



Scientific Independence: A Key to Credibility

Leonard F. Ruggiero, Deputy Program Manager, Wildlife and Terrestrial Habitats Science Program, RMRS, Missoula, MT

Independence and objectivity are key ingredients of scientific credibility, especially in research organizations that are part of a natural resource management agency like the Forest Service. Credibility, in turn, is essential to the utility of scientific information in socio-political processes. In order to develop this thesis further, a basic understanding of Forest Service organizational structure is important.

The Forest Service is comprised of three major branches: the National Forest System (managers and policy makers for National Forests and National Grasslands), Research and Development (scientists chartered to address issues in natural resource management for numerous information users, including the public), and State and Private Forestry (responsible for providing assistance to private and state landowners). This article is directed toward the first two branches.

The relationship between the National Forest System and the Forest Service Research and Development (Research) branches is somewhat hampered by confusion over the respective roles of scientists (researchers) and managers (policy makers and those that implement management policy). For example, some managers believe that scientists can enhance a given policy position or management action by advocating for it. This neglects the importance of scientific credibility and the difference between advocating for one's research versus advocating for or against a given policy. Similarly, some scientists believe the best way to increase funding for research is to support management policies or actions. But, as a very astute forest supervisor once told me, "Everyone has a hired

gun...they are not credible...and we need you guys [Forest Service Research] to be credible." It is naïve to believe that direct involvement in the establishment or evaluation of management policy doesn't damage scientific credibility in the long run. Neglecting this fact may put one on the short-term path to increased relevance and greater funding opportunities, but at the cost of long-term credibility.

Behavior by scientists that simply *appears* to serve a preconceived agenda can cause one's independence to be questioned. And because independence is a necessary component of scientific credibility, a loss of credibility can result from the mere *perception* that independence has been lost or compromised. Of course it is difficult to avoid such perceptions in many instances, especially when scientists and managers work together to solve problems. For example, this was the case with the National Lynx Survey where National Forest System field personnel were used to collect data according to an experimental design put into place by Forest Service Research. In such instances, it is essential to clearly state roles and responsibilities in order to guard against the perception that scientific

independence has been compromised.

No one—neither the scientist nor the policy maker—is served by a loss of scientific credibility. This point is often overlooked by those who would have scientists assist managers with litigation, participate in policy

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Whether the subject is endangered species management, dangers of second hand smoke, or ecosystem management, credible science is prerequisite to informed public discourse. This lynx research by Forest Service Research is a good example of independent work and the credibility that follows. (Photo by Milo Burcham)

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Scientific Independence . . . (from page 1)

development, or demonstrate the relevance of their research through various forms of accountability to clients. These kinds of activities pose real risks to the hard-won credibility currently enjoyed by the cadre of world-class Forest Service researchers (see Harrison, Autumn-Lynn. 2006. Who's who in conservation biology—an authorship analysis. *Conservation Biology* 20(3):652-657).

The Role of Science in Natural Resource Management

Administratively, the National Forest System and the Research branches are distinct until one gets to the office of the Chief of the Forest Service. The chief is the head of the agency, meaning that these two branches are administratively distinct until joined at the very top of the organization. There is very good reason for this, as we shall see.

The McSweeney-McNary Forest Research Act of 1928 (replaced by the Forest and Rangeland Renewable Resources Research Act of 1976) is the statute that enabled the Forest Service to conduct scientific research. The Forest Service Manual (FSM), which provides direction on how to implement statutes and related regulations, states in the section on Research Policies: “To achieve its Research and Development (R&D) program objectives, the Forest Service shall ... maintain the R&D function as a *separate entity* ... with clear accountability through a system that *maintains scientific freedom*...” (emphasis added). This means that both Congress and the authors of these FSM directives recognized the importance of keeping research independent. This also signifies congressional intent to protect a key element of scientific credibility.

In addition, Congress appropriates funds separately for management and research within the Forest Service. Congress insists that research scientists and managers maintain distinct roles, and this distinction is formalized by appropriating funds separately for these two purposes and by ensuring that funds appropriated for one purpose are not used for the other.

This separation also serves to keep conducting science separate from formulating policy and the political ramifications of that process. The wisdom here is that science cannot be credible if it is politicized. Science should not be influenced by managers, and scientists should not establish policy. This logic keeps scientific research “independent” while ensuring that policy makers are free to consider factors other than scientific understandings.

Thus, science simply informs decision making by land managers. As the new forest planning regulations clearly state, those responsible for land management decisions must consider the best available science and document how this science was applied (Federal Register 70(3), January 5, 2005; Section 219.11(4); p. 1059). However, nothing says that scientists are responsible for making decisions or establishing

policy. In fact, this is expressly *not* the role of scientists as evident in the mechanisms discussed above.

The value of science to natural resource management agencies thus emerges. Agency scientists are an independent, credible source of information that is considered in both the establishment of policy and in land management actions. In this context, the scientific basis for decision making is established in an impartial way. All other things equal, agency research scientists are best equipped to work with managers to define problems and seek solutions because they are most familiar with agency culture. This includes a familiarity with both the substance and the context of the scientific issues facing managers.

The Role of Policy Makers, Scientists, and the Public in the Establishment of Management Policy

As we have seen, policy makers establish policy. Scientists do not. Policy is established by considering science along with the relevant political issues; hence, mechanisms for public involvement exist. Because policy formulation and the political process are inherently unscientific processes, scientists must avoid any perception of participation in them if they wish to remain effective. The perception of direct involvement in policy development clearly

implies political considerations.

None of this obviates the need for scientists to advocate for the results of their research. Perhaps such advocacy includes the view that policy makers should carefully consider or even apply their findings. However, this is a fundamentally different posture than advocating for or participating in a particular policy *per se*. A quote from Kessler and Thomas (in previously cited *Conservation Biology* 20(3), June 2006) drives this point home:

“It is one thing for an organization to advocate for science and its effective use to inform policy and management decisions. It is another thing to advocate for a particular position or policy choice. All scientific societies struggle with this issue, which has major implications for their credibility and future effectiveness.”

Because agency scientists work for the American public, the results of their work must be available for use by anyone who wishes to engage in socio-political processes. Research that appears to be influenced by personal or organizational bias is not “scientific” and is not useful in this regard. When independence is lacking in scientific research, society is not served.

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ECO-Report

Published by the
Rocky Mountain Research Station
800 E. Beckwith St., Missoula, MT 59801
(406) 777-7416

Editor/Writer: Sharon Ritter
Associate Editor: Janie Canton-Thompson



BEMRP: Conducting Research, Sharing Results

Greg Jones, Research Forester, Social, Economics, and Decision Science Program, and BEMRP Program Leader, RMRS, Missoula, MT

A couple of years ago the Bitterroot National Forest began planning the Trapper Bunkhouse Land Stewardship Project (Trapper-Bunkhouse Project). This project includes fuels reduction, watershed improvements, noncommercial thinning in plantations to improve resiliency to insects and disease, and commercial timber harvest to provide economic value to the community and help fund project activities.

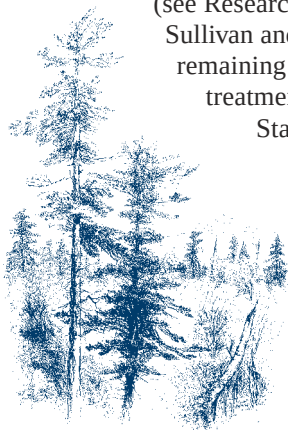
The Trapper-Bunkhouse Project shows the value of the partnership between managers and researchers that is at the core of BEMRP. Researchers and managers came together to ask what research questions could be addressed by a land stewardship project such as this. We found we needed an assessment of how landscape modeling could help managers with their decisions and a scientifically sound assessment of the effects of treatments. In the meantime, we're also continuing other research projects that address different needs expressed by managers.

As a first step in the researchers' involvement with this project, researchers and managers have been testing interaction of three types of landscape models to evaluate:

- 1) the wildland fire behavior expected spatially on the landscape given current vegetation and fuel patterns;
- 2) how current conditions are expected to change in the future in the absence of vegetation treatments;
- 3) where to place vegetation treatments over time to reduce likelihood of undesirable severe wildland fire and improve forest health given available budgets; and
- 4) evaluate effectiveness of treatment alternatives for reducing undesirable severe wildland fire as well as reducing associated losses from fire when it does occur.

These modeling tests are nearing completion (see Research Highlights written by Janet Sullivan and Ward McCaughey). The remaining modeling work is evaluating treatment alternatives. A forthcoming Station report will document results from these modeling tests.

A small portion of the Trapper-Bunkhouse Project is devoted to replicated tests of forest restoration/fuel reduction treatments designed for the frequent, low-intensity fire regime forests that are



Part of the Trapper-Bunkhouse Project area near Darby (background), with biomass stockpiles for use in the Darby school's biomass burner (foreground). The wildfire threat to this area, along with its importance to residents for work, recreation, and esthetics made it a high priority for fuel reduction treatments. (Photo by Betsy Ballard)

common in lower elevations of the Bitterroot Valley and elsewhere in the Northern Rockies. Research questions identified through BEMRP's interactions with managers include impacts of vegetation treatments on soil compaction and nutritional qualities, potential for weed invasion, health and vigor of resulting stands of trees, effectiveness in reducing the probability of severe wildfire, and others. We identified locations for the treatment replications, and the necessary environmental analysis of our proposed research is included in the draft Environment Impact Statement for the project. Researchers are collecting pre-treatment data in anticipation of treatments occurring in summer and fall 2008.

