



C. Webb/Western Canada Wilderness Committee

## New life for old forest

As loggers and environmentalists battle over North America's ancient forests, a new philosophy is emerging. Canadian scientists are rewriting the ecological rules, with far-reaching consequences for the forestry of the future

Leigh Dayton

**T**HE NORTHERN spotted owl is small as owls go. Weighing little more than 600 grams and standing less than half a metre tall, the physical size of the bird is overshadowed by its imposing political stature. For the mottled brown owl has become a symbol, a cause célèbre and the star of a drama set in the majestic coniferous forests of America's Pacific northwest.

The spotted owl gained its exalted status in July this year, when the US government declared it a "threatened" species. The designation was made after wildlife biologists demonstrated conclusively that the bird can survive only in the old growth forests of northern California, Oregon, Washington and southern British Columbia. And biologists working for the US Forest Service found that one pair of owls needs as much as 900 hectares of ancient forest to thrive and raise their young. Under the 1973 US Endangered Species Act, a plant or animal that has been officially "listed" must be given stringent protection. A comprehensive strategy to preserve the owl is soon to go before Congress for approval. There is no doubt that the plan will reduce drastically the amount of logging allowed on federal lands.

Clearly, the northern spotted owl has ruffled the feathers of the powerful forest industry. Jim Geisinger, president of the Northwest Forestry Association, predicts dire economic

consequences, including the loss of 100 000 jobs over the next 10 years, if the industry is barred from logging the owl's habitat. The loggers believe it is they, not the northern spotted owl, who are endangered.

Environmentalists, on the other hand, are claiming the designation as a victory in their battle to save North America's virgin forests from the logger's chainsaw. The owl is an indicator species: it reflects the health of the forest. By saving habitat for the bird, irreplaceable forests and their inhabitants are preserved for all time, says Andy Stahl, a resource analyst with the Sierra Club Legal Defense Fund in Seattle.

The battle lines are sharply drawn: greens versus loggers. But between these two a new group is emerging. Members of this group are scientists who are quietly rewriting the ecological rules of the forest. Over the past decade they have developed a fuller understanding of what an old growth forest is, what makes it tick, and its complex role in the environment. These scientists believe their work can help to determine how much old growth remains in North America and the best way to manage it. They hope that a scientific approach to the problem will lead to new ways of thinking about forests generally. Because the war rages across the continent, although the battle is thickest in spotted owl country. At stake are the last stands of ancient forest in North America.

*Wise and exalted: the northern spotted owl (left) may have ruffled a few feathers among Northwest American loggers, but the battle for primeval forest (centre) extends across the continent*



E. Orians



When Europeans first stepped ashore on the east coast of North America they gazed upon a seemingly endless blanket of primeval forest. Hardwood and white pines stretched south from what is now Canada to the liveoaks, cypress and pines of the American southeast. In the far north, the pine forests gave way to the taiga of the subarctic which reached across the continent to meet the Douglas firs, hemlocks, spruce and redwoods that swept down the Pacific coast. High in the Rocky Mountains were vast stands of spruce, lodgepole pine and alpine pine. Settlers kept few records and researchers are only beginning to reconstruct a picture of those virgin forests. So it is difficult to estimate how much native woodland has been lost, says Ken Lertzman, an ecologist at Simon Fraser University in Vancouver. His "best guess" is that two-thirds of Canada's original forests are gone. Across the border in the US, the Wilderness Society calculates that 95 per cent of America's original forest has been logged.

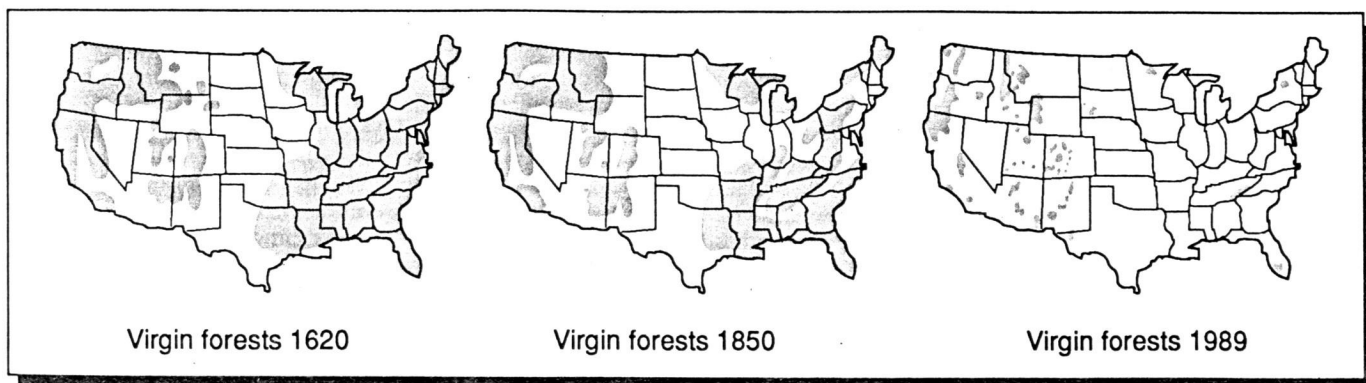
It is almost as hard to assess the extent of today's old growth forests. Part of the difficulty is that outside agricultural areas, the area under forest has not decreased much: "What we've done is convert old growth into younger stands, more managed forests," says Chad Oliver, a silviculturist at the University of Washington in Seattle.

