

They say that before the Europeans arrived in North America, a squirrel could travel from coast-to-coast through the treetops, without ever touching the ground. From the mighty oaks to the towering redwoods, America was a land of bountiful forests.

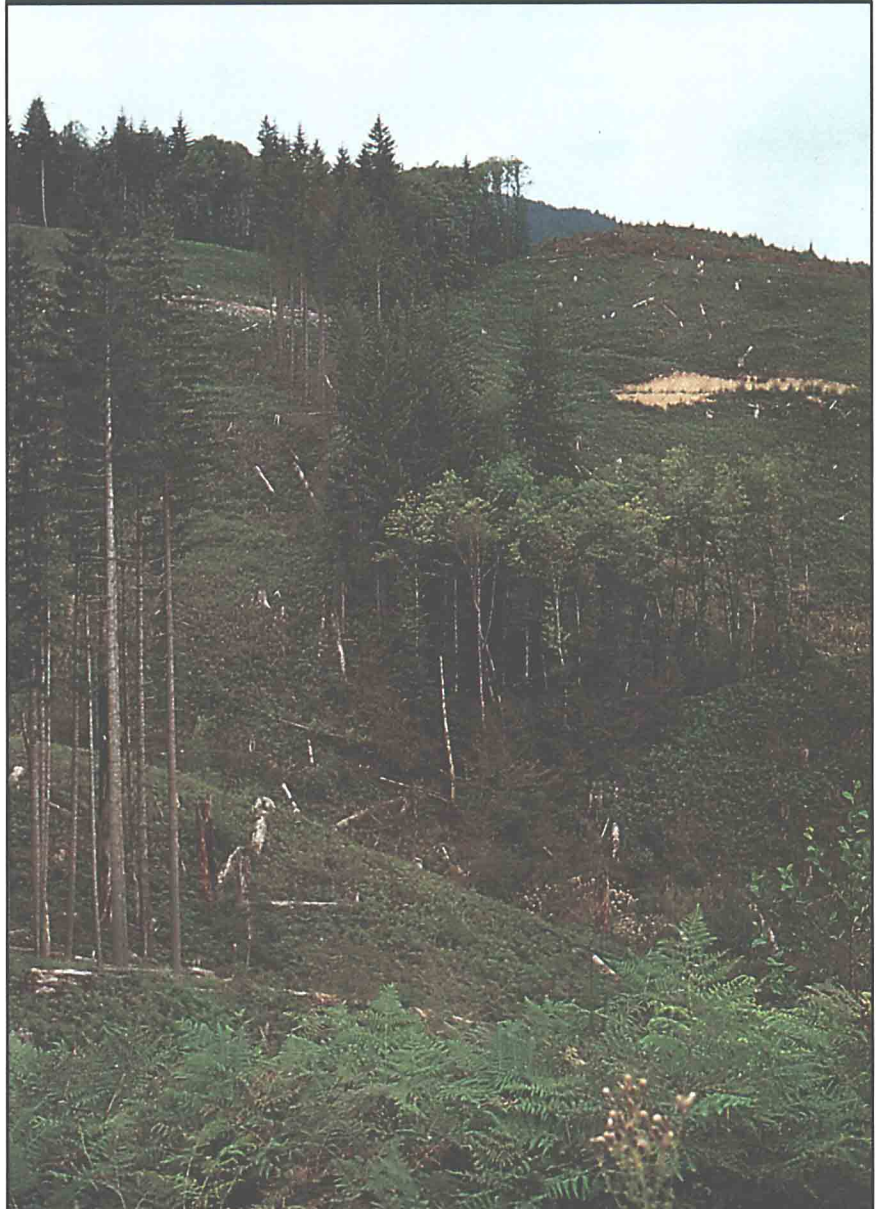
With steady determination, the Pilgrims, the colonists, the settlers cleared the forests to build cities and plant their crops. Loggers came and leveled vast areas of upper and northern Michigan. The railroads pushed west and acquired vast holdings of timber from the government. The government itself established national forests and then began cutting away at its holdings.

And finally, an owl in the forests of the Pacific Northwest was spotted and became the means to halt the logging and force a re-examination of forestry management practices...

BY DONALD G. MEADOWS

Old growth and new forestry

Concerns for ecosystems spur a rethinking of forest management practices.



What is old growth?

