Bitterroot Ecosystem Management Research Project

# ECO-REPORT

A Progress Report from a Partnership in Landscape Level Ecosystem Management

SUMMER 1998

# Research-Management-Public Partnership Continues

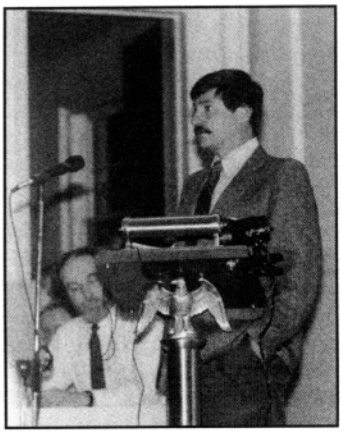
**by Greg Jones, Program Leader**

Can you believe it? The Bitterroot Ecosystem Management Research Project has been going on for nearly five years! It seems like only a year or two ago that Clint Carlson and others wrote the project's original proposal and began to develop it as a reality. Lots has been accomplished since then, as you can see in this and earlier editions of *ECO-Report*. The project has changed some along the way (see article on leadership, p. 2); chief among them for me was Clint Carlson's retirement and my subsequent appointment as leader of the project last December. Following Clint in this leadership role has been a bit like what a producer might face in making a sequel to the movie "Titanic"— except that the Bitterroot Ecosystem Management Research Project is *anything but* a sinking ship!

This April we held the project's fourth annual workshop. Breaking with the tradition of focusing on accomplishments of researchers and managers, this year we focused on presenting "the big picture" to the Bitterroot public and held the workshop in the Community Center at City Hall, Hamilton, so many Bitterrooters could attend. (See p. 3.) Summer is not even past, but we have already begun planning for the project's five-year symposium to be held May 18-20, 1999 (see below).

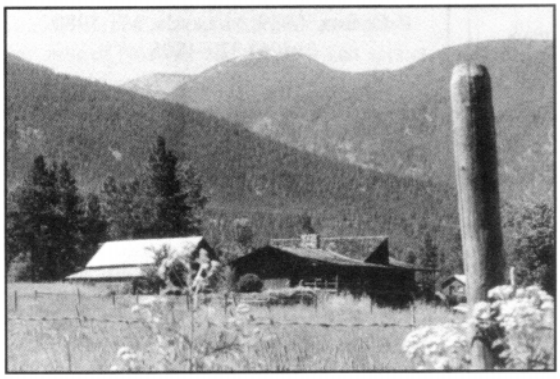
This spring, activity in the project has centered on developing our research prospectus for the next five years. Our mission is **to strengthen the scientific theory and practice of managing Rocky Mountain ecosystems at the landscape level in the context of social, economic, and ecological opportunities and constraints.** We will continue to conduct applied research addressing biophysical and socioeconomic topics (see "Objectives," p. 11). In the first five years, we have learned a great deal about fire regimes in low-elevation forests and habitat requirements of animal species. In the coming five years, we will increase our focus on mid- and high-elevation forests and aquatics, and we will integrate and synthesize knowledge about the land and its inhabitants at landscape scales.

Public participation will remain important in the Bitterroot Ecosystem Management Research Project. In the next five years we will explore the potential for collaborative management across landscapes of diverse ownerships and land use classifications. We will propose and test potential solutions to social, administrative, and environmental barriers to implementing ecosystem management. Finally, we plan to test new communications approaches. The project will continue to share research results with the scientific community, resource managers, private land owners, and the public. The future holds more changes, for sure, and plenty of challenges for all partners in ecosystem management.



*Greg Jones listens to a question during April 7 public workshop in Hamilton Community Hall. Photo by J.K. Smith.*

## Symposium to Wrap Up Five Years' Work



*Communities of living things from valley bottom to mountain top are the subject of Bitterroot Ecosystem Management Research Project studies and demonstrations. Photo by J.K. Smith.*

Partners in the Bitterroot Ecosystem Management Research Project have already begun to plan for a three-day symposium next spring (May 18-20, 1999) to discuss what has been learned in the first five-year phase of the project. Two days of presentations and panel discussions at the Holiday Inn Parkside, Missoula, will include reports from Project researchers and managers, comments from the public, and invited papers from other projects in ecosystem-based management from the western United States. A poster session Tuesday evening, May 18, at the Holiday Inn Parkside will feature research from the Bitterroot and throughout the nation. Bitterroot researchers and their posters will travel to the Community Center at City Hall, Hamilton, the next evening, May 19, for a dialogue with Bitterroot residents. The symposium's third day will be "in the field," a visit to research and management demonstration sites in the Bitterroot National Forest.

### Inside

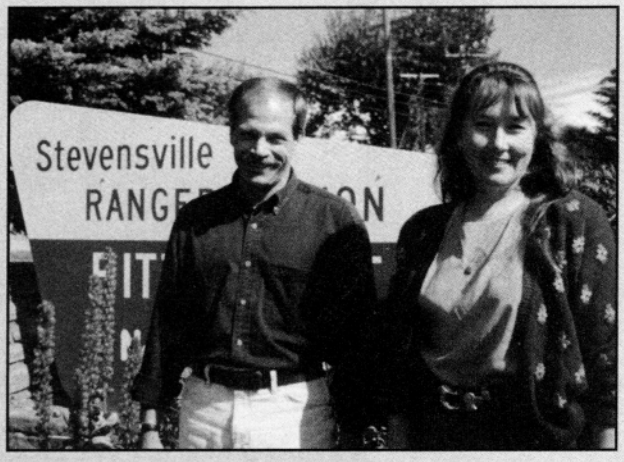
# Leadership Changes

**by Nan Christianson and Jane Kapler Smith**

The Bitterroot Ecosystem Management Research Project has seen several changes in leadership during the past year. Last December, Greg Jones, research forester and modeler with the Rocky Mountain Research Station, took over leadership of the project from Clint Carlson, the project's first leader. Project partners already know Jones as one of the developers of the Multi-resource Analysis and Geographic Information Systems (MAGIS) model used in planning for the Stevensville West Central area. Carlson, whose Forest Service career began in 1961 on the West Fork District of the Bitterroot, retired December 1. His retirement keeps him in the Bitterroot most of the time, teaching martial arts and helping his wife Sally from their new office/gym in Florence.

Within the Bitterroot National Forest, two leadership positions have new faces this year. Rodd Richardson was appointed Forest Supervisor following the retirement of Steve Kelly last December. The Bitterroot Ecosystem Management Research Project benefitted from Steve's steady support during the first four years of the project. Richardson transferred to the Bitterroot from the Flathead National Forest, where he served in both the Deputy and Forest Supervisor positions. Richardson helped host the presentation of research results from the Bitterroot Ecosystem Management Research Project at the Community Center at City Hall, Hamilton, last April 7 (see p. 3), and has participated in planning for the next phase of the project.

Leadership on the Stevensville Ranger District has also changed this past year. District Ranger Leslie Weldon helped initiate the project on the district and participated in early planning and research efforts. Tom Wagner began his tenure as Stevensville's ranger just as the project reached key decision points for the Stevensville West Central project. Last January, Tom became District Ranger for the Darby and Sula Ranger Districts, where he will continue to be involved in the Bitterroot Ecosystem Management Research Project. Nan Christianson assumed the responsibilities of Ranger at Stevensville in January of this year. Nan's background in recreation, community development, and collaboration brings new and valued perspectives to the project.




