Chapter Five: Integrated Science and Long-Term Programs of Research

The success of the Long Term Ecological Research (LTER) Program at the National Science Foundation (NSF) depended on the credibility, innovation, and intellectual rigor of the science it funded after 1980, and the H.J. Andrews Experimental Forest (Andrews Forest) supplied that need. Long Term Ecological Research funding helped people with career appointments at Oregon State University (OSU) and at the Pacific Northwest (PNW) Research Station make long-term commitments to support, develop, and staff studies at the Andrews Forest with less concern for how much support the university or the Forest Service might be able to provide. This structure of funding, however, meant that most of the people hired to support the Andrews group's research programs after 1980 depended on fixed-term appointments. The group, as a whole, had more autonomy to design and staff programs of research, but many people had to live with constant uncertainty about their futures in that group. Those who succeeded in that environment quickly learned the importance of nurturing good professional and personal relations with other people while pursuing their own research goals.

At the Andrews Forest, the group struggled to dispel the common notion that "very little research … lasts past the lifetime or career of the investigator."[1] During the first LTER grant, they experimented with ways to encourage researchers to cooperate with each other, to look for ways that their projects tied in with earlier studies, and to consider how their studies might help others who might develop studies at that site in the future. They needed to communicate across disciplinary boundaries and from one project to another. At the Andrews Forest, people structured their science to meet goals that the group defined in a collaborative process. The group considered new proposals in the context of previous efforts and plans for future studies at that site. Links among various studies, however, often were apparent only in retrospect. The advent of LTER, and the group exercise of developing proposals for renewal under that NSF program, formalized efforts to identify long-term "threads" of research themes. After two decades of working under this system, the group presented those threads in its fourth LTER proposal (LTER4). It identified each thread of research as a "component" in a broader "synthesis area" that linked scientists and ideas from various studies at the Andrews Forest.

[1] Andrews group interview 22 September 1997, 37; communication from Fred Swanson 2 January 1999.

By the end of the 1990s, scientists at the Andrews Forest had identified nine major threads of long-term continuity linking research efforts applied across the 50-year history of scientific inquiry in this place: (1) vegetation succession; (2) hydrology, small watersheds; (3) soils; (4) disturbance, landscape; (5) wildlife; (6) biodiversity, arthropods; (7) decomposition, carbon dynamics; (8) forest-stream interactions; and (9) information management.[2] These nine threads of research share an emphasis on the characteristics of old-growth stands, but the group's continuing attentiveness to conditions in young, managed stands, also pushed them more in the direction of research at the landscape scale to include much that is not directly related to old growth.

The Andrews Forest of the late 20th century was a landscape dramatically transformed from the "forest primeval" Silen remembered from his work there decades earlier. Experimental clearcuts and other manipulations from the preceding half-century left about a quarter of the Andrews in various stages of regeneration. Young and maturing stands on this landscape offered many different opportunities for research in related components of the ecosystem. The nine threads of research identified in LTER4, however, illustrate the snowballing accumulation of research and specialized skills relevant to old-growth and other issues that this group brought to bear on the Andrews Forest. The self-conscious, group effort to retrospectively trace threads of continuity belies the organic process by which individuals became involved in specific studies and shaped their outcome. Their published work details numerous individual studies, but it seldom conveys the personal initiative and interpersonal skills that linked those projects into this web of interconnected, long-term science. Those human patterns are apparent in various programs initiated since 1969 that collectively illustrate how scientists grounded their studies in the intellectual and physical legacy of the Andrews and contributed to the emerging pattern of those nine threads.

Linkages that were invisible or only vaguely apparent to people at the time, later became more obvious and eventually influenced the direction of long-term research in this group.[3] The nine threads identified for the 50th anniversary of the Andrews Forest illustrate the thinking of the group at the end of the century. This study, consequently, does not attempt to trace any one of those threads from start to

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[2] Andrews group, "H.J. Andrews Experimental Forest Research Timeline," Chart developed for the 50-Year Anniversary History of the H.J. Andrews Experimental Forest, 1998.

[3] Conversations with Fred Swanson September 1998.

finish or provide a comprehensive chronicle. Instead, it explores the style of interaction by highlighting selected studies that collectively illustrate, but do not delimit the nature and depth of interconnectivity in this group.

The group first developed the concept of long-term research at the Andrews Forest and then applied the lessons they learned in that landscape to studies at other scales and in other locations. Studies of stream ecology near logged drainages on the Andrews Forest, for example, contributed to a breakaway proposal for a "river continuum" study with regional and national components that built on an idea originating with Robin Vannote, of the Stroud Water Research Laboratory in Pennsylvania. Scientists who had explored theories of vegetative succession, stream ecology, and geomorphology at the Andrews Forest during the 1970s, as another example, led an interagency study of the effects of the Mount St. Helens eruption in 1980 and returned to the Lookout Creek drainage with new ideas about disturbance and biological legacies. That experience renewed their enthusiasm for "questioning the obvious." In a dramatic example of "questioning the obvious," the group proposed a 200-year log-decomposition study on and near the Andrews Forest. That "long-term" proposal for the first LTER grant also forced the group to grapple with strategies to transfer leadership from one generation of scientists to the next. That long-term commitment also attracted attention to the incongruity of permanent science and temporary facilities, and the group parlayed that paradox into a major grant to support infrastructure improvements at the headquarters site. In the process of improving the site, the group transformed the Andrews Forest into a place for spiritual renewal and professional networking. In this way, long-term research secured a future for the group and the experimental forest itself.

Long-Term Research and Clearcut Legacies

Scientists planning research at the Andrews Forest after 1969 had to fit their studies to the clearcuts, roads, and other consequences of previous management efforts on that landscape. The initial memorandum of understanding establishing the experimental forest had specified that the new facility would supply the entire quota of timber slated for harvest from the Blue River watershed of the Willamette National Forest through the first 15 years of the agreement. That consideration overwhelmed science goals during the initial phase of planning roads and laying out timber sales. The understanding stipulated that sales would "fulfill obligations incurred in accepting access road money for opening up the Blue River watershed." The implications of the agreement were clear: the PNW Station Director agreed to develop cutting plans for the experimental forest "so that this planned rate of cutting can be maintained in an orderly fashion." The Willamette National Forest planned to harvest 20 million board feet of logs per year from the Blue River drainage from 1949 to 1964, with the explicit proviso that this entire amount would come from the experimental forest.[4]

The character of the place relative to the surrounding landscape changed dramatically during the last half of the century. By the late 1960s, the initial agreement had favored management practices that produced a patchwork landscape of clearcuts linked with a network of roads traversing the Lookout Creek drainage. The Andrews Forest was a "gap" surrounded by a relatively intact forest of old-growth timber on nearby drainages. In the last three decades of the century, however, the group curtailed timber harvests on the Andrews Forest while the rate of cutting escalated in nearby drainages, inverting the relation between the experimental forest and the surrounding national forest. The group gradually redefined the Andrews Forest as a science-oriented reserve of regenerating second-growth stands interspersed with relatively extensive stands of old-growth and younger, native forest. The Lookout Creek drainage, by the end of the century, was in a situation inversely similar to conditions at mid century. In the 1950s, the pace of logging on the Andrews Forest had exceeded the pace of logging on nearby drainages, but by the end of the century, proportionally more unlogged, old-growth stands survived on the Andrews Forest than on nearby drainages of the national forest. Scientists who worked at the Andrews Forest during that later period encountered a hybrid landscape in apparent transition, and their perceptions of that place shaped their priorities for future research.

"Roading the Andrews" and "converting" its old-growth stands into young-forest conditions left an enormous amount of woody debris.

The early process of "roading the Andrews" and "converting" its old-growth stands into young-forest conditions left an enormous amount of logging-related, woody debris on the experimental forest. Extensive rot and other damage rendered many of the old-growth logs "unmarketable" by contemporary standards.[5] Amid the decaying woody debris and the young stands regenerating after the extensive logging efforts of the 1950s, Silen perceived a forest in an apparent state of ecological transformation: early surveys of animal populations before logging pronounced that area a "biological desert" and Silen seldom saw game animals during

[4] "Agreement [4 June 1948] between the Regional Forester, Forest Supervisor, and Experiment Station Director …in the administration of the Blue River Experimental Forest," H.J. Andrews Memorandum of Understanding Folder, H.J. Andrews Files, File Box F, Storage Vault, FSL, Corvallis, OR.

[5] December 1992 discussion with Roy Silen, 11-12; communication from Fred Swanson 2 January 1999.

his extensive field work. As logging created new openings in the old-growth stands, however, Silen observed "heavy" increases in "all the game populations."[6]

This perception of a forest in transition shaped management priorities on the Andrews Forest and subsequent research priorities. The evident effects of logging and road-building activities during the 1950s attracted wildlife specialist Jay Gashwiler, who studied small-animal populations before, during, and after logging, and in relation to seed fall. He observed that chipmunks and red-backed mice quickly moved from recently logged or burned stands into adjacent green timber, but deer mice populations in the logged units increased.[7] The research emphasis on logged and roaded areas and effects of logging continued through the mid 1960s. Rothacher's concern about "debris down the drainage"[8] and Fredriksen's analyses of erosion and sedimentation problems associated with building logging roads,[9] exemplified the focus of research in the era of intensive logging on the experimental forest. Franklin and Dyrness began to branch out into regional vegetation classification studies by mid decade, but through the beginning of the International Biological Programme (IBP) at the close of the 1960s, logging activities and their aftermath were dominant factors guiding individual research efforts on the Lookout Creek drainage.[10]

The emphasis of research at the Andrews Forest shifted in the 1970s, during the IBP, from studies of logging effects to studies of the attributes of old-growth stands and associated streams. As logging activities geared up on adjacent drainages after the 1960s, the experimental forest became an apparent refuge from the

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[6] December 1992 discussion with Roy Silen, 13-14.

[7] Berntsen and Rothacher, *A Guide to the H.J. Andrews Experimental Forest*, 17; Jay S. Gashwiler, "Tree Seed Abundance vs. Deer Mouse Populations in Douglas-Fir Clearcuts." In: *Proceedings of the Society of American Foresters* (Washington, DC: Society of American Foresters, 1965), 219-222.

[8] Jack Rothacher, "How Much Debris Down the Drainage?" *The Timberman.* 60(1959): 75-76.

[9] R.L. Fredriksen, "Sedimentation After Logging Road Construction in a Small Western Oregon Watershed." In: *Proceedings of the Federal inter-agency sedimentation conference* (Washington, DC: U.S. Department of Agriculture, Misc. Publ. 970, 1963), 56-59.

[10] See, for example, C.T. Dyrness, *Soil Surface Conditions Following Skyline Logging* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Res. Note PNW-111, 1969) and Jerry F. Franklin, *Natural Regeneration of Douglas-Fir and Associated Species Using Modified Clear-Cutting Systems in the Oregon Cascades* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Res. Pap PNW-3, 1963).

industrial transformation of the Willamette National Forest. Its patchwork landscape of regenerating stands intermixed with old growth attracted scientists who hoped to include the place as one in a network of sites in the IBP. One important constraint was the group's perception that any proposal for long-term research had to be "sexy enough to be salable to the National Science Foundation." In an effort to define a unique niche for the Andrews Forest in the IBP, they downplayed the managed characteristics of the place and emphasized its more "pristine" features. The group's focus, thereafter, shifted to studies of the remaining stands of old growth on the drainage. The effort to fit research at the Andrews into the constraints of the IBP, [11] inverted previous perceptions of the place as a site managed for intensive logging. That process of adapting to the priorities of an external program of research, however, also limited opportunities to secure funding for some projects more closely linked with the earlier emphasis on the regenerating patches. Scientists in the group struggled to reconcile wildlife studies, for example, with the broader effort at the Andrews Forest during the Coniferous Biome project. Waring later confessed that despite ongoing wildlife studies at the site since the 1950s, he "couldn't really see the role" of those efforts in the IBP, which emphasized studies of "undisturbed" forests.[12]

The Coniferous Biome's emphasis on undisturbed forests was an easier fit with the group's earlier research and data on woody debris and logging effects on the Lookout Creek watershed. The physical characteristics of woody debris help explain why the Coniferous Biome strengthened this arena of research while wildlife studies languished. Studies of woody debris detailed "interface issues" that involved interactions between organic and inorganic components plus forest and stream components of the ecosystem. The IBP provided scientists in the group with unaccustomed resources and encouraged them to apply their understanding of woody debris in the unfamiliar terrain of "undisturbed" stands of old growth at the Andrews Forest. Among the new resources that the IBP provided, Waring lists as most valuable the ability to link up with people who were studying similar processes and issues in other biomes. The IBP created interdisciplinary networks stretching across many different sites: people at the Eastern and Tundra Biomes contributed ideas that the Andrews group applied to their own studies of decomposition and carbon cycling in old-growth, coniferous forests.[13]

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[11] Andrews group interview 22 September 1997, 33; interview with IBP group, 20.

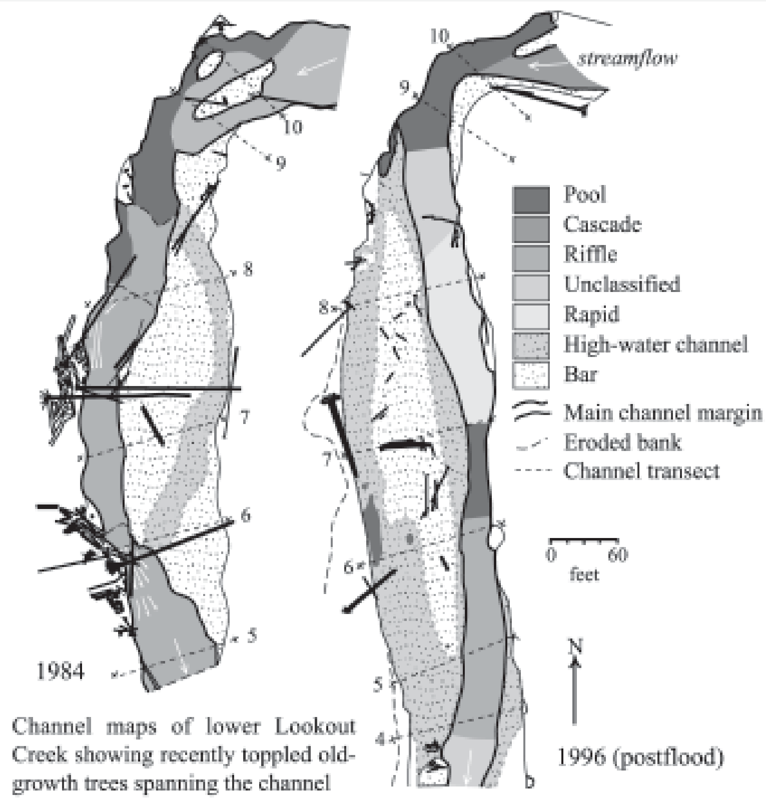
[12] Interview with Dick Waring, 7.

[13] Interview with IBP group, 20; interview with Dick Waring, 4.

Sidebar 5.1: Woody Debris in Streams

The Issue: Wood in streams is a particularly significant component of forest-stream interaction studies at the Andrews Forest. Big, slowly decomposing, dead wood is conspicuous in streams flowing through forests of large, long-lived trees- as well as in younger forests. When static, wood strongly influences the ecological, hydrological, and geomorphic structure and function of stream systems (Triska and Cromack 1980), and while moving in floods, wood pieces can increase ecosystem disturbance (Johnson et al. 2000). Management activities can alter stream systems by changing the condition of wood in streams and by modifying the riparian zones that are sources of wood for streams.

The Roots: The issue of wood in streams developed in parallel on both science and management fronts. Scientists sought to bring the woody debris component into stream ecosystem budgets of nutrients and carbon during the International Biological Programme study period and to quantify effects of wood on channel form, aquatic habitat, and sediment movement. Both ecologists and geomorphologists had ignored wood in streams because it was inconvenient to study with standard methods, which were designed to measure the rapid accumulation and breakdown of fine litter. Woody debris in streams became a major management issue in Oregon in the mid 1970s, when new requirements for removing logging debris from streams raised the specter of high logging costs and unnatural, wood-free streams. This issue was highlighted by standing-room-only crowds at 2-day symposiums on logging debris in streams in 1975 and 1977 at Oregon State University, which brought together scientists and loggers with shared interests.



Channel maps of lower Lookout Creek showing recently toppled old-growth trees spanning the channel (left, 1984) and paucity of wood after the February 1996 flood (right). Note switch of channel from west to east bank during 1996 flood. 1984 map adapted from Nakamura and Swanson (1993); 1996 map from Faustini (2000).

The Approach: The earliest studies of wood in streams in the Andrews Forest were simple inventories and maps (Froehlich 1973, Swanson et al. 1976). Wood moving during a flood in 1977 showed the value of repeated mapping to document change (Lienkaemper and Swanson 1987). Measurement of wood conditions, dynamics, and consequences was enhanced by establishing forest reference stands straddling streams and networks of surveyed channel cross sections to track channel change, repeated mapping, and annual surveys of more than 1,700 numbered pieces of wood in study reaches. These observations were supplemented by computer simulation modeling of wood dynamics; studies of wood movement in small, experimental streams; and replicated field experiments manipulating wood abundance and configuration to test their effects on fish populations and other ecosystem components.

Results: River ecology research in North America, Europe, and Japan has embraced the study of wood in rivers as an important theme (Gregory et al. 2003). Studying wood in streams was a major departure for stream geomorphologists. It led to new methods for characterizing wood transport, budgets, and the structure and function of wood accumulations in ways that parallel more traditional studies of inorganic (sand and gravel) sediment in rivers. Forest ecology studies of riparian zones often feature concerns about wood recruitment to streams, including the rate of wood decomposition and its residence time. Sustaining the supply and function of wood in streams has become a pivotal issue for improving stream habitat and managing riparian vegetation.

Woody Debris in Streams and the River Continuum

The IBP shifted the emphasis to consider conditions before logging.

The IBP encouraged scientists at the Andrews Forest to look at an old forest in a new context. Earlier studies on the Lookout Creek drainage had emphasized the effects of logging, but the IBP shifted the emphasis to consider conditions before logging. The IBP was a community of people and ideas that inspired researchers at the Andrews Forest. As people in the group tried to figure out how stream ecosystems worked, their involvement with people from other IBP sites encouraged them to study the storage and flux of carbon as a common denominator of ecosystems. Jim Sedell and Frank Triska (another OSU postdoc) were particularly receptive to this external pressure to explore issues relating to carbon storage and nutrient cycling. They were also influenced by studies closer to home, including Froehlich's method for measuring woody debris in streams.[14]

The stream team was well positioned to adopt Froehlich's methods in their research, and to expand on those ideas to explore forest-stream interactions, because of their earlier efforts to build interdisciplinary, collaborative links beyond their own group. Entomologist Norm Anderson's faculty standing and his collaboration with Jim Hall, a colleague in fisheries and wildlife at OSU, helped him build a nucleus of people with scientific credibility in the academic community. These well-established scientists supported and inspired their more junior colleagues, like Frank Triska, Sedell, and Gregory, who began working with the group as graduate-student and postdoctoral associates during the Coniferous Biome. Among their other cooperative efforts, for example, Sedell, Hall, and Triska collaborated on a 1973 publication, *Stream Ecology in Relation to Land Use*.[15]

The riparian group became more than the sum of its individual members in 1973, when it joined a multisite initiative to secure major funding from the NSF, independent of the IBP. This "river continuum" grant, which the NSF approved 2 years later, enabled the riparian group to operate with relative autonomy while still participating in the Coniferous Biome.[16] The river-continuum concept is a hypothesis that a river network is a linked system in which ecosystem-scale processes downstream are linked with upstream components. The concept posits an orderly system of biotic assemblages and processes operating along a continuous and

[14] Interview with riparian group, 14.

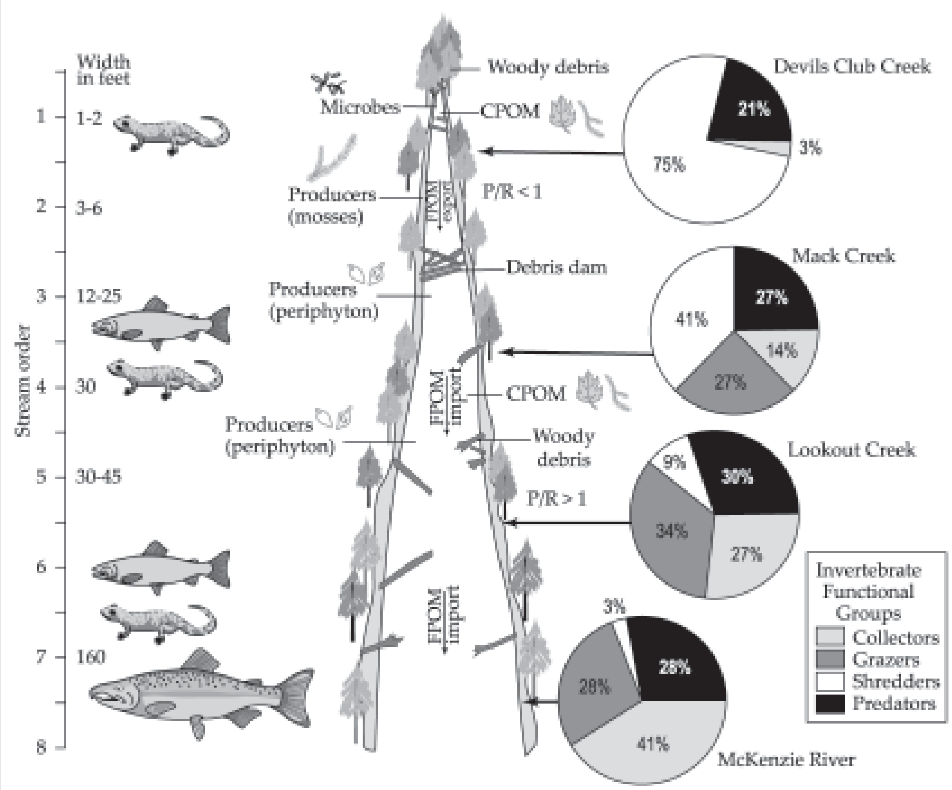
[15] J.R. Sedell, J. Hall, and F.J. Triska, "*Stream Ecology in Relation to Land Use*" (Seattle: University of Washington, Coniferous Forest Biome Internal Report 1138, 1973). Interview with riparian group, 6.

[16] Interview with Jim Sedell, 6-7.

Sidebar 5.2: River Continuum Concept

The Issue: Aquatic ecologists long struggled for a conceptual framework for interpreting results of studies conducted at localized sites along rivers. The river continuum concept provides a broad geographic perspective on the variety of river ecosystem conditions and processes from small, forest-dominated, headwater streams to large rivers (Vannote et al. 1980). This concept describes river systems as longitudinally linked, with orderly biotic assemblages that link ecosystem-scale processes in upstream and downstream parts of a river network (Sedell et al. 1989). The influence of adjacent forests on food resources and habitat structure in river ecosystems is thought to decrease from small streams to large rivers. For example, small, heavily-shaded streams have communities of invertebrates dominated by consumers of forest litter, but more open, downstream areas have major communities of invertebrates that consume light-loving algae.

The Roots: The river continuum concept was developed by Robin Vannote and colleagues, including Jim Sedell of the Andrews Forest group, in an effort to bring theories about energy expenditure in river systems from the field of geomorphology into stream ecology. The river continuum concept has become a central theory in stream ecology and the subject of constructive debate.



The River Continuum Concept of variation in ecological characteristics from headwater streams to large rivers (modified from Vannote et al. 1980). FPOM is fine particulate organic matter; CPOM is coarse particulate organic matter; P/R is the production/respiration ratio.

The Approach: The river continuum concept was originally explored by sampling streams in four large basins in the United States, including the upper McKenzie River streams of the Andrews Forest. In each of these basins, a sequence of four study sites arrayed down the river was sampled and the longitudinal variation in stream properties was compared to the river continuum concept predictions.

Results: The river continuum concept has been an exceptionally fruitful idea in stream ecology, as much for the discussion it has precipitated as for the strength of the original idea. Vigorous, collegial debate has led to proposed modifications that accommodate conditions not considered in the original construct, such as the flood pulse concept. A next important scientific step is to move from the strictly longitudinal view of the river continuum concept to address the effects the network structure of river systems. The implication of the concept for managers is that the properties of a stream reach depend strongly on the context of that stream's position in the river network. That context reflects both location along the stream system and the types and strength of local forest influences. Thus, management objectives can best be met by considering both conditions at the project site and its broader context.

integrated series of resource gradients and physical adjustments downstream from headwaters to the larger river. Sixteen years after the group's initial river-continuum proposal to NSF, Sedell and Swanson, in an article they coauthored with Jeffrey E. Richey of the University of Washington School of Oceanography, described the river continuum as "One of the most provocative concepts of longitudinal variation in riverine ecosystem characteristics." They observed, however, that the concept had some important limitations for understanding both large and small basins; notably, dams and other disruptions may fragment the river system into discontinuous "patches." Nonetheless, they concluded, the river-continuum approach had important advantages over more traditional studies of drainage-basin ecosystems or studies that proceed from a fisheries perspective with an emphasis on species distributions and productivity in different habitats.[17]

The river-continuum initiative helped a subset of the Andrews group coalesce into an integrated work-unit that gained a new public identity as the stream team. Gregory recalls that near the beginning of the events leading up to the river-continuum proposal, he attended a workshop on how to measure primary production in streams. That workshop inspired him to incorporate the concept into a graphic design he created for T-shirts intended for distribution to riparian crews working at Mack Creek. The design had a western theme, with a picture of a bunch of cowboys above the words "stream team." That T-shirt, Gregory observes, "solidified what had been bubbling for the last couple of years. We just started calling it the Stream Team." The T-shirt maneuver encouraged individuals to identify with the group, and the tongue-in-cheek moniker (stream team) subsequently found its way into the OSU staff directory and the community traditions of the Andrews group.[18]

The river-continuum grant lent fiscal and programmatic weight to the public image of the stream team. The informal campus group grew rapidly from its start as informal gatherings of five or six people crammed into one small office early in the 1970s. Less than two decades later, more than 50 people from 15 different departments and 5 different colleges attended regular, Monday-morning meetings

[17] J.R. Sedell, J.E. Richey, and F.J. Swanson, "The River Continuum Concept: a Basis for the Expected Ecosystem Behavior of Very Large Rivers?" In: D.P. Dodge (ed.), *Proceedings of the International large river symposium, Canadian special publications in fisheries and aquatic sciences* 106(1989): 49-55. For an earlier discussion of the concept, see R.L. Vannote, G.W. Minshall, K.W. Cummins, J.R. Sedell, and C.E. Cushing, "The River Continuum Concept," *Canadian Journal of Fisheries and Aquatic Sciences* 37(1980): 130-137.

[18] Interview with riparian group, 6.

of the stream team. The meetings provided a forum where graduate students could present their research plans and seek informal critiques and suggestions. Sedell argues the concept was "pretty novel." They encouraged people to talk about what they thought, "take risks," and inspire others in the group to do likewise. He concedes that informal presentations were not necessarily the ideal format for communicating concrete research proposals, but he concludes that they "really defined what we were about, … it was much more inclusive and interdisciplinary than what, certainly, this university had seen." Stream team meetings also frequently featured visiting senior scientists, and Swanson observes that, although the ideas they presented were not yet set in concrete as "dogma," they were nonetheless "real." People were freely sharing their ideas and intellectual property while it was still in germinative form.[19]

The stream team was rooted in substantive science, but its community links were a source of inspiration and credibility.

The stream team was rooted in substantive science, but its community links beyond the Andrews Forest were a significant source of inspiration and intellectual credibility. The conceptual basis for the river continuum grant originated in 1972, shortly after Sedell arrived in Corvallis as a postdoctoral associate fresh from his graduate work at the University of Pittsburgh. When the aquatic group began to discuss their lack of a defining concept for streams in the Coniferous Biome, Sedell drew on his connections at Oak Ridge, Pittsburgh, and Michigan State University to bring in leading aquatics experts. He organized a workshop in 1972 that brought together people like Charles Warren, who presented his ideas on systems analysis, and Ken Mann, known for his work on energetics in England. Other participants included Ken Cummins, then with Michigan State University, Wayne Minshall, then with Idaho State University, Robin Vannote, with the Stroud Laboratory in Pennsylvania, and their graduate students. That workshop culminated in a decision not to follow the philosophy-rooted, systems analysis path Warren had laid out; instead, the stream team decided to focus more on nutrient balances. Sedell argues, however, that the workshop started a dialogue with Minshall, Cummins, and Vannote that continued at subsequent meetings of the Ecological Society of America. Those meetings led to a small grant proposal that was funded in 1975, and those funds supported a meeting at the Hickory Corners field station at Michigan State University, where participants drafted the NSF proposal that was eventually funded while Franklin was still a program manager at that agency.[20] All of these factors eventually led to the River Continuum Project.

[19] Communication from Fred Swanson 2 January 1999; interview with Jim Sedell, 5-6.

[20] Interview with Jim Sedell, 6-7.