Other research undertaken by BEMRP's participating research units is addressing a number of topics important to managing Rocky Mountain ecosystems. We have learned, for example, that 13 years after applying forest restoration thinning in ponderosa pine stands, trees are continuing to respond positively, with less moisture stress and greater photosynthetic activity than unthinned stands. We've also learned that understory thinning and burning treatments in old-growth ponderosa pine and larch stands 6 years ago were effective in reducing competition for water and nutrients, resulting in preserving and improving the health of valuable old-growth trees. Other studies have documented that impacts of invasive plants can ripple through natural ecosystems from plants to insects to songbirds. The results of these and other studies were published in 53 research papers in 2006, making this valuable research available to land managers throughout the nation.

In other activities, BEMRP sponsored a well-attended

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Using Models to Provide a Virtual Test of Forest Treatments

Janet Sullivan, Biologist, Social, Economics, and Decision Science Program, RMRS, Missoula, MT; and Kevin Hyde, Landscape Modeling Hydrologist, Management & Engineering Technologies International, Missoula, MT

BEMRP's participation in the Bitterroot National Forest's proposed Trapper Bunkhouse Land Stewardship Project (Trapper-Bunkhouse Project) consists of two parts. One is the field study mentioned elsewhere in this ECO-Report that is looking into the effects of thinning and burning on various resources. The other part involves modeling to determine where treatments should take place both from a fuel reduction and economic standpoint.

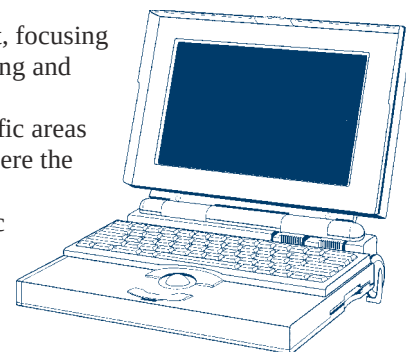
Through the course of the Trapper-Bunkhouse Project, researchers have worked with Forest personnel to integrate various types of computer models with the project planning process (see the 2005 ECO-Report article "Visualizing a Forest Landscape Today and Tomorrow" available at BEMRP's website: <http://www.fs.fed.us/rm/ecopartner>). Early on, we used broad-scale models of vegetation disturbance processes and fire behavior along the Bitterroot Front to help the Forest focus in on a particular project area. During the final phase of the planning process researchers worked with the Forest to test the utility and efficiency of MAGIS, a planning model that integrates vegetation information with fire hazard, economic, and other resource information.

The objective of MAGIS modeling was to assist development of scenarios that make the best use of budgets and reduce wildfire hazards while providing other significant resource benefits. During this process, researchers interacted with Forest planning team members to design model scenarios that included the issues outlined in the purpose-and-need

statements for the project, focusing primarily on fire-risk rating and economics. The modeled scenarios indicated specific areas (delineated as stands) where the combined benefits (fuel reduction AND economic efficiency) could increase the overall efficiency of the project.

These areas were further investigated on the ground to determine whether they should be included in the action alternatives. The "ground-truthed" treatments were compiled to build a model-assisted alternative to include with other alternatives in the draft Environmental Impact Statement.

Once the Forest defined alternatives to evaluate, additional fire behavior modeling provided a virtual test of how effectively proposed treatments may alter future fire behavior across the entire project area. The primary modeling tool for this step was FlamMap, a product of the Fire Sciences Lab. FlamMap is a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.) over a landscape for constant weather and fuel moisture conditions. We compared proposed treatments under the action alternatives with the No Action alternative. While analyses of the results are still underway, preliminary results indicate that the model-assisted alternative may more effectively constrain future fire behavior than treatments defined and located using conventional planning processes.



Scientific Independence... (from page 2)

Scientists have a responsibility to society based on the confidence that is placed in credible scientific information. Indeed, as demonstrated by organizations like the National Academy of Sciences, science often represents the only social means by which complex problems can be solved. When issues like "spotted owl conservation and national economics" or "global warming" become highly politicized, the general public, and some politicians, turn to science for reliable information. In such cases, the preponderance of "scientific information" holds sway even when scientific consensus is beyond reach. For this reason alone, scientists must strive for independent, credible understandings worthy of "scientific stature" and the value placed on such stature by society. This highlights a significant difference between scientists who work *with* those who must consider political factors versus scientists who work *for* them.

Conducting Research... (from page 3)

half-day session at the Northern Region Training Academy that included presentations on: 1) biomass utilization opportunities from restoration treatments; 2) ecology and management of invasive species; 3) efficacy of herbicide for mitigation of ecological impacts of spotted knapweed invasion; and 4) fire history of riparian and upland zones in six headwater drainages of the Bitterroot National Forest.

We also helped with eight school field trips to local Forest sites and a public field trip to the Trapper-Bunkhouse Project area. An impressive Lick Creek Demonstration/Research Forest Interpretive Auto Tour brochure has been completed recently and is available at the Bitterroot National Forest Darby District office. Check out our updated website for more information on BEMRP research, activities, and publications (<http://www.fs.fed.us/rm/ecopartner>).

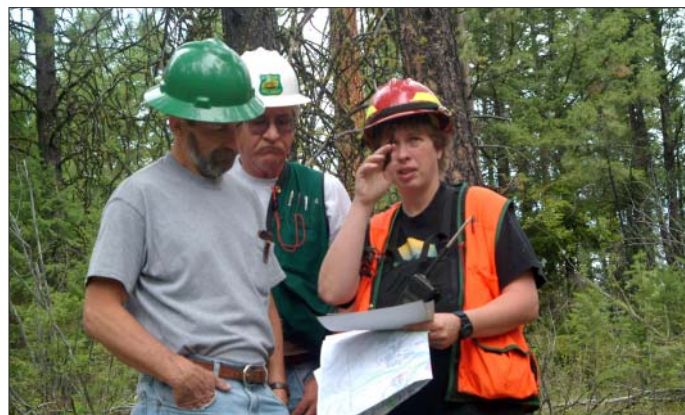
Understanding Forest Ecology from the Landscape to the Project Level

Ward McCaughey, Research Forester, Forest and Woodland Ecosystems Science Program, RMRS, Missoula, MT

Several researchers in the Forestry Sciences Laboratory have been actively involved in BEMRP since its inception in the early 1990s. The recent research on the Trapper Bunkhouse Land Stewardship Project began in 2004. In ecosystem management, sometimes we need to look at the big picture, or the landscape scale, and sometimes we need to work on a more local, or project-level scale. In the past few years we've taken a landscape-level approach to understanding the role of fire in riparian forests and have used models to predict where wildfires are likely to occur. We've also focused in on a project area where we might be able to affect wildfire behavior and study the effects of treatments to reduce wildfire risk.

In 2004 and 2005, Jimmie Chew and Chris Stalling made several computer simulation runs of landscape processes along the entire western portion of the Bitterroot National Forest. Chris used the SIMPPLLE (**SI**Mulating **P**atterns and **P**rocesses at **L**andscape **s**ca**L**Es) model developed by Jimmie to evaluate areas where wildfires might have greatest impact on the wildland/urban interface. The predicted occurrences of wildfires were influenced by the interaction of different forest stand conditions with simulated insect and disease activity. These simulations were for a no-treatment alternative, using early vegetation data sets agreed upon by the BEMRP Landscape Analysis Team in 2004.

The SIMPPLLE model identified three critical areas at risk to high-severity wildfire along the Bitterroot Front, and through local knowledge from Bitterroot National Forest resource specialists the Forest chose the area between Trapper and Bunkhouse Creeks on the Darby District as the highest priority area in need of fuel reduction efforts. When new vegetation maps (called VMAP) became available in early 2006, new model simulations validated the original runs.



Mick Harrington, Ed Hayes, and Cheri Hartless reviewing stands on the Trapper Bunkhouse Land Stewardship Project that will potentially be used for research study sites. (Photo by Ward McCaughey)



Elaine Sutherland, Eric Ziegler, and Ethan Mace collecting an increment core from a fire-killed tree on the Bitterroot National Forest. (Photo by Mathew Burbank)

I participate on the Bitterroot National Forest Interdisciplinary Team (IDT), which is composed of Forest Service managers and researchers evaluating research needs for the Trapper Bunkhouse Land Stewardship Project. I also am on the Treatment Development Team sub-committee in charge of developing a replicated set of experiments that will test the effects of fuel reduction treatments. This past year I worked together with Mick Harrington, a research forester from the Fire Sciences Laboratory in Missoula, to locate sites similar in stand structure where experiments could be conducted. We mapped and flagged boundaries of each treatment area and installed temporary plots to measure pre-treatment stand structures. We installed permanent plots in the fall of 2006 and I will coordinate initial measurement of vegetation components during the summer of 2007.

