Bitterroot Ecosystem Management Research Project (BEMRP)

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Scientific Independence: A Key to Credibility

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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.

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)

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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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.

> *"Scientists have a responsibility to society based on the confidence that is placed in credible scientific information."*

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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Using Models to Provide a Virtual Test of Forest Treatments

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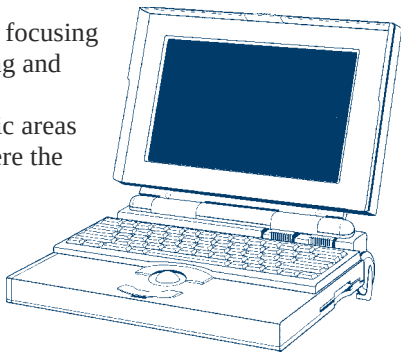
BEMRP's participation in the Bitterroot National Forest's proposed Trapper Bunkhouse Land Stewardship Project (Trapper-Bunkhouse Project) consists of two parts. One is the field study mentioned elsewhere in this ECO-Report that is looking into the effects of thinning and burning on various resources. 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.

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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).