At the time the river-continuum proposal went forward to NSF for review, Sedell observes, "classic ecologists" tended to rate "ecosystem" proposals low because those proposals tended to be "big and messy," not to mention expensive. Despite initial encouragement and support from leading scientists in aquatics research at other institutions, the stream team initially floundered in search of a "story line" that would lend structure and focus to their efforts. Vannote's suggestion that they build the grant around the concept of a "river continuum" broke the logjam. He hypothesized that rivers were a continuum with major gradients of change in energy expenditure from their headwaters to large rivers. From that point on, Sedell argues, "It was a matter of structuring how we were going to test or describe this concept empirically, at four different sites and in a common place." The proposal listed Jim Sedell as the principal investigator coordinating the effort at the Andrews Forest through OSU, with Wayne Minshall at Idaho State coordinating work on the Salmon River, Ken Cummins at Kellogg Biological Station coordinating in the Kalamazoo River Basin, and Robin Vannote coordinating work on the Brandywine River system in Pennsylvania. The proposal received mixed reviews, but at Franklin's urging, NSF approved the grant.[21]

Waring and Franklin were both strongly supportive of the river-continuum grant as a partial solution to the impending budget crunch for studies at the Andrews at the end of the IBP. The grant provided support for a core group of scientists from the coniferous biome to continue building on an existing body of work. It also led the group in new directions and offered opportunities for another generation of leaders to emerge at the Andrews Forest. That, according to Sedell, was "the whole point … you define a core, and then your grants that you get are just spokes off of that core. … for the most part, we tried to build on what we'd already done [at the Andrews Forest]." Gregory was just finishing his doctoral research when the river-continuum grant came through, and his work helped the initial effort to get the project up and running.[22]

The stream team inspired a wide array of research at the Andrews Forest that followed the strategy of defining a core concept and then branching out into related studies funded with individual grants. Scientists who coalesced around the stream team weathered the transition from IBP to EER and then LTER funding with

[21] Interview with Stan Gregory, 6; interview with Jim Sedell, 6-7. Robin Vannote et. al., "The River Continuum Concept" *Canadian Journal of Fisheries and Aquatic Sciences* 37(1980): 130-137.

[22] Interview with Stan Gregory, 6; interview with Jim Sedell, 6-7.

minimal disruption. Sedell and Gregory tried to direct funds budgeted for "overhead" in the river-continuum grant at the Andrews Forest into either new equipment or new pilot studies. In that way, they funded Alsie Campbell's studies of riparian vegetation that initiated a whole new thread of research. The river continuum also eased the transition from IBP to EER funding in the form of a grant supporting Chuck Hawkins, Gregory, and Triska in their studies of intake, succession, and decomposition. Those studies were later funded as components of the EER proposal.[23]

The success of the river-continuum proposal had ripple effects that spread well beyond the Andrews Forest or even the Willamette basin. The ripples included both people and ideas in a self-reinforcing cycle of collaborative research. The concept of a continuum began with the group's and Vannotes' studies of small streams, and then people applied it to studies of carbon flow and standing crops of carbon in other aquatic systems. "Suddenly," Sedell observes, oceanographers like Cliff Dahm began to look at dissolved organic carbon in small woodland streams, as well as in the larger Columbia River basin. Involvement with the river continuum effort linked Gregory and other new members of the Andrews group with an array of well-connected people at an early point in their careers. The grant brought in Bob Naiman as a postdoctoral associate and Dale McCullough and Chuck Hawkins as graduate student research assistants. Naiman worked at the Andrews Forest for several years before transferring to Woods Hole, and he eventually secured an appointment at the University of Washington. Hawkins and McCullough both finished their degrees at OSU before moving on to career positions at Utah State (Hawkins), and at the Columbia River Intertribal Council (McCullough). The four of them, Gregory observes, "grew up [professionally] together." Gregory, himself, took a job with the U.S. Fish and Wildlife Service in 1977 for nearly 4 years, before rejoining the group as a postdoctoral associate working for Cummins, who replaced Sedell at OSU. Sedell, himself, accepted an appointment with Weyerhaeuser. Cummins brought his colleagues, Milt and Amelia Ward, into the Andrews group, and they subsequently worked with Nick Auman, who was finishing his Ph.D. in

[23] Interview with Jim Sedell, 6-7.

microbiology at OSU. Then, when Mount St. Helens blew, Sedell rejoined the group, and the stream team began to get more involved with the land-water and forest-stream interactions in a riparian setting.[24]

Legacies of the Andrews Forest and the Mount St. Helens Catharsis

The stream team's image and accomplishments buttressed the tradition of long-term continuity at the Andrews Forest and linked it with people committed to riparian issues.[25] They blurred the boundaries between basic science, applied research, and forest management, notably in the case of woody debris in streams. Their success with riparian issues also carried over into studies with a more terrestrial focus. The 1980 eruption of Mount St. Helens reinforced the Andrews group's focus on interdisciplinary work when they responded to that event with an intense, interdisciplinary field project. That effort was a high-profile variation on the "pulses" that Franklin staged as team-building exercises in other venues, including expeditions as early as 1973 at the Steamboat Mountain Research Natural Area and the group's work on the Hoh River of the Olympic Peninsula in 1978. The group, he observes, began to "take ourselves out of an Andrews context and put ourselves in little mini-crucibles, both for team building and for science, and when [Mount] St. Helens came along, you know, it was an extraordinary opportunity." At Mount St. Helens, he notes, the group staged "two immense pulses," each for 2-week periods. One of the pulses involved 150 people. Franklin admits to not knowing "where this was going to go," but he emphasizes that it was useful to be up there in an "interdisciplinary context." Most of what they learned, he concludes, "had to do with disturbances and how disturbances work."[26]

Three veterans of the Andrews group—Jerry Franklin, Jim Sedell, and Fred Swanson—effectively became research coordinators for an ad-hoc, interagency research effort at Mount St. Helens soon after the eruption. They secured about $50,000 from NSF plus additional Forest Service funds for each of 2 years to cover expenses for pulses on the mountain, including everything from food and lodging to helicopters. "Mostly," Swanson observes, "we facilitated interactions

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[24] Interview with Stan Gregory, 6; interview with Jim Sedell, 7.

[25] Interview with riparian group, 11.

[26] Interview with Jerry Franklin, 25-26.

Al Levno

Figure 36—Fred Swanson (left) takes initial readings from a set of erosion pins established in August 1980 at a study site on Mount St. Helens, shortly after the eruption earlier that year.

and communication so the science, overall, could be better." Swanson and Franklin recruited Sedell into the collaborative effort at Mount St. Helens, and he emphasizes that the personal connection he had forged with Swanson over the previous decade was the central reason for his decision to work with the group.[27]

The Mount St. Helens event was an opportunity to extrapolate themes originating with the Coniferous Biome and test them against field conditions in the broader landscape of the Pacific Northwest. Among other benefits of their experience at Mount St. Helens, people in the group gained an appreciation for the power of conceptual modeling, as opposed to the advantages of models on a strictly mathematical basis. McKee explains they learned to appreciate the eventual interaction of terrestrial and aquatic systems and the potential for incorporating feedback loops into that conceptual model. He also suggests that the group's response to the eruption was an important test of their leadership and organizational structure. The stream team, McKee argues, "stayed together so much because of the Mount St. Helens [eruption]. …" That group was able to get together the money needed to

[27] Communication from Fred Swanson 2 January 1999; interview with Jim Sedell, 11-12. Interview with Robert Tarrant by Max Geier on 24 July 1997 at 1:00 pm in his Corvallis home as transcribed by Keesje Hoekstra, 13.

The Mount St. Helens effort was the first time Swanson really emerged as a major leader of the Andrews group.

field a research effort on that site, without sacrificing resources needed to continue support for ongoing studies back at the Andrews. The Mount St. Helens effort was also the first time Swanson really emerged as a major leader of the Andrews group. He worked closely with Franklin to orchestrate the focus of the program, and Franklin concedes Swanson may have had a clearer grasp of where that work was headed.[28]

Swanson suggests that the work at Mount St. Helens "drove itself in terms of issues to study" but he notes that it also addressed questions that concerned land managers, including the effects of salvage logging and agency efforts to develop interpretive programs at the volcanic site. Franklin recalls that he, Swanson, and Sedell were well-positioned to lead the Mount St. Helens effort because by the early 1980s, land managers who previously focused on salvage operations designed to remove decayed timber began to pay more attention to ecological issues. He notes there were "extraordinary opportunities" to position themselves in an institution [meaning the National Forest System] that would have "a lot of control over the situation, and at the same time, also remain connected to the National Science Foundation." The three of them, Franklin concludes, essentially became coordinators, or "gatekeepers in the field for, in my case, terrestrial ecology, [in] Fred's case, geomorph[ology], [in] Jim's case, aquatic research."[29] Swanson found the connections he had developed while working for the U.S. Geological Survey very useful as he worked with Franklin and Sedell to coordinate the Mount St. Helens effort. One of those contacts was Dick Janda, of the U.S. Geological Survey, who previously served on the Andrews Forest advisory committee and had led a forest geomorphology project at Redwood Creek and Redwood National Park. Janda, who was used to working in high-profile arenas, worked in the spotlight of the national news media at Mount St. Helens, where he led a component of the Geological Survey work.[30]

Many of the research issues unearthed in the Mount St. Helens eruption were obvious extensions of concerns that the stream team had addressed earlier at the Andrews Forest. Sedell recalls thinking at the time that it was "the chance of a lifetime" to take what they had learned on the Andrews Forest and say "Well here's the most colossal event we've seen in our careers. What's the recovery, what are

[28] Interview with riparian group, 9.

[29] Interview with Jerry Franklin, 25-26.

[30] Communication from Fred Swanson 2 January 1999.

some of the processes we'd look for?" It was also an opportunity to strengthen the interdisciplinary team of cooperating scientists and demonstrate their flexibility as a science group capable of doing significant research under public scrutiny and time constraints at field locations beyond the Andrews. Sedell recruited Cliff Dahm, who brought along other oceanographers, along with Milt and Amy Ward, Gary Lamberti, and Al Steinman. Eventually, he observes, "a whole bunch of the Andrews group also did work up … on the mountain."[31]

The Andrews group gained insight into issues of disturbances and biological legacies from their work at Mount St. Helens, and they learned about many different types and combinations of disturbances. That work, Franklin observes, led initially to the group's concept of ecological "survivors," and eventually to the concept that he termed "biological legacies." Their joint experience at Mount St. Helens, he notes, "illuminated the whole issue of disturbances and biological legacies and how nature stores systems [through] a disturbance." One advantage of the research at Mount St. Helens, Franklin concludes, was that the group was able to simultaneously examine "a dozen different natural kinds of disturbances or combinations of disturbances that turned up there." Swanson also recalls, "At first glance, the place looked devastated—it looked like everything had been killed. This heightened the surprise at finding so many survivors of such varied types."[32] It was a place that piqued their curiosity and that, more than anything, drove them to work there.

Long-Term Modeling Concerns and Terrestrial and Aquatic Legacies of Mount St. Helens

Mount St. Helens drew members of the Andrews group away from the experimental forest and into a venue that placed them in the limelight of national attention. Their willingness to test ideas originating at the Andrews Forest in that venue was a high-stakes gamble. Much of what they learned demonstrated that previous models of ecosystems did not explain the complex patterns of recovery apparent in

[31] Interview with Jim Sedell, 11.

[32] Interview with Jerry Franklin, 26; communication from Fred Swanson 2 January 1999; Jerry F. Franklin, James A. MacMahon, Frederick J. Swanson, and James R. Sedell, "Ecosystem Responses to the Eruption of Mount St. Helens," *National Geographic Research: A Scientific Journal* (Spring 1985): 198-216. See also, Jerry F. Franklin and Charles B. Halpern, "Influence of Biological Legacies on Succession." In: Dennis E. Ferguson, et al., *Proceedings—Land Classifications Based on Vegetation: Applications for Resource Management*, 17-19 November 1987, Moscow, ID (Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, 1989), 54-55.

the blast zone. Scientists involved in research at Mount St. Helens later observed, "Essentially no posteruption environment outside the crater was completely free of pre-eruption biological influences, although there were substantial differences in the amounts of living and dead organic material that persisted." These legacy elements, they argued, were critical determinants of posteruption successional patterns. The landscape at Mount St. Helens may have appeared simple, but "complex interactions developed immediately," thus demonstrating the maxim that "ecosystems are characterized by numerous and elaborate linkages among plants, animals, and physical processes." The very diversity of recovery patterns at Mount St. Helens, they concluded, "makes apparent the inadequacies of simple models in characterizing or explaining successional patterns."[33] That insight, in itself, challenged many assumptions guiding previous efforts to design long-term studies at the Andrews Forest.

The results of the Mount St. Helens effort forced a reassessment of long-term thinking at the Andrews Forest, but scientists like Swanson characterize the consequent need to readjust the group's theories and models as "fun and compelling." Much early work at the Andrews Forest had focused on recovery and regeneration issues related to disturbance from fires, floods, timber harvests, and landslides. Many of the people who led that earlier work were also directly involved as leaders in the effort at Mount St. Helens. They tested hard-won lessons from the Andrews Forest, added new insights from the blast zone, and brought them home to the Lookout Creek drainage. In this way, the group used challenging new insights to improve their initial theories, rather than viewing such challenges as threats to their initial theories. The concept that many particulars of research at the experimental forest were specific to that site, or at least not directly transferable to Mount St. Helens, actually raised exciting possibilities for scientists steeped in the adaptive culture of the Andrews group. They were eager to test those new ideas against ongoing programs of research at the Andrews. This dynamic generated a sense of method prevailing over theory, or as Swanson explains, a sense of "natural history in real time." The group began to design studies that actually accommodated and encouraged cooperative, collaborative, and adaptive effort, and they placed less emphasis on building detailed, theoretical models or computer simulations. Gregory clarifies, "The stream team hasn't been anti-modeling. We just use it where it

[33] Jerry F. Franklin, James A. MacMahon, Frederick J. Swanson, and James R. Sedell, "Ecosystem Responses to the Eruption of Mount St. Helens," *National Geographic Research: A Scientific Journal* (Spring 1985): 200-214.

works and don't feel the need to model everything that we do. … we have had small bits and pieces of other models … it's adapting the research to the situation as opposed to having one trick that we try to apply to in all situations."[34]

Their experience at Mount St. Helens and with the river continuum helped the group link terrestrial and aquatic research with conceptual models.

Their experience at Mount St. Helens and with the river continuum helped the group realize they could link terrestrial and aquatic research with conceptual, rather than quantitative models. They perceived a "strong influence" of aquatic interactions with the terrestrial landscape, and, as a result, they expected that terrestrial ecosystems would change along with the continuum from smaller to larger streams. That concept, Gregory concedes, "would get so complex if you tried to quantify it, it would crash." The key, he argues, is flexibility. Overreliance or adherence to a particular conceptual model, in other words, could become such a drag on creativity that it might lead scientists into a political conundrum: "If you produce either a controversial concept or model, then you are at the stage that it will be attacked and criticized and then, even if you don't want to defend it, you usually get dragged into defending it and large portions of your time are spent defending something that was in the past."[35]

One strategy for avoiding the paralyzing distraction that Gregory associates with defending outdated conceptual models was to initiate studies on a larger scale that continued over a longer span of time. The river-continuum initiative was a compelling example of the potential benefits of moving in that direction. It tested the contribution of forests to small streams and explored whether a succession exists from leaf-dominated organisms and processing in small, forest-dominated streams to more algae-dominated organisms in large rivers. That concept, Gregory argues, was "amazingly successful." "As long as water is going to run downhill," he argues, "you're going to come back to some sort of continuum and succession or gradation of different energy processing." Once the group linked gradations of scale in streams with the degree to which forest-stream interactions affected the terrestrial and aquatic components of that system, they also began to look more closely at different scales of woody debris and its respective role. The group tended to discount the importance of logs until they worked out a carbon budget and discovered large wood was "dominant" in that budget. The energetic driver, as Sedell observed, was the leaves, but they were a "minor" part of the total "organic

[34] Communication from Swanson 2 January 1999; interview with riparian group, 10.

[35] Interview with riparian group, 10.

Sidebar 5.3: Log Decomposition, Dead Wood, and Carbon Dynamics

The Issue: Conifer forests of the Pacific Northwest store massive quantities of carbon in the living and dead components of the forest and in soil. The roles of forests as sinks for carbon by uptake of carbon dioxide from the atmosphere and of forestry practices as possible sources of carbon dioxide have become important issues in the science and politics of global climate change. Dead wood is an important, but often neglected, component of the carbon budget and an integral part of forest ecosystems.

Characteristics of fallen trees	Decay Class I	II	III	IV	V
Bark	Intact	Intact	Trace	Absent	Absent
Twigs	Present	Absent	Absent	Absent	Absent
Texture	Intact	Intact to partly soft	Hard, large pieces	Small, soft blocky pieces	Soft and powdery
Cross-section shape and invading roots	None	None	In sapwood	In heartwood	In heartwood
Color of wood	Original color	Original color	Original color to faded	Light brown to reddish	Red brown to dark brown

Log decomposition classification used in Pacific Northwest forests (modified from Maser et al. 1988).
Photos: Jay Sexton, Oregon State University.

The Roots: Dead wood is a conspicuous component of Douglas-fir forests, and it posed an ecological as well as navigational challenge to scientists. During the 1970s, dead wood was considered in studies of nutrient and carbon budgets of forest stands, soils, decomposition, and wildlife habitat. Not until the late 1980s did issues surrounding carbon sequestration and the global carbon budget bring studies of dead wood into focus for ecologists as a component of global climate change.

The Approach: Initial studies of dead wood and carbon stores simply described stages of log decay and amounts of wood in stands of different composition and history. Detailed field studies of processes and functions associated with dead wood followed, including Mark Harmon's 200-year log decomposition experiment (Harmon 1991). This field experiment was preceded by a compilation of world literature on the ecology of coarse woody debris in temperate ecosystems by Harmon and a team of other Andrews scientists (Harmon et al. 1986). These studies and a host of others, including remote sensing and archival research, are incorporated into a modeling system used to assess how forest growth, decomposition, forestry practices, and use of wood products affect change in carbon storage in a 2.5-million-acre area centered on Andrews Forest (Cohen et al. 1996).

Results: Managing forests was once the exclusive domain of silviculturists focused on the live trees; however, with recognition of the many important functions of dead wood in ecosystems, "morticulturists," in Harmon's term (Harmon 2001), are now providing creative schemes for managing the dead wood component of stands. Dead wood has become an integral part of the land managers' responsibilities for both ecological and carbon-sequestration objectives. The science of carbon dynamics has gained definition and even prominence as a field in only the past decade or two.

story." Even a very small fraction of wood processing, they concluded, was a "huge contribution" to an energy budget on a stream, and that insight led to the group's ongoing studies of the structural roles of wood in streams.[36]

Long-term studies of log decomposition simply extended the earlier effort to study woody debris in streams onto the forest floor. Legacies from past studies and insights from contemporary research converged at the Andrews Forest during the mid 1980s in ways that made that conceptual leap seem obvious. As the Mount St. Helens effort wound down at mid decade, scientists who participated in that program returned to the Andrews with renewed enthusiasm for questioning the obvious. The group embraced the concept of flexible, conceptual models, while continuing their commitment to uphold the legacy of long-term monitoring on the Andrews Forest. These scientific insights from the river-continuum effort and Mount St. Helens coincided with programmatic shifts at NSF and policy adjustments in the National Forest System. The log decomposition study they initiated in 1985 merged elements from all of these factors into a key proposal for the newly established LTER program at NSF. That LTER proposal exemplified McKee's view that long-term research, as with any study proposal, should be fundamentally rooted in "coming up with the story line that will be funded." The proposal explained the group's ideas as a framework that could not only tie the various components of the group together, but could also be tested with scientific rigor.[37]

The group's concept of long-term research grew out of the Forest Service tradition of managing water and tree resources for long-term use, but the ecosystem perspective of the IBP transformed the concept. The group looked for ways to include components that would excite the group and NSF reviewers, and the concept of a 200-year study of log decomposition seemed to fit the bill. As Franklin observes, it was long term, experimental, and "real." The long-term approach also had the added benefit of encouraging land managers to pay closer attention to their scientist counterparts when drafting policies governing forest management practices. Managers who participated in "show-me" tours of the log-decomposition study were impressed with the commitment and rigor of the scientists who designed the experiment, and, Swanson argues, that further encouraged them to integrate research ideas into their management plans.[38]

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[36] Interview with Jim Sedell, 12-13.

[37] Interview with riparian group, 13-14.

[38] Andrews group interview 22 September 1997, 22.

Martha Brookes

Figure 37—Jerry Franklin, Fred Swanson, and Jim Sedell took leading roles in an interagency research effort at Mount St. Helens shortly after the 1980 eruption, and Franklin notes that experience vaulted Swanson into a more prominent leadership role in the Andrews group. Here, Swanson and Franklin discuss the situation at a field site on the H.J. Andrews Experimental Forest during a "show-me" tour in 1997.

The log-decomposition study extended the concept of long-term research across a chronological scale of unprecedented proportions, and the ability to secure funding and initiate the project was as much an institutional breakthrough as it was a conceptual innovation. Dyrness notes of the 200-year duration of the study, beginning in 1985, "This is a real departure. We were always schooled, … when I started out in research for the PNW Station, that our studies should be short in duration. That you should be able to finish it up in a year and have a publication and then go on to bigger and better things." Dyrness himself had challenged those expectations with his early work laying out long-term study plots on vegetation succession in the Andrews, where he had established permanent plots before logging and then continuously monitored those plots after logging. In his experience, he observes, Forest Service administrators at the time usually "didn't believe in long-term studies."[39]

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[39] Communication from Fred Swanson 2 January 1999; Andrews History Project Workshop of 7 August 1996, 15.

Log Decomposition and the Convergence of Individual and Community Experience

The task of first designing the log-decomposition study as an archetype for long-term research, and then implementing it, fell to a person whose involvement with the group was recent and tenuous. Mark Harmon's involvement at the Andrews Forest paralleled the Mount St. Helens eruption and subsequent research. After beginning with the group as a graduate student in 1980, he took the lead for the log-decomposition work in 1984 and vaulted from a relatively inconspicuous role to the forefront of a controversial, yet defining study. He first compiled a "story line" for the initial grant proposal, beginning with extensive review of pertinent literature. This demanding effort required an intensive investment of time and energy. At the time he began the work, Harmon was still working on his doctoral research at OSU under the direction of Jerry Franklin. His first involvement with the Andrews group followed the Hoh River Pulse, which focused on the "nurse-log" concept. Participants in that pulse explored the notion that old-growth logs provided nutrients and other benefits to the ecosystem as they decomposed on the forest floor. Harmon's fieldwork mostly focused on the Hoh River drainage, and he had very little experience with the Andrews Forest before December 1980.[40]

Short-term, soft-money appointments, first as a graduate assistant, and continuing as a postdoctoral associate, funded Harmon's work on the log-decomposition study. He initially placed his graduate studies on hold to design and implement the project for the group, but he eventually completed his Ph.D. in 1985. In many ways, Harmon's work set the tone for subsequent research at the Andrews Forest through the late 1990s. It was long term in nature, collaborative in style, and responsive to management concerns of the National Forest System. It was driven by the intense personal effort and scientific commitment of a unique personality, as reflected in his teenage years when he competed in high school athletics as an accomplished wrestler. It was also a flashy way to highlight basic science and other research at the Andrews Forest while still addressing the pragmatic concerns of forest managers. Harmon engaged about a dozen people to work with him on the literature review, and he produced a 170-page monograph detailing that review. Even before it was in print, he distributed early drafts to land managers at the Willamette National Forest. The concept moved from initial theory to management

Harmon's work was long term in nature, collaborative in style, and responsive to management concerns.

[40] Interview with Mark Harmon by Max Geier on 1 October 1997 in his office at Oregon State University, as transcribed by Linda Hahn, 6, 9, and 13.

Figure 38—Mark Harmon explains the Log Decomposition project at a field site on the H.J. Andrews Experimental Forest in 1997.

practice even before Harmon implemented the field study. His initial literature review synthesized previous, relevant research and convinced both District Ranger Steve Eubanks and Forest Supervisor Mike Kerrick that management policy on the Willamette National Forest was flawed. In response, they ordered an immediate halt to the "piling of unmerchantable material" (PUMing) on the Willamette National Forest, resulting in an estimated savings of $18 million a year. The other national forests on the west side of the Cascades soon followed suit.[41]

The process of compiling the literature review and initiating the decomposition study began a generational transition of leadership that was apparent to the young graduate student assigned to the task. Harmon perceived that those who worked at the Andrews Forest in earlier years, notably including Franklin, Cromack, and Phil Sollins, considered the literature review a culmination of their efforts on that particular study. From Harmon's perspective, however, it was "the beginning." In that sense, the previous generation of scientists passed "the baton" of leadership to Harmon, who viewed the assignment as a personal and professional opportunity

[41] Andrews History Project Workshop of 7 August 1996, 16; interview with Mike Kerrick, 25.

with few parallels. He considered the general theme of log decomposition such a "basic question" that it was open to almost limitless possibilities. Where others emphasized the expansive, temporal scale of the study, Harmon perceived an opportunity to miniaturize the scale of ecosystem studies. Referring to the log study, he observes, "It's like a mini-ecosystem. Lots of times … [we] have a hard time measuring what's going on in a big ecosystem. But this was like a little, mini-ecosystem." The study was Harmon's answer to critics who claimed that ecosystem research lacked scientific rigor. In that miniaturized system, he argued, scientists could measure "all the things you could measure in an ecosystem," and they could design experiments that tested ecosystem processes with measurable results that could be replicated or tested with other experiments.[42]

The log-decomposition study continued the IBP's emphasis on studies of old-growth ecosystems, but it also built on earlier, management-oriented studies of regeneration, growth, and yield. In Harmon's efforts to formulate a study design that would eventually span 200 years, moreover, growth-and-yield studies were among the few prototypes available for genuinely long-term research. Even those long-term studies, however, were poor models because the log-decomposition project was not primarily intended as a management-oriented study. Referring to his search for precursors or potential models for the log study, Harmon observes that even with studies of litter decay, including leaves and other small debris, "a long study was a year. People hadn't even acknowledged that even [litter decay] took decades. So, there weren't many decomposition experiments that went beyond a year or two."[43]

The group's willingness to trust Harmon with a study so symbolic of their long-term commitment to the Andrews Forest was ironic, given his almost complete lack of prior involvement and tenuous status. The paradox of a tightly knit community handing over their legacy to a raw recruit, however, is more apparent than real. Harmon's background reads like a roadmap to previous traditions of recruitment into the group, and many of those with more established records at the Andrews Forest could easily recognize pieces of themselves embedded in Harmon's past. He was new blood from an old vein. Like McKee, Harmon hailed from New England, and although he attended Amherst for his undergraduate degree, he also headed south for his graduate work. Like Dyrness, he was an undergraduate convert to ecology, and after a brief, postgraduate stint at Glacier

[42] Interview with Mark Harmon, 14.

[43] Interview with Mark Harmon, 13.

National Park, Harmon took the advice of a fellow Amherst graduate at Glacier and headed to the University of Tennessee. At Tennessee, Harmon, like Gregory, was drawn into closer involvement with the Park Service, working at Great Smokies National Park and with scientists involved with research programs at Oak Ridge National Laboratories. Like Dyrness, Harmon's prior experience in Oregon was limited to a jaunt through the Pacific Northwest as an undergraduate. He hitchhiked down the Oregon coast from Seattle in the early 1970s as part of a break from a summer excursion to Nevada, where he helped his brother build a house. Like Swanson and Gregory, Harmon traces his evolving scientific interests through a series of summer research camps and field experiences at sites remote from his original home and from his eventual involvement at the Andrews. He recounts, for example, a conversion of sorts that he experienced while attending a geology summer camp in Montana: "I found out I was not going to be a geologist because I, I just absolutely [had no talent] as a geologist."[44]

Even then [late 1970s], they were known for real integrated studies. We would hear crazy things … about people climbing trees with ropes, and all kinds of strange things.

Harmon's brief experience hitchhiking through the Pacific Northwest stimulated his abiding interest in big trees. His research interests subsequently moved in the direction of vegetation studies, eventually leading to his involvement with the Andrews group.[45] Harmon's interests met his future in the mid 1970s at a conference in Athens, Georgia, where he happened to encounter Kermit Cromack and Jim Sedell. Over the next 4 years, he more frequently encountered members of the group at other conferences. He particularly recalls McKee, Sedell, and Franklin presenting their research from the Hoh River Pulse, shortly before Harmon considered transferring to OSU to begin his doctoral work. Of the Andrews group, he observes, "even then [late 1970s], they were known for real integrated studies. We would hear crazy things … about people climbing trees with ropes, and all kinds of strange things going on out in the Northwest. So, it sounded like a really interesting place." The key to his involvement, however, was an incidental contact with Franklin when Harmon was working as a guide in the Great Smokies: "I guided him; he came right at the height of fall color season, and [it was] a perfect time for Jerry." In the course of their encounter in the woods, Harmon discussed graduate school with Franklin, who suggested there might be some opportunities for funding at OSU. Harmon was also attracted by the "whole idea of integrated work and also working in a team."[46]

[44] Interview with Mark Harmon, 1-5.

[45] Interview with Mark Harmon, 4.

[46] Interview with Mark Harmon, 1, 4.

Harmon began his postdoctoral appointment about the time his mentor began to distance himself from OSU. By the time Franklin left to take a sabbatical at Harvard Forest early in 1985, Harmon had developed a personal, long-term interest in collaborative research at the Andrews. After setting up the log study, he was determined to stay with it, and he was sold on the opportunities for research he had identified while compiling the literature review. He enthusiastically embraced the group's ideal of integrated work and team research, and he found it "exciting" to work in a place where people were actually putting those principles into practice.[47]

Watching Puddles Dry Up and Logs Fall Apart

In designing a study intended to last 200 years, Harmon saw the opportunity to link many previous, briefer studies at the Andrews Forest. He envisioned a program of research that would be a central reference point for everyone connected with the group. Harmon, therefore, designed the log study as a "temporal backbone" for a whole series of experiments, observations, and measurements. He and other scientists in the group could design and implement a wide range of research in a fashion that would link them all together, through time. In that sense, Harmon conceived of the log study as "just a series of linked short-term studies." Those shorter, linked studies would generate interim results with immediate utility, while the long-term study proceeded through the next two centuries. "You would have to be an idiot, to wait two hundred years," Harmon explains, "and we were not idiots. We were going to keep working on this."[48]

The log study epitomized the group's goal of promoting collaborative, long-term research that would also be useful to forest managers. That strategy, however, involved some risks. If they focused exclusively on research with practical applications, the group might encourage the idea that basic science was, by comparison, irrelevant, or trivial. Instead, they emphasized basic science as a foundation for applied research, and they stressed the value of field-testing scientific theories. In that sense, the log-decomposition study resembled the stream team's

[47] Interview with Jerry Franklin, 25-26; interview with Mark Harmon, 18.

