eight feet tall, their sensitive growing leaders are above the zone of most killing frost.

Koa is not just a plant worth thousands of dollars as a standing tree, it plays a critical role in restoring a damaged ecosystem. Research indicates that koa, a nitrogen fixing legume, may drop several hundred pounds per acre of nitrogen in leaf litter every year. When koa stands are established in abandoned pasture at 6,500 foot elevation, introduced grasses and forbs are shaded out, thus reducing competition with native understory species.

Soils become more acid and phosphorus is more available. The roots of koa penetrate deeper into the soil, bringing into active circulation nutrients which had leached below the rooting zone of grasses.

Biological control is one weapon to control an introduced forest weed when it has become established. The concept appears straight-forward: scientists find natural predators of the weed in its native habitat, bring them to the existing weed infestation, and release them so they can eat the weed, thereby slowing its growth and preventing it from reproducing. Unfortunately, this approach can be as hazardous as the most violent chemical agent. The biological control agent is an

introduced species and if it becomes established, it could become another problem. The agent could prey on non-target plants or compete with closely related native organisms or even have genetic compatibility with a native organism.

The Institute of the Pacific Islands Forestry has been asked to apply its experience with insect and disease organisms in forest environments to lead control efforts to combat introduced forest weeds. One task is to conduct biological investigations on insects potentially capable of attacking weeds. Another is to test plant/insect interactions in quarantine to determine if the potential agent will attack any non-target plants. After insects are released, studies are conducted to determine the success of their establishment and impact on target plants. Research helps provide knowledge for maximum assurance that insects released to control a forest weed are limited to the target, do not threaten any native plant or valuable crop plant, and successfully impact the target weed.

Scientists have provided data that have been used for obtaining permits to release two insects on banana poka (*Passiflora mollissima*), one on faya trees (*Myrica faya*), and four on gorse (*Ulex europaeus*). Banana poka is a vine that covers the crowns of young trees and can even get into the tops of



Techniques for propagating native forest species are developed by Institute personnel.



An Ohia planted beneath a stand of nine-year-old koa experiences much less competition from introduced pasture grasses than it would in the open.

fully mature trees including koa, ohia lehua (*Metrosideros polymorpha*), and nearly any other native tree or shrub. This vine effectively kills young trees by causing mechanical damage and by preventing sunlight from reaching the leaves. Faya trees

displace native plants by competition and by increasing available nitrogen to benefit a different suite of plants. Gorse is a spiny shrub found in subalpine sites on land converted from forest to grassland. Neither cattle nor people can penetrate solid

stands of gorse and its dense shade prevents natural forest regeneration.

Sustainability

Roughly half of Hawaii's 6,300 square miles is forested, while less than half of Guam and the Commonwealth of the Northern Mariana Islands and perhaps two-thirds of American Samoa are forested. These Pacific territories are showcases of our tropical forests.

Management strategies for these islands must focus on economic and biological ways to maintain productive forests that are mostly native. Research that is needed to support these strategies include understanding the roles of different species of forest plants and providing answers about how to propagate them, get them back into the wild, and produce fiber and habitat necessary to sustain island economy and life.

Privatizing forest land in New Zealand: for the US?

by Sherri Richardson
and George Stankey
Pacific Northwest
Research Station

There has been much talk on the political front in the United States about restructuring the management of public lands, including the National Forests. Among the various alternatives being discussed is the idea of privatization; conveying these lands and the resources they hold, to the private sector. Many reasons are cited for this, including an ability to increase the economic return from these lands and the ability to make their management more responsive to local concerns and needs.

In New Zealand, the idea of privatizing public land has moved beyond the debate stage and is now a reality. Around the world, natural resource managers and researchers are watching this effort closely to learn if it will indeed prove to be successful and what the impacts on the forests, communities, and economy will be. Two such interested persons are Roger Clark, Manager of the People and Natural Resources Program at the Pacific Northwest (PNW) Research Station's Forestry Sciences Lab in Seattle, and George Stankey, Research Social Scientist with the program in Corvallis, Oregon.

