

Chapter 4: Progress to Date

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Introduction

The inferences and opinions expressed in this report attest to the complex nature of the Northwest Forest Plan (the Plan) and its far-reaching effects on the socioeconomic and ecological fabric of the Pacific Northwest. Progress to date can be summarized by addressing four interconnected questions:

- Has the Plan resulted in changes that are consistent with objectives identified by President Clinton?
- Are major assumptions behind the Plan still valid?
- Have we advanced learning through monitoring and adaptive management?
- Does the Plan provide robust direction for the future?

Measurable Progress

President Clinton challenged federal agencies to work together to develop a scientifically credible plan to protect the long-term ecological health of federally managed forests, while providing sustainable levels of forest products that would contribute to the economic stability of the region. Has the Plan resulted in changes that are consistent with the objectives identified by President Clinton? Ten years after it was initiated is too soon to judge whether it has been fully successful, but some trends are clear.

The most notable accomplishments are associated with protecting late-successional and old-growth forest, termed older forest, and riparian forests and associated species. Harvest of trees in older forest and riparian areas has dwindled to insignificant amounts compared to historical harvest rates. The Plan protects most existing old-growth stands from future harvest, and other midseral stands are slowly developing old-growth characteristics, such as large

trees and multistoried canopies. Other successes include active watershed restoration and decommissioning of roads, site-specific protection of sensitive species, improved watershed planning processes, increased understanding of the distribution and habitat needs of species of concern, and advancing silvicultural practices to accelerate old-growth development.

The Plan also fell short in some arenas, most notably in providing for a “predictable and sustainable level of timber sales and nontimber resources” and “new economic opportunities for year-round, high-wage, high-skill jobs” (FEMAT 1993, chapter 3). Specifically, timber harvest rates were lower than expected. Current overall harvest rates likely can be sustained, but only if the mix of harvest prescriptions changes through time to match changes in the structural composition of forests. Timber shortfalls resulted in economic hardship for some communities, but others were able to compensate by increases in other economic sectors and through active civic leadership. Active fuels management in the drier forests of the eastern Cascades and Klamath-Siskiyou regions lagged behind expectations, perhaps increasing the risk of uncharacteristic large or severe fire in these regions. Large fires, such as the Megram Fire in 1999 (125,000 acres) and the Biscuit Fire in 2002 (500,000 acres), resulted in substantial losses of older forests and local increases in watershed degradation, but disturbance rates averaged over the Plan area were consistent with expectations.

The Plan failed to fully end “the gridlock within the federal government,” although increases in cooperation among federal agencies and between research and management were noticeable. An understandable lack of consensus among stakeholders and the agencies contributes to continuing stalemate in some areas.



Nan Vance



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A variety of forest products contribute to human well-being: bear grass and salal used as floral greens, mushrooms both as a cash crop and as a food; Douglas-fir for softwood lumber.

Validity of Assumptions

The Plan rested on many wide-ranging assumptions either explicitly identified in planning documents or implied through the Plan's direction and expectations. Various lines of evidence support the veracity of many of these assumptions, yet others have been challenged by new findings or emerging knowledge. Testing and refining assumptions is a critical step toward improved understanding and ability to manage effectively.

Many Assumptions Remain Valid

One of the Plan's central assumptions was that old-growth forests (especially those with older forest structure) were limited in distribution and that the network of reserves identified in the Plan would encompass most of the remaining old growth. Updated (and more accurate) inventories are remarkably consistent with pre-Plan regional estimates of old-growth forest and reaffirm the assumed overlap of old growth and the reserve network (chapter 6). The network of late-successional reserves and congressionally reserved areas was also assumed to include most of the best remaining habitat for northern spotted owls (see appendix for species names) and other old-growth-dependent species. Recent estimates identified 10.3 million acres of owl habitat in these areas, representing 59 percent of the owl habitat available on federal land (Davis and Lint 2005). Owl habitat also was thought to be an adequate surrogate for marbled murrelet habitat where the two species overlap, and it was assumed that the Plan reserve strategy would include 86 percent of the federally controlled murrelet nesting habitat. Improved modeling of murrelet habitat has produced similar estimates (81 percent), suggesting that the original planners successfully identified much of the nesting habitat on federal lands. Whether protection of habitat has halted declines in owl or murrelet numbers is a complex and as yet unanswered question (chapter 7).