[48] Interview with Mark Harmon, 12.

Figure 39—Mark Harmon and others placing logs in Lookout Creek in July 1985 as part of the Stream/Upland Decomposition Comparison study.

contributions to the riparian management plan for the Willamette National Forest.[49] Both efforts encouraged collaboration and synthesis. The riparian management plan, conceptually, applied insights from the river-continuum effort and, more broadly, from the whole set of forest-stream interactions work at the Andrews Forest. It was also collaborative in the sense that it was the product of the Willamette National Forest Riparian Task Force. That body included managers, planners, and district staff associated with the national forest, as well as scientists involved with the Andrews group. The task force laid out guidelines for establishing riparian resource values, landscape management, basin management, harvest

[49] Stan Gregory and Linda Ashkenas, "*Riparian Management Guide: Willamette National Forest*" (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, 1990). The path of ideas leading to this result include William R. Meehan, Frederick J. Swanson, and James R. Sedell, "Influences of Riparian Vegetation on Aquatic Ecosystems With Particular Reference to Salmonid Fishes and Their Food Supply." In: *Importance, Preservation and Management of Riparian Habitat: a Symposium; 1977 July 9; Tuscon, AZ* (Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Gen. Tech. Rep. RM-43, 1977), 137-145; Frederick J. Swanson, Richard J. Janda, Thomas Dunne, Douglas N. Swanston (eds.), *Sediment Budgets and Routing in Forested Drainage Basins* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-141, 1982), 165; Stanley V. Gregory, Frederick J. Swanson, Arthur W. McKee, and Kenneth W. Cummins, "An Ecosystem Perspective of Riparian Zones," *Bioscience* 41(1991)8: 540-551. These concepts, Swanson observes, similarly found a place in later efforts to develop regional management strategies such as the Northwest Forest Plan.

unit management, riparian rehabilitation, and monitoring responsibilities on the Willamette National Forest. The log study, similarly, was a group effort to organize and synthesize information in topical areas.

The riparian plan and the log study both dealt with "basic science issues," although the science attracted less publicity than the planned duration of the research or its management implications. In the public eye, McKee observes, the log study was "like watching mud puddles dry up." To the participating scientists, however, it involved experimental designs that tested fundamental concepts in exciting new ways not previously possible. In each case, the social interaction of the group encouraged individual scientists to question the obvious, adding insight, depth, and immediacy to the concept of long-term research. Their close association with other scientists and land managers while attending monthly meetings, riding in vans to field sites, standing on landings, or pointing down a stream, helped them work and laugh together, without rancor, even when they disagreed on particulars. That characteristic helped the group bridge the apparent gap between basic research and applied studies.[50]

Explicit links between the log study and other prominent research previously accomplished at the Andrews shielded Harmon's work from potential ridicule for its impossibly ambitious timeframe. Harmon emphasized the study's similarities with previous work at the Andrews. He had previously worked with permanent plots for measuring forest growth—many were tagged and measured at regular intervals across more than 70 years. Those studies began with people who placed the original tags, even though they knew that someone else would have to follow up on their work. Without that initial effort, Harmon noted, "We wouldn't be doing what we're doing now. We wouldn't have all that information. To me it wasn't that different." The most obvious difference was Harmon's effort to improve on the experimental design: "… instead of the trees just growing on their own, we actually had to put these things [logs] out … we couldn't just go with what was there, and … have a good experiment." The integrity of the experimental design was, in fact, Harmon's central concern: "It wasn't enough to put out a bunch of logs and say, 'Gee whiz.' You had to have some pretty tight hypotheses. So, actually, before I ever went down to the Andrews, I spent a lot of time just thinking what those would be, and how they would … lead to a [general] model of decay."[51]

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[50] Interview with Mark Harmon, 11-12; Andrews History Project Workshop of 7 August 1996, 18.

[51] Interview with Mark Harmon, 11-12.

Harmon anticipated criticism of the log study, and he launched a pre-emptive effort to define the ground on which critics would have to stand or fall by their arguments. In July 1985, he sent copies of the initial study plan to Louise Mastrantonio, Research Information Services at PNW Station in Portland, requesting help in filming and otherwise recording efforts to install the experiment. The study plan, he observed, was designed to test the effect on decay of log species and logs of different sizes, as well as the relation of invertebrates to rates of decay. In his letter to Mastrantonio, he also stressed plans to initiate "a series of detailed process-oriented studies on the interactions between microbes and invertebrates."[52] The Station publication *PNW News* reported the beginning of the study that month, outlining plans to place "logs of specified ages, sizes, and species at six locations on the Experimental Forest, in an attempt to standardize initial log conditions and natural processes." Aside from the long-term, 200-year goals of the study, the report stressed the initial objective for the first 5 years of the study to "characterize and quantify the roles of insects in the colonization of logs by decay organisms, such as fungi and bacteria. This will be accomplished by screening a selected set of logs to keep insects out." The study involved replication at six sites on the Andrews Forest, for a total of 500 logs, in an effort to ensure the long-term project would survive unplanned disturbances and to sample some of the climate variability of the forest landscape. The effort was funded with a timber sale on the Andrews Forest, with grants from the NSF through the LTER program, and with funds from PNW Station. Other grants also funded subsequent phases of the study.[53]

The scale of the logs and the planned duration of the study required close coordination with district managers and contractors.

The experimental design required field placement of logs under controlled and replicable conditions. The scale of the logs and the planned duration of the study required close coordination with district managers and contractors. Steve Eubanks, District Ranger at Blue River, developed a critical-path diagram for the project because, as Harmon recalls, "The fear was that [the project] … was just too … complicated and complex, and … we just had to make sure that this wasn't an embarrassment and a boondoggle." Harmon and Eubanks "spent a lot of time" discussing possible, worst-case scenarios: "'What if it snows in September?' Or, … 'What if something breaks down?' And, 'How late can we go, how will we address this problem?'" From the start, the scientists and managers involved in

[52] Mark E. Harmon to Louise Mastrantonio [letter] 12 July 1985.

[53] *PNW News* (1 July 1985); Mark E. Harmon, "*Long-Term Experiments on Log Decomposition at the H.J. Andrews Experimental Forest*" (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-280, 1991).

Mark Harmon, June 1985

Figure 40—This group of volunteers who worked on the Log Decomposition study in 1985 included Karen Luchessa, John Moreau, and a crew of student helpers from Oregon State University. Shown here on the steps of the old McRae trailer on the H.J. Andrews Experimental Forest headquarters site, the crew placed the logs in the component of the study involving the Stream/Upland Decomposition Comparison.

the effort recognized the potential for a public relations nightmare. Harmon worked with district personnel to address strategic and tactical concerns. In some ways, he admits, the plan was "literally a crazy idea. To take sound trees, cut them down, drag them out into the woods and stick them out to rot was, you know, 'Oh my God.'" Among others who Harmon worked with at the Blue River Ranger District, Vince Pulao helped him decide from which sites to take trees, based on the feasibility of getting them out. Once the overall strategy was determined, Harmon and Pulao spent "a lot of time" working out the details of how they would "actually get access" to the sites, using old roads or other strategies.[54]

Harmon notes that Forest Service managers were "not too involved" in planning the basic experiment, but they became "more and more involved" during implementation. They adopted the acronym "D-Day" (for "duck day") in planning field operations, anticipating a negative public reaction as details of the effort became more apparent to outside observers. Mostly, however, they were concerned about pragmatic engineering concerns. Once the logs were acquired from

[54] Interview with Mark Harmon, 9-10.

the donor sites, they had to be placed into the host sites. That second phase was the reverse of a normal logging operation, and the group considered the feasibility of moving the logs into intact stands with cable systems. The district staff, however, convinced McKee and Harmon that if they installed a small, temporary road to provide access for "regular logging machinery," then loaders could place the logs with more accuracy and care. In the end, Harmon concludes, "They were right, actually." Out of 500 logs placed for the study, only 1 small tree on a single site had to be removed to make room for the equipment used to place the log.[55]

The entire operation of putting 500 logs of various species and sizes at 6 places on the Andrews Forest was completed in the month of September 1985, from felling the first tree to placing the last log. After the initial installation effort, much of it with volunteer labor supplied by cooperators in the Andrews group, Harmon continued the study with little direct assistance. Once the logs were at the appropriate sites, he required an additional 5 months to install the remainder of the study. This included, in Harmon's words, "an awful lot of work to describe what they looked like at first." He then proceeded with the planned, experimental manipulations, cutting sections off each log at both ends, mapping them, and building insect exclosures. Harmon began his analysis even before completing the installation. He stored cross sections of logs measuring about 19.7 inches in diameter and 3.94 inches thick in a cooler at the Blue River Ranger District office. The "cookies" he cut from the ends of the logs completely filled a 2,400-cubic-foot cooler originally designed for storing seedlings. An interim progress report in *Forestry Research News* (28 January 1986) detailed some of the procedures, including hand-trimming, drying, measuring, and recording data on size, weight, and condition of more than 20,000 wood samples of Douglas-fir, western redcedar, western hemlock, and Pacific silver fir. Each sample was bar-coded to facilitate tracking and future analysis, and the inner and outer bark on the various wood samples was stripped apart with wood chisels. Harmon's study design also specified the same process for each new sample from each of the 500 logs, scheduled at intervals of 1, 2, 3, 4, 5, 6, 8, 16, 24, 32, 60, 90, 120, 150 180, and 220 years.[56]

The concept of cutting down mature trees, sectioning them into logs, and then spending money and resources to place that sound timber in the forest just to watch them rot, was a public relations powderkeg. The study site was close

[55] Interview with Mark Harmon, 10.

[56] Interview with Mark Harmon, 10-11.

to Blue River, a timber-dependent community suffering through economic decline throughout the 1980s. Harmon recalls few expressions of concern from local community leaders at the time, but the attitude of some of the people who actually placed the logs was more of a problem. On the first day, Harmon recalls, "I went up to check on the work, and the guy who was in the loader... he got out of there and he just cursed a blue streak. He thought that this was just the stupidest, damned idea he ever heard of. 'What idiot came up with this?' He went on and on." By the end of the month, however, Harmon observes, the equipment operators were "quite proud of the work they did and they understood why they did it." The key was communication with people on the work sites. Harmon and others in the group explained the theory and urging the operators to "Think about it this way," and he concludes, "they got convinced." The atmosphere in timber towns in the mid 1980s was arguably not as tense as it later became, during the crises of the 1990s, when Harmon argues the group would "get fried" if they tried the same thing. Even in that more contentious decade, however, the log-decomposition sites were a handy starting point for many field tours at the Andrews Forest. They served as a dramatic example of basic science examining ecological processes like decomposition and forest-stand composition and structure. Tours of the Andrews Forest typically began with this study in the morning and then moved on to other sites to show applications and demonstrate findings from the log-decomposition study in actual land use practices.[57]

The ability to work closely with contracting loggers was a critical element of a study that relied on funds from a timber sale on the Andrews Forest to finance the implementation of the log "treatments." The process resembled Silen's earlier efforts to devise an experimental road system funded with timber sales that included detailed specifications written into the contract. Silen had enforced those provisions by cultivating a personal understanding with the contractor, Mike Savelich. In the 1980s, however, the Blue River Ranger District assumed more of the burden of planning and administering the sales. Harmon and Pulao worked with Eubanks to devise contracts that specified placing logs at the various sites. Eubanks then assumed responsibility for making the process as seamless as possible. He worked to "implement a fair amount of the installation of that research" as part of the timber sale. Each contract required the logger to build the

[57] Interview with Mark Harmon, 11; communication from Fred Swanson 2 January 1999.

roads, take the logs from the harvest area, put them on a truck with a self-loader, take them to the installation site, and set them in place. Eubanks worked to ensure that the contractors and the researchers communicated at each step in that process. In his own estimation, it was a "very nontraditional approach" that "saved a lot of research money for other things."[58]

Harmon's effort to explain the scientific basis for the detailed specifications in the timber-sale contracts effectively prevented a rift with the local, timber-dependent community. Beyond the immediate vicinity of Blue River and the other timber towns where those loggers lived, however, critics of the study were more numerous and potentially threatening. As with other new projects, the log study was incorporated into "show-me" tours of the Andrews, and although it was not the only study with controversial implications, he notes it was "probably one of the highlights." It was popular, he suspects, because, "at least in a bizzaro sense … you could say you went and you saw where the insane people were."[59] One of the most blunt and intimidating challenges he encountered came from the dean of the college where Harmon was still a graduate student, and where he was angling for an eventual postdoctoral appointment. Harmon recalls that Dean Carl Stoltenberg, College of Forestry at OSU, sat down across from him at a dinner after one such tour and, as Harmon recalls, said, "This is the most stupid ... thing I've ever heard of in my life."[60]

"At that time," Harmon notes, "… the value of long-term studies in ecological work was still up in the air."

Stoltenberg's response was just one example of a general skepticism that Harmon attributes to the relative novelty of doing long-term, ecological research. "At that time," Harmon notes, "… the value of long-term studies in ecological work was still up in the air. In subsequent years, however, the results of the study began to validate the premise that initially inspired the log-decomposition proposal in the first place: "People realize that a lot of short-term results are often just misleading. That you have to actually look at it in a longer framework, … or you don't know what the results mean." In the late 1980s, however, that premise "wasn't necessarily clear. And we got lots of comments like, '200-year study, that's a long time to wait for results'... you'll be dead.' Nice things like that."

[58] Interview by Max Geier with Steve Eubanks on 9 January 1998 in Eubanks' Office at the Chippewa National Forest, Minnesota, as transcribed by Elizabeth Foster, 16.

[59] Interview with Mark Harmon, 33.

[60] Interview with Mark Harmon, 12.

Wildlife Studies and the Reconstructed Landscape

The group's LTER funding and the relatively secure, supportive involvement of the Willamette National Forest rendered Stoltenberg's criticism essentially toothless. Over the next decade, however, the log study raised the stakes for other initiatives on the Andrews Forest. As an emblem of long-term research, collaborative relations with forest managers, and conceptual innovation, the 200-year study was a hard act to follow. It was a dramatic hook for reporters seeking an unusual story line, and numerous news reports and magazine articles popularized Harmon's work by the end of the first 5-year interval.[61] The study elevated terrestrial programs of research into the spotlight previously dominated by old-growth forest and riparian studies at the Andrews Forest, but it also raised expectations for future proposals. The detailed process of designing the log-decomposition study also uncovered gaps in the fields of research represented among cooperators in the group. Those gaps of expertise attracted more attention in the group through the latter half of the 1980s and into the next decade. As Harmon explains, much of his prior work with Franklin focused on how things changed or evolved in an old-growth forest. The log study simply inverted the logic to explore how things fell apart. That study's emphasis on decomposers, however, highlighted questions about animal activity in old-growth stands. Previous wildlife studies on the experimental forest focused largely on regenerating stands. The log study, however, raised issues that demonstrated the relevance of early research by people relatively peripheral to the group but critical to that community's collective grasp of old-growth issues.

Wildlife biologist Chris Maser and mycologist James Trappe, for example, ranged broadly through forests of the Pacific Northwest, including the Andrews Forest, to study the relation between small mammals and fungi found in association with decaying timber. Maser, who worked with the U.S. Bureau of Land Management, and Trappe, who worked with PNW Station and then (after retirement from the Forest Service) with OSU at the Corvallis Forestry Sciences Laboratory, began their collaboration during the 1970s, exploring the relation between decaying logs,

[61] Harmon compiled a hefty file of newsclippings covering the study beginning, for example with a report of the initial installation, which was covered in the *Eugene Register Guard* (3 March 1986), and continuing into the 1990s, including a front-page article in the Sunday edition of the [Salem] *Statesman Journal* (17 June 1990). See also, Robert Heilman, "Coarse Woody Debris: the Underside of Forestry" *Forest World* (Fall 1988): 36-40.

fungi, small mammals (including the northern flying squirrel and the California red-backed vole), and the nutrient-cycling processes that sustain living trees in old-growth forests. Much of their work during the 1970s and early 1980s included collaboration with members of the Andrews group. Trappe maintains, however, that his own work was mostly peripheral to the experimental forest, aside from occasional trips there for gathering fungi. One of his graduate students, Makoto Ogawa, also worked at the Andrews Forest with IBP funding while devising the five-class decay classification scheme for coarse woody debris that subsequently became the standard for work in west-side forests of the Cascade Range. Their combined efforts demonstrated the importance of more systematic studies to understand the ecological role of wildlife in old-growth forests. Despite the work of people like Maser and Trappe, however, wildlife studies were a weak link in the legacy of interdisciplinary cooperation at the Andrews.[62]

The comparatively light emphasis on wildlife studies was a product of the perceptions of scientists involved with the Coniferous Biome. Their activities, interests, and concerns had redefined priorities at the Andrews Forest during the 1970s. The relative dearth of wildlife studies in that era was a shortcoming that often went unnoticed amid the many accomplishments of the group, although Swanson notes they "often get 'dinged' [by outside reviewers] for not having more wildlife work and having it integrated."[63] Within the group, this lapse also attracted the attention of Phil Sollins, a soil scientist who contributed a somewhat unusual perspective to the group in the course of his nearly three decades of involvement with that community.

Unlike many others in the group, Sollins was unimpressed with the "big trees" at the Andrews Forest, and he preferred to study the more-hidden parts of that ecosystem. One of his many studies suggested the need for more wildlife research at that facility. His unique perspective is, at least in part, rooted in his west-coast upbringing, which is unusual in the group. Sollins, a Los Angeles native, frequented redwood forests on family camping trips in the 1940s and 1950s. That experience influenced his later perceptions of the Andrews Forest. "I certainly had seen big trees and seen bigger trees," he observes, "so this [old-growth Douglas-fir] … was

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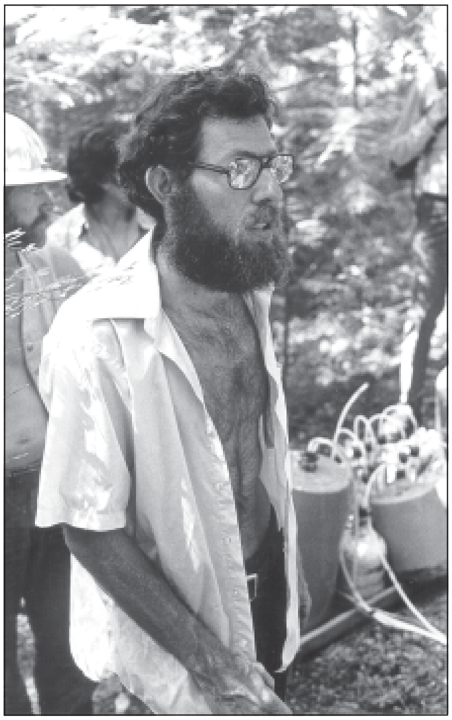
[62] Interview with Jim Trappe by Max Geier on 15 September 1997 in Trappe's office at the FSL, Corvallis, OR, as transcribed by Keesje Hoekstra, 1-3; Chris Maser and James M. Trappe, tech. eds. *The Seen and Unseen World of the Fallen Tree* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Gen. Tech. Rep. PNW-164, in cooperation with the U.S. Department of the Interior, Bureau of Land Management, 1984).

[63] Interview with Mark Harmon, 5; communication from Fred Swanson, 1998.



Rollie Geppart

Figure 41—Phil Sollins, shown here in 1979, was less impressed with the big trees on the H.J. Andrews Experimental Forest than some of his colleagues, owing to his prior experience among California redwoods. His fresh outlook helped shift the group's focus to less visible components of the old-growth forest.

nice but it wasn't anything unusual." That was an uncommon view in the group, except for Waring, who also came to the Andrews Forest after extensive experience in California. Little about the place struck Sollins as remarkable. Even the amount of precipitation failed to impress him because he was accustomed to the tropical forests of Puerto Rico, where he once lived as a youth. People and science, not the characteristics of the local or regional landscape, attracted Sollins to the Andrews. Sollins had worked with the renowned scientist, Tom Odum, while finishing his graduate studies at the University of North Carolina and the University of Tennessee. He also worked on the Eastern Deciduous Biome of the IBP at Oak Ridge National Laboratories. That work plugged him into other sites in the IBP network, and he joined the Coniferous Biome in the early 1970s. By that time, he already had considerable expertise and experience in the areas of nutrient cycling, biomass estimation, stem flow, water chemistry, and computer programming. He initially split his time between Andrews-affiliated modeling efforts and the Coniferous Biome components centered on the University of Washington until 1975, when he moved to Corvallis. Thereafter, he worked on soft-money appointments at OSU and focused more exclusively on the Andrews component of the Biome

People and science, not the characteristics of the local or regional landscape, attracted Sollins to the Andrews.

Figure 42—Dave Perry, shown here in a characteristic pose in the 1980s, was a forest ecologist with the Andrews group who helped drive research at the H.J. Andrews Experimental Forest in the direction of more extensive long-term programs of research.

until 1991, when he secured a tenure-track appointment in the Forest Science Department at OSU.[64]

The group's relative inability to expand on earlier wildlife studies at the Andrews Forest during the biome became a concern for Sollins when he encountered difficulty with a study of snowbrush that did not develop as expected.[65] One ongoing thread of research at the Andrews Forest involved studies of nutrient cycling and the role of species associated with nitrogen-fixing bacteria, such as red alder along streams or snowbrush in the uplands. Continuing that thread of inquiry into the 1980s, Sollins set up a study on the Andrews that was designed to evaluate soil nutrients in relation to the amount of snowbrush on a particular site. The study called for a clearcut followed by a hot, prescribed burn. Sollins worked closely with the Blue River Ranger District to coordinate that treatment. "We were trying to kill everything," he observes, "… [and] when we'd plant Doug-fir, *Ceanothus* [snowbrush] would out-compete the Douglas-fir and we'd be able to study the competition." The plan didn't work: "We did everything we could to encourage the

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[64] Interview with Phil Sollins by Max Geier on 24 September 1997 at Sollins' office, FSL, Corvallis, OR, as transcribed by Jeff Prater and Elisabeth Foster, 1-2, 5.

[65] Interview with Phil Sollins, 10.

Ceanothus. We got 20, 30, 40 thousand [snowbrush seedlings] per hectare germinating and they never grew. The Doug-fir just took off, totally." Contrary to Sollins' expectations, virtually all of the snowbrush on the treated study area died or languished.[66]

Sollins and his cooperator at OSU, forest ecologist Dave Perry, scrambled to rescue the study by isolating the factors limiting snowbrush growth. Despite concerted efforts, they never identified a clear solution to the puzzle, but they had many theories about what "went wrong."[67] Sollins suspects that the study failed for reasons related to changes in hunting regulations that promoted wildlife recovery in the vicinity, but he had little to go on. The group had not established a base of wildlife research sufficient to support a rigorous postmortem on the snowbrush study. As the population of elk and bear increased at the Andrews Forest, the problem of inadequate wildlife studies became more acute. Observing that the group has done "excellent work" on studies of streams, insects, birds, and bats, Sollins suggests, "It would be nice if we could get some more work than we have on this [large wildlife species]." About the time the snowbrush study mysteriously derailed, he observes, "the elk herds took off [rapidly increased in number]." He postulates that "over-hunting had just finally been stopped and the elk herds were finally widely established and this was the first year which they [elk] really started coming around the Andrews again." Given the opportunity to browse on snowbrush, he concludes, "Elk prefer it to Doug-fir." Lacking any structured wildlife studies examining elk behavior on the Andrews Forest in that period, however, Sollins was at a loss to prove his theory, which might have had far-reaching implications. Efforts to manage snowbrush with herbicides during the 1970s triggered controversy about the environmental implications of aerial spraying. When elk populations recovered, Sollins observes, that controversy "sort of dropped out of the picture."[68]

Conclusion

The efforts of people like Maser, Trappe, Harmon, and Sollins clearly demonstrated by the late 1980s the importance of wildlife issues to collaborative studies of forest ecology. Wildlife could not be ignored if scientists and land managers hoped to

[66] Interview with Phil Sollins, 9.

[67] Interview with Phil Sollins, 9.

[68] Interview with Phil Sollins, 9.

develop a clear, practical understanding of ecosystem processes in Pacific Northwest forests. Wildlife issues, indeed, loomed large in the future for managers of public lands in the United States, where popular interest in ecological issues had escalated rapidly in the previous two decades. The group was better positioned for responsive engagement with new issues than for any particular concern in the late 1980s, and the key to their preparedness was the Andrews Forest itself.

People in the group were stewards of a relatively intact expanse of native forest in a setting that permitted manipulation of that resource for research purposes. The group had imposed a stricter test of scientific relevance on management activities at the Andrews Forest during the 1970s, which amounted to a virtual moratorium on nonsalvage timber sales in the Lookout Creek. Timber harvests and road building on neighboring drainages of the Willamette National Forest, meanwhile, rapidly escalated through the 1980s. As a result, people who joined the group during that decade saw the Andrews Forest in a new light. It was an accessible reserve of intensively studied, regenerating, older clearcuts and stands of old growth within a larger, patchwork landscape of more recent timber harvests, road projects, recreational developments, and other activities on the Willamette National Forest. The place, however, was relatively underdeveloped, by comparison with other research facilities funded with LTER grants, and the group played up that fact in their search for additional support. The NSF reviewers who cycled through the Andrews Forest on “show-me” tours through the late 1980s could hardly accuse the group of profligate spending. It was a skeletal, shoe-string operation with a make-do ethic that was patently obvious to even the most casual observer. The group promoted the Andrews Forest as a place of mystical attraction where people subsidized scientific programs with voluntary effort. People came to the place for emotional, as well as pragmatic reasons. They found the place inspiring, and they forged new ties with other people in that setting. The result was a community that supported scientific research in both a spiritual and a practical sense.

The group promoted the Andrews Forest as a place of mystical attraction where people subsidized scientific programs with voluntary effort.

That context of over 40 years of continuous monitoring and data management at the Andrews Forest helped the group adapt quickly to new demands for research on old-growth and other issues. They could speak with authority, if not definitiveness, on native forest ecosystems. Their successful efforts to collaborate across disciplines and in cooperation with forest managers earlier in the decade also helped them cope with the intense pressure of a changing political environment. Finally, their ability to mobilize intellectual and community resources beyond the Andrews Forest in response to the Mount St. Helens event demonstrated a potential for responsive engagement with real-world concerns. The group was poised to dramatically expand its public role and consciously exploit its professional influence.

Chapter Six: The Old-Growth Debate and the Andrews

Wildlife studies, for the most part, lagged well behind other areas of research at the H.J. Andrews Experimental Forest (Andrews Forest) through the end of the century, but one such project transformed the group's public role. Eric Forsman's behavioral study of the northern spotted owl focused public attention on old-growth forests in the Pacific Northwest. That development provided a dramatic new focal point for the Andrews group. Forsman's owl study had more impact on people in that collaborative community than his involvement with them, although he earned all three of his undergraduate and graduate degrees in wildlife management at Oregon State University (OSU). Forsman, a native of Eugene, worked with OSU fisheries and wildlife professor Charles E. Meslow during the early 1970s and finished his Master's thesis in 1976.[1] That work focused on the Andrews Forest, but it also included field work elsewhere, notably on the nearby O&C Forest [lands previously included in a since-terminated land-grant to a 19th century railroad, the Oregon and California, now administered by the Bureau of Land Management]. His subsequent Ph.D. dissertation project ranged more broadly. It was a detailed, yet far-ranging assessment of the owl's habitat needs and distribution. At the height of the International Biological Programme (IBP) era, the Andrews Forest was an obvious locale for an OSU graduate student seeking field sites among extensive stands of old-growth Douglas-fir readily accessible by road. Many of his peers and professors already worked at other sites on that drainage. He and Meslow collaborated with seven other scientists in a report on spotted owls on the Willamette National Forest, and the group included that report in its compilation of Andrews-related research.[2] Forsman's primary significance to the group, however, was indirect. His linkage of the spotted owl with old-growth habitat prompted two decades of intense scientific scrutiny of this bird and its habitat needs in

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[1] Eric Forsman, "A Preliminary Investigation of the Spotted Owl in Oregon" (M.S. thesis, Oregon State University, 1976); Jack Ward Thomas, Eric D. Forsman, Joseph B. Lint, and others, "A Conservation Strategy for the Northern Spotted Owl" (Portland, OR: Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl, Report, May 1990), 51.

[2] E.C. Meslow, E.D. Forsman, K.A. Swindle, S.M. Desimone, G.A. Lehman, S. Adey, J. Buck, T.A. Church, and T.L. Cutler, "The Ecology of Spotted Owls on the Willamette National Forest: Habitat Use and Demography" (Corvallis, OR: Oregon Cooperative Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, annual research report, FY 1992). Eric Forsman, "A Preliminary Investigation of the Spotted Owl in Oregon," 126; Eric Forsman, "Habitat Utilization by Spotted Owls in the West-Central Cascades of Oregon" (Ph.D. diss., Oregon State University, 1980), 95.

relation to federal and state standards of forest management in the Pacific Northwest. The group had little direct involvement in that effort, but the owl inquiry raised the stakes for ecosystems research at the Andrews Forest.

The prolonged inquiry into the biology and habitat needs of the northern spotted owl forced state and federal agencies to revise guidelines for forest management to reduce adverse effects on this species. Managers tried to determine the optimal size and arrangement for habitat conservation areas in old-growth forest. By the mid 1980s, that effort was deeply entangled with the science issues of the owl's habitat needs and with public policies mandating multiple uses for national forest lands.[3] After a convoluted and contentious process, the U.S. Fish and Wildlife Service proposed in 1989 that the northern spotted owl warranted protection as a threatened species under the Endangered Species Act of 1973. Two federal agencies responsible for managing public lands in the owl's range subsequently assembled an interagency task force charged with developing a "scientifically credible" conservation strategy for the northern spotted owl. The Forest Service collaborated in the effort with three agencies in the Department of the Interior: the Bureau of Land Management, the Fish and Wildlife Service, and the National Park Service. That group submitted its report in early 1990.[4]

The owl report weighed heavily on timber-dependent communities already suffering from a depressed regional economy hard hit by a slump in the construction industry, declining competitiveness in global markets, and corporate restructuring. Reactions in those communities lurched from anger and resentment toward resigned despair as residents who already faced a bleak outlook for future employment anticipated the fallout.[5] The report noted the owl's dependence on old-growth conditions and proposed a drastic expansion of habitat-conservation areas to include large tracts of old-growth and other forest types. It also proposed opening to

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[3] For an example of how these issues intersected, see E.D. Forsman and E.C. Meslow, "Old Growth Forest Retention for Spotted Owls, How Much Do They Need?" In: R.J. Gutierrez and A.B. Carey, eds., *Ecology and Management of the Spotted Owl in the Pacific Northwest* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Station, Gen. Tech. Rep. PNW-185, 1985), 58-59.