"We've heard talk at various political levels, from the counties to Congress, about the 'New Zealand' model, but in fact, not many people understand fully what New Zealand did, or perhaps more importantly, why they did it. However, when you understand the background and

context of the experiment, the idea that we could import that model uncritically to the U.S. is highly questionable," they explain.

Defining the New Zealand model

What exactly is the New Zealand model and would it work in the United States? Clark and Stankey have been interested in examining alternative institutional arrangements for natural resource management, making research and the efforts undertaken in New Zealand important to understand. Many of that Nation's environmental controversies mirror those in the U.S., and the historical manner in which resource management and

research have been conducted also are similar to that in the U.S. Thus, the experience of the New Zealanders could hold important lessons for the U.S. as we struggle to deal with similar issues.

Between 1970 and the early 1980s, New Zealand found itself in an increasingly difficult economic situation. For example, inflation had risen to nearly 14 percent per annum. A report by the International Monetary Fund had concluded that for all intents and purposes, New Zealand was bankrupt. The country's standard of living had slumped to 91st out of 105 major countries, a collapse from 1954 when it was ranked second in the world. Then, in 1984, with a change in



The privatization of public forests in New Zealand involved only the plantations of exotic Radiata pine, which represented only about 10 percent of all public forest land. (photo credit: Jim Boyle, Oregon State University).

government, a decision was made to begin dramatic governmental reform. This included a decision to increase the return on a number of state-owned assets; this was to be achieved through conversion of several governmental enterprises into so-called "State-owned Enterprises" or SOEs. This included organizations such as Air New Zealand and New Zealand Post; it also included the New Zealand Forest Service. The intent was to treat these activities as private sector businesses and to require them to perform profitably. This overall restructuring of government was grounded in free-market principles, deregulation, and user pay; it also foresaw an end to subsidies and other protective mechanisms, such as tariffs.

New Zealand Forest Service is dissolved

In this dramatically rapid change, the 70-year-old New Zealand Forest Service was dissolved, replaced by the Forestry Corporation. A key feature of this reorganization was all indigenous forests were taken from the forestry agency and placed under administration of the also newly created Department of Conservation.

Forest Corporation was left with the management of only the plantation forests, composed almost wholly of exotic stands of radiata pine. Thus, literally overnight, the management of

New Zealand's forests changed, with 12 million acres of indigenous forest now managed by the Department of Conservation—and off limits to any timber harvesting—and the 1.3 million acres of plantation forests now under management of a publicly owned corporation, which would be required to operate according to free-market principles and in which managers would be required to show a return on the investments, as would any private business.

Rather than privatizing all of the previously owned public forests, the privatization action affected only the exotic plantation forests, which represented only about 7 percent of all New Zealand forests and perhaps 10 percent of the forests previously controlled by the New Zealand Forest Service before its dissolution into the Forestry Corporation.

Although the Forestry Corporation showed an almost immediate profit to the New Zealand government, it was destined to be a short-lived institution. For a variety of reasons, some explicit, others not, a decision was made to move the plantation forests from management by a publicly owned corporation to full privatization. Only 3 years after the creation of the Corporation, the government announced plans to begin auctioning off the plantations to the highest bidder. Today, those sales virtually have been completed; only a few

thousand acres remain under management of the Forestry Corporation, which itself has been reduced to a skeletal staff. Purchasers of the forests include both domestic and foreign owners.

The sales themselves have important caveats. Perhaps most importantly, purchasers acquire the rights of access to the timber, not the land. Two key reasons for this proviso can be cited. First, there are several pending claims to many of the lands on the part of New Zealand's traditional people, the Maori. There is an ongoing forum through which these claims are examined. New Zealand officials concluded that retaining title to the land would expedite resolution of any conflicts stemming from these claims. Second, there was a concern that selling off New Zealand sovereign territory to foreign owners was simply going to prove unacceptable to the people of the country.

Could forest management change in the United States?

In scarcely a decade, the management of New Zealand forests, both indigenous and exotic, has undergone dramatic change. Could such a change occur here? Are the conditions in place in the U.S. that would allow such a radical restructuring of forest tenure and management to take place?

