

A REPORTER AT LARGE

THE ANCIENT FOREST

Swanson
3264

OURS was once a forested planet. The rocky hillsides of Greece were covered with trees. Syria was known for its forests, not its deserts. Lebanon had vast cedar forests, from which the navies of Phoenicia, Persia, and Macedonia took their ship timber, and which provided the wood that Solomon used to build the temple at Jerusalem. Oak and beech forests dominated the landscapes of England and Ireland. In Germany and Sweden, bears and wolves roamed through wild forests where manicured tree farms now stand. Columbus saw the moon-scape that we call Haiti "filled with trees of a thousand kinds." Exploring the east coast of North America in 1524, Verrazano wrote of "a land full of the largest forests . . . with as much beauty and delectable appearance as it would be possible to express." The first European settlers gazed upon these forests with a mixture of awe, fear, and greed. To them the forests were both a terrible wilderness and a source of riches. Cutting them down was the way to security and prosperity. "The very notion of advancement, or civilization, or prosperity, seems inseparably connected with the total extirpation of the forest," one settler observed. At first, forests were cleared mainly for subsistence purposes—to get land for farming or wood for homebuilding—but large-scale commercial logging was under way by the early eighteen-hundreds. In 1850, according to the book "This Well-Wooded Land," lumber production was the No. 1 manufacturing industry in the United States.

The loggers started in the great hardwood and white-pine forests of the Northeast. By the time of the Civil War, those forests had largely been exhausted. Logging then moved to the pineries, the cypress swamps, and the live-oak stands of the South and to the pine forests of

the Great Lakes region. It took only fifty years to deplete the latter. One writer of the time described logging as "the great nomad among American industries, driving from one virgin forest to another, like a threshing machine from one ripe wheat field to the next." In Canada, the progression followed a similar line—from New Brunswick to Quebec and on to the Pacific Coast.

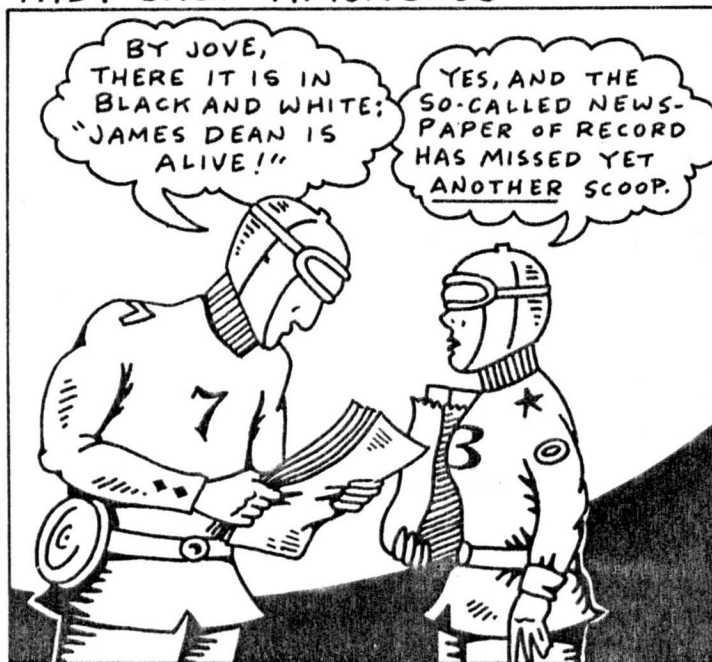
In the West, the loggers came up against their last frontier—the most magnificent forest on the continent and the greatest conifer forest on earth. The Pacific forest curves along the coast for nearly two thousand miles, from the Alaska Panhandle to just north of the Golden Gate; it stretches inland as far as the Cascade Range and the Coast Ranges. The trees—spruces, cedars, redwoods, hemlocks, and Douglas firs—are immense, many three hundred feet or higher and fifty feet around. Five-hundred-year-old trees are not uncommon here, and some of the trees are more than two thousand years old. These are the largest and oldest trees in the world, and their age and size imbue this forest with a solemnity so deep it seems to many visitors spiritual. This forest is home to a greater mass of life than even the tropical rain forests. It is crucial to

the stability of the region's and the world's climate: it causes up to a third of the local precipitation, and it stores more carbon than any other terrestrial ecosystem. It is the breeding ground for the most productive salmon fisheries in the world—fisheries that support an industry worth billions of dollars annually. It is home to little-known species, such as the marbled murrelet, one of the last birds in North America to have its nesting place discovered, and the Pacific yew, a tree that contains an important anti-tumor agent. Above all, this forest is a remnant of the world as it was before man appeared, as it was when water was fit to drink and air was fit to breathe.

Originally, the Pacific forest covered seventy thousand square miles of Canada and the United States. About sixty per cent of Canada's Pacific forest has by now been destroyed, mostly in the past forty years. In the United States, less than ten per cent survives. Almost all that remains in both countries is on public lands, and it is scheduled to be cut for lumber, plywood, and pulp, much of it for export to Japan. Conservationists estimate that these forests will be gone in less than twenty years. Government and timber-industry officials disagree; they say it will be fifty to eighty years before the forests are exterminated.

From the air or from a mountaintop, the forest may seem at first like a single entity—a homogeneous swath of green that blankets hills and valleys. A closer look contradicts this picture. The forest is really many forests—a patchwork of different colors, shapes, and textures. The ribbon of deep green snaking through the forest is made by spruce trees lining a stream bank. Circular patches of green and rust colors are bare boggy areas too wet to support trees. A set of pick-up-sticks on a hillside is a five-acre patch of wind

THEY SHOP AMONG US



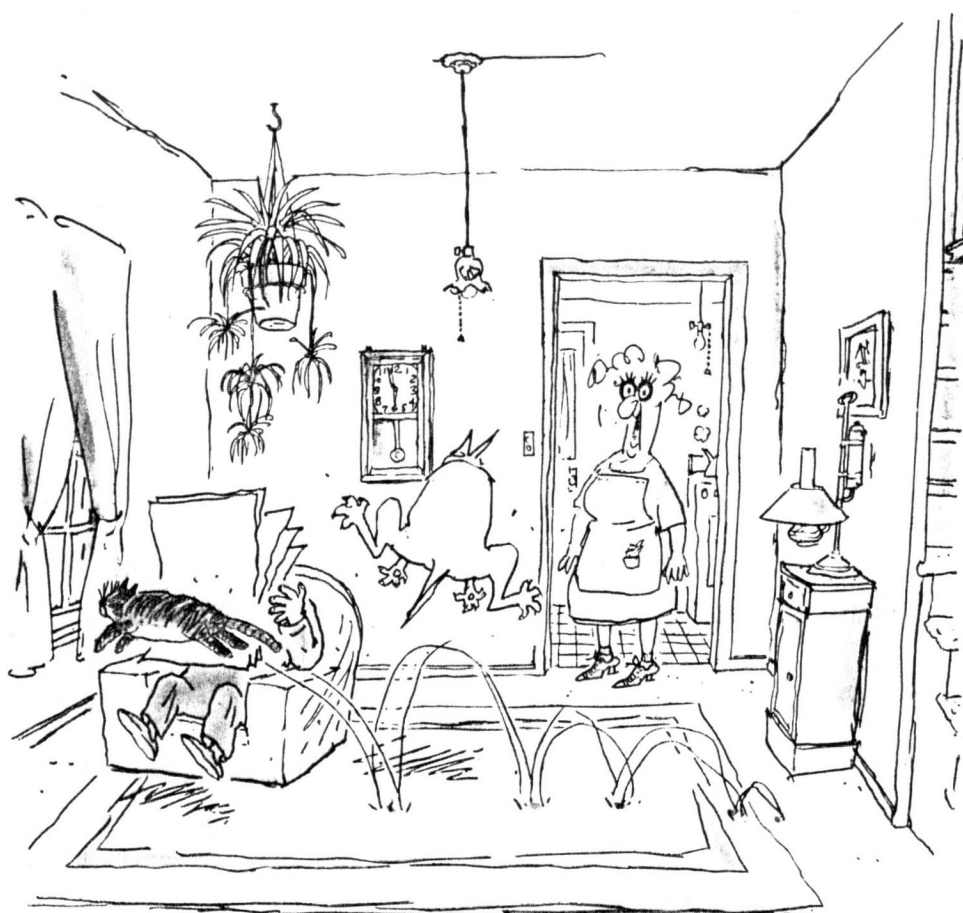
C. Brown

throw—huge trees tossed to the ground by fierce winds several years ago and now bleached a deathly, leafless white. A blackened patch with many trees still standing is where fire, perhaps set by lightning, ran through a grove. Bare treetops rising from the green forest like enormous white candelabras are the sign of an ancient cedar forest. Some areas are well stocked, densely packed with big trees. Others, perhaps on rocky hillsides or acid soils, have fewer and smaller trees.

The Pacific forest is essentially a coastal forest. The close connection between land, river, and ocean is especially noticeable in Alaska and Canada, where glaciers and shifting tectonic plates have created a landscape of hills and valleys and a jagged coastline with innumerable islands and inlets. The result is thousands of small watersheds, each draining into the ocean through its own little estuary, and each with its own character.

Tenakee Inlet almost bisects Chichagof Island, one of the main islands of the Alexander Archipelago, in southeastern Alaska. With Jason Carter, who lives in one of the island's three small towns, I cruised the inlet on a sunny April day and found it alive with wildlife that depend on it and on the forest that borders it. In just a few hours, we saw countless bald eagles, a colony of harbor seals, several groups of deer standing on the beach or swimming across the inlet, a mink scuttling across some rocks, a school of Dall's porpoises that played with us, diving and jumping in front of our boat, a brown bear loping across some tidal flats, a colony of sea lions, Canada geese and sandhill cranes flying in formation, two humpback whales blowing and diving, great blue herons, and numerous ducks, including some beautiful green-wing teal. For dinner that night, we ate enormous shrimp and Dungeness crabs that Jason had caught that morning. A day or two earlier, someone had said to me, "How many places in the world can you sit and watch humpback whales and brown bears at the same time? Here you can."

ONE of the things that make the Pacific Northwest forest so unusual is that it is a forest of conifers, and not broad-leaved trees. In "Ancient Forests of the Pacific Northwest" Elliott Norse, a senior ecologist at the



BOOTH

"Eyeliner is back!"

Wilderness Society, explains that eighty million years ago conifers were the dominant vegetation on earth. Even then, however, a new, more diverse and adaptable type of plant was evolving—one that reproduces by means of flowers. The flowering plants, including broad-leaved trees, have evolved and adapted so well to different habitats that in most parts of the world they have pushed the less versatile conifers into a mere supporting role. True conifer forests are now restricted mostly to the Arctic regions—the far-northern reaches of Canada and the Soviet Union. But in the Pacific Northwest conifers have retained their prehistoric majesty. The reason for this anomaly is the region's strange climate: the winters are wet with regular freezes, and the summers are hot and dry. In most parts of the world, there is a season of moisture and warmth, when plants have the water and the sunlight they need for photosynthesis. In the Pacific Northwest during the summer, there is enough light for photosynthesis but not enough

water. In the winter, when there is enough light and water for photosynthesis, temperatures often dip below freezing, and cause most broad-leaved plants to lose their leaves. Conifers, however, are well adapted to exploiting the opportunities for growth in these forests. Most conifers keep their leaves all year, so they are able to photosynthesize and grow during the winter months. And conifers, because they use water more efficiently than broad-leaved trees do, can also grow during the dry summer months.

Though the climate in the southern reaches of the Pacific forest is relatively dry, Alaska, British Columbia, and part of Washington State receive as much as a hundred and eighty inches of rain a year and have true temperate rain forests. As one walks through these forests, one is struck by the sheer volume of green stuff and by the exuberance with which it strives to live. Things grow in the oddest places. Every tree is hung with epiphytes and ferns. More than a hundred species of mosses and lichens grow high in the

canopy. Fifty or a hundred feet above the ground, large trees sprout from the trunks of even larger trees. This sense of abundance is not deceptive. The Pacific rain forest cannot compete with tropical rain forests in the variety of plants and animals that it supports, but it supports a greater mass of living things by far. "Secrets of the Old Growth Forest," by David Kelly, tells us that the most productive tropical rain forests that have been measured contain a hundred and eighty-five tons of plants an acre. The average Pacific Northwest forest contains just under four hundred tons an acre. Some redwood forests contain eighteen hundred tons an acre. If human beings were as efficient in supporting themselves as these forests are, one square mile would be enough land to sustain nearly three million people.

Disasters—floods, volcanic eruptions, avalanches, lightning strikes, fires, and windstorms—have shaped the Pacific forest, and they continue to do so. Douglas fir, for example, owes its dominance of the Cascade region to the area's frequent fires. Douglas firs cannot grow in shade, and they do not germinate well on the layer of decaying vegetation that covers the soil in a Pacific Northwest forest. But after a fire reduces tree cover and burns off the litter, Douglas-fir seedlings germinate, and then they grow faster than their competitors. In the wet forests of Alaska and Canada, where fires are rare, hemlock and spruce are the dominant species.

The Pacific forest is a triumph of life over adversity. It thrives on thin, nutrient-poor, unstable soils, on steep hillsides, and under extremely difficult climatic conditions. Unfortunately for the forest, man took its magnificence at face value and inquired no further. How do its trees achieve their great size? How do they flourish in a difficult climate and terrain? How can it support such a large population of wild creatures? Those questions went unasked. In 1952, a Forest Service silviculturist called the great forests "biological deserts." The world's tropical rain forests, which scientists complain are ignored and misunderstood, have

In the hygienic sand
of the new municipal sandbox,
toddlers with names from the soaps,
Brandon and Samantha,
fill and empty, fill and empty
their bright plastic buckets
alongside children with names
from obscure books of the Bible.
We are all mothers here,
friendly and polite.
We are teaching our children to share.

A man could slice his way
through us like a pirate!
And why not? Didn't we open
our bodies recklessly
to any star, say, Little one,
whoever you are, come in?

PLAYGROUND

But the men are busy elsewhere.
Broad-hipped in fashionable sweatpants,
we discuss the day—a tabloid
murder, does cold cream work,
those students in China—

and as we talk
not one of us isn't thinking
Mama! Was it like this?
Did I do this to you?
But Mama too is busy,
she is dead, or in Florida,
or taking up new interests,
and the children want apple juice
and Cheerios, diapers and naps.
We have no one to ask but each other.
But we do not ask each other.

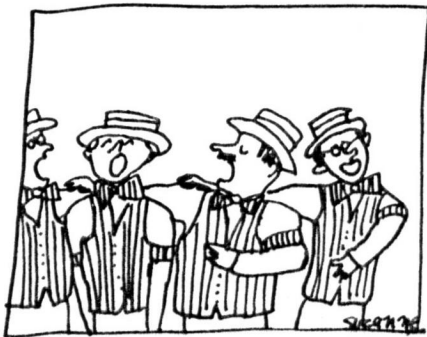
—KATHA POLLITT

been far more intensively studied, and for a far longer time, than has their forgotten sister in the Pacific Northwest. The first comprehensive ecological study of the Pacific forest—a forty-eight-page report—was published in 1981. By contrast, a classic text on tropical-rain-forest ecology, by Paul Richards, was published in 1952, and in writing it Richards was able to draw on a body of published work about rain forests extending back at least to 1891.