Other studies directed by Elaine Kennedy Sutherland have been conducted on the Bitterroot National Forest since 2002. Fire history and vegetation data from 13 headwater stream corridors and associated uplands on the Bitterroot and Lolo National Forests show that fires in these mixed conifer/lodgepole pine systems were more frequent and less severe than generally supposed. Our studies show that fires burned through these riparian sites approximately every 5 to 36 years.

BEMRP's projects are just a few of what we are doing around the Northern Rockies to improve knowledge of the ecosystems in this area. For more information on some of our projects, please see our website at <http://www.fs.fed.us/rm/ecology/>.

Impacts of Invasive Plants on Songbirds: Using Song Structure as an Indicator of Habitat Quality

Yvette Ortega, Wildlife Biologist, Wildlife and Terrestrial Habitats Science Program, RMRS, Missoula, MT

Invasive species can alter habitat quality over broad scales, so they pose a severe threat to songbird populations. Through our long-term research program supported by BEMRP, we have found that changes in habitat quality induced by exotic plants like spotted knapweed can lead to subtle yet profound changes in songbird populations. For example, in knapweed-invaded habitats compared to those dominated by native vegetation, we detected no change in abundance of adult chipping sparrows—but we observed delays in breeding that led to reduced breeding productivity and increased turnover of adults between breeding seasons. Knapweed invasion caused declines in native plants that led to declines in insects serving as key food sources for songbirds and other vertebrates. This resulted in diminished habitat quality for songbirds.

Our results illustrate the rippling impacts of invasive species on songbirds. Results also underscore the importance of measuring parameters other than abundance when assessing population status of songbirds, as abundance is not necessarily correlated with habitat quality. This presents a particular challenge to natural resource managers charged with monitoring songbird populations to assess changes in habitat quality, especially since monitoring tools for songbirds are currently limited primarily to count-based methodologies that yield information on abundance alone. Furthermore, measures of population status that are sensitive to changes in habitat



Chipping sparrow marked with bands used to track individuals. Tracking birds and recording songs are part of a study of impacts of weed invasion on populations. (Photo by Aubree Benson)

quality are difficult to derive, particularly at scales relevant to management.

Using understandings obtained from our research and in collaboration with Erick Greene at the University of Montana, we are testing a novel method for assessing songbird population status and habitat quality that is based on an easily measured parameter—song structure. Song structure refers to the array of song types sung by a species in a particular area. Song types in birds are much like human accents, varying by locale. In many migratory species, young birds acquire their one signature song with its particular accent by learning from their neighbors in their first breeding year. Areas of high habitat quality should have low turnover of breeding adults between years. Therefore, high quality sites are dominated by older birds who learned their song on-site and therefore sing in the local accent. In contrast, areas of low habitat quality should have relatively few older birds to serve as teachers and songs should exhibit greater variety since they were likely acquired in other places. These differences in learning environment may ultimately affect song structure, as young birds settling in high-quality sites readily learn the local accent from their older neighbors, maintaining the song tradition by returning in subsequent breeding seasons. Those settling in low quality habitats learn a mix of songs from various neighbors and disperse in future seasons.

We are using 2 years of field data to link changes in habitat quality caused by spotted knapweed invasion to differences in song structure at invaded compared to native-dominated sites. In 2005 and 2006, we recorded songs of more than 200 individually marked chipping sparrows at seven sites on the Lolo National Forest in western Montana. Preliminary

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Aubree Benson sporting song-recording equipment and holding a chipping sparrow captured for color-banding to allow tracking of individuals. Aubree led song recording efforts and wrote a senior thesis using data from the study. (Photo by Tricia Rodriguez)

Off-Highway Vehicle Management under the New Forest Service Travel Management Rule

Neal Christensen, PhD Candidate, College of Forestry and Conservation, University of Montana, Missoula

Land management agencies nationwide are challenged to plan for increasing recreation use and conflicts that arise over that use on public lands. The fastest growing group of users on most National Forests in the United States is off-highway vehicle (OHV) riders. When he was Forest Service Chief, Dale Bosworth cited unmanaged recreation as one of four threats to the health of our nation's forests and grasslands. He often talked about growing unmanaged OHV use on National Forest System (NFS) lands, saying "We have to improve our management [of OHVs] so we get responsible recreational use based on sound outdoor ethics."

Chief Bosworth decided the Forest Service would address OHV issues through a new Service-wide travel management rule that would take a systematic approach to designating all motor vehicle use on NFS lands. The process will involve the public and engage user groups and volunteers to help protect National Forest lands through ethical and responsible use. The travel management rule was established in November 2005 and calls for designating and mapping open roads, trails, and areas by classes of vehicles and times of year that use may occur.

Travel management planning will begin in the near future on the Bitterroot National Forest in Montana and promises to present many challenges. The Bitterroot Forest is currently completing a general land management plan and will follow that with site-specific Forest-wide travel management planning. The challenge for managers is to determine an appropriate balance between motorized and nonmotorized designations on a finite number of travel routes. Most users

seek similar types of setting and experience opportunities, including destinations, scenery, loops, and access for other activities; but their choice of travel method may interfere with other users' desires. A recent BEMRP project provided information about OHV planning issues and approaches under the new travel management rule. The project produced a report designed to inform Forest managers and the public about resources and planning tools available to assist in development of a travel management plan, and it provided lessons learned from other travel planning efforts. (Report is available on the BEMRP website at http://www.fs.fed.us/rm/ecopartner/hdrecent_papers.shtml.)

www.fs.fed.us/rm/ecopartner/hdrecent_papers.shtml

The U.S. Forest Service policy and experiences of planners nationwide suggest a collaborative process with a system-wide, Forest-level perspective will be the most appropriate and successful for developing a widely supported OHV

travel management plan. Ongoing involvement of the public in OHV planning is required and will contribute to public acceptance of the resulting designations.

Social science research may be useful for OHV planning. Developing good understanding among managers and the public about recreation uses and their associated environmental and social impacts will improve final travel plans and their acceptability. Social science research can help managers understand the effects of specific, limited scope disturbances such as fuels reduction, logging, and wildfire on larger scale road and trail systems. An in-depth understanding of complex local relationships to National Forest lands may help managers and the public develop working relationships in the spirit of cooperation rather than taking on the polarized nature that has marked past contentious OHV planning efforts nationwide.



The fastest growing group of users on National Forests in the United States is OHV riders. A new Service-wide travel management rule establishes a systematic approach to designating all motor vehicle use on NFS roads, trails, and areas by type of vehicle and time of year. (Photos by U.S. Forest Service)



Benefits of Treating Old-Growth Stands

Mick Harrington, Research Forester, Fire, Fuels, and Smoke Science Program, RMRS, Missoula, MT

Old-growth ponderosa pine and western larch forests that developed as a result of frequent, low-intensity fires were once extensive in the Inland West, but now are rare due to historical logging and, more recently, severe wildfires. In response to missing several natural fire cycles, remaining stands of old trees are at increasingly greater risk from uncharacteristically high severity wildfire and insect and disease impacts. Fire suppression activities over almost a century have allowed dense ingrowth of mostly shade-tolerant species. In turn, this increased stand density creates ladder fuels (thickets of understory trees), increasing potential for high intensity wildfire and competition for site resources (soil moisture and nutrients). Land managers recognize this condition as unsustainable but have been generally reluctant to implement treatments because of uncertainty about effects on old-growth habitat.

We designed a study to evaluate alternative restoration treatments for reducing the potential for high intensity crown fire in an old-growth stand and to test and compare treatment effects on physiological performance of old trees. The study site was a remnant 330-year-old ponderosa pine/western larch stand on the Lolo National Forest, 5 miles north of Missoula, Montana. Historical fire return intervals averaged 20 years with the longest interval being 34 years during the three centuries prior to 1919, followed by an 80-year fire absence. During this time the stand density increased from 60 trees/acre of pine and larch to 500 trees/acre of mostly Douglas-fir. I report here on results of three treatments: understory tree removal with slash burning, understory removal and overstory thinning with slash burning, and a control. Slash burning included prescribed fire and pile burning. We designed treatments to produce a condition that resembled the historical

stand with only a few healthy understory pine or larch left under the canopy of old trees.

Six years after treatment, we remeasured stand characteristics and surface fuels and used these data in current fire behavior models to predict potential wildfire characteristics. Under severe wildfire weather conditions, the model predicted an almost certain high intensity crown fire in the untreated control stand, resulting in high mortality of old trees. This was primarily due to excessive levels of ladder fuels. In both treated stand conditions, our models predicted a surface fire to move quickly through the stand but predicted that initiation and movement of crown fire was highly unlikely, even under the worst fire weather conditions.

Data showed that physiological performance of old trees in the treated stands was greatly improved over control trees for 5 years after treatments. Removal of several hundred understory trees/acre resulted in increased soil moisture in treated stands that was measured as increased water use by the old larch. This was at least partially responsible for increased needle biomass and radial growth compared to control trees. The 300+ years-old ponderosa pine also responded with increased needle biomass, bud size, and radial growth, all indicators of improved health and resistance to forest pests.