Obviously, any answer to such questions must be speculative. It is important to understand, however, those underlying features of the New Zealand situation that were present during this period of reform; from such an analysis, both similarities and differences between the two countries might be observed.

First, as noted earlier, the extremely serious economic conditions of New Zealand in the early 1980s gave rise to an especially heightened sense of urgency that something had to be done and done quickly, lest the situation deteriorate to a catastrophic level. In many ways, the sentiment among many was "How could things be any worse?" The Nation's plantation forests were seen as a major source of capital; moreover, the history of a lack of any return to the government on its investments in forestry led many to conclude that, at a minimum, the restructuring would at least lead to an end in a flow of cash from the national treasury to the agency.

Second, the increasingly acrimonious conflict between forest managers and the environmental movement in New Zealand was seen as unproductive and inimical to the national well-being. Breaking the nexus over timber harvesting was seen as a crucial need. This was especially so with harvesting of New Zealand's indigenous forests. Thus, in the decision to restructure New Zealand forest management, the decision also

was made to end any further harvesting of publicly held indigenous forests.

A key message in this decision is that there was insufficient trust within either the government or public at large to leave the New Zealand Forest Service in charge of either the plantations (designated for commercial production) or the indigenous forests (designated for conservation). As noted earlier, a new government agency was established—the Department of Conservation (DOC)—and given responsibility for management of the indigenous forests.

Westminster system facilitates change

A third key element is that the particular form of government, founded on the Westminster system, facilitated rapid change. Under the Westminster system, the party in power holds sway (in U.S. terms) in both executive as well as legislative terms. Thus, although there can be extremely contentious discussions within the party, once a policy decision is arrived at, its execution and implementation is virtually assured. The normal kind of "checks and balances" between the executive (i.e., White House) and legislative (Congress) with which we are familiar is not present in the same fashion in New Zealand.

The move to privatization of the New Zealand forests, therefore, has interesting implications for

U.S. policymakers, but can hardly be thought of as a simple template from which we construct a similar undertaking here. There are major differences in the scales involved; the total area of New Zealand is about the same as the state of Oregon.

The forest lands that were privatized—the exotic pine plantations—have always been defined, in both legal as well as conventional terms, as being for production; in the U.S., it is less easy to make a clear distinction between those lands designated solely for production and those for multiple uses and benefits. Moreover, these plantation forests stand in stark contrast in both symbolic and visual terms to the indigenous forests; in this sense, they have always been seen as "different" and perhaps even foreign. And, again it is important to note the differing political structure of the two countries; the capacity for rapid and dramatic policy changes seems less likely in the American situation than in the system of Westminster government in New Zealand.

For more information about the New Zealand experiment in forest management, contact either Roger Clark, People and Natural Resources Program, Forestry Sciences Lab, 4043 Roosevelt Way NE, Seattle, WA 98105, Phone (206) 553-7817 or George Stankey, People and Natural Resources Program, c/o Department of Forest Resources, Oregon State University, Corvallis, OR 97331, phone (503) 737-1496.

Research gives foresters a crystal ball

by Dave Tippets
Intermountain Station

What effects do management actions have on water quality and quantity? That is often the most critical question to consider before natural resource managers select a management alternative, including no action.

Before the historic 1994 fires in the Boise and Payette National Forests (Idaho) died, managers considered the fires' potential to increase soil erosion. Managers worried most about those watersheds that provide spawning habitat for anadromous fish and where fires burned across the highly erosive soils of the Idaho batholith. What impact



Intermountain Station Hydrologist Bob Brown installs rain gauges around an experimental plot used to quantify soil erosion underneath an artificial rain simulator.

would salvage logging have on erosion? Could the mechanical impact of logging equipment on the hydrophobic layers formed in the soil by the heat of severe fires actually reduce the potential for soil erosion?

Then in the summer of 1995 a heavy rainstorm moved millions of tons of soil into the North Fork of the Boise River within just a couple of hours. The flood also washed away cars and homes.

Hydrologists had a hypothesis that salvage logging could be designed to reduce erosion potential where severe fires burned on the coarse granitic soils of the Idaho batholith, but they didn't have adequate data yet to prove or disprove the hypothesis.