Statistics compiled for a Canadian government document, Canada's Forest Inventory 1986, indicate that Canada has more than 100 million hectares of unlogged old forest. But the data come mainly from forestry sources, which take into account only "productive", or loggable, forests. The forestry industry's definition of old growth reflects the logging life of a forest rather than its biological life.

For similar reasons, good nationwide data are not readily available in the US. However, John Butruille, of the US Forest Service, believes that the figures compiled by the Forest Service are sound for the 19 national forests he manages for the Forest Service in Oregon and Washington. These heavily logged states have approximately 10 million hectares of forest, of which about a quarter is old growth forest, says Butruille.

Deanne Kloefer of the Wilderness Society in Seattle argues that the Forest Service's "timber-oriented definition" gives figures that are far too low. "Our total estimate for both states [Oregon and Washington] is 950 000 hectares," she said. "Of the total amount of old growth, 39 per cent [374 000 hectares] is protected." Kloefer believes these figures show that overlogging of old growth forests is more serious than the Forest Service admits.

Regardless of how much is left, virtually all unprotected old growth in Canada and the US will be logged to extinction



*Some foresters agree that the future of old growth forest looks bleak without changes in the use of public land*

Source: The Wilderness Society



WCWC

hectares per year. Most accessible, though, is the "how long before it is gone" scale. On that measure, optimists estimate that the old growth in the west coast forest will last another 60 years; pessimists foresee the demise of unprotected stands in as little as 15 years.

Disputes arise over old growth statistics because what is measured depends on who is doing the measuring and why. Broadly speaking, environmentalists measure patches of beautiful old trees, whereas governments and loggers work on the basis of saleable timber. Many scientists and foresters, however, are now convinced that both approaches are wrong and are based on out-of-date notions of the ecology and biology of old growth forests.

In recent years there has been a profound shift in the principles of forest ecology. Ecologists believed that the forest was a closed, stable ecosystem. "We used to think that a forest was basically a group of species that had evolved together or been together for a very long time," Chad Oliver said. "Now what we find is that a forest community is a group of species that may have recently migrated together and then, in the future, might migrate in separate directions." The far-reaching impli-



Joel Bennett/SEACC

*Old growth forests are teeming with life, from inconspicuous fungi to deer and bears (right)*

unless both countries change their policies on the use of public land, says David Handley, a forester and the manager of resource analysis for the Canadian timber company MacMillan Bloedel. According to Handley, there are three reasons for this: at present, the biggest, most commercially valuable trees are in old growth forests, most old growth forests are on publicly owned land where cutting is permitted or encouraged, and the forest industry needs time to make an "orderly transition" from logging virgin forest to harvesting secondary stands first cut many years ago.

The rate at which trees are cut is measured on several scales: cubic metres per year, "board feet" per year, and

cation is that all forests are dynamic, interactive structures that respond to natural disturbances such as drought, disease or a change in climate. According to the new school of thought, it is wrong to assume that, over hundreds of years, a forest grows to a mature, climax, stage where it remains in perfect balance forever. Chaos is the norm and change is the consequence.

Old growth forest is born of catastrophe. A wind storm, wildfire or other natural disaster begins the process by clearing a patch of forest, says Jerry Franklin, an ecologist with the Forest Service's Pacific Northwest Research Station and the University of Washington. Soon local plants resprout, and others grow from seeds blown in from farther afield. Within 20 or 30 years, young trees are beginning to grow up; their canopies merge and shade the plants below. For another 30 years or so, the only breaks in this dense layer of young trees are the gaps created when trees killed by the original cataclysm fall through the new canopy.

#### Mature trees drop out

After 100 or 150 years, depending on the species, the youth of the forest is over. During this mature stage, growth slows and the ancient trees gradually die. In the Pacific northwest, old Douglas firs soaring to 150 metres drop out and are replaced by much shorter hemlocks, cedars and silver firs. This phase may continue for several centuries, sometimes even for a millennium. Usually, though, another dramatic disturbance sweeps through the forest long before the old giants reach the end of their biological lifespan.