In a similar context, key watersheds that were assumed to be in better condition than most were identified as part of the Aquatic Conservation Strategy (ACS). The aquatic monitoring effort demonstrated that key watersheds generally

have fewer roads and higher rates of road decommissioning, which accounts for higher condition scores (Gallo and others 2005). The aquatic strategy was designed by using a body of science that pointed to the dynamic interconnections of riparian vegetation, large wood, sediment, and landscape disturbance. Subsequent research has further strengthened the underlying assumptions of the ACS (chapter 9).

Monitoring results reinforce several other key assumptions of the Plan. For example, forest inventory data abundantly demonstrate that trees can grow quickly in the productive forests of the Pacific Northwest. Increases in mean tree diameter in undisturbed stands suggest that old-growth forests are being naturally recruited, with positive implications for both terrestrial and aquatic species. It is still unknown how rapidly these new old-growth forests will acquire the structure of older forests.

Experimental thinning in plantations demonstrated that some old-growth features, such as large trees and spatial heterogeneity, could develop more rapidly following treatment; other features, such as species diversity, may simply require time (chapter 6). The implications of accelerated development are not fully understood. Clearly, many species are associated with old-growth forests, but whether they respond solely to structure or to more time-dependent processes (dispersal, for example) is often unknown.

Two of the more controversial issues in the Plan include the permanency of reserve boundaries and salvage logging in reserves. The Plan assumed that reserve networks would be large enough to withstand large disturbances without loss of function. Thus far, that assumption seems to hold true. That fixed reserves are an optimal strategy for conserving biodiversity in the long term remains an untested assumption. Indeed, testing such a broad-scale, long-term hypothesis is not possible in a short time. In chapter 6, we note that the direction for salvage logging in late-successional reserves was unclear, but left open the possibility of limited salvage logging for commercial purposes. An underlying assumption was that the rationale for salvage logging was primarily economic, not ecological, and little

salvage in reserves would occur. Emerging science findings confirm assumptions about the ecological functions of downed wood and large snags following wildfire. Retention of large, dead tress following stand-replacing wildfire provides long-term benefits consistent with the ecological goals of the Plan.

Unsupported Assumptions

Several assumptions incorporated into the Plan have since shown to be unsupported, or only weakly supported, by new evidence or understanding. Assumptions were challenged regarding both socioeconomic and ecological relations, with implications for both. One of the more important findings concerns the role of the federally managed lands. From a socioeconomic perspective, it was assumed that timber flow from federal lands was a key determinant of community well-being. As discussed in chapter 5, this is true in some communities. Looking more broadly, the presumption that federal land would continue to be a major supplier of high-grade commercial timber is questionable. The dominant social values expressed in forest management may have changed since Plan inception. For example, lawsuits, threats of lawsuits, and protest regarding harvest of old-growth forest in matrix areas or thinning older forest in reserves has resulted in lower-than-anticipated harvest levels, and have slowed the pace of active management. The results include unanticipated amounts of old growth remaining in matrix areas and elevated risk of uncharacteristic severe fire in dry forests, with positive and negative implications for species of concern. Post-Plan information on species' distributions and habitat preferences can aid local or regional assessments of whether old-growth harvest in matrix areas or additional fuel treatments in dry forest threaten species viability.

Experience with the Plan has led to important changes in how ecosystem processes are viewed and the applicability of various conservation paradigms. For example, the northern spotted owl was used as an umbrella species; it was

assumed that conserving the habitat of spotted owls would provide for the needs of many other old-growth-dependent species. Because of the Survey and Manage program, we now recognize that a single-species focus may not be effective for all old-growth-related species, and that more holistic strategies may be required. The identification of barred owls and West Nile virus as potential threats to northern spotted owls demonstrates that providing habitat is a necessary but not sufficient condition for conserving species. That disturbance is an important component of ecosystem productivity and biological diversity is increasingly recognized; positive long-term benefits can arise from episodic disturbances at a variety of spatial and temporal scales.

Advances in Learning

Many of the issues involved in monitoring and adaptive management discussed in chapter 10 are briefly summarized here by asking, "Have monitoring and adaptive management advanced learning?" Overall, the answer is a qualified yes. Some notable successes were achieved, but also some failures; improvements are possible in places.

