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The Dickey Bird Scientists Take Charge: Science, Policy, and the Spotted Owl

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THOMAS R. WELLOCK

the dickey bird
SCIENTISTS

TAKE CHARGE: SCIENCE, POLICY, AND THE SPOTTED OWL

ABSTRACT

In 1992, the Forest Service adopted a new operating policy, Ecosystem Management, which minimized the agency's timber production goals in favor of a more ecologically balanced view of its responsibilities. In explaining this shift, scholars have dismissed the possibility of internal reform, arguing that the Service could not change without irresistible external pressure from environmental activists and new public values supporting biodiversity. Viewing the Service's shift through the lens of the spotted owl controversy, however, demonstrates the important role agency culture played in instigating bureaucratic change. The Service's evolution stemmed from the rising influence of its scientists in policy formation. Their research in support of protecting the owl and the biodiversity of old-growth forests thrived in an agency that nurtured scientific independence, and it thrust them into leadership positions. Forest Service science legitimized the arguments of environmentalists and crystallized public values favoring biodiversity into a new policy.

THE FOREST SERVICE would never be the same. Jack Ward Thomas knew that. By 1992, the lead scientist in the effort to protect the Northern Spotted Owl had been working for three years crafting plans to save the threatened bird. Now, he realized, he and his team of biologists had done much more than that; they had undone the storied mission of the Service to harvest timber, to "get the cut out." His forester bosses were not in charge. He was. The timber industry could only cut timber by his leave. "Scientists," he surmised, "have now obtained power."¹ The following year, Thomas himself obtained formal power, becoming the first biologist appointed Chief of the Forest Service (1993-1996).

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Scientists involved in the spotted owl controversy helped remake the Forest Service, leading to its adoption of a new operating philosophy. Ecosystem Management, as defined by the Service, was an “ecological approach to achieve the multiple-use management of national forests and grasslands by blending the needs of people and environmental values in such a way that national forests and grasslands represent diverse, healthy, productive and sustainable ecosystems.” Ecosystem Management ended the agency’s mission to maximize timber production in favor of a more ecologically balanced view of its responsibilities.²

In explaining the rise of Ecosystem Management and similar initiatives, Samuel Hays emphasized the importance of national value trends toward environmental amenities. Ecological forestry, he argued, emerged inevitably from these new values. The owl controversy was just one regional manifestation of it. Hays correctly stressed the overarching importance of society’s value shifts, but his analysis overlooks internal agency dynamics that might explain why some agencies embraced Ecosystem Management while others lagged. It also misses the formative influence of the owl controversy in crystallizing agency support for ecosystem management before there was a groundswell of opinion for such a policy.³ As Thomas argued, the spotted owl controversy took “the lid off of the whole greater issue as to what ... we want[ed] our national forest managed for.”⁴

Hays is not alone in stressing external forces to explain agency change. Many scholarly accounts of Ecosystem Management’s origins credit the tactics of the environmental movement. These analyses claim that the tradition-bound, production-oriented Forest Service formulated Ecosystem Management as a desperate ploy during the spotted owl controversy to retain control over its forest lands while changing as little as possible. The agency had to be shackled and dragged to the policy by environmentalists through court orders.⁵ Obviously the environmental movement played a pivotal role in the last half of the spotted owl controversy, but it was barely visible in the 1970s and early 1980s when the Service’s institutional culture was undergoing substantial change.

Policy experts who highlight the internal dynamics of bureaucratic change see little influence from scientists. They explain that in a pluralistic political culture government agencies respond to their own interests and political pressure. Scientists, whose studies are often riddled with inconclusive results, have only limited influence in shaping the debate. This uncertainty and the fragmentation of power created by the multiple agencies, laws, and interest groups allow bureaucrats to “justify whatever direction they want to set.”⁶ Scientists, who are often disinclined to compromise, are largely shut out of final decisions and are relegated to being providers of information, information that is often ignored.⁷ Litigation is usually necessary to alter bureaucratic behavior.

That was not the case in this story. “From inside the Forest Service,” one of its lead biologists argued, “most of [the owl controversy and agency behavior] was driven by science.”⁸ Often uncomfortable with their leading role as policy

makers, scientists nevertheless wielded enormous influence because only they had the reputation and expertise to solve the agency's management and political problems in adapting to new environmental values. They wrote the critical regulations regarding wildlife and timber policy, served on forest planning teams, did the research that narrowed executive options to a few very unpleasant choices, represented the Service in court and in Congress, drew up the Ecosystem Management plans, and assumed key leadership positions, including Forest Service Chief. Their research helped shift public opinion to value biodiversity and the preservation of ecosystems rather than the preservation of a few charismatic species such as the spotted owl.⁹

The reason for this outsized role for scientists is clear. Their reputable science and a long-standing favorable climate in the agency toward science dictated policy change as much as any of the external influences on the agency. The Forest Service was receptive to a science-informed policy and sponsored the scientific research that led to it. Much has been made of the intense conflict between the Service's wildlife scientists and its traditional forestry agenda. Less ink has been devoted to the Service's commitment to scientific research and the autonomy it granted its scientists. It was the Service's historical emphasis on expertise and adaptability that made this change possible. Early on, the Forest Service established experimental stations and sponsored academic research.¹⁰ The agency was, perhaps, a "timber beast" in the postwar period, but its support of independent science and the deference it gave to its scientists laid the basis for its dramatic shift in priorities. The agency funded extensive spotted owl studies, hired scores of wildlife biologists and ecologists, and took most, if not all, of their advice in creating enormous old-growth-habitat reserves in the Pacific Northwest.

As scientific research justified preserving diverse species and public concern led to endangered species protection, the Service broadened its wildlife expertise beyond its traditional concern with game animals. This infusion of new personnel with different perspectives than the agency's foresters encouraged the Service to manage its lands to increase biodiversity, rather than timber harvests. Agencies such as the Fish and Wildlife Service (FWS) and the Bureau of Land Management (BLM) that did not have this tradition of scientific independence were more susceptible to direct political interference in this controversy.

The scientists did not do this alone, of course. The environmental movement was an essential component in transforming the Service, but in a broader sense than is often portrayed. It enabled government scientists by winning passage of the National Environmental Policy Act (NEPA) and Endangered Species Act (ESA). Together these acts mandated scientific input on environmental impact statements and determinations of endangered species status. Through the National Forest Management Act (NFMA) of 1976, the movement helped establish a forest management system that valued public input, interdisciplinary science, and ecological diversity.¹¹ It then policed that system through

litigation and effective lobbying that neutralized industry clout with the Service and in Congress.

Within this new resource-management regime, however, much change came from inside the Service as foresters and scientists debated and learned to accommodate each other. Thomas Dunlap observed that “[historians] have too often characterized ‘government’ as an inert lump that must be moved by (usually high-minded and pure-souled) conservation organizations.” Too little attention is given to how agencies adapt to new values, laws, scientific information, and the infusion of a more diverse professional staff.¹² All of these factors had a profound influence on the Service’s evolution.

Many dispute that the Service underwent significant change of its own accord in the 1970s and 1980s. Logs and lumber mills seemed to win out over wildlife. At times during the controversy, this was true, as the Service tried in 1984 and 1988 to opt for less than what its scientists recommended was the minimum needed to save the spotted owl. But the Service’s attempt to balance those recommendations with its multiple-use mission was hardly surprising. The stakes were enormous: tens of thousands of jobs, billions of board feet, billions of dollars. The Service’s mission was turned inside-out in a little more than a decade. It was more change than a bureaucracy could do well or quickly. When the Service faltered, environmental lawsuits and court orders forced it to complete its transformation to ecosystem management. In the end, then, two groups mattered most: judges and scientists.

The spotted owl controversy indicates that the Forest Service’s move toward Ecosystem Management was not an inevitable result of new public values, external interest group pressure, or bureaucratic self-interest. By giving scientists and science their due, a more complete story emerges. Environmentalists and their values could only win this one with help on the inside. It came from respected scientific authority within a science-friendly agency that legitimized and crystallized public values favoring biodiversity into a new policy.

IN THE SUMMER 1968, Eric Forsman, biology major at Oregon State University, was working a summer job as a Forest Service fire guard at Box Canyon in Oregon’s Willamette National Forest. It was a great job for him because he loved the outdoors. He had grown up on an old strawberry farm near Eugene, spending his free time hunting and trapping game. By his teens, his hunting had turned into a fascination with birds. “Owls really intrigued me,” he recalled. He once dragged his biology professor to a Great Horned Owl nest he had located. When he climbed the tree, the female struck with the force of a “medicine ball.” He descended stunned with blood running down his neck. “I thought it was just great.”¹³

Forsman spent his free time at the station looking for owls, especially the Northern Spotted Owl. At that time, seeing a spotted owl was about as common as a reported sighting of Big Foot. One evening he heard what sounded like a dog barking in the meadow near the station, but no dog appeared. What happened

Figure 1. Reclusive yet Fearless.

Photos courtesy Dale X. Phipps.

The spotted owl's lack of fear around humans made them relatively easy to track, study, and tag, leading to Eric Forsman's path-breaking research on the species. This female and her chick (Figure 2) were photographed from just ten feet away in the Naches Ranger District of Wenatchee National Forest in 2009.

next changed his life. He tried an owl hoot. A spotted owl pair swooped down to defend their territory, one perching just a few feet away from Forsman. The owl's lack of fear of humans was profoundly moving. "I've never seen anyone who isn't affected by their first interaction" with the spotted owl, he noted. "For me it's like going to church."¹⁴

Having found his religion, Forsman began his graduate work in 1972, studying the spotted owl at Oregon State University (OSU). He was already the foremost expert on the owl—there was no one else. He even kept a female owl as a pet in his backyard, named Fat Broad by the wife of one of his friends after the B.C. comic character because the owl ate like crazy. From his observations, he knew that spotted owls strongly preferred old growth forests to second growth. But more rigorous study was necessary. The best place to go for research funds was the Forest Service's Cooperative Wildlife Research Unit in La Grande, Oregon. Jack Ward Thomas, the lead research biologist at the station, had some "year-end money" that he dangled in front of Forsman's OSU mentor Howard Wight. Wight funneled the money to Forsman's owl research. Studying a nongame species was a bit of a departure for the Forest Service, and Thomas joked to Wight about the owl, "What's the bag limit on those damn things?" "We were not doing a lot of research about tweety birds and hoot owls," Thomas recalled. "Most of our stuff was on [game species like] elk and deer." Nevertheless, the Service offered Forsman the grant even though his research proposal clearly detailed the danger that old-growth harvests posed to the owl and his stated aim was to restrict logging.¹⁵ Even as

Figure 2. Reclusive yet Fearless.