At first it would seem easy to define old growth. You walk into the woods, you see a tree that seems to reach to the clouds, whose girth is more than you can even half-way span with your arms, your jaw drops in amazement, and you say, "Wow, look at that old tree!" But for scientific or government purposes, the definition is more complex.

What constitutes old growth partly depends on what species of tree you're talking about. In the Pacific Northwest, the species of concern is Douglas-fir. Old growth also takes in the forest ecosystem.

The Forest Ecosystem Management Assessment Team (FEMAT) report defines old-growth forest as "A forest stand usually at least 180–220 years old with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground."

Snags, CWD, and riparian zones

Snags are good things for spotted owls and other wild critters. They serve as nesting sites, observation posts, and convenience stores. In the eyes of forest workers and Occupational Safety and Health Administration, however, snags can pose very real hazards to anyone working near the standing dead—or dying—trees.

CWD, or coarse woody debris, is the "portion of a tree that has fallen or been cut and left in the woods." It too can be hazardous to foresters who may slip or trip on limbs and branches. The dead wood is also cited as a fire hazard. Like snags, it serves as home and shelter to various plants and wildlife. And as it decays, it enriches the soil.

Traditional forestry would clear snags and salvage much of the woody debris from a harvest area. Sometimes "controlled" burns would be used to help clear an area for replanting. Reseeding might be allowed to occur naturally, or commercial interests might favor planting conifer seedlings.

Riparian zones, generally the areas bordering lakes and streams that affect fish and aquatic ecosystems, have also hit the spotlight. A big reason for that has been the decline of salmon in rivers and loss of spawning areas in the Northwest. Logging roads and clearcuts get part of the blame for the soil runoff and silting that have damaged those streams.

—Donald G. Meadows

It was a year ago this month that President Clinton called together representatives of industry and science, local citizens, and others for a Forest Summit. The hope was that the discussions might lead to an amicable solution to logging restrictions and efforts to protect old growth and spotted owls in the Pacific Coast states. The effects of those restrictions have certainly been felt by the pulp and paper industry in that part of the United States. The effects are also being felt in other parts of the nation. Although a "solution" is still pending, many of the old ways of timber harvesting are being replaced by new approaches regarding forestry management.

Congressional excesses

The northern spotted owl, which makes its home in old-growth forests, gets a lot of the credit—and blame—for the restrictions and changes in logging practices on public lands in Northern California and the Pacific Northwest. Undoubtedly the region has suffered economically as priorities shifted from timber sales to habitat protection within the National Forests. But change is inevitable, and some might argue that the logging boom would have gone bust anyway.

Part of the reason for that, recounts William Dietrich, author of *The Final Forest*, was that the Forest Service would determine how much harvest the forests could handle, and then Congress would increase the amount based on political and budgetary needs. For example, the harvest approved by the 1986 Congress exceeded the Forest Service's recommendation by 700 million board feet. In 1987, an extra billion board feet was okayed for harvest. The excesses numbered 300 Mbf, 200 Mbf, and 500 Mbf over the next three years. Congress seemed more interested in what flowed from the faucet rather than how well the reservoir was being replenished and maintained.

In the meantime, environmental groups were banding together to protect habitat for the northern spotted owl through injunctions against logging on federal lands. In 1990, the owl was listed as a threatened species under the Endangered Species Act. In March of 1991, U. S. District Court Judge William Dwyer ruled that efforts by the USDA Forest Service failed to protect the owl. He subsequently barred the Forest Service from selling timber off of national forests in the range of the northern spotted owl until an acceptable plan was prepared to protect the bird.

There are 24,260,700 acres of federal land within the northern spotted owl's range.

In the effort to resolve the issue, various advisory teams have been formed, have developed plans, and have issued reports. Among those have been the Interagency Scientific Committee on the Conservation of the Northern Spotted Owl (ISC), the Scientific Panel on Late-Successional Forest Ecosystems (Gang of Four), the Northern Spotted Owl Recovery Team, and the Scientific Analysis Team (SAT). Jack Ward Thomas, chief research wildlife biologist for the Forest Service in the Pacific Northwest, has headed each.

It was Thomas who, through the ISC report, helped break the molds on how we have to think about old growth ecosys-



New forestry trials on Plum Creek Timber Co.'s Cougar Ramp Unit in Washington

rems, said Jerry F. Franklin, himself an innovator who worked as an ecologist for the Forest Service. Thomas came up with the concept of habitat conservation areas, matrices, and conductivity in the matrix, Franklin said. The "matrix" consisted of federal lands where most of the harvesting and silvicultural activities would take place.

