

Editor's note. The Northwest Scientific Association has assisted the Tongass National Forest and the Pacific Northwest Research Station in obtaining independent (blind) technical reviews for various components of the science input to the Tongass Land Management Plan. A previous version of this manuscript was submitted to *Conservation Biology* in response to the article by Meffe et al. (1998) cited below, but was not accepted for publication by that journal.

Charles G. Shaw, III, Fred H. Everest, Douglas N. Swanston, Kent R. Julin, and Stewart D. Allen,
USDA Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory, 2770 Sherwood Lane,
Suite 2A, Juneau, Alaska 99821.

Independent Scientific Review in Natural Resources Management: A Recent Example from the Tongass Land Management Plan

The Society for Conservation Biology recently commissioned a paper on "Independent Scientific Review in Natural Resource Management" (Meffe et al. 1998). We read this publication with considerable interest, because our experience as scientists participating in development of the Land Management Plan for the Tongass National Forest (the largest national forest in the United States at 6.85 million hectares) led us to a similar conclusion over two years ago — there was a strong need for a rigorous evaluation of the use of scientific information in this highly controversial (Williams 1995) and still contentious (Durbin 1998) Land Management Plan (USDA Forest Service 1997). It is questionable if one could have found a more provocative land management situation to attempt such a scientific review. The Tongass has been a focus of often intense social, political, and ecological debate for over 40 years as this largely unaltered temperate rainforest contains abundant timber, wildlife, fish, mineral, and scenic resources in a unique archipelago setting.

We conducted our precedent-setting evaluation on the use of scientific information in the Tongass Land Management Plan over several months and prepared the final results in manuscript form. After an in-depth, independent scientific peer review, this manuscript was published (Everest et al. 1997). Our efforts also were presented in June 1997 at the annual meeting of the American Fisheries Society and in September 1997 in the Symposium on Advocacy in Science at the Wildlife Society Conference. Thus, published information specific to our effort on the Tongass National Forest, as well as other pertinent litera-

ture, was available to Meffe et al. (1998) to cite and discuss in their treatise. Curiously, they chose not to cite our widely distributed paper or any other well-known and available literature which, in our opinion, created a false impression regarding their originality.

As indicated by Meffe et al. (1998), there are several goals in conducting such a science-use review. We generally agree with their stated goals and consider that our evaluation of the Tongass Plan (Everest et al. 1997) accomplished the seven goals indicated in the commissioned paper, with the last three goals forming the basis of our approach. We provided another critical goal that is only alluded to by Meffe et al. (1998); that is, the review process should be designed to allow managers an opportunity to bring their developing policy direction in line with available scientific information. In this way, the review can serve to improve the final decision document rather than just deliver a report card on "how well did they do?" To accomplish this objective, the review process needs to be iterative; that is, it needs to be conducted coincident with development of the decision document and frequently shared with those making policy decisions (Fig. 1).

Our evaluation (Everest et al. 1997) of the Tongass Land Management Plan (USDA Forest Service 1997) went through several iterations as we shared drafts with managers for them to see "how they were doing" in various areas with regard to the application of available science information to policy development (Fig. 1). These subject areas included habitat for wildlife and fish,

protection for caves and karst topography, slope stability, road management, various timber management issues, certain social and economic concerns, monitoring, and adaptive management. Policymakers frequently reconsidered management direction in these areas based on our review comments. They often changed direction in the

emerging plan or added further clarification to acknowledge the nature of the available information bearing on the topic or the likely levels of risk (Shaw 1999) to one or more resources associated with the decision. For example, preliminary drafts of the Plan disallowed timber harvest within 150 meters of the beach to protect critical wildlife