Photos courtesy Dale X. Phipps.

Spotted owl chick, photographed from just ten feet away in the Naches Ranger District of Wenatchee National Forest in 2009.

his research came to increasingly dire conclusions about the owl's habitat needs, the Forest Service continued without objection to fund Forsman through his doctoral research.

Despite Thomas's joke about bag limits, the public and the Service were taking greater interest in the science of nongame wildlife. Forsman's funding was just one example of those changing priorities.¹⁶ The ESA of 1973, and the earlier versions of it, along with the National Forest Management Act of 1976 gave new responsibilities to state and federal wildlife agencies to preserve habitat for rare species and ecological diversity. NEPA's Environmental Impact Statements (EIS) required interdisciplinary teams. Biologists were in high demand. State agencies were traditionally responsible for game management and began hiring them for nongame species. Charlie Bruce, who became intimately involved in the owl controversy, started his career as Oregon's first nongame bird biologist. His colleagues teased him as the "dickey bird guy" who studied small unimportant species, but he was just the first of many.¹⁷ Similarly, the Forest Service hired scores of "ologists" as

Figure 3. Eric Forsman and Fat Broad.



Photo courtesy Eric Forsman.

Pictured here in 1973 with Eric Forsman, Fat Broad was adopted by the scientist when she was young and became quite attached to humans. Forsman took the owl on countless exhibitions to schools and other public functions in Oregon evangelizing about the plight of her species.

foresters recognized that their own expertise was not sufficient. Jim Lyon, an early wildlife biologist hire, recalled that by the 1970s the demand for biologists outstripped supply. Soon the biologists “started taking over the Forest Service.”¹⁸ By the late 1980s, staff science positions increased from 284 to 688 wildlife biologists, 75 to 236 fisheries biologists, 47 to 206 archeologists, and 7 to 84 ecologists.¹⁹

This resulted in a clash of cultures between foresters and the new hires, a clash the “ologists” eventually won. As Regional Supervisor Jeff Sirmon noted, these new “experts didn’t have the kind of allegiance to the organization that the traditional forestry recruit had, and the organization found it very difficult to accommodate conflicting perspectives within the agency.” The term “combat biologist,” meant either as an insult or worn as a badge of honor, epitomized the tension. Nevertheless, Dale Robertson, Forest Service Chief (1987-1993), concluded that with the hiring of scientists “we were planting the seeds for the destruction of the multiple use management concept.” Those who challenged the ethic that “timber was king” felt unwelcome and were accused of not being team players, but biologists shook up the agency’s conventional wisdom.²⁰ For example, the Service’s biologists successfully challenged the forester’s myth that “good timber management is good wildlife management” by demonstrating the essential role old-growth played in the forest ecosystem.²¹ Foresters usually cared about game animals that flourished on the browse that sprouted in a clear-cut and considered old-growth areas biological deserts. Service scientists helped undermine that position and educate the public to the value of old growth.

The Service scientists' success stemmed from the agency's long-standing protection of its research division. Since 1915, the Service's research branch answered only to the chief to prevent them from being diverted by regional foresters into more immediate problems, and over the years, the chiefs largely protected the research branch from excessive interference. "One of the most fascinating things about the Forest Service is the integrity of the research division," Thomas argued. "It is one of the agency's greatest strengths—and always has been. . . . Much of the research that caused the Forest Service its biggest management pains have come out of its own research division," as Forsman's funding demonstrated.²² As its researchers took greater interest in nongame species, the Service promoted such study through a series of symposia starting in 1975. Those who attended the first meeting understood it as "part of the opening skirmish in . . . a revolution" in resource management.²³

The spotted owl was the early beneficiary of the new attention given to nongame species. Forsman became an advocate for the spotted owl and drew these new state and federal agency biologists into his effort to save them. By the spring of 1973, he had written letters to local officials, agencies, senators, and environmental organizations.²⁴ With the ESA about to be passed, state and federal officials knew they needed a better understanding of threatened species. The Oregon Game Commission created the Oregon Endangered Species Task Force, an influential advisory committee of mostly wildlife specialists from state resource agencies, the Service, and the BLM.

The task force started its work in June 1973 and turned immediately to protecting spotted owl habitat. The BLM representative reported the alarming news that his agency planned to liquidate all of its old growth in less than thirty years. The Forest Service, he thought, planned on doing the same. Given this scheduled demise of ancient forests, the task force members asked Forsman how much old-growth habitat spotted owls needed. Forsman was still three years from finishing his thesis. Here were the representatives of every major federal and state resource agency in Oregon asking him what to do. He chose the low end of the 200 to 1,000 acre range he had recommended to the Service earlier. Three hundred acres for each pair, he told them. It was hard for the task force, and even Forsman himself, to imagine two birds needing much more. They sent the recommendation to the regional heads of the Forest Service and the BLM.²⁵

It was a hazardous choice for the agencies to take that much old-growth out of the timber base in a region so dependent on the timber industry. They rejected the request, confident that further research would show that the owl needed less habitat. It did not this time. Forsman's estimate was too low by a factor of ten. Forest Service biologist Hal Salwasser recalled, "every time there was a stalling tactic the habitat protection [on the owl] ratcheted up another notch, till it ratcheted all the way [up]."²⁶

Regardless of the politics involved, the agencies' decision was not unreasonable considering the lack of knowledge about the owl. Forsman's

three-hundred-acre estimate was half baked, and serious scientific owl studies were not finished. His 1976 thesis convinced the BLM, Forest Service, and the endangered species task force to protect four hundred owl pairs with three hundred acres of old-growth around each nest. Similarly, in response to Forsman's 1980 PhD dissertation, the task force successfully recommended the addition of an optional seven hundred acres to their habitat areas. Although the few environmentalists who were paying attention to this issue criticized the Service for reserving as little land as possible, that was not the case in practice. Much to the chagrin of the forest industry, the seven-hundred-acre "option" often was taken as a minimum requirement for owl habitat by forest supervisors, especially since research showed that owls needed more habitat.²⁷ Rather than see the activities of the task force as a hindrance to its timber mission, the Service's Region 6 (Oregon and Washington) administrators praised its work, believing that its actions had prevented the listing of the spotted owl under the ESA.²⁸ With the Service's blessing, the task force and Forsman's research guided the controversy's trajectory toward greater owl protection.

The ascendancy of the dickey bird scientists did not go unnoticed. That an unsupervised committee of experts had gained considerable influence over on-the-ground policy alarmed allies of the timber industry. Officials in the Oregon State Department of Forestry, a timber-friendly agency, grumbled that the task force was operating in "quasi-official capacity" and its recommendations were symptomatic of "those who propose to protect flora and fauna for all time [and] is a movement often unhindered by reason." The task force recommendations were, they feared, "only the beginning of anticipated management constraints" carried out "with little other input regarding other multiple-use impacts."²⁹ Nonetheless, the task force's influence continued.

The timber industry and its allies had every reason to worry about the threat of the spotted owl to logging in the Pacific Northwest. The old growth stands on federal lands, they hoped, would save an industry that was fast running out of merchantable trees. The problem dated back to the first half of the century when the Forest Service was largely a custodian of national forests and sold little timber given the glut of logs from private lands. The Service withheld sales until the private supply dried up.³⁰ By the early 1970s, timber companies had exhausted their holdings, a situation expected to last several decades. After 1945, the Forest Service and BLM filled the gap with its still plentiful supply of old growth, particularly in Oregon and Washington. The counterintuitive logic of the timber industry was that a sustained yield of timber was assured not by logging old growth at a carefully measured pace, but by cutting it down as fast as possible to allow young rapidly growing trees to replace slow-growing, "decadent" stands of mature timber. The Forest Service would, as the industry did on its own lands, increase the harvest by actively managing the new growth with improved tree species, aggressive fertilization, and thinning to maximize growth rates. With these measures, industry experts predicted that the

Pacific Northwest would not face a significant dip in timber harvests.³¹ Only demands to save old growth for wilderness and wildlife stood in the way. The industry was already battling the environmental movement on designating new wilderness areas through the Roadless Area Review Evaluations (RARE) process. The owl and its scientific guardians were a new and troubling force in the management of the national forests.

Just as ominous were reforms that further bolstered the forces for wildlife protection. Two federal laws strengthened the mandate that federal agencies protect vulnerable species. Passed in 1974, the Sikes Act required that federal agencies provide protection to any species listed as threatened, endangered or rare by a state agency. The following year, at the behest of the Endangered Species Task Force, the spotted owl was listed as threatened by the Oregon Game Commission. Although some argued that this was an administrative list that did not have the weight of law, because of the Sikes Act, federal agencies responded as if it did.³²

Of even greater importance for the Forest Service was the passage of the National Forest Management Act in 1976. Passed to overcome court prohibitions on clear-cutting in national forests, the NFMA also gave the forest industry “departures,” an exception to allow accelerated harvest rates above what was considered sustainable—a section of the law designed with rapid cutting of old-growth in mind. But Congress placated environmentalists, too, by requiring that forest planning protect plant and species diversity.³³ This became the key obstacle in preventing the regular use of departures.

The regulations that implemented the NFMA were crucial to foiling old-growth clear-cutting and expanding the power of the scientists. Environmental groups did not trust the Service to write the regulations, and Senator Lee Metcalf of Montana inserted an unprecedented requirement to create a “Committee of Scientists” to oversee the process.³⁴ The Committee was composed of seven scientists with different areas of expertise and chaired by Arthur Cooper from the Forestry Department at North Carolina State University, Raleigh. Although their role was originally envisioned to simply review regulation language written by the Service’s staff, the scientists wrote extensive sections of the draft. The Service’s staff under Rex Hartgraves set up a close working relationship with the Committee, and found the input from the Committee essential in crafting the final regulations.³⁵

The wildlife biologist selected for the Committee had a profound influence on the regulations. William Webb was an emeritus professor from the State University of New York’s School of Forestry with a fondness for exclamation points. He seemed like a conservative choice. Webb had been a consultant on a presidential advisory committee that had advocated rapid liquidation of old-growth forests and his recent research on eastern forests found that most songbirds had adapted easily to clear-cutting.³⁶ But Webb became the chief spokesman for the Service’s biologists. He believed the NFMA’s diversity language could advance the cause of saving wildlife. He complained that the Service

had traditionally given “non-timber values of the forest a minor place Now there is a different direction!” As Webb read the NFMA, Congress intended that “the planning process *starts* with the assumption that all resources of the forest are equal in value.” The Service was “no longer to maximize timber production, but to manage public lands for public benefit.”³⁷

Webb was particularly concerned about providing protection for species that were losing habitat. He wanted to prevent these “preendangered” species from being listed under the ESA “because [Forest Service] management programs . . . are gradually eliminating significant habitat.” Having consulted with Forsman previously, he was thinking specifically of the precarious situation for old growth habitat and the spotted owl. He spent the next six months searching for the proper language to cover such species in the regulations.³⁸

The “obscure clause” that emerged from Webb’s search, as Jack Ward Thomas concluded, “shook the agency” more than any other legislative or regulatory requirement in its history. It boiled down to two words, “viable populations.” The Service, Webb wrote, had to maintain viable populations of all species in the national forests. The term “viable populations” originally came from microbiology and simply referred to the portion of any culture of bacteria that was capable of growth. By the early 1960s, wildlife scientists appropriated the phrase to refer to any population level that was capable of maintaining a species’ existence over an extended period of time.³⁹ By the early 1970s, scientists were tinkering with models, particularly on commercially valuable fish populations, to estimate what a “minimum viable population” might be, based on a number of factors including genetics, habitat requirements, stochastic (random) events, and catastrophes.⁴⁰ These estimates were rough hypotheses and lacked a firm technical grounding.