Enter the scientists from the Intermountain Research Station's Engineering Technology Research Work Unit at the Moscow, ID Forestry Sciences Laboratory—Research Engineers Bill Elliot, Randy Foltz, and Pete Robichaud, who are charged with adding the forestry component to the large national Water Erosion Prediction Program (WEPP). Elliot is the project leader. Foltz is focusing on how forest roads contribute to soil erosion and Robichaud is studying how forest and fire management practices contribute to soil erosion.

WEPP is a complex computer model that describes the processes that lead to erosion. These processes include water



Intermountain Research Station intern Patty Liu measures rainfall underneath the artificial rainfall simulator used to measure erosion after a prescribed slash fire.

infiltration into the soil and runoff, and describe how soil detaches, is transported in water, and then is deposited. The Moscow team's contribution to WEPP will expand it to address disturbance processes such as road building, logging, and fire.

Before the computer model can be used in any given watershed, data must be put in for climate, slope, soil, and a management file that includes descriptions of plant communities and soil disturbance types. A structure file links hillslope element and channel elements together into the watershed version of WEPP.

When the Moscow team finishes adding their forest land component to the large computer model, land planners will be able to better predict erosion following planned forest management

alternatives. They will be able to assess, with a much higher level of certainty, events like the devastating flood on the North Fork of the Boise River. They will also be able to more effectively plan emergency watershed rehabilitation before the rain falls and the snow melts.

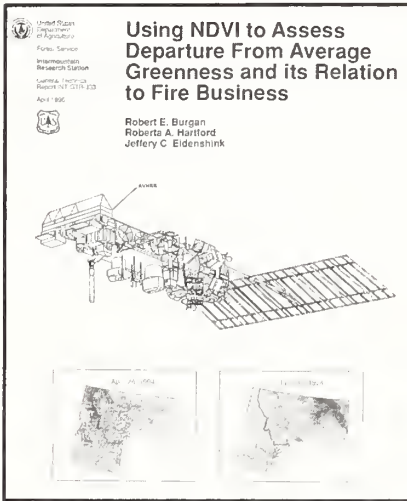
With the support of the Boise and Payette Forests, research crews simulated artificial rainfall on wide variety of roads and forested mountainsides. Some slopes were burned with fires of different severity; some slopes were logged. Research to build and improve the WEPP model for application on forest land is one of the Forest Service's highest priorities.

WEPP will provide foresters with the computer tools that will be like having a crystal ball to predict soil erosion on forested mountainsides.



Researchers collect sediment washed off a burned hillside plot by an artificial rain simulator.

New from research ✓



An outer space view of greenness reveals much about fire condition

Intermountain Station researchers Bob Burgan and Bobby Hartford worked with U.S. Geological Survey Remote Sensing Scientist Jeffery Eldenshink to discover the relationship between average greenness of vegetation and the moisture content of 1,000-hour fuels. In doing so, they demonstrated a new way that remote sensing data collected by satellites can be used in the fire business.

Using new vegetation index NDVI maps they calculated the average greenness for different times of the year. They found a relationship between that average greenness and the moisture in 1,000-hour fuels.

During the 1993 and 1994 fire seasons in Idaho and Montana

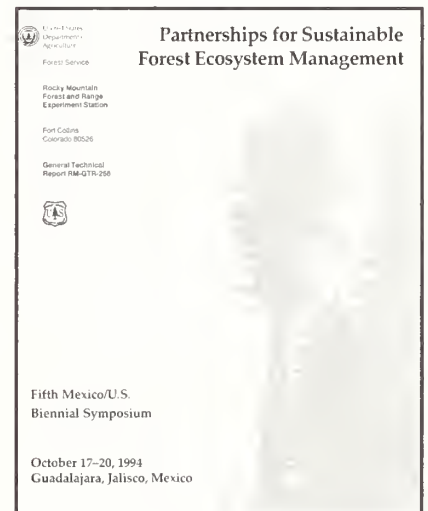
the departures from average greenness showed a relationship to area burned. This information may prove useful for broad-scale fire potential assessment.