Regional habitat awareness and planning have been the driving forces in the evolution of forest management over the last 10 years, according to Thomas. Legal actions have focused concern on how federal agencies deal with habitats for fish and wildlife and have spawned an evolution in thinking.

The Endangered Species Act, the National Environmental Policy Act, and other legal actions "have combined to ensure that species deserving of identification as threatened based on technical information, indeed be listed, that appropriate methods of assessing and propagating management plans will be followed, and that scientifically credible approaches to management will be developed and initiated," Thomas said.

Over the past 20 years there's been an evolution in thinking away from land management for single-species enhancement toward maintaining biodiversity. That shift is reflected in the statement of purpose to the Endangered Species Act, which includes the protection of ecosystems on which threatened or endangered species depend. Part of the idea is that an ecosystem is the sum of its parts and that each part may be significant in the maintenance of the whole, Thomas explained.

In the last four or five years, habitat planning changed significantly, Thomas noted. In mid-1989, it was clear the northern spotted owl was about to be listed as a threatened species. Forest Service and Bureau of Land Management plans to deal with the indicator species and old-growth habitat did not hold up under scientific scrutiny. Consequently, a team of scientists (the ISC) was assembled to design a credible strategy to protect the owl, Thomas explained.

The plan issued by the team in the spring of 1990 designated reserve areas for the owls and put restrictions on the amount of logging allowed within the forests connecting one reserve to another. The concept of a matrix (50-11-40) emerged.

Subsequent study teams and panels issued reports and developed plans that described various schemes for forest land allocation, but the ban on logging continued and debate between environmental and economic interests remained hot.

In an attempt to resolve the situation, President Clinton called together scientists, economists, forests industry representatives, environmentalists, and concerned citizens for a day-long meeting to discuss the issues and possible solutions.

President Clinton spoke to the heart of the issue in opening the conference: "How can we achieve a balanced and comprehensive policy that recognizes the importance of the forests and timber to the economy and jobs in this region, and how can we preserve our precious old-growth forests, which are part of our national heritage and that, once destroyed, can never be replaced?"



New forestry trials on Plum Creek Timber Co.'s Cougar Ramp Unit in Washington

Option 9

Following the April 2, 1993, Forest Conference in Portland, OR, President Clinton created the Forest Ecosystem Management Team (FEMAT). Its mission was to "produce a plan to break the gridlock over federal forest management...in the Pacific Northwest and Northern California."

In its July 1993 report, FEMAT suggested 10 options to resolve the issue. A Draft Supplemental Environmental Impact Statement (DSEIS) was also issued in July.

The FEMAT report recommended Option 9 as the best all-around approach. It is the only one of the 10 that includes adaptive management areas. "The objective for each of these areas is to learn more about ecosystem management while meeting social and economic objectives," the DSEIS states. "Each area has a different emphasis to its prescription, such as maximizing the amount of late-successional forests or improving riparian conditions through silvicultural treatments."

Lands within the options are separated into areas in which timber can be harvested (matrix), those where limited harvesting is allowed (late-successional reserves and adaptive management areas), and those where no harvesting is allowed (reserves and withdrawn areas).

Option 1, which Franklin referred to as the "Deep Green" option, would allow the harvest of about 200 Mbf. That's less than 5% of the traditional harvest level, he noted. Option 9

ups that to 1.2 billion board feet. That, itself, is overshadowed by harvests of 4.8 billion board feet in the 1970s and 1980s.

Before any plan is adopted, foresters and biologists at the local level should have a chance to suggest boundary changes to best achieve the overall goals, Franklin indicated.

Realistically, no plan will fully satisfy all interests. Hearings on the DSEIS, held in September and early October, drew a range of comments. Labor and industry felt Option 9 would go too far in protecting old-growth forests and that the economic impact would be more than estimated. Environmentalists suggested the plan does not go far enough in protecting the forests and wildlife. A final environmental impact statement was expected in December.

And the legal maneuvering continues. Last fall, the Northwest Forest Resource Council filed a lawsuit alleging FEMAT had violated the Federal Advisory Committee Act in developing its options because some of its members were not full-time federal employees.

