

The new forestry

An ecosystem approach to land management

Foresters on public lands often find themselves in tug-of-war situations. If they satisfy environmentalists who want to keep the land pristine, lumber companies are alienated; when government foresters agree to increase timber cuts, environmentalists are angered.

Jerry Franklin, chief plant ecologist for the US Forest Service and a professor at the University of Washington's College of Forest Resources, suggests the alternative to this no-win situation is what he calls "new forestry." It is a way to "manage land to accommodate ecological values and allow for the extraction of commodities," says the leader of the new forestry movement. He says studies on forest ecosystems are indicating that commodity production and preservation of ecological values are not completely incompatible.

Proponents and critics of new forestry call it by a number of names: alternative silviculture, hobby silviculture, gonzo forestry, ecological forestry, a unified field theory for forestry, and old-style German forestry. Depending on who is talking, it is described as a science, an attitude, or a solution to touchy social and political questions related to forest management. Some foresters and ecologists question whether new forestry can meet its dual goals of commodity production and maintenance of ecological integrity. The consensus: much research is still needed.

What is new forestry?

According to Franklin and Fred Swanson, a researcher at the H. J.

by Anna Maria Gillis

Andrews Experimental Forest in Oregon, the fundamental premise of new forestry is that forests must be maintained as complex ecosystems rather than as tree factories. New forestry experts, many of whom conduct their research at Andrews, say the simplification of forests through the planting of single-species stands reduces the forest's resilience to catastrophic events such as fires, windstorms, and maybe even climate change.

"Long-term site productivity is ultimately dependent upon ecosystem resilience—an ability to absorb stress or change without significant loss of function—not simply soil properties. . . . Foresters must manage to retain greater ecological margins in order to sustain long-term productivity and buffer against uncertainties," say Franklin and his colleagues in *Maintaining Long-term Productivity of Pacific Northwest Forest Ecosystems* (Timber Press, 1989, Portland, OR).

Natural ecosystems are extremely complex, and those complexities have to be incorporated into management, says Swanson. In studies during the last two decades, researchers have found that green trees, snags, boles, and woody debris in forests are important to the maintenance of biodiversity, particularly of invertebrates and fungi. This knowledge has led proponents of new forestry to recommend that timber harvesting plans include stipulations that some snags, green and downed trees, and woody debris be left on stands after trees are harvested. "In new forestry, what's left behind on the site is more important than what is taken out," says Franklin.

On the landscape level, new-forestry managers determine whether

the arrangement of cutting patches affects the habitats of a forest's interior dwellers, creates too many edge areas, and provides corridors for species to travel to new areas. To maintain or develop forests that are ecologically diverse, Franklin recommends that clearcutting (where all trees in a patch are harvested) and selective cutting (where only a few trees are cut from each patch) be largely replaced with a strategy called partial cutting.

Foresters employed clearcutting heavily from the 1960s to the 1980s. Clearcutting, generally done in 20- to 40- acre patches and scattered through an area, led to tremendous forest fragmentation. Selective cutting was the preferred cutting style before the 1960s. In selective cutting, a forest is entered frequently so a large number of roads need to be maintained. Erosion and root diseases often occur on land managed this way, Franklin says.

Under partial cutting, the majority (typically 85–90%) of the trees on a site are harvested, Franklin estimates. After such a partial cut, the land might be left alone for an extended period, possibly decades. This procedure would cut down on the erosion problems associated with selective cutting, says Franklin, who also suggests that partially cut sites be aggregated to reduce fragmentation.

Although there is no simple formula to follow, Franklin and his colleagues say the principles of new forestry can be applied to all types of forests. In established forests, new forestry practices will maintain diversity; in plantation settings, diversity could be added, they say.

Franklin acknowledges that, in a business sense, new forestry may re-

duce short-term income. "We're selling the new forestry on its long-term environmental values."