*New faces in the Bitterroot Ecosystem Management Research Project, Rodd Richardson (left) and Nan Christianson at Stevensville Ranger Station. Photo by Dixie Dies.*

# Field Trips 1998

The public joined researchers and managers on the afternoon of Tuesday, July 21 for "Managing Streamside Vegetation: Larry Creek Demonstration Project," a field trip to an area harvested in 1996-97 and burned in October 1997. Eighteen participants visited the area, which was treated to encourage regeneration of cottonwoods, aspens, willows and other broad-leafed shrubs. Presenters Mick Harrington (Rocky Mountain Research Station) and Matt Arno (University of Montana) described goals and treatments. Participants observed trees and understory plants growing in openings created by harvesting and fire. Mike Jakober (Bitterroot National Forest) reported research showing that the treatments did not alter sedimentation or water temperature in Larry Creek. Placement of logged trees across stream channels, he added, may enhance fish habitat structure over time, as the trees decay and collapse into the stream.

Two more Bitterroot Ecosystem Management Research Project field trips are scheduled for this year: Please call the Stevensville Ranger Station (777-5461) if you plan to attend!

*Matt Arno compares treated area with untreated area on the Larry Creek riparian restoration site during July 21 field trip. Photo by J.K. Smith.*

**"Whitebark Pine Forests and Responses to Blister Rust"**

Sat. Sept 19, 9 a.m.-4 p.m. Meet at Stevensville Ranger Station. Bring a sack lunch. Visit Smith Creek headwaters, site of whitebark pine demonstration treatments and plantings of rust resistant pine. Presenters: Bob Keane (Rocky Mountain Research Station), Janet Howard (University of Montana), and Cathy Stewart (Bitterroot National Forest).

**"Where Does all the Nitrogen Go? Soils, Nutrients, and Succession in Bitterroot Forests"**

Wed. Sept 23, 1-4 p.m. Meet at Forest Supervisor's Office, Hamilton. Visit Lost Horse demonstration sites. Presenters: Tom DeLuca (University of Montana), Steve Arno (Rocky Mountain Research Station), and Linda Pietarinen (Bitterroot National Forest).


## ECO-Report

Published by the
Rocky Mountain Research Station
P. O. Box 8089, Missoula, MT 59807
(406) 329-4805

Editor/Writer: Jane Kapler Smith

# A Century of Change in One Evening

**by Lucia Solorzano**

What kind of habitats will the Bitterroot National Forest provide over the next century—landscapes thick with Douglas-fir and ladder fuels, or graced by large ponderosa pine and shrubs? Riparian areas rich with breeding songbirds, or dense with fir and ripe for crown fire? About 70 people attended a workshop the evening of April 7 entitled "A Century of Change in Your National Forest— Findings from the Bitterroot Ecosystem Management Research Project." Participants heard researchers and managers discuss changes in the forest during the last century and possible changes in the next century:

- Steve Arno, Rocky Mountain Research Station scientist, described Mike Hartwell's research regarding the dramatic changes in tree composition that have occurred since the turn of the century. (See "Looks Easy on a Map," p. 10.)
- University of Montana Professor Carl Fiedler and Bitterroot National Forest Biologist John Ormiston discussed how native wildlife species have evolved in the presence of disturbances, including fire. Without fire old growth ponderosa pines are stressed by competition, and young pines cannot compete with invading Douglas-fir for sunlight, water, and nutrients.
- University of Montana Graduate Student Matt Arno and Bitterroot National Forest Wildlife Biologist Dave Lockman focused on healthy streamside vegetation, dominated by broad-leafed trees and shrubs, which provides breeding sites for songbirds. Without occasional fire, grand fir predominates instead. Conversion to grand fir increases the likelihood that a severe wildfire will kill all of the trees and fill the streams with sediment.
- Using patterns from the past to focus on the future, Forester Jimmie Chew (Rocky Mountain Research Station) used the computer model SIMPPLLE (Simulating Landscape Patterns and Processes at Landscape ScaLEs) to project how continued absence of fire would probably affect tree composition during the next century. He explained, for instance, that coverage by whitebark pine in upper elevation forests may decline 90 percent in the next 30 years.

*Carl Fiedler addresses public at workshop in Hamilton. Photo by J.K. Smith.*

Can Bitterroot residents affect the patterns of change in the forest? Yes, presenters agreed. Greg Jones, leader of the Bitterroot Ecosystem Management Research Project, invited the public to become involved "when the futures we predict are different from the futures we'd like to see." Workshop moderator and University of Montana professor Jim Burchfield asked participants to join him to explore opportunities for action in response to changes in Bitterroot forests. To contact Burchfield, call 406-243-6650.

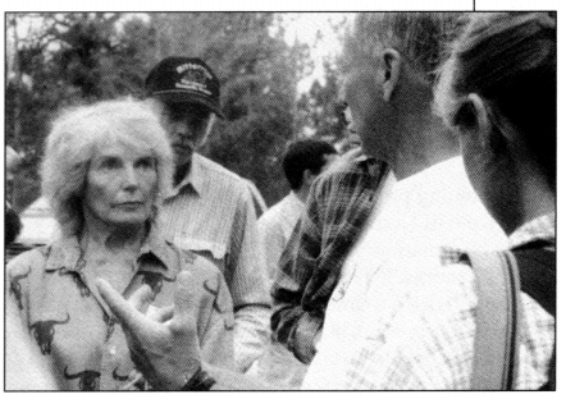
# Treatments for Restoring Ponderosa Pine

Visitors to the Bear/Fred Burr Demonstration Site on a field trip last July 29 found blackened tree trunks and dead saplings as evidence of a prescribed burn conducted ten weeks before. Other reminders included resprouting willows and a bright green sward of pinegrass flowering under the opened tree canopy.

Cathy Stewart, Bitterroot National Forest silviculturist, described treatments on the Bear/Fred Burr site: The formerly dense Douglas-fir/ponderosa pine forest was commercially thinned during fall and winter 1995-1996 using several different logging methods. Slash piles were burned; then the site was broadcast burned in May 1997.

Why treat this forest? In particular, why burn it? "To restore conditions under which a many-aged ponderosa pine forest can develop," Research Forester Steve Arno explained. "To increase forage for deer, moose, and elk," Wildlife Biologist L. Jack Lyon added. "To reduce ladder fuels and the risk of severe fire," Stevensville District Fire Management Officer Brooke Thompson replied.

Field trip participants included members of the public, researchers, and Bitterroot National Forest staff. Many participants commented positively on the green understory and open structure of the treated forest, but several were disappointed that numerous stumps were evident. Participants questioned the feasibility and desirability of treating large areas of forest to protect homes in the urban/wildland interface. Participants described aesthetic and spiritual values of the forest, and discussed how these harmonized or conflicted with the thinning and underburning done at Bear/Fred Burr.



*Clint Carlson (right) explains life cycle of Douglas-fir dwarf mistletoe to field trip participants at Bear/Fred Burr demonstration site. Photo by J.K. Smith.*

Participants also questioned the wisdom of using prescribed fire in spring, when birds are nesting. Jack Lyon responded the day after the field trip: "Raptors might nest in upland forest like that at Bear/Fred Burr, but both would use the biggest trees, so an underburn would not affect them directly. Most small birds nest in riparian sites rather than in upland conifer stands. Junco and Solitaire nest in cut banks, which do not burn."