But within the Forest Service and the Bureau of Land Management, there has been a clear shift in attitude over how the National Forests should be managed. The impact of logging practices and the need to maintain ecosystems are of much greater concern. There's no going back to the days when yield per acre was the primary goal, says Franklin.

Defining a new forestry

Franklin, who now serves as professor of ecosystem analysis in the College of Forest Resources at the University of Washington, Seattle, is often cited as the "father" or "guru" of new forestry. Essentially the concept is an effort to develop "alternative approaches to resource management...that better integrate maintenance of ecological values with commodity production," Franklin notes.

The idea grew in part from visiting Mount St. Helens following the 1980 eruption and discovering patterns of survival there (See related story, p. 49). But for Franklin, the roots go back to his childhood and time spent in the ancient forests of Oregon. It's an evolving concept that has been bolstered or modified slightly over the last 10 years by scientific studies.

Several studies have raised concerns about the impact of clearcuts, logging roads, and fragmentation on forest ecosystems of the Pacific Northwest. Soil erosion and flooding are the most obvious problems associated with clearcuts and careless road building. Less obvious is the damage caused to fish habitat and the cumulative effect on hydrology.

"Checkerboard" patterns of dispersed patch clearcutting used on federal lands in the 1940s caused extensive forest fragmentation and edge effect. Edge effects may extend 200 meters or more inside the remaining forest. Within that area, relative humidity, wind effects, and increased exposure to sunlight combine to modify the "microenvironment," Franklin explains. "Such forest fragments...are more vulnerable to disturbances such as windthrow and wildfire," he notes, and "...rates of tree mortality increase dramatically."

Yet Franklin makes it clear that new forestry or "New

Perspectives” is not intended to overthrow “the old tools of forestry, such as traditional clearcutting, slash burning and tree planting techniques. The idea is to add new knowledge and techniques to existing approaches, thereby generating more management options.”

Although some of the new techniques resemble traditional practices, there is an important philosophical difference, Franklin adds. The basic tenet of new forestry is “management of forests as a whole, rather than as a collection of trees.” A general principle is to “maintain or create stands that are structurally and compositionally diverse.”

Various approaches may work to achieve that structural diversity. Hardwoods, for example, when intermixed with a stand of conifers, enhance species diversity and enrich the soil. Including a greater variety of conifers within a stand offers similar benefits.

Delaying canopy closure—the point at which commercial trees fill the stand—gives animals and vascular plants a chance to make use of the site. Wider tree spacings, heavy precommercial thinning, and pruning are techniques used to delay canopy closure.

Coarse woody debris is most abundant in natural and old-growth forests. The amount retained can be increased by leaving all or most unmerchantable logs on the site rather than removing them. Because of safety concerns, retaining snags presents more of a challenge. Franklin notes two approaches that reduce the risk: clustering snags in groups or patches and turning green trees into snags during harvest.

Of course, retention of green trees on cutover areas can also enhance structural diversity. From 10–40% of live trees might be retained as “shelterwood,” Franklin said.

“No pattern fits all,” Franklin notes, and ideas about what does work are still evolving.

New forestry in practice

Plum Creek Timber Co. has been experimenting with “new forestry” techniques on its Cougar Ramp Unit, located in the Lewis River drainage in southwestern Washington. The company is evaluating the techniques “as operational and economic alternatives to the standard practices of clearcut harvesting and even-age management in western coniferous forests,” notes Lorin L. Hicks, fish and wildlife resources manager for Plum Creek.

The 73-acre site was harvested in 1990 using uphill cable logging. About 15% of the unit was retained in clustered patches that included green trees, snags, and downed logs. Clustering “minimized additional harvest costs while reducing safety risks and damage to retained trees,” the company noted. Harvesters tried to avoid disturbing wildlife habitat in the patches by felling trees away from the patches. They also left nonhazardous snags and understory vegetation in the harvested areas.

In managing the unit, the company also tried to maintain the aesthetic value of the site and allow for future blowdown salvage and reforestation. It also tried to retain the representa-

tive mixture of trees and shrubs that had occupied the unit, including young and old, healthy and dying trees.

Studies at the site identified 55 bird species. Western tana-gers were an example of species that benefited from the contour patch design.