To learn more, and get a copy of this publication that is illustrated with color reproductions of the satellite maps, request *Using NDVI to Assess Departure From Average Greenness and its Relation to Fire Business*, General Technical Report INT-333, from the Intermountain Research Station.

Partnerships for sustainable forest ecosystem management

Mexico and the U.S. have enjoyed a long history of institutional collaboration and cooperation in many forestry-related disciplines. To further and enhance this cooperation, a major symposium was held in late 1994 in Guadalajara, Mexico. The event brought together 500 policy makers, resource managers, scientists, indigenous people, industry and landowners. The symposium was designed to share information that promotes forest sustainability, emphasizing research-management interactions, building partnerships, and the need for a transdisciplinary approach to

sustainable ecosystem management. Over 30 invited papers, case studies and posters were presented. The proceedings are printed in both English and Spanish, under one cover. For your copy of *Partnerships for Sustainable Forest Ecosystem Management: Fifth Mexico/U.S. Biennial Symposium*, request General Technical Report RM-266, available from the Rocky Mountain Station.



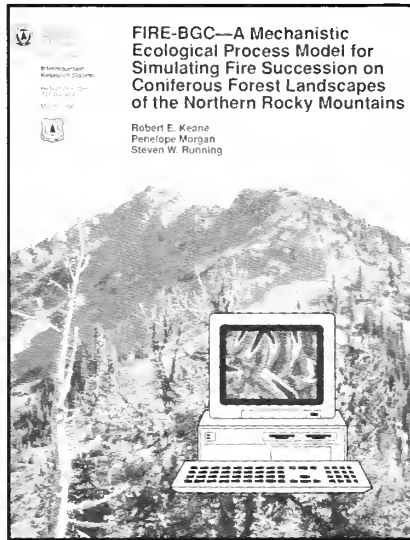
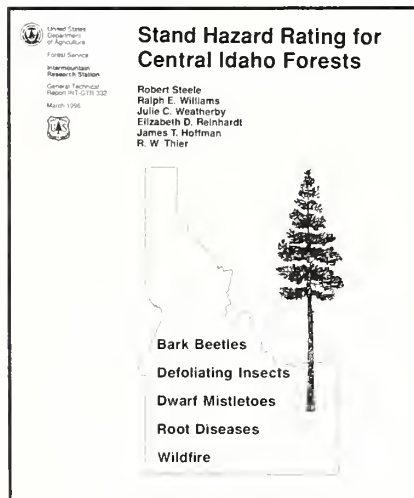
Stand hazard rating for central Idaho forests

The Intermountain Station, State and Private Forestry, and the Boise National Forest worked together to develop relative

stand hazard ratings for forests in Central Idaho.

Scientists considered 11 major ecological disturbance agents that can threaten forests. These major agents include Douglas-fir beetle, mountain pine beetle, western pine beetle, spruce beetle, Douglas-fir tussock moth, western spruce budworm, dwarf mistletoes, annosus root disease, armillaria root diseases, Schweintzii root and butt rot, and wildfire. The scientists considered the combined interactions of the agents.

The information provided in this publication helps managers to compare stands and identify which ones have the greatest forest health risk. For more information request, *Stand Hazard Rating for Central Idaho Forests*, General Technical Report INT-332, from the Intermountain Research Station.



Model for fire succession on coniferous landscapes

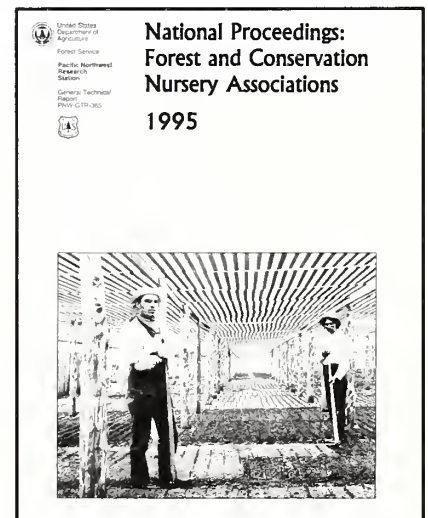
Intermountain Station Research Ecologist Bob Keane worked with Professor Penny Morgan of the University of Idaho and Professor Steve Running of the University of Montana to develop an ecological process model that simulates fire succession in the coniferous forests of the Northern Rockies.