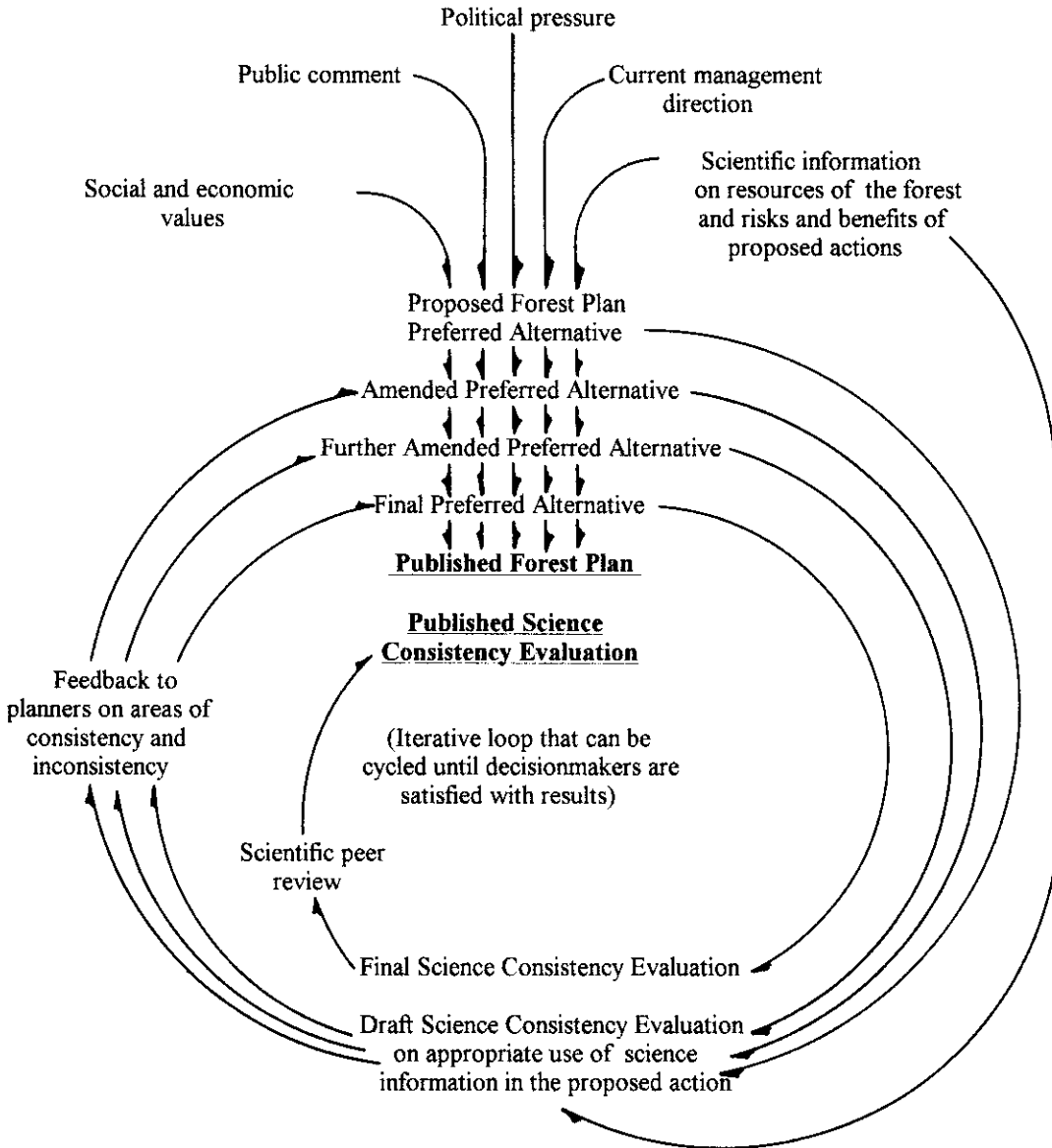


Figure 1. Schematic diagram of the process used in developing the Tongass Land Management Plan. Without the addition of scientists to the team and their continued role in developing scientific information, interactively evaluating its use, and having their efforts peer reviewed by other scientists (left side of schematic diagram), it is questionable how well science-based information would have fared in the final plan.

habitat. Based on published information and risk assessment panels (Shaw 1999), our draft evaluation indicated that, in comparison to a 150-meter zone, a 300-meter zone markedly reduced risk to beach-adjacent wildlife habitat. In the final Plan, managers chose to reduce risk and disallowed timber harvest within a 300-meter zone; we (Everest et al. 1997) found this decision to be consistent with the available scientific information.

Another key component of a scientific review that Meffe et al. (1998) did not address is that decisionmakers need to have a clear understanding of the criteria that will be used by scientists to evaluate their proposed management policies. Forest plans and other land management decision documents often are criticized for having vague direction open to various interpretations; scientific reviews of such documents should not be open to similar criticism. Articulating in advance the criteria that will be used in the scientific evaluation alleviates this concern.