# Planning for Collaboration

Research recently completed at the University of Montana may help guide revision of the Bitterroot Forest Plan. Professor Rebecca Richards and her student assistant, Krista McClusky, interviewed members of collaborative groups active in the Bitterroot Valley and on other regional national forests to determine how such groups might contribute to Forest planning.

Bitterroot National Forest staff defined for Richards and McClusky what they considered to be effective public participation. Using these criteria, the researchers talked with planners and members of collaborative groups on five national forests in the Northern Region. They found that, while effective collaborative planning efforts are diverse, they have many features in common. Richards and McClusky then compared these characteristics to descriptions of effective public participation from published articles about collaboration successes.

## Be Clear about the Process

The most important features identified in successful collaboration were the political structure of the agency and community expectations about that structure. A consultative ("top-down") decision-making structure like that of the Forest Service cannot easily accommodate cooperative ("bottom-up") participation in which members expect to have decision-making authority. Therefore, within a consultative framework (like that of the national forest system), collaborative groups must include the Forest Service representatives responsible for project implementation. Moreover, those representatives must frequently clarify the actual decision-making authority for other members.

*. . . while effective collaborative planning efforts are diverse, they have many features in common.*

Richards and McClusky identified other important features of successful collaboration. Respondents felt that goals should be specific and achievable within a relatively short time span. Public participants should be included early in a planning process to insure that members are aware of group goals and the "history" that precedes them. Moreover, group membership should be diverse and should represent the community so goals will be addressed from multiple viewpoints. To ensure trust and dialogue, members should represent themselves as individuals rather than as representatives of special interest groups. Information communicated through the local media and by word of mouth is disseminated more effectively than through formal bureaucratic channels. Finally, most collaborative groups depend on a facilitator to mediate and lead the process so the group can remain focused on common issues and avoid extreme positions.

## Many Recipes for Success

Having visited with planners on several forests, Richards and McClusky note that there is clearly no single "recipe" for success in public involvement. Since successful efforts depend on both existing and emerging public groups, they suggest that the Bitterroot National Forest not attempt to form a specific group to work on the Forest Plan. Instead they recommend that Forest Service representatives participate more actively in existing groups and any new groups that emerge. By doing this, staff can help integrate the forest's goals and visions into community planning, inform participants how their opinions might be used in Forest Plan revision, and identify common issues and short-term achievable goals that could be addressed in the Forest Plan.

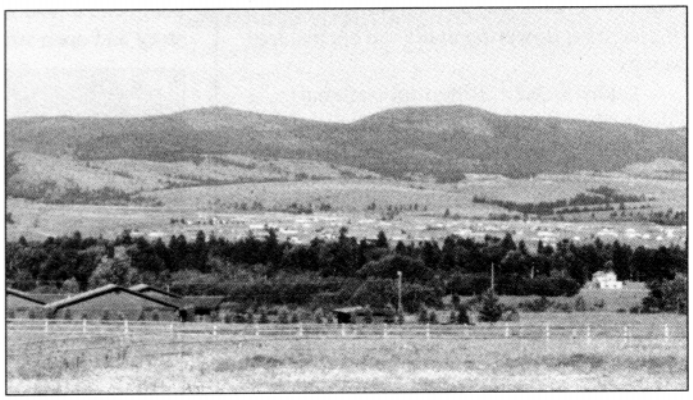
***Reports Available***

# Consensus Building and Use of Technical Information

University of Montana Professors Steve McCool and Wayne Freimund summarized two projects completed this spring for the Bitterroot Ecosystem Management Research Project. "Building Consensus: Legitimate Hope or Seductive Paradox?" by McCool and Graduate Student Kathleen Guthrie examines the viewpoints of scientists, agency managers, and public representatives toward consensus building in the Stevensville Southwest and West Central planning processes on the Bitterroot National Forest. Nearly every respondent felt the agency had been inclusive, the authors report, and also felt "the problem could be resolved through public participation." However, respondents did not agree on the definition of the problem addressed through the process and also disagreed about whether they could "live with" the agency's decision and give "permission to act." People varied in their capacity to assimilate the technical information presented at meetings.

Use of technical information in the two planning processes formed the basis for Freimund's report, "The Role of Computerized Communication and the Presence of Scientist Information in the Stevensville West-Central Ecosystem Analysis Process." Technical information was difficult for managers and the public to assimilate, he found. Managers learned the potential that science holds but also the data and time required to use it effectively. Frustration with partially completed research and models sometimes even interfered with dialogue, a result Freimund calls a "boomerang effect." "Managers must face the challenge," he concludes, "of keeping up on the workings of science, and being the primary conduit through which the public learns of scientific findings." An essential public role is to articulate values that are NOT described by science.

Copies of the completed reports are available. Call Jane Kapler Smith at 406-329-4805.



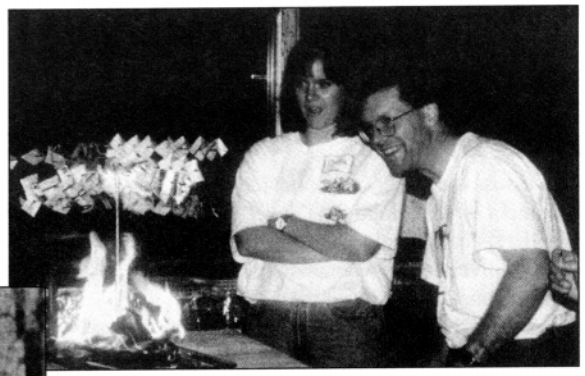
*The Sapphire and Bitterroot Mountains provide the backdrop for daily life in the Bitterroot Valley, while the valley's human community shapes the context for forest management. Convictions and viewpoints within the human community are the subject of Human Dimensions programs in the Bitterroot Ecosystem Management Research Project. Photo by J.K. Smith.*

# *Fire Works* in Classrooms

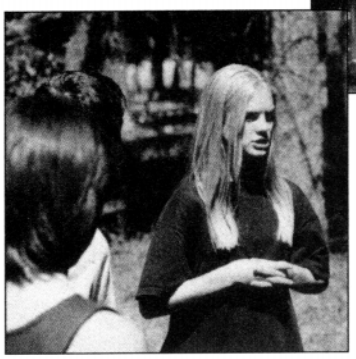
**by Gloria Weisgerber, Northern Region**

The Rocky Mountain Research Station's Fire Sciences Lab in Missoula, MT, conducts research on fire in the ecosystem, but staff want to make sure the product of the research reaches the public—even children. "Fire science is too interesting for researchers to keep it to themselves," says ecologist Jane Kapler Smith. This is why she and technician Nancy McMurray began to develop *FireWorks*.

*FireWorks* is a trunk full of educational materials about fire. The trunk includes fire-scarred tree cross sections ("cookies"), cones and bark samples for tree identification, and lots of pictures, posters, and books. It also contains hardware and materials for investigating the chemistry and physics of combustion. Two curricula (one for grades 1-5 and one for grades 6-9) explain how to use each item in the classroom.



*Middle School teachers from Thompson falls Junior High learn about ladder fuels at a workshop for FireWorks teachers. Photo by Tania Schoennagel.*



*A seventh grader from Meadow Hill Middle School, Missoula, thinks hard to answer a question about fire ecology during a field trip to Pattee Canyon in May. Photo by Kinnerly Smith.*

## Does it work?

Last spring, pilot teachers used *FireWorks* in eight schools in western Montana, involving about 400 students. University of Montana Professor James Walsh and Graduate Student Linda Terwilliger assessed the trunk's effectiveness using five classrooms at the seventh grade level. How? "Not just with a paper-and-pencil test," says Walsh, "but by questioning students in the field."