The principal author of that 1981 report, "Ecological Characteristics of Old-Growth Douglas-Fir Forests," was a Forest Service scientist named Jerry Franklin, the son of a pulp-and-paper-mill employee in Washington State. Like many forestry students, Franklin helped put himself through school by working for the Forest Service. He did research on subalpine forests while he was studying for a Ph.D. in botany and soil science from Washington State University. His true love, though, was the Douglas-fir forest in which he had played and camped as a boy. In 1969, the National Science

Foundation, in association with the Forest Service, financed a new program to study the ecology of the Pacific forest. Franklin became one of the project's leaders. "I was thinking, My God, here are these incredible forests, and nobody really knows a damn thing about them," Franklin told me as we walked through the Mt. Baker-Snoqualmie National Forest, in Washington State, last May. "They sort of got lost in the cracks, because the academic biologists and ecologists wanted to go down to the tropics, and the foresters thought they knew all they needed to know about the forests here, which was how to cut them down."

Forests, like human beings, have a natural life span. Once they reach maturity, at about two hundred years, growth slows down considerably, and most of their energy goes into sustaining themselves. Eventually, though it may take several centuries more, decay sets in, and the trees die and fall down. To a logger, leaving trees in the ground beyond their point of maximum annual wood production makes no sense. Since the Pacific forest consists of trees that tend to live for centuries beyond that point, it has been regarded by loggers and foresters alike as decadent. The professional forester's view is that such forests should be cleared and replanted with healthy young trees as quickly as possible. Franklin and his colleagues, however, found that this post-mature phase, now generally called old-growth, is the



richest, most complex stage of the forest's life. For the first few decades after a patch of forest is cleared—by fire, wind, or logging—it is an open, grassy area, a good feeding ground for wildlife such as deer, bears, and elk. During severe winters, though, when these open areas are blanketed with several feet of snow, the animals take refuge in old-growth stands, where the ground is protected from snow, and food is still available. At about thirty years, the young stand enters an almost sterile period that lasts for up to a hundred years. This occurs because the trees, all the same age, have formed a dense, unbroken canopy, which blocks the sun and shades out understory growth. As the stand ages, trees die and fall, allowing sunlight to penetrate to the forest floor and stimulate another layer of growth. When the stand achieves

a certain complexity of structure—shrubs, herbs, and trees of varying heights creating a multistoried canopy—it has become old-growth.

It is impossible to come up with a description of old-growth forest that fits the whole Pacific region, since, as Franklin points out, "nature is just too complex and variable to fit into neat conceptual boxes." Still, there is general agreement that true old-growth forests are characterized by large, old living trees; a multilayered canopy; large standing dead trees, called snags; and large dead trees on the ground and in streams. The dead trees are essential to the health of the forest, and are the basis of its astonishing productivity. The nutrients that the forest needs are not mainly in the soil but in the living and dead plant material itself. As leaves and branches fall to the forest floor, as trees and plants die and decay, this material is recycled to the living forest. With this highly efficient and almost closed system, the forest feeds itself, wasting nothing.

Though the great old giants of the forest may be beyond their wood-producing prime, they are at their prime

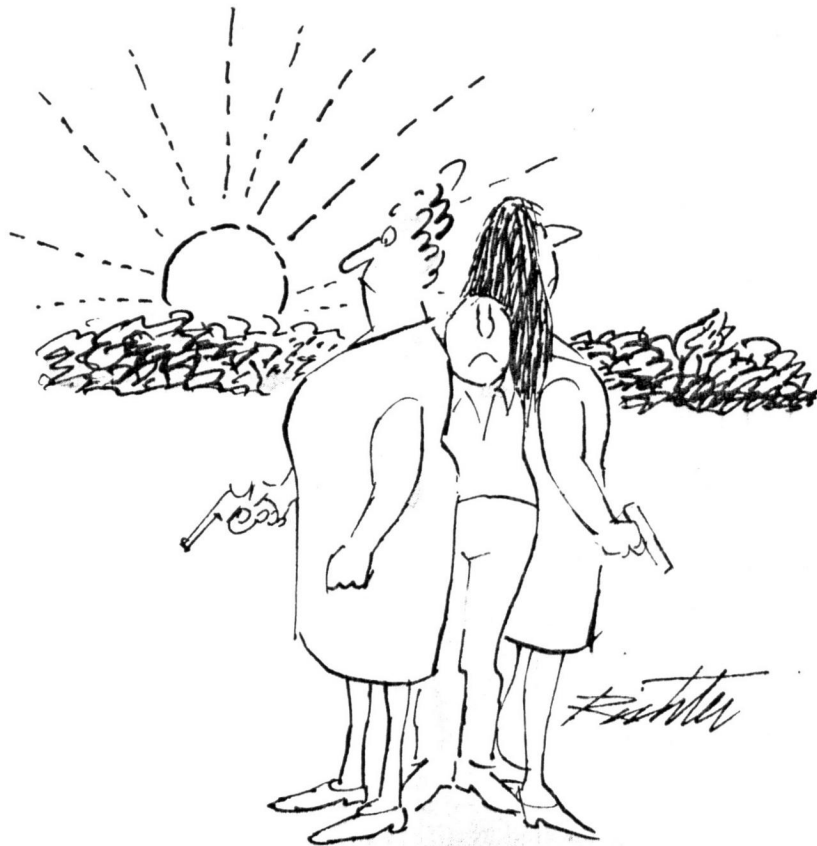


"Try again, Kemosabe. This time ease out clutch slowly."

for many other functions. Scientists have lately discovered that there are lichens that grow only on the canopies of the old-growth trees and can capture nitrogen from the atmosphere. A steady, barely noticeable rain of these lichens constantly enriches the layer of nutrients on the forest floor. A single old-growth tree may have sixty to seventy million needles, and a total of forty-three thousand square feet of leaf surface. The needles are astonishingly successful at collecting moisture and chemical nutrients from the atmosphere. When forests were cut around the Bull Run watershed, from which Portland, Oregon, gets some of its water supply, Forest Service scientists expected more water to enter the reservoir, because of reduced evaporation and transpiration. Instead, water levels in the reservoir dropped. Surprised researchers found that almost a third of the water in the Bull Run reservoir has never come from rain. Rather, the tall trees in old-growth forests collect it from passing clouds and fog banks. When the trees are cut down, the moisture banks waft by without depositing the water they hold. Old-growth

trees also protect the soil and the wildlife from the extreme effects of the region's wet, cold winters and dry summers: first, the dense canopy breaks the impact of the intense rain and snow, helping to prevent disastrous floods, landslides, and soil erosion, and providing a sheltered environment for wildlife in winter; second, the huge trunks can store thousands of gallons of water for the trees' own use and that of other species in the dry season.

One of the most important features of the old-growth forest is the variety of habitats it provides for wildlife. More than a hundred and fifty species of mammals live in such forests, and as many as fifteen hundred invertebrate species may live in a single stand. So far, according to Kelly's book, scientists have found a hundred and eighteen vertebrate species (mammals, birds, reptiles, amphibians, and fishes) whose primary habitat is old-growth. The large old trees, merely by virtue of their great height, create a continuum of climatic conditions, from the cool, dark, moist forest floor to the harsher environment of the canopy, exposed to the sun, rain, snow, fog, and



wind. Every part of the tree—living or dead, including the roots—is home to a whole community of plants, insects, birds, and mammals. The plants and the animals that dwell in the canopy are different from those which nest in a snag, live halfway down a tree trunk, or stay on the forest floor. One species, the tiny red tree vole, which is found only in these forests, spends its entire life high up in a Douglas fir. It makes its nest there, eats almost nothing but Douglas-fir needles, and gets its water by licking rain from the needles.

A tree that is killed by fire, lightning, insects, or disease may remain standing for two hundred years or more. These huge snags are colonized by many types of insects, birds, and mammals. Several species of bats and birds breed under patches of loose bark. Ospreys and bald eagles use the snags as lookout posts. But the most valuable feature of the snags is the cavities that develop in their trunks and branches. At least forty-five vertebrate species, from the northern flying squirrel to the rare and beautiful northern spotted owl, will nest or feed only in the cavi-

ties of old-growth trees. These animals eat the mosses, lichens, and insects that invade dead or dying trees, and they in turn are eaten by animals higher up the food chain—animals like black bears, pine martens, and bobcats, all of which take shelter in snags.

In the very act of falling, a tree contributes to forest diversity in several ways. Its fall creates a light gap—a hole in the canopy through which sunlight can penetrate to the forest floor and stimulate the growth of plants, such as Western hemlock, that have survived for years in the deep shade but needed this burst of light to grow to full size. A tree that is uprooted creates two new wildlife habitats: the pit where its roots used to be, and the exposed roots themselves. A walk through any old-growth forest will take one past several fallen trees, their huge but shallow roots sticking ten or fifteen feet into the air and overgrown with mosses, lichens, ferns, and shrubs. The wresting of the roots from the ground allows organic matter to mix in with the mineral soil—an essential ecological service in the Sitka-spruce forests of Alaska, where the soil has a

tendency to harden and form an impervious pan.

A thousand-year-old tree that falls to the forest floor may take four hundred years more to decay completely. During those centuries, it contributes in many ways to the life and the balance of the forest. Downed logs reduce soil erosion by creating a natural terracing effect on hillsides. They contain enormous amounts of water—enough to see many forest creatures through the dry season. A fallen tree supports an amazing, though still not entirely charted, variety of wildlife—at least a hundred and sixty-three species of birds, mammals, reptiles, and amphibians, and more invertebrates than have yet been counted. Most old-growth forests contain more than fifty tons of downed wood per acre. As much as a third of the forest's soil organic matter comes from these decaying logs; hemlock seedlings and other shade-tolerant plants take root in them as if in a rich plot of soil. In some areas, these "nurse logs" are the primary sites for tree reproduction.

Perhaps the most important and interesting aspect of the decay cycle is the interplay between certain fungi, which grow on decaying trees, and the roots of living trees. These fungi, called mycorrhizae, infect the root tips of many tree species, including all the conifers in the Pacific Northwest forest. In doing so, they promote the growth of tiny root hairs that spread across the forest floor searching for nutrients, and so help trees absorb nutrients that are unavailable to uninfected roots. Without mycorrhizae, trees cannot obtain the phosphorus, the nitrogen, and the water they need to survive and grow. An experiment that was conducted in Oregon's Siskiyou National Forest by Oregon State University in cooperation with the Forest Service found that Douglas-fir seedlings died within two years of planting when they were deprived of mycorrhizae. In turn, mycorrhizae, which cannot photosynthesize, obtain their food from trees.

Some mycorrhizal fungi, such as chanterelle mushrooms, reproduce aboveground. Others, like truffles, do so underground, and only in the wild. (In Europe, the black truffle, a mycorrhizal fungus, fetches four hundred to six hundred dollars a pound. A market in domestic truffles is just beginning,

but the Oregon white truffle is already a valuable commercial crop.) Truffle spores are dispersed in the droppings of the mice, squirrels, chipmunks, and voles that eat the fungus. Since fungi can infect only those roots with which they come into direct contact, these small animals are essential to the survival of the forest. They are also essential to the spotted owl, which relies in large part on truffle-eating mammals for food. A decline of a forest's spotted-owl population might mean that there are not enough truffles to support a healthy population of these mammals, and therefore that the young trees in that forest are not being inoculated with the mycorrhizae upon which their survival depends. Thus the Forest Service has designated the spotted owl an "indicator species"—a species by which one can to some extent gauge the health of the forest.

IN the midst of the nineteenth century's orgy of logging, there dawned the realization that the North American forest was finite. By 1879, according to a study by Michael Williams in "World Deforestation in the Twentieth Century," more than two hundred million acres—a quarter of the country's forestland—was gone, and the rate of deforestation was increasing. There was talk of a timber famine, and the talk was frightening, because at that time and for many decades to come the United States was at base a timber economy.

Many people, perhaps most, simply denied or were unaware that careless land-clearing caused serious problems. Others saw such problems as the unavoidable cost of the need to turn forests into farmland and timber. A few raised their voices in warning. One such was George Perkins Marsh, a Vermont lawyer, businessman, congressman, and diplomat. Marsh had extensive experience of deforestation. He was briefly a lumber dealer in Burlington, a town that in the space of twenty years went from selling timber from the nearby Green Mountains to having to buy it, because those woods were exhausted. Marsh also spent some time as Ambassador to Turkey, and was struck by the effects of deforestation in that country and in the Mediterranean region as a whole. In 1864, he published "Man and Nature," a book that Lewis Mumford later called "the fountainhead of the conservation

movement." In it Marsh explained how "indiscriminate clearing of the woods" in other countries had damaged water supplies, agriculture, and commerce and had led to the downfall of cities and nations. "Man has too long forgotten that the earth was given to him for usufruct alone, not for consumption, still less for profligate waste," he wrote. He called for a new treatment of the natural world, based not on a romantic view of nature as an inspiration or a challenge to mankind, and not on a political philosophy that says the land belongs to the people, but on a scientific understanding of how natural systems work.

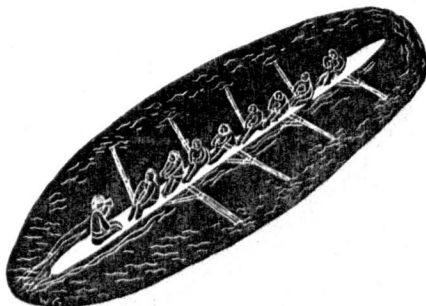
In 1891, Congress gave the President authority to create forest "reservations." No one was clear about the purpose of the forests until 1897, when Congress decided that they should be managed to protect watersheds and "to furnish a continuous supply of timber for the use and necessities of citizens of the United States." In 1905, President Theodore Roosevelt, an ardent conservationist, gave authority for managing these reservations, or national forests, to the Department of Agriculture's forestry division, renamed the Forest Service. By 1913, there were a hundred and eighty-seven million acres of national forests, and four million acres have been added since. While most of the national forests are in the West, the system also includes over twenty-four million acres of lands in the Eastern and Southern states, most of which have already been logged.

The first head of the Forest Service was an aristocratic Easterner, Gifford Pinchot. Though Pinchot had been trained in forestry in France, he was more of a politician and a crusader than a technician. He deplored the way private landowners were treating the nation's forests, and he argued, unsuccessfully, that the government should take control of all the country's forestlands. Pinchot was an inspirational figure and—especially with the

backing of his ally Teddy Roosevelt—a powerful one. As David Clary points out in "Timber and the Forest Service," Pinchot believed deeply in scientific forestry as a tool of social progress. It was up to the Forest Service, he said, to replace the rootless, boom-and-bust logging economy with stable communities able to count on a continuing supply of timber from the national forests.

The Forest Service also played a part in advancing another rationale for forest protection—the preservation of wilderness. Private landowners, who were cutting their trees as fast as they could, pressured the Forest Service to keep national-forest timber off the already glutted market. The agency therefore kept its forests intact, waiting in gloomy anticipation of the day when the private forests would be exhausted and it could step in to avert the long-dreaded timber famine. In the meantime, "the national forests were de-facto wilderness, largely unaltered from their primeval conditions, seldom visited by man, and the 'hard-rock' forest rangers came to hold a deep affection for this wild uninhabited country," according to the forestry scholar Richard Behan, quoted in Dennis Roth's "The Wilderness Movement and the National Forests." Many of the leading advocates of wilderness in the first decades of this century were Forest Service employees—men who lived close to nature the year-round and wanted to see its beauty protected.