[4] Thomas, Forsman, Lint, and others, "A Conservation Strategy for the Northern Spotted Owl," 51-57.

[5] William Dietrich, "The Final Forest: the Battle for the Last Great Trees of the Pacific Northwest" (NY: Simon and Schuster, 1992), 72-85; William G. Robbins, "Hard Times in Paradise."

Sidebar 6.1: Northern Spotted Owl

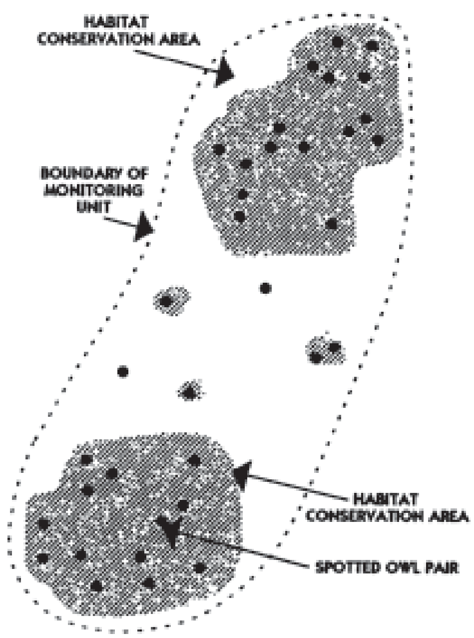
The Issue: Of the numerous species believed to be highly associated with old-growth forest habitat, the northern spotted owl (*Strix occidentalis caurina*) is best known and the focal point for forest and species conservation measures in the Pacific Northwest. The viability of spotted owl populations has been considered an indicator of the viability of old-growth forest communities as a whole.

The Roots: Basic understanding of the biology of northern spotted owls began in the 1970s with the personal curiosity of Eric Forsman, a graduate student at Oregon State University working in the Andrews Forest and neighboring lands on and near the Willamette National Forest. Drawing on these and other studies, efforts by federal agencies to protect these owls and other old-growth-associated species culminated in the Northwest Forest Plan (USDA and USDI 1994), which prescribed forest management for 24 million acres of the range of northern spotted owl from northern California to Canada. Studies and monitoring activities continue to track owl populations and their responses to management actions and other ecological and environmental factors. Thus, work that began in the basic science arena was enveloped in heated, high-level, policy and management debates.

The Approach: As with most ecological studies, Forsman's original study began in the field as descriptive work, making repeated observations of locations of banded owls to determine their home ranges, uses of habitat, interactions with predators and prey, and other aspects of their life histories (Forsman et al. 1984). Since the 1980s, populations of owls have been monitored and modeled to assess change in response to habitat loss, forest regrowth, predation, and other factors in a large (>370,000 acre) area centered on the Andrews Forest (Ackers 2004), and in similar large areas elsewhere in the region.

Results: The northern spotted owl represents a key lesson in the history of the Andrews Forest--some simple, basic studies can be central to major policy and management issues many years later. Work on the spotted owl, old-growth forests, and forest-stream interactions followed this course. Long-term monitoring and other science and management efforts offer a more refined understanding of how this species is related to forest structure and composition, which could affect future approaches to understanding and managing species-habitat relations in general.

Above: Northern spotted owl adult perched on a snag in the Andrews Forest. Photo: Al Levno, USDA Forest Service.



Right: The 1990 Interagency Report (Interagency Scientific Committee on the Northern Spotted Owl), recommended an adaptive management plan that included long-term monitoring of how spotted owls responded to the strategy, including sampling units that extended across a matrix of several different Habitat Conservation Areas and connecting corridors. From Thomas et al. 1990.

logging and other uses some areas previously off limits, and it proposed managing selected stands of second growth to hasten the development of old-growth conditions. That strategy, of course, required answers to two questions: "What **are** old-growth conditions, and **how** does one manage for those conditions?" The Andrews group in 1990 was remarkably well positioned to address these questions.

Much was at stake beyond the owl's immediate survival. Public debate over the future of forest management on public lands was heated in the late 20th century. A political backlash against the environmental initiatives of the early 1970s took root near the end of that decade and flourished during the presidencies of Ronald Reagan and George Bush, from 1981 through 1992. The debate about federal and state priorities for managing public lands included a conservative reconstruction of Congressional mandates after the 1994 federal elections. Members of Congress intensively scrutinized management practices on national forests, particularly in the Pacific Northwest. Timber production in the region was a central feature of the postwar economy. Forest policy issues reverberated through local and state politics and preoccupied congressional delegates from the Pacific Northwest. The human demographics of the issue, however, changed during the mid 1980s. People who depended on timber jobs found themselves increasingly outnumbered by people in other sectors of the economy, especially urban dwellers, for whom timber was not necessarily a leading priority.

The old-growth debate of the late 20th century took the group by surprise. Most important, their ability to adapt, respond, and *act* brought them national prominence.

Acceptable standards of stewardship over forest resources on the national forests in the Pacific Northwest, consequently, were a dynamic management concern in the 1980s and 1990s. The scientists and managers responsible for the Andrews Forest during those years were no more capable of controlling these forces than their predecessors had been in the first decades after World War II. For the most part, the old-growth debate of the late 20th century took the group by surprise. Their applied-science focus, their maniacal persistence in long-term studies, and their collaborative effort, however, positioned people in the group as acknowledged authorities on this and related issues. They were able to tap into networks of support nurtured and cultivated over previous decades of research at the Andrews Forest. Most important, their ability to adapt, respond, and **act** brought them national prominence as consulting professionals who helped shape a strategy for the next century. By the last decade of the 20th century, they were in the unaccustomed position of working as first-source consultants, managing facilities and programs that inspired envy, awe, and even resentment from their peers. The story of the Andrews group during these years is the story of a community discovering

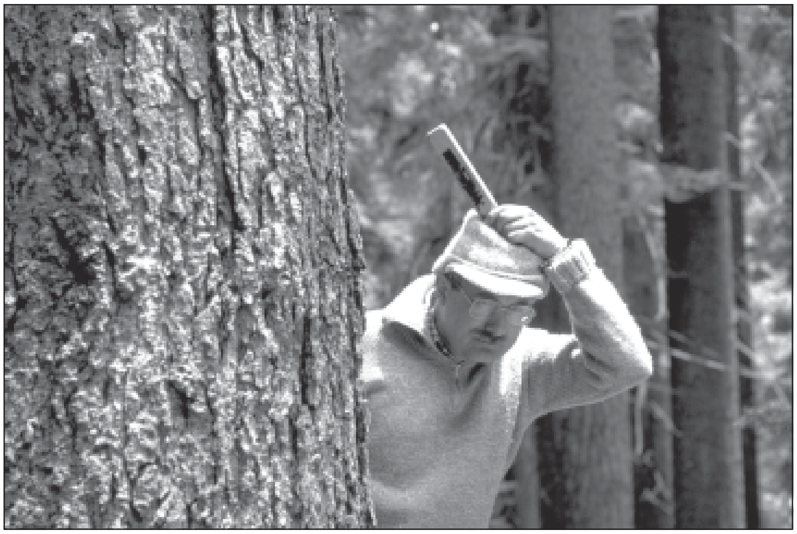


Figure 43—As the International Biological Programme wound down in the late 1970s, Jerry Franklin brainstormed the concept of a “pulse” as a sort of scientific retreat generating a burst of creative energy and enthusiastic field research that would help the Andrews group sustain a sense of common purpose and community, thereby encouraging ongoing, collaborative studies. Stan Gregory took this photo of Jerry Franklin in the Sierra Pulse in 1983.

itself and then learning how to act with self-conscious authority when confronted with crises beyond their control.

Modeling Sustainable Networks of Science and Community on a Managed Landscape

Forest Service and OSU scientists at Corvallis had previously launched joint efforts to understand ecological composition and function in old-growth stands and watersheds at the Andrews Forest during and after the Coniferous Biome. In the intervening years, Franklin tried to impart a sense of urgency and mission to his colleagues, encouraging them to focus on the science mission and to avoid petty distinctions between agency and university scientists.[6] Younger scientists picked up on the theme, partially sacrificing their initial science interests in service to the collaborative ideal. Gregory, for example, would have preferred to focus on fish, and he had considerable latitude in the type of research project he could pursue for his graduate work. His colleagues in the IBP, however, encouraged him to focus his

[6] Interview with small-watersheds group, 19-20.

dissertation work within certain broad parameters: “It needed to be something in the Andrews, and something that helped understand stream ecosystems, something that wasn’t already being done.” Those parameters led Gregory to study primary production in streams. His thesis focused on a clearcut section and an old-growth section of Mack Creek on the Andrews Forest, where he studied rates of primary production, and the nutrient dynamics associated with those rates. That focus involved Gregory in what he describes as “one of the first truly multidisciplinary ecosystem programs.” As a young graduate student, he was involved with Jim Sedell, Jim Hall, Jerry Franklin, Dick Waring, and Kermit Cromack, and “lots of other people” in an atmosphere where everyone in the program was “constantly getting together and exchanging ideas and concepts about how ecosystems function.” It was an unparalleled learning experience and professional opportunity.[7]

By the time the Andrews group assembled for a working retreat at the Wind River Experimental Forest in Washington in 1978, its members generally espoused the collaborative ethic of the IBP as an ingrained tradition and shared value. They were unconcerned with artificial distinctions between Forest Service or university employees, or relative rank within those institutions, and unaffiliated, visiting scientists swelled the ranks of those officially connected with either OSU or the Pacific Northwest (PNW) Research Station. Their Wind River gathering was intended as an opportunity to synthesize insights from a variety of divergent, yet interrelated studies of old-growth forests and streams, and the group expected the meeting would eventually lead to a publication reflecting that synthesis. Sedell and his fellow conferees at that meeting were motivated by a collective sense that the funding mechanisms on which they all relied would inexorably drive research deeper into a tinkering mindset of small studies nibbling around the edges of larger issues. As a remedy, they proposed to jointly articulate a new paradigm for research designed to address, more directly, public concerns about urgent ecological problems. Whereas standard industry sources tended to fund questions like, “How can we ‘up’ production and cut costs?” or “What’s the minimum [environmental protection] we need?” Sedell and his colleagues at the Wind River meeting argued they could tap into an emerging willingness, particularly in the National Science Foundation (NSF), to fund basic studies that addressed more fundamental questions: “How does the system work and are we doing the things that keep the system working that way?” By the time of that 1978 meeting, those who attended the

[7] Interview with Stan Gregory, 1.

conference had worked together for nearly a decade. The pressures of securing grants, tenure, positions, and promotion in federal agencies, academia, and private industry, however, had discouraged formal integration of their work. The meeting produced a publication that Sedell describes as a collaborative effort: "… there were about six or eight of us authors that put together this book on the characteristics and function of old-growth forests, and that was just synthesizing bits and pieces that we'd all done, to put it into a coherent story, and that was the first look at those forests that way." That government technical report,[8] he concludes, "had more to do with focusing [research] on old-growth forests than anything."[9]

The report, publicly released in 1981, provided the group with a central theme around which they could weave a coherent program from the multiple strands of research at the Andrews Forest. It included two major components: "Characteristics of old-growth forests" and "Managing for old-growth forests and attributes." Descriptive sections of the report explored the composition and function of forests and streams, and the structure of old-growth trees, snags, and logs on land and in streams. Programmatic sections suggested strategies for "perpetuating or re-creating old-growth forests," including the distribution of old-growth management areas, and appropriate structural attributes to guide management planning toward accomplishing these goals. The programmatic sections went well beyond characterizing or describing old growth: they were a call for action. This report confronted the group with the question of what management methods might be needed to maintain ecological processes and structural features of old-growth forests.[10] In response to that question, people in the group **acted**. They shared their collective insights on the processes and structure of the old-growth Douglas-fir forest at Lookout Creek in a 2-week program offered in July 1981 as part of the Continuing Education division of the College of Forestry at OSU.

The 2-week program drew on a wide range of Andrews collaborators and resources, pairing a 5-day short course involving fieldwork at the Andrews Forest with a 5-day workshop in Corvallis that focused on habitat types. This intensive, two-stage program communicated scientific ideas and then illustrated their application in a real-world setting. Topics for the short course were a virtual catalogue of

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[8] Jerry F. Franklin, Kermit Cromack, Jr., William Denison, [and others], "*Ecological Characteristics of Old-Growth Douglas-Fir Forests*" (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Gen. Tech. Rep. PNW-118, 1981), 48.

[9] Interview with Jim Sedell, 18.

[10] Interview with Jim Sedell, 18.

research relevant to the questions swirling around the 1981 report. They included methods for assessing biomass, leaf area, net production, stand vigor, and growth efficiency; environmental controls on forest composition and function; techniques for measuring environmental conditions; structural features, including old-growth stands; tree canopies as complex ecosystems; nutrient cycling and nitrogen; coarse woody debris in forests and streams; chronic erosion processes (creep) and catastrophic erosion processes (landslides); vegetation and geomorphic interactions; riparian zones (structure and importance); stream channel stability; stream ecosystem structure and function (energy sources, invertebrates, fish, other vertebrates); and contrasts between natural and managed ecosystems.[11]

The report and related events amounted to a coming-out party for many of the scientists affiliated with the Andrews group, and not everyone hailed their arrival. Public land policy in the Pacific Northwest during the early 1980s was a political minefield. With few exceptions, these scientists had relatively little experience negotiating that political terrain. The economy of the Pacific Northwest was mired in a timber recession linked with double-digit inflation and a stagnant construction industry. People who depended on the timber industry for their livelihood demanded attention to their concerns. In that context, a misconception about the group gained credence in the popular culture: State-funded scientists who studied old growth at the Andrews Forest were supplying information that aided environmentalist efforts to halt logging in old-growth forests. That perception led to an inquiry by the Oregon State Legislature, which summoned McKee to explain why the state was supporting research at the Andrews Forest that might buttress environmental initiatives to protect old growth. McKee responded, "We don't study **just** old growth."[12]

The Oregon State Legislature summoned McKee to explain why the state was supporting research that might protect old growth. McKee responded, "We don't study *just* old growth."

The group's political support was unpredictable and tenuous by comparison with its critics. Oregon Congressman Peter DeFazio (Democrat) and Oregon Senator Mark Hatfield (Republican) provided a strong, bipartisan, national base of support for the Andrews Forest and related programs. Closer to home, however, representatives in the Oregon State Legislature were often less open in their support, if not directly hostile, from the perspective of the group's leadership. McKee assigns much of the credit for defusing the legislative inquiry of the early 1980s

[11] "H.J. Andrews short course for summer 1981" H.J. Andrews Files, File Box D, Storage Vault, FSL, Corvallis, OR.

[12] Andrews History Project Workshop of 7 August 1996, 34.

to the legislative representatives for the district that included the Andrews Forest. From his own perspective, however, he concludes that political and physical geography sometimes eroded their standing with political supporters in state and local government: "We've had a diversity of support from some people at the state level and county level … [because] that state district keeps changing its boundaries. They call it the helicopter district, because it's a bunch of west-slope valleys running north and south." These westward-draining river valleys, separated by high ridges, made it difficult to move around or campaign in the district except by air and tended to separate people and interests in that district into separate enclaves that lacked a cohesive central focus or direction.[13]

Management Transitions and Implications for Studies of Forest Ecosystems

Faced with uncertain support from the state of Oregon, the group leaned more heavily on its federal base and strengthened its ties with the management branch of the Forest Service. They found a strong ally in Mike Kerrick, who took the helm as forest supervisor for the Willamette National Forest shortly before the controversy over old growth heated up in the Pacific Northwest. Kerrick's previous career wove in and out of the Andrews community five different times between 1952 and 1980, when he returned to the Willamette as forest supervisor.[14] Even he, however, was surprised to find that relations between managers at Blue River and researchers at the Andrews Forest had taken a cooperative turn by 1980. Jim Caswell, for example, had replaced Robert Burns as District Ranger at Blue River a few years before Kerrick's return as forest supervisor. McKee credits Caswell with strengthening the "partnership" between district personnel and scientists with the group and concluded he "really wanted to build that partnership into a stronger partnership."[15]

Kerrick had gained an appreciation of the need for stronger links between managers and researchers during his previous stint as deputy forest supervisor with the Coconino National Forest. His efforts to encourage better interaction between forest managers at Coconino and scientists engaged in research relevant to grazing and water issues on that national forest never fully paid off because, he recalls, "it was still a we-they kind of thing from the district standpoint." By comparison with

[13] Andrews History Project Workshop of 7 August 1996, 32.

[14] Interview with Mike Kerrick, 14, 17-18.

[15] Rakestraw, 133; interview with Mike Kerrick, 14, 17-18.

the more-established, long-running conflict over grazing rights and water claims in the American Southwest, the full implications of the emerging old-growth debate in the Pacific Northwest were less obvious to Kerrick when he returned to the Willamette National Forest. He did, however, quickly grasp the need to ensure that management practices would keep pace with science relevant to issues on that national forest over the next decade. The potential for closer cooperation with scientists at the Andrews, consequently, was a valued attribute of his new appointment.[16] Kerrick, in short, had undergone something of a conversion since his earlier years as Anderson's protégé at the Blue River Ranger District. After 1980, he supported forest managers and staff at Blue River who showed an emerging interest in research findings. The timing of this rapprochement was critical for the success of the group, as the debate over old-growth forests brought research programs at the Andrews Forest under increased scrutiny. The group's proposal to establish the Andrews as a National Field Research Facility coincided with Kerrick's arrival, and together, those two circumstances helped forge a stronger bond with managers at the Blue River Ranger District. The NSF proposal called for a local advisory committee to include the district ranger at Blue River and representatives from the Willamette National Forest and from the Pacific Northwest Regional Office.[17]

Kerrick's goal of promoting stronger relations between managers and scientists at the Andrews Forest came at an opportune moment in the history of that facility. The group's ability to secure renewable funding from the NSF in addition to ongoing support from the Forest Service and Oregon State built a more autonomous base than would have been possible without that third leg of support. Scientists in the group were also becoming more assertive in promoting management applications for their research, thanks in part to the more accommodating style of District Ranger Caswell. When Caswell accepted a promotion to deputy forest supervisor in Boise, Idaho, in 1983, scientists at the Andrews viewed his departure as an opportunity to play a more direct role in selecting his successor at Blue River.[18] They wanted to recruit a district ranger who would work more actively with the group and break down some of the barriers separating research ideas at the Andrews from management applications on the Blue River Ranger District. That goal was consistent with the 1981 report on strategies of "managing for old-growth forests

[16] Interview with Mike Kerrick, 17-18.

[17] Interview with IBP group, 23.

[18] Interview with Franklin, 22-23; interview with IBP group, 24.

Gerald Williams

Figure 44—Kerrick's recruitment of Steve Eubanks as district ranger at Blue River transformed science-management relations at the H.J. Andrews Experimental Forest into full-blown managerial enthusiasm for experimental forestry. Here, Dave Alexander, Steve Eubanks (crouching), Rolf Anderson, and Jerry Mason confer at the McKenzie Bridge campground during a meeting of staff from the Willamette National Forest and the Umpqua National Forest on 18 July 1986.

and attributes." The group embraced its responsibility to directly address management issues, and the science leadership presented the Andrews Forest as a venue for communicating that mission to a wider audience.

The group's perception of Caswell's departure as an opportunity, rather than a crisis, illustrates the emerging self-confidence of the science leadership at the Andrews in the early 1980s. Rather than responding to management inquiries or seeking ways to interest forest managers in their work, science leaders asserted their relevance to an internal personnel decision of the Willamette National Forest. In doing so, they stepped beyond the sketchy boundaries laid down in previous memorandums of understanding between PNW Station, OSU, and the Willamette National Forest. The fact that they perceived their efforts to influence Kerrick's decision on this hire as successful, however, was as much a measure of Kerrick's evolving management style as it was a testimony to the brash self-confidence of the Andrews group. During his interview with Steve Eubanks, who eventually won the job, Kerrick never specifically indicated that good relations with research was a management goal for the district ranger at Blue River. Instead, he asked Eubanks, "How do you feel about working with research folk?" Eubanks, who had been working with research in his previous assignments, responded that he considered it "a real unique opportunity." From Kerrick's perspective, the budding partnership with the group at the Andrews Forest was an "incredible resource" and his priority was to avoid doing anything that would "negatively affect it." Instead, he wanted to "nurture it and see it grow." In the end, Kerrick concluded, Eubanks "probably spent more energy and effort on the Andrews than … I wanted," but he could see "great things happening" as the partnership with research "really flowered under his administration."[19]

Kerrick assigned the new district ranger responsibility for nurturing the liaison with research, and he included that responsibility as a management goal for that person. For Kerrick, that directive was a simple extension of the traditional priorities of the Forest Service. Forest managers, he explained, constantly look for "useful stuff" that will "help manage the forest better." In his view, people, rather than ideas, most commonly interfered with that goal, and he favored a strategy of selecting people who could "hang out and work … with the research community" while also fulfilling their responsibilities as a district ranger.[20] The person he selected to fill that niche at Blue River brought a level of management energy and enthusiasm that few scientists at the Andrews Forest had noted in his predecessors. They nicknamed Eubanks "The Research Ranger on the Research Ranger District" because he demonstrated a real enthusiasm for research by applying it in his district. People in the group considered Eubanks a "major participant in the research program" who did more than just support their efforts: he actually made proposals and suggestions, sometimes disconcerting scientists who casually tossed around ideas without concern for their practical implications. Eubanks, however, took each suggestion seriously, and in Sedell's words, "ran it back at us" with a critique of its feasibility. He was also aggressive in implementing new practices on the ground to demonstrate the management implications of ecosystem research, particularly in relation to alternative silvicultural practices.[21]

They nicknamed Eubanks "The Research Ranger" because he demonstrated a real enthusiasm for research by applying it in his district.

[19] Interview with Steve Eubanks, 10; interview with Mike Kerrick, 17-18; interview with Jerry Franklin, 23; interview with IBP group.

[20] Andrews group interview 22 September 1997, 35.

[21] Interview with Mike Kerrick, 17-18; interview with Jerry Franklin, 23; interview with Jim Sedell, 8; communication from Fred Swanson 3 January 1999.

Linking Personal and Professional Priorities With Experimental Forestry on the Andrews

The person Kerrick selected to replace Caswell as district ranger at Blue River had professional and personal roots deeply embedded in the old-growth forests of Oregon. Like Silen and Franklin, Eubanks was a native of the Pacific Northwest. He was born and raised near Salem, Oregon, where he grew up hunting and fishing in nearby Douglas-fir forests. His career path to forestry was less a conscious decision than a predictable outcome, given his childhood experiences, peer group, and proximity to OSU. He grew up in the latter years of the postwar timber boom in western Oregon, when many Willamette Valley high schools still offered programs designed to prepare graduates for entry-level jobs in the timber industry. Eubanks recalls of his own career plans during that period, “I didn’t really have a vision of what I wanted to do, but I ended up in forestry.” When an OSU recruiter visited Eubanks’ high school to talk about careers in forest engineering, Eubanks thought it sounded like “a pretty neat deal” although he “didn’t know diddly-squat about forestry at that point.” With a similar degree of introspection, he stumbled into the forestry program and eventually graduated from OSU in 1970 with a degree in forest engineering.[22]

When Eubanks decided to seek a career in the Forest Service, his fellow graduates questioned the move. By the time he completed his degree, the forestry community was more polarized than in Silen’s era, and many of his classmates urged him to pursue a career in private industry. As a recent product of the state’s leading forestry education program, he was thoroughly steeped in that school’s traditional emphasis on applied research. Eubanks, however, worked for the Forest Service each summer of his college career, and he considered the agency a possible career path. His Forest Service co-workers impressed him with their commitment to principled forestry. Upon graduation in 1970, Eubanks landed a permanent position in the forest supervisor’s office of the Mount Hood National Forest, headquartered in Portland, Oregon. It was an auspicious year that included the first Earth Day celebration and related initiatives that expanded the mission and focus of the modern Forest Service well beyond production forestry. In Portland, he rubbed shoulders with a new cadre of scientists who, like Eubanks, found a home in the Forest Service of that era, and he learned to appreciate “the nonforestry specialists

[22] Interview with Steve Eubanks, 1.

as well as the forestry—such as the hydrologist, the fish biologist, the wildlife biologist, and … the landscape architects." From them, he learned "how to do things" in an environmentally sensitive way.[23] In that decade, from Eubanks' perspective, he and other forest professionals in the management branch of the Forest Service sought appropriate responses to an increasingly complex array of issues: "That sort of stuff [ecosystem thinking] just made sense. … we weren't butting heads with anybody. I mean, we were bringing folks along with us as we went … it just sort of made sense."[24]

Eubanks indirectly linked up with the Andrews community after he transferred from the Mount Hood to the Wenatchee National Forest in east-central Washington. Two years after that transfer, in 1977, some technicians who worked with Eubanks in his new position attended a workshop in Wenatchee, where they encountered Chris Maser, an invited speaker and ecologist. Maser was then working for the Bureau of Land Management in eastern Oregon and he participated in the Wind River meeting on old growth the next year. In 1977, the Wenatchee office was struggling with a management plan for a small drainage on the Wenatchee National Forest. Eubanks learned about Maser from the technicians who were "very impressed with Chris [Maser] and what he had to say as sort of nontraditional viewpoints of managing the forest ecosystem." When the supervisor's office later assembled a team to plan precommercial thinning and harvesting in that basin, they included Maser as an outside consultant. Maser spent a week on the district with the forest silviculturist, the district silviculturist, and the forest soil scientists. "Really, at that point," Eubanks notes, "things just clicked … we were just sort of on the same wave length. That was the beginning of a long-term friendship with Chris that … influenced a lot of my thinking. We came up with some very nontraditional approaches on how to handle everything from coarse woody debris to … what kind of harvests that we were gonna do."[25]

By the time Maser brought his interagency vision of management alternatives to the attention of people in the Wenatchee National Forest supervisor's office in 1977, he was already serving with Sedell and eight other scientists on the H.J.

[23] Interview with Steve Eubanks, 1.

[24] Interview with Steve Eubanks, 2.

[25] Interview with Steve Eubanks, 2.

Andrews National Advisory Committee.[26] That committee helped the group plan its campaign to secure additional NSF funding, beginning with the initial facilities grant (or Experimental Ecological Research [EER]) and eventually resulting in the first Long Term Ecological Research (LTER) grant. Among other responsibilities, the advisory committee suggested strategies for attracting scientists from outside the region and for evaluating whether the permanent facilities for research at the Andrews Forest met the group's needs. They also considered how to increase funding from the NSF, manage data, and devise a management plan with zoning restrictions to protect the research resource. Committee members, who met at the Log Cabin Inn at McKenzie Bridge that year, toured, among other sites, the large-stream monitoring and stream research programs on Mack Creek, the tree canopy research program, and the erosion and geomorphology studies on Lookout Creek.[27]

The linkage of Eubanks, Maser, and the advisory committee in 1977 is just one example of how events beyond the Andrews Forest linked the group with its past and future priorities. During the late 1970s and early 1980s, that experimental forest emerged as a center for studying old-growth forests and planning management strategies that integrated scientific research with public mandates. In that period, the group transcended the Andrews Forest by linking experimental theory with management needs on the Blue River District of the Willamette National Forest, and that link between science and practice enhanced their national reputation. As a result, the group was well positioned to respond when the old-growth debate exploded into the open. Eubanks was a primary, but not unique agent of the pairing of management and research interests at the Andrews Forest. His case illustrates how the group informally recruited and cooperatively engaged other scientists and managers involved with similar issues in the Pacific Northwest in that period.

When Eubanks returned to Oregon from Wenatchee to become district ranger for the Bear Springs District of the Mount Hood National Forest in the late 1970s, he reinforced his previously indirect links with the Andrews group. He arrived to

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[26] Committee members included: Daniel Botkin (Marine Biology Laboratory, Woods Hole, MA), Dale Cole (UW College of Forest Resources), Stanley Cook (UO Biology), Dak Crossley (U Georgia Entomology), Richard Janda (USGS, Menlo Park, Geomorphology and Hydrology), George Lauff (W.K. Kellogg Biology Station, Hickory Corners, MI), Jack Major (UC Davis Botany), Chris Maser (BLM Range and Wildlife Habitat Laboratory, La Grande), Robert Pierce (USFS Durham, NH, FSL), James Sedell (OSU Fisheries and Wildlife). Memo (31 August 1977) from Jerry F. Franklin, Chief Plant Ecologist to H.J. Andrews National Advisory Committee re: arrangements for September meeting. Research Office Records (RG 170) Accession 91:1, reel 1, folders 29-30, Oregon State University Archives; interview with IBP group, 27.