"Tell me about one part of this shrub that is likely to survive most fires." McMurray figures she asked this question 57 times while helping on field trips to the Thompson River and Pattee Canyon. Students from surrounding communities answered 30 such questions on each of five field trips. Lolo National Forest staff helped with the trips.

Walsh and Terwilliger's assessment showed that seventh graders did indeed learn about fire ecology by using *FireWorks*. *FireWorks* students "performed better in a field demonstration of skills than did students who did not receive the *FireWorks* instruction," according to their final report. Furthermore, classes studying *FireWorks* seemed to be more positive and productive than classes studying other material. For instance, students studying *FireWorks* were more engaged and attentive than students in comparison groups. Students perceived teachers using *FireWorks* as more interested in their ideas and easier to talk with than teachers of comparison groups. During *FireWorks* classes, teachers spent less time on discipline than when teaching other material.

Based on the Walsh/Terwilliger report and suggestions from teachers, Smith and McMurray plan to revise *FireWorks* this winter. Workshops for teachers and environmental educators are available through the Fire Lab; call 406-329-4805 or 406-329-4809 for more information.

# Streamside Area Burned

**by Steve Arno**

Streamside forests and fire may seem an unlikely combination, but Rocky Mountain Research Station Scientist Mick Harrington and University of Montana Graduate Student Matt Arno put the two together for a second time last spring with help from staff on the Lolo National Forest. They prescribed burned a streamside ("riparian") site located within low-elevation conifer forest in the Lolo's Ninemile District. This was the second burn in their study; the first took place at Larry Creek in the Bitterroot National Forest on October 1, 1997. (See field trip report, p. 2.)

*Matt Young and Dennis Simmerman, staff on the prescribed burn site at Rock Creek, show the size of this fire-scarred western larch stump in a riparian area. The larch was logged in the early 1900s. Photo by Steve Arno.*

Why burn a riparian area? The answer begins on the dry hillsides that surround riparian zones. "In past centuries, frequent underburns kept these upland forests open and favored large, old ponderosa pines," according to Harrington. In past centuries, occasional fires spread to the edge of small streams and spotted across in gusty winds or on falling snags. Patchy fires alternated with rapid growth on these sites, producing open forests of large pine and larch trees with a rich assortment of broad-leafed, fruit-bearing shrubs underneath. The big trees were removed from most of these streamside sites a century ago, and fires have been excluded. The sites now support dense thickets of shade-loving conifers, with few shrubs or herbs. Ironically, their structure makes them vulnerable to severe damage by wildfire.

Harrington and Arno are testing a remedy. On a mild afternoon last April, they worked with the Ninemile fire crew to burn an area along Rock Creek. The site had been prepared by felling small grand firs and allowing them to dry out, creating a fuel bed that could carry fire. "Normally such dense, shady thickets will only burn under severe wildfire conditions," says Arno. Rock Creek was burned along with about 300 acres of adjacent upland forest, an economically feasible approach for treating small riparian areas. Will the aspens and shrubs thrive again? Harrington and Arno will be watching for answers.

# Late-breaking News from Fauna Studies

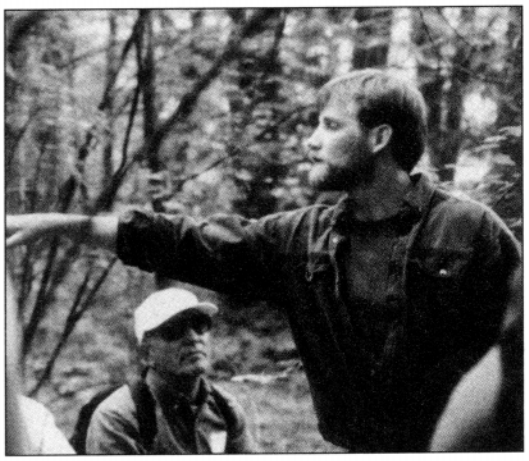
by Sallie J. Hejl

## Nesting Dippers

To assess the effect of streamside development on the American Dipper (a bird species that is completely restricted to streams), University of Montana Graduate Student Sophie Osborn surveyed 23 creeks and monitored 49 dipper nests in the Bitterroot Valley. Her study indicates that dippers appear to be negatively affected only by streamside developments that degrade water quality or the integrity of the streams themselves; examples include heavy grazing and de-watering of streams for irrigation. Streamside developments such as housing and roads do not seem to have a negative impact on dippers. In fact, the building of bridges across streams has benefitted dippers by increasing the availability of nest sites. Since dippers nest early at low elevations and most bridge nests are located at these low elevations, bridges have enabled many dippers to produce two broods in a season, increasing their productivity.

## Small Mammal Detectives

Len Ruggiero and Dean Pearson, scientists at the Rocky Mountain Research Station, have estimated the likelihood of detecting small mammals in ponderosa pine and western larch habitats and have also estimated the time it takes to detect them. Their research will help determine whether presence/absence data about small mammals can be used at broad scales to determine habitat selection and monitor changes in animal distributions. Ruggiero and Pearson have found that detection probabilities vary among species. Deer mice and red-backed voles are likely to be detected in a relatively short time. Chipmunks, red squirrels, and golden-mantled ground squirrels are less likely to be detected, and it takes longer to detect them.



*Dean Pearson explains use of fluorescent dyes to determine the travel routes of deermice across openings in a dense streamside forest. Photo by J.K. Smith.*

## Cavity Nesters

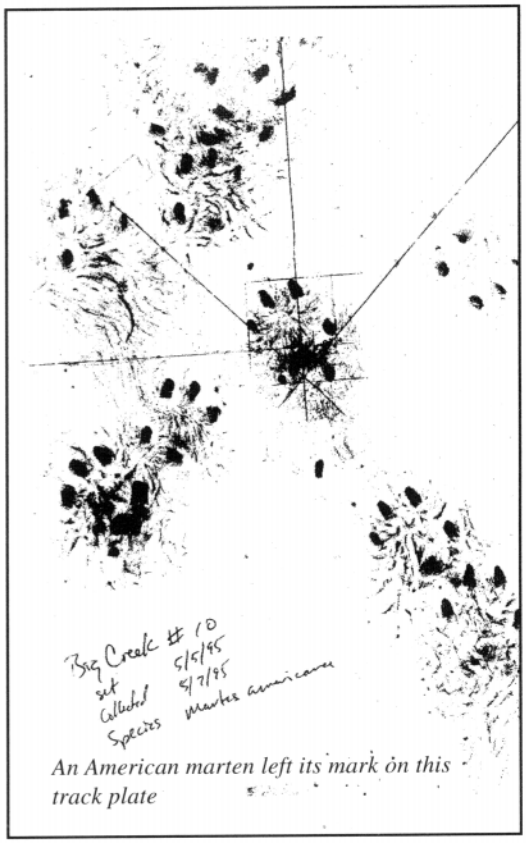
Rocky Mountain Research Station Scientists Sallie Hejl and Tom Thompson are determining how to get accurate information on the presence of woodpeckers and other cavity-nesting bird species in old-growth ponderosa pine/Douglas-fir forest. Most scientists and managers conduct breeding bird surveys from mid-May through June. Hejl and Thompson's study used a longer sampling time, beginning in mid-April and ending in late June. Observers detected several cavity-nesting species (Northern Pygmy-owl, Williamson's Sapsucker, and Red-naped Sapsucker) much more often in the early part of the season (April to mid-May) than later, when breeding bird surveys are typically done. Information from this study can be used to improve monitoring programs and to learn more about the habitat needs of cavity-nesting species.