Our results give resource managers clear evidence that fuel reduction/restoration treatments in old-growth, fire-adapted ecosystems can have several benefits: 1) reduced probability of uncharacteristically severe wildfire behavior and effects, even under severe fire weather; and 2) improved general health of old trees by reducing competition for soil moisture and nutrients, allowing for greater resistance to insects and disease. In addition, these treatments provide greater opportunity for regeneration of pine and larch in the created open understory with exposed mineral soil.



Before (left, 1998) and after (right, 2003) thinning and prescribed burning in an old-growth ponderosa pine/western larch stand. These trees are between 250 and 330 years old and 18 to 24 inches diameter at breast height. (Photo by Mick Harrington)

Looking at Emissions and Economics of Biomass Use

Sharon Ritter, Research/Management Coordinator and ECO-Report Editor, BEMRP, RMRS, Stevensville, MT

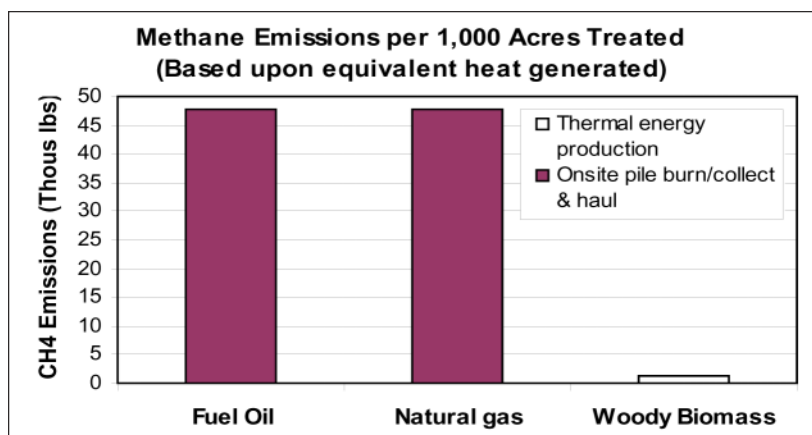
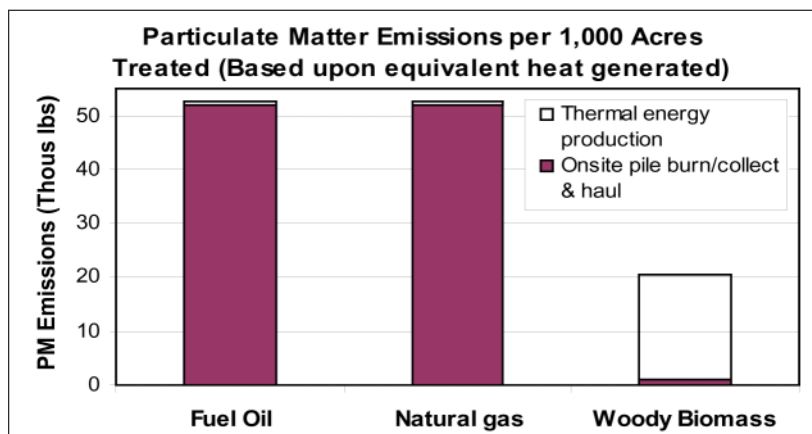
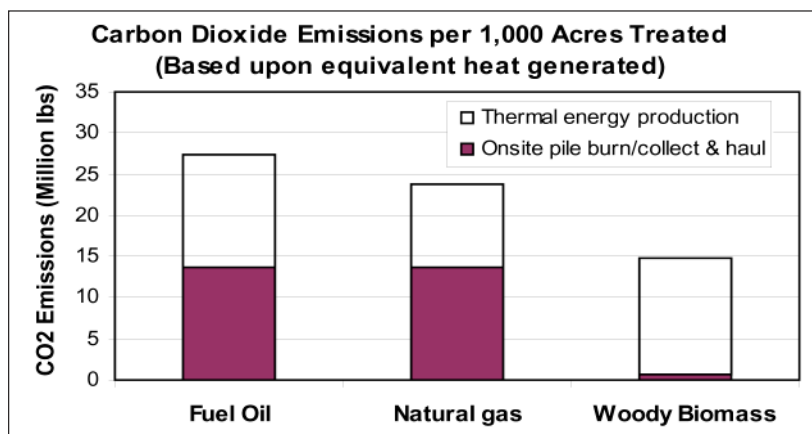
There is more and more discussion these days about greenhouse gas emissions and their contribution to global warming. As a result of the 2006 documentary film *An Inconvenient Truth*, and reports released intermittently by the Intergovernmental Panel on Climate Change, individuals, businesses, and private and governmental agencies feel a greater urgency to find ways to reduce levels of greenhouse gas emissions.

In Montana, several research foresters and economists thought about how to measure local forest management contributions to greenhouse gas emissions. Greg Jones and Dave Calkin at the Rocky Mountain Research Station (RMRS), and Dan Loeffler and Edward Butler at the University of Montana College of Forestry and Conservation (UM) were interested in opportunities to use the biomass residues (tops, limbs, and small commercial trees) resulting from forest vegetation treatments such as thinning trees and understory to reduce forest fuel levels. These residues from forest treatments typically end up in piles and are burned. The scattered plumes of smoke rising from the forest in the spring and fall come from burning these “slash” or biomass piles.

The researchers wanted to build on previous work they conducted exploring the economics of using this material as an energy source, but adding analysis of greenhouse gas emissions from biomass used for energy versus fossil fuels. For example, in the Bitterroot Valley of Montana, biomass is used in biomass boilers at schools in Darby and Victor. Another user is Frenchtown’s Smurfit-Stone Container Corporation where biomass supplies heat for the manufacturing plant and to generate electricity. The scientists wanted to understand the tradeoffs in carbon balance and air quality (particulate matter) between using the biomass as an energy source *versus* burning it in the woods.

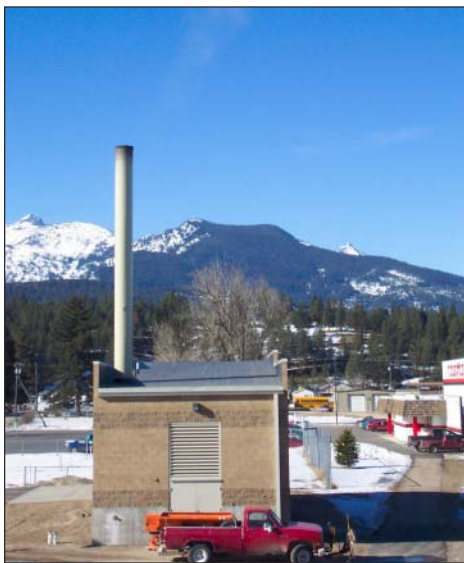
What makes this study unique is that it looked at all sources of emissions and energy consumption associated with the various options. Handling forest residues to be used in biomass boilers expends energy because it requires fossil fuels like gas and diesel to harvest, chip, and haul the material to the boilers. Even getting the fossil fuels from the ground and refined for use in vehicles and boilers has energy costs. The vehicles involved in harvesting, chipping, and hauling give off carbon dioxide, carbon monoxide, methane, and particulate matter. On the

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Measured emissions for 1) collecting, hauling and utilizing forest residue for heat energy (white area), and 2) using either fuel oil or natural gas to produce equivalent heat energy and burn biomass residues onsite (dark area). All measured emissions associated with extracting, delivering, and final energy use are included for all three fuel sources.

Looking at Emissions .. (from page 9)



This biomass boiler provides heat to the school in Darby, Montana. Emissions are very low from this type of boiler. (Photo by U.S. Forest Service)

other hand, burning biomass in place also releases these pollutants.

So the question came down to this: What's the best thing to do from an economic and emissions perspective—use fossil fuels such as natural gas or heating oil to heat a building and burn the biomass on site, or chip and haul the biomass to a nearby boiler and use it for energy instead of fossil fuels?

What the researchers found was that from an economics standpoint it is cost-effective to haul this material to a utilization site such as Darby school's boiler or even the more distant Frenchtown boiler, as long as the haul distance was a maximum of 40 to 50 miles (given the current market and fuel prices). Based on Environmental Protection Agency emission factors, they also found that using the biomass for the equivalent amount of thermal energy would release approximately half of the carbon dioxide compared to using

fossil fuels for energy and burning the biomass at the harvest site (see graphs). Particulate matter less than 10 microns in size (PM-10) decreases by even more—75 percent. Methane, a short-lived but very harmful component of greenhouse gases, can be reduced by 90% by burning the biomass in boilers rather than outside. Another advantage of burning biomass for energy is that there is a net increase in the amount of greenhouse gases that remain sequestered under ground from unused fossil fuels, rather than released into the atmosphere.

Next the researchers want to look at other economic aspects including the possibility that groups using biomass boilers could sell carbon offsets. Carbon offsets counteract or offset greenhouse gases that would have been emitted into the atmosphere. For example, the Townsend school and Montana Fuels for Schools Program have sold carbon offsets through the Climate Trust to offset carbon produced at the Basin Electric Power Plant in Butte. What was once considered waste has now taken on a value, both economically and environmentally. The researchers' results show that by taking into account all sources of emissions, the decrease in emissions are even larger than originally thought.