Without question, the monitoring program produced a wealth of data and information. Major improvements in remote sensing and forest inventories provide a detailed picture of current forest conditions throughout the Plan area and allow tracking of changes in these forests. Species surveys and population monitoring aid understanding of the distribution and habitat needs of many species and provide indicators of change for select species. Because of the Survey and Manage program, for example, more than 67,000 species locations were mapped—an unparalleled achievement for a monitoring program over a similar-sized area. The northern spotted owl monitoring program is one of the most intensive avian population monitoring efforts in North America. The aquatic and riparian monitoring effort is systematically building a database on riparian and instream conditions that is amenable to both monitoring and exploring linkages among ecological drivers and

responses at multiple spatial scales. Despite its late start, the socioeconomic program has produced findings that aid understanding of the large-scale context of the Plan, as well as its regional and local impacts.

Room for improvement can be found, however, even in the most successful programs. Some efforts are still in nascent phases; judging their ultimate success is difficult. Funding shortfalls and disagreements on design slowed implementation of the aquatic and riparian monitoring program. The marbled murrelet monitoring effort also took time to get underway, which limits the time series available for analysis. A general plan for monitoring biodiversity was not developed; even defining biodiversity pragmatically is difficult (chapter 8). Inconsistencies between agencies and administrative units continue to impede integration of data in multiple ways. For example, differences in remote sensing and classification methods created problems in developing a seamless vegetation map stretching from California to Oregon and Washington.

Experimental management has produced useful, but spotty, results. Much of the success has come from stand-level experiments such as variable-density thinning in plantations or combinations of prescribed fire and thinning in experimental forests. Rigorous broad-scale experiments were lacking. Experience with adaptive management areas is generally disappointing, because they have not facilitated the degree of innovation and experimentation expected. Too often, precaution seems to have trumped learning. As discussed in chapter 10, carefully focused questions, quantifiable expectations, efficient monitoring, and well-structured comparisons could accelerate learning.

Looking to the Future

Invariably, the question arises as to whether observations of the past decade provide evidence that the Plan is or is not working and warrants revision. Science alone cannot offer a definitive answer to this question, nor should it. To assert that the Plan is working requires subjective judgments for which no consensus exists. The Plan is too complex and diverse to give it a simple pass-fail grade. Clearly, some

expectations of the Plan have been met more successfully than others, but it is too early or too difficult to judge most outcomes. How the Plan is ultimately judged depends on expectations, the value assigned to its various components and consequences, and beliefs about the possible performance of alternative strategies. Judging the Plan is much like trying to evaluate the performance of a sports team early in the season when team cohesion is weak and their strengths and weaknesses have not been fully tested nor revealed and observers have their own criteria for declaring success.

Various observations on the Plan and its ability to help federal agencies address major management challenges are reviewed below. These observations are organized by the types of problems that characterize particular issues, rather than by topical areas. The various issues and their similarities are assessed in terms of appropriate scale, temporal tradeoffs, or interactions between pattern and process. Finally, the Plan's flexibility to address a range of issues is examined.

Appropriate Scale

The importance of spatial scale is an oft-repeated theme in this report. That is, every major issue has its own characteristic scale or mix of scales. Mismatches between the scale of a management response and the characteristic scale of the issue can contribute to ineffective management. For example, the Plan is addressed exclusively at federally managed lands. For socioeconomic issues, federal lands are a small part of local, regional, and even international economies. Thus, trying to anticipate or assess the Plan's effects without looking at the larger context is illogical. On the ecological side, wide-ranging species like anadromous salmon and marbled murrelets cannot be managed effectively on federal land alone. Other issues like invasive species and wildland fire do not recognize administrative boundaries. Federally managed land is vital to solving wide-ranging problems, but overall societal goals cannot be met by partial fixes. Therefore, integrating the Plan with transboundary planning efforts such as the National Fire

Plan, the Northwest Power Planning Council's fish and wildlife program, or other state and federal efforts can help build partnerships essential for success.