# Making Tracks . . . Where are the American Martens? *These biologists aim to find out*

Some wildlife species, like the American marten, are secretive and evasive. Since they are hard to detect, they are hard for managers to protect, according to University of Montana professor Kerry Foresman and graduate student Jacob Ivan. Foresman has refined the use of covered track plates to find out if martens are frequenting an area. Having worked with the method extensively, however, Foresman sees its shortcomings clearly. "Unfortunately," he points out, "the absence of tracks on a plate doesn't tell you that the animal is NOT around. It just may not have 'left its mark' on that particular plate at that particular time."

To overcome this shortcoming, Ivan and Foresman are searching for ways to relate track plate data to information gleaned using other methods. This summer, they are fitting martens with radio collars in several Bitterroot drainages and will use radio-monitoring to keep track of the martens' activities and locations. Track plates will be put out in the same drainages. But these track plates won't be "all alone" out there; each will be "watched" with a telemetry system, which will log the presence of a radio-collared animal anywhere within 10 meters. The telemetry will enable Foresman and Ivan to identify the individuals that visit each track plate and record the amount of time spent near the plate before an animal enters and leaves a track.

Relationships between track plate data, the more detailed data from radio-collared animals, and telemetry data from the area around track plates will provide insights about marten habits. Foresman and Ivan plan to use the observations to estimate the likelihood of detecting a marten that is present in an area, whether it visits track plates or not.




*An American marten left its mark on this track plate*

# Streamside Habitat: Island and Refuge

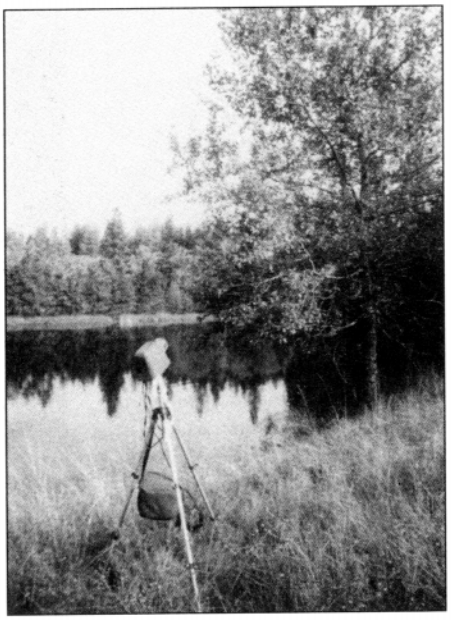
**by F. Jeremy Wheeler, Timothy S. Redman, and Joshua J. Tewksbury**

Walk along any Bitterroot trail, and you'll notice the special feel of streamside habitat. What's overhead changes from pine and Douglas-fir on uplands to a mixture of cottonwood, aspen, pine, larch, and grand fir. What's underfoot changes from a bed of pine needles to moist, spongy soil with leaves, needles, and moss. It's a riparian site, habitat valued worldwide for supporting more species than drier, upland sites.

Our research in riparian habitat of the Bitterroot Front focuses on the special role of cottonwood, willow, aspen, and other shrub species in riparian habitat. The patches of this cover along forest streams seem miniscule on the landscape, but their importance to birds is disproportionately large.

## Islands of Diversity

Cottonwood, aspen, and streamside shrubs cover less than 5 percent of the Bitterroot National Forest, but we found 20 percent of all bird species *only* in this kind of habitat. Even very small patches support several species that will not nest in pine and fir forests. More than twice as many bird species occur in broad-leafed cover than in conifer forests near streams. Where fire and other disturbances have been excluded for many decades, broad-leafed cover is changing to grand fir, eliminating these "islands" of nesting habitat for bird species like the Yellow Warbler and American Redstart.

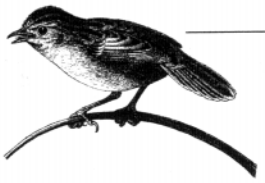


*A small video camera spies on the nesting habits of neotropical migratory birds in streamside vegetation and records parasitism by the Brown-headed Cowbird. Photo by Joshua Tewksbury.*

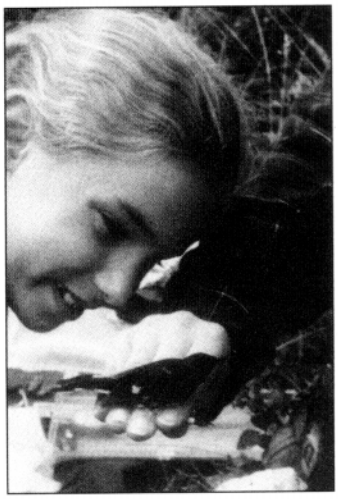
## Mountain Retreats

Cottonwood forests along the Bitterroot River support many more birds than the tiny patches of streamside habitat in the Bitteroot National Forest, but they are also close neighbors of agricultural lands, favorite haunt of the Brown-headed Cowbird. Instead of building her own nest, the female cowbird lays her eggs in the nest of another bird. The "host" bird then incubates the cowbird egg. The cowbird hatches earlier and is larger and more aggressive than the host's own young, so the cowbird nestling gets most of the food. Most often, the young of the host do not survive a cowbird "step-sibling." But how far are cowbirds willing to commute from their agricultural foraging ground to lay eggs? We found most cowbirds within 2 kilometers of agricultural land and none more than 3.4 kilometers from agriculture. For a species like the Warbling Vireo, with 65 percent of its valley-bottom nests parasitized, streamside habitat within the forest may provide the last refuge from the Brown-headed Cowbird. Managers may need to carefully use disturbances such as fire to regenerate broad-leafed deciduous trees and shrubs.

# Habitat for Small Ones



Thirty-seven people met forest inhabitants face-to-face in July 1997 on the field trip "Habitat for Small Ones." Participants viewed warblers, cowbirds, and even the nocturnal northern flying squirrel.



*An eight-year-old observer gets close to an American Redstart netted, measured and weighed at the start of the "Habitat for Small Ones" field trip. Photo by J.K. Smith.*

Joshua Tewksbury hosted the field trip's first stop alongside Coyote Coulee, near Camas Creek southwest of Hamilton. (See the article above about Tewksbury's research.) On the day of the field trip, Tewksbury's volunteer crew assembled a net near an American Redstart nest. Ten minutes later, they were examining a female and two male redstarts. Field trip participants also visited a dusky flycatcher nest that held a large, young cowbird. Almost hidden underneath was a flycatcher nestling. Asked whether he would remove the cowbird from the nest, Tewkbury replied, "No, we are assessing the impact of cowbirds. If we remove the cowbird, we won't learn if the flycatcher can raise its nestlings along with a cowbird or not."

## Mammals and Aspens after Lunch

Wildlife Biologist Dean Pearson, Rocky Mountain Research Station, helped field trip participants view habitat through the eyes of small mammals. Pearson introduced three native American rodents trapped during the course of his and Biologist Len Ruggiero's research—a packrat, a northern flying squirrel, and a red-backed vole. "These animals collect and disperse seed and are food sources for many predators," Pearson explained.