At another harvest site, in the Manastash Creek drainage near Wenatchee National Forest in northcentral Washington, Plum Creek modified plans to clearcut a 183-acre unit when an active spotted owl nest was discovered. According to Hicks, harvest of the Frost Meadows Unit was modified in the following ways:

- A no-cut corridor in excess of 400 ft wide was established along the creek as a travel route for the owls
- About 80% of the residual stand in the unit closest to the nest was left intact “to maintain old growth habitat characteristics such as large diameter trees and decayed, dead and downed timber.” (Yet 50% of the merchantable timber volume was removed.)
- Green trees and coarse woody debris were left in the remainder of the unit. “About 18–20 old-growth overstory trees per acre and the associated understory trees in their immediate vicinity were retained.”

The objective was to “accelerate the development of future spotted owl habitat by providing for multilayered tree canopies

Coarse woody debris, gaps, and stands of “green” trees in one of the D. B. Cooper Units of the Gifford Pinchot National Forest in Washington





Decaying tree remnants enrich the soil.

and interspersed overmature trees,” Hicks said. Apparently the effort had some success. A pair of spotted owls remained in the area and raised two young in 1992.

Industry perspective

While new forestry techniques work well on some public and private sites, Weyerhaeuser’s John P. McMahon points out there are important differences between how different forests are managed. Private or industrial forests are generally managed for sustainable timber production, said the company’s vice president.

Even so, common objects can be agreed upon, he noted. Representatives from industrial forest companies, academia, and other groups last year identified key roles private industrial landowners could take in managing forest ecosystems. The workshop, sponsored by the University of Washington’s Olympic Natural Resources Center, devised the following list to apply to forests of western Washington:

- Protection of riparian areas and wetlands
- Provision of habitat of early and midsuccessional species
- Assistance for public land managers in meeting their responsibilities for late successional ecosystems
- Maintenance of site productivity—with particular emphasis on protecting soil properties.

Some of the steps taken by Weyerhaeuser are representative of efforts taken by other timber companies to responsibly manage forests. The company has conducted a number of studies to help it develop ecosystem or landscape management goals, McMahon said. Those studies include a comprehensive level-two watershed analysis in Washington State, plus several wildlife habitat, stream habitat, fisheries enhancement, and biological diversity surveys.

There are, admittedly, challenges to integrating private for-

est management with ecosystem or landscape management goals, McMahon said.

If, for example, private landowners engage in voluntary actions that may affect timber harvest volumes or prices, irrespective of the additional socially accepted objectives that may be achieved, they may be in violation of antitrust laws, he explained. The issue requires careful review by attorneys and understanding from public officials regarding the limitations private landowners might be able to voluntarily agree to.

For private forest owners to accept landscape management as worthwhile, government must re-establish regulatory stability, McMahon continued. Landowners must be reassured that they can predictably plan tree harvests. Realistically, most private owners must still practice stand level management. And they want the latitude to use silvicultural

practices that meet land use objectives, including tree improvement and fertilization to optimize growth and yield, he said.

McMahon favors site-specific land management decision-making using multidisciplinary teams where necessary, so that landowners aren’t “incessantly being constrained by inflexible regulations.” Riparian zones are an example of where site-specific prescriptions are necessary, he said.

“Private owners can make a significant contribution to ecosystem management if they can rely on the kinds of incentives our free market system responds to, or at least do not face disincentives,” McMahon said.

Many landowners fear an overemphasis on ecosystem and fisheries management without regard for the economic impact, McMahon said. “Our future land management decision-making must seek to strike an appropriate balance between all resource management objectives to meet the needs of society and an increasing world population that is demanding no less in terms of material wealth, but at the same time wants assurance that we are managing our renewable resources on a sustainable basis,” McMahon said.

But, “We must always be willing to experiment, to encourage and support adaptive management trials and innovative silvicultural techniques...such as accelerating the development of stand structural characteristics,” McMahon said. It’s an opportunity to benefit from the accumulated silvicultural know-how of the private sector to get more growth and yield from the most productive sites. That will help offset reduced harvest on federal lands, he said, and it’s consistent with the idea that private owners should be the focus of timber production.

The Menominee way

The Menominee Indians of Wisconsin provide another perspective on how forests can be maintained and used. The tribe has developed a reputation for wise management of the 1/4-million-acre forest encompassed by their reservation.

In 1854, through a series of treaties, the tribe settled on Wisconsin's Wolf River, said Marshall Secore, forest manager for Menominee Tribal Enterprises in Keshena, WI, since 1975. Now, corn fields surround the Menominee lands and, to the north, the Nicolet National Forest.