Tree tops, limbs, and small trees (biomass) left over from a thinning project on the Bitterroot National Forest. Originally scheduled to be burned, it instead went to Darby for use in the boiler. (Photo by U.S. Forest Service)

Meet BEMRP's Executive Committee

BEMRP is a multi-disciplinary partnership that brings together these scientists from the U.S. Forest Service Rocky Mountain Research Station and the University of Montana, together with managers from the Bitterroot National Forest and Northern Region.

Greg Jones—RMRS Social, Economics, and Decision Science Program
Dave Calkin— RMRS Social, Economics, and Decision Science Program
Mick Harrington— RMRS Fire, Fuels, and Smoke Science Program
Ward McCaughey— RMRS Forest and Woodland Ecosystems Science Program
Alan Watson—Aldo Leopold Wilderness Research Institute
Dean Pearson—RMRS Wildlife and Terrestrial Habitats Science Program
Jim Burchfield—The University of Montana College of Forestry and Conservation
Sue Heald—Bitterroot National Forest
Kerry McMenus—Northern Region Office
Chuck Oliver—Bitterroot National Forest
Dan Ritter—Bitterroot National Forest

Soil Productivity and Harvest Operations

Deborah Page-Dumroese,
Research Soil Scientist, Forest
and Woodland Ecosystems
Science Program, RMRS,
Moscow, ID

Concern over changes in soil productivity due to forest management is often debated by forest managers and the public. One key element in the discussion is use of mechanized equipment (such as rubber-tired skidders, log forwarders, or tracked vehicles) to remove timber products from the forest. Part of the debate focuses on soil compaction, removal of nutrients when tree crowns are removed rather than left on the soil surface after harvest, length of time for soils to recover, and methods for monitoring. We have found that ultimately soil properties (texture, organic matter, and water content) determine the impact of harvesting or site preparation.

We are interested in studying how fuel reduction treatments proposed for the Trapper Bunkhouse Land Stewardship Project (Trapper-Bunkhouse Project) affect physical and chemical properties of soils. BEMRP requested the help of soil scientists at the Forestry Sciences Laboratory in Moscow, Idaho. The study sites in the Trapper-Bunkhouse Project will use a variety of harvesting and site preparation techniques. This year, we collected pre-harvest data. Crews assessed current soil surface and subsurface conditions using a visual classification system. This visual classification system (0-3) assesses current condition of the surface soil as it may have been affected by previous harvest, site preparation equipment, or burning. For instance, an area classified as “0” is one that has had no previous disturbance, the forest floor is



Researcher using an impact hammer core sampler to collect bulk density cores in Northern Idaho. (Photo by Han-Sup Han)

intact, there are no ruts, and the area was not burned. On the other hand, a classification of “3” means there could be deep ruts from previous equipment use, the area was severely burned, or the forest floor was displaced more than 10 feet away.

In addition, our soil assessment crew collected soil cores to determine pre-harvest organic matter, pH, texture, and nutrient contents. To track impacts of the number of machine passes, we will attach a Global Positioning System (GPS) unit to each piece of

mechanized equipment to track movements. We will be able to evaluate the impact of number of passes on soil physical properties like compaction or changes in pore-size distribution. After harvesting is complete, we will resample by reassessing the soil surface visually and by again collecting soil cores to determine how harvest methods may impact soil properties. However, the consequences of soil impacts must be measured against



Two types of cores collected with the core sampler. The large core (4 cm x 30 cm) is used to determine pore size distribution at various depths in the mineral soil, and the small core (4 cm x 10 cm) is used to determine bulk density (a measure of compaction). (Photo by Han-Sup Han)

vegetation growth over a long period of time. Because this study involves many researchers from other disciplines, these sites provide an ideal location for tracking the long-term responses of both soil and vegetation after harvesting and fuel reduction activities.

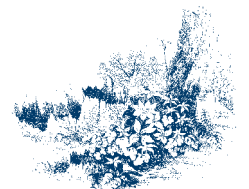
Glossary . . . (from page 16)

SOIL PRODUCTIVITY: The inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

VMAP: A project to map current vegetation west of the Continental Divide in the Forest Service’s Northern Region and

designed to address several needs. The result of this project is a geo-spatial database that produces four primary map products: Dominance Type, Tree Canopy Cover Class, Life Form, and Tree Diameter Class.

WEIGHT OF THE EVIDENCE: Considering all available research and weighing its relevance and reliability in an integrated manner.



"This Is a Great Place to Work!"

Janie Canton-Thompson, Social Scientist, Social, Economics, and Decision Science Program, RMRS, Missoula, MT

"I still pinch myself. This is a great place to work!" says Dan Ritter, Stevensville, Montana's district ranger and one of the Bitterroot National Forest's representatives to BEMRP. Dan's enthusiasm for the job spills out all over. Raised in Nazareth, Pennsylvania, Dan spent his youth roaming the woods. His high school passion was photography but a visit to Yellowstone Park sowed the seed for his career in natural resources.

After earning a degree in recreation and parks management from Penn State University, Dan became a seasonal interpretative specialist at Voyagers National Park in Minnesota. Next came seasonal work in Yosemite, followed by a summer with The Nature Conservancy as caretaker for land in Maine. In 1980, Dan received his first seasonal Forest Service job as a wilderness ranger on the Shoshone National Forest, Lander, WY, where he met his wife Sharon. Over the next eight years, he was a seasonal employee with trails, wilderness, and recreation responsibilities.

In 1988, Dan obtained permanent status as a forestry technician in Lander. In 1992, he became the Selway-Bitterroot wilderness coordinator on the Nez Perce National Forest, Grangeville, ID. He moved to the Bitterroot National Forest in 1997 as Darby District's staff resource assistant. "When I came to the Bitterroot I realized after about 2 months that I'd led a very sheltered life. I was so overwhelmed with the amount of activity and controversy and workload here. I learned a lot in that job, and I got a variety of experience that I would have never had."

From 2000 to 2005, Dan filled five different acting and deputy ranger jobs and a recreation staff officer position on the Bitterroot Forest. In June 2005, he became Stevensville District Ranger. Noting how much he enjoys the great variety in district ranger duties, Dan exclaimed, "It's the best job I've ever had! It's where the action is. There's opportunity to make a difference."

Dan feels very much a part of the Stevensville community. He thinks Forest Service jobs "are a lot about social science and relationships with people." Dan likes to listen to people and tries to see all sides of an issue. It makes some decisions difficult "when you can understand where everybody's coming from," he says. A realist, he believes decision makers can never



While not new to the Bitterroot National Forest, Dan Ritter is a new addition to BEMRP. (Photo by Sharon Ritter)

"It is very humbling to be a district ranger. It's a huge responsibility and I take it seriously."

make everyone happy because value polarizations are too great on some issues. Dan loves dealing with lots of things at once: "It is very humbling to be the district ranger. It's a huge responsibility, and I take it seriously."

Challenges are opportunities in disguise, Dan believes. His district faces at least four major challenges: fire management, land use, wilderness dams, and travel management. According to him, successfully managing these issues will require more social science input.

Over the past few decades, fire suppression has become costly, and cost effective responses to wildland fires are critical. Point protection (protecting immediately threatened economic resources) rather than perimeter control (full control of the

edge of a fire) is becoming the norm. Dan observed that some members of the public disagree with the point protection approach. He and his staff are working with community members to explore solutions to wildland fire issues.

The Bitterroot Valley's population is booming, escalating the land use issues on Stevensville District. Residents are requesting permits to connect driveways to Forest Service roads, which are neither designed nor maintained for such use. Moreover, a controversial proposal for a ski area on the district has garnered thousands of public comments.

Dams in designated Wilderness Areas remain an issue. Dan's job is enabling dam owners to maintain the safety of their dams and still preserve wilderness values.

Travel management presents a growing challenge. District recreational use has escalated, and Dan wants to accommodate it while protecting the resource and maintaining the rustic character of recreational experiences.

Dan's vision for the district is "caring for the land and serving the people," professionally providing the best customer service possible. "We're here to serve people whether they agree or disagree with us," he said. "Caring for the land," for Dan, means practicing sustainable land stewardship, with some timber management and some livestock grazing. He's optimistic the agency can work with the public to plan projects with these ends in mind.

Dan has been involved with BEMRP for 2 years and serves on its Executive Committee. I asked him about his vision for BEMRP. He responded, "The idea of having researchers and managers working together is a great idea; it

(continued on page 14)

Private Industrial Foresters and Forest Service Research—The Relevancy Question

Janie Canton-Thompson, Social Scientist, Social, Economics, and Decision Science Program, RMRS, Missoula, MT

What is the nature of the relationship between U.S. Forest Service researchers and private industrial foresters? How can Forest Service Research maintain independence while serving agency and private forestry managers? We decided to seek input from someone outside of the Forest Service, so I asked Pat Connell, Vice President of Resource Operations for Rocky Mountain Log Homes, Hamilton, MT, for his views. Pat is a member of the Ravalli County Resource Advisory Committee that works with local citizens and the Bitterroot National Forest.