Following the new logic, an old growth forest has characteristic attributes: significant numbers of huge, long-lived trees; many large, standing dead trees, called "snags"; numerous logs lying about the forest floor; and multiple layers of canopy created by the crowns of trees of various ages and species. "Old growth forests are structurally complex and rich systems," says Franklin. From top to bottom, they are teeming with life. In the Pacific northwest alone, biologists have identified more than a hundred species of mammals, birds, amphibians, reptiles and fish: bear and elk, flying squirrels, a rare seabird called the marbled murrelet, frogs and toads, and salamanders, and fish such as the steelhead and coho salmon—and the northern spotted owl.

Scientists suspect that as many as 40 of these species may survive only in the protective cocoon of an old growth forest. But the most numerous residents, by far, are "inconspicuous, non-charismatic" species, says Gordon Orians of the University of Washington. He is concerned that too many public

debates focus on "a few charismatic species that may, or may not, be vital in the functioning of the forest". Hundreds of species of arthropods, from insects and spiders to centipedes and beetles, are overlooked, he says. And at the bottom of the heap are the forest's fungi and microorganisms. Yet these underrated forms of life are vital to the health of the forest.

All the forest's creatures depend on its unique qualities for "room and board", Orians says. In the Pacific forests, open spaces between trees shelter deer and bears. Snags are home to spotted owls, several species of bats and flying squirrels. Large rotting logs protect the redbacked vole, a small rodent that eats, and helps to disperse, the fruiting bodies of mycorrhizal fungi that are so important in the nutrition of trees. Ants, termites and beetles also live in the logs. As they carve out their nests, they break the wood down into usable nutrients and create living spaces for voles and other small animals. The logs also store enormous amounts of water that protect animals during fire and provide water in times of drought. Every component of the forest, from the crowns of towering trees to roots buried deep in the soil, supports, and is supported by, a great web of organisms.

Biologists have learnt much about the ecology of the old growth forest, but they are only just beginning to untangle the many threads that link it to the wider world. All the indications are that these venerable forests are vital to the continuing well-being of both humans and nature.

Locally, forests are the key to controlling flooding and preventing landslides. According to Franklin, the snags, downed wood and organic litter of the forest protect hillsides from erosion. Logs that fall into streams and rivers and jam them make the water "sticky"; that is, they capture debris that would otherwise be "exported" to communities downstream. They also help to filter the water for valuable fish stocks and other aquatic creatures by trapping sediment and woody debris. Likewise, they create deep, quiet pools in which many species live and spawn. The forest also modifies the weather. It helps to moderate extremes of heat and cold, and researchers working for the Forest Service have found that the needles of the forest's conifers capture moisture from fog and clouds. In some areas of the Pacific northwest, this accounts for up to a quarter of the local rainfall. And while some scientists, such as Oliver, consider it a "red herring", others are convinced that old growth forests play a role in the global climate, through the storage and release of carbon.

Whatever its value as an ecological and climatic stabiliser, Oliver and others believe that the ultimate value of an old growth forest is biological and aesthetic: it provides a life-saving habitat for dwindling species of plants and animals and irreplaceable beauty for people. According to Oliver, maintenance of species' diversity and wilderness are the "real issues" in today's old growth debate.

What scientists have learnt about the turbulent, complex life

## Hot spots in the old growth war

**A**T 90 metres high, the Carmanah Giant is the tallest tree in Canada. The mighty hemlock is also the symbol of the battle between environmentalists and the forest industry on Vancouver Island. Last April the provincial government set aside the lower half of the Carmanah Valley as a provincial park, but ruled that the logging company MacMillan Bloedel could harvest the upper half if studies showed that logging would not harm the watershed below.

Environmentalists are not satisfied with this plan. They claim that the valley contains one of the last continuous tracts of old growth rainforest in the country and should be preserved in its entirety.

Other disputed areas on Vancouver Island include the watersheds of Brooks Peninsula and Clayoquot Sound. Data collected for the American organisation, Conservation International, show that of the 27 main watersheds on the island, only one is unlogged, and none is protected.

In eastern Canada, the Temagami Wilderness Society is working to preserve 3500 square kilometres of old growth forest. The Temagami Forest contains the largest known stand of virgin white pine in North America. All legal efforts to halt logging have failed so far. Last summer, however, the province established a Stewardship Council to oversee activities in the forest. The Society is not represented, but on the council are sympathetic members of the Teme-Augama Indian band, whose native lands claim includes the area.