[27] Andrews History Project Workshop of 7 August 1996, 11; memo (31 August 1977) from Jerry F. Franklin.

find his new district still relying on traditional methods, including "a lot of clean up of slash." Eubanks arranged a meeting of his Bear Springs staff with Maser and some of his close associates, including Jim Trappe, the mycologist with PNW Station whose work included some collaboration with the Andrews group at the Corvallis Laboratory. Trappe and Maser also collaborated on several studies in the Andrews Forest during this period, culminating in a jointly edited compilation entitled, *The Seen and Unseen World of the Fallen Tree*.[28] Maser and Trappe worked with Eubanks and his staff at Bear Springs into the early 1980s as they devised guidelines for slash treatment on the district. As a result of those efforts, the Bear Springs District implemented some of Eubanks' "nontraditional" approaches, leaving more coarse woody debris and more reserve trees.[29]

By the early 1980s, public support for innovative strategies of forest management was directly evident. Eubanks is just one example of how even traditional graduates of production-oriented programs of forest engineering were receptive to relatively new ideas, including those linked with the Andrews. Eubanks and his colleagues at the Bear Springs District "took a certain amount of heat" from other staff officers on the Mount Hood National Forest, but they also earned "kudos for the things we were doing in nontraditional ways." Despite criticism from some quarters, in fact, these efforts to implement innovative ideas of ecosystem management earned the Bear Springs District an award from the Pacific Northwest Region as "District of the Year" for several years running. In recruiting Eubanks for a transfer from his GS-12 position as district ranger at Bear Springs to his GS-13 appointment as district ranger at Blue River,[30] Kerrick hired an experienced administrator with proven success in implementing new ideas in ways appropriate to the specific concerns of his district. Eubanks was also, however, a forest manager firmly rooted in the standards of forestry as traditionally practiced in western Oregon. His success at the Bear Springs District demonstrated that "nontraditional" ideas appealed to people whose personal origins and professional roles were rooted in the mainstream of traditional, production-oriented forestry. In 1984, he brought that ingredient of common appeal home to the Andrews Forest.

Eubanks demonstrated that "nontraditional" ideas appealed to people rooted in the mainstream of traditional, production-oriented forestry.

[28] Chris Maser and James M. Trappe, tech. eds., *The Seen and Unseen World of the Fallen Tree* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Gen. Tech. Rep. PNW-164, 1984).

[29] Interview with Steve Eubanks, 2.

[30] Interview with Steve Eubanks, 2, 4.

Implementing Old-Growth Theory on the Blue River District, 1983–1989

Scientists with the Andrews group gained an enlarged arena for experimental forestry with the arrival of Eubanks at Blue River in 1984. He joined the core community after a 5-year period of progressive involvement with people more peripheral to the group's efforts at the Andrews Forest. He arrived in an era when the core leadership of the group was becoming more assertive about the management implications of their research. The surrounding district, however, remained largely unaffected by their efforts before Eubanks took over as district ranger. With some exceptions, he was surprised to discover that cooperation between district staff and researchers was mostly limited to the Andrews Forest itself. The Blue River District had implemented relatively few nontraditional strategies beyond the Lookout Creek drainage. On his first tour of the Blue River District, Eubanks drove around with some of his staff to survey harvesting yields and management strategies on the district. He observed "basically traditional" clearcuts, with "no wildlife trees," and he mentioned to one of his companions, "You know, I'm not used to that." Management strategies that Eubanks had implemented at Bear Springs called for leaving a substantial number of green, tall trees, and standing dead trees on logged units. In response to that observation, Eubanks recalls, one of the assistant district rangers at Blue River responded, "Well, geez, the Forest Supervisor [Kerrick] was out one time, and we were looking at the unit where we had a couple of wildlife trees left and he made the comment that the only good wildlife tree is one that is going down the road on a truck." Eubanks concludes, "I sort of filed that one away."[31]

Whether his new subordinates were attempting to avoid a confrontation with their new boss by shifting upstairs the responsibility for a perceived failing, or whether Kerrick really had made that comment, it was a rude awakening to the realities of forest management on the Blue River District. Eubanks professes he "had a lot of respect for Mike [Kerrick] as Forest Supervisor," and he concedes Kerrick "gave us lots and lots of freedom," but he also understands that Kerrick "had a certain amount of discomfort" with the ideas and innovations Eubanks brought to his work on the Blue River District. The important point, however, was that Eubanks found Kerrick willing to consider new ideas and to change his mind and introduce new policies in cases where there was "better information."[32]

[31] Interview with Steve Eubanks, 11.

[32] Interview with Steve Eubanks, 11.

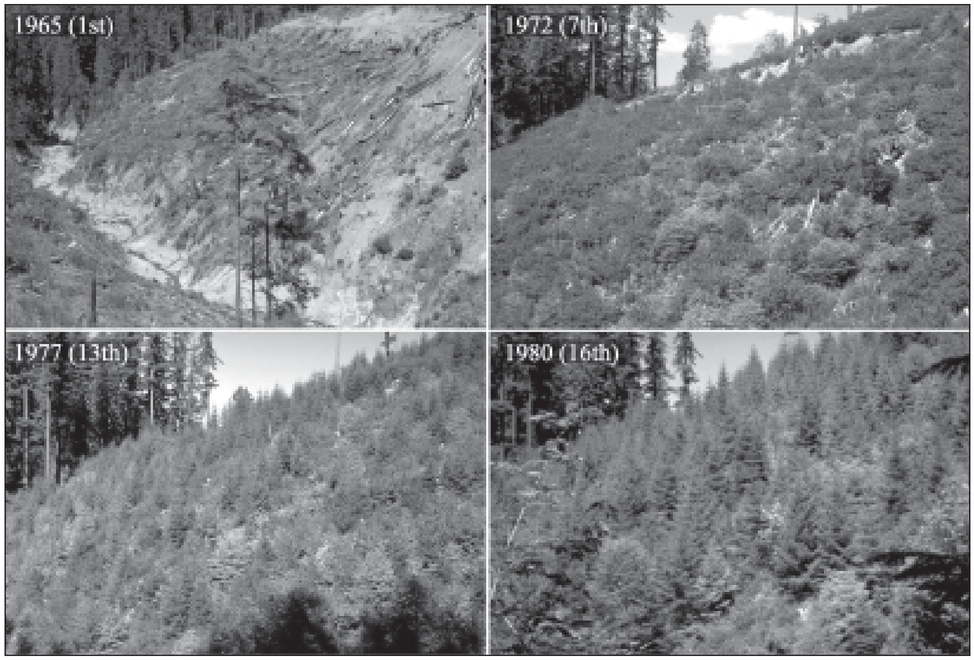

Figure 45—Although the H.J. Andrews Experimental Forest gained a reputation during the 1990s for its contributions to studies of old-growth conditions, the comparative watersheds approach of earlier studies also left a legacy of extensive, second-growth stands. These photographs taken by Dick Fredriksen and Al Levno over a period of 15 years, show conditions on the lower logged unit on Watershed 3 in the 1st, 7th, 13th, and 16th summers after the 1964 flood (1965-1980).

As management plans for the Blue River Ranger District began to include ideas that originated with studies at the Andrews Forest, the group's ideas about old growth and ecosystem productivity began to change. The starting point for the group's evolving ideas about old-growth forests and ecological interactions during the 1980s was the 1981 publication, *Ecological Characteristics of Old-Growth Douglas-Fir Forests*.[33] That report identified old-growth Douglas-fir—western hemlock forests, ranging from 350 to 750 years old, as the primary example of old-growth ecosystems in western Oregon and Washington. It stressed, however, that in the strict sense, they are "generally not climax forests" because on most sites, Douglas-fir is "subject to replacement by western hemlock and other more [shade] tolerant associates." The concept of an apparently ancient forest in a sustained stage of dynamic transition was central to the initial synthesis of ideas

[33] Jerry F. Franklin, Kermit Cromack, Jr., William Denison, [and others], "*Ecological Characteristics of Old-Growth Douglas-Fir Forests"* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Gen. Tech. Rep. PNW-118, 1981).

about old growth in the early 1980s. The report framed specific attributes of old growth as a comparison between "natural" and "managed" stands, and as a contrast between "old growth" and "second growth." A cautionary note explained that managed stands of second growth differed, qualitatively, from natural stands of second growth, notably in terms of the continuity, or legacy, of woody debris through severe disturbance. Young, natural stands tended to have significant amounts of woody debris, but intensively managed stands of any age did not. Variation, according to the report, was the most important constant in old-growth forests. The publication cited variation—in size, spatial distribution, species, color, texture, lighting, and undergrowth—as a central feature of old-growth forests, with numerous logs of various sizes and stages of decay littering the forest floor, and with relatively few evident signs of wildlife present. These attributes of old growth, the authors noted, were clearly evident in small- to moderate-size streams flowing through old growth, where organic debris (ranging in scale from logs to leaves, needles, twigs, and bud scales) was a primary component of variation. Large-scale elements were also central features of old growth: live old-growth trees, standing dead trees, logs on land, and logs in streams. These prominent elements were also functional components of the forest, with distinct roles as habitat and in terms of nutrient cycling. The report inverted contemporary logging literature by asserting, "The most sterile successional stage, in diversity of both plant and animal species, is a dense, rapidly growing young conifer forest."[34]

The group's 1981 publication emphasized areas of uncertainty and the need for further studies, but it also noted, "many species find optimum habitat in old-growth forests and some probably require old-growth habitat for survival." The report linked these concepts to mechanisms of primary production, energy flow, conservation and cycling of nutrients, and regulation of waterflow in old-growth forests. The authors also countered arguments that primary production necessarily

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[34] Franklin, Cromack, Denison, [and others], "*Ecological Characteristics of Old-Growth*," 1-4; communication from Fred Swanson 3 January 1999. Similar themes were further developed in Thomas A. Spies and Jerry F. Franklin, "The Structure of Natural Young, Mature, and Old-Growth Douglas-Fir Forests in Oregon and Washington." In: Leonard F. Ruggiero, Keith B. Aubry, Andrew B. Carey, Mark H. Huff, tech. eds., *Wildlife and Vegetation of Unmanaged Douglas-Fir Forests* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-285, 1991), 91-109; and A.J. Hansen, T.A. Spies, F.J. Swanson, and J.L. Ohmann, "Conserving Biodiversity in Managed Forests" *BioScience* 41 (1991)6: 382-392.

declined in old-growth stands, emphasizing that the multilayered canopy of an old-growth forest was well suited to "efficient capture of energy" and that photosynthetic production "is generally large and intact in an old-growth forest."[35]

The early emphasis on watershed studies at the Andrews Forest and the more recently developed concepts of a river continuum and forest-stream interactions were particularly evident in the group's 1981 report. It identified streams as integral components of old-growth conditions and suggested they were a reservoir of organic matter and a locale for processes in old-growth forests, rather than simple conduits for exporting debris from the ecosystem. Bacteria, fungi, insects, and other organisms processed organic matter in forest streams, and a large proportion of the basic food resource derived from wood in small streams under old-growth trees. Coarse, woody debris in smaller streams was a major source of nitrogen fixed in those systems. The influence of the forest, however, diminished with the increasing scale of the stream, according to this synthesis of previous research, while the kinds, numbers, and biomass of organisms increased with the scale of the stream.[36]

The ideas expressed in the group's 1981 synthesis are a freeze-frame view of the thinking of the Andrews group on the subject of old growth and forest-stream interactions at the end of the 1970s. Like the dynamic forests they describe, however, those ideas were in a state of sustained transition when PNW Station published that synthesis as a General Technical Report. The synthesis was based on monitoring and research activities spanning more than three decades, and those efforts continued through the next two decades, with different people, insights, and methods added into the mix. The who participated in that process at the Andrews Forest seldom can point to any specific "eureka" experience that revolutionized their thinking, just as Eubanks has a hard time identifying any specific event that revolutionized his thinking about acceptable forest management practices. Scientists with the Andrews group, moreover, seldom considered their research a viable model for revolutionizing management practices. Instead, they tended to answer questions with more questions, and they sought venues for exploring issues as they arose and evolved through time. Opportunities for such explorations dramatically expanded when Eubanks joined the group. His willingness

Scientists at the Andrews Forest seldom can point to any specific "eureka" experience that revolutionized their thinking.

[35] Franklin, Cromack, Denison, [and others], *Ecological Characteristics of Old-Growth*, 5.

[36] Franklin, Cromack, Denison, [and others], *Ecological Characteristics of Old-Growth*, 9-13.

to reconsider what made sense in the manager's world of applied forestry pushed the group to reconsider what made sense in the realm of ideas about forest ecosystems. He was, however, a contributing factor, not a determining factor in the evolution of the group.[37]

Minutes taken at the monthly meetings of the Andrews group collectively provide a record of a scientific community in transition during the 1980s. Individually, the minutes from any particular meeting outline the central concerns of that community at a given moment, much as the 1981 synthesis provides a rough outline of the group's thinking on the issue of old growth at that historic moment. It was a group held together by dynamic engagement with ideas and people, and they were consistently pulled in many different directions at any given time. The LTER meeting of 12 October 1984, for example, introduced new District Ranger Steve Eubanks to the 23 other people in attendance that day and to many others who later read the meeting notes. Other items on the agenda included a discussion of the Renewal Proposal (requesting $233,981), strategic planning for LTER II, and the results of a visit to the Andrews Forest by Deputy Regional Forester John Butruille and Johns Hopkins University Professor Gordon "Reds" Wolman in their new roles as members of the LTER National Committee. In the area of data management, the group was informed of efforts to improve the performance of the biomass [software] package to make it more user-friendly, they were warned of the need to develop a 5-year strategy for meeting data management needs, and they learned that students were doing data entry in an effort to cut costs. The H.J. Andrews Data Management Group was also planning to attend a symposium at the University of South Carolina that would include representatives from all 11 LTER sites. Along similar lines of intersite coordination, Andrews' site director Art McKee was planning to exchange places with his counterpart from Hubbard Brook for winter 1986. The Andrews group was also informed that funding for building improvements at the headquarters site was running out, even as interest in the site for summer short courses was exceeding capacity. Four people were employed by the "Central Lab" with LTER funds at an annual cost of $40,000, but people from seven different agencies were listed as the "main users" of that facility. Efforts to communicate the group's ideas in separate syntheses of work on woody debris, on ecosystem volume, and on ecosystem response and recovery at Mount St. Helens were proceeding "painfully," or were awaiting sabbatical opportunities so

[37] Interview with Al Levno, 8-9.

that someone could devote more time to those tasks. One timber sale (the "Vanilla Leaf sale") was underway, and two others were delayed for a year. Additional concerns at that meeting included an insect proposal to examine the effects of log structure on heterotrophic activity and the effects of invertebrate populations on decomposition processes. The group was introduced to Shigeo Kobayashi, a visiting scientist from the Forestry and Forest Products Research Institute in Tsukuba, Japan, who worked at Mount St. Helens and the Andrews Forest, and they learned of problems with protecting research sites at Mount St. Helens.[38]

The above listing of abbreviated discussion points from a typical meeting in 1984 imperfectly illustrates the mushrooming concerns of the Andrews group during the mid 1980s. The 23 people who attended and discussed these issues contributed hours of their time and energy to the meeting. The printed record, however, summarizes what actually ensued in less than three pages. Attendance itself is also an imperfect indicator of participation in the group. A memo dated 17 November 1983, from Franklin to the "H.J. Andrews Local Site Committee and Associated Interested Parties," for example, was addressed to the attention of 36 different people. Minutes from the 28 October 1983 meeting were attached to the memo. Subsequent minutes indicated only about 16 people actually attended the meeting that memo was intended to announce.[39] Those who attended meetings of the group, moreover, often did so on a casual basis, leaving and sometimes returning to rejoin the gathering or arriving late from other engagements, while business continued in their absence. The meetings operated on a consensus model, usually with a senior collaborator setting the agenda and facilitating the discussion, but often deferring to scientists who were directly engaged in a particular project when the meeting reached that point in the agenda. It was a fluid, free-flowing format that operated within a minimalist executive framework while encouraging group

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[38] Those in attendance at this meeting included Fred Swanson, Kermit Cromack, Steve Eubanks, Dave Perry, Tim Schowalter, Mark Harmon, Nick Aumen, Joe Means, Paul Alaback, Susan Stafford, Al Levno, Stan Gregory, Dick Waring, Logan Norris, Gary Lamberti, Judy Brenneman, Mark Klopsch, Jack Lattin, Phil Sollins, Rolfe Anderson, Ken Cummins, Don Boelter, Greg Creole, and Jerry Franklin. H.J. Andrews LTER meeting minutes (12 October 1984).

[39] Those included on this list of "Associated Interested Parties" included Jim Sedell, Paul Alaback, Art McKee, Dave Perry, Greg Koerper, Fred Swanson, George Bengston, Kermit Cromack, Bill Emmingham, Susan Stafford, Jack Lattin, George Keller, Dennis Harr, Tom Spies, Tom Callahan, Don Boelter, Jim Caswell, Phil Sollins, Mark Klopsch, Mike Gallegly, Jim Hall, Al Levno, Kenneth Cummins, Dick Waring, Bob Tarrant, Stan Gregory, Rolfe Anderson, George Carroll, Tim Schowalter, Peggy Reilly, Karen Luchessa, Mark Harmon, Vince Puleo, Debra Coffey-Flexner, Adelaida Chaverri, and Karen Waddell. LTER meeting minutes (2 December 1983)

discussion, debate, and consensus-based problem-solving that drew on all the expertise and human resources in the room at that particular time. The monthly meeting was a touchstone event reflecting, but not embodying, personal sacrifice and commitment to the group. It was also a structured, but flexible opportunity for communication and coordination, but it was not the defining event of the Andrews community. Working relations were initiated and developed beyond the meeting room, and they required active engagement in the issues, events, and people working with specific programs of research at the Andrews Forest or other, relevant sites.

By summer 1986, the group was grappling with problems of overcrowding resulting from the proliferation of research projects at the Andrews Forest. Concerned that new projects might compromise the integrity of ongoing field studies, some members of the group drafted a protocol for securing approval of research in the experimental forest. They then circulated that protocol to the rest of the group at the meeting of 21 February 1986. The protocol charged the site director with maintaining a registry of projects, and it required scientists to provide the site director with brief preproposals or research descriptions in advance of actual work. The site director would then present these preproposals at the monthly meeting and notify researchers whose studies might be affected by the proposed work. All studies requiring manipulations exceeding 12.5 acres would also be submitted to the National Advisory Committee for review and approval. All projects approved by the Local Site Committee would be signed, dated, and filed at the Andrews Forest, the Blue River District, and the Corvallis Forestry Sciences Laboratory. At that point, the research project and location would be entered into the Land Base Inventory for the Andrews Forest.[40]

One obvious solution to the problem of competing pressures on the experimental forest was to move beyond the limits of that piece of real estate.

One obvious solution to the problem of competing pressures on the experimental forest itself was to move beyond the limits of that piece of real estate. The nearby districts of the Willamette National Forest, particularly Blue River, were obvious candidates for such an expansion. Eubanks was a regular participant in the monthly meetings of the group, beginning in 1984, and that venue became a setting for exploring possible links between scientific theory and forest policy. By mid decade, Eubanks began to take the ideas presented at the monthly meetings and develop strategies for implementing them on the Blue River Ranger District. He also returned to those meetings with feedback and concerns that challenged previous thinking in the group. In managing for old-growth characteristics, for example, he

[40] LTER meeting minutes (21 February 1986).

provided the research community with newly drafted guidelines the district had adopted for managing large woody material on intensively managed sites. As background, he cited a 2-year-old report by Maser and Trappe.[41] Those guidelines noted concerns about long-term site productivity and recent evidence suggesting that productivity may decrease over time at high rates of use. He also announced that the district had convened an "interdisciplinary team" to develop a strategy applying "recent research findings" to ensure the long-term productivity of timber in managed stands.[42]

Long-Term Site Productivity, Problems of Scale, and Coordination of Effort

The decision to incorporate research ideas about long-term productivity into guidelines for managing woody debris at the Blue River District had broad implications for the group. Dave Perry and Phil Sollins led an effort to develop a long-term site productivity project at the Andrews Forest as part of the LTER. Minutes of the group's monthly meetings from the mid to late 1980s, however, suggest that those efforts stalled and sputtered amid a flurry of personnel changes in that period. In addition to Franklin's sabbatical and eventual move to the University of Washington, Art McKee left on an exchange to Hubbard Brook during the latter half of the decade. Then, amidst planning efforts on the long-term site productivity project, Sollins accepted a 2-year appointment at Yale in June 1987. His responsibilities for the project shifted to Perry and Mary Leuking, a recent postdoc from the University of California Riverside hired to run Sollins' lab in his absence. Before the end of 1988, Steve Eubanks announced he had accepted a position in Washington, DC, and would leave the Andrews group by the end of January 1989. The next month, Bernard Bormann, who previously had little involvement with the Andrews Forest or group, moved to Corvallis to lead Forest Service research on long-term site productivity. His arrival rejuvenated enthusiasm for the concept in subsequent

[41] Chris Maser and James M. Trappe, *The Seen and Unseen World of the Fallen Tree*.

[42] "District Resource Management Guidelines [28 July 1986]" in HJA Local Site Committee meeting minutes (19 September 1986).

meetings, and the group learned that his research unit planned to locate two study sites on and adjacent to one of the reference stands that year. By December of the next year, Mike Kerrick had also announced his retirement.[43]

The high degree of turnover forced the group into a leadership transition related to its search for a defining research focus. Among other concerns, the group needed to strengthen its proposal for continuing LTER funding. Harmon, whose log-decomposition study was a frequent topic of discussion at the monthly meetings, emerged as a leading figure in that effort. He and others in the group struggled with the idea of adding more projects to the LTER proposal. Harmon's log study remained a centerpiece of the proposal, but they wanted to avoid tying their fate to any particular project, however long term. That concern led them to the decision to look at long-term site productivity as a possible addition that would begin late in LTER 2. The group was less clear on who should lead the project because it included many different disciplines. Harmon notes the confusion over leadership was compounded by a sense of overload on major projects. As one example, the group had an "endless debate" about a proposal Franklin termed "the Phoenix Project." Franklin's concept was to do something "big and bold and exciting," and he came up with the idea of setting the torch to a patch of forest (about 100 acres) so the group could study the effects of a catastrophic fire in old growth. Despite some initial "prework" and lengthy discussions, Harmon observes, that "neat idea" never crystallized into a viable proposal because it was "a bit more complex than anybody could quite take on" and the group "could never get consensus on a central idea, theme, or anything."[44]

Eubanks added a jolt of managerial reality to the theoretical focus of the group as they pondered the idea of torching off a large area of old growth in the tense political atmosphere of the late 1980s. That proposal was one of the more dramatic examples of Eubanks' dual role as enthusiastic participant in the group and as a seasoned Forest Service administrator. From his perspective, the idea was to simulate a natural disturbance regime. They would select a large patch of old growth, intensively monitor and document the site, and then deliberately set it on fire during the summer to simulate the same conditions that would lead to a natural fire.

[43] HJA Local Site Committee meeting minutes (9 May 1986, 17 October 1986, 10 April 1987, 5 June 1987, 14 October 1988, 6 January 1989, 17 February 1989, 10 March 1989, 14 December 1990). See also, the records retained in the "Long-Term Site Productivity Folder, 1984-1987" H.J. Andrews Files, File Box B, Storage Vault, FSL, Corvallis, OR.

[44] Interview with Mark Harmon, 18.

Eubanks' recollection of the proposal conveys a mixture of professional curiosity and pragmatic disbelief: "Now that was an interesting discussion because what we were talking about was going to be very complicated and very expensive. I mean, you don't torch off a 70- or 80-acre … stand of old growth in the summer time without a lot of implications. You know, that is right during [the period of high] fire danger." From a research perspective, however, a burn scheduled during the winter would not duplicate natural conditions, and it would not burn as hot as a summer fire with dry fuel. The study needed a high-intensity fire that would "crown out," and that was simply not acceptable, from a management standpoint, during the summer period of high risk for fires elsewhere in the national forest. Despite the technical hurdles and potential for disastrous public relations, however, Eubanks seriously considered the proposal. District staff drew up a burn plan for a candidate area, and studied the implications relevant to that particular site, mapping out the potential for spot fires up to 2 miles away, among other concerns. The proposal ultimately died in the planning stages, but Eubanks considered the study meritorious from a management standpoint because "premonitoring" the site would have provided "more qualitative information" than relying only on postmonitoring an area burned in a wildfire. The proposal, however, simply failed the acid test of enthusiasm in the group: it lacked sustained sponsorship or sufficient interest in that community. When Franklin left for the University of Washington, the proposal lost its strongest proponent.[45]

The Phoenix proposal was not without parallel. Managers at other sites had plans to initiate catastrophic fires to study the effects in various ecosystems.

The Phoenix proposal raised important leadership issues that demonstrated an emerging complexity and diffusion of authority within the Andrews group. Monumental projects took place in a political context that had to be factored into the decision process: Did the risks outweigh the potential science and management benefits? The Phoenix proposal was not without parallel. Scientists and forest managers at other sites had plans to initiate catastrophic fires to study the effects in various ecosystems, including the LTER research area near Fairbanks, Alaska. Swanson observes that the group also proposed broader science questions relevant to the proposed burn at the time they were considering the Phoenix idea: "Part of the context was [the] nuclear winter debate and what gases and particulates are emitted in a big fire and what are effects [in the] atmosphere." Despite the scientific potential, however, Swanson questioned the wisdom of proceeding: "I felt it would put too many eggs in a risky basket, and it would be a stand-scale study (or

[45] Interview with Steve Eubanks, 20-21.

small watershed), and we needed to move on to a big landscape scale." The issue opened an internal debate within the group over the need to initiate a landscape experiment. The group had planned such a study for the upper Blue River drainage in 1988, but sidelined that project when the study area was designated as a habitat conservation area for the northern spotted owl and, therefore, off-limits to manipulative experiments of this nature. The group nonetheless moved in the direction of a landscape study at a different site that eventually became the Augusta Landscape Plan. More than a decade later (January 1999), the group revisited the concept of a landscape experiment in an expanded version, including the same area planned for the 1988 study, that eventually became the Blue River Landscape Plan and Study.[46]

The apparent lack of support for the Phoenix Project in the group seems paradoxical, given Franklin's role in the conceptual development of the idea. The group, however, had already moved toward a more diffuse process of decision-making, and Franklin was no longer a dominant leader. That transition was partly a function of new personalities blending into the group, but it also demonstrated the evolving community culture at the Andrews in the era of the LTER. The Forest Service component of funding and other support remained critical to the survival and identity of the group, but LTER funding introduced an element of flexibility that subtly eroded previous lines of authority. People adapted, but they did so in ways that were often indirect or submerged beneath a frenzy of distracting detail and mushrooming responsibilities. The result was a vague, unarticulated sense that things were slightly off-balance. Fred Swanson officially took over from Franklin in 1986 as the PNW Station scientist in Corvallis responsible for leading Forest Service Research at the Andrews Forest, but the more informal lines of authority in the group could not be so summarily transferred. In addition to leadership concerns, an overload of responsibilities and a multitude of possibilities confronted the group. The leadership of grant-funded scientists like Harmon and Warren Cohen, for example, encouraged more carbon studies and landscape work, as opposed to the more "monumental experiments" Franklin tended to favor. As the group moved in other directions, Franklin concluded it was a good time for him to move on to other things, trusting Swanson to continue his legacy of Forest Service leadership at the Andrews.[47]

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[46] Communication from Fred Swanson 2 January 1999. J.H. Cissel, F.J. Swanson, P.J. Weisberg, "Landscape Management Using Historical Fire Regimes: Blue River, Oregon," *Ecological Applications* (1999): 1217-1231.

[47] Communication from Fred Swanson 2 January 1999; interview with Jerry Franklin, 21.

Amid the distractions of this transition in community culture, the failed Phoenix initiative simply dramatized chronic issues that also plagued the long-term site-productivity project. Rather than the lack of interest and excessive risk that ultimately scotched the Phoenix initiative, the long-term site productivity project suffered from too much input. It simply lacked focus. It was a "mish-mash" of so many good ideas that, Harmon concluded, "just was not coalescing." The effort to secure NSF funding for the second round of the LTER, however, sharpened the group's focus, and in the process of working through their difficulties, the new cohort of leaders clarified their thinking. It was really clear, they concluded, that they could not keep adding on new "mega-projects" when they were having "real problems" keeping their earlier blockbuster studies on track. Despite the crumbling vision of long-term productivity as a centerpiece project for the group, that initiative did yield a compendium volume in 1989 addressing long-term productivity issues relating to forest ecosystems in the Pacific Northwest. This publication solidified the group's status as an obvious source for information about how to sustain forest production while protecting old-growth habitat. It was particularly important in the next decade, when the spotted owl issue placed a premium on ideas about how to reconcile these issues. The project, however, was a disappointment when compared to its potential to provide a central focus for the group's divergent research. It came to an abrupt end when Perry suddenly declared the project over, after an expenditure of about $350,000. The Forest Service subsequently revived the project and relocated it to the Isolation Block on the Willamette National Forest south of the McKenzie River. Harmon, who cites Perry's decision as personally disappointing, concludes, "They frankly did a much better job with it than we did. But it was a shame because when it started, it was a hot topic."[48]

The group learned an important lesson from its inability to continue the long-term site productivity initiative. The pressure to secure large blocks of funding spawned a tendency to think in blockbuster terms, but expanding the scale without refining the focus imperiled the viability of the project and risked other damage to the group. Human and financial resources were limited, and both were contingent on demonstrable successes. Young scientists could not be expected to sacrifice their careers on projects with no definable near-term output, and funding agencies could not be expected to keep the money flowing to programs from which results were not forthcoming. The site productivity study consumed many resources but

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[48] D.A Perry, R. Meurisse, B. Thomas, [and others], eds., "*Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems*" (Portland, OR: Timber Press, 1989); interview with Mark Harmon, 18, 22.

the group had very little to show for the money they had invested. They spent about $30,000 a year to set up the tightly structured and narrowly focused log-decomposition study, but the long-term site productivity initiative consumed $70,000 per year for upwards of 5 years without clarifying its direction or even installing the study. The contrast was glaring, and Harmon concluded it was not only "risky," but "we can't afford it."[49]

External and internal pressures forced the group to invent new strategies during the 1980s, but they inherited a powerful legacy of research that blended detailed focus and creative flexibility. Their collaborative efforts contributed to an evolving set of ideas and strategies for understanding and managing forests and watersheds that began to bear fruit during that decade. Studies involving the group and the Andrews Forest, for example, were the basis for a 1988 publication that focused on coarse woody debris in the old-growth forests, streams, rivers, estuaries, and beaches of western Oregon.[50] That publication included Franklin and Maser's ruminations on future options for public lands in the region. They emphasized the need for a management philosophy built around the premise that biological diversity must be maintained if forest management is to attain multiple-use objectives. They also acknowledged that intensive forest management was intended to produce large quantities of wood fiber in the shortest time possible. They warned, however, that methods that reduced the complexity of biological systems might sacrifice the potential for long-term productivity in those systems. They noted that management strategies for such biological simplification could be "economically disadvantageous," and they proposed an alternative forest management strategy to maintain long-term site productivity by promoting ecological diversity in the forest portion of the ecosystem.