Even before the NFMA, the Forest Service and the Fish and Wildlife Service used the term loosely without carefully defining it. It seemed to best express what it meant for a species to no longer be threatened or endangered.⁴¹ As long as a species was viable without human help, it was not endangered. The viability language became common among biologists in the Service’s Region 6. Forest supervisors in eastern Oregon approached Thomas for help in planning how to protect potentially hundreds of species. Developed in consultation with more than fifty experts over several years, Thomas’s answer was to create a practical ecosystem management model for Oregon’s Blue Mountains. His advice to foresters was not to count specific species but to focus on what they could control: habitat. “By accounting for the habitats, the manager can account for the wildlife” was Thomas’s logic. Service planners could hope to achieve a viable population of a species if a sufficient portion of a forest contained suitable habitat.⁴² Thomas admitted that the study’s novel approach involved some guesswork, but the Blue Mountain study was seen as a prototype of the ecosystem management planning the Service developed in the 1990s.⁴³ Certain “indicator species” were selected whose overall success was considered a good

indicator of the welfare of other species dependent on the same habitat. In Region 6, the spotted owl was an indicator species for old-growth forests. It was the proverbial canary in the coal mine whose viability was a sign of overall old-growth ecosystem and wildlife health.

This still ill-defined concept found a home in the new regulations at the behest of the Service's staff. The viable population language had achieved currency throughout the Forest Service prior to 1978 through Thomas's publications and other internal reports.⁴⁴ At the same time, Dale Jones, head of the Service Wildlife Division, supported Webb's desire to protect "pre-endangered" species, and he consulted with his wildlife staff, including Thomas, on proper regulatory language. "Viable populations" best expressed what they wanted to achieve. Protecting viable populations, moreover, fit well with the Service's existing direction from Chief John McGuire (1972-1979) to restrict management practices that might force a species to be declared endangered. After extensive discussions with Service staff in March 1978, Webb added a requirement to the regulations that, with later revisions, required the Service to maintain "viable populations of all existing native vertebrate species in the planning area and to maintain and improve habitat of management indicator species."⁴⁵ With very little debate, Webb and the Forest Service staff had created a whole new class of protected wildlife not covered by existing federal law. In effect, the Forest Service required of itself that it safeguard minimum populations of every species in the national forests. While scholars have portrayed the Service as a reluctant actor in preserving species, few seem to recognize that the agency went far beyond the existing requirements of the ESA or the NFMA's diversity requirement of its own accord. The new regulations became the main driver of the spotted owl controversy.⁴⁶

Transplanting the "viable population" concept from the Petrie dish to forest management was an enormous intellectual and practical undertaking. The meaning of viability for a cell culture was obvious; for an animal in a complex ecosystem, it was not. As Thomas envisioned it, viability simply meant that planners should "think more broadly when considering wildlife" and focus on saving diverse habitat. Thomas's study established viability in terms of the amount of habitat that forest managers provided an indicator species, not by maintaining a specified number of a species.⁴⁷ The language in the regulations, however, did the reverse. It required measuring success by calculating a viable number of animals and then requiring managers to provide enough habitat to get there. The Service had to count owls and decide if it was enough. But how many owls did it take to be viable? How much habitat was needed to ensure viability for every species in the forest? How did that habitat need to be distributed? Viability, Thomas believed, "was an easy thing to discuss in theory, and an almost impossible thing to do technically." For a species like the spotted owl that needed an area of old growth the size of Rhode Island, the implications were vast. The forest industry may have understood the danger, since it tried early on to eliminate the "viable

populations” language from the regulations. But following the guidance of its Committee of Scientists, the Service kept the wording in the final version.⁴⁸

The viability issue started causing problems almost immediately. Only scientists could calculate a viable population of spotted owls, and the Service went looking for them. In 1980, David Soule published *Conservation Biology*, which estimated genetic viability through mathematical calculations.⁴⁹ In consultation with Soule, the Service concluded that they needed at least five hundred pairs of owls whose territories were close enough to each other to ensure enough intermixing to prevent inbreeding. The relatively immobile spotted owls had to be carefully distributed. It was not sufficient to create isolated clusters of owls holed up only in national parks and wilderness areas spread hundreds of miles apart. Such isolated populations became vulnerable over time to inbreeding and stochastic events. To avoid this, the timber industry proposed that the Service and BLM periodically swap owls between parks and wilderness areas, an option federal officials never took seriously.⁵⁰ After all, if a species needed such help to survive, it was, by definition, endangered.

The only solution, it seemed, was to create an even distribution of owl habitats spread out like a grid throughout national forests to ensure “connectivity.” That meant pulling old-growth out of the timber base and increasing the number of pairs. “We were using the owl as a kind of model to try out what [was] the genetically effective population size,” Hal Salwasser recalled. Although five hundred pairs might be sufficient in the abstract, “the geographic distribution of the owls is such that if you’re to keep them well distributed throughout their entire range, you’d end up having a lot more than five hundred pairs. You’d end up with a hundred or two hundred on every national forest. So the owl did influence how we were thinking, but it wasn’t the only species.” There were a host of similar species around the country that had similar habitat issues, such as the Red Cockaded Woodpecker in the South.⁵¹ The owl’s extensive habitat needs, however, made the debate over it particularly intense.

The battle over how much habitat to set aside for owls was fought behind the scenes over planning between the Service’s interdisciplinary teams of experts and the forest industry. The complex and poorly understood planning documents required by the NFMA for each national forest became the battlefield. These plans were supposed to determine how forest lands would be used over a ten-year period for timber, recreation, wilderness use, and wildlife. Because of Region 6’s huge harvests, the industry poured in more resources to pick apart every aspect of the Service’s planning than any other region. Regional Forester, Jeff Sirmon recalled, “Region 6 became the crucible for almost everything that was in the regulations ... on planning.” Sirmon had come to Region 6 in 1982 convinced that it had over-cut its lands and was determined to reduce harvests there, but he ran into tremendous resistance from the industry. “They just took a general approach that there shouldn’t be any reduction in the amount of timber that should be offered.”⁵²

The Service tried to deal with this incredibly complex task through an untested computer program called FORPLAN (Forest Planning). But the program frustrated Service staff and led to accusations of biased programming by environmentalists. Even its creator, K. Norman Johnson, agreed that the program had an unintentional timber cutting bias. He had started with a timber management program. Other multiple-use considerations were tacked on to the program as “constraints.” The program had difficulty factoring in habitat requirements and completely failed with the issue of viable populations. Planners in each forest tried to deal with these difficulties ad hoc, but this only led to protests by the industry of a lack of consistency in planning. Despite the bias in favor of timber cutting, the early FORPLAN runs still showed that in many forests, timber harvests would have to decline because extensive acreage had to be pulled from the timber base to satisfy other multiple-use objectives, especially wildlife habitat.⁵³

Dissatisfied with Region 6’s planning, the forest industry responded by turning to its new friends in the Reagan White House to rewrite forest regulations. Ronald Reagan selected two timber industry executives, John Crowell and Douglas MacCleery, to oversee the Forest Service in the Department of Agriculture. In 1981, Vice President George Bush announced a new initiative to streamline regulations, including NFMA’s. The tactic backfired. Rex Hartgraves opposed the initiative. The original regulations, he noted, had been drafted after eighteen hearings by the Committee of Scientists and had wide acceptance from the key interests involved. Rewriting the regulations so soon, he was sure, would create outrage. It did. When the proposed revisions were published in February 1982, the environmental community, members of the Committee of Scientists, and Congress protested. More than two thousand individuals wrote letters, Congress held hearings, and members of Congress demanded new regulatory hearings and an extended comment period on the proposed changes. The administration’s changes, critics claimed, would ramp up departures to cut old growth, weaken the commitment to interdisciplinary science teams, gut protections for wildlife and diversity, and soften the language on viable populations by removing the requirement to maintain viable populations of *all* species and improve the habitat of indicator species.⁵⁴

The Service’s response to the outcry showed how much it needed its scientists for validation. The agency went back to the Committee of Scientists and held another hearing. Hartgraves rewrote the draft, putting back in much of the original regulation language. William Webb consulted with the Forest Service’s wildlife biologists in Fort Collins, Colorado, Steve Mealey and Hal Salwasser. They were heavily involved in planning and had grown concerned that some forests had tried to meet viability requirements exclusively by stuffing species in wilderness areas as the industry had suggested. Only a well-distributed population could avoid these viability problems, they told Webb. Webb took their advice. A viable population and its habitat, the final regulations said, had to be well distributed throughout the planning area. Given the owl’s

extensive acreage requirements, the new regulations virtually guaranteed that millions of acres would have to be removed from the timber base to ensure the genetic connectivity between owl populations.⁵⁵

The timber industry realized the Reagan Administration's gambit had been a fiasco, and scientists were to blame. The day after the new regulations were published on September 30, 1982, Dennis Hayward, a timber industry representative, wrote a revealing internal industry memo that accurately foretold the future. He warned that "unless immediate action is taken, hundreds of millions of board feet" of timber would be lost in spotted owl, old-growth reserves. Region 6 had given its "wildlife biologists a free hand to utilize their 'knowledge' of what a viable population is (fine tuned by the spotted owl issue) and to set 'standards' for the forests." And given the research of Forsman and others, the acreage requirement was sure to get bigger. Biologists, Hayward correctly concluded, were determining forest policy. What was even more alarming, Hayward thought, was that the Service's administrators, mostly foresters, were as intimidated by the science as industry. Agency biologists enjoyed an aura of authority that their bosses were reluctant to challenge.⁵⁶