The greatest of the Forest Service's wilderness advocates was Aldo Leopold, a forester and game manager for the agency and a founder of the Wilderness Society, which is now one of the agency's strongest critics. Leopold believed that encounters with wilderness had formed the American spirit, and that taming the American landscape would cut the country off from the roots of its vitality. "Is it not a bit beside the point for us to be so solicitous about preserving institutions without giving so much as a thought to preserving the environment which produced them and which may now be one of our effective means of keeping them alive?" he asked. Inspired by the infant science of ecology, Leopold also argued that mankind needed to preserve natural areas for study. It was at Leopold's urging that, in 1924, the Forest Service set aside its first wilderness area—five hundred thousand acres

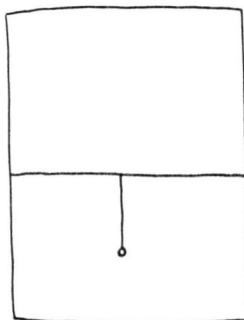


around New Mexico's Gila River.

The idea that national forests could harbor wilderness areas and produce timber was consistent with the Forest Service's philosophy that forests offer many benefits, not only timber, wilderness, and the protection of water quality but also fishing, hunting, and recreation. For many years, the agency had no difficulty in reconciling these often conflicting interests, because there was no pressure to cut the national forests. The Second World War changed that. The Forest Service responded to the military's urgent need for wood by more than doubling its timber production in three years. As the country settled back into civilian life, the demand for wood continued to soar, but private forestlands were almost exhausted, and could not meet the demand. This was the timber famine that the Forest Service had long anticipated—the moment when it would step in to keep the American people in timber and the American timber industry in business.

The Forest Service had been set up to demonstrate to a sloppy and reckless timber industry how forests should be managed, but, early on, it came under pressure to violate its own guidelines. In the immediate postwar period, the harvest from the national forests was just a fraction of its potential. But, because the national forests were then still largely inaccessible, pressure on the few areas that logging trucks *could* reach was intense. By 1948, according to Clary's book, B. H. Payne, a Forest Service timber manager, was rueing the fact that "the Forest Service was forced to accept in part the highly undesirable practice of over-cutting on some of the developed areas in order to increase the over-all supply of timber." The demand for timber from the national forests climbed all through the fifties and sixties. "Land and Resource Planning in the National Forests," by Charles Wilkinson and H. Michael Anderson, shows that from 1944 to 1966 the amount of timber cut annually from the national forests almost quadrupled. Because of the quality and the volume of their timber, the ancient Pacific forests have been the most heavily cut. Since the mid-sixties, the hundred and fifty-six national forests

have produced around twelve billion board feet of timber a year, and about a quarter of it comes from the thirteen old-growth national forests of the Pacific Northwest. (Board feet are the measure of the amount of usable wood in a tree. One board foot is one foot square and one inch thick. It takes about ten thousand board feet of timber to build the average single-family house. A large, old Douglas fir may contain that much timber; some giants are on record as containing thirty thousand board feet.)



Darryl Shedden

Throughout the nineteen-sixties, evidence mounted that the Forest Service was mismanaging and overcutting the national forests. A 1969 Forest Service study concluded that its Douglas-fir forests were being overcut, and predicted that harvests would drop by forty-five per cent once the old-growth trees were gone. In 1970, a group of highly respected foresters issued a report criticizing the Forest Service for ignoring its legal obligation to protect all the resources of the forest. "Multiple-use management, in fact, does not exist as the governing principle," the report said. And in 1975 the Fourth Circuit Court of Appeals, in Virginia, banned clear-cutting in the Monongahela National Forest, in West Virginia. To cope with this emergency, Congress in 1976 adopted the National Forest Management Act, which ordered the agency to limit the timber cut to an amount that each forest could sustain in perpetuity. Under the N.F.M.A., the agency was also ordered to prepare, as part of its ten-year management plans, harvesting schedules, based on realistic analyses of each forest's timber potential. In these plans roads, meadows, lakes, and rocky areas may not be counted as forestland. The plans must also eliminate from the timber base land on which trees will not grow back within five years of logging, and must make more accurate estimates of the amount of forest to be set aside to protect other values, including water quality, wildlife, and recreation. On the other hand, the plans allow the agency to assume that it will be able to increase productivity by using fertilizers, pesticides, and specially selected seedlings in growing the next generation of

trees. Taking all this information together, the Forest Service has determined that the sustainable harvest level for forests in Washington and Oregon is substantially lower than had been thought. The sustainability of even these lower levels has been called into question by some prominent foresters. James Torrence, the regional forester in charge of all the national forests in Washington and Oregon, told the *Portland Oregonian* shortly before his retirement, last summer, "We can do it"—harvest at the new levels. "We can physically do it. But we can't do it for the 10-year life of the plans."

In any case, none of the new forest plans for the Pacific Northwest are yet in effect. Draft plans for those forests indicated that the sustainable harvest level was about twenty per cent lower than had been assumed. In 1983, John Crowell, the Assistant Secretary of Agriculture who was responsible for the Forest Service, and had previously been general counsel to Louisiana-Pacific, one of the country's largest purchasers of federal timber, ordered the plans withdrawn and revised, and that process took six years to complete. In the course of this delay, additional scientific evidence of the ecological damage caused by high timber harvests was amassed. The new draft plans indicate that sustainable yield for the forests is about twenty-five per cent lower than current cutting levels. In addition, planners in several national forests have indicated privately that the final plans should have even lower harvest levels than the draft plans specify.

While the forest plans are slowly being completed, Congress has been directing the Forest Service to increase its planned cut above the sustainable yields reflected in the draft forest plans, and even above the historically high levels still being proposed by the Forest Service. In 1987—the last year for which analyzed figures are available—Congress ordered the Forest Service to cut eighteen per cent more timber from the nine old-growth national forests in western Washington and Oregon than the agency had proposed, or almost eleven per cent more than the draft plans for the forests say is sustainable. The Siskiyou National Forest, for example, has been ordered to harvest 46.7 per cent more than the Forest Service itself proposed, the Rogue River National Forest 35.8 per cent more, and



"Around here his word is law."

the Mt. Baker-Snoqualmie National Forest 28.8 per cent more.

Overcutting is also a serious problem in British Columbia's forests, and provincial government ministers as well as industry officials expect timber yields to drop by at least twenty-five per cent as the old-growth runs out. More than ninety per cent of British Columbia's forests are publicly owned, and under the Canadian system publicly owned forests are the responsibility of the provincial governments. The system of allocating timber harvests in British Columbia is very different from that in the United States, where the Forest Service manages the forests on a day-to-day basis and awards onetime logging rights through competitive bidding. In British Columbia, the provincial Ministry of Forests licenses private companies to log and *manage* large areas of the public forests in perpetuity, with minimal oversight from its forest service and with virtually no public oversight. A study by Bill Wagner, at the University of Victoria, shows that more than ninety per cent of the province's public forests are under the control of just four groups of linked companies—the Bentley-Prentice group, the Mead-Scott group, the Bronfman, Reichmann & Desmarais group, and the Sauder, Champion, Ketcham & Fletcher group.

Most data on public forests in Canada, including the amount of timber cut in each licensed area and the price the government charges licensees for logs, are kept private, on the ground that licensees have a right to commercial confidentiality. Therefore, it is virtually impossible for citizens or academics to check either government's or industry's claims about the condition of the public forests. Licensees are required to adhere to vaguely worded management plans, among whose many shortcomings are that they do not require the use of the most up-to-date scientific data available and that they make little pretense of giving equal weight to the protection of such non-timber resources as fisheries, wildlife habitat, archeological sites, and endangered species. Management plans are public documents, but they can be amended in private, with no public notice. Citizens have no right to take either licensees or the government to court for alleged violations of management plans.

In the ancient coastal forests of British Columbia, the most extensive tenures are so-called tree-farm licenses, under which a company is given rights, renewable in perpetuity, over a large area of forest. The company does not pay for the license, even though tree-farm licenses, which can be used as

collateral or sold, are valuable assets, and can be worth billions of dollars. If for any reason—including the creation of a national park, the settlement of native-land claims, or the protection of wildlife and fisheries—the government causes the cut on a licensed area to be reduced by more than five per cent over twenty-five years, it must compensate the licensee for lost future profits. The Ministry of Forests sets the allowable cut for each licensed area on the basis of forest inventories, which the licensees carry out periodically. In general, the inventories do not exclude all areas that are inaccessible, environmentally sensitive, or valuable for wildlife, scenery, or archeology, or that have uneconomic timber.

Neither the province nor the timber industry claims that logging at present levels is sustainable. In 1979, the province abandoned sustained yield as a goal of its forestry program. A 1984 report by the Ministry of Forests noted, "British Columbia's forests are commonly thought to be managed under a policy of constant production over time. This is not true. Many future second-growth stands will yield smaller harvests at maturity than the existing old-growth forests." Worries about this so-called falldown problem are being pushed into the future, though its effects are already being felt in parts of the province where the old-growth has run out. Peter Pearse, British Columbia's leading forest economist, argues that "this complication ought not to worry us much if the impact is not felt until the mid-twenty-first century." And Norm Godfrey, who until recently was the forestry manager for Vancouver Island's Alberni tree-farm-license area—one of the largest such areas in British Columbia, and licensed to the conglomerate MacMillan Bloedel—says, "You have to look at it a different way. It's not that we'll get less later but that we're getting more now."

TODAY, the effects of almost fifty years of intensive logging in the publicly owned forests of the Pacific Northwest are clear. The logging industry has been unable to take large amounts of timber out of the forest

without damaging water quality, wildlife, and even the forest's capacity for regeneration. Clear-cuts, once regarded as appropriate only in special circumstances, cover—or uncover—the landscape. The United States Forest Service makes an effort to protect the public from the mournful sight of clear-cuts by leaving “visual-protection corridors” of tall trees along the roadsides, but as the cutting has progressed from the valley floors up the steep hillsides clear-cuts have become harder and harder to hide; some spread across thousands of acres. It is not merely the sight of large areas of deforested land that upsets and confuses visitors; the jagged stumps, broken branches, and shredded bark that clutter the logging sites, and are bleached by the sun or blackened by fires set to destroy them, accentuate the sense of devastation, and so do the landslides that commonly scar steep denuded slopes. Senator Gale McGee, of Wyoming, called clear-cutting “a shocking desecration that has to be seen to be believed,” and described one clear-cut as looking “as if a squadron of B-52s had ravaged the pristine beauty of the Wind River Mountains.” In British Columbia, there is no limit on the size of clear-cuts. The limit on clear-cuts in the United States is forty acres in most national forests, sixty acres in Douglas-fir forests, and a hundred acres in Alaska, but exceptions can be granted. Observers estimate that up to half the clear-cuts in Alaska's Tongass National Forest are larger than a hundred acres.

Flying over the forests of Oregon, Washington, British Columbia, and Alaska, I have seen mile after mile of contiguous or nearly contiguous clear-cuts, and they are among the ugliest scars on the planet. One near the Bowron Lakes, in British Columbia, covers more than a hundred and eighty square miles: it is one of the few manifestations of man visible from space. But looks are not everything. If this temporarily barren ground is only one stage in a cycle of growth and renewal, it may be a price worth paying for our use of wood. Assuming that we need trees and are going to cut them, perhaps the question should be not “Is it ugly?” but “Does it work?” What method of tree cutting has the least impact on the surrounding area and on the ability of the land to grow more trees? Clear-cutting, despite its ugly-

ness, has several advantages over selection logging, in which only a few trees are taken out at a time. That clear-cutting is more economical is obvious. Also, some species, such as Douglas fir, do not regenerate well after selection logging, because they cannot grow in deep shade. Initially, clear-cutting has a greater impact on a site than selection logging has, but selection logging subjects a site to repeated invasions with heavy equipment and new roads. And there is some concern that in selection logging the best specimens—the biggest, straightest trees—are cut first, with only comparatively stunted, scrawny trees left behind to form a degraded genetic reservoir for succeeding generations. In some circumstances, then, clear-cutting is an appropriate method of logging. But clear-cutting—especially as it is practiced today—is a drastic operation, which carries the risk of serious damage and is not suitable for fragile soils or steep slopes.

National forests are generally less suitable for clear-cutting than private lands are, because private owners claimed the accessible, lowland forests first, leaving the national forests to be carved out of the steepest, most remote, and most easily damaged lands. As a result, erosion and landslides after clear-cuts are particular problems on public forestland. The high rainfall that is common along the Pacific Coast increases the instability of the soil. When the protective tree cover and the thick layer of organic matter are removed, there is nothing to absorb and store the available moisture. Consequently, a heavily logged area will have more intense runoff in the wet season and less water available in the dry season. In winter and spring, the creeks will run dark with silt; in summer and fall, they will be dry and choked with logging debris.

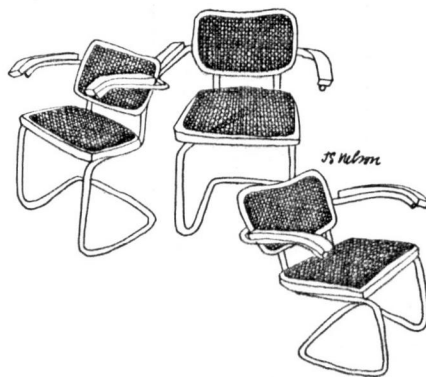
Neither the United States Forest

Service nor the British Columbia forest service bans cutting on steep hillsides; each situation is evaluated individually. The result is that throughout the region slopes as steep as eighty and ninety degrees have been clear-cut. One of the most common sights on clear-cut slopes is a logging road running straight across a mountainside, with the earth crumbling away every few hundred yards. The washed-down soil chokes creeks and rivers.

To survive, forest streams must flow through corridors of living trees, and must contain a certain amount of wood—often more than sixty pounds for every square yard of stream—from large trees that have fallen into them. These accumulations of wood create the plunge pools, side channels, and gravel beds that are important fish habitats. Without them, sediment and logging debris flow downstream unimpeded, smothering the bottom-dwelling insects, scouring the streambed, and eroding the stream bank. Yet one frequently sees lakes and streams with no buffer at all, or with a hopelessly inadequate fringe, one or two trees deep. “We did that in the sixties and seventies, and now we're dragging the wood back into the streams,” David Gibbons, until recently the regional fisheries-program manager for the Forest Service in Alaska, told me, adding that the state is introducing new guidelines for logging near forest streams.

When a forest has been clear-cut and the timber removed, there are literally tons of woody debris left behind—broken trees, branches, huge stumps, twigs, piles of bark. This unsightly mess, called slash, is sometimes allowed to decay and return nutrients to the soil, but more often it is burned, in order to destroy debris that might fuel wildfires, and to make replanting easier. Slash burning is a significant contributor to air pollution in Oregon and Washington.

Proponents of logging often argue—erroneously—that cutting old-growth forests counteracts global warming, which is caused by the buildup in the atmosphere of carbon dioxide and other gases. Their argument is based on the fact that young trees absorb carbon dioxide at a faster rate than do old trees. This is true, but as Mark Harmon, a forest scientist at Oregon State University, explains, “even though the young forest is tak-



ing up carbon real fast, it can never—or not for hundreds of years—make up for the huge amount of carbon that was released when that old-growth forest was cut.”