The "diversified management" option that Franklin and Maser proposed reformulated the group's 1981 concept of a forest in sustained transition, but their 1988 publication placed more emphasis on management options. They called for a strategy of temporal diversity, noting that intensive timber management typically aims to eliminate three successional stages: grass-forb, mature, and old-growth. They defined the mature stage as beginning at 80 to 100 years of age and persisting for about 100 years, and they argued old-growth conditions began emerging

[49] Interview with Mark Harmon, 18, 21.

[50] Jerry F. Franklin and Chris Maser, "Looking Ahead: Some Options for Public Lands." In: Chris Maser, Robert F. Tarrant, James M. Trappe, and Jerry F. Franklin, eds., *From the Forest to the Sea: a Story of Fallen Trees*, 113-116.

between 175 to 200 years of age. The management strategy they proposed emphasized the contribution of a diversified forest to the "stability, diversity, and productivity of the tributary aquatic portion of the ecosystem." The young, closed-canopy forest (less than 80 years) that intensive management strategies were designed to promote, they argued, is the "least diverse stage of succession" and, in that stage, the trees "mobilize all resources of the site." They proposed mechanisms for delaying, or otherwise manipulating the timing of canopy closure to mimic patch conditions in other, "natural" successional stages. Perhaps most significantly, in the context of the recommendations of the Thomas proposal on spotted owls that followed 2 years after this publication, Franklin and Maser argued, in 1988, that mature and old-growth stands could be maintained by "reserving existing stands and creating new stands with long rotations." It was both a call for action and a formula requiring ongoing studies: "Diversified management accommodates change and recognizes our limited knowledge of how forests function." They emphasized the need for "maintaining options" with an eye toward ensuring long-term productivity.[51]

"Diversified management accommodates change and recognizes our limited knowledge of how forests function."

Franklin and Maser's recommendations stood on the foundation of previous decades of work focusing on old growth and broader forest and watershed issues at the Andrews Forest. Their recommendations also set the tone for implementing old-growth and landscape studies and management priorities over the next decade. Other sections of *From the Forest to the Sea* emphasized particular mechanisms creating diversity in old-growth forests, including the importance of disturbance from falling trees. These events, they observed, create openings in the canopy and opportunities for new plants to become established; contribute organic matter and habitat for microorganisms, plants, fungi, and animals; release nutrients to forest soils; reduce erosion by forming barriers to downhill soil movement; and promote nitrogen fixation by bacteria living in the wood, in addition to nitrogen from other litter components such as leaves. Complex arrangement of fallen trees across the forest floor, some on the ground and others suspended at various heights, creates a complex matrix of shade, habitat, and cover, further promoting a diversity of microhabitats and associated species. Progressive decomposition of logs adds internal as well as external surface area, further enhancing the diversity and number

[51] Franklin and Maser, "Looking Ahead: Some Options for Public Lands," 113-116.

of microclimates.[52] Old-growth trees in riparian zones provide dense vegetative canopies, contribute litter that delivers nutrients to the stream portion of the ecosystem, and eventually fall into streams and rivers, becoming large organic debris that supports productive habitats for salmonid and other fish by stabilizing other debris, anchoring pools, providing cover, and storing and releasing nutrients. Large, stabilized logs also protect riparian sites where alder and other species can become established. They promote vegetative growth that eventually stabilizes stream channels or restabilizes stream channels after floods. Woody debris in streams also provides habitat for algae and microbes consumed by insects, and it provides substrate for aquatic invertebrates. Gradual decomposition of logs in streams releases nutrients while providing habitat for nitrogen-fixing microorganisms.[53] From the perspective of the Andrews group, this publication helped clarify where they had been, but they were less certain, heading into the 1990s, of exactly where they were going.

Stepping out of the Fire and Into the Frying Pan of the 1990s

Just as the Andrews group struggled to find a focus and to adapt to a significant transition of leadership and talent, the U.S. Fish and Wildlife Service clarified matters in the broader arena of forestry conflicts with its April 1989 proposal to list the northern spotted owl as a threatened species. Four federal agencies responsible for managing public lands in the owl's range subsequently assembled an interagency task force to develop a "scientifically credible" conservation strategy for the northern spotted owl, and that group submitted its report in early 1990.[54] That strategy defined a two-stage approach to the problem: first, protect existing old-growth habitat in amounts and distribution that would "adequately ensure the owl's long-term survival" and second, seek ways to "produce and sustain suitable

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[52] Chris Maser, Stephen Cline, Kermit Cromack, Jr., James Trappe, and Everett Hansen, "What We Know About Large Trees That Fall to the Forest Floor." In: Chris Maser, Robert F. Tarrant, James M. Trappe, and Jerry F. Franklin, eds., *From the Forest to the Sea: a Story of Fallen Trees* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-229, 1988), 25-45.

[53] James R. Sedell, Peter A. Bisson, Frederick J. Swanson, and Stanley V. Gregory, "What We Know About Trees That Fall Into Streams and Rivers." In: Chris Maser, Robert F. Tarrant, James M. Trappe, and Jerry F. Franklin, eds., *From the Forest to the Sea: a Story of Fallen Trees* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-229, 1988), 47-83.

[54] Thomas, Forsman, Lint, and others, *A Conservation Strategy for the Northern Spotted Owl*, (the Interagency Scientific Committee, or ISC report), 51-57; Dietrich, *The Final Forest*, 72-85.

owl habitat in managed forests."[55] The scope of the plan extended from northern California to the Canadian border. It was a magnet for criticism. On the one hand, timber interests complained it was an unfair expansion of regulatory control beyond existing habitat conservation areas. Environmental groups, however, criticized the proposal as a sellout that would open previously protected old-growth habitat for future logging on the unproved premise that second-growth could be managed to mimic old-growth characteristics and thus provide suitable habitat for the owl. Both sides in the controversy questioned the proposal as a technocratic compromise that undervalued other concerns. Neither side, however, was willing to surrender the hallowed ground of scientific principle. Instead, the argument turned on whether science could be, or already had been sufficiently integrated into management strategies.

Implementing the interagency strategy would have required close coordination of management goals with state-of-the-art research relevant to old-growth forests. By 1990, when the Thomas report appeared, the Andrews group was not only modeling the concept of applied research on the Blue River District, they were working on a book-length synthesis of their efforts. The synthesis volume idea originated in the mid 1980s, and it continued through the end of the century. It had reached the stage of chapter assignments and an outline by the time Franklin began to prepare the group for a pulse planned for 8-16 June 1987 at Fraser Experimental Forest in Colorado. The book effort sputtered, however, and the group managed only a few, partial efforts before the end of the century. Eubanks wrote a publication describing the process of technology transfer at Blue River before he left in 1989, and Franklin issued his manifesto on New Forestry in a brief article that appeared that same year. Swanson and Franklin also teamed up on a 1992 article for *Ecological Applications* entitled "New forestry principles from ecosystem analysis of Pacific Northwest forests."[56]

The group directly addressed the conservation strategy for the spotted owl in an extended discussion at their April 1990 meeting. That discussion centered on

[55] Thomas, Forsman, Lint, and others, *A Conservation Strategy for the Northern Spotted Owl*, 2.

[56] Steve Eubanks, "Applied concepts of ecosystem management: developing guidelines for coarse, woody debris." In: Perry, D.A.; Meurisse, R.; Thomas, B.; [and others], eds., *Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems* (Portland, OR: Timber Press, 1989), 230-236; Jerry Franklin, "Toward a New Forestry," *American Forests* (November/December 1989), 1-8. HJA Local Site Committee meeting minutes (9 May 1986, 17 October 1986, 10 April 1987, 5 June 1987, 14 October 1988, 6 January 1989, 17 February 1989, 10 March 1989). J. Franklin and F. Swanson, "New Forestry Principles From Ecosystem Analysis of Pacific Northwest Forests," *Ecological Applications* 2(1992): 262-274; "Book Stuff" Records, H.J. Andrews Files, File Box E, Storage Vault, FSL, Corvallis, OR.

the issue of "placing large tracts of partially clearcut land on a recovery path." Only 15 people attended the meeting: Lynn Burditt, who had just replaced Steve Eubanks as district ranger at Blue River; Cynthia Orlando; Tom Spies; Bill McComb; Art McKee; Mark Harmon; Julia Jones; Jack Lattin; Dave Perry; Cindy McCain; Joe Beatty; George Lienkaemper; Bob Griffiths; Linda Ashkenas; and Fred Swanson. By comparison with the list of 36 prominent scientists Franklin had invited to a similar meeting 7 years earlier, this session attracted a relatively small number of long-term veterans mixed with more recent additions to the group. Together, they concluded the owl recovery plan was a "natural extension of landscape studies we are planning." Provisions of the interagency proposal that attracted particular attention at the 1990 meeting included the strategy's call for "testing of alternative silvicultural practices that may provide some owl habitat and some cutting for timber," as well as other provisions for "creating more compositionally and structurally diverse stands in plantations previously destined for max[imum] Douglas-fir wood fiber production." With those goals in mind, the Andrews group planned their strategy for the upcoming months: "We will be defining the landscape- and stand-level studies that arise from the owl report, keeping our eye on the ecosystem ball and not being distracted by the present owl-emphasis."[57]

The Andrews group perceived the owl crisis as an opportunity to refocus public attention on underlying ecosystem processes in old-growth forests.

The newly reconstituted Andrews group clearly perceived the owl crisis as an opportunity to refocus public attention on underlying ecosystem processes in old-growth forests. Working from Franklin's dictum to "look for something big to do, and just do it," the group also committed itself to ensuring that people did not abandon the forest for the big trees. The rising tide of public sentiment surrounding the owl issue was an opportunity for recommitment to community principles and action. It opened a window for promoting the Andrews vision in more public venues. The broader context of the old-growth dispute also led to overblown political rhetoric that seemed to invite a more public response from the scientific community. In response to rising concerns about the buildup of greenhouse gases and global warming, for example, Alaska Senator Frank Murkowski and others urged the Forest Service to press forward with a program of intensive clearcutting as a way to promote young forests that would allegedly store more carbon than old-growth forests. Ongoing research at the Andrews Forest, however, suggested that cutting old forests to make way for young stands would actually release more

[57] LTER/HJA Local Site Committee meeting minutes (6 April 1990).

Figure 46—The renewed focus on old-growth conditions amidst the controversies of the early 1990s prompted congressionally funded developments at the H.J. Andrews Experimental Forest, as seen in this view of the new administrative building. The office/lab building contains administration offices, five small laboratories for processing field samples, a computer room, and a small library. The Salt Salmon open-air pavilion is used for group gatherings during mild weather.

carbon into the atmosphere. Harmon, Franklin, and Ferrell responded to the political opening with a February 1990 article in *Science*, directly challenging, with science, the argument that conversion of old-growth forests to young, fast-growing stands would decrease atmospheric carbon dioxide. On the contrary, they argued, it would take 200 years before regenerating stands would begin to approach the carbon-storage capacity of the previous old-growth stand. They also issued a press release summarizing the arguments presented in that paper. Harmon recalls, "Within days two things happened: The Forest Service disavowed any knowledge of this proposed [accelerated logging] program, and they were searching on a way to get me fired. But I didn't work for them." Secondly, he notes, Murkowski denied having made the claim. The *Science* article made the proposal a political orphan. The group had previously advised Congress through agency channels that the concept was mistaken, but in Harmon's words, "they were not listening." The *Science* article, however, attracted newspaper coverage, and helped avert the changes to Forest Service policy that Murkowski reportedly had wanted.[58]

[58] Mark Harmon, William K. Ferrell, and Jerry Franklin, "Effects on Carbon Storage of Conversion of Old-Growth Forests to Young Forests," *Science* (9 February 1990), 699-701; interview with Mark Harmon, 7.

The carbon-storage example illustrates the group's higher public profile in the 1990s. During that decade, people in the group learned the political value of their multiple lines of support. They could address complex and controversial issues in public forums with less concern for political backlash, provided they could back it up with good science. The group's past success and increasingly public profile also attracted more favorable Congressional attention. Lawmakers from the Pacific Northwest scrambled to demonstrate their responsiveness to the concerns of constituents caught in the wrangle over old-growth forests in the region. The Andrews Forest happened to be located in the heart of the old-growth controversy in the western Oregon Cascades. More important, the group was already working with forest managers on the Blue River Ranger District to implement ecosystem management and riparian guidelines for maintaining stream ecosystems as a management strategy. These circumstances made the Andrews Forest a logical field venue for politicians seeking to learn about forest ecosystems and related concerns and to demonstrate their relevance and engagement with the old-growth issue.

The group enjoyed strong support from the Oregon delegation to Congress, particularly from Congressmen Les AuCoin and Peter DeFazio, as well as Senator Mark Hatfield. That support yielded tangible benefits in the early 1990s. AuCoin accompanied Congressman Chet Atkins, who chaired a House subcommittee overseeing the Forest Service budget, along with other committee members and staff, on a tour of the Andrews Forest in August 1989. During that visit, the group spotlighted its ongoing research at the Andrews Forest in areas relating to New Forestry, the spotted owl, landscape studies, and other issues. AuCoin returned for a second visit in April 1990. During that visit, he expressed shock at the living conditions scientists endured at the Andrews while pursuing world-class programs of research. AuCoin converted the affectionate nickname "Ghetto in the Meadow," by which scientists referred to the headquarters site, into a powerful political metaphor that helped him win a major Congressional allocation to improve those facilities. The following June, the group learned he was preparing a $1,000,000 request to fund facilities improvements at the Andrews Forest headquarters site, including several bunkhouses, office and laboratory facilities, and a meeting room. On 30 June 1990, DeFazio accompanied Congressman Bruce Vento (D-Minn.) and five staffers to view research and forestry practices at the Andrews Forest and on the Blue River Ranger District. That tour emphasized demonstrations of the research-management partnership modeled there. In November 1990, people in the group learned from AuCoin's office that the $1,000,000 for facilities improvement at the Andrews was appropriated in the FY1991 Forest Service budget. They proceeded to organize a site development committee consisting of Art McKee, Jack Lattin, John Cissel, Stan Gregory, Dick Suwaya, and Fred Swanson. In addition to the new funds from the Congressional allocation, the Forest Service and the NSF provided ongoing support, notably including the NSF approval in 1990 for continuing the Andrews LTER from 1991 through 1996. The LTER renewal began at $500,000 for the first year, and scaled up to $600,000 by the last year of that period. Within a month after learning from AuCoin's office that the $1 million allocation had been appropriated for FY1991, the Dean of the College of Forestry at Oregon State University also awarded the Andrews Ecosystem group the College of Forestry Dean's Superior Achievement Award for 1990.[59] The Congressional allocation provided a major boost for capital improvements at the Andrews Forest, but it also solidified the group's standing with the three primary legs of its funding triad. Everyone loved a success story.

Conclusion

By the early 1990s, the Andrews group had clearly moved into a new era, with a refined mission and a reconstituted community that combined new faces and initiatives with continuing ideas and associates. The emphasis on characterizing old growth during the previous decade gave way to a more concerted effort to coordinate research and management in an adaptive strategy for promoting long-term productivity in old-growth forests. More broadly, the group emerged as a leading venue for developing ecosystem management guidelines for national forest lands. With this emerging prominence, they suddenly confronted the reality of unprecedented amounts of funding. That funding, however, came with higher expectations. Events largely beyond their control and away from the Andrews Forest buffeted the group, but they kept their focus on fundamental issues rooted in previous decades of research there. Old-growth forests continued as one central theme among many other continuing threads of collaborative research, and people in the group engaged new issues with more self-confidence. They adapted the principle of sustained transition that Maser and Franklin outlined in *From the Forest to the Sea*, and they applied it to their group, developing internal networks of informal authority and communicating their ideas to a broader, public audience.

[59] Minutes of LTER/HJA Local Site Committee Meeting (18 August 1989, 3 November 1989, 11 January 1990, 6 April 1990, 1 June 1990, 2 November 1990).

Chapter Seven: Mainstreaming the Andrews and Transforming the Mainstream

The Andrews group focused on fundamental, underlying ecosystem processes during the old-growth debates of the 1990s and promoted that outlook in public forums. People in the group tried, however, to make their studies more directly relevant to the public debate over management priorities. By the late 1990s, that outlook helped make the H.J. Andrews Experimental Forest (Andrews Forest), and the group associated with it, a model for how the Forest Service and other agencies might better integrate management and research activities on public lands. The group constantly reinvented itself throughout the decade, and people in that community considered that pattern of sustained innovation one reason for their continued success. Unconsciously mimicking the dynamic nature of the ecosystems in which they worked, these people struggled to reconcile the dynamic structure and ideas of the Andrews Forest and group with the constantly evolving priorities of public agencies and their policy mandates.

Major personnel changes forced the Andrews group to adapt and examine more closely the ways in which scientists and managers collaborated on the Blue River Ranger District during the 1990s. In many cases, the people who filled in for departing veterans had less personal experience at the Andrews Forest. The sudden infusion of funds for new buildings and other infrastructure improvements at the Andrews transformed the place into a more permanent, more urbanized setting that helped recruit cooperators but also altered their initial perceptions of the experimental forest. Even Dyrness, who returned to the Andrews group early in the 1990s after nearly two decades in Alaska, was surprised to discover that modern facilities at the headquarters site had transformed it into a prominent center for community interaction, including volleyball games and other recreational activities.[1]

Funds for new buildings and other infrastructure improvements transformed the place into a more permanent, more urbanized setting.

The new cohort of researchers who joined the group on soft-money appointments during the 1990s supported a smaller core of people who continued in leadership roles with more secure funding. By comparison with previous decades, more people in the group were younger, with less secure tenure. The new buildings, infrastructure, and community activities at the headquarters site provided a sense of permanence for this increasingly impermanent community. The group still emphasized continuity with earlier efforts, but fewer people in the group had

[1] Interview with Ted Dyrness on 11 September 1996, 27-28.

firsthand experience in that previous work. At the same time, the group attracted people from a broader array of backgrounds. More scientists joined the group while working as employees of other, cooperating agencies, although the more senior members of the group were more often Forest Service employees who tended to stay with that agency for most of their careers. Those who came to the group from the university community at Corvallis, by contrast, more commonly were undergraduate or graduate students, or people just beginning their postgraduate careers. These more recently trained recruits contributed newly honed skills in specialized fields to a group led by seasoned professionals. In the late 1990s, Swanson characterized the resulting makeup of the group as “bi-modal, with a few senior people, and a lot of really young [folks].”[2]

The Andrews group styled itself as a self-selecting community with a cooperative ethic, but it struggled to articulate a consistent vision for the 1990s. The group’s self-image contrasted sharply with the more hierarchical structures and bureaucratic traditions of the various state and federal agencies that supported its work. Before the Andrews model of adaptive management could be implemented in even one of those agencies, either the agency—or the model—had to change. The group’s cooperative ethic originated with a set of virtually unexamined, shared assumptions about historical origins of the Andrews community, and its successful engagement with the Willamette National Forest rested on a similarly unexamined foundation. People in the group spent much of the 1990s trying to explain the Andrews model to people unfamiliar with the history of how that collaborative community came to be. In the process, they began to examine more closely and critically the way they functioned as a group.

One of the more important ways in which the Andrews model changed during the 1990s involved members of the group who gravitated toward regional issues that absorbed energy and diverted them from day-to-day activities at the experimental forest. Leaders of the group participated in efforts to integrate landscape and regional perspectives into management plans and policies at regional, national, and international scales, notably including the Northwest Forest Plan of 1996. Swanson, for example, identified the watershed analysis component of the Northwest Forest Plan as “a medium for carrying some of that landscape thinking to the land manager.” The concept, he noted, “came out of academic circles, merged with Forest Service experience, and … then moved on into policy, and [then it] comes ripping back out to management.” Scientists affiliated with the group were

[2] Interview with small watersheds group, 21-22.


Al Levno, January 1993

Figure 47—Apartment facilities at the H.J. Andrews Experimental Forest headquarters compound. These new accommodations transformed the former "ghetto in the meadow" into a welcoming, world-class facility with lodging available at the headquarters site on a year-round basis for visitors and researchers.

also featured contributors to a major 1997 synthesis of the scientific principles underpinning ecosystem management.[3] As a group, they tried to encourage a cooperative linkage of ecosystems research with forest management policy.

Personal and Community Pathways to the Cooperative Ethic of Adaptive Management

Scientists affiliated with the Andrews group during the 1990s looked beyond old-growth forests to promote habitat restoration across a broad mosaic of ecosystems in the Pacific Northwest. The stream team, for example, continued studies rooted in their previous efforts at the Andrews Forest, but their research also focused on densely populated and intensively managed areas adjoining other major streams and rivers. They grappled with research questions that included social and

[3] Stan Gregory and Linda Ashkenas, *Riparian Management Guide: Willamette National Forest* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region,1990); E. Thomas Tuchmann, Kent P. Connaughton, Lisa E. Freedman, and Clarence B. Moriwaki, *The Northwest Forest Plan: A Report to the President and Congress* (Portland, OR: U.S. Department of Agriculture, Office of Forestry and Economic Assistance, December 1996); and Kathryn A. Kohm and Jerry F. Franklin, *Creating a Forestry for the 21st Century* (Washington, DC: Island Press, 1997); interview with small watersheds group, 20.

economic components as well as ecological concepts. As urban growth led to increased demands on natural resources and added pressure for updated land use guidelines, the group explored whether ideas developed on the Andrews Forest could be applied on agricultural, urban, or other landscapes altered by human use. The question included both science and policy issues. At one level, scientists explored how to "restore" riparian areas where urban growth impinged on those ecosystems. At another, the growing number of people changed the political context in which management decisions were made. Policymakers balanced scientific concepts of land use planning against the competing priorities of a growing population, and people in the group were uncertain what roles they could play in that process.[4]

The Andrews Forest is remote from regional centers of urban growth, but people joined the group during the 1990s for reasons similar to those attracting other immigrants to the Pacific Northwest. The place had a reputation, deserved or not, of providing opportunities for individual success. Scientific productivity was one measure of success, but prominent, continuing access to funding was a measure of opportunity. Both scientific productivity and access to funding were obvious attributes of the Andrews group by the early 1990s. Julia Jones, who joined the Andrews group in 1991 after extensive work in north and east Africa and after leaving an appointment on the faculty of the University of California at Santa Barbara, was particularly struck by the availability of funding through the Long Term Ecological Research (LTER) program that dwarfed programs with which she was previously associated. While working in Africa, she learned of the group's involvement with the LTER program, and considered them "rich researchers." As a result, she had "ambivalent feelings about LTERs." They were "so much better off" in terms of funding and staffing that she didn't see what she could offer by way of making a "contribution," nor did she ever see it as something that she "would have wanted to do." When she relocated to the Pacific Northwest for family reasons, however, she was naturally drawn to the group, the body of work they had accumulated, and the opportunity for funded research that she discovered in that com-munity. She perceived and exploited the long-term streamflow records from monitoring efforts at the Andrews Forest as an underdeveloped resource, and she earned a niche in the group by applying her skills to those data.[5]

[4] Interview with riparian group, 28.

[5] Interview with Julia Jones, 27 October 1997, by Max Geier at Jones' home in Corvallis, as transcribed by Keesje Hoekstra, 6.

The reputation of the place attracted more people who arrived with only vague notions of what the Andrews Forest had to offer.

The reputation of the place attracted more people who arrived with only vague notions of what the Andrews Forest had to offer or whether the site was even relevant to their research interests. Preconceptions shaded initial perceptions of the place, and the process of selecting a site for scientific research was personal and social, as well as professional and scientific. Long-term associates of the group were somewhat bemused when people came to the Andrews Forest with a set of expectations for what they needed to do their research, but with little knowledge of whether the place suited those needs.[6] They were drawn to the group for reasons less related to site characteristics on the Andrews Forest than with their own preconceptions about the place. The group then helped them adapt their ideas to the real conditions they encountered in the Pacific Northwest, on and beyond the Andrews Forest.

The social process of selecting a site for scientific research brought people together in ways that forged personal bonds and contributed to the potential success of a project. Stream team collaborators Norm Anderson, Stan Gregory, and Linda Ashkenas, for example, had a memorable time simply picking out a site for studying old-growth, clearcuts, and regrowth in relation to riparian concerns on Grasshopper Creek. That and similar social experiences with other people on field projects, Gregory remembers, "make it enjoyable and worthwhile." People in the group sustained their community with shared, social experiences at field sites that they recalled as adventurous outings. In one case, Gregory and Chuck Hawkins rode into the Grasshopper Creek drainage on a snowmobile to check potential study sites during the winter. The snowmobile wasn't big enough to carry both of them and their gear, so Gregory and Hawkins took turns towing each other on skis behind the machine. As they roared across the flats, Gregory bounced through a big hole with the snowmachine. When Hawkins hit the same hole on his skies, he "springboarded up about 15 feet in the air straight over a hill and crashed." Linda Ashkenas recalls that Gregory and Hawkins later "replicated" that experience while driving in a car with her during field work on Mount St. Helens. She remembers Gregory had his mouth full of mandarin orange slices as Hawkins drove "much too fast down a road." Gregory saw a hole coming up, but his mouth was full of mandarin oranges, "so he just went, whoo, whoo, whoo.' [laughter] Chuck and I looked at him like '**What** is going on?' and then we hit the hole." Gregory later

[6] Interview with riparian group, 1-2, 20.


Al Levno

Figure 48—Beginning in 1992, the U.S. Geological Survey constructed and operated an experimental debris flume at a location on the H.J. Andrews Experimental Forest near the headquarters compound. At the time it was constructed, this flume was the largest experimental flume in the country.

explained, "'whoo, whoo, whoo,' … means to stand on the top [in] Oregon. [laughter] It is those experiences that actually keep us all in it. That is what makes it enjoyable."[7]

Social interaction—and the ability to laugh about it later—was also a critical element of the adaptive management philosophy on the Blue River Ranger District by the 1990s. Eubanks tried to keep people "actively involved" and communicating with each other about their activities on the Andrews Forest. He worked to facilitate and mediate human interaction by identifying people with negative attitudes and encouraging them to talk about it. He also tried to keep as many people on the district involved with as many of the scientists at the Andrews Forest as possible.[8]

[7] Interview with riparian group, 21.

[8] Interview with Steve Eubanks, 19.

A new cohort of scientists and managers during the early 1990s tested the group's ability to sustain a community built on shared experience and informal opportunities for social bonding. The proliferation of programs with links to the Andrews Forest during this period forced the group to devise a more systematic strategy for maintaining a sociable spirit of community. In this era of transition, a few long-term associates, including Swanson, Gregory, Lattin, Levno, and McKee, assumed more prominent roles, but more recent recruits also shouldered much of the burden. Biometrician Susan Stafford, ecologists Linda Ashkenas and Mark Harmon, entomologists Andy Moldenke and Tim Schowalter, and hydrologist Gordon Grant all joined the group and assumed more prominent roles. These names are just a few examples that illustrate this generational transition in leadership and involvement. They identify the people most commonly mentioned by those interviewed for this study. Many other people, however, also attended the monthly meetings of the LTER/HJA Local Site Committee or participated in research that resulted in publications linked with the group.[9]

The core group of people who had already embraced the collaborative spirit of the group helped a new cohort of scientists, managers, and administrators adapt to the reality of the Andrews Forest. Within 3 years, beginning in 1989, John Cissel, Lynn Burditt, Julia Jones, Gabriel Tucker, and Bob Griffiths all became closely affiliated with the core group as research scientists or forest managers, and George Brown succeeded Carl Stoltenberg as Dean of the College of Forestry at Oregon State University (OSU) in 1990. These six people followed career paths that converged at the Andrews Forest in the last decade of the 20th century. Brown, who had worked at the Andrews early in his career, digging soil pits during the International Biological Programme (IBP) era, brought a personal affinity for the place to his role as an administrator at the university most closely associated with that place. All six people followed career paths to the Andrews common to many of their predecessors in the group. All of them made apparently serendipitous decisions that eventually led them to the Andrews Forest, and several of them returned there in the 1990s to renew an involvement begun earlier in their academic careers. Taken in context, however, something more than chance guided them in this direction. One characteristic all of these people share is a place of origin not in

[9] Donald Henshaw, Sarah E. Greene, and Tami Lowry, "Research Publications of the H.J. Andrews Experimental Forest, Cascade Range, Oregon: 1998 Supplement" (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-427, July 1998).

Figure 49—The new conference/classroom, shown here nearing completion in February 1998, seated nearly 100 people when it opened later that year, providing the first indoor meeting space for large groups at the headquarters site. The Andrews group selected a design for the vinyl flooring that depicts an old-growth tree.

the Pacific Northwest. They were recent migrants in a region of immigrants. This contrasts with many people prominent in earlier cohorts of leadership at the Andrews Forest, including Silen, Franklin, Levno, Sedell, and Eubanks, whose experience in the Pacific Northwest began when they were children. This 1990s cohort, however, consists of people who grew up in the northeastern and south-central regions of the United States. Their most obvious, shared characteristic is frequent geographic mobility in a closely interwoven network of research institutions and professional associations that converge in the Pacific Northwest at the Andrews Forest. They are not a scientific sample, but they are examples of people closely associated with the Andrews Forest, in terms of their personal identification with that group, regular participation in group meetings during 1996-98, or frequent referral by other members of the group interviewed for this study. In a period when regular attendance at monthly LTER/HJA Local Site Committee meetings averaged barely 20 people, these six researchers and forest managers figured prominently in that forum.[10]

Management Transitions and Institutionalized Innovations at Blue River Ranger District

The district ranger in Blue River was a crucial link in the administrative framework linking research at the Andrews Forest to policy on the Willamette National Forest. Lynn Burditt, who took over that assignment in 1989, worked with the group to structure an institutional foundation for their collaborative efforts that would go beyond the personal rapport and enthusiasm that Eubanks had offered. Burditt also brought a stronger, national perspective to the position. As district ranger, she argued that management initiatives at the Blue River District and the Andrews Forest should be relevant to and compliant with institutional goals in ways that could be clearly articulated. Unlike Eubanks, her prior involvement with the group was negligible. Her pathway into the group, however, was a composite of institutional affiliations, academic preparation, and field experience common to other people at the forefront of applied research at the Andrews Forest.