Forest Service leadership was reluctant to admit that it was losing its discretion to harvest timber. Ignoring the implications of the viability language Chief Max Peterson (1979-1987) argued in late 1982 at a conference on forest ecosystems that the NFMA diversity requirements "do not require much" of the Service other than to provide some of it. The Service's biologists knew better. At the same conference, Jack Ward Thomas and Hal Salwasser invoked Aldo Leopold, noting that the NFMA's "commitment to maintain biological diversity, including viable populations, ... is perhaps the most significant land ethic policy undertaken by a resource management agency." Looking to the future, Salwasser and other biologists presented ideas that later became key elements of ecosystem management policy. William Webb, in his presentation, exulted that "the NFMA requires a revolution in Forest Service planning" and that all natural resources were now on the "first team" with timber. He forecast, "The diversity requirement makes the Forest Service responsible for ecosystem management, not timber-/range-/wildlife-/wilderness-/soil-/fish management. All of those elements, plus dynamics, constitutes an ecosystem that requires management."⁵⁷

There was little the industry could do about this shift. Its officials tried through a series of threatening letters and meetings to bully Region 6 to back down on their wildlife standards. In January 1983, at a two-day meeting with Service officials in Portland, industry executives attacked the viable population regulations, but they were overmatched by Service scientists.⁵⁸ It was an unfamiliar position for the industry. When it came to timber management, the industry treated the Service as might a seasoned veteran in dispensing advice to a rookie. But the industry was ill-prepared to debate wildlife issues. "They didn't have their own science," Salwasser recalled. Hayward agreed. "We did not have a stable of good people [in biology]... That stuff [regarding viable

populations] was cutting edge.” The best minds on the owl issue and viable populations either worked directly for the agency or had their research contracted by it. The industry knew trees, not wildlife.⁵⁹ Its only counter was to demand that the Service reveal in its forest plans the cost of saving the owl in terms of jobs and timber sales. The debate was framed early on as the owl vs. jobs simply because the industry had already lost the science argument.

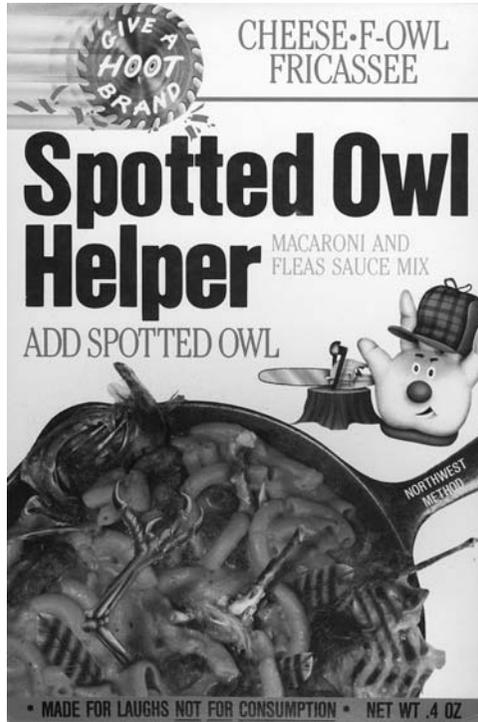
The industry’s strategy ultimately boiled down to appealing its case to politicians and Reagan appointees. Its officials hoped that the high cost of saving an endangered species would force politicians to revise the NFMA and ESA. “It is clear that major reductions in the available [timber] land base will be made for a myriad of wildlife species and habitat requirements,” they warned MacCleery and Crowell. They estimated that 160,000 acres of productive timber land would be lost on just six forests in Region 6, and another 70,000 would be lost to save the Pine Marten and Pileated Woodpecker. But the economic arguments could not change the science or the legal requirements imposed by NFMA regulations. While MacCleery did try to get Service planners to provide better justifications for the management requirements they included in their plans, he did little else. Courts could overrule anything administrators might do to contravene the law. Until the regulations or the science behind viable populations changed, the only point to be debated was exactly how much timber-capable land a viable population needed.⁶⁰ And the environmental movement was sure to pounce on any decision that deviated too much from the existing science or regulations.

That reality was clearly demonstrated in the development of the *Regional Guide for the Pacific Northwest Region*, which directed Region 6’s forest planning. The *Guide*, published in 1984, delivered less than had been promised in protecting the spotted owl, and left the acreage requirements for them in a confused state. Given the pressure from the timber industry, it is likely the Service wanted to avoid a clear statement of habitat need for the owl, and the *Guide* provided no such clarity. While it only required that a three-hundred-acre core be maintained for owls, the *Guide* added confusion by instructing planners to provide owl habitat as suggested by the endangered species task force in 1981—one thousand acres of old growth within 1.5 miles of each nest. The *Guide* conceded that the one-thousand-acre recommendation was what was “currently considered necessary” for owl viability. Forest plans were, then, likely to reserve one thousand acres for each pair, rather than the minimum three hundred. Spotted owl research showed that a nesting pair required more than this, but as Regional Forester Jeff Sirmon explained, the Service was hamstrung by agreements it had with the BLM. The Service could not expand coverage because the “Department of Interior [BLM] was not willing to move one inch on what they considered to be the maximum that they would allow for spotted owls.” Faced with political resistance from the BLM, the Service chose to stay with the existing agreement between the two agencies.⁶¹

The environmental community decided that they could do better than the seemingly minimal standards in the *Guide* and its EIS.⁶² The National Wildlife Federation, the Oregon Wildlife Federation, the Lane County Audubon Society, and the Oregon Natural Resources Council appealed the *Guide* to MacCleery requesting that the Service write a supplementary EIS (SEIS) for the spotted owl. The appellants charged that the *Guide* failed to provide for the diversity requirement of the NFMA as achieved by maintaining minimum viable populations of all species. The *Guide* had not considered the full influence of timber harvests on old growth and the spotted owl, nor had the Service used new scientific research that showed the owl needed more habitat. The petitioners were also concerned that the owls would not be well distributed in the Region 6 planning area unless habitats were coordinated between the national forests. The Service's current Spotted Owl Management Plan was "little more than a collective guess" of agency and BLM biologists. More expertise in species viability, they argued, was necessary.⁶³

MacCleery's decision was easier made than it looked. Environmentalists wanted a SEIS, and, oddly enough, so did the timber industry. The industry was betting that a SEIS with new science and a cost analysis would benefit them. As Dennis Hayward recalled, the industry hoped the SEIS would highlight "the impact [of saving the owl] on timber supply and jobs and county revenues and communities in the state. That would be a balancing factor." After weighing the high cost of saving the owl, "politically then [the agencies] would find better solutions." These political pressures, however, mattered less than the poor quality of the EIS. The Service's legal counsel told MacCleery that the EIS "wasn't worth the gunpowder it would take to blow it up." They were sure to lose a lawsuit. Lacking supporting science for its owl plan, the Service had to go back and try again. MacCleery reversed the Chief's decision and ordered a SEIS for the spotted owl on the grounds that new scientific evidence might alter owl planning.⁶⁴

The decision to write a SEIS was a watershed for the Forest Service. An unprecedented amount of staff time and expertise was rushed in to develop a variety of options that modeled different habitat sizes and distributions of habitat in Region 5 (California) and 6. The interdisciplinary team was composed of economists, ecologists, timber managers, and biologists who brought with them a range of perspectives. As viability research was still in its infancy, its scientists did some of the first population viability analyses that tried to take different options and estimate the chances of owl viability at ten, fifty, and one hundred years out. Given the pioneering nature of such estimates, biologist Bruce Marcot built in some "fuzz" or uncertainty into the estimates. He would not be giving his supervisors clarity but levels of confidence that the owl would remain viable. It made them, he recalled, "extremely nervous." They wanted to avoid responsibility and "make it appear that it was the biology and the biologists that caused them to pick this decision." Marcot later concluded that "managers—like politicians, the press, the courts, and the public—often want

Figure 4. Anger in Timber Country.

Courtesy of The Forest History Society.

As timber communities came to realize the extent to which Forest Service plans for the spotted owl would constrain harvest, black humor about killing and eating spotted owls became commonplace on bumper stickers and on items such as this “Owl Helper.”

clear unambiguous answers.”⁶⁵ By providing his answers in terms of uncertainty, as scientists do in their research, he forced the Chief to make a hazardous decision between biological, economic and social factors. While this seemed to give the Chief the kind of latitude to minimize the staff’s scientific analysis, Marcot’s and the other team members’ analysis had narrowed dramatically the Service’s choices to just two, neither of them appealing. Given the regulatory mandate to preserve viable populations, accepting an option with a high level of uncertainty about the owl’s viability could not possibly survive legal challenge, and none of the realistic options avoided a drop in timber harvests. The Service’s preferred Alternative F in the SEIS selected 550 habitat areas that would remove 1,000 acres each from the timber base. Another 1,200 acres would not have scheduled timber harvests. The 2,200 acres meant that almost 700,000 acres considered suitable for logging would not be scheduled for timber harvests. Tom Ortman, the team leader recalled, “The Chief’s staff was aghast because here we had doubled the size of the habitat areas.”⁶⁶ Team members

complained of pressure to modify the plan to accommodate timber harvests. But the recommendation stood. A draft SEIS was released in August 1986. “We first protected a hundred acres,” Chief Max Peterson recalled, “and then we moved it up to three hundred acres and finally went to a thousand acres. . . . We had all kinds of howls from people that we were way overprotecting, that we were moving in advance of knowing anything. . . . Somebody in the Pacific Northwest said they needed a lifeboat and life jacket and I had thrown them an anvil.”⁶⁷

Despite the political fire storm that ensued, the anvil only got bigger. The Service received 40,820 responses to the draft, almost universally condemning the document. The industry attacked the document as “less than worthless” claiming that it reflected poor science and shoddy workmanship. Environmental organizations attacked the science, but from the other direction. They pointed out that the Service itself admitted that the plan did not provide more than a medium to low assurance of owl viability beyond fifty years. By December 1988, as Ronald Reagan started packing his belongings to leave the White House, environmentalists called the Service a sell-out to the timber industry for opting for a plan that set aside 3,000 acres for owls in Washington and between 1,500 and 2,000 acres in Oregon. The Service had increased its commitment to owl reserves by nearly ten times what was considered the best science just ten years earlier—all this for a species that had not yet been listed under the ESA.⁶⁸ The viability language and Service scientists alone had radically altered the debate.