Whether and how to develop natural resources is an issue of great debate, because of the potential impact on tribal social structure and traditional, religious and environmental values, Secore said. It needs to be approached as a larger plan of social and economic development.

The tribe has achieved "a successful equilibrium between harvest and utilization only of what the land can provide and maximization of jobs and other economic benefits which come from sustained forestry," Secore said.

The Menominee have been practicing sustained management through selective harvest ever since the reservation was formed in 1854. Legislation passed in 1890 assigned harvest rights within the reservation to the tribe, allowing 20 Mbf to be harvested annually.

"Under the Menominee Forest Management Plan, all lands under intensive management are designated as sustained yield acreage," Secore said. Those lands total 220,000 acres. The forest also contains 14 of the 16 major forest cover types found in the Great Lakes region, he added. The management plan contains a silvicultural prescription for each cover type. Those describe cutting management options, plus stand volume and quality.

The strict prescription includes a minimum stock level which must be present before any harvesting of free-standing timber occurs, Secore said. "The remaining understocked acreage is allowed to grow for future harvests until the stocking level exceeds the silviculture prescribed minimum," he said.

The Menominee Forest stands as a testament to the effectiveness of a tribal land ethic, Secore asserted. The management has been so effective that some preservationists have mistakenly referred to sections of the forest as examples of untouched old-growth timber, he noted. Visitors to the forest have commented on how much it resembles what they imagine the "untouched" forests of Wisconsin might have appeared.

When the reservation was first established, it contained an estimated 1.3 billion board feet of timber, according to Secore. From 1865 through 1989, the tribe has harvested 2.4 billion board feet of wood. The most recent surveys indicate 1.7 billion board feet of timber are contained within the reservation, "even after 135 years of harvesting."

"The Menominee People have long recognized that their forest, as a healthy, vibrant resource managed for the long term under sustained forestry principles, is the basis for all those multiuses, including timber, water, wildlife, recreation and spiritual rejuvenation," Secore said.

The lesson, taught to Secore when he started as forester, rings true for today, also: "You have to work now, for a while, to become sensitive to the needs of the people and the land, and in so doing, you must be humble." ■

Meadows is editor of Tappi Journal.

Eastern old growth

Old growth isn't limited to the Pacific Northwest, it's just harder to find and harder to recognize east of the Mississippi. One reason is that eastern old-growth includes a greater variety of tree species. Those species, though they may reach an impressive age, do not always grow to the heights of their western cousins. In addition, stands of eastern old growth are less well mapped than are those of the Pacific Coast states.

Only about 1% of eastern forests might qualify as old growth. Much of that—520,000 acres—lies in the Great Smokey Mountains National Park. Among the smallest stands is 40 acres on Lewis Island in Georgia.

Efforts to inventory existing old-growth in the Southeast are hampered by "the absence of specific, consistent techniques for evaluating old-growth attributes," notes Richard A. Hardt, of the School of Forest Resources at the University of Georgia. However, in a study of two sites in the southern Appalachian Mountains, Hardt found that many of the variables used to characterize western old growth apply to eastern old growth. Such stands can be distinguished by the density of large trees and snags and the range of tree diameters.

Beyond the existence of old growth, however, the debate over forest management in the Pacific Northeast has touched the psyche of the rest of the nation.

In the Northeast, the Northern Forest Lands Council, formed by Congress in 1990, has been looking at forest resource use in Maine, New Hampshire, Vermont, and New York. The council was scheduled to issue draft recommendations this March on how to best balance the economic and environmental health of the forests in those four states. A final report is supposed to go to Congress in June.

The issues in the Northeast go beyond ecosystem management. They include restrictive property taxes, private property rights, public access to the forests, logging and tourism dollars, and cultural values.

Similarly, the issues in the South are as distinctive as the forests that grow there. There seems to be a lack of appreciation for the gross differences in the land-holding element of forests in the South, observed George Bengtson of the Auburn (AL) School of Forestry. In Alabama, for example, about 95% of the forest belongs to private owners, many of them small landowners whose families have held the land for several hundred years, he said. They manage their forest lands in various ways for various purposes, but they consider themselves good stewards and they worry about regulatory trends moving to the South and affecting them.

—Donald G. Meadows