With 33 years as a private industrial forester, Pat is one of very few professional foresters in the nation's log home industry. He's passionate about private industrial forestry and shared with me his experience with Forest Service Research and views on many current issues. Pat cautioned that his views are those of a non-landed private industrial forester whose industry relies on agency timber sales. Foresters in this branch of the forest products industry may have interests in Forest Service Research that differ from those of commercial forest-land industrial foresters.

At one time, private foresters and researchers pursued "interrelated cooperative efforts" to solve mutual problems. Pat recalls working with researchers in the western Tree Improvement Program (a program that addresses tree genetics) and cooperative nursery efforts during the 1970s and early 1980s. Before the early 1990s, Forest Service Research employed more logging system specialists and economists. (Note: Forest Service records show that nationwide its research scientists in the forest products technology job series declined from 63 in 1985 to 17 in 2007, a 73 percent reduction, while the number of research scientist foresters shrank from 350 to 140, a 60 percent decline. Total number of Forest Service research scientists decreased from 985 to 547, a 44 percent reduction over the same period.) In addition, the National Forest System used to invite private foresters and Forest Service Research to provide input to National Forest interdisciplinary teams (IDT) in the interest of creating synergistic products.

Pat blames the Federal Advisory Committee Act (FACA) for extinguishing these cooperative efforts. With FACA, says Pat, "We were the bad guys. We were from industry, and there were only extremely special situations where Forest Service and industry could 'work together' because of fear of collusive results."

It's now difficult for industrial foresters to convey the costs of timber sale policy inconsistencies within and among



Pat Connell felling the first of several beetle-killed Douglas-firs on a Healthy Forest Restoration Act project on the Bitterroot National Forest. Pat says "the science of forestry and foresters cannot be fooled when the venue is the woods rather than the courts." (Photo by Mary Beaver)

regions. According to Pat, economic realities are not adequately addressed when requiring new harvesting systems and equipment. "I've got stuff that requires incredible yarding distance, utilization standards that are insane, and as a result

the Forest Service is getting much less stumpage value than if there was a little more creativity!" While Pat thinks timber sales designed for multiple benefits are a worthy goal, too often the result isn't viable for industry. There's an opportunity for research

economists to involve private foresters in designing more realistic competitive bid processes to obtain best value. The small volume offered in today's sales makes it unaffordable for private companies to invest in the innovative technology required to meet increasingly rigid contract specifications. Pat suggested researchers study the economic implications of current Federal timber sale policies and test contract specifications against reality.

According to Pat, lack of harvestable wood has forced the segment of the log home industry that is dependent on dead wood into Canada to acquire such wood. This occurs despite

"The Forest Service is getting much less stumpage value than if there was a little more creativity!"

(continued on page 14)

Connell... (from page 13)

more wood volume growing annually on National Forests than being harvested or burned. Therefore, he recommends the Forest Service focus less on tree-growth research and more on what the National Forest System can do to satisfy National Environmental Policy Act requirements while providing a sustainable supply of wood.

Pat is unaware of any collaboration or partnership between Research and private foresters. This indicates that Research needs to do a better job informing the public about research taking place. He believes the agency needs to realize “industry actually knows something.” Opportunity exists for researchers and private foresters to collaborate in developing useful forest management tools and techniques. For example, Pat’s company utilizes dead wood in a unique way; yet few agency managers or researchers “have come to see what we do, what improvement we do, any thoughts we’ve got.” As a result, the agency seems unaware that markets are changing and how.

Useful technology transfer could be improved between researchers and private industrial foresters. For example, Pat suggested that district ranger stations, supervisors’ offices, and Research Stations provide indexes of locally conducted research in their foyers. Annotated bibliographies of this research by category and location would be helpful to private foresters and the public.

Relevancy is the basic question, Pat thinks. Who chooses what projects to research or conveys their needs and ensures scientific answers? This leads to the issue of Forest Service Research maintaining independence and credibility. Connell believes Research should serve the National Forest System,

providing information it needs. According to him, independence and credibility mean research that can be replicated. Without this, there’s a validity problem. Pat affirmed researchers require great autonomy for best science.

Pat believes Research provides data and information to National Forest System management about issues, but does not make management decisions. Moreover, informing and sharing “best science” seldom convinces those with ideological opposition to embrace sound projects.

Pat is disturbed by the mantra of forest restoration being necessitated by past fire suppression. In reality, he thinks fuels are accumulating because timber harvest has ground to a halt. “Right now we’re growing more than we’re burning [through all types of fires]. We have made a social change of opinion that we are willing to have our wood fiber supplied by Canada [and] want the National Forests to become de facto National Parks,” he says. Moreover, he thinks the agency’s ability to attack fires while they’re reasonably small has diminished because there are fewer agency and industrial crews working in the woods.

According to Connell, Research needs to provide information and tools to help managers analyze implications of “No Action” alternatives in projects: “Basically the No Action alternative is taking a photograph, and all subsequent proposed actions are compared to [this] photograph. In truth, there’s no such thing as a static forest. You can’t actively manage when you create an inactive, inanimate icon as a control.”

From start to finish, the Forest Service Research relevancy question is dependent on context. It must be answered in terms of what research results are needed, by whom, when, where, and for what purpose.

Invasive Plants... (from page 6)

analyses support the idea that song structure may be an important indicator of habitat quality—songs at native-dominated sites formed cohesive neighborhoods that were more similar to each other than those at knapweed-invaded sites. Sampling at additional sites over a range of habitats will be necessary to evaluate song structure as a broadly applicable measure of population status. Given the links between song learning, turnover rates, and habitat quality in songbirds, song structure may serve as a new and improved means of monitoring population status, including impacts of invasive species.

Tours... (from page 19)

restoration projects. We then retraced the route we used for the public tour and Chuck shared concerns expressed by the public on their tour.

These chances to interact—public to manager to researcher—take time and commitment, but it’s worth it to share information and perspectives while out in the forest together. It has been a key part of BEMRP’s efforts to work in partnership and share research results with others.

Ritter... (from page 12)

works.” This partnership helps managers understand what’s “best science” and keeps researchers “grounded with what’s real.” Researchers are regarded as independent, so researchers’ involvement gives managers’ decisions credibility. These days, much of a forest manager’s job is social science-related. “I wouldn’t want BEMRP to lose sight of that,” he says.

Dan sees a role for BEMRP in travel management. This effort will require considerable social science research because people deeply value the National Forest, traveling through it by different means and for different reasons.

Outside the job, Dan pursues his passion for the outdoors by traveling, mountain biking, backpacking with Sharon and sons Dylan and Torrey, and fishing. “My real passion is golf. It’s a game that demands 100 percent focus. You can’t play golf and think about work.”

Wildland fire, lands, wilderness dams, and travel management—these challenges promise an exciting journey for Dan. Given his eagerness to work with diverse publics and openness to scientifically based research on management issues, Dan’s vision of quality land stewardship and customer service is becoming a reality on the Stevensville Ranger District.

The “Spotlight”...highlighting researchers at work:

Dean Pearson

“There are no Mondays”

Sharon Ritter, Research/Management Coordinator and ECO-Report Editor, BEMRP, RMRS, Stevensville, MT

Listen to Dean Pearson tell his story, and you can imagine him as a kid exploring the Bitterroot River, questioning how the natural world worked. That same questioning spirit led to his current position as a research wildlife biologist with RMRS. It shows in his fascination with community ecology and kept him going this past summer digging trenches in 100 degree heat to bury a predator-proof fence.

Dean grew up in the Bitterroot, Flathead, and Missoula areas. High school and Dean didn't get along, so he dropped out. A summer program with Montana Department of Natural Resources led to work as a fire lookout, then firefighter. Eventually, he got his high school diploma and a counselor recommended college.

Given his love of the outdoors, majoring in wildlife biology sounded good to Dean. After he got his bachelors degree from the University of Montana, he hooked up with Kerry Foresman in the Division of Biological Sciences. He earned his masters degree in zoology by working on a BEMRP-funded study on detecting carnivores using track plates and cameras and preparing a literature review for BEMRP on small mammals of the Bitterroot National Forest.

Just as he was finishing that project, Len Ruggiero with RMRS in Missoula needed someone with a strong background in small mammals, carnivores, and statistics. Dean spent the next half dozen years working for Len. Eventually, he realized that he was going to need a PhD if he wanted to go anywhere with research. So he worked with Ray Callaway in the Division of Biological Sciences to get his PhD in organismal biology and ecology, which gave him a strong background in plant ecology. This led to what became his next great adventure—trying to understand how whole communities work.

Dean's PhD research on knapweed, native plants, biocontrols, deer mice, and hantavirus made him both famous and infamous. Mt. Sentinel's invading knapweed aroused Dean's curiosity about knapweed's effects on the grassland community. He had noticed small piles of knapweed seedheads that looked like piles deer mice might make while



Dean handling a lynx kitten. (Photo by Milo Burcham)

feeding. When he trapped some mice and examined their stomachs, they were full of maggots of the gall fly *Urophora affinis*, one of 13 biocontrols released in Montana to control spotted knapweed. Dean, Ray, and their colleagues went on to show that this readily available source of protein during the winter months increases mouse populations, with a resultant increase in prevalence of the Sin Nombre virus. Populations of hungry mice also put more strain on native plants, already suffering from effects of knapweed.