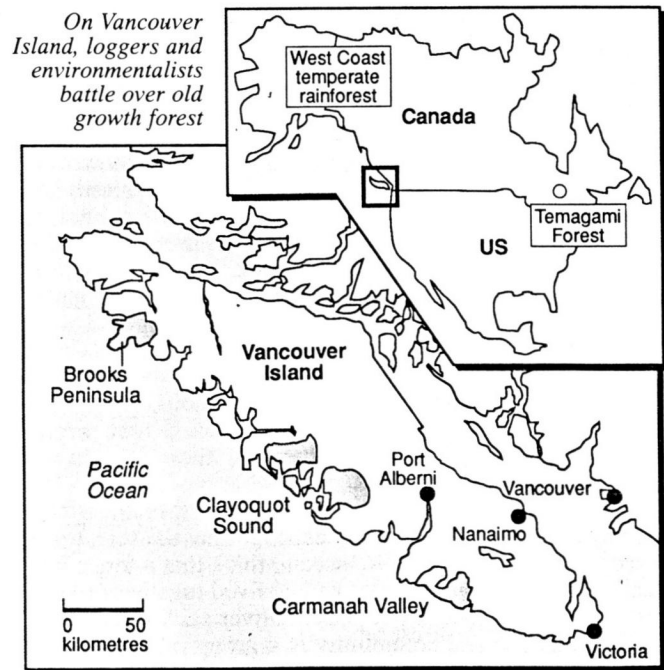
For a decade the Southeast Alaska Conservation Council has launched six law suits and has extensively lobbied the US Congress. The target is the 1980 Timber Reform Act which guarantees that the Ketchikan Pulp Company and the

Japanese-owned Alaska Pulp Corporation can log in the Tongass National Forest for the next 40 years, paying only nominal fees for the right. The old stands of Sitka spruce and Western hemlock in the Tongass are home to the world's densest population of eagles and grizzly bears. Bills to revise the law are now before both houses of the US Congress. "Meanwhile, the pulp companies are going full-tilt," says Barth Koehler, executive director of the Council.

The red-cockaded woodpecker makes its home in the old growth pine forests of 12 southeastern states. The bird excavates a nest hole in a 75 to 100-year-old pine. Resin seeping from the cavity protects the woodpecker from the rat snake, its worst predator. It may well take years to complete a cavity, but once the job is finished, generations of woodpeckers may use the nest. The Sierra Club Legal Defense Fund has begun legal action to stop the destruction and the fragmentation of the bird's habitat.

In California's Sierra Nevada mountains, the

2000-year-old sequoias are among the oldest inhabitants on Earth. Last July, conservation groups, timber firms and people with grazing interests, along with the State and the US Forest Service, agreed to a new management plan for the Sequoia National Forest. "In one stroke we rescued more than 40 000 hectares of primarily old-growth forest... and completely reversed the Forest Service position on logging in Giant Sequoia groves," said Julie McDonald, a lawyer who represented a coalition of environmental groups. □





G. Fliegehem/WCWC

*The new forestry aims to mimic nature's disaster-style "logging." Despite the risks, some foresters are prepared to try it*

of an old growth forest has convinced the University of Washington's Oliver, Orians and Franklin and Ken Lertzman of Simon Fraser University that "business as usual" is no longer possible in North America's forests. Although foresters such as David Handley of MacMillan Bloedel are confident that conventional practices are evolving to meet the challenges of "multi-use" forests—places shared by loggers, hitch-hikers, campers and scientists—the researchers are sceptical. Further, they say the answer does not lie in ill-conceived compromises such as a recent case in British Columbia: there, the government divided a forest in two, half for industry and half for conservation.

"We must manage for biodiversity," argues Lertzman. "We must manage across a landscape so we maintain all of the structures that seemed to have occurred naturally over an area," adds Oliver. The way to achieve this is to set aside large, contiguous patches of old growth which can serve as refuges for plants and animals, Orians says. Next, says Franklin, scientists and foresters must work together to apply the ecological lessons learnt in the forest to the management of the vast areas of unprotected land that will inevitably be logged.

To this end, Franklin has pioneered what he calls the "new forestry". In the "old" forestry, large, fragmented tracts of forest are stripped bare by clear cutting, usually followed by controlled burning to remove stumps, branches and snags. The new forestry tries to mimic nature's disaster-style "logging" techniques. "New forestry translates into maintaining snags, downed logs, woody debris, and even large green trees as part of managed systems," says Franklin. "You cut a larger percentage of the landscape [at one time], but then you get out and leave it alone."

The new forestry is controversial, risky and unproven. But its potential benefits to forest conservation are so great that already foresters in the National Forests of Siskiyou and Willamette are applying the concepts on a trial basis. The Washington State Department of Natural Resources has recommended creating an Experimental State Forest on public lands on the Olympic Peninsula in order to try the techniques on a wide scale.

Franklin passionately hopes that the new forestry will prove itself, catch on, and safeguard the matchless forests of his childhood. "Certainly if all the old growth forests were gone today, the planet would not cease to turn. It would still go on," he reflected. "But it has to do, not with whether life is possible, but whether life is worthwhile. For life to be worthwhile for me, we need that richness, that diversity and that opportunity that the old growth forests provide." □



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