In the Tongass evaluation (Everest et al. 1997), we developed and applied the following criteria to address how scientific information was used by managers in setting policy:

- All scientific information made available to managers was considered in the decision.
- Scientific information was understood and correctly interpreted.
- Resource risks associated with decisions were acknowledged and documented.

All three criteria had to be met before a decision was considered to have appropriately used the available scientific information. Similarly, a management decision was considered to not have appropriately used available scientific information if any of the following circumstances occurred:

- Managers misrepresented or reinterpreted information in ways not supported by the original information.
- Managers selectively used information such that a different decision was reached than would have been made if all available information had been used.
- Decisions were stated and documented in such a way that implementation effects could not be predicted.
- Projected consequences of management actions were not consistent with scientific information.

In applying these criteria to the Tongass Land Management Plan, we concluded that the decisions made therein for riparian habitat, fish sustainability, wildlife viability, karst and caves protection, slope stability, timber resources, certain social and economic effects, and monitoring achieved a high degree of consistency with the available scientific information (Everest et al. 1997).

Through applying such criteria to management decision documents, it becomes apparent that certain contentious policy decisions are not necessarily inappropriate relative to available information just because some scientific reviewers may personally disagree with them. Although an essential consideration, science information does not "make" management decisions. Policymakers make such decisions after they complete what is essentially a value-oriented integration of the "positive and negative" features (environmental, economic, social, and political) of the projected outcomes of alternative management paths.

Because scientists using science information do not make management policy decisions, what part should scientists play in evaluating such decisions? It is our general position that scientists should not advocate, recommend, or impose any particular outcome or decision. To maintain neutrality and thus credibility, scientists should not impose their personal values into the process by making management recommendations. The personal values of scientists coupled with scientific information do not equal science. In this regard, four of the authors of Meffe et al. (1998) would have been poor choices for scientific review of the Tongass Forest Plan, because they signed a letter to the President of the United States advocating a particular management outcome on the Tongass.

In contrast to advocating any particular management direction, we contend scientists should advocate that the relevant scientific information be considered when a decision is made. They should, based on established criteria that are clearly articulated, determine when a decision has appropriately used the available science information and when it has not. Some further and contrasting discussions regarding the roles of scientists and managers in land management policy development appear in Philpot (1992) Risser and Lubchenco (1992), Hanley (1994), Lackey (1997), Lubchenco (1998), and Mills et al. (1998).

In the Tongass National Forest effort, we used an approach to conducting a science review somewhat different than that advocated by Meffe et al. (1998). We agree that independent scientific review of proposed management actions is of paramount importance, but today's natural resource issues on public lands involve a wide range of issues and the decisions surrounding these issues are extremely complex. This complexity requires that those reviewing the use of scientific information in management decisionmaking be fully aware of the relevant information base and be specifically acquainted with how it was used in developing and setting the policy.

Less than full knowledge could, even with the best of intentions, lead to a flawed review. It also could reduce the likelihood of, or extend the timeframe or mechanism for, achieving the necessary understanding, acceptance, and change by the management policymakers. We thus suggest a two-stage process in which the initial review is conducted by scientists who have followed the process and situation closely, or have in some way been *involved* with it so that they understand the various approaches and nuances used by managers in their policy setting. The independence of their review is established through the supervisory structure maintained in the planning effort (the scientists are not supervised by policy decisionmakers) and through the completed analysis being subjected to an independent, scientific peer review (Fig. 1).

In the Tongass effort, we were assigned to the planning team but reported to the Director of the Forest Service's Pacific Northwest Research Station rather than to the Alaska Regional Forester who approved the Land Management Plan. Administrative structure in the Forest Service is such that Directors of Research Stations are independent from Regional Foresters; their lines of authority meet only at the Forest Service Chief's office. Thus, the "authority separation" appropriately emphasized by Risser and Lubchenco (1992) as important for scientific involvement in land management policy formation was clearly maintained.