Burditt was born in Kentucky but grew up in Oak Ridge, Tennessee, and lived in 17 different states as a young woman. Life in Oak Ridge is an experience many of her associates at the Andrews Forest also shared. Sollins, Gregory, and Harmon, for example, all had professional and academic connections with scientists at Oak Ridge that influenced their career decisions. Burditt, however, was the only person in the group who actually grew up there. From that experience, she gained an appreciation, later in life, for the way in which a bureaucratic agency could influence what people considered "normal." At Oak Ridge, she lived with the inescapable presence of Oak Ridge National Laboratories and she saw how that nuclear research and production facility influenced the local community. In one respect,

Life in Oak Ridge is an experience many of her associates at the Andrews Forest also shared.

[10] Interview with John Cissel by Max Geier on 7 November 1997 in Logan Norris' office at the FSL, in Corvallis, OR, as transcribed by Jeff Prater and Keesje Hoekstra, 1; interview with Lynn Burditt by Max Geier on 3 October 1997 in Geier's office at the FSL, in Corvallis, OR, as transcribed by Brooke Warren, 9; interview with Julia Jones, 1-2; interview with Gabe Tucker by Max Geier on 19 August 1997 in Geier's office at the FSL, in Corvallis, OR, as transcribed by Elizabeth Foster and Keesje Hoekstra, 1; interview with Bob Griffiths by Max Geier on 6 November 1997 in Griffiths' office at the FSL, in Corvallis, OR, as transcribed by Andy Coleman and Keesje Hoekstra, 1-2; interview with Sherri Johnson by Max Geier on 24 November 1997 in Johnson's office at the FSL, in Corvallis, OR, as transcribed by Lisa Fleming and Keesje Hoekstra, 1-3; interview with George Brown by Max Geier on 19 September 1997 at Brown's office in Peavy Hall, Oregon State University, Corvallis, OR, as transcribed by Brooke Warren and Nicole Duncum, 1-2, 12.

Oak Ridge, Tennessee, resembled Blue River, Oregon: it was a place where relatively poor people with rural outlooks went about their lives while scientists with doctoral degrees lived in a separate world in the same place. Her father worked for the Navy in a high-security area at the Oak Ridge National Laboratory. Burditt had no idea what her father did in that facility. At the time, she thought it was normal to work in a place where workers could not talk to their own families about their jobs.[11] A strict hierarchy separated insiders from everyone else, and Burditt learned how those barriers interfered with human interaction. Later, she discovered other models for communicating in federal agencies

Oak Ridge schools pressured students to consider careers in science and engineering, and Burditt followed that advice. She studied at the Syracuse College of Environmental Sciences and Forestry before transferring to Iowa State University, where she graduated in the mid 1970s with a degree in Forest Management, Outdoor Recreation, and Resource Management. One of her professors at Iowa State was John Gordon, who later chaired the Forest Science department at OSU and mentored many of his colleagues into work on the Andrews Forest before moving on to become Dean of Forestry at Yale.[12] Growing up, like Gregory, in the vicinity of the Great Smokey Mountains, Burditt's initial goal was a career with the National Park Service. Federal jobs were scarce in the mid 1970s, however, and Burditt did geomagnetic surveys for an aerial survey company in Houston, Texas, until she finally secured a position with the Clearwater National Forest in Moscow, Idaho, in 1977. Two years later, the Clearwater National Forest sent her to OSU for a technical training program in forest engineering.[13]

Burditt gained national exposure and career mobility during and after that Corvallis-based technical training program, which included field trips to the Andrews Forest for a course in stream ecology. At the time, the group was absorbed in the effort to secure its first LTER grant with an emphasis on research with an applied purpose. Ecological research was gaining national support, and the technical training program introduced Burditt to a broad range of management practices in different sectors of the Forest Service. Participants in the program worked on projects for several different national forests during the summer. Burditt drew assignments in North Carolina and Virginia, as well as more local stints with the Mount Hood National Forest, where Eubanks was also employed, and at the

[11] Interview with Lynn Burditt, 3-4.

[12] Interview with Lynn Burditt, 4.

[13] Interview with Lynn Burditt, 1.

Al Levno, July 1991

Figure 50—District Ranger Lynn Burditt's broad-based, national experience and prior handling of controversial issues made her a logical choice to replace Steve Eubanks as the Andrews group became increasingly prominent in the old-growth controversies of the 1990s. Here, Burditt speaks at a field site on the Blue River Ranger District during a tour of the H.J. Andrews Experimental Forest that focused on the Slim Scout, green tree retention, logging demonstration area.

Shasta/Trinity National Forest in California. Her involvement in the training program also helped Burditt secure a place on a Forest Service detail to Mount St. Helens to work on the volcano recovery project in May 1981. From there, she moved on to an assignment with the Flathead National Forest in Montana, where she served a couple of years as the Forest Logging Engineer. For much of the 1980s, she served as a management assistant responsible for planning, presale and layout, timber sale administration, and compliance with the National Environmental Policy Act. She discovered that the Flathead National Forest was a "pretty controversial place," with hot-button management issues involving grizzly bear, bull trout, and scenic resources. With that experience, she earned promotion to district ranger in Whitefish, Montana, in 1987, serving in that capacity until 1989, when Kerrick hired her to replace Steve Eubanks as District Ranger at Blue River.[14]

Kerrick hired Burditt just a year before he retired from the Forest Service, and he expected her to build on the cooperative relations Eubanks had established with researchers at the Andrews Forest. He also expected her to change the tone of that program. Burditt had more extensive, wide-ranging experience in national forests in the Western United States than Eubanks. She was also well seasoned in public relations, having survived close, critical scrutiny as one of a handful of women who worked their way into the mostly male profession of district rangers during the 1980s. She had a solid reputation as a careful, fair-minded, and seasoned administrator. Kerrick didn't think she would be as "gung-ho" as Eubanks, but he expected her to be "more effective" in adapting to the changing political climate while implementing adaptive management areas and managing the "flow of information between researchers and management." He found her to be "more cautious" than Eubanks, who took actions about which, Kerrick "felt a little nervous," even though he didn't want to discourage similar efforts. For her part, Burditt accepted the position primarily because she was impressed with Kerrick and his support for building on the partnership between the Blue River Ranger District and the Andrews group.[15]

Burditt made an immediate contribution, working with Swanson, McKee, and Kerrick, to define and implement a research liaison position at Blue River, transforming a position that previously emphasized silviculture to one that addressed broader issues of landscape planning and management. Kerrick argued the Willamette National Forest could be a leader in ecosystem management, and toward that end, he agreed to fund the newly defined research liaison position from his national forest budget. The person who filled the position would work as a "transfer agent," to help "move information" from managers to researchers and from researchers to managers.[16] The immediacy of the owl issue and the public scrutiny that accompanied the injunction that halted logging in old growth in those years made the idea of a research liaison particularly inviting to forest managers on the Willamette National Forest. At the Blue River Ranger District, in particular, the staff faced a steady flow of visitors interested in old growth and related issues. In

[14] Interview with Lynn Burditt, 3.

[15] Interview with Lynn Burditt, 4-5, 7-8; interview with Mike Kerrick, 18-19.

[16] Interview with Mike Kerrick, 18-19.

Burditt's first year at Blue River, visitors from various political groups, international organizations, and media outlets swarmed over the Andrews Forest and the surrounding district in search of information and ideas. Among other innovations, Burditt developed a tracking system to keep tabs on everyone who visited the Andrews and the surrounding district. The system, she argued, was an effort to exploit an opportunity, not a reaction to concerns about security at the site. The Andrews Forest attracted people who took ideas from that place to apply elsewhere. Those people, therefore, were a potential network for disseminating ideas and information from the Andrews group to others who might put those ideas into practice.[17] Burditt's tracking system simply documented and systematized the informal networks that already linked the Andrews group with scientists and forest managers at other sites.

The Andrews Forest attracted people who took ideas from that place to apply elsewhere.

Burditt favored the proposal to shift the emphasis to a landscape planning and management research liaison at the Blue River Ranger District as a strategy for managing the challenge of public scrutiny and media attention at the Andrews Forest. As a native of Oak Ridge, Burditt was no stranger to living and working with leading scientists and intellectuals, but she later recalled a sense of being at the center of something momentous in her role at Blue River. She described the setting in almost mystical terms: One day, as, she walked through Reference Stand 2 with some visiting VIPs accompanying a work party on their way to open a trail through that site, they encountered Jerry Franklin walking up the hill, and "… the sun shone through just at the right moment [and shone on him], you know, it was like … the mountain had come to talk." The ranger district was on a fast track to national prominence, and a series of reporters visited and featured the place in the *New York Times*, the *Washington Post*, the *Seattle Times*, *Discovery Magazine*, and on public television. Burditt neither expected nor wanted a high-profile position, but it was an unavoidable part of her job at Blue River. She took over from Eubanks just as concerns about old growth and the northern spotted owl peaked, and by that time, he had already established the district's reputation as a place for people who wanted to learn how to apply scientific theories about riparian reserves, riparian management areas, green tree retention, and woody debris.[18]

The concept of a research liaison working with national forest staff and Andrews Forest scientists evolved from an earlier initiative to establish a silviculturist assigned to the Andrews Forest and funded through the national forest. That

[17] Interview with Lynn Burditt, 9.

[18] Interview with Lynn Burditt, 10.

initiative built from the premise that, given the previous rate of harvest activity at the Andrews Forest, the district needed to develop a long-term plan for managing silviculture of the Douglas-fir plantations that early cutting created on that drainage. Vince Pulao, who worked as the silviculturist at Blue River several years before Burditt became district ranger, resigned just a few weeks after she arrived and took a new assignment in the Eugene office of the Willamette National Forest. As they planned the search for Pulao's replacement, Burditt and other leaders in the group were also beginning to explore the concept of a Blue River landscape study. The study called for an aggregate of clustered cutting units, rather than the more usual practice of dispersing them across the landscape. They wanted to implement that concept on the Blue River Ranger District so they could study the consequences of the aggregated (as opposed to dispersed) cutting plan at a landscape scale. They realized the research questions the group was exploring could not be adequately addressed without moving outside the Andrews Forest to areas where substantial logging was anticipated and on a scale larger than the experimental forest could accommodate. As Burditt considered how to implement the idea, she realized the position description for the Andrews silviculturist did not adequately describe the skills needed to manage the proposed landscape study.[19]

Once they realized the demands of the job had outgrown the standards expected of a silviculture specialist, District Ranger Burditt worked with Andrews site director McKee (an employee of OSU) and Pacific Northwest (PNW) Research Station scientist Swanson to draft a new position description for a "research liaison." The person in that position would primarily be responsible for installing the Blue River landscape study. The new position description defined a wide range of roles in broad terms, and it included an upgrade from GS-11 to a GS-12 on the federal scale of job classifications. McKee, Swanson, Burditt, and Rolf Anderson, the lead planning officer with the Willamette National Forest supervisor's office, then sat down to select a candidate for the job. The person they chose was John Cissel, who stood out from other applicants for his experience in forest planning and modeling and for his demonstrated interest in ecological research.[20]

[19] Interview with Lynn Burditt, 10-11.

[20] Interview with Lynn Burditt, 10-11.

Figure 51—John Cissel, who was hired as the Willamette National Forest's research liaison with the H.J. Andrews Experimental Forest (Andrews Forest), worked to bridge the gap between the operational priorities of forest managers and conceptual theories of scientific researchers. Here, he measures the diameter of an old-growth Douglas-fir on the Andrews Forest, Blue River Ranger District, Willamette National Forest.

Facilitating Collaboration With a Foot in Both Worlds and a Home in Neither

Cissel stands out from his colleagues in the Andrews group as someone who was recruited specifically because of the existing collaboration between researchers and managers. Others were recruited or drawn to the group because of their clear interest in collaborative research or because of their demonstrated ability to cooperate effectively with researchers and managers. Cissel, however, was hired to fill a position designed to institutionalize that collaborative spirit and to serve as a catalyst for moving beyond that initial beachhead. In that role, he had few benchmarks or guides, and no real peers in the Willamette National Forest or even in the Pacific Northwest Region (Region 6). He didn't know anyone in the agency with a similar position.[21]

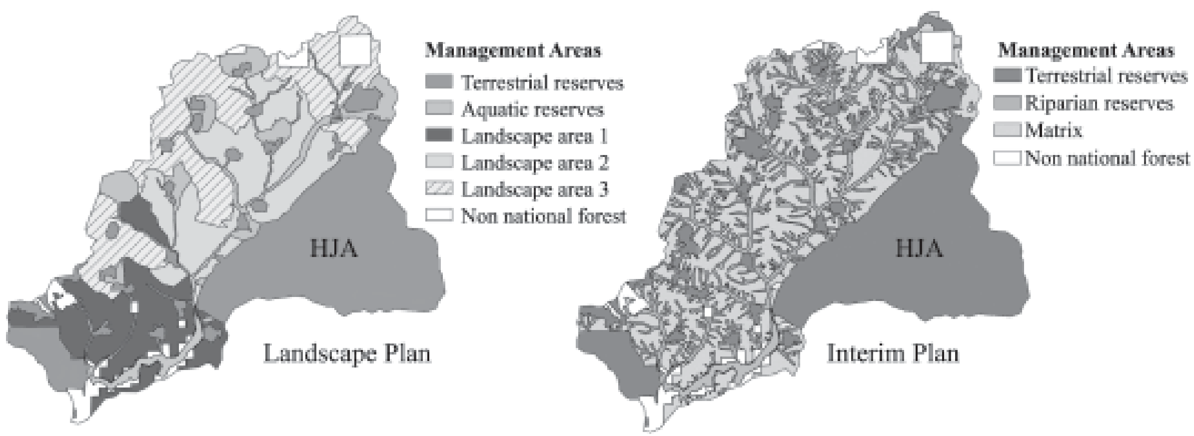
Cissel had only a vague understanding of his responsibilities as the Willamette National Forest's research liaison with the Andrews Forest. He had an even vaguer sense of his subsequent career path or the standards by which he would be evaluated. The job appealed to him because it offered the otherwise unlikely opportunity to develop his own research interests in the management branch of the Forest

[21] Interview with John Cissel, 3.

Sidebar 7.1: Managing Forest Landscapes

The Issue: Early approaches to managing forests focused on managing individual forest stands, and landscape considerations were rudimentary and secondary, at best. As issues of protecting biological diversity and watershed values have increased in stature and complexity, greater emphasis has been placed on design of landscape patterns. This emphasis has led to exploring alternative landscape management systems, including systems based in part on the historical disturbance regime. The premise of this approach is that native species were sustained, historically, under a range of ecosystem conditions and disturbance events, so maintaining the ecosystem within that range of conditions may be a useful first step in planning future management to sustain those species.

The Roots: In the period 1950 to 1990, federal forest land managers in the Pacific Northwest used a harvest system of clearcut patches dispersed across the landscape. By the 1980s, questions were raised about the fragmented landscape pattern created by this approach and its ability to sustain species that favored interior forest habitat. Alternative forest landscape management systems were put forth—aggregated cutting patches to reduce the fragmentation effects, a system emphasizing reserves to protect species, and the use of historical disturbance patterns as a general template for setting cutting frequency and extent. In sum, management and policy issues have raised questions about how landscapes function; however, the science of landscape ecology has had difficulty providing answers.



Alternative forest landscape management plans for the Blue River watershed outside the Andrews Forest (labeled HJA above). The Landscape Plan (left) is based in part on the historical wildfire regime, with cutting frequency ranging from 100 years (Landscape Area 1) to 260 years (area 3). The Interim Plan (right) is based on the Northwest Forest Plan (USDA and USDI 1994) and has extensive riparian reserves and an 80-year cutting rotation in matrix areas. Adapted from Cissel et al. (1999).

The Approach: In the 1980s, issues concerning management of forest landscapes were addressed with simple observation, modeling of pattern development, and interpretation of possible ecological consequences (Franklin and Forman 1987, Harris 1984, Spies et al. 1994). More sophisticated simulation modeling addressed pattern development and effects on habitat and the resistance of landscape pattern to change (Li et al. 1993; Wallin et al. 1994, 1996). A subsequent generation of simulation models was used to examine a broader range of landscape management approaches and their consequences in terms of hydrologic features, biodiversity, and carbon dynamics (Swanson et al. 2003). A critical step in learning about landscape management has been to develop and implement a plan to manage a real landscape--the Blue River Landscape Management Plan and administrative study carried out with an adaptive management approach (Cissel et al. 1999). This effort links the concept of managing landscapes in the context of historical disturbance regimes with actual on-the-ground management.

Results: The issue of how to manage forest landscape patterns created by cutting has had profound and still-emerging effects on science and management. Land management policy is struggling to find approaches that meet the very diverse management objectives for public forest lands--to protect biodiversity, yield wood products, sustain water quality and flows, manage fire risk, sequester carbon, and accomplish other objectives. The approach embodied in the Blue River Landscape Management Plan may be a harbinger of future approaches.

Service. The Blue River position was unique because it assigned someone stationed on a ranger district responsibility for coordinating, implementing, and monitoring research, and for educating other people about those efforts. Burditt also encouraged Cissel to develop his own research agenda. That was an unusual opportunity for a position in a district, and Cissel's rank (GS-12) was also unusually high for a district, where people more typically were responsible for laying out trails, preparing timber sales, or managing wildlife. Since the people who hired him seemed uncertain about how to define his job, Cissel could shape it to suit his interests. Even his title was uncertain. Swanson tended to call him a research liaison, but Cissel called himself a research coordinator. His job classification listed him as an ecologist. He had never worked in that field, but he did hold graduate degrees in forestry and operations research, and he included ecology and ecosystem modeling among his fields of academic preparation.[22]

The man hired as research liaison personified the institutional structure that linked science with management at the Andrews Forest and the group's hopes for ecosystem management.

The man hired as research liaison personified both the institutional structure that linked science with management at the Andrews Forest and the group's hopes for ecosystem management. The position, like the Andrews itself, was subject to the joint oversight of the Willamette National Forest, PNW Station, and OSU. The group, paradoxically, attempted to institutionalize its interagency framework with a position that largely depended on the personality and abilities of the person they hired. It was an uneasy pairing of personal and political responsibility with limited authority. That combination was not necessarily an attractive opportunity for someone schooled in the hierarchical traditions of the Forest Service. At the time the position at Blue River opened, however, Cissel was at a point in his career where the administrative distinction between the research and management branches of the Forest Service threatened to divorce his personal and professional goals. The research liaison position allowed him to forestall that split while advancing his career. It made him an employee of the Willamette National Forest, but he reported to a board of directors: one from PNW, one from OSU, and one from the Willamette National Forest. Swanson, Burditt, and McKee gave him broad direction at quarterly meetings of the board. The national forest issued his paycheck, but he considered himself an employee of the group that directed his work, and together, they tried to determine "collective priorities."[23]

The career path that brought Cissel to this new position was unique but not remote from others in the group. He grew up on a dairy farm in Montgomery

[22] Interview with John Cissel, 3.

[23] Interview with John Cissel, 1, 5.

County, Maryland, until it was swallowed up by the urban growth of metropolitan Washington, DC. His academic career touched down at several universities where Sedell and Swanson had contacts. He attended the State University of New York and Michigan State University, where he completed a BS degree in forestry. Like Eubanks, his choice of major was driven by a vague interest in forestry and hopes for employment in that field. He followed up the undergraduate degree with graduate studies at Pennsylvania State University, where he specialized in forest planning and operations research, with an emphasis on systems modeling and research forests. During his graduate years, Cissel also worked for a few summers in northern Idaho. That experience revived images of the old-growth forests in the Cascade Mountains and Olympic Peninsula that he gleaned from *National Geographic* in earlier years—pictures of "hugely productive and lush forests and snow-covered mountains." Thereafter, he began exploring opportunities for employment in the Pacific Northwest. After graduate school, however, he worked for the Allegheny National Forest, working with other staff to develop a prototype forest plan. He hoped to translate that experience into a position in the Pacific Northwest because he simply realized that "this was the region where I wanted to come."[24]

The personal and the political converged for Cissel during his early career in the Forest Service, and that convergence eventually led him to the Andrews group. He worked during the early 1980s as an operations research analyst working on the forest plan for the Richmond National Forest until 1985, when he took a summer position with the Willamette National Forest. In that period of transition for forestry practices in the Pacific Northwest, Cissel found "a lot of opportunity" and "lots of things happening" in his new position. He led a team of people assigned to explore possibilities for a research plan for the Willamette National Forest. His team classified—from a landscape point of view—ecological functions of old-growth forests and translated that information into landscape-level priorities to help managers decide whether, when, and where to cut. Cissel first encountered the Andrews group at a meeting where he presented his work with the Willamette National Forest. As he presented his team's ideas, Cissel ran into Swanson and McKee, who suggested some additional scenarios Cissel's group might try. When his team followed up on that suggestion, Cissel "felt it was cool and we enjoyed working with it."[25] It was the beginning of his collaborative work with the group.

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[24] Interview with John Cissel, 1.

[25] Interview with John Cissel, 2.

Cissel staked an early claim to the vaguely defined middle ground between the research and management wings of the Andrews group. That professional stance, he argues, left him somewhat apart from both wings: "I have to operate in both cultures and make the connections. … lots of folks up here [at the Corvallis FSL] tend to see me as a down-to-earth, pragmatic, get-it-done kind of person because that's the role I have to play a lot of times. But, … the [Blue River Ranger] District, lots of times, sees me as this airy research person coming in [with] ideas and concepts and not real connected with how you get stuff done. That's the role I play—to try to bring both sides a little closer together with what's reality here."[26]

Adaptive Planning and Collaborative Initiatives on the Willamette National Forest

The group's efforts to bridge the gap between research and policy strained the limits of the Andrews Forest as an institutional base for their work, especially as they moved from relative obscurity into the public eye. During the early 1990s, the group established the Cascade Center for Ecosystem Management to more clearly define their research-management partnership, which conducted applied studies, and to communicate their findings to a broader, public audience. One important venue for communicating the group's ideas involved taking visitors on tours of the Andrews Forest and neighboring national forest land. These tours typically began early in the morning at a field site where members of the group presented findings from basic research on streams and long-term studies, such as the 200-year log decomposition study site. After a midday break, the discussion continued at sites on the Blue River Ranger District where the staff showed visitors how they implemented concepts from research presented earlier in the day. These tours, however, sometimes generated questions that could not be answered with field demonstrations on the small piece of real estate that included the Blue River Ranger District and the Andrews Forest. The group wanted to explore landscape management approaches at a larger scale and on other forests.[27]

The group's strategy for testing their model beyond the Andrews largely depended on the Research Liaison at Blue River. Swanson, McKee, and Burditt all worked on landscape projects at the Andrews Forest, and the group was looking for a new, integrative focus for research there. These concerns influenced the group's plans for the Cascade Center for Ecosystems Management in 1991. Cissel,

[26] Interview with John Cissel, 10.

[27] Interview with Lynn Burditt, 14.

meanwhile, needed to secure his status with the Willamette National Forest in a position that was only vaguely defined and therefore potentially vulnerable in times of budgetary reductions. The group's initial plans called for the Research Liaison to install a forest fragmentation study in Blue River, but that idea ran afoul of the recovery plan for the spotted owl. The supercharged politics of the spotted owl issue directly blocked efforts to implement the landscape project when interim directives put the Blue River watershed within a habitat conservation area (HCA), where the recovery plan prohibited manipulative activities. The landscape project that Cissel was supposed to install would have called for timber harvests in aggregated and dispersed clearcuts, but the HCA designation prohibited that activity. The HCA also threatened the group's other programs because a cartographic error mistakenly included half of the Andrews Forest in its boundaries. McKee immediately filed a protest, and with Kerrick's support, appealed to the Regional Forester to change the boundary of the HCA to exclude the Andrews Forest. Pending that appeal, the western half of the Andrews Forest was off limits to any manipulations whatsoever for about 2 years. The area intended for the forest fragmentation study in Blue River, however, appeared to be permanently off limits.[28]

Habitat conservation areas were intended to protect the old-growth habitat and migration corridors necessary to sustain a viable, breeding population of northern spotted owls, but this particular HCA blocked a landscape study that the group hoped, among other things, would help federal agencies manage more effectively for old-growth conditions. The Interagency Scientific Committee followed a detailed process governing the selection of HCA areas that provided venues for public hearings,[29] but its designation of an HCA that excluded much of the Blue River watershed from manipulative management knocked the group off its stride. It also eroded the premise for funding Cissel's position through the Willamette National Forest. Cissel had to "start from scratch" to build a program that supplied a purpose for his position. Kerrick asked him, "Now what you going to do? Is there gonna be any workload for you?" In retrospect, Cissel views that as "a laughable kind of question." At the time, however, he felt the pressure to "create a program,"

[28] Andrews group interview 22 September 1997, 45.

[29] Jack Ward Thomas, Eric D. Forsman, Joseph B. Lint, [and others], "*A Conservation Strategy for the Northern Spotted Owl*" (Portland, OR: Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl, Report, May 1990), 283-297.

and he worked with the group to establish the Cascade Center that first year. Rolf Anderson helped the group identify and define functional areas with specific funding codes in the line item budget for Region 6 and then linked those different line items together to create a budget for the Cascade Center.[30]

The Cascade Center needed a clear, functional purpose to qualify for line-item funds from the Forest Service, and Cissel assumed much of the burden for defining one. He focused his efforts away from the Andrews, looking for a site elsewhere on the district that could be integrated into an existing, regional network of Long Term Ecosystem Productivity (LTEP) sites. He quickly identified a site close to the Andrews, and his LTEP proposal leaned heavily on that facility's reputation as a center for long-term studies. Cissel hoped the LTEP would provide some stability and funding for the research program at the Blue River District. With the LTEP site installed, he also helped initiate a young-stand thinning and diversity project, and he organized a landscape project on the district at Augusta Creek, outside the area governed by the HCA.[31]

The Cascade Center was not entirely Cissel's idea. Burditt, Swanson, McKee, and others tried to restructure the group's efforts to reach an audience beyond the Andrews well before Cissel joined them. Amidst recurring visits by Congressional delegations and many others, the group discussed the "tremendous level of media attention to Andrews research and spinoff forestry practices" at their monthly meeting in July 1990. The reputation of the place was attracting resources and attention from other federal agencies. The U.S. Geological Survey, for example, initiated plans in that month to build a debris-flow flume at the headquarters site, within easy walking distance of a newly built, 16-bedroom dormitory funded by the Forest Service. At their July 1990 meeting, the Andrews group discussed these developments and noted an "increasing need for more organized interface with the public."[32]

The reputation of the place was attracting resources and attention from other federal agencies.

The group brainstormed ways to create a formal public entity that conveyed their concept of collaborative research and management in ways that an "experimental forest" could not. Institutes and centers were popular organizational concepts in the Forest Service and universities in the early 1990s, and PNW Station had recently established two of them: the Copper River Delta Institute in Alaska and the Blue Mountains Institute in eastern Oregon. The group decided they needed

[30] Interview with Lynn Burditt, 14; interview with John Cissel, 7.

[31] Interview with John Cissel, 8.

[32] Minutes of LTER/HJA Local Site Committee meeting (7 July 1990).

a similar structure to pull together the various fragments and threads of research programs, grants, initiatives, and science-management teams in which they participated. While the LTER provided a central organizing theme for basic science, the group lacked a central identity of the strong research-management partnership that had evolved at the Andrews. A center could provide the formal, organizational structure they needed to reach across multiple agency and geographic boundaries and establish an institutional identity that the informal Andrews group otherwise lacked. With the Cascade Center for Ecosystem Management, people in the group hoped to reconcile their group's informal identity with the bureaucratic structures on which they relied. The center they proposed was a concept or a program of work, not a place or a building, but it was a real, sponsoring agency that they directly controlled. It would coordinate the group's wide array of activities and public service interests involving adaptive management and related research and management questions. It would support the group's efforts to implement projects designed to answer those questions and then coordinate efforts to integrate the results from such projects with other, related work. The center would also facilitate the group's efforts to communicate an integrated view of its programs with practical demonstrations and education forums.[33]

The group's effort to establish the Cascade Center for Ecosystem Management in the early 1990s was collaborative, informal, and more circuitous than linear. Cissel, for example, explains how he ran across a chance reference describing how the Chief of the Forest Service had designated a "demonstration forest" on the Ouachita National Forest. "I started thinking," he recalls, "'Well you know, we've got the Andrews, all this stuff going on here, then we've got these other research projects kind of scattered all over the place, then we got the LTEP, the Young Stand Diversity [Silviculture Study], we got Augusta Creek [Landscape Study], the whole district that's involved in significant ways in terms of developing and applying ecosystems information, maybe we are a demonstration district: Blue River Demonstration District.'" When he floated that idea during a conversation with Swanson, McKee, Gregory, and Grant on their way back from a field trip at the Augusta Creek site, Cissel recalls, "People said, 'Well, that sounds kind of cool.'" With that understated vote of confidence, he took the matter up with Burditt, who cautiously encouraged Cissel with the comment, "You know, that's kind of interesting, lots of implications there." Cissel next floated his idea past Rolf

[33] Max G. Geier, *Forest Science Research and Scientific Communities in Alaska* (Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-426, March 1998), 187; interview with Lynn Burditt, 14.