The model, FIRE BioGeoChemical (FIRE-BGC), simulates long-term stand dynamics. Planners can use the model to investigate various fire scenarios, including prescribed burning, fire exclusion, and historical fire regimes.

Ecological processes such as fire and seed dispersal are simulated annually. Other processes, such as tree

establishment, growth, mortality, organic matter accumulation, decomposition, and undergrowth plant dynamics are simulated both daily and annually. A comparison of simulated predictions and data collected in the field showed that model predictions were within 10 to 30 percent of observed values.

Request, *FIRE-BGC—A Mechanistic Ecological Process Model for Simulating Fire Succession on Coniferous Forest Landscapes of the Northern Rocky Mountains*, Research Paper INT-484, from the Intermountain Research Station.



Proceedings from the forest and conservation nursery associations

This publication is a compilation of 23 papers that were presented

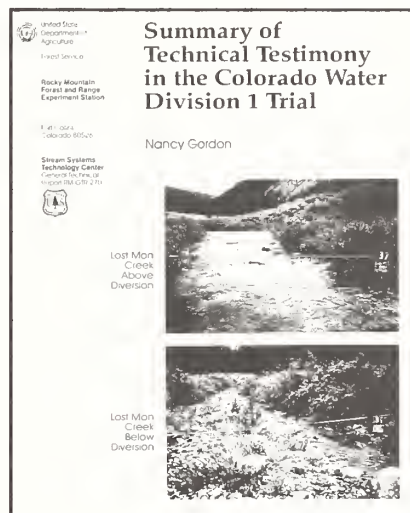
at the regional meetings of the forest and conservation nursery associations in the United States in 1995. The Western Forest and Conservation Nursery Association meeting was held in Kearney, NE, on August 7-11, 1995, and the Northeastern Forest Nursery Association Conference was held in Mitchell, IN, on August 14-17, 1995. The subject matter ranges from seed collection and processing, through nursery cultural practices, to harvesting storage and outplanting.

Request *National Proceedings: Forest and Conservation Nursery Associations 1995*, General Technical Report PNW-365, available from the Pacific Northwest Research Station.

Technical testimony in the Colorado Water Division 1 Trial

The Colorado Water Division 1 Water Rights Trial was one of the most significant federal reserved instream flow water rights cases to occur since the Supreme Court ruled in the case of *United States v. New Mexico* in 1978. The Rocky Mountain Station has just issued a report that summarizes the large amount of technical data and information pertaining to the disciplines of geomorphology, hydrology and sediment transport mechanics compiled and presented to the judge during the Water Division 1 Trial. For a copy,

request *Technical Testimony in the Water Division 1 Trial*, General Technical Report RM-270. A companion publication summarizes the history of federal reserved water rights, outlines the major issues argued in the case, and presents the court's decision. It is intended primarily for managers. For a copy of the executive summary, request *Summary of Technical Testimony in the Colorado Water Division 1 Trial*, General Technical Report RM-270a.