Dean cautions weed managers to consider overall effects of introducing biocontrols, including indirect effects on nontarget species. Researchers in biocontrol spend a great deal of time and money making sure that species they introduce only feed on targeted plant species. Some of these biocontrols have been very successful.

“When it works, it's amazing,” he says. But when he presented his research on deer mice and the gall fly at a meeting of biocontrol folks, “You could have heard a pin drop. It

was complete silence, then suddenly hands started shooting up in the air. ‘Why do you want to shut down biocontrol?’ Now, how does what I'm reporting lead to that?”

Instead, Dean advocates spending more effort testing the efficacy of biocontrols before introducing them. If we understand which ones will be the most successful, we will end up with an ecological feedback loop. The biocontrol will successfully reduce weeds, mice numbers will return to more normal levels, their predation on native plant seeds will decrease, and native plants will increase. “It's community reassembly,” he says, taking a community that is heading in a trajectory we don't want and redirecting it onto a trajectory that, while different than the original, is still better than the one directed by weeds.

Dean isn't afraid of controversy: “If I see something that's wrong, I'll speak out.” He strongly advocates dialogue, whether it's about biocontrols or the role of Forest Service research. Researchers' autonomy is important to both researchers and managers. Says Dean: “Our role as researchers is to understand the system, tools, and side effects, and help managers understand the results of alternatives, whether it's the result of doing no active management or the results of various types of management. We need to lay it out objectively to the public.”

(continued on page 16)



Glossary – “What Do You Mean By That?”

Despite our efforts to write ECO-Report articles in “jargon-free” language, we still have to use terminology unfamiliar to some readers. Should you not recognize a term in ECO-Report, this glossary may help. If you don’t find the word here, visit BEMRP’s Glossary web page at <http://www.fs.fed.us/rm/ecopartner>. Remember some definitions change over time as new information develops. Periodically, we revise our web glossary page to reflect these changes.

BIOMASS: The amount of all living or dead plant material in an area. In terms of forest biomass utilization, it is often used to refer to the woody material (resulting from forest treatments) that is unsuitable for traditional forest products such as pulp wood or lumber.

BIOMASS BOILER: Boiler fired by biomass used to produce thermal heat and/or electricity.

BREEDING PRODUCTIVITY: The number of young successfully produced per pair of birds in a season.

CARBON BALANCE: The concentration of carbon released into the atmosphere compared to the amounts stored in the oceans, soil, and vegetation.

CARBON OR GREENHOUSE GAS OFFSETS: A greenhouse gas offset is generated by the reduction, avoidance, or sequestration of greenhouse gas emissions from a specific project. Offsets counteract or offset greenhouse gases that would have been emitted into the atmosphere; they are a compensating equivalent for reductions made at a specific source of emissions.

CARBON SEQUESTRATION: The provision of long-term storage of carbon in the terrestrial biosphere, underground, or the oceans so that the buildup of carbon dioxide (the principal greenhouse gas) concentration in the atmosphere will reduce or slow.

PARTICULATE MATTER: A complex mixture of extremely small particles and liquid droplets. Particulate matter may be in the form of fly ash, soot, dust, fumes, etc. Small particulate matter, or PM-10, is less than 10 microns in size and can pass through the throat and nose and enter the lungs.

PEER REVIEW: A publication is considered peer reviewed if it has been reviewed independently and approved by other experts in the author’s field before it is published.

RESOURCE ADVISORY COMMITTEE (RAC): Resource Advisory Committees (RAC) were formed under the Secure Rural Schools and Community Self-Determination Act of 2000 (Public Law 106-393) to improve collaborative relationships and provide advice and recommendations to the land management agencies.

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Dean Pearson . . . (from page 15)

The public often doesn’t understand the difference between U.S. Forest Service management and research branches. Dean says, “Research was set up to be autonomous from the National Forest System and State and Private Forestry. Research doesn’t answer to managers and the budgets are completely separate.” Yet, it is also important for researchers to know how managers function so they can conduct relevant research. BEMRP provides that close interaction, he says, but the closer they work together, the wider becomes the gray zone that separates them. “We just need to keep talking and stay aware of when we’re entering that gray zone.”

Dean’s interest in community ecology continues with John Maron in the Division of Biological Sciences on the project requiring predator-proof fences. You can sense his excitement as he talks about this attempt to understand the role of predators and small mammals in a grassland ecosystem. He loves coming to work, saying, “There are no Mondays.” Each day gives him more and more chances to increase his understanding of nature.



Dean Pearson loves to share his love of the outdoors with daughters Anya (left) and Rachel (right), shown here in Yellowstone. (Photo by Ellen McCullough)

A Review of *Rescuing Science from Politics: Regulation and the Distortion of Scientific Research*

Sharon Ritter, Research/Management Coordinator and
ECO-Report Editor, BEMRP, RMRS, Stevensville, MT

The National Forest System (NFS) and Forest Service Research and Development (Research) are separate branches of the U.S. Forest Service. The need for partners within BEMRP to remain independent is constantly on their minds. Research scientists take great care to remain independent from the NFS and NFS managers strongly encourage that independence. Without it, the result would be a lack of credibility and loss of support from both the public and the research community-at-large.

For example, we are expecting valuable information to come from the study of effects of fuel reduction treatments proposed for the Trapper Bunkhouse Land Stewardship Project. Both managers and scientists realize it will be money and time wasted if there is any question that Research is influencing policy or that managers are influencing research methods or results. So the two groups work together, but with care.

In *Rescuing Science from Politics: Regulation and the Distortion of Scientific Research*, edited by Wendy Wagner and Rena Steinzor,¹ 15 leading academics in law, science, and philosophy look at basic principles of science and give examples of how these principles have been violated. They also suggest changes that could be made legally and through policy to keep scientific principles in place.

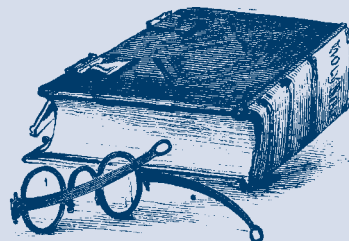
The book is organized around three principles laid out in the introduction. It then presents several chapters for each principle, giving examples of how each is threatened by existing practices and policies. The three principles are:

Independence and Freedom: Scientists must be able to conduct research without unjustified restrictions, including undue influence by research sponsors.

Transparency and Honesty: Data and results of research must be communicated honestly and expeditiously to the research community and broader public. Findings must be represented accurately, including limitations of the research.

A Public Infrastructure for Science: Government support of independent research is essential to produce discoveries that benefit the public good. In appropriate circumstances, peer review serves an important role in assisting the government's decision making regarding the use and funding of science, but peer review must never be used to censor research.

BOOK CORNER



Scientific independence is threatened by special interest groups when they attack individual studies, and sometimes even the integrity of the scientists themselves, to have courts reject some research as “junk science.” Authors remind us that science is a continuing search for answers and rarely comes up with one definitive answer. Instead, scientists use the “weight of the evidence” approach when evaluating relevant studies. “The principle that research by its nature is incomplete and to dismiss research because it does not provide a definitive answer could result in the exclusion of valuable science from regulatory decision making,” says author Donald T. Hornstein.²

Scientific freedom is at risk when some private industries that fund scientists to conduct studies include a nondisclosure clause in their contracts. This clause prevents scientists from releasing data or publishing their research unless approved by their funding source. Research that is negative to the company can be legally withheld from the public and regulatory agencies. Interestingly, under the 1999 Data Access Act, data collected under federally funded studies must be made available to the public and private industry, but the same is not true of privately funded studies.

Most examples given in the book relate to medical and environmental toxicology studies, such as investigations of the effects of chemicals on human health. These are often the ones that end up in court because scientific evidence contrary to a private industry's financial interests can have huge economic consequences. The payoff for an industry to cast doubt on the science is worth the cost of litigation.

A few examples focus on natural resource issues. In her chapter addressing the principle of transparency, author Holly Doremus states, “Transparency about who makes regulatory decisions, about the scientific basis for those decisions, and especially about the value choices made in the translation step from science to policy is essential to the effective use of scientific information in the political world of policy making.”³ As an example of lack of transparency, Dr. Doremus presents the Klamath Basin Water Conflict. This was in the national news in 2001 when a severe drought resulted in the federal government deciding to stop flow of

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Restoring an Educational Area

Sharon Ritter, Research/Management Coordinator and ECO-Report Editor, BEMRP, RMRS, Stevensville, MT

The Watershed Education Network (WEN), Lone Rock School, and Bitterroot National Forest teamed up to complete some much needed conservation work at the Willoughby Environmental Education Area southeast of Stevensville, MT. WEN received a grant from the Ravalli County Resource Advisory Committee to facilitate conservation work in Ravalli County. WEN then partnered with Lone Rock School's seventh grade class and asked them to design a management plan for the site. After touring Willoughby, the students came up with recommendations to improve the education area.