In a spruce-fir forest, deermice left trails close to downed logs. The small mammals, Pearson said, prefer to cross openings alongside woody debris, which provides shelter. Mushrooms stored by red squirrels for winter food were evident on tree branches. A squirrel midden, where hundreds of fir cones had been dissected for their nutritious seeds, lay deep in the shade.

Stevensville Wildlife Biologist Dave Lockman led participants through an upland aspen stand near Hayes Creek. Lockman explained that aspen stands provide habitat for migratory birds, woodpeckers, elk, and deer. Where aspens have not burned in nearly a century, many are dying and being replaced by conifer forest. Participants discussed ways to sustain aspen in the landscape.

# The "Spotlight"...highlighting researchers at work:

## *Researcher finds soils are fertile ground.*

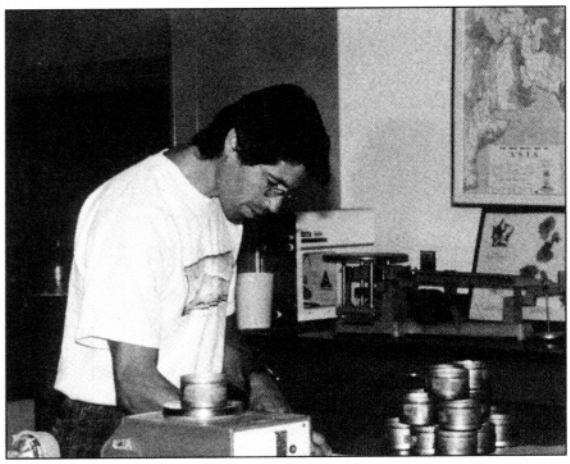
**by Lucia Solorzano**

To Tom DeLuca, associate professor of forest soils at the University of Montana, life as a soil scientist began in the early 1980s, when his family inherited a large potato farm in Wisconsin. A geology major at the University of Wisconsin at Madison, DeLuca became intrigued—not with the potatoes but with the layer of earth surrounding them, the soil. Compared with the study of geology, where DeLuca felt he was interpreting historical processes, soil science seemed "a dynamic science, a mixture of chemistry, physics, and biology, a very active science," he recalls.

DeLuca's family ended up selling the potato farm, but now, 15 years later, he remains a soil scientist. Since coming to the University of Montana five years ago, much of DeLuca's research has focused on how fire affects soil and its organic matter. Why fire? "Fire," says DeLuca, "represents the major catastrophic perturbation that soils face in this region." Trying to understand just how fire changes the composition of soil, how much, and for how long keeps DeLuca sampling burn sites. He also conducts research in mine reclamation and slash management, and he is beginning to study the substances that leak into the soil from roots of invasive plants like knapweed.

When DeLuca is not teaching about, sampling or analyzing soil, he's making tracks in it as he bikes, hikes, or runs daily. A 10K racer, DeLuca also skis, plays soccer, and has coached the soccer teams of his sons, ages 6 and 8, for the past three years. His wife Denise is an engineer.

For DeLuca, the very thin layer of earth that covers potato fields in Wisconsin and hides the rocky spine of the Bitterroots still holds enormous fascination. Each sample he collects this summer could increase our understanding of forest soils or the relationship between soils and fire.



*Tom DeLuca weighs soil samples in his laboratory. Photo by J.K. Smith.*

# Field Trip Last September Returned to Lick Creek

The Lick Creek Demonstration Forest south of Hamilton has hosted discussions about forest management since at least 1909, when it was first logged commercially. Thirty-one researchers, members of the public, and forest managers continued this tradition on a field trip to Lick Creek last September 4. Participants viewed sites thinned during winter 1996-1997 near Lost Horse Creek. Research by University of Montana Professor Tom DeLuca is describing the effects of various slash treatments, equipment, and seasons of treatment on soils in this area. (See article on next page.) DeLuca discussed a pattern common in forest soils: The nitrogen available to plants is very limited except for a short time after fire, while fire may concentrate supplies of potassium (relatively low in soils of this region) in the soil. The way slash is handled may influence nutrient levels dramatically.

*Clint Carlson (right) discusses management of ponderosa pine at Lick Creek. Photo by J.K. Smith.*

At a site harvested five years ago and prescribed burned four years ago to enhance old-growth ponderosa pine and reduce understory Douglas-fir, Research Forester Mick Harrington described what he has learned. Treatments reduced Douglas-fir, as originally planned; the burns were essential for achieving this goal. Pine mortality was higher in areas with greater fire intensity and greater bark beetle activity. Knapweed, a nonnative species that can reduce native species through competition, is increasing in all harvested units, perhaps more quickly in the severely burned units than in the unburned units. Current research will investigate snag creation and long-term effects of the treatments.

After a dinner served by Trapper Creek Job Corps Culinary Arts students, participants heard birding stories from Bitterroot National Forest Wildlife Biologist John Ormiston. Ormiston coordinates MAPS (acronym for "Monitoring Avian Productivity and Survivorship") surveys in the Forest. A nationwide program that keeps track of bird populations, MAPS has three sites in the Bitterroot Valley: Lick Creek, lower Rock Creek, and Lee Metcalf National Wildlife Refuge. There are about 420 sites nationwide.

# Soil Responses to Selecting Harvest and Burning

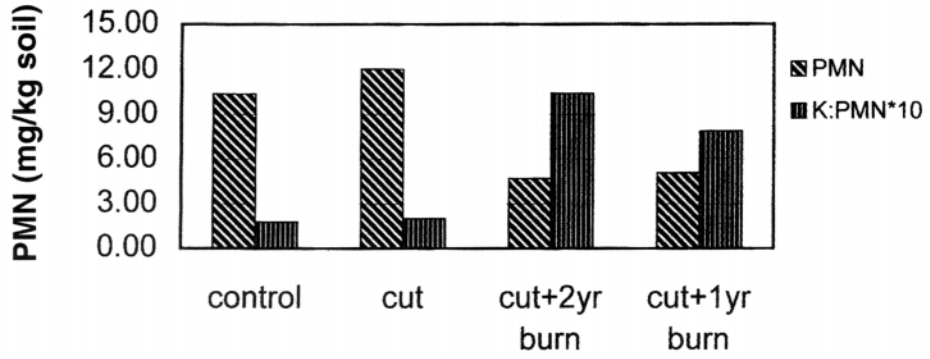
**by Tom DeLuca and K. Zouhar, University of Montana**

People who care about the land almost always treat the soil with respect and often want greater understanding as well. What happens to soils when the forest changes? What happens to soils when humans change the forest? In the summer of 1995 we began studying an area near Lick Creek to learn about microbial activity and soil nutrients after harvesting with and without underburning. During 1995 and 1996, we sampled soils from a single tree selection harvest, harvested areas burned one and two years earlier, and an untreated ("control") area. In each sample, we measured a chemical smorgasbord including ammonium, nitrate, potentially mineralizable nitrogen, sugars, potassium, magnesium, calcium, total carbon and nitrogen, soil moisture content, microbial biomass, and the soil's ability to retain water.