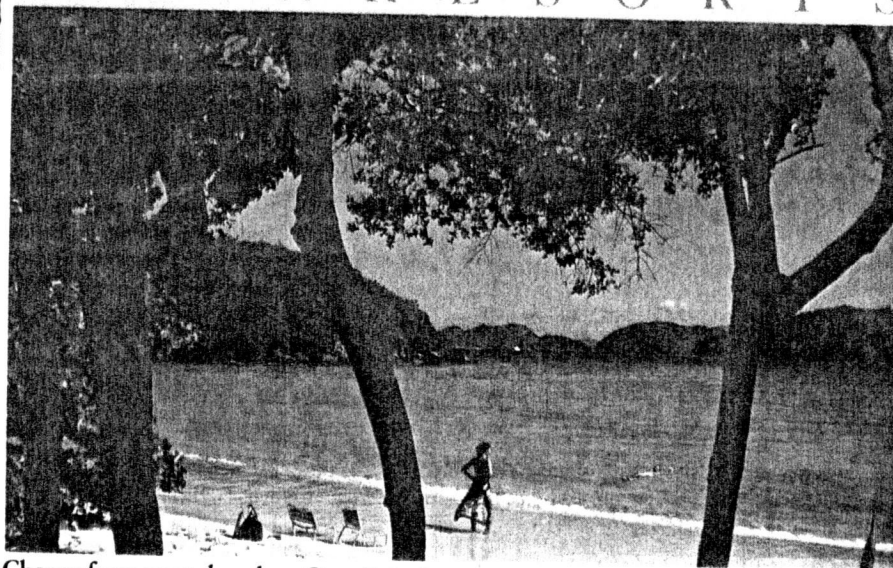
Simply cutting a tree does not cause the carbon stored within it to escape into the atmosphere. Only as the tree decomposes is the carbon released. When a forest is cut, the logging debris, leaf litter, and other organic matter left behind are exposed to sunlight, which speeds up decomposition. Often, a logging site is deliberately burned after clear-cutting, sending carbon into the air immediately. The soil is another storehouse of carbon, and as it is torn up and exposed to the air and sun during logging operations it also decomposes, sending its carbon load up to the atmosphere. Of the timber that is taken away, less than half is made into long-lived items, such as lumber or plywood. Fifty-two per cent is burned as fuel or made into paper or fibre products, which are soon thrown away, to decompose or be burned. Thus, Harmon says, “a great big chunk of this huge storehouse of carbon that is the old-growth forest is converted back into carbon dioxide within a few years.”

If an area is to be clear-cut, there must, of course, be a road into it, and the United States Forest Service has become the biggest road-building agency in the world. Into the fragile landscape of the national forests it has carved hundreds of thousands of miles of roads. Many have been abandoned, but today the national forests contain more than three hundred and forty thousand miles of operable roads. That is eight times the mileage of the entire interstate-highway system. Over the next fifty years, the Forest Service plans to build about a hundred thousand miles of new roads, and to rebuild over three hundred thousand miles. Despite the fact that most logging roads are not paved, they are expensive to build and maintain, because of the rough terrain they must penetrate and the disturbances to which they are always subject. Major logging roads cost forty-five thousand dollars a mile on the average, and secondary ones average fifteen thousand dollars a mile. The Forest Service pays for roads by the sale of timber and by direct grants from the federal government; in 1988, the grants amounted to a hundred and seventy-five million dollars.

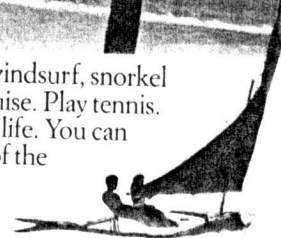
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ROCK RESORTS

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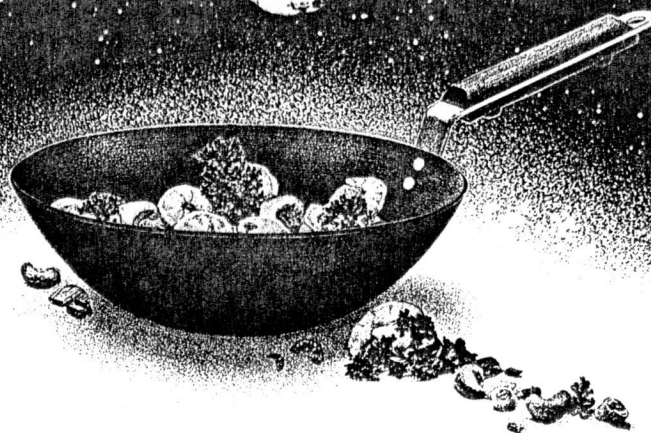
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ing streams, dislodging rocks, creating piles of excess earth, roads are inherently destabilizing. When a road is bulldozed or blasted across a slope, tons of earth and rocks are moved. Often the excess soil is simply pushed over the side of the road, and there it forms a nucleus for future landslides. Every year, newly built logging roads make about a hundred and eighty thousand stream crossings. Each crossing involves a risk of damage to the stream. Ideally, roads should be engineered to allow streams to flow freely under them. In many cases, however, logging roads are simply cut across streambeds. Streams are often forced into drainage culverts that are inadequate to cope with the high-water flow or with the deluges of large branches, boulders, and logging waste, called debris torrents, that may be swept into the stream channel. Such debris torrents choke streambeds, causing floods, washouts, and landslides, which erode slopes, destroy the road, and silt up larger streams below.

Whatever the failures of the Forest Service in maintaining high standards of logging-road design and construction, those of British Columbia's Ministry of Forests are far worse. "We seem to be ten years behind in Canada in terms of forest legislation," Norm Godfrey told me. "There are laws telling our U.S. operation what to do in a way that doesn't exist in British Columbia at this time." As I toured MacMillan Bloedel's Vancouver Island concessions by plane with Godfrey and a group of other company officials, in the spring of 1989, and, later, on my own, I saw plenty of evidence to support his statement.

Since the discovery, in 1988, that the Carmanah Valley, which is part of a MacMillan Bloedel concession on Vancouver Island, contains some spectacularly large ancient trees, including the world's tallest spruce, this remote valley has become a tourist attraction and a cause célèbre among Canadian environmentalists. They have enlisted much support from hikers shocked by what they have seen of a logging operation that was not meant to be on public display. Staring down at the clear-cuts, Godfrey shook his head and said, "If we had thought ahead, we'd have planned the road to minimize the visual impact."

"You'd love to turn the clock back," Dennis Bendickson, the company's

divisional engineer, murmured in assent.

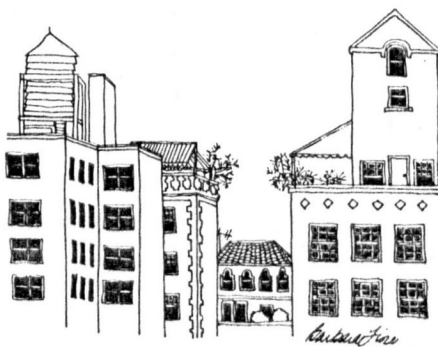
Later, as we passed over the Cypre region, a mountainous coastal area where huge clear-cuts are crisscrossed by poorly designed logging roads, Godfrey said, "We wouldn't do it that way now. The cuts would be smaller. Not because we know something now that we didn't then but because of the changing expectations of the public." MacMillan Bloedel is still logging at Cypre. In the winter of 1988, erosion from the denuded slopes was so bad that the company had to spread a slurry containing legumes and grasses over the hills in a bid to save both the hills and Cypress Bay, which they were falling into. Environmentalists are particularly upset by the devastation of Cypre and nearby watersheds, because they are part of Clayoquot Sound, a beautiful area of coastal mountains, fjords, forested islands, and white sand beaches that together make up one of two of Vancouver Island's last large expanses of coastal rain forest. The Ucluelet forest, some miles farther south, adjoins the Pacific Rim National Park, a long, narrow expanse of pristine beaches. "We logged every square foot of Ucluelet," Godfrey commented. "But we wouldn't do it that way now."

Half a century of clear-cutting and road building has left North America with a severely fragmented forest. The northeastern area of Alaska's Chichagof Island is a poignant illustration. Almost every watershed of this once-perfect landscape of forests, rivers, white sand beaches, and snow-capped mountain ridges has been violated, largely as a result of the Forest Service's allowing loggers to search out and take the biggest trees, which are scattered in small stands—a process known as high-grading. Though these old-growth stands are a small part of the forest, they are the most profitable to cut. But they are also the heart of the

forest ecosystem, supporting both a mass of timber and a mass of life. Many of the clear-cuts are separated from each other by narrow strips of standing trees. These strips are supposed to serve as wildlife refuges, but they are utterly inadequate to support the animals displaced by logging, according to John Schoen, a wildlife biologist with Alaska's Department of Fish and Game. Moreover, some of these narrow strips have been largely or completely destroyed by wind. Many rivers and lakes are logged right down to their edges. Pointing to Kook Lake, a sockeye-salmon fishery severely damaged by overlogging, Schoen exploded, "Has that been high-graded? Man, I tell you it has!"

According to the Forest Service, only twelve per cent of the forest of northeastern Chichagof Island has been logged. But the logging has been concentrated in the high-volume old-growth forest, and clear-cuts are spread over almost every one of the region's watersheds. Near the coastal town of Tenakee Springs, the watersheds of Basket Bay, Kook Lake, Crab Bay, Corner Bay, Indian River, Pavlof Harbor, and Kennel Creek have all been high-graded, and severely damaged from an ecological point of view. Gone are dense, low-elevation forests where deer sheltered and fed in winter, and riparian forests where brown bears lived and in whose waters millions of salmon spawned each spring. The four hundred square miles of northeastern Chichagof Island is now laced by two hundred miles of logging roads, and the Forest Service plans to build another two hundred miles of roads over the next twenty-two years. These roads will take loggers into the few remaining pristine watersheds and drastically change the lives of Tenakee Springs' hundred residents.

Tenakee Springs is isolated, and the residents like it that way. Outsiders can get there only by boat or floatplane. There are no roads, and so there are no automobiles. The town has a small electric generator, limited indoor plumbing, and, at the time I visited, last spring, two communal telephones. The townspeople bathe together, too—women in the morning and evening, men in the afternoon and at night—in hot springs that bubble up in the center of town. There are few jobs in Tenakee, and many of the residents go off for a few months each year to earn



some cash; in 1988, several worked on the Exxon Valdez oil-spill cleanup. But the ocean, the rivers, and the forest provide much of what people need—food, firewood, and building materials.

In the early nineteen-seventies, the Forest Service decided that Tenakee Springs should be linked by a road to the larger town of Hoonah, twenty-four miles to the northwest, "for administrative reasons." (The road would connect two Forest Service districts.) Almost everyone in Tenakee is vehemently opposed to that plan. Even the Forest Service concedes that the road is unpopular. Helen Clough, then the district ranger who had jurisdiction over the road, told me, "A great majority of the Tenakee residents don't want a road to their town. They value that isolation, that remoteness—that's why they live there. It's one of the few remaining communities in Alaska—or America—where you can live that way."

The opponents of the road believe that an influx of cars and hunters will destroy the environment they love, and depend on for a living. Hoonah is already plagued by an excess of

hunters. Because it is one of the hunting areas closest to Juneau, scores of hunters in camper vans make the short ferry trip to Hoonah each weekend during the hunting season. The pressure of hunting and the destruction of the animals' habitat by logging have reduced the island's bear population so much that the state Department of Fish and Game has had to drastically restrict hunting in northeastern Chichagof. Commercial guides, who must pay the Forest Service a small percentage of their gross income for the right to operate in the national forest, have been forced to cut back or abandon their businesses in the area.

Despite the opposition, the Forest Service went ahead and built a road from Tenakee to within six miles of the Hoonah road system. Because the road had to traverse town land for a short distance to reach the coast, the City of Tenakee Springs threatened to deny access unless the Forest Service and the Alaska Pulp Company, which has logging rights in the area, agreed not to connect the road with other road systems. In response, the Forest Service in 1988 used its power as a federal

agency to condemn the right-of-way, offering to pay Tenakee Springs a hundred dollars in compensation. Meanwhile, both Tenakee Springs and three clans of Tlingit Indians have gone to court to force the Forest Service to consider what effect the road link and increased logging might have on wildlife and water quality. Tenakee Springs has also appealed to Congress to include a clause banning a road link across the island in forthcoming legislation. That is probably Tenakee's last hope in its nearly twenty-year-long struggle to preserve its isolation and its way of life.

NO one knows exactly how much of the ancient Pacific forest is left. There are no comprehensive maps or surveys of old-growth, and the little information that has been gathered is fragmentary and inconsistent. The United States Forest Service is only now developing a definition of old-growth—a step that British Columbia's forest service has not yet taken. One thing that is known is that the greatest extent of old-growth forest left is in coastal British Columbia,

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which also has the highest old-growth logging rates. And sixty per cent of British Columbia's coastal old-growth forest is estimated to have already been destroyed. Of perhaps seven million acres left, fewer than four hundred and fifty thousand have been set aside in parks and preserves. At the present cutting rate—about a hundred and twenty-five thousand acres a year—it is estimated that virtually all unprotected coastal old-growth will be gone by the year 2020. According to Douglas Williams and Robert Gasson, University of British Columbia forest analysts, the high-volume forests that both ecologists and economists value most will be gone even sooner—in fifteen years.

The Tongass National Forest takes in almost seventeen million acres and stretches across thousands of watersheds, over scores of islands, from valley bottoms to mountaintops, covering virtually the whole of southeastern Alaska. The general impression, even among foresters and environmentalists, is that the Tongass is the continent's great reservoir of old-growth. But although much of the Tongass is covered by very old trees only a small part

of the region has the ecological and topographical conditions needed to support true old-growth forest. This classic high-volume old-growth, which originally covered almost a million acres, is being logged much faster than the rest of the forest, according to a study by Matthew Kirchhoff, a research biologist with the Alaska Department of Fish and Game. Twenty-five per cent of the classic old-growth is already gone, twenty per cent is legally protected, and thirty per cent is scheduled to be cut; the remaining twenty-five per cent is not scheduled for cutting at this time, because of technical and economic constraints.