New forestry and spotted owls

The idea of ecosystem management has been around for a while, at least since 1976 when Congress passed the National Forest Management Act, but the scientific basis for it and the social incentives to carry it out did not exist until recently, says Franklin. "The crisis associated with the spotted owl and timber production is what's bringing new forestry to a head in the Pacific Northwest," he says.

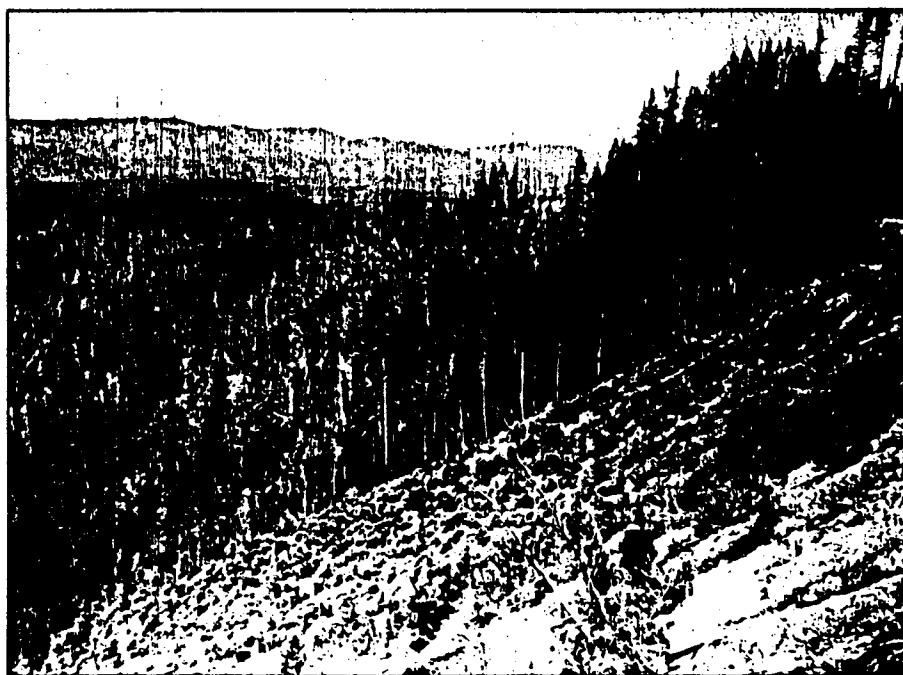
The either/or issue of whether to log or preserve spotted-owl land began around 1984, when the US Forest Service published a management plan for the Pacific Northwest. Environmental groups claimed that the plan did not assure the conservation of the northern spotted owl, and timber companies argued that the Forest Service was protecting too much owl habitat, which is generally old-growth forests. The old growth—characterized by multilayered canopies, many downed trees, much debris, and spectacularly tall trees, many aged 200 years or more—has a high degree of both biodiversity and valuable lumber. In Oregon and Washington, an estimated 2.3 million acres of old growth remain, much of it fragmented and in edge zones.

In April, the Thomas Committee, a federally appointed scientific commission studying the status of the owl, recommended that several million acres of western forest land be set aside as habitat conservation areas for the owl. It also said new forestry is still experimental and recommended that it be studied outside owl-habitat conservation areas. In June, the US Fish and Wildlife Service declared the owl to be a threatened species. Logging interests opposed that action.