We were charged with developing a scientifically credible, value neutral-information base for the Tongass Land Management Plan, evaluating

the quality of data and methods being used to develop the Plan, and clarifying the likely risks to various resources associated with alternative management scenarios (Mills et al. 1998). Finally, we independently conducted a science evaluation of the Plan which was itself subjected to a rigorous peer review and published (Everest et al. 1997). Thus, our approach followed the other primary guideline offered by Risser and Lubchenco (1992) for scientific involvement in land management policy formation. That is, to guard the scientific credibility of the effort [our evaluation], it must be subjected to the same kind of peer review that is expected in the process of conducting science.

The stated intent of the Alaska Regional Forester was to produce a scientifically credible and resource sustainable Land Management Plan for the Tongass National Forest. It became apparent that our involvement with development of the information base and independent review of the final product was essential to meeting that goal (Fig. 1). At times, our efforts and approach caused considerable consternation among management policymakers, particularly because they realized that our review would be published. They were not accustomed to having their decisions so closely scrutinized by Forest Service colleagues whom they did not manage. They also were unaccustomed to providing justification and acknowledgement of risks associated with their decisions. In the end, however, they did acknowledge that our involvement in the process and our insistence on maintaining independence from the management policy decisionmakers led them to incorporate the best available scientific information in the Forest Plan.

To our knowledge, this rigorous evaluation (Everest et al. 1997) of the way managers used scientific information in the Land Management Plan for the Tongass National Forest (USDA Forest Service 1997) is the first of its kind. We hope that others will build on the process we initiated and continue the debate stimulated by Meffe et al. (1998). We collectively should improve policy decision-making in management of public lands by ensuring rigorous review by qualified research specialists. The use of established criteria in a value-neutral manner will ensure that natural resource management is indeed science-based.

Literature Cited

- Durbin, K. 1998. A struggle for science on the Tongass. *Inner Voice* 10:8-12.
- Everest, F. H., D. N. Swanston, C. G. Shaw III, W. P. Smith, K. R. Julin, and S. D. Allen. 1997. Evaluation of the use of scientific information in developing the 1997 Forest Plan for Tongass National Forest. 1997. Gen. Tech. Rcp. PNW-GTR-415. Pacific Northwest Research Station, USDA Forest Service, Portland, Ore.
- Hanley, T. A. 1994. Interaction of wildlife research and forest management: the need for maturation of science and policy. *For. Chron.* 70:527-532.
- Lackey, R. T. 1997. Restoration of Pacific salmon: the role of science and scientists. Pages 35-40 in S. Sommarstrom (editor), *What is watershed stability?* Proceedings of the sixth biennial watershed management conference. Water Resources Center Report No. 92. University of California, Davis.
- Lubchenco, J. 1998. Entering the century of the environment: a new social contract for science. *Science* 279:491-497.
- Meffe, G. K., P. D. Boersma, D. D. Murphy, B. R. Noon, H. R. Pulliam, M. E. Soulé, and D. M. Walker. 1998. Independent scientific review in natural resource management. *Conserv. Biol.* 12:268-270.
- Mills, T. J., F. H. Everest, P. Janik, B. Pendleton, C. G. Shaw III, and D. N. Swanston. 1998. Science/management collaboration: lessons learned from the revision of the Tongass National Forest Plan. *West. J. of Appl. For.* 13:90-96.
- Philpot, C. 1992. Institutional change: science, policy, and management. Pages 127-130 in: P.W. Adams and W.A. Atkinson (compilers), *Watershed resources: balancing environmental, social, political, and economic factors in large basins.* Oregon State University Press, Corvallis.
- Risser, P. G. and J. Lubchenco. 1992. The role of science in management of large watersheds. Pages 119-126 in P. W. Adams and W. A. Atkinson (compilers), *Watershed resources: balancing environmental, social, political, and economic factors in large basins.* Oregon State University Press, Corvallis. 162p.
- Shaw, C.G., III. 1999. Use of risk assessment panels during revision of the Tongass Land Management Plan. General Technical Report PNW-GTR-460. Pacific Northwest Research Station, Forest Service, Portland, Ore. In press.
- USDA Forest Service. 1997. Tongass National Forest land and resource management plan. Forest Service, Alaska Region, Juneau, Alaska.
- Williams, T. 1995. Tearing at the Tongass. *Audubon* 97:26-32.