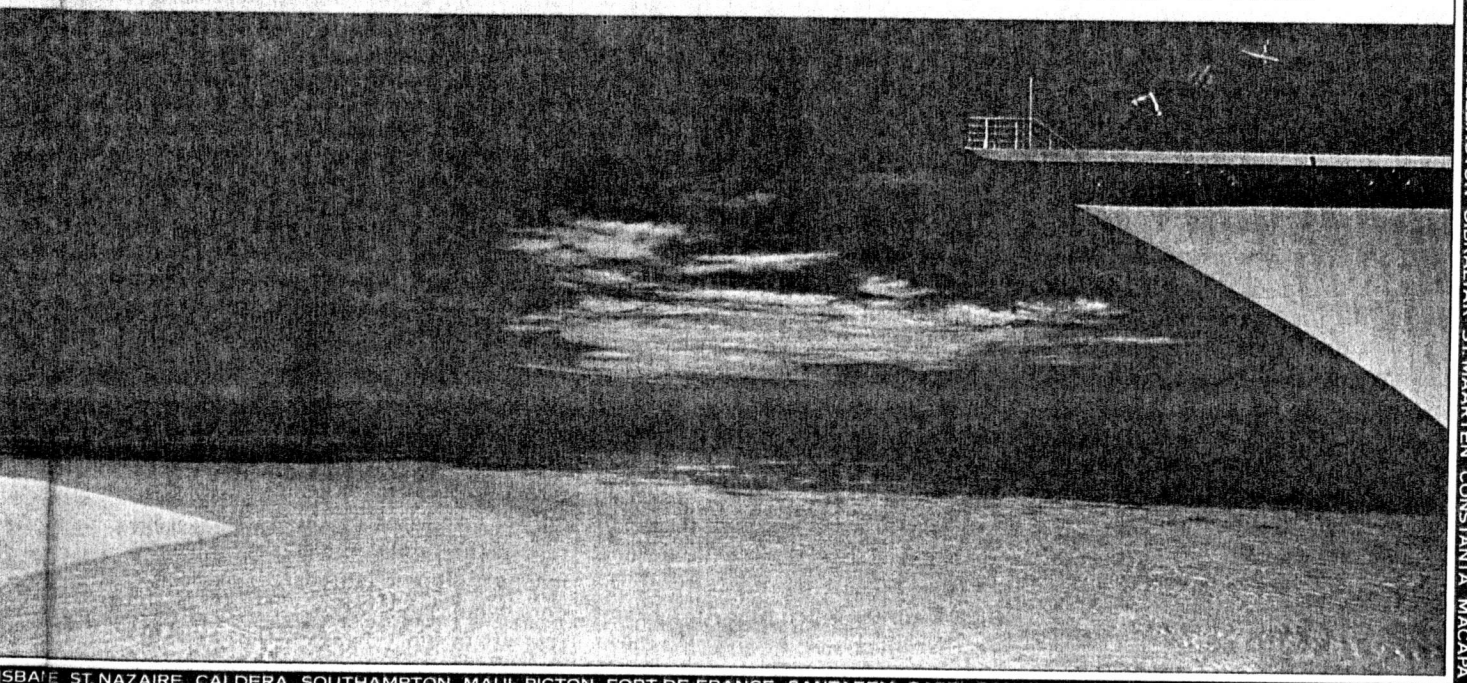
Old-growth forests in the lower forty-eight states originally covered twenty-five million acres. The Forest Service estimates that the twelve old-growth national forests in Washington, Oregon, and Northern California have four million one hundred thousand acres of old-growth left. Adding in all other old-growth forests—those owned by the states or by the federal Bureau of Land Management, and those in national parks—brings the total for the region up to five million

four hundred thousand acres, of which a million acres are under permanent protection. According to the Wilderness Society, however, the Forest Service has greatly exaggerated the extent of the remaining ancient forests. In the most comprehensive independent study of old-growth so far conducted, Peter Morrison, a forest ecologist, analyzed old-growth in six Pacific Northwest national forests for the Wilderness Society in 1988. Using Forest Service data and aerial photographs, Morrison and his colleagues found that the six national forests contained a total of one million one hundred thousand acres of old-growth, and not two and a half million acres, as the Forest Service had estimated.

The Forest Service, which is now conducting its own old-growth inventory, has reacted mildly to the society's study. "I have no problem with it," Karl Bergsvik, the agency's assistant director for timber management, told me a year ago in his office, in Washington, D.C. "The only problem I have—and it applies to our data as well—is that they used information from inventories that weren't designed to

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provide the kind of information we're developing." Old-growth estimates for several of the six forests studied by the Wilderness Society have since been revised. The estimate for the Gifford Pinchot National Forest, for example, has been lowered from two hundred and thirty-one thousand acres to a hundred and ninety-three thousand; the society's figure, however, was a hundred and nineteen thousand acres.

The Wilderness Society figures indicate that the ancient forests are much closer to extinction than was realized. Forest Service officials say, for example, that the Siskiyou National Forest has four hundred and forty-three thousand acres of old-growth now, and after fifty more years of logging it will have a hundred and eighty-one thousand acres left. But the Wilderness Society says that the Siskiyou has less than this already—only a hundred and forty-one thousand acres. Extrapolating from its study and taking into account state, private, and other federal lands, the Wilderness Society estimates that the unprotected old-growth in all of western Washington and Oregon comes to under a million five hundred thousand acres—less than half the official estimate. If this estimate is correct, at the present rates of logging every bit of unprotected old-growth in western Washington and Oregon will be gone in less than twenty years.

Efforts to protect the ancient forests have so far been inadequate. Less than five per cent of the original forest has some sort of legal protection. The situation in British Columbia is particularly worrying, for neither of the two biggest reserves there is completely secure. One, the South Moresby National Park Reserve, is the subject of unsettled native-land claims, and the government of British Columbia has already seriously eroded the other, its Strathcona Provincial Park, by opening it to hydroelectric development, mining, and logging. Insuring the survival of the ancient forests is not merely a matter of protecting a certain percentage of the original forest. A system of parks and reserves is adequate only if it reflects the diversity of the original forest—including, for example, the Sitka-spruce and Western-hemlock forests along the coast from Northern California to Alaska, the

Douglas-fir forests of Oregon and Washington, the Western-red-cedar forests of coastal British Columbia and Washington, and the mixed evergreen-hardwood forest of Oregon's Siskiyou Mountains. The reserves should also contain a significant proportion of the forests that have the greatest degree of biological diversity—the low-elevation forests on good growing sites. "There's damn little of the lower-elevation forest set aside," Jerry Franklin, now of the University of Washington, says.

"In our wilderness areas, it's mostly higher-elevation forest with poor biological diversity. So the wilderness areas don't do a good job of protecting biological diversity. And the parks, with the exception of the Olympic National Park, don't really do a good job, either." In both the United States and Canada, parks have been chosen for their dramatic scenery rather than for their biological significance. Most of the parks in the Pacific area are centered on mountain ranges. They consist largely of rocks and snow and ice, with perhaps a fringe of old-growth forest on the lower slopes.

Reserves must also be big enough to accommodate the needs of their native species. Charles Meslow, a spotted-owl specialist with the Fish and Wildlife Service, has said that each mating pair of spotted owls, for example, requires from fifteen hundred to four thousand acres of old-growth forest, depending on where the forest is. In general, according to Franklin, "it is preferable to have reserves of several hundred acres, but smaller patches may also be worth saving, depending on a number of circumstances, including the type of forest, how isolated it is, and how rare it is." In 1986, the Forest Service's Old Growth Definition Task Group, a committee of government and university scientists, concluded that stands of less than eighty acres are ordinarily too small to be viable in the Pacific Northwest. As the climate heats up, it is going to be important to have not only reserves of a viable size but also corridors of forest linking those reserves, so that plants and animals can migrate among different latitudes. The corridors would also allow several small reserves to function as one larger unit. Unfortunately, no such corridors exist, and much of what remains of the an-

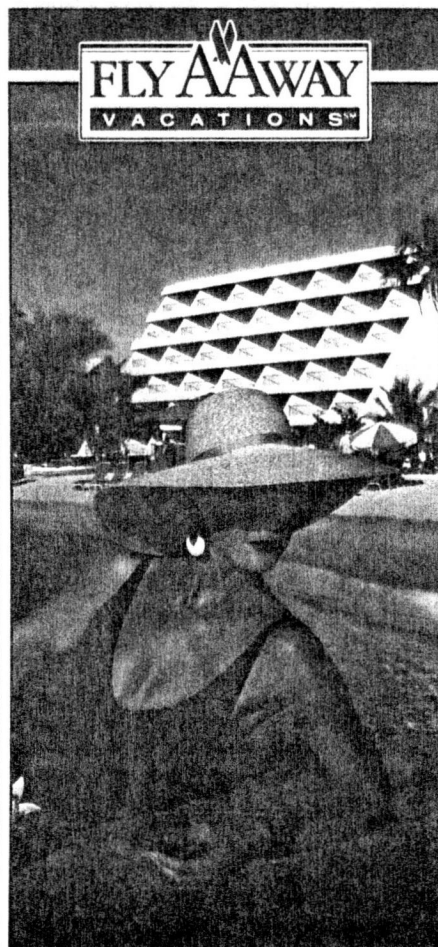


cient forest consists of small, isolated patches surrounded by clear-cuts or bisected by logging roads. The majority of the old-growth patches in the Siuslaw National Forest, in Oregon, for example, consist of less than forty acres.

"It's interesting that we're telling Third World countries, 'Don't cut your forests,' and yet look at the things we're doing here. We're wiping out our fish runs, we're wiping out our biotic diversity; we're sending species to extinction," Andy Kerr, of the Oregon Natural Resources Council, says. "You know, we're not a Third World country. We're not so poor that we have to destroy our ancient forests. And we're not so rich that we can afford to."

Our destruction of the greatest forests remaining on this continent has many consequences, certain to be long-lasting and in some cases irreversible. Fishing, tourism, and recreation are already suffering. It is harder for people who wish to do so to make a subsistence living. An ecological system that we do not yet understand is disappearing. Plant and animal species are being driven to the edge of extinction. Rivers and streams are dying. Drastic changes in our planet's climate are being hastened. In exchange, we are getting wood. But for how long? Instead of waiting the two hundred years it would take for the next generation of trees to produce as much wood as the ancient forest has produced, foresters are trying to speed up growth through the development of better seedlings, through the use of chemical fertilizers and pesticides, and through more intensive care of young trees. By these methods, the foresters figure, an eighty-year-old plantation could produce the same volume of timber as a forest two hundred and fifty, or even five hundred, years old—from thirty to fifty thousand board feet of timber an acre. The plantation trees will not be as big as those of the ancient forest, but there will be more of them per acre. "We know what nature can do, and we're relatively certain that we can do better than nature," George Leonard, the associate chief of the Forest Service, says.

Though the Forest Service insists that its reforestation program is a success, it is difficult to know for certain. The agency's records on reforestation and growth rates are incomplete and, in



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some cases, unreliable. The Forest Service defines reforestation so narrowly that it can claim very high rates of restocking, but these claims may be misleading. In 1988, for example, officials of the Siskiyou National Forest said that more than ninety-nine per cent of the forest's logged-over areas had been replanted to Forest Service standards. But the agency sets standards only for the number of trees planted, not for the number that survive. Thus one area in the Siskiyou National Forest has been reforested to agency standards six times since 1961—and there is every indication that the latest planting will also fail. The agency keeps no records of how fast its plantations are growing, or how robust they are. "The agency doesn't want to know what's happening out there," says Julie Norman, who is president of the board of Headwaters, an Oregon group dedicated to promoting sustainable forestry, and who is an expert on the Forest Service's computer-modeling program.

Forest Service officials often assure the public that the forests of the future will consist of genetically superior trees—vigorous, large, and straight-trunked. But the agency does not breed improved varieties. Rather, it reforests with seeds taken from trees with desirable qualities, and hopes that those qualities will be passed on. It is, of course, impossible to know in advance whether a given trait is genetic or merely the result of circumstances. Intensive management of the national forests did not begin until the nineteen-seventies, and specially selected seeds have been planted on a large scale for just over ten years. The Forest Service has estimated that areas replanted with these seeds will produce ten per cent more timber than ordinary sites. The agency's calculations are based not on data on tree growth from on-the-ground surveys but on assumptions and computer projections. Some foresters have raised questions about the reliability of this estimate, especially since the agency is not attempting to insure that a site is reforested with seeds collected from the locality. Plants adapted to one site may not do well in another whose soil, moisture level, and exposure to sun and shade are different, according to Barry Flamm, who was formerly the supervisor of the Shoshone National Forest, in Idaho, and is now the chief forester for the Wilder-

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I heard its fruity murmur of disease
and cure. I heard the sweet word "sleep,"

which made me thirstier. Did I say it,
or did you? And will I learn
to wave the drink with a goodbye wrist

in conversation, toss it off all bracelet-bare
like more small talk about a small affair?
To begin, I'll claim what I want

is small: the childish hand
of a dream to smooth me over,
a cold sip of water in bed,

your one kiss, never again.
I'll claim I was a girl before this gin,
then beg you for another.

—DEBORAH GOTTLIEB GARRISON

ness Society. "The jury isn't in yet on whether a lot of these so-called improved trees are really improved in terms of timber quality and in terms of survivability over a long period," Flamm says.

The Forest Service's expectation that growth rates will increase is based on two assumptions: not only that intensive management will raise productivity but also that intensive management will be able to continue. Critics charge that since the latter assumption, at least, has not always been justified it makes a mockery of the agency's growth predictions. Herbicide spraying to keep down competing vegetation, for example, has been banned in national forests in Oregon and Washington since 1984. "The agency assumed that

using herbicides would boost the cut by as much as thirty-seven per cent, but the cut hasn't dropped to make up for the fact that they're not spraying—and that they're not meeting their targets for clearing the brush by hand, either," Julie Norman says. In another case, analysts at the Siskiyou National Forest, responding to a request from Oregon's Governor Neil Goldschmidt, raised their estimate of the forest's sustainable harvest level by four million board feet a year on the expectation—which they had previously felt was unjustified—that Congress would give them money for fertilizers.

"It's voodoo forestry," Richard Brown, a resource specialist with the National Wildlife Federation in Portland, says. "Shorter rotations, better seeds—they conjure up all these intangibles that are supposed to enhance future growth. They don't really care if it works. The point is that it provides them with an excuse to cut more big old trees now."

Intensive forestry in the United States has a very short history. Only a few managed forests predate the Second World War. The forest ecologist Chris Maser has written, "I know of



Westman

no nation and no people that have maintained on a sustainable basis, plantation-managed trees beyond three rotations. The famous Black Forest in Europe is a plantation; it and other forests are dying at the end of the third rotation. The eastern pine plantations are dying. It's the end of their third rotation." Barry Flamm says, "It's a justifiable worry that forest productivity will decline."

Up to half the trees in the German and Scandinavian forest plantations are dying. In the mid-nineteen-eighties, the Forest Service detected a twenty-five-per-cent decrease in annual growth rates and a sharp increase in mortality rates in the plantations of the southeastern United States. The damage in both the American and the European plantations has been attributed to acid rain, but Maser hypothesizes that it is partly the consequence of several centuries of intensive management. By deliberately removing "extraneous" material, such as dead logs, from the forest floor, foresters interfere with the "dead-wood" cycle that produces the mycorrhizal fungi without which many trees cannot survive.

Though foresters like to apply agricultural metaphors to their trade, they face a much more difficult and uncertain task than do farmers whose crops mature in six months. First, trees must survive in a world of predators and environmental stresses for decades rather than for months. Second, the nature of the stresses is hard to predict or to guard against. "There are so many variables in the future—climate, insects, acid rain—that it's hard to say whether the second growth will live up to our expectations," Karl Bergsvik, of the Forest Service, says. Jerry Franklin adds, "We just don't know if we can do repeated croppings without serious problems. I think even some of the industrial-oriented people would agree

on that when you backed them into a corner."

Research suggests that one solution is to mimic the natural variety and complexity of the forest—to try to grow forests rather than just trees. "What forestry has traditionally done is make the forest simple," Franklin says. "What we have to learn to do is make the forest diverse." The first step is to change the way we log. "Instead of working all over the forest, concentrate your activity for a decade or two at a time on smaller areas. Cut more of it in terms of percentage of landscape, but then get out, pull out the road system, and leave it alone. And in the cutting itself leave behind a lot of structure—green trees, dead trees, and downed wood." Such an approach would result in man-made clearings that are more like the clearings made by wind and fire, which leave behind "legacies," such as large living and dead trees, rotting logs, organic litter, spores of mycorrhizal fungi, and areas of undisturbed soil, that enable the forest to renew itself. "A diverse forest is more resistant to various kinds of perturbations, less susceptible to insects and diseases," Franklin argues. "It's

likely to be more capable of responding to global climate changes, dealing with environmental stresses of one kind or another. So that simply by having a more diverse forest you increase its ability to resist—and if not to resist, then to recover from—these disturbances, and that also contributes to this idea of sustainable productivity."