It still was not enough habitat for the owl if not well distributed. The Service sacrificed some connectivity in trying to balance owl habitat needs with its multiple-use mission, especially its commitment to protect local timber communities. Chief Dale Robertson gave his scientists a thumb-rule: owl habitat reserves could not reduce the timber harvest by more than 5 percent. The final option selected by Robertson in 1988 hit that number exactly. While the Service’s preferred option provided very good short-term viability to the owl, it gave the owl only a modest chance beyond one hundred years. Alternative M—proposed by a panel of scientists recruited by the Audubon Society including a Forest Service scientist—provided much better long-term viability.⁶⁹ But it took more than 600,000 additional acres out of the timber base, eliminated 1,500 more jobs, and cost the Service \$32 million in revenue.⁷⁰ Hal Salwasser and his boss Robert Nelson made the appeal to Robertson to go with alternative M rather than F. “We said, ‘you can sign this version [M] and you’ll have an Audubon blue ribbon panel of scientists in support of you. You can sign this one [F] and we’re going to tell that you need to disclose that this has only a 50 percent likelihood of having the owls around in a hundred years.’” Given the incredible political pressure brought to bear on Robertson, he opted to take some risk with the owl and rejected the Audubon plan. Robertson’s decision was portrayed by environmentalists as a sellout to industry, but that image overlooks just how limited was the industry’s “victory.” It temporarily avoided

Figure 5. The Scientists Take Charge.

USDA Forest Service photo, courtesy of The Forest History Society.

In July 1990, the Interagency Scientific Committee posed for this photo in the Forest Service chief's conference room, Washington, D.C. Scientists had reached an unprecedented level of influence in the Service. From left: Eric D. Forsman, E. Charles Meslow, Barry R. Noon, Jared Verner, Jack Ward Thomas, Joseph B. Lint.

massive timber cuts, but Robertson's decision implicitly conceded that the science of saving the owl would eventually trump economic need. He had to promise that the decision would be reviewed every five years and adjusted as necessary to maintain owl viability.⁷¹ That all he could give timber communities was a few more years of decent timber harvests was a testament to how science had constrained his discretion.

Robertson never made the mistake of overruling science again. His already limited discretion was wiped out in a series of court rulings that favored environmental groups and forced federal agencies to provide more aggressive protection to the owl and other old-growth species. The Fish and Wildlife Service was essentially ordered by the courts to declare the owl a threatened species in 1989, and the BLM lost in court when it tried to withdraw from interagency planning to save the owl. Judge William Dwyer rejected the Service's SEIS and later ordered the Forest Service to develop a plan to meet its mandate to maintain viable populations of all old-growth species, not just the owl. That order virtually mandated an ecosystem management approach to Pacific Northwest forests. Robertson responded by recruiting Jack Ward Thomas as the head of the Interagency Scientific Committee (ISC). He gave its scientists free rein to design a management plan to save the owl. As Salwasser saw it, the ISC was the birth of agency scientists as "public policy strategists."⁷²

Robertson decided that he had to remake the agency and put scientists on an equal footing with foresters. The twin controversies of clear-cutting and what he

called “the real driver,” endangered species protection as enforced by environmental litigation, pushed him to an extraordinary conclusion. “I had decided ... [that] I had to get out of the clearcutting business.” “You couldn’t overlook the conclusion that multiple use management forestry that the Forest Service was practicing was creating endangered species ... The National Forest Management Act basically said we were to manage the national forests for all viable populations of species, and obviously we were falling short on that.”⁷³ The Service needed a new environmentally attuned management philosophy.

Just because he had come to that conclusion, Robertson knew, did not mean much if he did not have the support of the Service, the Department of Agriculture, and the White House. “You can’t tell people to stop breathing without giving them an alternative.... I had that grand scheme in my mind; we came out with *New Perspectives*, which was a pilot test.”⁷⁴ *New Perspectives* was rooted in the earlier ideas put forward in management plans such as Thomas’s Blue Mountain study, and since the 1970s, many Service staff had advocated for ecosystem management. In particular, scientists crafting the SEIS had recommended that the statement focus on the old-growth ecosystem rather than just the owl. Spotted owl planning, however, had sucked up the agency’s resources, and broadening the planning to do an entire ecosystem seemed impossible.⁷⁵ But when faced with this crisis, the Service chose a new course. Headed by Hal Salwasser, *New Perspectives* became the trial run for ecosystem management.

Many of the scientific ideas for *New Perspectives* came from informal experiments between scientists and foresters in national forests throughout the country and from Forest Service experiments that had been going on since the early 1970s in the H.J. Andrews Experimental Forest in Oregon under the guidance of Jerry Franklin, a Forest Service researcher and later a professor at the University of Washington. He was the foremost expert on old-growth forests in the country, and he espoused a “New Forestry” to replace the clearcuts. “I guess it was the stimulation of the spotted owl crisis that brought it [New Forestry] together—the notion that each of these pieces [of the forest] has to be addressed as part of a whole, and that forestry really needed a new philosophy of how to operate.” New Forestry, he claimed, was a “kinder and gentler forestry that better accommodates ecological values, while allowing for the extraction of commodities.”⁷⁶ Franklin had always been less interested in timber-worthy trees than the rest of the forest, the woody debris and fallen logs that replenished the soil and provided nutrients for many species, and the standing dead trees—snags—that provided habitat for cavity nesting birds. Rather than cleaning up or burning away this “slash,” Franklin advocated leaving behind a messy forest. He created migration corridors of trees for wildlife, and larger buffer strips near streams and rivers. He even advocated replanting cut-over areas with mixed species rather than a monoculture of Douglas Fir, the traditional practice for clear-cut logging. The idea, as Bruce Marcot said,

Figure 6. Dale Robertson.

Courtesy of The Forest History Society.

Although much criticized by environmentalists, Dale Robertson was a critical force in moving the Forest Service away from multiple-use forestry to new initiatives in ecosystem management.

was to create a “thread through time” of the forest elements that ensured the continuity of its ecological functions.⁷⁷

The challenge for the Service was to meld Franklin’s scientific ideas with new management practices, politics, and public input. And even though “much of the stimulus for New Perspectives ... originated with the old-growth forest issue in the Pacific Northwest,” as Salwasser stated, the Service needed to take advantage of similar trends elsewhere in the national forests.⁷⁸ He received funding to sponsor experimental projects on forests in every region of the country to get scientists and land managers to develop alternatives to clear-cutting. From these experiments, the Service drew up four key principles to successful land management: sustainability, public participation and partnerships, integration (interdisciplinary approaches), and collaboration of all involved parties. Although the Service had been moving away from a dominant expert model for some time, New Perspectives was an admission that the old Progressive era model that hoped to substitute expertise for politics was not workable in this new age of litigation. A better melding of the two was needed.⁷⁹

Figure 7. Taking Power.

Courtesy of The Forest History Society.

Appointed as Chief in 1993, Jack Ward Thomas's promotion symbolized and solidified the influence of science at all levels of the Service.

Persuading the White House to go along with New Perspective's ecosystem management ideas required some luck of timing. In 1992, Robertson took advantage of George W. Bush's floundering on environmental issues at the Rio Summit to convince the president's chief of staff and his friend, Clayton Yeutter, that Bush could save his international image on environmental issues by announcing the end of clear-cutting and the Service's conversion to Ecosystem Management. Bush agreed and announced the decision at the Summit. On July 28, 1992, Robertson approved the new charter for Ecosystem Management with largely the same key principles that had guided New Perspectives.⁸⁰

As Ecosystem Management moved from pilot to policy, Jack Ward Thomas and his team developed a working model for the Pacific Northwest.⁸¹ The science of viable populations had come a long way and proved unassailable when the Bush administration tried to undermine the conclusions of Thomas's team. Bush's Secretary of the Interior, Manuel Lujan, reportedly blustered that "no bunch of biologists are going to determine policy for the United States government."⁸² But that is exactly what happened. Under the weight of court orders and a mandate by President Bill Clinton, the Forest Ecosystem

Management Assessment Team (FEMAT) developed a plan to manage old-growth forests and save spotted owls. In its approach and expansive review of the environmental, economic, and social considerations inherent in managing old-growth, the FEMAT report was a model of the Service's ecosystem management philosophy and the basis for Clinton's Northwest Forest Plan (NFP). The Plan continues to govern old-growth and spotted owl management today.

The spotted owl controversy reveals how, through the environmental laws of the 1970s, scientists had insinuated themselves into the framework of federal environmental policy. It is rarely recognized just how much science informed Forest Service policy, no doubt due in part to the scientists themselves, many of whom did not understand the power they had amassed or, perhaps, they were not willing to admit that they had long ago crossed the blurry line between science and policy.⁸³ This sentiment was best expressed in a report by Thomas and others on the viability of all species in old growth. The team expressed wonderment and exasperation at the fine mess that politicians and bureaucrats had gotten them into. They noted the "cauldron" of laws, regulations, court cases, and decrees from politicians and bureaucrats that had forced a blundering Forest Service into a de facto ecosystem management policy. Strangely, they wrote, "However, it is not for scientists to determine policy."⁸⁴ They had, of course, been doing it all along. In every aspect of the policy cycle—agenda setting, formulation, legitimation, implementation, assessment, and reformulation—scientists and science dominated. One activist put it best when he noted of the spotted owl story, "more than any other natural resource controversy in recent years, this one has been shaped by scientific research." That research and the scientists behind it shaped the spotted owl controversy and the creation of Ecosystem Management, ending the Forest Service's dominant philosophy of "getting out the cut."⁸⁵

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NOTES

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Hal Salwasser, and Douglas MacCleery. Thanks also goes to the staff at the Forest History Society. Cheryl Oakes and Steve Anderson made a research trip to Durham most enjoyable. Finally, Dale Phipps took me up close to a spotted owl one unforgettable morning and demonstrated how much the people of the Pacific Northwest care about their forests.