Below the level of transboundary problems, other spatial-scale issues fall wholly within the federal estate. Chapter 6 touches on the linkages between size and distribution of reserves and the purposes they are intended to serve. Limited historical evidence suggests that they are large enough to be resilient to certain types of disturbance, but hardly impervious. Chapters 8 and 9 discuss the role of complementary coarse- and fine-scale filters in species conservation. The lesson is that some species may fall through the cracks of a coarse-scale policy that expects large reserves to meet the needs of all species. Some level of fine-scale protection of unique habitats or even of individuals (for example, nesting pairs of owls) may be required. Chapter 9 also discusses the importance of managing within watersheds by looking across a range of stream sizes and upstream-downstream and upslope-riparian perspectives, and discusses that broad-scale strategy of managing for a range of watershed conditions. Chapter 3 identifies the lack of mid-scale planning to help match the Plan's strategic direction to an appropriate scale of action.

Temporal Tradeoffs

The questions of appropriate spatial scale are paralleled by issues of temporal scale. One pervasive issue is that of the tradeoffs between short- and long-term consequences. This issue is particularly acute when a short-term impact (or benefit) is highly probable but small, relative to a less likely but more substantial long-term benefit (or impact). The classic example is fuel management in fire-prone ecosystems; the negative short-term effects on sensitive species such as spotted owls can be balanced against possible long-term benefits of reduced losses in habitat to high-severity fire. A second example is salvage logging. Salvage logging may provide short-term economic gain and reduce fuel loads (depending on methods), but also may have long-term consequences for soil compaction, erosion, or loss of unique early successional habitats containing large downed

wood and snags (chapter 6). Indeed, the more general question of active management versus passive protection invariably invokes temporal comparisons. As discussed in chapter 10, simple rules such as the precautionary principle do not assure an optimal solution.

Moreover, temporal tradeoffs are implicit in decisions about agency organization, staffing, training, and investment in research or learning. Just as physical infrastructure constrains management options, the same is true of social capital, agency technical capacity, knowledge, and technology. Major reductions in agency workforce affect the ability to plan and implement projects. Federal workforce reductions also affect rural communities, where federal workers may be some of the more highly educated and influential residents (chapter 5). The discussion in chapters 3 and 10 regarding agency capacity for adaptive management and midscale planning reinforce a basic truth—you cannot build a trustworthy ship without shipwrights.

Science played a major role in shaping the Plan, and scientists continued to be active in implementing, monitoring, and assessing its effects. A shift toward advanced technologies (for example, internet, geographic information system, and remote sensing) has improved efficiency, changed agency operations, and even revamped how federal agencies engage and interact with the public. Management challenges continue to grow and become more complex, however, making prudent investments in research and learning even more critical. Such investments reflect additional tradeoffs between short- and long-term gains. Funds invested in monitoring and research are not available for other uses nor can the benefits be guaranteed. In these cases, we need to be sensitive to the information needs of management (and society in general), and identify explicitly the expected benefits and risks of investments in research and monitoring.

Pattern and Process

A third—and perhaps most daunting—set of problems in ecosystem management involves interactions between pattern and process. Similar to the issues of appropriate

scale, pattern and process are intertwined concepts for describing, understanding, and managing landscapes—with a temporal twist. Pattern, the spatial arrangement of landscape components, is a consequence of process, the interactions between ecological components acting on a landscape. Just as pattern results from processes, processes are also constrained by pattern, but more than just pattern; other ecological components can be involved. An example is wildland fire. Fire acts in concert with other processes to shape spatial patterns of vegetation structure. Conversely, the expression of fire on a landscape is constrained by vegetational patterns and topography. The challenge is that these processes are often not directly observable and they are inferred from landscape patterns. Managers face a more difficult challenge in that they use processes to shape pattern, hoping that the patterns they create will affect other processes outside of their direct control. For example, agencies use prescribed fire and thinning to create fuel breaks intended to alter wildland fire behavior, such that areas of concern do not burn or else burn at low intensity.

Several of the more challenging topics addressed in this report involve interactions of pattern and process. One example is the relation between forest development (succession) and disturbance. Understanding of how individual trees, stands, and even complex landscapes develop in ways that either retard or encourage certain types of disturbance is evolving. The variety and distribution of old-growth characteristics described in chapter 6 are derived in part by such interactions at multiple scales. Another example is the interaction of terrestrial disturbances and stream-channel dynamics discussed in chapter 9. Invasive species and disease are additional issues that invariably include interacting processes affected by pattern.