THE Forest Service is often criticized for selling timber from national forests at a loss, but the agency points out that, over all, its timber-sales program makes money; it made two hundred and sixty-seven million dollars in 1987. The profitability is largely due to the twelve old-growth forests in Washington, Oregon, and Northern California. Though the cost to the agency of doing surveys and building roads is just as high in the Pacific forests as in the other national forests, the volume of timber per acre in these old-growth forests is so much higher than it is in the rest of the country that sales of their timber are immensely profitable, even at low Forest Service prices. Ninety per cent of the Forest Service's 1987 net timber receipts came from sales in these twelve



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forests, though two-thirds of the timber came from the other hundred and forty-four forests.

Because of a unique arrangement, the Tongass National Forest is the only one of the old-growth forests to lose money on its timber sales. When the Tongass was designated a national forest, in 1907, it was seen as the key to the economic development of southeastern Alaska, but then Forest Service officials labored vainly for decades to get a local pulp industry started. The aftermath of the Second World War revitalized the agency's dreams. In ceding Manchuria to China and Sakhalin Island to the Soviet Union, in 1945, Japan lost almost half its timber resources. Japanese businesses sought to have Alaska make up for those losses, and they were supported by the American military administration that ruled postwar Japan and was looking for ways to rebuild its economy. In 1953, the Japanese agreed to build a pulp mill in Alaska instead of simply taking the raw logs back to Japan for processing. The mill is operated by the Alaska Pulp Corporation, which is a consortium of virtually all the leading Japanese companies that have interests in any aspect of wood processing and trading. At around the same time, the United States government signed a contract to build a mill with the newly formed Ketchikan Pulp Company, which is now owned by Louisiana-Pacific.

In exchange for building the mills, the two companies received fifty-year contracts guaranteeing them timber supplies at extremely low prices. The contracts established what has been called a "duopoly" over two-thirds of the Tongass National Forest's commercial forestland. There is no competitive bidding for this timber; prices are subject to review every five years but can be raised only by agreement between the United States government and the mills. Almost all the timber from the Tongass goes to Japan and other Pacific Rim countries. Sitka spruce, which, along with Western hemlock, dominates the Tongass, is valued by the United States Customs Service at more than seven hundred dollars per thousand board feet. Alaska Pulp currently pays two dollars and twenty-six cents for a thousand board

feet of Sitka spruce, and a dollar and twenty-two cents for a thousand board feet of prized Alaskan cedar. On the average, the company pays a dollar and forty-seven cents for a thousand board feet of Tongass timber. The Forest Service charges more than that for a road map of the Tongass. Ketchikan Pulp's prices are higher: they average just over forty-nine dollars per thousand board feet. Native Alaskans, who control about half a million acres of southeastern Alaska's forest, sell their timber abroad, because they cannot compete with the Forest Service's low prices.

In 1980, Congress set aside about a third of the Tongass as wilderness. The vast majority of the wilderness sites were mountainous areas, mostly rock and ice. Only nine per cent of the high-volume forest was designated wilderness, and the pulp companies were still guaranteed their contractual timber supplies. Nonetheless, Senator Ted Stevens, of Alaska, insisted on an addition to the Alaska National Interest Lands Conservation Act, or ANILCA. Section 705(a) of the act requires the Forest Service to make four hundred and fifty million board feet of Tongass timber available for sale each year, and to spend at least forty million dollars a year building logging roads and preparing timber sales, whether or not anyone wants to buy the timber. A Government Accounting Office report found that between 1980 and 1986 the agency spent a hundred and thirty-one million dollars building roads and preparing timber for sales that never materialized.

The Tongass is the biggest money loser of all the national forests. In some years, the government has lost ninety-nine cents for every dollar it spent on timber programs in the Tongass. Between 1982 and 1988, Tongass timber sales cost the government more than three hundred and fifty million dollars. Though the point of the fifty-year contracts and of ANILCA's Section 705(a) is to create and maintain local jobs, the number of timber jobs in southeastern Alaska has dropped to eighteen hundred from twenty-seven hundred in 1980, largely because of automation and a decline in the Japanese timber market. The Wilderness Society estimates that each remaining job



costs American taxpayers thirty-six thousand dollars a year in subsidies. Southeastern Alaska's main industry is now fishing, which employs twenty-six hundred people directly; recreation-tourism, which employs around two thousand people, is its fastest-growing industry. Both are threatened by the continued logging of the old-growth forest.

In 1981, an independent Alaskan logging company won a suit in federal district court in Seattle, and Ketchikan Pulp and Alaska Pulp were found guilty of conspiracy and restraint of trade. The judge ruled that they had used the advantages their contracts gave them "to control the Alaska timber market, to eliminate competition, and to maintain and exercise monopoly power." A Forest Service review of the case concluded that the agency had lost as much as eighty-three million dollars in its dealings with the two companies. The Forest Service claimed damages against the two companies, and the case was referred to the Justice Department. Ketchikan Pulp settled the claim against it by making minor modifications in its long-term contract

and agreeing to pay a million dollars. Alaska Pulp decided to fight the claim, and in 1987 made a counterclaim, that the Forest Service owed it eighty-three million dollars, because the agency had failed to fulfill a contractual obligation to provide the company with profitable timber. The company had taken exception to recent efforts by the Forest Service to direct logging to areas other than the richest, high-volume parts of the forest, which had borne the brunt of the logging so far. By the time both sides were ready to argue the case, the Justice Department announced that the statute of limitations had run out.

Both companies say that they need the contracts and the low timber prices to stay in business. Environmentalists say that the contracts and the provisions of Section 705(a) that force the Forest Service to build unneeded roads are tearing the heart out of the forest. Bart Koehler, the executive director of the Southeast Alaska Conservation Council, says, "Conservation groups around the country are fighting the Forest Service's multiple-use system. They groan when I tell them that our

ambition in Alaska is just to get to that point—to get the contracts off our back so we can just deal with the same problems that are driving them crazy." The House of Representatives has passed a bill that would terminate the contracts, open Tongass timber sales to competitive bidding, give protection to a million eight hundred thousand acres of important fish-and-wildlife habitat, and stop construction of the Tenakee Springs road. It would also repeal Section 705(a), making the timber harvest and the Forest Service's budget subject to review, as is the case in respect to all the other national forests. The Senate is considering a bill that is much weaker from an environmental viewpoint. The Forest Service opposes the bills, on the ground that contracts with the federal government should be inviolable. The pulp companies say they will sue the government for several billion dollars on a charge of breach of contract if either version of the Tongass Timber Reform Act is enacted.

Even in the lower forty-eight states, where there are no long-term contracts, the Forest Service does not attempt to charge for its timber what it

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costs to produce it or will cost to replace it; instead, the agency charges what it estimates the buyer can afford to pay. It calculates the selling price for the finished product—lumber, plywood, or pulp—subtracts the cutting, transporting, and manufacturing costs, and then takes off a ten-per-cent profit margin. The remainder is what the Forest Service charges. If there are several prospective buyers, the price may be bid up, but often there is only one bidder. Because the Forest Service is such an important source of timber on the domestic market, private companies are forced to charge lower prices, too. Many small-woodlot owners choose to leave their timber standing rather than sell it so cheap, and their decision further restricts the amount of timber available to domestic mills.

In the past seven years, civil disobedience has become increasingly common as a way of protesting threats to the forest. Protesters have blockaded logging roads with fallen trees, boulders, and their own bodies; buried themselves up to their necks in the paths of advancing bulldozers, and suspended themselves from trees, dangling a hundred feet off the ground for days at a time. Less frequently, they have engaged in controversial acts of sabotage, ranging from pouring sugar into the gasoline tanks of logging trucks, to disabling bulldozers, to rendering trees worthless—and dangerous—for milling by driving six-inch-long iron spikes into them. In most cases, however, protesters have been able only to delay or publicize the objects of their protests.

It is in British Columbia, where critics of the province's forest management have little access to information, no right of administrative appeal, and no recourse to the courts, that civil disobedience has been most effective. One reason is the alliance between environmentalists and the province's native groups, most of whom, never having signed treaties with the government, maintain claims to their traditional lands, which compose the bulk of the province. In 1987, Canada designated over three hundred and fifty thousand forested acres of South Moresby, the southern fifteen per cent of the Queen Charlotte Islands, as a national-park reserve. The declaration capped a thirteen-year struggle to stop Western Forest Products from logging South Moresby. The effort had gained

national attention in 1985, when seventy-two Haida Indians were arrested for blockading a logging road. Hundreds of thousands of people wrote to the federal government in support of a national park. When William Vander Zalm, the premier of British Columbia, turned down a federal offer to pay the province a hundred and six million dollars in compensation for the land, he received almost thirty thousand telegrams in one week.

Meares Island, in Clayoquot Sound, off the west coast of Vancouver Island, is small and still largely unlogged. Two mountains, cloaked by the ancient forest, dominate the island and the coastal landscape for miles around. Eagles nest in huge spruces; black bears hibernate in the cavities of dead cedars; otters and mink live along the tree-sheltered shoreline; cougars and wolves hunt in the island's forests; scores of species of ducks and other waterfowl search for food in one of western Canada's largest mud flats; and sea lions, harbor porpoises, and gray and killer whales feed and swim offshore. For centuries, this rich land has been home to the Clayoquot and the Ahousat people. Opitsaht, a village on the island, has been continuously inhabited for more than five thousand years. The native people have challenged the legitimacy of the tree-farm licenses under which MacMillan Bloedel and another logging company, Fletcher Challenge, control virtually the whole island. In April of 1984, the Clayoquots proclaimed Meares Island a tribal park. In the autumn of that year, when a boatload of MacMillan Bloedel loggers came to Meares to begin cutting, they were met by a flotilla of boats and crowds of protesters on the beaches. The loggers departed and the dispute went to the courts. "We stood guard on the island for

six months, taking turns according to who could take time off from work or be away from their family," Steve Lawson, a commercial fisherman and tour-boat operator who lives on a neighboring island, says. "We were out in the water at dawn every day. At least twenty people, and sometimes as many as three hundred." The following spring, British Columbia's Court of Appeal enjoined logging on the island until the native land claim is settled.

LOU GOLD once taught political science at Oberlin College and at the University of Illinois. Now he is a part-time hermit and a full-time advocate for an ancient-forest national park. Gold went to southwestern Oregon in 1982 to visit friends who live near the Siskiyou National Forest. By the following spring, he had been jailed for taking part in a protest against a logging road being built to Bald Mountain, a place Gold had never seen. Environmentalists objected to the road because it would break up the largest unprotected area of virgin forest in the continental United States—an area that they believe should be a national park.

Gold now spends four months of each year living on Bald Mountain, clearing up the considerable mess that fire-lookout stations have left behind. The rest of the year he travels around the United States giving slide shows about Bald Mountain and the Siskiyou Mountains and gathering support for ancient forests and for the plan to turn most of the Siskiyou National Forest into a national park. Forest Service officials have remarked that they can follow Gold's progress across the country by the postmarks on the letters they receive from citizens complaining about their plans to log the Siskiyous and to build almost five hundred miles of roads in an area fifty miles long and twenty-five miles wide.

The Siskiyou Mountains are the northern extension of what the writer David Rains Wallace calls the Klamath Knot, a complex of ranges which straddles the California-Oregon border and includes the Trinity Alps and the Marble Mountains. The Siskiyou is the oldest range west of the Rockies—two hundred million years old in some parts. Unlike most of this continent's mountain ranges, the Siskiyou has an east-west orientation. It links



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the coastal mountains with the Cascades and the Sierra Nevadas, to the east. The links with so many different ecological communities make the Siskiyou a center for diversity and a source of adaptation for future changes. "It's an area where there's a lot of evolution going on, because there's so much material able to come in and migrate out," Tom Atzet, the Forest Service's ecologist for the area, says. In botanical wealth and diversity, it is rivalled in North America only by the Great Smoky Mountains. The Siskiyou is the major center of plant evolution west of the Mississippi; it contains more than a hundred plant species listed as rare or sensitive by the Forest Service, and is the only meeting point for southern species such as redwoods, and northern species such as Alaska yellow cedar. Dave Willis, a moving force in the national-park campaign, says, "If there is any place in the country that deserves to be a national park, and that needs the protection of being a national park, this is it." Last summer, I accompanied Willis to the Siskiyou.

The botanical richness was evident everywhere as Willis and I made our way on horseback to Bald Mountain. I was on horseback because of my deep aversion to carrying heavy packs up steep mountain slopes. Willis rode because thirteen years ago, while climbing Mt. McKinley, he lost his hands and feet to frostbite. The injury makes it difficult for him to walk more than a few hundred feet at a time, though he still manages to ride, rock-climb, and lead wilderness treks for a living. The forest changed as we moved uphill. We started off in a riparian forest that is home to one of the rarest and most valuable trees in the world, the Port Orford cedar. As we began to climb, we entered a strange forest of stunted pines and hardwoods, and towering Douglas firs, a combination unique to the Siskiyou area. Farther on, we passed through a lovely tan-oak-and-madrone forest whose slender trunks and dappled shade remind one of an English beech forest; finally, we reached the great Douglas-fir forest that crowns Bald Mountain. The mountain itself is the high point of a forested ridge, three thousand feet above the Illinois River, that is dotted with lovely meadows—"prairies" in the local argot. These prairies are among the most beautiful spots on

earth, surrounded by gracefully drooping Douglas firs whose lower branches gently brush the deep-green grasses. In these islands of sunlight, flowers bloom in a profusion that I haven't seen in almost twenty years of botanizing here and abroad: bearded mariposa lilies; orange-spotted leopard lilies; blue irises; and scores of blue, yellow, and pink flowers that I couldn't name.

In the summer of 1987, a fierce lightning storm started dozens of fires all over the Klamath Mountains, including several that raged across almost a hundred thousand acres of Bald Mountain, destroying some groves, merely scorching the trunks of others, and completely bypassing still others. Fire is a part of the natural cycle in these forests, and two years later much of the burned area was beginning to recover. The blockades of the Bald Mountain logging road in which both Lou Gold and Dave Willis took part had succeeded in slowing construction, but by July of 1983, when a judge decided that the road was illegal, about half of it had been built. After the fires, the Forest Service announced plans to complete the road so that close to ten thousand acres of trees in fire-damaged areas could be logged. Environmentalists argued that the forest should be left to heal itself—that logging and road building would damage an already stressed ecosystem—but they succeeded only in reducing the planned eight-mile extension to a mile. The logging operation was proceeding at full steam last summer, using helicopters to winch trees, including a good proportion of healthy trees, out from roadless areas. "It's like mugging a burn victim," Gold said.

IN the United States, the future of the ancient forest is now being decided largely in the courts, where a symbiotic relationship has developed between government scientists and critics of the government. "It was the advocacy groups' picking up on the science and using it in their lawsuits that really brought us out of the closet," Jerry Franklin said last year. "If it weren't for them, I suspect, we'd still be in our ivory tower, shouting out the window with nobody paying any attention."