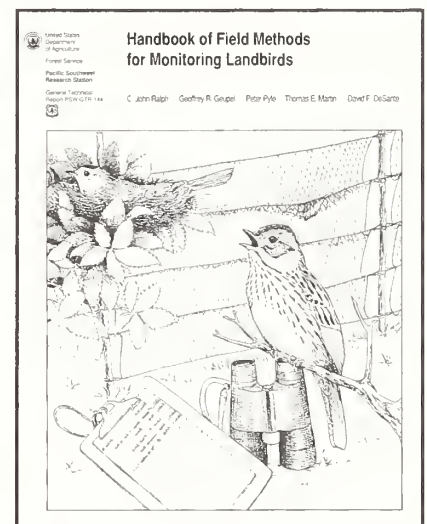
Field methods for monitoring landbirds

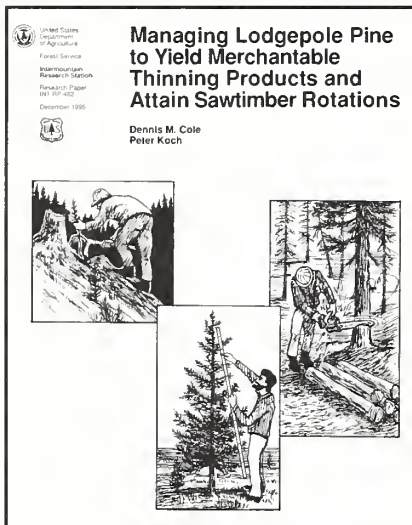
The need for specific methodology to monitor populations of terrestrial birds has resulted in the publication *Handbook of Field Methods for Monitoring Landbirds*. Based on the authors' collective

experiences in operating monitoring stations, the handbook includes methods for assaying population size, demographics, and status of virtually all species of landbirds.

Among the topics covered are selecting a monitoring method, determining station locations, determining which species can be monitored, establishing and maintaining a study plot, journal keeping, training personnel, measuring habitat, recording weather, and color-banding individuals to determine specific demographic parameters. Sources of materials needed for each method are given, as well as specific references to publications.

Request *Handbook of Field Methods for Monitoring Landbirds*, General Technical Report PSW-144, from the Pacific Southwest Research Station (at its distribution center in Fort Collins, Colorado).





efficient than it has often been in the past.

Management guidelines are suggested that include consideration of other resources such as wildlife, watershed, landscape and ecosystem management. Request *Managing Lodgepole Pine to Yield Merchantable Thinning Products and Attain Sawtimber Rotations*, Research Paper INT-482, from the Intermountain Research Station.

enhance forage quality and quantity. A new report from the Rocky Mountain Station describes how prescribed burning and timber harvest can be used to enhance the forage base. Scientists suggest that grazing systems designed to remove livestock from key winter ranges before late summer will provide a greater portion of the woody plants for deer use. The report also covers the need for research to focus on understanding how changes in Black Hills community patterns have influenced deer foraging strategies and habitat use, and on the need for ecologically based techniques to maintain consistent forage quality. Details are in *Managing Habitats for White-tailed Deer in the Black Hills and Bear Lodge Mountains of South Dakota and Wyoming*. General Technical Report RM-274 is available from the Rocky Mountain Station.

Managing lodgepole pine for thinning products and sawtimber

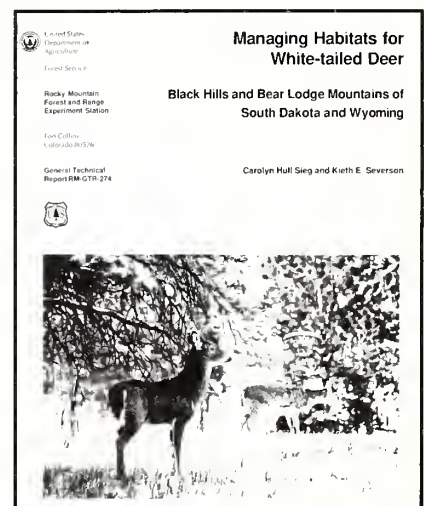
Intermountain Station researchers Dennis Cole and Peter Koch have developed a strategy to grow lodgepole pine to sawtimber size in 80 years and minimize the risks of barkbeetle attack and wildfire.

A publication detailing the studies suggests practical spacing patterns to achieve stocking control in juvenile stands. Stands are thinned at 30 years which produces an average stand diameter of 10 inches at 80 years of age.