Underburned plots were significantly less acidic than untreated plots, probably because carbon and nitrogen had burned off, leaving alkaline elements behind in the ash. Soluble sugars and microbial biomass were significantly higher in the cut area than in burned areas. This difference probably occurred because the unburned areas (control and unburned harvest) retained more litter and slash than the burned areas, where fire had volatilized some nitrogen from the soil or forest floor. Burned areas had less microbial biomass than unburned areas; potentially mineralizable nitrogen was lower as well. The ratio of potassium to potentially mineralizable nitrogen followed the opposite pattern; on underburned plots it was nearly triple the level on control plots (see graph).

Treatments had little or no effect on long-term pools of carbon, nitrogen, and strong base cations such as potassium and calcium, but microbial activity and the pool of mineralizable nitrogen seemed to be reduced by the combination of harvesting with underburning. Since we do not know about nutrient cycling in ponderosa pine/Douglas-fir forests under presettlement conditions, it is difficult to know how important this reduction in nutrient availability is to the ecosystem. Reduced mineralizable nitrogen could reduce the forest's productivity, but the increased ratio of potassium to nitrogen may be a positive effect. The rocks in this region have relatively low levels of available potassium. Other research has shown that increased ratios of potassium to mineralizable nitrogen are associated with lower mortality from insects and disease.

Our research provides some answers to questions about soils in western forests, but—just as important—it raises new questions. We will continue to look for both questions and answers in the soils of the Bitterroot this summer and fall.




*Potentially mineralizable nitrogen (PMN) and the ratio of potassium to nitrogen (K:PMN) on DeLuca and Zouhar's study sites. Nitrogen declined significantly after burning, but the ratio of potassium to nitrogen increased. Increases in this ratio are related to decreases in disease and insect severity in ponderosa pine/Douglas-fir forest.*

# Book Corner

## Bird Info: *The Birds of North America*

**by Jane Kapler Smith**

Colorful birds are like chips of sunlight in the wildlands of the Intermountain West, and many of us human residents want to learn more about them. Would you like to know about the sunbathing habits of Clark's Nutcrackers? ... how much the eggs of the Pileated Woodpecker weigh? ... how big the harem of the Red-winged Blackbird is? *The Birds of North America* provides these curious details about individual species, plus extensive information about habitat, migration, population status, and conservation. *Birds of North America* is not a gigantic coffee-table book, however. Although it can be purchased as a collection of volumes, it is also available as a series of pamphlets, each 20 pages long or so, describing individual bird species. Number 331, describing the Clark's Nutcracker and containing a lot of information from western Montana, has just been published. The Nutcracker pamphlet was written by a partner in the Bitterroot Ecosystem Management Research Project, Dr. Diana Tomback of the University of Colorado, Denver. You may order it for $7.50, or you may be more interested in the pamphlet about the Mountain Bluebird, a summer resident of the northern Rocky Mountains. Perhaps you'd like to learn more about Great Blue Herons, Red-tailed Hawks, or Spruce Grouse; all are described in this series. The publisher plans to provide more (Steller's Jay, for instance, and Chipping Sparrow) in the near future. For a complete list of species and instructions on how to order them, visit the *Birds of North America* Web site, www.birdsofna.org.

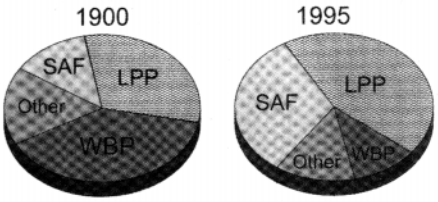
# Looks Easy on a Map

University of Montana Graduate Student Mike Hartwell's research design looks so simple: Just measure every point in a grid laid out across a map. Mike says it is easy, too, "until you take the map out into the woods." In the rugged, densely forested terrain of the Bitterroot Front, it's quite a challenge to describe the forest and its history at 500-foot intervals along parallel lines 500 feet apart. Mike has gotten good at it, though, now that he has information from more than 20 miles of sample lines in his study areas near Mill, Sweeney, and Bass Creeks.

Hartwell's findings as a basis for maintaining biological diversity and wildlife habitat.

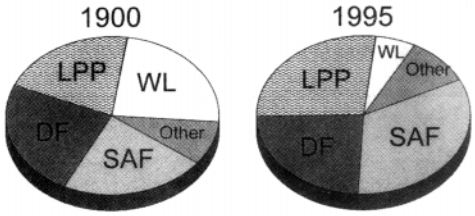
"The keys to explaining forest change on the Bitterroot Front," Hartwell says, "are fire and logging." In every elevation zone and every forest type, fire dependent tree species—mainly pines and larch—have decreased over the past century and fire intolerant species—Douglas-fir and subalpine fir—have increased. Ponderosa pine, for example, used to comprise 51 percent of tree volume at low elevations; now it comprises about 26 percent. At the same elevations, Douglas-fir has increased from 19 to 55 percent. The pie charts on this page show dramatic changes in forest composition at all elevations. In 1900, whitebark pine dominated forest stands as low as 6,800 feet elevation; today it dominates only above 7,500 feet. Whitebark pine has declined severely in the last century because it was weakened in the mountain pine beetle epidemics of the 1930s and is now being heavily attacked by a nonnative fungus, white pine blister rust. Whitebark pine forests are important habitat for species that live in high mountain ridges and valleys. These forests are also important for watershed protection, since whitebark pines are often the only trees capable of surviving and holding the soil against erosion on steep, dry slopes.

*In 1900, whitebark pine covered more than a third of high elevation forests on the Bitterroot Front; it now covers about a tenth, while cover by lodgepole pine and subalpine fir has increased. LPP=lodgepole pine; SAF=subalpine fir; WBP=whitebark pine.*




*This whitebark pine stand below St. Mary Lookout contains a mixture of living and dead whitebark pines, the latter killed by mountain pine beetle and white pine blister rust. Photo by J.K. Smith.*

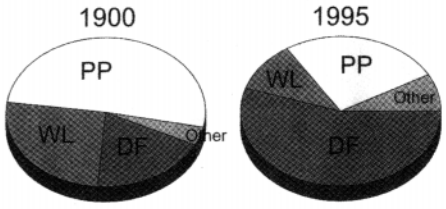
*Middle elevation forests on the Bitterroot Front, like this slope above Kootenai Creek, are a patchwork of stands with different fire histories. Photo provided by Steve Arno.*




*Western larch cover has decreased by 75 percent at middle elevations in the past century; subalpine fir cover has increased by 50 percent. DF=Douglas-fir; LPP=lodgepole pine; SAF=subalpine fir; WL=western larch.*

The shift from pines and larch to fir species is only one aspect of Bitterroot forests that has changed dramatically in the past century. The "ages" of forest stands have changed, too. Today, low-elevation forests tend to be younger because of extensive logging. Forests at middle and high elevations tend to be older than they were in past centuries because severe fires have decreased.