1. Jack Ward Thomas, *Jack Ward Thomas: The Journals of a Forest Service Chief*, ed. Harold K. Steen (Seattle: University of Washington Press, 2004), 50.
2. Hal Salwasser, "Ecosystem Management: Charter for Washington Office Staff and Interdisciplinary Teams," July 28, 1992, U.S. Forest Service History Collection (FSHC), Forest History Society, Durham, NC, F5.3.
3. Samuel P. Hays, *Wars in the Woods: The Rise of Ecological Forestry in America* (Pittsburgh, PA: University of Pittsburgh Press, 2007), xi. Hays's recent history of the Forest Service exaggerates the importance of activists and scientists outside the agency in changing its culture and does not address the internal agency factors that caused this shift. Samuel P. Hays, *The American People and the National Forests: The First Century of the U.S. Forest Service* (Pittsburgh, PA: University of Pittsburgh Press, 2009), 106-36.
4. Jack Ward Thomas, telephone interview by the author, August 7, 2009.
5. Hays, *American People and the National Forests*, 12; Richard Freeman "The EcoFactory: The United States Forest Service and the Political Construction of Ecosystem Management," *Environmental History* 7 (October 2002): 632-58; William M. Salka, "Mission Evolution: The United States Forest Service's Response to Crisis," *Review of Policy Research* 21 (2004): 221-32; Steven Lewis Yaffee, *The Wisdom of the Spotted Owl: Policy Lessons for a New Century* (Washington, DC: Island Press, 1994), xxi; Kathie Durbin, *Tree Huggers: Victory, Defeat and Renewal in the Northwest Ancient Forest Campaign* (Seattle, WA: The Mountaineers, 1996), 93; Miles Burnett and Charles Davis, "Getting Out the Cut: Politics and National Forest Timber Harvests, 1960-1995," *Administration and Society* 34 (2002): 202-28; and Daniel J. Rohlf, "Science, Law, and Policy in Managing Natural Resources: Toward a Sound Mix Rather than a Sound Bite," in *Forest Futures: Science, Politics, and Policy for the Next Century*, ed. Karen Arabas and Joe Bowersox (Lanham, MD: Rowman and Littlefield, 2004): 127-42. George Hoberg also argues for the primacy of values and the environmental movement. They along with Forest Service regulations made it possible for scientists to have greater influence in the Forest Service and create Ecosystem Management. Thus scientific influence was more a result than a cause. This overlooks that it was largely scientists who began this controversy and wrote the regulations that empowered them. George Hoberg, "The Emerging Triumph of Ecosystem Management: The Transformation of Federal Forest Policy," in *Western Public Lands and Environmental Politics*, ed. Charles Davis, 2nd ed. (Boulder, CO: Westview Press, 2001): 72. At the other end of the spectrum, Gerald Williams and Christopher McGrory Klyza have briefly argued that the policy was a more rational decision based on evolving science from within the agency. Gerald W. Williams, *The U.S. Forest Service in the Pacific Northwest: A History* (Corvallis: Oregon State University Press, 2009), 359; and Christopher McGrory Klyza *Who Controls Public Lands? Mining Forestry, and Grazing Policies, 1870-1990* (Chapel Hill: University of North Carolina Press, 1996), 149.
6. Steven L. Yaffee, "The Northern Spotted Owl: An Indicator of the Importance of Sociopolitical Context," in *Endangered Species Recovery: Finding the Lessons*,

- Improving the Process*, ed. Tim W. Clark, Richard P. Reading, and Alice L. Clarke (Washington, DC: Island Press, 1994), 64. This volume also contains articles by Richard P. Reading and Brian J. Miller, David J. Mattson and John J. Craighead, and Craig R. Groves that see agencies as subverting science to maintain institutional priorities. Paul Hirt offers an excellent portrayal of dissent within the agency that forced a new policy, but sees Ecosystem Management as the Service's effort at changing to remain the same. Paul W. Hirt, *A Conspiracy of Optimism: Management of the National Forests Since World War Two* (Lincoln: University of Nebraska Press, 1994), 285-91.
7. Steven Yaffee offers one of the best analyses of the forces that led to change within the Forest Service, but even he accepts the stereotype that "agency officials did not seek information aggressively because they did not want to find out what they did not want to know." But the agency's record is more mixed. From the very beginning, it pursued aggressively new information on the owl and used it in making decisions about its preservation. Yaffee, *The Wisdom of the Spotted Owl*, 204.
 8. Hal Salwasser, interview by author, February 4, 2009, Corvallis, OR.
 9. Thomas Dunlap finds similar influence by scientists on public opinion and agency behavior. Thomas R. Dunlap, *Saving America's Wildlife* (Princeton, NJ: Princeton University Press, 1988).
 10. The Forest Service's research division had long enjoyed autonomy from regional foresters, since they answered only to the Service's chief. See Margaret Herring and Sarah Greene, *Forest of Time: A Century of Science at Wind River Experimental Forest* (Corvallis: Oregon State University Press, 2007), 37 and 64-65. Paul W. Hirt, "Predicting the Future by Understanding the Past: A Historian Considers the Forest Service," in *A Vision for the U.S. Forest Service: Goals for Its Next Century*, ed. Roger Sedjo (Washington, DC: Resources for the Future, 2000), 155.
 11. Shelia Jasanoff, *The Fifth Branch: Science Advisors as Policymakers* (Cambridge: Harvard University Press, 1990), 39-60. These trends were widely felt throughout federal agencies as the "new social regulation" of the 1970s replaced bureaucratic autonomy with a more transparent system that subjected administrative decisions to greater scrutiny by scientists, citizens, and the courts.
 12. Dunlap, *Saving America's Wildlife*, xiii.
 13. Eric Forsman, interview by the author, February 3, 2009, Corvallis, OR.
 14. Ibid.
 15. Howard Wight and Eric Forsman, "Prospectus of Proposed Research under Bureau of Sport Fisheries and Wildlife with Oregon State University," April 7, 1972, Charles E. Meslow Papers (Meslow papers), Oregon State University Archives, Corvallis, Oregon, Box 32; Wight and Forsman, "Research Proposal, Oregon Cooperative Wildlife Research Unit," March 30, 1973, Meslow papers, box 32; and Thomas, telephone interview.
 16. Scientists had been essential to these changing priorities since the late nineteenth century. See Dunlap, *Saving America's Wildlife*.
 17. Charles Bruce, interview by author, February 3, 2009, Corvallis OR. The Forest Service also provided 50 percent funding for spotted owl studies in northern California. California, Department of Fish and Game, "The Status of the Spotted Owl in Northwestern California," October 1973, by Gordon I. Gould; and California, Department of Fish and Game and the U.S. Forest Service, "The Status of the Spotted Owl in California," August 1974, by Gordon I. Gould.
 18. Jim Lyon, interview notes, December 28, 1995, FSHC, F18.3.

19. George Hoberg. "The Emerging Triumph of Ecosystem Management: The Transformation of Federal Forest Policy," in *Western Public Lands and Environmental Politics*, ed. Charles Davis (Boulder, CO: Westview Press, 2001), 63; Paul Shields, interview notes, December 12, 1995, FSHC, F18.3. Wildlife leadership in the Service also pushed for greater resources by commissioning a study by the Wildlife Management Institute of its programs. The WMI study recommended a dramatic expansion of the agency's wildlife capability. Many of its recommendations were implemented. Wildlife Management Institute, *Evaluation of Forest Service Wildlife and Fish Programs in the Intermountain, Pacific Northwest, and Southern Regions* (Washington, DC: Wildlife Management Institute, January 1979); Lonnie Williamson, interview notes, November 29, [1995?]; Dale Jones, interview notes, February 13, 1996, FSHC, F18.3; Dale Jones, telephone interview by author, August 10, 2009.
20. Leon Murphy, interview notes, January 17, 1996, FSHC, F18.3; Jeff Sirmon, telephone interview with the author, August 28, 2009; F. Dale Robertson, *An Interview with F. Dale Robertson*, ed. Harold K. Steen, (Durham, NC: Forest History Society, August 12-14, 1999), 26.
21. Glenn Patrick Juday, "Old Growth Forests: A Necessary Element of Multiple Use and Sustained Yield National Forest Management," *Environmental Law* 8 (1976): 497-522; Robert J. Hrubes and Giuseppe Rensi, "Options for Reducing 'Waste' in the Management of Old-Growth Forests," *Journal of Forestry* 75 (November 1977): 719-21; R. William Mannan, "Assemblages of Bird Species in Western Coniferous Old-Growth Forests," *Workshop Proceedings: Management of Western Forests and Grasslands for Nongame Birds* Richard M. DeGraff (Ogden, UT: Forest Service February 11-14, 1980): 357-68.
22. Harold K. Steen, *Forest Service Research: Finding Answers to Conservation's Questions* (Durham, NC: Forest History Society, 1998), 10-12, 77-78; Herring and Greene, *Forest of Time*, 65; Terry L. West, "Research in the U.S.D.A. Forest Service: A Historian's View," (paper presented at the Third Symposium in Resource Management, College Station, TX, May 18, 1990); and Jack Ward Thomas, *An Interview with Jack Ward Thomas*, ed. Harold K. Steen (Durham, NC: Forest History Society, 2002), 11.
23. John S. Gottschalk, "Keynote Address: The Challenge of Practical Ecology," *Proceedings of the Symposium on Management of Forest and Range Habitats for Nongame Birds* (Washington, DC: Forest Service, July 1975), 5.
24. See numerous letters from Forsman in Meslow Papers, Box 32.
25. Eric Forsman, interview; Robert C. McQuown to Eric D. Forsman, May 9, 1973, Meslow papers, box 32; Robert C. McQuown to Jack Inman, June 1, 1973, Record Group 95, Forest Service Records (FSR), National Archives, Pacific Northwest Branch, Seattle, WA, 95-79-0347, "Threatened Species," box 4; and "Minutes, Oregon Endangered Species Task Force: First Meeting," June 29, 1973, Office Files of the Oregon Department of Fish and Wildlife (ODFW), Salem, OR.
26. Robert Thorheim and Archie D. Craft to Robert Mace, August 16, 1973, FSR, 95-79-0347, "Threatened Species," box 4; and Salwasser, interview.
27. Eric D. Forsman, "A Preliminary Investigation of the Spotted Owl in Oregon," (master's thesis, Oregon State University, 1976); and Eric D. Forsman, "Habitat Utilization by Spotted Owls in the West-Central Cascades of Oregon," (PhD diss., Oregon State University, 1980). Even before Forsman had finished his dissertation, the Service had drifted above the 300-acre requirement when some forests reserved 540 acres of old growth for the owl. Department of Agriculture, U.S. Forest Service,