These lawsuits, which focussed on establishing the ecological value or vulnerability of individual sites scheduled for logging or road building, had

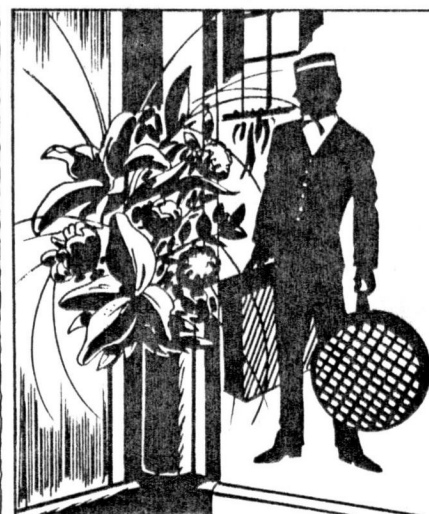
mixed success. But as the ancient forest continued to dwindle a new element entered the equation—the northern spotted owl, whose habitat is the old-growth forest. In the early eighties, researchers in the Forest Service, the Fish and Wildlife Service, and academic institutions established that the northern spotted owl was nearing extinction, and that further destruction of its habitat posed a threat to its survival. In 1987, environmentalists filed the first of three spotted-owl lawsuits. Those suits dramatically changed the clash over forest resources. For the first time, the courts were being asked to rule not on just one stand of trees but on large areas of old-growth, stretching across many national forests. The Sierra Club Legal Defense Fund filed the suits for various coalitions of plaintiffs, including *Strix occidentalis caurina*, the northern spotted owl itself.

In *Northern Spotted Owl v. Hodel*, twenty-five environmental groups joined the owl in challenging the Fish and Wildlife Service's refusal to list it as threatened or endangered under the Endangered Species Act. In 1988, the federal district court in Seattle ordered Fish and Wildlife to reconsider its decision that the owl was not threatened or endangered, saying that "expert opinion is to the contrary." The environmentalists won their point in the spring of 1989, when the Fish and Wildlife Service proposed to list the spotted owl as a threatened species—a category that requires special protection of its habitat. As yet, the spotted owl has not been listed; the Fish and Wildlife Service can take up to eighteen months to complete the process.

In the two related cases, environmentalists argued that the Bureau of Land Management in western Oregon and the Forest Service in Oregon and Washington had acted illegally in allowing timber to be cut from public forests without properly considering the impact that logging would have on the spotted owl. In the B.L.M. case, the judge found that the bureau's refusal to consider logging's impact on the owl was "arbitrary and capricious," but the case was dismissed as moot in December of 1989, because of a Congressional ban on judicial review

of the bureau's timber-management plans. A series of injunctions issued in the case had prevented logging in western Oregon for nearly two years. In the Forest Service case, the federal district court in Seattle enjoined the disputed timber sales in March of 1989 until that case could be fully heard. That ruling halted about a billion board feet of timber sales, and a subsequent decision by the Forest Service to postpone for the same period all timber sales in spotted-owl habitat roughly doubled that amount. The injunction was lifted in November, after Congress placed further restrictions on judicial review of Forest Service and B.L.M. actions. Both of these cases are now on appeal by the environmentalists to the Ninth Circuit Court of Appeals, in San Francisco.

One company affected by the spotted-owl lawsuits is Dahlstrom Lumber, in Hoquiam, a once-thriving mill town on Washington's Olympic Peninsula. The mills in Hoquiam and the surrounding towns depend on old-growth trees from the Olympic National Forest—an important home for the northern spotted owl. Monte and Kirk Dahlstrom are a good-natured, easygoing pair of brothers. They built their mills—a lumber mill and a veneer mill—themselves, financed by a Small Business Administration loan and second mortgages. Dahlstrom Lumber began operating in 1980. When the business is running at full capacity, it employs nineteen people directly and thirty through logging and trucking contractors. In addition, several hundred jobs depend in part on the lumber that Dahlstrom supplies to other factories. The Dahlstroms' sawmill and veneer plants require seven million and three million board feet of timber a year, respectively. They use nothing but old-growth hemlock from the national forests. "We bid only on the biggest timber," Kirk says. Sixty per cent of the lumber they cut is shipped to other mills in the United States, to be made into high-quality window frames, doors, and moldings. Twenty per cent is sent to Japan, for use in construction work. And twenty per cent is barely processed—just squared off into what are known in the industry as "cants"—and sent to Japan to be made into veneers, glued onto a ply-



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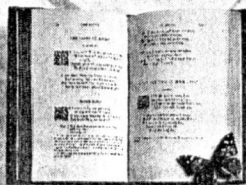
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wood backing that originated as tropical hardwoods in Indonesia, and sent back to the United States as flooring. The veneer that the Dahlstroms make goes to a box factory in the United States and is applied to boxes for fruit, mostly kiwis and grapes. Old-growth veneer is used for this mundane purpose because it can stand up to the extended cold conditions under which the fruit is stored and shipped.

The moves to increase protection of the spotted owl have seriously threatened the Dahlstroms' timber supply. In January of 1989, the Forest Service announced that because certain lands were to be set aside as spotted-owl habitat, timber sales in the Olympic National Forest's Quinault Ranger District, which supplies the local mills, would be reduced to forty-two million board feet in 1989—less than half of what the service had been selling—and that future sales would drop to thirty million board feet a year. Despite that squeeze, the Dahlstroms felt that they could go on, though they would have to close the veneer plant to do so. They had a year's stockpile of timber, and they were high bidders on a timber sale, called the Canyon sale, that would keep them in business for a second year. But the Canyon sale was in spotted-owl habitat, so it was halted by the Forest Service—case injunction in the spring of 1989, as was virtually every other timber sale in the Quinault Ranger District. I visited the Dahlstrom brothers shortly after they learned that the Canyon sale had been cancelled, and they were still in a state of shock.

"All the value that we thought we were adding in expanding the mill—they just took it away with those injunctions," Kirk said. "But the point is, they're trying to take my way of life away. This is more than a business; it's my life." Both brothers contend that preservationists—as environmentalists are called around here—are outsiders who are toying with important local resources. "It's a living to me; it's a hobby to them," Kirk said. "My fight is supported by people in my community who know the situation. Theirs is supported by people in Boston, New York, Los Angeles, and Seattle, who don't understand. They want to live in a city, have all the advantages of living and working in the city, and play where I work, where I live." Casting a

derisive eye at my notebook, he went on, "You know, this country can't survive on writers and computer punchers. It needs to use our natural resources, use them productively."

One of the Dahlstroms' biggest worries was having to fire workers. Closing the veneer plant meant laying off five people. "I have a good crew," Monte said. "I've got great guys. But a lot of them can hardly read and write. If we close, and the other local mills do, there's no place for these guys.

Kirk and I won't starve—we'll be able to do something else—but what are they going to do?"

Kirk said that his worries about the business and the men who depended on him were putting him through

"a mental anguish you can't believe." The idea, often proposed by environmentalists, of retraining for loggers and other workers in the old-growth-timber industry was met with contempt by both brothers.

"Don't insult me with low-interest loans," Monte said. "I don't want welfare. Just give me a timber supply."

Senator Mark Hatfield, of Oregon, came to the rescue of the Dahlstroms and the rest of the Northwest timber industry by inserting a clause in the 1990 federal appropriations bill which overruled the court injunction on the sale of timber from spotted-owl habitat. The clause required the Forest Service to release more than a billion board feet of timber from spotted-owl habitat for sale. The Canyon sale was one of those released. "The Canyon sale will get us through 1990," Kirk Dahlstrom told me earlier this year. "After that, though, we're not confident. We no longer have any faith in the federal government's promises." Pressure on the lands that supply the Dahlstroms' timber will increase because of a federal interagency report released last month, which concluded that the northern spotted owl is "imperilled over significant portions of its range," and called for three million acres of federal forestland to be withdrawn from logging in order to protect the owl's habitat.

As far as loggers, millworkers, and others in the timber industry are concerned, the issue is a simple one: jobs versus owls. The anger and fear of the threatened workers are reflected in the black humor of bumper stickers saying

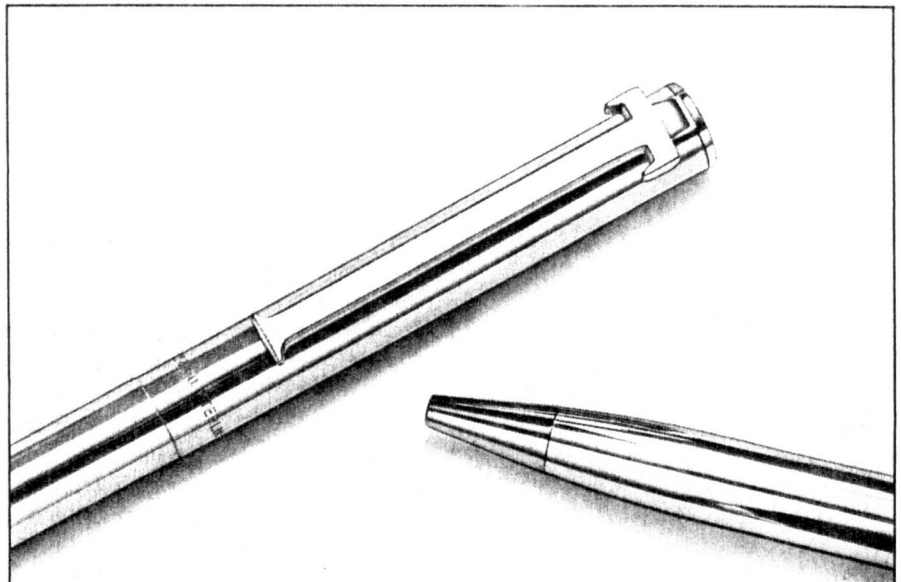


"SAVE A LOGGER, KILL AN OWL" and T-shirts emblazoned with the motto "I ♥ spotted owls . . . barbecued, fricasseed, baked, stir-fried." One mill-owner showed me a spotted-owl joke that had come through on his fax machine: "What's the difference between a spotted owl and a logger? A spotted owl can still make a small deposit on a new pickup."

The northern spotted owl lives only in Northern California, Oregon, and Washington, but it has become a symbol to timber workers everywhere who are fearful of losing their jobs. In imploring a Senate panel meeting in Sitka, Alaska, not to cancel the pulp mills' monopolies in the Tongass National Forest, John Parton, a logger for the Alaska Pulp Corporation, compared himself with the owl. "I, too, am an endangered species," he said. "I am . . . a Pacific Northwest logger. Will you give my mate and I thousands of acres of timberland, for that is what I, too, need to survive." All through the Pacific Northwest, loggers and others in the timber industry are holding rallies, marches, and "spotted-owl barbecues"—often with their employers footing the bill—to protest the threat to their jobs.

The timber industry in the Northwest has been suffering for years, however. Its problems predate public concern about ancient forests or the spotted owl. Throughout the region, mills—especially mills that depend on big, old trees—have been closing down. Some towns, such as Westfir, Oregon, that were founded on timber and until recently thrived on it have lost all their mills. Oregon's Department of Employment has reported that between 1977 and 1987 the state lost more than twelve thousand jobs in logging and wood processing, and that its timber industry now provides only about five per cent of Oregon's jobs. As other industries—notably tourism, now No. 3 in Oregon—pick up the slack, timber is losing some of its political clout in the region. Nevertheless, David Mumper, a timberlands resource manager at Weyerhaeuser, recently said of Washington State's growing population, "I look at it as twenty thousand people a year moving into the state that have no use for us, because our industry's not growing. Politically, the people in this state could kill us."

The reason for the job losses is not a shortage of timber from national for-

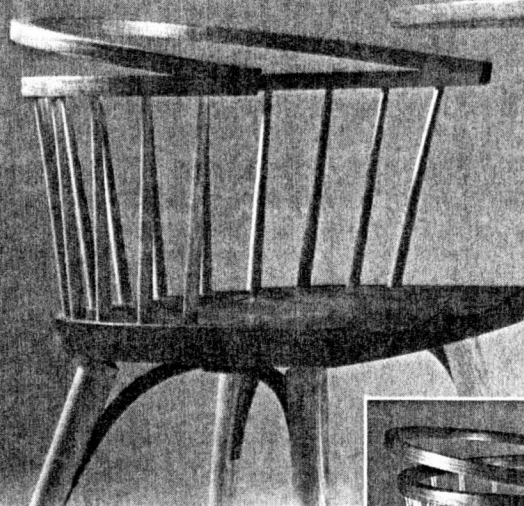


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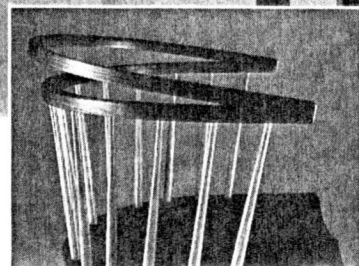
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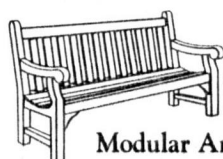
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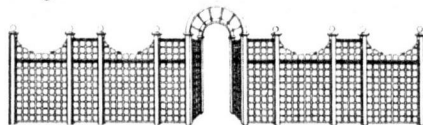
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ests; in fact, figures from Oregon's Departments of Employment and Forestry show that the amount of timber taken from the state's national forests has increased as jobs have disappeared. Oregon's fifteen-per-cent drop in logging and processing jobs accompanied a sixteen-per-cent increase in wood taken from the national forests. The main reason for the job decline is growing automation of the timber industry. In 1977, for example, it took 10.12 workers to process a million board feet of wood. Ten years later, only 8.2 workers were required to handle that amount—a rise of almost twenty per cent in worker productivity. As automation has reduced the number of jobs, “management has been able to extract some pretty strong concessions, including twenty-five-per-cent pay cuts from union members,” says Jeffrey Olson, a former economist for Boise Cascade who now works for the Wilderness Society. Instead of pinning responsibility for pay cuts and lost jobs on their own modernization programs or on overcutting of the industry's own lands, managers have encouraged the notion that those problems result from environmentalists' demands to “lock up the forest.”

Unlike the United States Forest Service, British Columbia's forest service makes no pretense of managing its public forests equally for timber and for other uses. The single goal of its timber management is to create a prosperous timber economy. Instead, by allowing overcutting, it has contributed to the destabilization of the timber industry. In the past decade, jobs in the province's timber industry have declined by twenty-five per cent, partly because of automation, partly because of a slump in the market, and partly because in some areas old-growth timber has run out. “It was a social contract,” Cameron Young, the author of “The Forests of British Columbia,” says. He explains, “The companies were given free access to public forestland. In return, they provided work and healthy economies. If there were no more fish in a stream, there was always another stream. If a forest was destroyed, there were always more forests. No one complained. But the social contract has been abrogated. Employment has declined even

though they are cutting more and more wood.”