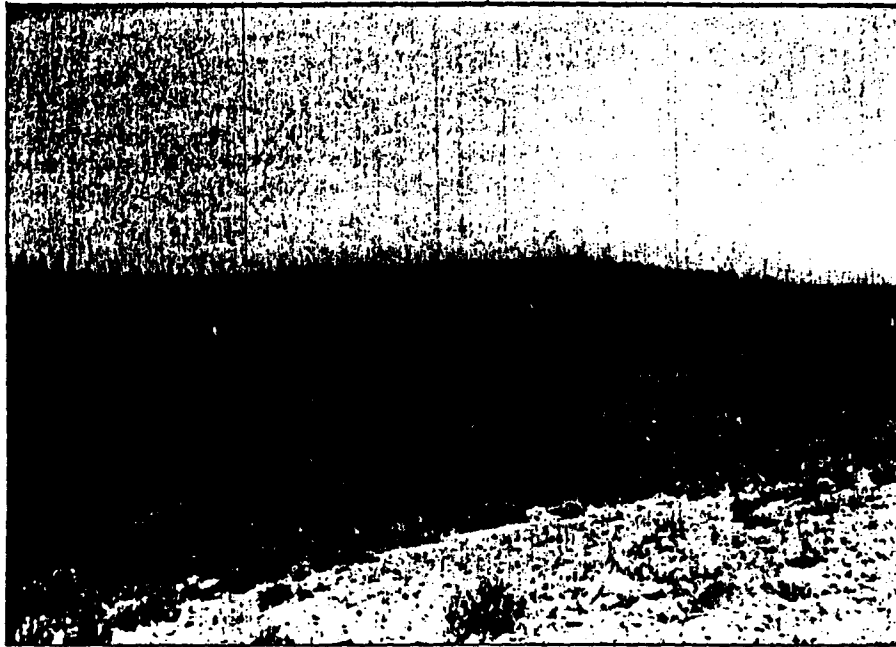
The dissension about the spotted owl has been enough to make people start thinking about options in managing old-growth forests. In May,



After a fire in the Willamette National Forest in Oregon, scientists and managers harvested some of the fire-killed trees and left patches and corridors of live green trees and standing and dead trees (foreground). The resulting forest is expected to contain more ecological structure and biotic diversity than the forests in the photos that follow. Photo: US Forest Service.



The harvest in the foreground removed all standing trees and large woody debris from the site. Reforestation was with one tree species. This clearcut is typical of harvests from the 1960s through the 1980s on the western Cascade Range of Oregon. Photo: US Forest Service.



Restoration after fires in the 1960s usually involved removing all trees from the site and replanting with nursery stock of one species. The resulting stand had little structural or species diversity. Photo: US Forest Service.

Franklin told a joint session of House of Representative committees that new forestry practices could create managed forests suitable as habitats for spotted owls and other old-growth species. "I'm not proposing that new forestry be used as a substitute for preservation, but I think wherever we make a decision to cut timber, whether it's old-growth or other forests, we should consider new forestry," Franklin says.

Currently, legislation requiring the new forestry practices on some spotted-owl land is being reviewed by the Pacific Northwest congressional delegation. Rep. Jolene Unsoeld (D-WA), concerned that scientific recommendations to set aside large blocks of national forest for the owl would result in a substantial reduction in federal timber harvests in Oregon and Washington, has proposed that new forestry be practiced on at least three spotted-owl habitat conservation areas in Washington, Oregon, and California and on an equal amount of federally managed land dedicated to timber harvesting.

That new forestry might be used in old-growth areas that are home to spotted owls makes ecologist Peter Morrison nervous. "Using new forestry as a solution to the old-growth dilemma will not work," says Morrison, who works for the Wilderness Society. The Seattle ecologist says the little research available indicating that the owls can live in younger forests that retain some old-growth characteristics is not convincing enough to make it the basis of policy.

Morrison would prefer that new forestry management be prohibited in old-growth forests. He says he fully supports new forestry outside the ancient forests and thinks, if managed properly, younger forests that were "barren of diversity" might benefit from the practices. In Oregon and Washington, approximately 90% of the commercial forest land is young or mature forest, and Morrison says that is enough land on which to practice new forestry.

Experimental work on new forestry is currently under way on federal, state, and private lands in Washing-

ton and Oregon. The Washington State Department of Natural Resources has designated 265,000 acre of its land as experimental area for alternative silviculture and will require the practice of new forestry techniques by holders of future timber contracts.