- Interim Spotted Owl Management Plan for the Gifford Pinchot National Forest* by Dennis Mengel and William Ruediger, (Vancouver: Gifford Pinchot National Forest, 1980), 4. For any close observer from the timber industry, Forsman's dissertation had to be a scary portent of the future. In his study of fourteen adult owls, the smallest home range he found for a pair was about one thousand acres. The average, however, was about four thousand acres. For five hundred pairs, that was 2 million acres, about twice the size of Rhode Island. See also Forest Service, *Regional Guide for the Pacific Northwest Region* (Portland, OR: Forest Service, May 1984), Appendices C and F. For industry complaints that forest supervisors were assuming that one thousand acres had become a minimum, see Dennis Hayward to Jeff Sirmon, July 26, 1982, FSR, 95-97-0118, "FS Region 6 Recreation and Land Management."
28. Donald H. Morton to Forest Supervisors, May 17, 1977, FSR, 95-79-0347, "Threatened Species," box 3.
 29. See Resource Studies Section, Plans and Programming to Executive Staff, October 30, 1978, Oregon Department of Forestry, Oregon State Archives, Salem, Oregon, Endangered Species Resource Studies, Box 57 (Department of Forestry); Resource Studies Section to Executive Staff, March 10, 1978, Department of Forestry, box 57; Robert Greaves to Bill Holtscaw, Mike Beyerle, and Lee Ash, July 21, 1978, Department of Forestry, box 57; Robert [Greaves] to Mike [Beyerle], February 14, 1978, Department of Forestry, box 57; and Leland Ash to Neil Skill and Ron Smith, February 24, 1978. Department of Forestry, box 57.
 30. Harold K. Steen, *The U.S. Forest Service: A History* (Seattle: University of Washington Press, 1976), 113.
 31. Studies by Oregon State University, Oregon State Forestry Department, and the Industrial Forestry Association indicated that the only way to fill the coming gap in output from private lands was to cut old-growth forests on Forest Service and BLM lands. There was great concern that the Forest Service was reserving too much wilderness. See John H. Beuter, K. Norman Johnson, and H. Lynn Scheurman, *Timber for Oregon's Tomorrow: An Analysis of Reasonably Possible Outcomes* (Corvallis, OR: Forest Research Laboratory, School of Forestry, Oregon State University, January 1976), 63; David H. Stere, Blair R. Hopps, and Gary Lettman, *1980 Oregon Timber Supply Assessment: Projections of Future Available Harvests* (Salem: Oregon State Forestry Department, December 1980), v, 5, 8, and 10; and Forest Industries Council, *Oregon Forest Productivity Report 1980* (Washington, DC: Forest Industries Council, 1980).
 32. "Minutes of the Meeting of the Oregon Wildlife Commission, January 10, 1975, ODFW; R. Dennis Hayward, "The Northern Spotted Owl—Industry's Perspective," October 7, 1985, ODFW. The forest industry argued that the state listing was a "political, rather than scientific decision." Whether the spotted owl was listed as a political act to force federal agencies to protect the owl under the Sikes Act is uncertain, but the owl had already been listed as threatened in unofficial federal reports before this.
 33. The best account of the passage of the National Forest Management Act is Dennis C. Le Master, *Decade of Change: The Remaking of the Forest Service Statutory Authority during the 1970s* (Westport, CT: Greenwood Press, 1984).
 34. Lee Metcalf to Art W. Cooper, July 25, 1977, Arthur Cooper Papers (Cooper papers), Forest History Society, Durham, NC, box 2.
 35. Charles R. Hartgraves, telephone interview by author, July 27, 2009; and Charles R. Hartgraves, "The Development of Regulations for the National Forest System

- Land and Resource Management Planning," *Forest and Conservation History* 36 (July 1992): 125-28.
36. Fred A. Seaton, et al., *Report of the President's Advisory Panel on Timber and the Environment* (Washington, DC: U.S. Government Printing Office, April 1973), 468-89, and William Webb, et al., "Effect of Logging on Songbird Populations in a Northern Hardwood Forest," *Wildlife Monographs* 55 (July 1977): 3-35.
 37. William L. Webb to Arthur Cooper, August 18, 1977, Cooper Papers, box 2, emphasis in the original. Wildlife biologists within the Forest Service agreed with Webb in seeing the NFMA as a "new era in Forest Service fish and wildlife habitat management." Leon Murphy to Forest Supervisors, June 3 1977, FSR, 95-79-0347, Threatened Species, box 1.
 38. William L. Webb, "Comments on Draft R.P.A. Assessment Element Outline for 1980," June 1977, p. 34-36 in "Minutes, Committee of Scientists Meeting, August 29-30, 1977, Cooper Papers, box 1.
 39. N. W. Moore, "The Heaths of Dorset and their Conservation," *Journal of Ecology* 50 (July 1962): 369; Sherwin Carlquist, "The Biota of Long-Distance Dispersal. I. Principles of Dispersal and Evolution," *The Quarterly Review of Biology* 41 (September 1966): 247-70; Ralph Axtell, "Geographic Distribution of the Unisexual Whiptail *Cnemidophorus neomexicanus* (Sauria: Teiidae): Present and Past," *Herpetologica* 22 (December 30, 1966): 241-53.
 40. M. D. Hooper, "The Size and Surroundings of Nature Reserves," in *The Scientific Management of Animal and Plant Communities for Conservation*, ed. E. Duffey (Oxford: Blackwell Scientific Publications, 1970): 555-61; A. R. Main and M. Yadav, "Conservation of Macropods in Reserves in Western Australia," *Biological Conservation* 3 (January 1971): 123-33. The first sophisticated study of minimum viable populations is usually credited to Mark Leslie Shaffer, "Determining Minimum Viable Population Sizes: A Case Study of the Grizzly Bear (*Ursus arctos* L.)" (PhD diss, Duke University, 1978). However, fisheries biologists preceded him in constructing models analyzing commercial exploitation. J. R. Gould, "Extinction of a Fishery by Commercial Exploitation: A Note," *The Journal of Political Economy* 80 (September-October 1972): 1031-38; Colin W. Clark, "The Economics of Overexploitation," *Science* 181 (August 17, 1973): 630-34.
 41. Eastern Wolf Recovery Team, *Recovery Plan for the Eastern Timber Wolf* (Washington, DC: Government Printing Office, 1978), 8. See in particular Forest Service correspondence with the Fish and Wildlife Service on the timber wolf, Richard T. Brewster, et al., "An Analysis of Recovery Plan for the Eastern Timber Wolf," in vol. 2.
 42. Jack Ward Thomas, et al., "Guidelines for Maintaining and Enhancing Wildlife Habitat in Forest Management in the Blue Mountains of Oregon and Washington," *Transactions of the North American Wildlife and Natural Resources Conference* 41(1976): 452-76; Hugh Black and Jack Ward Thomas, "Forest and Range Wildlife Habitat Management: Ecological Principles and Management Systems," in *Proceedings of the Workshop on Nongame Bird Habitat Management in the Coniferous Forests of the Western United States*, ed. Richard M. DeGraaf (Portland, OR: Pacific Northwest Forest and Range Experiment Station, February 7-9, 1977), 47-55; and Jack Ward Thomas, ed., *Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington* (Washington, DC: U.S. Forest Service, Wildlife Management Institute, and U.S. Bureau of Land Management, September 1979), 6-7, and 72-75.
 43. Leon Murphy, interview notes, January 17, 1996, FSHC, F18.3.

44. Dale A. Jones to Regional Foresters, December 8, 1977, FSHC, F15.2. The report used viability language in reference to the spotted owl.
45. Dale A. Jones, telephone interview by author, August 9, 2009; Art Cooper to Committee of Scientists, March 15, 1978, Cooper papers, box 2; Committee of Scientists Meeting, minutes, March 29-30, 1978, Dallas, TX, Cooper papers, box 1; *Federal Register*, May 4, 1979, 26554.
46. Samuel Hays's criticism of the Service on species protection is typical of this view. He argues that the Service did only the minimum required by law. Hays, *American People and the National Forests*, 23, 112, and 124. Some of the Service's own wildlife specialists, however, understood the enormous significance of the new regulations. See Karl P. Siderits, "Nongame Bird Management on the National Forests in the Eastern Region—USDA Forest Service," in *Management of North Central and Northeastern Forests for Nongame Birds*, ed. Richard M DeGraaf (St. Paul, MN: U.S. Forest Service, 1979), 258; Larry Hedrick, interview notes, February 26, 1996, FSHC, F18.3. Other specialists, however, later saw the subsequent litigation as neutralizing any benefits. Stephen Mealey, telephone interview by author, August 3, 2009.
47. Thomas, *An Interview with Jack Ward Thomas*, 9, and Thomas, *Wildlife Habitats in Managed Forests*, 72-74.
48. Thomas, telephone interview; United States Senate, Hearing Before the Subcommittee on Parks, Recreation, and Renewable Resources of the Committee on Energy and Natural Resources, *National Forest Management Act Regulations*, 96th Cong. 1st sess., May 16, 1979, 44; "Department of Agriculture, Forest Service, National Forest System Land and Resources Management Planning," *Federal Register*, vol. 44, 17 September 1979, 53998.
49. Michael E. Soule, "Thresholds for Survival: Maintaining Fitness and Evolutionary Potential," in *Conservation Biology: An Evolutionary-Ecological Perspective*, ed. Michael E. Soule and Bruce A. Wilcox (Sunderland, MA: Sinauer Associates, 1980): 151-70. A couple of months after consulting with Soule, the Forest Service issued a new directive on viable populations that leaned heavily on his research. J. B. Hilmon to Regional Foresters, February, 24, 1982, FSR, 95-96-0161, "FS Region 6 Recreation and Land Management," box 2.
50. Ralph G. Peinecke to Jeff M. Sirmon, December 23, 1982; and Rick Bailey, et al., to Charles T. Coston, October 21, 1985, FSR, 95-97-0118, "FS Region 6 Recreation and Land Management;" Richard T. Bailey to Al Lampi, September 21, 1983, FSR, 95-96-0161, "Region 6 Recreation and Land Management," box 2.
51. Salwasser, interview; Hal Salwasser, et al., "Wildlife Population Viability: A Question of Risk," *Transactions of the North American Wildlife and Natural Resources Conference* 49 (1984): 421-39.
52. Sirmon, interview.
53. K. Norman Johnson, "Reflections on the Development of FORPLAN," in *FORPLAN: An Evaluation of a Forest Planning Tool, Proceedings of a Symposium November 4-6, 1986, Denver Colorado* (Fort Collins, CO: Forest Service, April 1987): 45-51; Dennis E. Teeguarden, "The Committee of Scientists Perspective on the Analytical Requirements for Forest Planning," in *FORPLAN*, 22; H. H. Shugart and Bradley J. Gilbert, "Ecological Evaluation of FORPLAN in National Forest Planning," in *FORPLAN*, 108; Western Forest Industries Association to Dale Robertson, July 21, 1982, FSR, 95-97-0118, "FS Region 6 Recreation and Land Management;" and Williams, *U.S. Forest Service in the Pacific Northwest*, 272-77. Technical difficulties associated with FORPLAN and the political pressure put on the Service by the