*Large ponderosa pines like this one dominated low elevation forests of the Bitterroot a century ago. Photo by J.K. Smith.*




*The proportion of cover by ponderosa pine and western larch has decreased by 50 percent since 1900, while the proportion of Douglas-fir cover has more than doubled. DF=Douglas-fir; PP=ponderosa pine; WL=western larch.*

Hartwell's research describes forests both a century ago and in the present day, and he has learned what forces shaped the historic landscapes. To come to this understanding, Hartwell recorded data on 216 plots and studied more than 1,200 tree cores. "These data are the most detailed field measurements of past and current conditions available in any area of the northern Rocky Mountains," comments Research Forester Steve Arno, who has worked with Hartwell throughout the project. The Bitterroot National Forest and other forests in the region can use

# Objectives for Five Years to Come

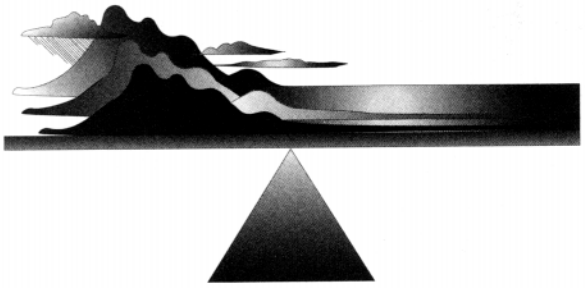
This spring, an interdisciplinary team developed the prospectus for the next five years of the Bitterroot Ecosystem Management Research Project. (See page 1.) The team included representatives from the Rocky Mountain Research Station, the Northern Region of the Forest Service, the Bitterroot National Forest, and the University of Montana's School of Forestry. Copies of the prospectus are available from Greg Jones at 406-542-4167. Here are the mission statement and objectives from the prospectus:

**The mission of BEMRP is to strengthen the scientific theory and practice of managing Rocky Mountain ecosystems at the landscape level in the context of social, economic, and ecological opportunities and constraints.**

Applied research will address biophysical and socioeconomic topics. Importance will be placed on integrating and synthesizing knowledge about the land, its waters, wildlife, and people at landscape scales. The role of public participation and collaboration in determining long-term strategies for managing ecosystems will be emphasized. The project will identify options, assess feasibility, and develop information to help understand consequences of management strategies. The project will stress dissemination of research results to the scientific community, resource managers, private landowners, and the public.

**Objectives:**

1. Understand and manage changes within the landscape by developing and integrating vegetation, fauna, and aquatic information.
2. Increase the efficiency of landscape analyses and assessments, adaptive management, and monitoring by developing integrative models.
3. Propose and test potential solutions to social, administrative, and environmental barriers to implementing ecosystem management.
4. Explore collaborative management across landscapes of diverse ownerships and land-use classification.
5. Develop and assess techniques for technical communication among researchers, managers, and the public.

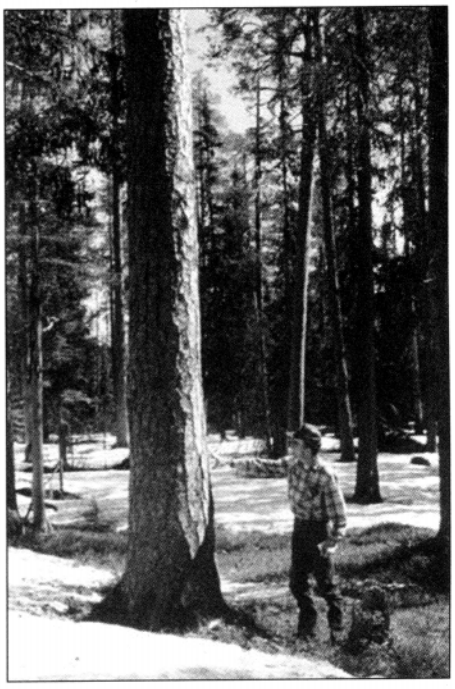


# Bitterroot Valley and Lapland: Ecological Cousins?

Fire scars mark the bases of old pines that are covered with platy, orange bark—but fire hasn't occurred in more than a century. During recent decades, open pine stands have grown dense with thickets of young, shade-loving trees. Pines have failed to regenerate. Birch and aspen trees have declined. Habitat for some animal species has deteriorated. Does this story sound familiar? To Rocky Mountain Research Station Scientist Steve Arno and his wife Bonnie, the resemblance to forests of the inland West and their home in the Bitterroot was "uncanny." But they weren't at home; they were halfway around the world, on the Society of American Foresters' tour of Norway and Sweden last spring.

Steve and Bonnie learned that much of the Scandinavian Peninsula is ecologically similar to low elevation forests of the Bitterroot, except that the dominant tree is Scots pine rather than ponderosa pine, and the shade-tolerant understory trees are Norway spruce rather than Douglas-fir. Steve, who has spent much of his 30-year career describing the ecology and fire history of forests of western North America, found the resemblance "amazing." In Swedish Lapland, where he had expected forests like those of interior Alaska, Steve and Bonnie visited reserves dominated by 300- to 500-year-old Scots pine, a species that most Americans consider best used for Christmas trees. "Old growth Scots pine looks remarkably like ponderosa pine," Steve says. "These Scots pines have thick, orange bark like that of ponderosa, and most of the big trees have scars from repeated fires." Ecologists in Sweden have learned that, without fire, shade-loving undergrowth suppresses tree regeneration, partly because of toxins produced by understory plants. Researchers there have recently reintroduced fire in two old growth reserves and are monitoring its effects.

If the ecology of Scandinavian forests looked familiar to visitors from western Montana, so did forest management trends. After an era of selective cutting followed by a period of clearcutting, managers in Norway and Sweden are now using forestry practices that sustain native vegetation and are aimed at restoring pre-1900 forest structure. Scandinavian managers are also working to protect habitat for hundreds of native species, including fungi and insects. Only the name of the endangered species list, the "red list" in Norway and Sweden, reminded Steve and Bonnie that they had to traverse more than 8,000 miles to get home.



*Steve Arno in an old growth Scots pine and Norway spruce forest in northern Sweden.*

# Bitterroot Project Visits Forestry Convention

Volunteer Madelyn Kempf hosted a booth describing the Bitterroot Ecosystem Management Research Project at the Society of American Foresters Convention last October 4-6 in Memphis, Tennessee. Kempf chaired the Project's Human Dimensions Research Group from 1993-1995 and is now with the Cleveland National Forest in California. She reports, "The booth was particularly successful in reaching educators and students. Participants were glad to see the Forest Service presenting information on ecosystem-based management that includes fire ecology."

"There was a lot of interest from most people on the use of fire as a tool in forest management," according to Kempf. The "80 Years of Change" poster, which displays photos taken from a single location in the Lick Creek drainage in 1909, 1948, 1958, 1968, 1979, and 1989, appealed to many, who felt it is important to clearly illustrate the cumulative changes that occur in wildlands over time when no disturbance occurs.

*Madelyn Kempf hosts a booth describing the Bitterroot Ecosystem Management Research Project at the Society of American Foresters 1997 convention.*

ECO REPORT

## Ecosystem Management Means Partnership

Furthering the goals of this project requires public participation in decision making. Would you like to become a partner? For more information, please contact

**Greg Jones, Program Leader**, Rocky Mountain Research Station
P.O. Box 8089, Missoula, MT 59807 (406-542-4167)
e-mail: gjones/rmrs_missoula@fs.fed.us

**Nan Christianson, District Ranger**, Stevensville Ranger District
88 Main Street, Stevensville, MT 59870 (406-777-5461)
e-mail: nchristianson/r1_bitterroot@fs.fed.us

**Professor Robert Pfister**, The University of Montana School of Forestry
Missoula, MT 59812 (406) 243-6582
e-mail: rpfister@forestry.umt.edu

Visit the Bitterroot Ecosystem Management Research Project on the Internet!
**http://www.forestry.umt.edu/bemrp**


## ECO-Report

Bitterroot Ecosystem Management
Research Project
USDA Forest Service
Rocky Mountain Research Station
P.O. Box 8089
Missoula, MT 59807