The authors show how thinning at 30 years can provide economic recovery and include utilization of the resource. This may help managers make thinning more economically

Managing habitats for the white-tailed deer

The white-tailed deer is one of the most studied animals in North America, yet much of the available information has been derived in ecosystems different from the Black Hills of South Dakota. This region is unique in that the dominant tree species, ponderosa pine, has excellent regenerative abilities. This, combined with timber management practices and fire suppression efforts in the last century, has allowed pine to expand at the expense of other plant communities. A critical first step in maintaining viable deer populations in the Black Hills is identifying key winter ranges. Given that protein and energy are limiting in winter forages in this region, the emphasis of management should be to





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- 2) *Managing Lodgepole Pine to Yield Merchantable Thinning Products and Attain Sawtimber Rotations*, Research Paper INT-482
- 3) *Stand Hazard Rating for Central Idaho Forests*, General Technical Report INT-332
- 4) *Using NDVI to Assess Departure from Average Greenness and its Relation to Fire Business*, General Technical Report INT-333
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- 2) *Technical Testimony in the Water Division 1 Trial*, General Technical Report RM-270
- 3) *Summary of Technical Testimony in the Colorado Water Division 1 Trial*, General Technical Report RM-270a
- 4) *Managing Habitats for White-tailed Deer in the Black Hills and Bear Lodge Mountains of South Dakota and Wyoming*, General Technical Report RM-274
- 5) *Visitor Perceptions About Grazing on a Forest Service Cattle Allotment*, Research Paper RM-321
- 6) Other _____

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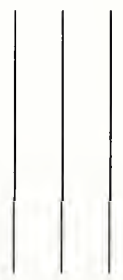
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- 1) *Handbook of Field Methods for Monitoring Landbirds*, General Technical Report PSW-144
- 2) *Mulching to Regenerate a Harsh Site: Effects on Douglas-fir Seedlings, Forbs, Grasses and Ferns*, Research Paper PSW-222
- 3) *Ecology and Conservation of the Marbled Murrelet*, General Technical Report PSW-152
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Marbled Murrelet: ecology and conservation

The Marbled Murrelet (*Brachyramphus marmoratus*) inhabits coastal areas of North America from Alaska to central California. The bird nests inland throughout most of its range on the wide upper branches of old, coniferous trees. Its nesting habits have remained largely unknown to ornithologists, and its nearshore feeding habits have made it difficult to survey.

Compiled and edited by the interagency Marbled Murrelet Conservation Assessment Core Team, this 420-page book includes 37 chapters on original studies and literature reviews of many aspects of the birds' biology, ecology, and conservation needs. It includes new information on the forest habitat used for nesting, marine distribution, and demographic analyses; and describes past and potential effects of humans on the its habitats. Future research needs and possible management strategies for both marine and forest habitats are suggested.

Request *Ecology and Conservation of the Marbled Murrelet*, General Technical Report PSW- 152, from the Pacific Southwest Research Station (at its distribution center in Fort Collins, Colorado).

Mulching to regenerate a harsh site

To promote a sustainable ecosystem and restore the natural forest to what had been pastureland, Douglas-fir seedlings were planted on the Arcata District, Bureau of Land Management, U.S. Department of the Interior, near Eureka, California.

Douglas-fir seedlings were released from a complex forb-grass-fern plant community by applying large and small durable mulches 1 month after planting. The large mulches were installed directly over the existing plant community, and the small mulches were applied over a scalp of similar size. Two-foot-square scalps and an untreated control provided additional comparisons. After five growing seasons, stem diameter of Douglas-fir seedlings with large mulches exceeded that of seedlings with small mulches. After 5 years, only seedlings with large mulches were significantly larger than counterparts with small scalps or in the control group.

Request *Mulching to Regenerate a Harsh Site: Effects on Douglas-fir Seedlings, Forbs, Grasses, and Ferns*, Research Paper PSW-222, from the Pacific Southwest Research Station (at its distribution center in Fort Collins, Colorado).

The economics of recreation

Recreation in the Pacific Northwest is a valuable resource. A method is described that translates recreation on Forest Service and Bureau of Land Management lands in northern California, western Oregon, and western Washington into economic value. By assigning recreation to land use type, the economic value associated with various land use changes can be identified. Results indicated that those land use changes resulting in more nonroaded recreational opportunities provide the greatest economic benefits. This is encouraging, given the move toward ecosystem management that many agencies are making, because more nonroaded opportunities will become available.

Request *Role of Nonmarket Economic Values in Benefit-cost Analysis of Public Forest Management Options*, General Technical Report PNW-361, available from the Pacific Northwest Research Station.

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