- industry made planning frustratingly complex. Planning created extensive dissent in the Service over its timber harvest goals. See the extensive correspondence in FSR, 95-97-0118, "FS Region 6 Recreation and Land Management," and Hirt, *Conspiracy of Optimism*, 266-92.
54. For the reaction to the draft regulations, see U.S. House of Representatives, Hearing Before the Subcommittee on Forests, Family Farms, and Energy of the Committee on Agriculture, *National Forest Management Act Regulations*, 97th Cong. 2nd sess., March 10, 1982; and Cooper papers, box 6. The forest industry had identified the requirement for protecting all species as a major concern. R. Dennis Hayward, "An Industry White Paper: 'What You Always Needed to Know About the Northern Spotted Owl—But Didn't Know to Ask,'" May 1981, in possession of the author.
 55. J. B. Hilmon to Regional Foresters, February, 24, 1982, FSR, 95-96-0161, "FS Region 6 Recreation and Land Management," box 2; Bill [Webb] to Art [Cooper], July 9, 1982, Cooper papers, box 6; Arthur W. Cooper to R. Max Peterson, July 26, 1982, Cooper Papers, box 6; Hartgraves, interview; Arthur W. Cooper, interview by author June 16, 2009, Raleigh, NC; "36 CFR Part 219, National Forest System land and Resource Management Planning," *Federal Register*, 47 September 30, 1982, 43026; Salwasser, interview.
 56. Dennis Hayward to Region 6 Technical Committee, October 1, 1982, FSR, 95-97-0118, "FS Region 6 Recreation and Land Management;" Dennis Hayward, telephone interview by author, July 23, 2009.
 57. R. Max Peterson, "Diversity Requirements in the National Forest Management Act," in *Natural Diversity in Forest Ecosystems: Proceedings of the Workshop November 29-December 1, 1982* ed. James L. Cooley and June H. Cooley (Athens, GA: University of Georgia, April 1984), 21-26; Hal Salwasser, et al., "Applying the Diversity Concept to National Forest Management," in *Natural Diversity in Forest Ecosystems*, 59-69; Salwasser, et al., "Applying Species-Habitat Relationships in Managing for National Forest Wildlife Diversity," in *Natural Diversity in Forest Ecosystems*, 173-81; William L. Webb, "Polyculture: The NFMA Mandate for Variety," in *Natural Diversity in Forest Ecosystems*, 183-92; Jack Ward Thomas, "Towards the Managed Forest: Going Places We've Never Been," *The Forestry Chronicle*, April 1985, 168-70.
 58. Attachment 1 to "Discussion Outline: Forest Industry Region 6 Policy Committee/Region Forester Regional Issue Update," April 12, 1983, FSR, 95-97-0118, "FS Region 6 Recreation and Land Management."
 59. Salwasser, interview. The industry tried to get its own experts to do battle on spotted owl issues, but the studies were never as credible as the ones done by academics or the Service's scientists, and some largely confirmed the existing literature. See Howard R. Postovit, "A Survey of the Spotted Owl in Northwestern Washington," (Washington, DC: Forest Industry Resource and Environment Program, [1977?]); Robert E. Vincent, "An Evaluation of Spotted Owl Inventory and Management on U.S. Forest Service Lands in Region Six," January 1986, Bruce Marcot Papers, Oregon State University Archives, Corvallis, OR, box 5.
 60. See attachment to Dale Robertson to Jeff Sirmon, May 24, 1983, FSR, 95-97-0118, "FS Region 6 Recreation and Land Management;" U.S. Forest Service, "A Report on Minimum Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region," June 1986.
 61. United States Forest Service, *Regional Guide for the Pacific Northwest Region* (Portland, OR: Forest Service, 1984), sec. 3-12-15, Appendices C and F; Forest Service, *Final Environmental Impact Statement for the Pacific Northwest Regional*

- Guide* (Portland, OR: Forest Service, 1984), sec. 2-24-29. Sirmon, interview. The BLM had in fact tried to walk away from the existing agreement in 1982, which had raised Sirmon's ire. *The News Register* (Roseburg, OR), September 29, 1982; Jeff M. Sirmon, August 20, 1982, FSR, 95-97-0118, "FS Region 6 Recreation and Land Management," FSR, 95-97-0118, "FS Region 6 Recreation and Land Management."
62. Environmentalists were late comers to the owl controversy. Their first publication on the issues was not until 1979. See Cameron LaFollette, *Saving All the Pieces: Old Growth Forest in Oregon*, Oregon Student Public Interest Research Group, March 1979.
 63. Forest Service, *Draft Supplement to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide*, vol. 2 (Portland, OR: Forest Service, 1986), Appendix G.
 64. Hayward realized later that the industry's logic contained a fatal flaw. Economics mattered little to the national public: "If it isn't my job that's at stake and the price of a two by four I can still afford ... then nuts with you." Hayward, interview; Douglas MacCleery, telephone interview by author, August 26, 2009; Douglas W. MacCleery to R. Max Peterson, March 8 1985, in *Draft Supplement to the Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide*, vol. 2 (Portland, OR: Forest Service 1986), appendix G.
 65. Bruce Marcot, interview by author, February 2, 2009, Portland, OR; Bruce G. Marcot and Richard Holthausen, "Analyzing Population Viability of the Spotted Owl in the Pacific Northwest," *Transactions of the North American Wildlife and Natural Resources Conference* 52 (1987): 333-47; Bruce G. Marcot, "The Quandaries and Promise of Risk Management: A Scientist's Perspective on Integration of Science and Management," *The George Wright Forum* 24 (2007): 30.
 66. Yaffee, *The Wisdom of the Spotted Owl*, 96.
 67. Peterson, *An Interview*, 151.
 68. Forest Service, *Summary of the Supplement to the Final Environmental Impact Statement for an Amendment to the Pacific Northwest Regional Guide: Planning for Management of Spotted Owl Habitat in the National Forests of the Pacific Northwest*, (Portland, OR: Forest Service, July 1988), 41-44.
 69. Advisory Panel of the Spotted Owl, *Report of the Advisory Panel on the Spotted Owl* (New York: National Audubon Society, 1986).
 70. Forest Service, *Summary of the Supplement to the Final Environmental Impact Statement*, 41-44.
 71. Salwasser, interview; and Dale F. Robertson, "Record of Decision: USDA Forest Service Amendment to the Pacific Northwest Regional Guide, Final Supplement to the Final Environmental Impact Statement," 8 December 1988, 6.
 72. Hal Salwasser, "The Challenge of New Perspectives," at the *Rocky Mountain New Perspectives Proceedings of a Regional Workshop* (Fort Collins, CO: U.S. Forest Service, July 8-10, 1991), 6. The Fish and Wildlife Service leadership was found to have blatantly overridden the recommendations of its scientists in refusing to list the owl. See U.S. General Accounting Office, *Report to the Chairman, Subcommittee on Fisheries and Wildlife Conservation and the Environment, Committee on Merchant Marine and Fisheries, House of Representatives, Endangered Species: Spotted Owl Petition Beset by Problems*, February 1989.
 73. Robertson, interview, 19 and 81; and MacCleery, interview.
 74. Robertson, interview, 21 and 85.
 75. "Task 9 Post Analysis—Minimum Management Requirements for Wildlife Species Associated with Old Growth," N.D. FSR, 95-96-0161, "FS Region 6 Recreation and

- Land Management,” box 2; and “Draft Working Paper; Management Prescriptions,” N.D., FSR, 95-96-0161, “FS Region 6 Recreation and Land Management,” box 2.
76. Jon R. Luoma, *The Hidden Forest: The Biography of an Ecosystem* (New York: Henry Holt, 1999), 162; Jerry Franklin, “Toward a New Forestry,” *American Forests*, November/December 1989, 2. Luoma’s work is the best treatment of the pioneering work done at the Andrews Forest.
 77. Franklin, “Toward a New Forestry,” 1-8 and Gerald W. Williams, “New Perspectives, New Forestry, or Biological Diversity: How Did We Get Here?” May 1991, FSHC, F12.1; Herring and Greene, *Forest of Time*, 111-23; and Marco, interview.
 78. Hal Salwasser, “New Perspectives for Managing the National Forest System,” May 9, 1990, FSHC, F12.1.
 79. Winfred B. Kessler, “Why We are Taking a New Perspective on National Forest Management,” March 10-12, 1991, FSHC, F 12.1; Salwasser, interview; Sirmon, interview.
 80. Robertson, interview, 85-88; *San Jose Mercury News*, June 4, 1992; Hal Salwasser, “Ecosystem Management: Charter for Washington Office and Interdisciplinary Teams,” July 28, 1992, FSHC, F5.3.
 81. Forest Service, *Viability Assessments and Management Considerations for Species Associated with Late-Successional and Old-Growth Forests of the Pacific Northwest*, by Jack Ward Thomas, et al. (Washington, DC: US Government Printing Office, March 1993); and Forest Ecosystem Management Assessment Team, *Forest Ecosystem Management: An Ecological, Economic, and Social Assessment*, by Jack Ward Thomas, et al. (Washington, DC: US Government Printing Office, July 1993).
 82. Thomas, *The Journals of a Forest Service Chief*, 30.
 83. Jack Ward Thomas, “Sustainability of the Northwest Forest Plan: Still to be Tested,” in *Forest Futures*, 3-22. As Shelia Jasanoff argues, “The notion that scientific advisers can or do limit themselves to addressing purely scientific issues, in particular, seems fundamentally misconceived.” Jasanoff, *Fifth Branch*, 249.
 84. Forest Service, *Viability Assessments and Management Considerations*, 7.
 85. Quoted in David A. Perry, “Ecological Realities of the Northwest Forest Plan,” in *Forest Futures*, 23. The recent direction of Ecosystem Management, however, is not so “clear cut.” The Northwest Forest Plan has met with only partial success. The NFP has protected old-growth, but the innovative the “adaptive management areas” (AMAs) that were supposed to create a management model for old-growth areas based on cooperation between researchers and managers, experimentation, public participation and partnerships, and forestry opportunities near logging communities have generated little enthusiasm or new knowledge. The FEMAT’s ideas were drawn up by scientists and ordered implemented by presidential decree. But mandating alliances between scientists and managers, some who remained resentful of their loss of control to scientists, has been difficult. As a result, AMAs have lost out in the competition for agency funds. Science has assumed a prominent position in the Service, but a management synthesis of the interest of foresters, scientists, and citizens remains elusive. Science cannot do it alone. Salwasser, interview; Marcot, interview; George H. Stankey, et al., “Adaptive Management and the Northwest Forest Plan: Rhetoric and Reality,” *Journal of Forestry* 101 (January/February 2003): 40-46; Bernard T. Bormann et al., “Adaptive Management of Forest Ecosystems: Did Some Rubber Hit the Road?” *BioScience* 57 (February 2007): 186-91; Valerie Rapp, *Northwest Forest Plan—The First 10 Years (1994-2003): First Decade Results of the Northwest Forest Plan* (Portland, OR: Forest Service, 2008), 34-37; Richard W. Haynes, et al., eds., *Northwest Forest*

Plan—The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results (Portland, OR: Forest Service, 2006), 224-25. Other Ecosystem Management projects have demonstrated the possibility of using science to facilitate communication and negotiation among competing interest groups. Thomas J. Mills and Roger N. Clark, "Roles of Research Scientists in Natural Resource Decision-Making," *Forest Ecology and Management* 153 (2001): 189-98.