The challenges of understanding and managing spatial pattern and processes come to the fore throughout the Plan, but nowhere more critically than in designating land allocations. The Plan may represent new thinking in resource management, but its primary mechanism is one of the oldest tricks in the book—multiple-use management by dominant-use zoning. Because of the Plan, the federal estate can be



Bruce Marcot

Pileated woodpeckers have excavated many feeding cavities in this old-growth Douglas-fir tree. The ecological roles of pileated woodpeckers include creating cavities that many other species use for breeding and hiding; physically breaking apart snags and down logs, which helps accelerate the return of organic matter into the soil; and creating wood and bark piles at the base of snags, which are used by other organisms including salamanders, lizards, and snakes.

viewed as a collage of overlapping land-use designations, with each designation bringing its own set of standards and guidelines, and a second set describing which directions take priority. Thus a single landscape can have late-successional reserves, key watersheds, riparian reserves, congressionally reserved lands, adaptive management areas, and sundry other special use designations. These make up only the administrative boundaries. The real landscape has its own tapestry of natural features (topography, soil, rainfall, stream networks, vegetation, fauna, and such) intersecting with human elements (like roads, farms, homes, cities, and dams). The administrative designations are expected to dictate human activities that will work with natural processes and existing features to create a desirable landscape

pattern of ecological attributes. Presumably, this pattern will constrain natural processes so the desired landscape is sustained for people to enjoy. The old saw, “it isn’t rocket science,” certainly applies: rocket science is not this hard!

The issue of land allocation segues naturally into conflicts between active and passive management. Many of the land designations are primarily proscriptive; that is, they prohibit activities rather than call for action. As such, they reflect the precautionary principle implemented as a restriction on activities that might have negative effects (chapter 10). To some extent, they also reflect what Hargrove (1994) calls “environmental therapeutic nihilism,” a belief that nature is too complex to manage intelligently and thus should be left alone to heal whatever ails it. Other tenets of this philosophy are reflected in the Plan and our assessment of its effectiveness. For example, the discussions of the benefits of natural disturbance in chapters 6 and 9 echo a parallel adage in human health that “whatever doesn’t kill you makes you stronger.” Although the premises that natural disturbances can be positive and ecosystems have natural recuperative powers have evidentiary support, experience with the Plan also illustrates the limits of such truisms. Every problem does not require active intervention, but some do.

Flexibility Provided by the Plan

The region affected by the Plan is an area of both remarkable similarities and pronounced differences. Traveling north to south or west to east reveals remarkable gradients in climate and topography, with resultant ecological variations in forest types and associated species. Equally remarkable are the socioeconomic differences between large metropolitan areas like Seattle, Washington, and Portland, Oregon, and the resource-dependent rural communities scattered throughout. For someone unfamiliar with the Plan’s genesis and its tie to the northern spotted owl, it would seem an odd collection of lands to be grouped under one management plan.

Accommodating the intraregional ecological and socioeconomic diversity has been a major challenge to those designing and implementing the Plan. Opinions differ whether the Plan intended for considerable discretion to adapt standards and guidelines to provincial or site-specific differences, but a reluctance or resistance to change default standards and guidelines is apparent. Flexibility and willingness to use it are essential to matching management actions to local conditions and improving efficiency. Exercising discretion is a standard approach to managing risk. For example, the quickest and safest way to travel between two points is to match your speed to the road conditions, not to drive at a constant speed. Flexibility also can allow for increased experimentation, and hence enhance opportunities for learning, leading to more efficient and effective ways to meet plan objectives.

The Plan represents an ambitious, long-term vision for managing federal lands of the Pacific Northwest, but it remains to be seen how well it can endure. Carrying the vision forward promises to be a continuing challenge; this requires building on the successes of the Plan and improving its shortcomings. Changes in social expectations and values, administrative policies and procedures, and sundry other socioeconomic factors will play out in unforeseen ways. Equally important are the inevitable ecological surprises, such as large-scale disturbances, invasive species, droughts, disease, and climate change that will strain ecosystem resiliency and potentially lead to major shifts in forest communities. In an era of declining federal funding and personnel, management agencies will be further challenged to improve partnerships and collaboration to leverage limited resources to meet growing societal demands. The only prediction that can be made with certainty is that information, knowledge, and creativity will always be essential ingredients for success.

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