Formerly prosperous mill towns in the province, such as Nanaimo and Chemainus, have turned to other sources of revenue, from sponsoring International Hell's Angels conventions and bathtub races to covering the town's walls with murals of the glory days of logging. The layoffs have come at the same time that timber companies have been making record profits. “Woodworkers accept that this is a cyclical industry, but this is the first time we've been losing jobs at the top of the cycle,” Lyn Kistner, a union official, told the *Toronto Globe & Mail* a year ago. In the early nineteen-eighties, when timber companies were losing money because of a slump in the timber market, British Columbia's forest service adopted a policy known as sympathetic administration, under which standards for environmental protection, road engineering, timber waste, and other such activities were lowered to save the companies money. “The focus was on turning a profit,” Norm Godfrey says. “So the forest service set aside a lot of things they'd wanted us to do, to let us make a profit.” It worked. A combination of sympathetic administration and a layoff of several thousand workers enabled MacMillan Bloedel, which had lost money from 1982 to 1985, to turn record profits, of two hundred and eighty-one million dollars in 1987 and three hundred and thirty million in 1988.



Many mills, like the Dahlstroms', are geared to process only trees at least two and a half feet in diameter, but those trees are almost gone. They are already gone from private lands, and once the public forests are cut down there will be no more big trees, ever. The hundred-and-fifty-to-two-hundred-year rotations needed to produce large-diameter trees are no longer economically feasible. Private companies, unable to afford long-term investments, are planning to cut their next generations of trees when they are only forty years old, or even only twenty-five, in the south. A few private timber companies—notably Medco, in Oregon; Plum Creek, in Washington; and California's Pacific Lumber, which owns the largest privately held virgin redwood forest—once tried to main-

tain long rotations by logging their lands slowly and selectively, but in today's market their large stocks of uncut trees are seen as underutilized assets, which should be cashed in. Two of these companies have recently been the subjects of leveraged buyouts by companies that plan to liquidate their timber resources as quickly as possible, in order to pay their debts, and the third is also getting rid of its timber, in an effort to prevent a takeover. Even the Forest Service, which originally planned rotations of a hundred and twenty to a hundred and fifty years in these forests, now plans to cut second-growth trees much earlier; according to the final management plans, some second-growth stands will be cut at sixty years in the Siuslaw National Forest and at seventy-five years in the Siskiyou. Shorter rotations are also planned in British Columbia. Older mills that do not retool will close; those which do install modern equipment will need fewer workers. Either way, the number of jobs in the timber industry will fall.

RIGHT now, most old-growth wood is used wastefully: centuries-old Douglas firs are cut into two-by-fours and used to frame our houses; rare cedar planks are nailed into molds for poured concrete and then thrown away; ancient hemlocks are pulped and converted into rayon or cellophane, wrapping paper or disposable diapers. "That's just plain wrong," Bart Koehler, of the Southeast Alaska Conservation Council, says. "When a four-hundred-year-old tree ends up on some baby's ass, it's an insult to all that's good and right with the world."

Fast-growing, coarse-grained, knotty wood from plantations can do many of the jobs now being done by wood from the ancient forests. But products that require high-quality wood—fine furniture, wooden boats, musical instruments, and more plebeian objects, like door and window frames—will become luxury items or disappear altogether. "Composite materials will take the place of solid wood," William Banzhaf, of the Society of American Foresters, says.

Environmentalists argue that the public forests are being exhausted to compensate for the industry's abuse of its own lands and its abandonment of domestic mills in favor of more profit-

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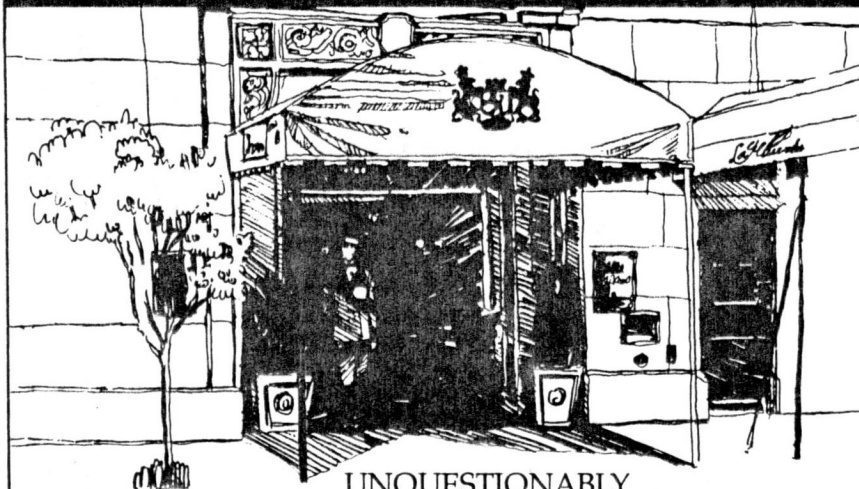
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able deals overseas. Less and less timber is coming from private lands, which have been crippled by overcutting. Thus more and more of the burden of supplying industry with timber is falling on public lands. Between 1977 and 1987, the amount of timber coming from private land in Oregon declined by almost nine per cent. In an effort to make up the shortfall, the timber harvest from public lands in the state was increased by thirteen per cent during that period. In 1987, public lands supplied sixty per cent of Oregon's timber cut, compared with fifty-four per cent ten years earlier.

Much of the Northwest's private forestlands are in the hands of a few large, integrated companies, such as Weyerhaeuser, Simpson Timber, and Boise Cascade. As mills are shutting—and mill towns are dying—for lack of timber, the giant companies are sending much of their timber overseas without processing it. Many are selling or closing their own mills to concentrate on the export market, where prices are fifteen to forty per cent higher than they are in the domestic market. Thus Japan, Korea, and Taiwan, rather than local economies, get the jobs, and the added value when the processed wood is sold, often back to the United States.

In 1988, three billion seven hundred million board feet of raw logs were exported from Oregon and Washington—a quarter of the total cut in those two states. Some of the exported logs are from national forests, even though federal regulations forbid exports of unprocessed wood from national forests or from land controlled by the Bureau of Land Management. The ban was imposed in 1968 to insure that federal forests provide raw materials for local companies, not foreign ones, but loopholes in the ban allow some large landowners to ship timber from their own lands overseas and feed their sawmills with federal timber—a process called substitution.

The Senate has passed a bill introduced by Robert Packwood, of Oregon, that would make the ban on federal log exports permanent and close the loopholes that allow substitution. The Bush Administration, on the other hand, has proposed to end the ban on the export of raw logs from federal lands. No other major wood-producing country allows the unrestricted export of unprocessed wood.



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Even Third World countries such as Indonesia, Thailand, Malaysia, and the Philippines set strict limits. Canada has virtually halted exports of unprocessed logs, by imposing a heavy tariff on them and requiring that the exporters prove that the logs are not needed in Canada. "We are the last nation on earth that allows the unfettered export of raw logs," says Oregon's Representative Peter DeFazio, who has introduced a bill to allow states to ban the export of logs from their lands. "The Weyerhaeuser Company and others are getting very rich by selling our heritage to the Japanese, and they don't want things to change. It's easy money for them. It's very profitable and much simpler than running a mill, and, in fact, their recent pattern of mill closures shows that in many cases they'd prefer to close mills and continue exporting logs than make the capital investment to update the mills."

THE guidelines set forth in the 1976 National Forest Management Act were supposed to enable the Forest Service to resolve conflicting demands on the nation's forests. The conflicts have only intensified, however, and the courts have become the main arbiters of forest policy. Environmentalists, the timber industry, scientists, and politicians are all saying that Congress must step in. "The prospect is of the courts' essentially dictating and managing the forests," Peter DeFazio says. "I think we're close to the point where the policymakers are going to have to roll up their sleeves and get back into the middle of this debate."

Andy Kerr, of the Oregon Natural Resources Council, agrees. "In 1976, when Congress confronted the fact that our forest policy was out of synch with public feelings, it lateraled," he says. "It just handed off to the Forest Service. It passed a law that let the Forest Service make all the tough choices. So it's telling the Forest Service, 'Cut a lot of timber and have a lot of everything else, too.' We are now at a point where there are conflicts that Congress alone can resolve."

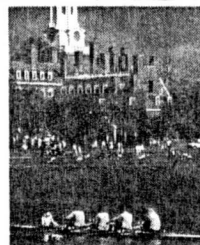
Many in the Forest Service would welcome a clearer directive from Congress. "We'll manage the national forests of the United States however the citizens of the United States want us to," Douglas MacWilliams, the forest

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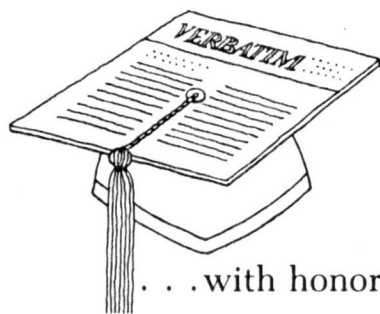
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supervisor of the Mt. Baker-Snoqualmie National Forest, says. "We don't own them. We're managing them in trust for the people of the United States, but the people of the United States are giving us conflicting advice about how they want them managed."

Probably the strongest congressional supporter of continued high levels of cutting from public forests is Oregon's Senator Hatfield, a liberal Republican with an excellent record on all environmental issues except those which intersect with forest policy. Hatfield is certainly the politician most feared and detested by ancient-forest advocates. Since 1980, Hatfield, the ranking minority member of the Appropriations Committee, and Republican Senator James McClure, of Idaho, another influential member of the committee from a big timber state, have succeeded in getting Congress to direct the Forest Service to cut more timber than it had planned to.

Hatfield has also unsheathed a new, powerful, and highly controversial weapon to prevent environmentalists from challenging the Forest Service in court. Since 1985, he has loaded appropriations bills with numerous riders that restrict citizens' ability to appeal to the courts. The first such rider concerned the Mapleton Ranger District, in the Siuslaw National Forest. In response to a lawsuit charging that logging had destroyed half the salmon and steelhead habitat in the district, a judge had enjoined all timber sales there until the Forest Service completed the management plan required by the National Forest Management Act. Hatfield attached a rider to the fiscal-year-1986 appropriations bill which allowed some timber sales to go ahead. A subsequent rider, extending the exemptions from the judge's decree, stated that the draft forest plan "shall be treated as satisfying all requirements of the National Environmental Policy Act . . . and the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act . . . and shall not be subject to administrative or judicial review for compliance with such acts."

The right to appeal federal land-management decisions is not a constitutional right but one created by Congress. Measures to limit judicial review have been used mainly to protect the



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national security. Increasingly, however, they are being used to override the laws designed to protect the environment. In a letter to his constituents Hatfield explained that his riders "are intended to mitigate the unacceptable economic disruption that would result if entire areas of the state were denied access to national-forest timber." The American Civil Liberties Union has joined environmentalists in protesting the use of riders to limit a citizen's ability to appeal to the courts.

Because the riders are attached to appropriations bills, which expire after a year, they must be renewed annually. So far, all of them have been, partly because few members of Congress or their staffs are aware of these brief amendments to appropriations bills that are several hundred pages long, and partly because Congress is a great respecter of local interests. Until recently, national-forest matters have been considered local issues, and in local issues Congress generally goes along with the representatives of the state or the region concerned. Gradually, however, national forests are becoming a national issue. "The old-growth forests are like Yellowstone or the Everglades or the Grand Canyon," Representative Jim Jontz, of Indiana, says. "Nobody would argue that just the people in Arizona should have something to say about the Grand Canyon."

Environmentalists argue that the prospect of economic dislocation should not hinder attempts to reform the timber industry and the management of the national forests. "When you have a war between nations, you don't refuse peace just because it might cause unemployment among soldiers," Lou Gold says. "And that's what we've got. We've been waging war on nature for a long time. It's time to declare peace with nature. We're going to have problems making the transition, but it's ridiculous not to end a bad practice because doing so would cause unemployment."

The "bad practice"—liquidating the ancient forest—will end when the forest is gone. And when it has ended, a large part of the timber industry will suffer and will need help in adjusting to the new reality. The shortages and the suffering have already begun. The fate of the whales and of the whaling industry presented the world with a similar problem. The question was a

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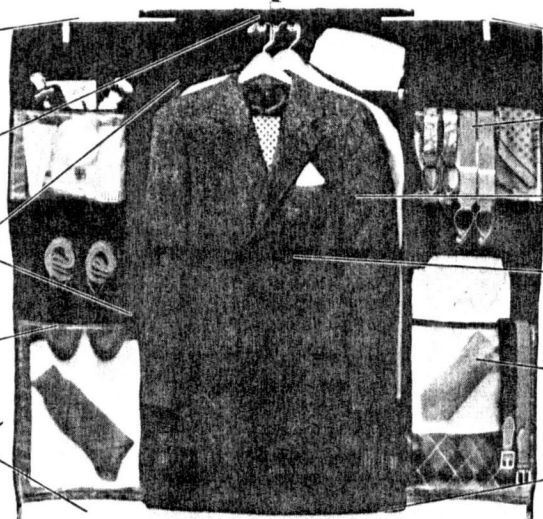
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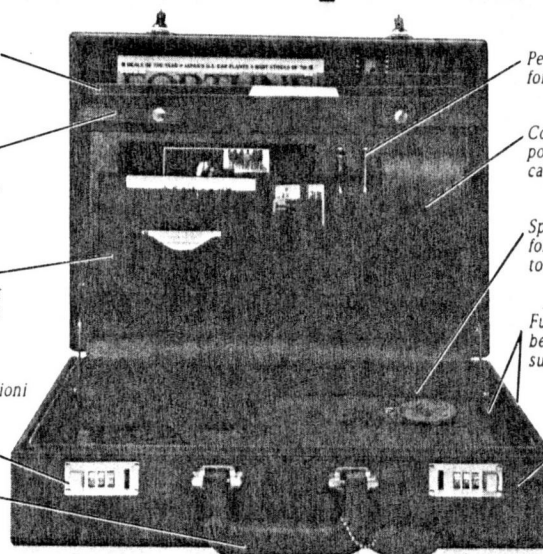
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simple one: Should a species be exterminated to postpone the inevitable collapse of the whaling industry? The choice we now face is less extreme. Unlike the whaling industry, the timber industry is not doomed; change, not death, is inevitable. The question for us now is: Shall we destroy our ancient forests to postpone this change for a few years?

The battle to preserve what remains of our ancient forests is not driven by science or economics or an abstract respect for natural systems, though all those do play a role. It is driven primarily by passion for a place. Across the Pacific region, people have fought to save their patch of forest—the one they live near, the one they know, the one they walk in or camp in, the one that overlooks their town, the one they see every day. What has now come to be referred to as "the ancient-forest movement" was not started by professional environmentalists in Washington, D.C., for some theoretical or bureaucratic reason. It was started and is being carried on by scores of local groups, such as the Friends of Clayoquot Sound, the Cathedral Forest Action Group, the Save Opal Creek Council, the Northcoast Environmental Center, and the Quilcene Ancient Forest Coalition. Behind the groups are people who live in towns like Tenakee Springs, Alaska; Tofino, British Columbia; Arcata, California; Galice, Oregon; and Bellingham, Washington. They are people with jobs and children, with ordinary lives.

"Most people are shocked to find that this is going on—to find that there's *any* cutting in national forests, much less clear-cutting," Lou Gold has said. "If you look at any road map, you're gonna see these big green areas all over the West—national forest this, national forest that. People think that means these are protected forests, like national parks. And if you come out and drive through these forests it's still not likely you're going to find out what's going on, because of the 'scenic protection'—a fringe of trees along the highway, so that drivers don't have to see anything ugly. Ask yourself who that scenic protection is for—you or the Forest Service. They're hiding what they're doing, and that's because they know that the American people would be furious if they learned what was happening back there."

—CATHERINE CAUFIELD