The Blue River Ranger District in the Willamette National Forest also has new forestry stipulations in its timber contracts and is doing some aggregated cutting studies, says district ranger Lynn Burditt. "We're working closely with scientists from the Pacific Northwest Research Station and Oregon State University to determine what we need to cut and what we need to leave," she says. Managers at Mt. Baker, Siuslaw, and Siskiyou National Forests also plan to change harvesting styles in these forests.

Plum Creek Timber Company and Weyerhaeuser Corporation, two of the largest timber companies in the Pacific Northwest, are evaluating new forestry practices on portions of their holdings. Plum Creek, which owns approximately 1.5 million acres across Montana, Idaho, and Washington, is under fire from environmental groups for the speed of its Pacific Northwest cutting. The company is adjusting its cutting patterns in the Cascades to retain green trees and is looking at how the altered practice affects the establishment of new trees. "We're also looking for the economic and environmental balance [for these practices]," says Lorin Hicks, Plum Creek's wildlife biologist.

Weyerhaeuser's manager of environmental forestry research, Jim Rochelle, says there is much to be learned about ways to provide habitat in strictly managed systems. More basic research is needed on topics such as corridors for species, the effects of aggregated cutting on interior species, and natural regeneration.

Although the data available suggest the possibility of protecting ecosystem values, industry questions whether new forestry is a relevant

alternative in terms of wood production, given the current land situation, says Mark Rey of the American Forest Resource Alliance, a consortium of forest product companies interested in timber supply issues. Intensive management, where the idea is to get the most timber possible from an area, became particularly popular in the past 25 years. Its use has accelerated since 1980 as more land has been set aside in preserves and other protected areas, Rey says.

Under new forestry, less wood fiber is harvested per unit area than in intensively managed systems. To get the same amount of timber that could be harvested from an intensively managed area, the harvest has to be extended over a larger area, Rey says. For the US Forest Service to meet its timber production goals using new forestry, it may have to make cuts over larger areas than it may have available. Rey sees two options: determine which lands should be set aside as preserved areas and then intensively manage the remaining land, or review the land set aside since 1970 and determine whether the ecological values of those sites would be preserved if new forestry was practiced on them. If the ecological values on those lands would be protected using new forestry, change the designations on those lands so they could be harvested. Under current land-availability conditions, new forestry may not provide a middle ground, says Rey.

What needs to be done?

There is consensus that forestry practices must be more ecologically based, but some people fear that the practice of new forestry may move too quickly. "In the Pacific Northwest, it's jumping from experimental scale to large-scale application without having gone through a pilot phase where operational bugs can be worked out," says William Atkinson, a forest engineer from Oregon State University. Atkinson and others have said the US Forest Service and other

NRC committee calls for better forestry research

Existing knowledge about forests is inadequate to develop sound forest-management policies, says the National Research Council Committee on Forestry Research in its report, *Forestry Research: A Mandate for Change*, released this July. The committee called for more research in five areas: the biology of forest organisms; ecosystem function and management; human-forest interactions; trade, competition, and cooperation; and wood as a raw material. One of the goals of that research should be creation of forest management systems that produce commodities while maintaining ecological values, says the committee, which also suggested that alternative silvicultural practices be developed that take into account recent ecosystem studies.

According to the committee, forestry research has not kept pace with the needs of forestry professionals. "While resource managers have been struggling with new [societal] views and values, forestry research has concentrated primarily on technical forestry or production-based forestry," the report says.

To meet society's needs for an environmentally based forestry, the financial commitment to research has to increase, the committee said. It estimates the combined government and private research budget for forestry is only \$350 million. It suggested that over the next five years the research budgets for the USDA Forest Service and the Cooperative State Research Service increase to \$218 million (up from \$135 million in 1988) and \$109 million (up from \$17.5 million in 1988), respectively. The USDA also should fund competitive grants totaling \$100 million for the five major research areas.