The next year, as eighth graders, the students created an interpretive welcome sign for Willoughby made from individual tiles that each of the students painted. They moved 15 tons of gravel onto the interpretive trail and filled in some



A student from Lone Rock School in the Bitterroot Valley learns how to properly plant native species at the Willoughby Environmental Education Area. (Photo by Julie Schreck)



Students from Lone Rock School wrestle a log while rebuilding a trail at the Willoughby Environmental Education Area. (Photo by Julie Schreck)

holes in the road leading to the site. They removed large rocks from the trail and recontoured parts that were eroded or had started to slope outwards. A group of students also pruned sagebrush and trees that had encroached upon the trail.

The students, in partnership with the Trapper Creek Job Corps Center, Bitterroot Ecological Awareness Resources, WEN, and U.S. Forest Service, planted more than 1,000 sagebrush, rose, cottonwood, and rabbitbrush on the site. BEMRP helped purchase these native plant species with conservation education funding from the Rocky Mountain Research Station. Lone Rock School students plan to adopt the site and will continue to monitor needs of the Willoughby Environmental Education Area for years to come.

Review... (from page 17)

irrigation water to long-term agricultural users. In this case, she concludes that natural resource agencies hid their political decisions "behind a veneer of science,"⁴ hence making them unaccountable politically for what was mostly a political decision.

The third principle is maintaining a public infrastructure for science. Authors of these chapters stress that peer review must be conducted by balanced panels and free from politics and conflicts of interest. They also argue that some research needs to be publicly funded, especially research that promises the greatest public benefit and is in greatest need of government oversight.

Rescuing Science from Politics reveals ways that the three principles of science have come under attack in the last few decades. If we are to retain or in some cases regain our faith in science, we need to be vigilant. This book will add to discussions about the need for the regulatory process to follow

these principles—for the good of our health and our environment.

Rescuing Science from Politics: Regulation and the Distortion of Scientific Research by Wendy Wagner and Rena Steinzor. Published in 2006 by Cambridge University Press, New York. 304 pages. ISBN-13: 978-0-521-85520-4. Available in hardcover (\$75.00) and paperback (\$29.99).

¹ Wendy Wagner is the Joe A. Worsham Centennial Professor at the University of Texas School of Law in Austin, Texas. Rena Steinzor is the Jacob A. France Research Professor of Law at the University of Maryland School of Law and has a secondary appointment at the University of Maryland Medical School Department of Epidemiology and Preventive Medicine.

² Hornstein, Donald T. 2006. The data wars, adaptive management, and the irony of "sound science." In: Wagner, Wendy; Steinzor, Rena. *Rescuing Science from Politics: Regulation and the Distortion of Scientific Research*. New York: Cambridge University Press. p. 104.

³ Doremus, Holly. 2006. Using science in a political world: the importance of transparency in natural resource regulation. In: Wagner and Steinzor, *Rescuing Science from Politics*. p. 144.

⁴ *Ibid.*, 158.

Getting Out on the Ground: Tours of Trapper-Bunkhouse Project



Mick Harrington sharing research results from his old-growth study.
(Photo by Sharon Ritter)

Sharon Ritter, Research/Management Coordinator and ECO-Report Editor, BEMRP, RMRS, Stevensville, MT

One of the most effective ways to share information is face to face. BEMRP researchers provided information during two tours of the Bitterroot National Forest's proposed Trapper Bunkhouse Land Stewardship Project (Trapper-Bunkhouse Project) in 2006 that reached out to other groups. On August 23, BEMRP executive committee members Chuck Oliver, Ward McCaughey, Mick Harrington, and Alan Watson joined Bitterroot National Forest employees and 35 members of the public on a 3-hour tour of the project area.

Stop 1 was at Chaffin Creek where Fisheries Biologist Rob Brassfield discussed possible forest treatments to protect an isolated population of bull trout from habitat loss due to stand-replacing fire. However, a November 2006 flood altered the stream and the Forest decided to remove those treatments from this project.

Stop 2 was at one of two units that will have special treatments as research plots. Research Foresters Mick Harrington and Ward McCaughey pointed out that there is no such thing as fire-proofing a forest. After all, this forest has been through multiple fires historically, as revealed by the fire scars found in large stumps from the last timber sale 80 to 90 years ago. "What we're trying to do," said Mick, "is change fire behavior." When asked if he had to test the effectiveness of treatments by burning the forest, Mick looked a little wistful as he said, "I've been waiting for years for a fire to come through my research plots." Instead, he will assess effectiveness of fuel reduction treatments by using fire models.

The research units will have a replicated research design with different thinning treatments and ways to reduce fuels. Researchers will look at the effects of these treatments on soil

compaction, soil nutrients, and productivity of sites. They also will look at invasive weeds and how remaining trees and understory vegetation respond to thinning and prescribed fire.

Bitterroot National Forest North Zone Silviculturist Kim Johnson explained the need to reduce fuels for public and firefighter safety and protect important natural resources. The Gash Creek Fire that burned 8,500 acres in 2006 started in an area with a high concentration of fuels and was one of the sites that BEMRP's modeling also had shown as being at risk.

Stop 3 was the most controversial. Here, within view of private land, Forest trails staff members Deb Gale and Monte Monroe discussed the proposal to address off-highway-vehicle (OHV) issues in the area, including erosion. At the public's request the Forest has since postponed OHV-related proposals for later consideration in a Forest-wide travel management plan.

Questions from the public revealed concerns they had about elk security, harvesting trees, roads, OHV use, and how the Forest would be able to accomplish needed work given decreasing budgets. Although there wasn't enough time for discussion, everyone definitely benefited from hearing first-hand about the project and people's concerns.

On September 15, seven members of the Northern Region's Ecosystem Management (EM) Team joined Chuck Oliver and Mick Harrington for a tour. Kevin Hyde and Kim Johnson discussed modeling used to select the area between Trapper and Bunkhouse Creeks for treatment. The modeling then was used to predict fire behavior and select possible stands for treatment. The EM Team was particularly interested in how data were used in integrated models. This could help in a region-wide Integrated Restoration and Protection Strategy that will prioritize funding for fuel reduction and forest

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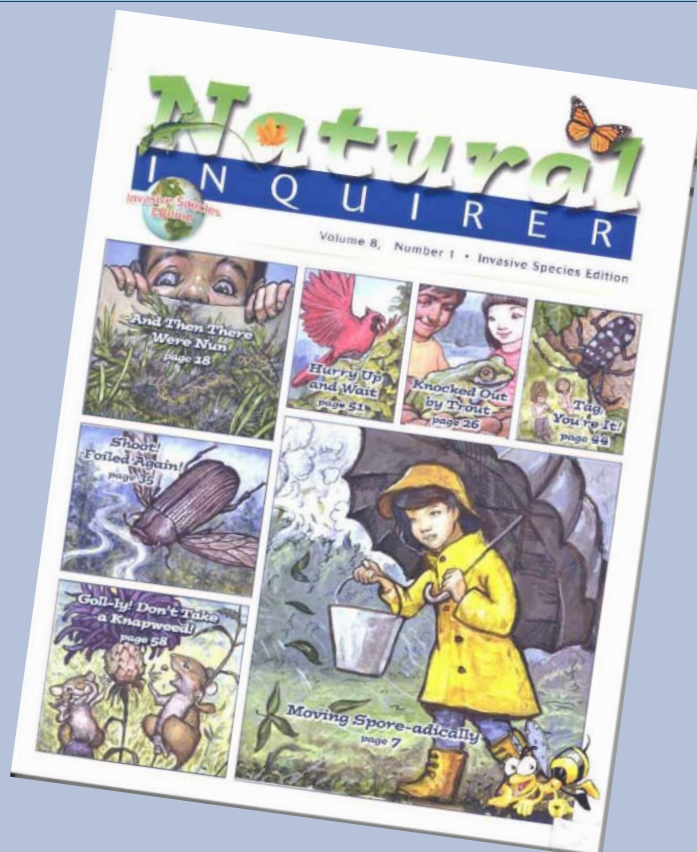


Research unit in the Trapper-Bunkhouse Project, showing stump from a timber sale 80 to 90 years ago, and dense regrowth. (Photo by Sharon Ritter)

New Publication Available

The *Natural Inquirer*, a Forest Service education journal for middle school science students, published the Invasive Species Edition in 2006. The article “Goll-ly! Don’t Take a Knapweed!” featured several researchers associated with BEMRP. Yvette Ortega, Dean Pearson, and Kevin McKelvey talk about the scientific process, ecosystems, and their research on knapweed, gall flies, and deer mice. They offer opportunities for students to reflect on research findings, do some number crunching, and create graphs.

Ortega, Yvette; Pearson, Dean; McKelvey, Kevin. 2006. Goll-ly! Don’t take a knapweed! The impact of nonnative plants and animals on deer mice. The *Natural Inquirer* 8(1):58-76. The Invasive Species Edition and other editions are available at: <http://www.naturalinquirer.usda.gov/>.



ECO-Report

Bitterroot Ecosystem Management
Research Project
USDA Forest Service
Rocky Mountain Research Station
800 E. Beckwith St.
Missoula, MT 59801

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