Beyond the money, the committee is particularly concerned that "the forest science community does not now have the human resources to do the research our nation requires." The committee says more people are needed who have received an interdisciplinary science education, along with courses in decision making and conflict resolution.

agencies are looking at new forestry as a quick political solution.

According to Atkinson, Rochelle, and others, the following areas should be studied before putting new forestry practices into widespread use:

- Define new forestry more clearly. New forestry is still so ill-defined that people may reinterpret or misinterpret what is known. Practitioners may do more harm than good out of ignorance. Some environmentalists fear that, when it comes to actual application, some companies may leave only a scattering of

trees across the landscape and call it "new forestry."

- Identify the personnel needs. Alternative silviculture is complex and labor-intensive. It requires land managers with an interdisciplinary background. Some people say government agencies would have to increase and upgrade their staffs to manage forests using new forestry techniques. Even if the money were available, the talent may not be.
- Look at the social and economic costs of new forestry. Profits from timber sales from Forest Service-managed land go to local counties and the federal treasury. Those tim-

ber sales help pay for roads and schools. If timber sales diminish and management costs increase, there is less money for local and national coffers.

- Work on production issues of commercial concern. New forestry does not address what will happen to wood yield and timber quality, a great concern as land availability shrinks and lumber demand increases. If new forestry is practiced, many foresters expect that yield, at least in the short run, will decrease because some of the best timber will be left behind. The emphasis on natural regeneration at some sites may mean that the trees that grow back may not provide the wood in greatest demand.
- Determine whether firefighting practices should change. Leaving debris and dead trees behind over a large landscape may increase the risk of forest fires.
- Determine what safety procedures are needed, and reevaluate safety laws that were designed for a different forestry style. When using new forestry practices, loggers may be working in tighter areas filled with green trees and snags that can get caught in equipment.
- Conduct more basic research, especially at the landscape level, to ensure that new forestry is meeting its ecological objectives.

It is understandable that environmental groups and logging interests have many concerns about alternative silvicultural practices and view them with a mixture of optimism, skepticism, and fear, says Hal Salwasser, who directs the Forest Service's New Perspectives Program (see box this page). "It does not give each group completely what it wants:

Foresters to try ecosystem approach

Alternative silviculture, also known as new forestry, is only a part of a new US Forest Service program called New Perspectives, says Hal Salwasser, director of the program. Under New Perspectives, which focuses on ecosystems management, the US Forest Service plans to do research related to ecosystem management; develop a public education program; conduct continuing education and training sessions; involve scientists, the public, and industry in natural resource management planning; and encourage the use of alternative silviculture.

The research agenda includes plans to study ecosystem management at the stand level, forest systems at the landscape level, forest dynamics and mechanisms of ecosystem recovery after disturbance, research and management methods, and the effects of applying new management techniques. The research program is supposed to be in effect by fiscal year 1992.

According to Salwasser, the move toward an ecosystem approach to management is being driven by a number of factors: the public's values are changing, new knowledge about ecosystems is available, and the US Forest Service's scientific makeup has become more diverse. A problem he foresees in carrying out this management style is that few people have the interdisciplinary training suited to ecosystems management. "We're setting out to do something in land and resource management without educational resources. Our [forestry] educational system was fine when we were teaching students to plan yields in fish, trees, or whatever. We have to see what can be done to bring [forestry] education in line with ecosystem management needs."

complete preservation or all the wood fiber." Salwasser expects industry will accept the practices "because it is their best hope for continued use of public land," and he anticipates some litigation from environmental groups.

Regardless of problems still to be resolved, James Woodman of the University of North Carolina expects that some form of new forestry will be standard practice in 30 or 40 years. As the world faces the possibilities of global warming, the reality

of a growing population, and the question of whether land should be used for forests or food, people will expect more than lumber from forests. "Forests will be valued for their effects on microclimates. Management will be performed with the intention of maintaining the canopy and diversity, clearcutting could be outlawed, and the privilege and luxury of growing forests for timber will be gone. A new forestry is the only way we can go, given societal demands," he says. □