Anderson, in the Forest supervisor's office, just as Kerrick happened by: "So I got up and got to the map and I pitched it to Mike, and … he felt that was really cool too, so I started writing it up." In working with Swanson to refine the proposal, however, Cissel notes, "I hit a snag. Somebody said 'Demonstration District? That sounds like, you know, you're gonna, maybe not cut as much timber or something. … it doesn't seem like a good idea,' or something like that. The connotation of a Demonstration District was too much for somebody along the way." The reputation of the Andrews group, however, rescued the idea from oblivion. Portland-office coordinators for an internal, Forest Service reform initiative known as "New Perspectives" visited the Andrews because, as Cissel recalls, "They recognized our history … as a place that was innovating and developing new practices. And so we laid out this same kind of thing for them and what we were thinking about for a Demonstration District." Cissel argues the experience had a formative influence on the New Perspectives program: "At that stage, they were trying to figure out what structure … this New Perspective program should have. And we said, 'This is kind of what we were thinking, but maybe … a different title than Demonstration District.'" After some effort, Cissel concludes, "We hit upon Cascade Center. And that Center label, Steve McDonald was the PNW New Perspectives manager there, … he said, 'I think that's got potential.'"[34]

The Cascade Center was up and running by 20 September 1991, when it shared top billing with the LTER as the heading for the minutes of the monthly meeting of the Andrews group. Those in attendance at that meeting participated in an extended briefing and discussion on the Cascade Center. Briefing documents observed, "Communications are a major emphasis of the Center." They included a six-point statement of objectives: producing information about ecosystems; developing management systems that incorporate new information about ecosystems; correlating management practices with social values; developing more effective processes of public participation; sharing new information about ecosystems, management practices, and social connections to ecosystem management; and adapting management practices in conjunction with the Willamette National Forest plan mechanisms to keep them current with new knowledge. The briefing emphasized local, regional, national, and international links with the Cascade Center, notably including landscape ecology workshops for four national forests, New Perspectives demonstration areas and sites for the Young Stand Study on three districts of the Willamette National Forest, long-term field studies, studies of biodiversity

[34] Interview with John Cissel, 8-9.

and long-term site productivity, and analysis of cumulative effects of management on hydrology and fish habitat on "a variety of watersheds across the Willamette National Forest." According to those briefing documents, "The guiding concept giving coherence to the whole collection of projects underway is called Adaptive Management." That concept was based on the fundamental premise that "We do not now know, and may never know, all that we would like to know about how resource and social systems operate, and that we must proceed with management actions despite incomplete knowledge. Adaptive Management is an active information-seeking strategy guiding design of management, research, and monitoring projects."[35]

Once established, the Cascade Center was a convenient handle for the fluid network of personal contacts that supported programs at the Andrews Forest and elsewhere in the Pacific Northwest. It was intended to break down the distinction between "applied" and "basic" research to promote further cooperation among forest managers and researchers. The development team for the Center modeled that process. In addition to Burditt, Cissel, McKee, and Swanson, that team included Anderson, a planner with the Willamette National Forest, and Darryl Kenops, Mike Kerrick's successor as forest supervisor. Kenops continued where Kerrick left off, supporting the science-management partnership centered on the Andrews. That support was critical when the agency was down-sized in the early 1990s. Kenops, along with his deputy supervisor, John Nelson, helped the group counter suggestions from other sectors of the agency that the Cascade Center was a "discretionary item" and therefore subject to budget cuts in lean years. Other Forest Service administrators particularly questioned whether funding for Cissel's position helped the district meet its targets to produce fish structures, timber volume, or recreation visitor days. With support from Nelson and Kenops, however, Burditt countered those concerns by arguing, along with Cissel, that "Part of our responsibility, because of this setting that we have, is generating new knowledge." The center and Cissel, she argued, helped the district meet those goals and objectives. Burditt's arguments eventually carried the day, but not without some controversy over the human costs of funding the center over other positions in the agency. The Willamette National Forest dropped from 770 permanent employees to barely 400 during the 1990s, and for managers like Burditt, that reduction in force was "very painful" and "controversial." Ultimately, they had to decide "What *is* 'necessary work'?"[36]

Willamette National Forest dropped from 770 permanent employees to barely 400. Managers like Burditt ultimately had to decide "What *is* 'necessary work'?"

[35] "Minutes of LTER/Cascade Center meeting," 20 September 1991.

[36] Interview with Lynn Burditt, 14.

The Andrews Group, "Necessary Work," and the Northwest Forest Plan

Amid the social and cultural dislocation of communities in the Pacific Northwest during the 1990s, the Andrews group joined a regional effort that effectively redefined the nature of "necessary work" in forest management and forest research. The Cascade Center for Ecosystem Management and the Research Liaison position were self-conscious efforts to institutionalize the community ethic of collaborative research and management at the Andrews Forest. That effort evolved in the context of productive and ongoing interactions among scientists and local forest managers on the Blue River Ranger District. The experience of collaborative involvement in the effort to develop the riparian management guide for the Willamette National Forest between 1988 and 1990 gave some members of the group a taste of success in moving from a theory to implementing that theory (technology transfer) on a broad scale beyond the Andrews. The riparian management guide was intended to "provide guidance for implementation of the Standards and Guidelines of the Willamette National Forest Land and Resource Management Plan (1990) for Riparian Management Areas." It was the product of the Willamette National Forest Task Force, including advice and technical review by representatives from the Willamette National Forest, OSU, PNW Station, the Oregon Department of Fish and Wildlife, and the Columbia River Inter-Tribal Fisheries Council. It was also translated into a guide for land managers in Japan. The guide overviewed riparian resource values, and it laid out strategies for landscape management, basin management, harvest-unit manage-ment, riparian rehabilitation, and monitoring efforts. As a guiding principle at the landscape scale, the guide postulated, "Land use practices that maintain the natural patterns and dynamics of riparian communities across the Willamette National Forest can minimize long-term degradation of riparian resources." It also suggested that "the array of interior old-growth forests can be continuously linked along the mature to old-growth forests within riparian management zones … [that] can also serve as corridors for the dispersal of plants and animals between harvested watersheds, roadless areas, wilderness areas, special habitat management areas, and designated recreational lands."[37]

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[37] Stan Gregory and Linda Ashkenas, "*Riparian Management Guide: Willamette National Forest*" (Portland: Pacific Northwest Region, Forest Service, U.S. Department of Agriculture, 1990), 21.

Leaders in the Andrews group participated more directly in management planning from the Willamette National Forest to the regional scale with the Northwest Forest Plan. The plan was a federal initiative spinning out of the debate over habitat for spotted owls. It originated with a presidential directive from William Clinton, who convened a forest conference in Portland, Oregon, on 2 April 1993, in the first year of his administration. The Clinton directive charged participants in that conference, including members of his White House Cabinet, with the mission of devising a science-based forest management plan that would protect and enhance the environment, provide a sustainable timber economy, support people and communities in the region, and ensure interagency cooperation. Between 1993 and 1996, that effort consumed the time and energy of many scientists in federal agencies, including many people in the Andrews group.[38]

The group's involvement in the Northwest Forest Plan tested their ability to translate the ideals of ecosystem management beyond the relatively supportive leadership of the Willamette National Forest. It was purportedly a regional planning strategy balancing scientific theory with economic, political, and cultural constraints in the Pacific Northwest. By the end of the decade, the group's leaders pointed to the Northwest Forest Plan as among the most significant efforts to which they contributed, but they also noted that their work on that initiative drained their energies, diverted their focus from ongoing efforts at the Andrews, and required personal and professional sacrifices.[39]

Despite the work that went into creating the Northwest Forest Plan, some people in the Andrews group believed that ongoing research into alternative models of landscape planning and management could lead to a quite different, workable approach. Cissel, for example, admits his personal bias for a project in which he was personally involved, but he argues the Augusta Creek Project was a more important contribution than the Northwest Forest Plan: "We really pioneered a different way of thinking about how [the] landscape should be planned to meet multiple, integrated, ecological [and] commercial objectives." The group's Augusta Project, he argues, showed that linkage at the landscape scale of implementation. At Augusta Creek, the group developed a management plan for a large landscape that considered those objectives in both spatial and temporal contexts. They modeled specific management objectives in a context that showed how other people

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[38] Tuchmann, Connaughton, Freedman, and Moriwaki, "*The Northwest Forest Plan: a Report to the President and Congress,*" 1-8.

[39] Interview with Stan Gregory, 19.

could implement the same ideas at a landscape scale. The approach, Cissel observes, differed significantly from the Northwest Forest Plan, which called for a mosaic of reserves and corridors in a matrix of land where some logging could take place. This was an approach largely driven by conservation-biology concerns,[40] but the Northwest Forest Plan, in effect, directed the group to further develop the ideas in the Augusta Creek Plan through their work as the Central Cascades Adaptive Management Area.

The group's involvement with the Northwest Forest Plan originated with their earlier work on the Willamette National Forest Land Management Plan of 1990, when the Forest Service began to change the way it operated on the ground. The principle of good public relations also supported innovations in the Willamette National Forest Guidelines of 1990. Forest Supervisor Kerrick exemplified the trend in an op-ed essay he wrote for the Eugene and Corvallis newspapers in August that year. Noting that managing a large and valuable federal property like the Willamette National Forest was "really managing nature," Kerrick asserted his belief in the basic paradigm that "humans can live in harmony with nature, and we need to continue to learn how to do so." Toward that end, he argued, "We are fortunate to have the H.J. Andrews Experimental Forest…. Much of what we know has come from this priceless research property." He also credited the "citizen owners" of the Willamette National Forest with "shaping a new future for the forest" that, he suggested, was enshrined in the Forest Plan that his office had recently devised. Promising both a "New Look" and a "New Way of Doing Business," Kerrick focused on "special places" on the Willamette National Forest representing 53 percent of its land base and 50 percent of its "old-growth inventory" from which "there will be no scheduled timber harvest." He emphasized efforts to incorporate "the best available scientific information into our standards and guidelines" with the goal of ensuring that "while producing a significant output of needed forest products, our projects will be more environmentally sensitive." As examples of new standards for the Willamette National Forest, Kerrick announced plans for "leaving standing live and dead trees and large woody debris in harvest areas to provide diversity in wildlife habitat; protecting riparian zones; and designing projects from a larger landscape perspective." Conceding that he was announcing these new guidelines in controversial times, Kerrick promised that it would

[40] Interview with John Cissel, 14.

"provide stability as the U.S. Fish and Wildlife Service develops a recovery plan for the spotted owl."[41]

The management plan for the Willamette National Forest that Kerrick announced in 1990 was, in part, the product of 2 years of collaboration in the Andrews group. Gregory, who played a central role in that effort, recalls a somewhat serendipitous process that presented him with unexpected influence in the planning effort. The group's riparian studies in the early 1980s disclosed problems with existing Forest Service guidelines. Then, when the Forest Service was required to develop a new Forest plan in the late 1980s, the agency recruited people in the group to draft riparian management guidelines for the Willamette National Forest. When the committee bogged down, District Rangers Herb Wick and Steve Eubanks asked Gregory if he would complete the initial draft himself. He recruited Linda Ashkenas, and together, they drafted a complete set of new guidelines. Gregory was surprised to find the Willamette National Forest "really open" to their proposals. Contrary to his expectations, the national forest staff had surprisingly little criticism of the standards he and Ashkenas drafted. Their Guidelines called for no harvest in any riparian management zones, and included all flood plains within those zones. They called for substantial buffer strips, even on ephemeral, tributary streams. When they sent those proposals out to the ranger districts for comments, Gregory "expected the timber beasts to just go crazy." The only comments, however, were suggestions on how to strengthen the proposal and give it "more meat."[42]

Established traditions of collaborative relations with Eubanks and ranger district staff at Blue River smoothed the way for Gregory and Ashkenas and laid the foundation for extending that precedent beyond the Willamette National Forest. The most potentially volatile criticism they confronted, Gregory recalls, was defused by an informal exchange during a field demonstration. The guideline they expected to draw the most fire from timber-oriented managers was the prohibition on harvests in the riparian management zones. When that point came up for discussion during a field excursion to explain the proposed guidelines, however, the timber operations leader for the Blue River Ranger District spoke in support of the guidelines. He told his peers in other districts that until they knew for sure what adverse effects their actions would have, they "shouldn't be messing around in there." The collaborative

[41] *Corvallis Gazette Times,* 27 August 1990.

[42] Interview with Stan Gregory, 18.

ethic of Kerrick's "New Look" forestry was especially apparent in an exchange that came later in the same field trip. On the last stop of the day, Kerrick asked Gregory and Ashkenas to explain why they should enforce buffers on ephemeral streams, observing, "There's a lot of them up here. What's your reasoning on that?" Gregory was encouraged by the question: "The cool thing was, he wasn't saying 'This is crazy!' … He was saying, 'What are you thinking? I mean **why** would we do this?'" When they explained that large wood stabilized landslides and debris flow and slowed down the runout distance, Kerrick suggested that on a "stable" watershed with an ephemeral stream and a lot of understory vegetation protecting the creek, the buffer strips really were not necessary to protect the riparian conditions from debris flows. When the scientists confirmed that if the watershed were genuinely "stable" that would be true, Kerrick suggested they go "back to the drawing board" and rewrite "just this one section so that you can deal with all the functions you've identified? But don't make an across-the-board buffer strip." Gregory considered the resulting refinements a significant improvement over the original draft. Most importantly, the buffer strip concept established a precedent for forest management at a critical juncture for agency planning in the Pacific Northwest:

> We ended up with … a classification of unstable lands and moderately stable, and stable. So we said 'Okay, you have to have this 25-75 foot no-harvest buffer strip on ephemeral streams, if it's in an unstable category. There's an intermediate practice for the moderately stable [category], and then, you don't have to have any special precautions on the stable-class forest.' And so that was the first time that I know of in this region that they were leaving buffer strips on little streams that dry up in the summer. And so they adopted them, and they'd just been in place for a little bit less than a year when the … Timber Summit occurred with Clinton. … as a result, the Willamette plan didn't get as much visibility in and of itself, it just helped in the evolution into the Northwest Forest Plan.[43]

The group's involvement in the Northwest Forest Plan was a logical expansion of their collaborative work with the Willamette National Forest and their success with landscape-scale studies. Those earlier efforts had already attracted national attention by 1992. The Forest Service, in that year, awarded the Andrews-Blue River-Cascade Center the agency's 1991 Centennial Conservation Award for continuing efforts to improve conservation and land stewardship through the group's

The group's involvement in the Northwest Forest Plan was a logical expansion of their collaborative work and their success with landscape-scale studies.

[43] Interview with Stan Gregory, p. 18.

research-management partnership.[44] The Augusta Creek Demonstration Project, well underway by that time, was an important manifestation of that partnership, and it was a self-confident expression of the group's determination to continue those collaborative efforts. An early statement of the project's goals and priorities emphasized the diversity of land use designations and research activities on the 20,000-acre area of Blue River District allocated for the Augusta Creek study. The area encompassed general forest land, wilderness, scenic river corridor, and other "special" designations. Activities included efforts to compile data characterizing vegetation and disturbance history (especially wildfire), in an effort to identify "natural processes and patterns" with the intent of defining "desired future conditions" for the area. This effort would provide the base for devising "alternative management scenarios" that would be "tested through public participation, modeling, and other techniques" with the ultimate goal of arriving at "a management plan embodying New Perspectives principles."[45] Looking back at the evolution of the Augusta Creek Project 7 years later, Cissel considers it "really unique." The project was a synthesis of the various threads of research at the Andrews Forest and the planning and modeling experience that Cissel brought to the group. Most models of forest planning revolved around the timber harvest: how much, at what rate, and in which patterns. The Augusta Creek project included that concept of modeling timber harvest over time and space, but applied it to "more of an ecological point of view." Cissel explains the concept as "scheduling to meet the sustained flow of timber harvest that meets … sustained-flow of desirable ecosystem conditions.[46]

Through the late 1990s, the collaboration of forest managers and scientists linked through the Cascade Center provided a focus and purpose for a disparate collection of more specialized studies. The emphasis on technology transfer and breaking down barriers between theory and practice, in itself, became an integrative force for the Andrews group. Their work at Augusta Creek, from 1991 to 1998, for example, pulled together several different threads of research and management interests. The Augusta Creek Project, however, was just one of several landscape-scale projects underway during the decade of the 1990s. The group ethic of applied research and collaborative engagement among forest managers and scientists was institutionalized in the briefing documents for the Cascade

[44] Minutes of the LTER-Cascade Center meeting (1 May 1992).

[45] Minutes of the LTER-Cascade Center meeting (20 September 1991).

[46] Interview with John Cissel, 2.

Center. That concept, and the projects that built on it, apparently bonded people to the Andrews Forest as much as it encouraged them to participate in broader regional initiatives.

Warren Cohen, for example, had joined the group 2 years earlier as research forester and remote sensing scientist for the PNW Station at the Andrews LTER site.[47] By 1991, Cohen was already leading a landscape-scale study of forest dynamics with National Aeronautics and Space Administration (NASA) collaborators. Together, this interagency group analyzed landscape changes over previous decades for a range of federal and private ownerships, with particular emphasis on cutting and regrowth rates and changes in landscape and habitat structure. Cohen also worked with Harmon and Ferrell in a NASA-sponsored project with a regional focus and with multiagency support from National Science Foundations (NSF), PNW Station, OSU, and the National Forest System. Together, they explored relations between land use and carbon sequestration and release to the atmosphere in chronological context. Other regional-scale and landscape-scale projects involving people associated with the Cascade Center by that time included studies of forest distribution and change for the state of Oregon, regional biodiversity as characterized through data collected for the U.S. Fish and Wildlife Service's "Gap Analysis" project, riparian network studies, and forest dynamics research. Among the many principal investigators and cooperators working on these regional- and landscape-scale efforts, leading figures guiding the Andrews group in these studies included Cissel, Gregory, McKee, Swanson, Grant, Jones, Harr, Lattin, Moldenke, Franklin, and Spies. Forest dynamics research included biodiversity studies of plant and invertebrate species in aquatic, riparian, and upland systems across spatial and successional scales; analysis of forest-opening edges to evaluate effects on microclimate and vegetation; and landscape modeling to examine effects of alternative cutting patterns over several rotations for areas of 10,000 to 30,000 acres. Riparian network research included studies of riparian-zone structure, function, and management for water quality, wildlife, and other values; studies of the hydrologic effects of forestry practices in large basins on peak and low flows from long-term streamflow records in basins with contrasting cutting and roading histories; and a

[47] Interview with John Cissel, 15-16; "H.J. Andrews LTER4 1996-2002 Proposal," Section 8, 5.

multibasin study on the effects of forestry practices on stream and riparian resources in a sampling of large basins, including inventories of fish, geomorphology, and other variables.[48]

By the time the Northwest Forest Plan initiative got underway in 1993, scientists and managers with the group had aggressively linked previous work at the Andrews with studies that took a broad-scale approach. The people leading those efforts could inform but not control the administrative effort to develop a regional response to the land use issues and socioeconomic concerns relating to spotted owl habitat in the Pacific Northwest. Although some of them invested a disproportionate amount of their time, energy, and professional reputations in that administrative effort, others continued ongoing studies on and off the experimental forest. Andrews group alums Franklin, Sedell, and Meslow participated in the President's Forest Conference in Portland on 2 April 1993, and other scientists and managers affiliated with the group—notably Swanson, Grant, Spies, and Cissel—reported later that week at the regular LTER-Cascade Center meeting that they had begun working on postconference activities. Those attending that monthly meeting of the group also discussed the results of a workshop on ecosystem management that attracted more than 200 participants from the Willamette and Siuslaw National Forests, and they planned improvements for a similar meeting scheduled the following week for participants from the Gifford Pinchot and Mount Hood National Forests.[49]

Those working on the Northwest Forest Plan in the spring of 1993 may have initially expected a 60-day commitment to follow up on the results of the President's conference, but the process predictably stretched far beyond that optimistic timeframe, culminating in a forest management plan completed on 13 April 1994. The grueling process produced a document that claimed to incorporate "nearly 110,000 public comments." No single voice, consequently, could have prominent, or even dominant authority in that context. Given the diversity of concerns that produced the presidential initiative in the first place, the final report could not take the form of an idealized and pristine scientific proposal and still remain true to the principle of collaborative engagement across diverse political interests. For

[48] For a more complete listing of participants, see the Cascade Center Briefing Documents appended to the meeting minutes. Minutes for the LTER-Cascade Center meeting (20 September 1991).

[49] Minutes for the LTER-Cascade Center meeting (9 April 1993).

scientists and managers engaged in that effort, the process required personal and professional commitment that mushroomed well out of proportion to their actual influence over the final product.[50]

People working on the Northwest Forest Plan brought new insights back to the Andrews group. At the group's September 1993 meeting, Swanson and Bormann, together with District Rangers Don Gonzales (Hebo Ranger District) and Burditt, presented the concept of adaptive management areas (AMAs) as proposed in "option 9" from the presidential planning process. This planning alternative was eventually adopted as the primary basis for the Northwest Forest Plan in its final form early the next year. Those who attended that meeting learned that the Central Cascades AMA, a 155,700-acre zone centered on the Andrews and Blue River Ranger District, was one of 10 proposed areas in the plan. Subsequent discussion at that meeting left some "general impressions" that no one was really in charge at the higher levels, that the rules for the AMAs were unclear, and that the entire concept could be "rendered useless by legal-judicial or other higher-level decisions." Those concerns fit perfectly with the group's earlier strategy of taking initiative in a zone where lines of authority were still in dispute. The conclusion of the group's discussion was a succinct "go for it."[51]

The Cascade Center-Andrews LTER meeting of 4 March 1994 demonstrated the group's activist approach to shaping the local course of pending implementation of the Northwest Forest Plan.

Those who attended the Cascade Center-Andrews LTER meeting of 4 March 1994 planned an agenda that demonstrated the group's activist approach to shaping the local course of pending implementation of the Northwest Forest Plan. Anticipating the final report on a presidential planning process with which leaders of the group were intimately involved, people in that regular meeting discussed plans for an "adaptive management workshop" for "scientists, citizens, OSU students, and state and federal agency folks." They compiled and presented a list of studies connected with the Andrews-Cascade Center "that involve analysis of ecosystems and social systems at landscape to regional scale." They also discussed plans for an NSF proposal to "Regionalize" LTER work with an emphasis on areas of landscape dynamics in response to wildfire and land use, changes in carbon stores, hydrology, and biodiversity." The group planned the proposal to include areas ranging from the central Cascades study area to the western halves of Oregon and Washington.[52]

[50] Tuchmann, Connaughton, Freedman, and Moriwaki, "*The Northwest Forest Plan: a Report to the President and Congress,*" 2, 116.

[51] Minutes of the Cascade Center-Andrews LTER meeting (10 September 1993).

[52] Minutes of the Cascade Center-Andrews LTER meeting (4 March 1994).

In the 20 months after the Northwest Forest Plan was finalized, the Andrews Forest and the Blue River Ranger District buzzed with efforts to implement the 155,700-acre Central Cascades AMA mandated in that document. That work preoccupied many people in the group, and it substantially increased the administrative burden confronting Swanson, McKee, Burditt, and Cissel. Field trips, interagency communication efforts, a research and learning assessment, watershed analyses, community strategic planning, watershed council collaboration, and implementing an ecosystem workforce demonstration crew linked with the Jobs in the Woods program were among the accomplishments the group reported for that year in the Central Cascades AMA.[53]

The plan placed the Andrews Forest at the center of a larger network of AMAs and, in that way, refocused attention on the experimental forest as an arena for collaborative engagement among scientists and forest managers. Cissel cites this development as among the most significant turning points for the group during his tenure at Blue River. He suggests, however, that the Northwest Forest Plan embraced a planning structure with shortcomings that became evident shortly after it was adopted: “The Northwest Forest Plan put matrix [lands] and riparian reserves all over the landscape.” The problems apparent in the reserve system, Cissel argues, are more than academic. Regional concerns are more seamless than the neat categories suggested by the mosaic of different use areas laid out in the plan, and that reality cracked the edifice of the Northwest Forest Plan almost before the ink dried on the agreement. The reserves were based on a strategy of partitioning the landscape to set aside some lands while managing other lands for timber production. By contrast, the landscape management concepts in the Augusta Creek Plan began with the premise that the landscape functions as an integral whole, it could be managed on a more integrated basis, and the history of landscape change can guide management of future conditions. The Northwest Forest Plan adopted watersheds as the fundamental building block of the proposal, and it designated conservation and reserve areas based on watersheds with the most valuable old-growth forests and salmon stocks. Activities were to be carefully circumscribed on the reserves, where the primary purpose of any thinning or salvage activities would be to “accelerate the development of old-growth conditions.” In addition,

[53] Tuchmann, Connaughton, Freedman, and Moriwaki, “*The Northwest Forest Plan: a Report to the President and Congress,*” 118.

the plan designated 10 AMAs of 78,000 to 380,000 acres open to "intensive ecological experimentation and social innovation to develop and demonstrate new ways to integrate ecological and economic objectives."[54]

The Northwest Forest Plan imposed significant constraints on forest lands outside the AMAs, but in doing so, it also tended to refocus the group's attention on the Andrews Forest and the Central Cascades AMA centered there. Landscape studies at the Augusta Creek site, for example, were outside the boundaries of the AMA. When proposed management activities related to those studies conflicted with guidelines from the Northwest Forest Plan, the obvious solution was to move the studies back to Blue River, within the AMA, where the additional benefits of long-term monitoring would also enhance the effort. The district was ready to do a timber sale at Augusta Creek, but it was managed according to a strategy different from the Northwest Forest Plan, including "intensive timber management." The group rapidly adapted to that decision, redesigning the study as a landscape plan for the Blue River watershed. It had taken years to get the Augusta Creek Project "tuned" to the point where the group "felt pretty good about it." The Blue River watershed was three times the size of the Augusta Creek drainage, but the group took concepts from the Augusta Project and used them to develop a landscape plan for the Blue River watershed in 2 weeks.[55]

Ecosystem Management and the Andrews Group

The Blue River landscape management strategy was still the focus of discussion for Andrews group participants who attended the monthly meeting in March 1998. Briefing materials for that discussion described the Blue River Landscape Project, beginning 17 April 1997, as an "untested approach to meeting the objectives of the Northwest Forest Plan." The project, according to this discussion, was based on the premise that productive ecosystems and native species likely would be sustained if ecological processes followed historical patterns. As that briefing document cautions, however, "the degree to which management activities, such as timber harvest and prescribed fire, can approximate historical disturbance regimes is not yet clear." Citing the advantages of working on a landscape subject to continuous study for nearly 50 years, the briefing laid out the theoretical framework of a monitoring effort organized along a "hierarchy of spatial scales." It cited the

[54] Tuchmann, Connaughton, Freedman, and Moriwaki, "*The Northwest Forest Plan: a Report to the President and Congress,*" 233-236; interview with John Cissel, 15, 18.

[55] Interview with John Cissel, 17.

mission of the Andrews Forest as a site supporting research and educational purposes, with a humanized landscape of experimental watersheds, plots, monitoring stations, and control areas that collectively "cover virtually all of the Andrews." It noted more than 100 projects currently active at the Andrews Forest, with major support from the LTER program. It characterized the place as one of 18 LTER sites representing different ecosystems throughout the United States and Antarctica, and it noted project-specific grants linking the Andrews Forest with the National Forest System, NASA, and the Environmental Protection Agency. Physical improvements emphasized in this briefing document included 3 dormitories capable of housing up to 60 people, a new office and laboratory building, and the pending completion of a new class and conference room "suitable for groups of up to 100 people."[56]

Those who attended the group's March 1998 meeting received a short history of the "emphasis and scope of the research program on the Andrews" as part of their briefing materials. According to this document, research at the Andrews began with an "initial emphasis [in the 1950s] … to learn how to convert old forests to new forests in an efficient manner," then "shifted in the 1960s to look at the effects of forest cutting," while the 1970s "ushered in a new era of ecosystem science, focused initially on old-growth forests." That emphasis on ecosystem science, the 1997 briefing document asserted, "continues today." Following that assertion, the document listed a catalogue of study themes: structure and composition of forest communities, vertebrates and invertebrates inhabiting the forest, aquatic ecology, decomposition, nutrient cycles, long-term ecosystem productivity, disturbance patterns, fungi, lichens, and relations among these features of the ecosystem. Finally, the proposal laid out three landscape areas in the landscape management strategy with the goal of developing different densities of trees, and identified priorities for monitoring at the scale of the entire watershed, subwatersheds, small streams, and local sites.

In addition to the close focus on the attributes of the Andrews Forest, the Blue River Landscape monitoring strategy also emphasized the broader context of the facility in relation to surrounding administrative units. It noted the linkage of the Andrews Forest and the Three Sisters Wilderness as a Biosphere Reserve, and proximity of the Andrews to matrix and riparian reserves designated under the Northwest Forest Plan. It also emphasized the proximity of the experimental forest

[56] "Blue River Landscape Monitoring Strategy, 4/18/97" as presented at the 6 March 1998 LTER/Cascade Center meeting.

to "large blocks of industrial forest lands … a short distance to the west of Blue River watershed."[57] It was just one among many examples of the drastically fragmented and partitioned, forested landscape of the Pacific Northwest. Rather than emphasizing the relatively pristine characteristics of the Andrews Forest that predominated in earlier depictions of this facility, the briefing document emphasized the "made" landscape of the place in the context of other managed landscapes in the Pacific Northwest. The group perceived these "second nature" characteristics, by the late 1990s, as attributes exceeding the importance of the "pristine nature" previously emphasized in promotional materials and proposals centered on the Andrews Forest.

Conclusion

The Cascade Center provided an administrative identity for collaborative efforts among people affiliated with the Willamette National Forest, PNW Station, and OSU.

Leaders of the group during the late 1990s retained the diffuse traditions of earlier years, while adapting their focus to more contemporary issues. The Cascade Center provided an administrative identity for collaborative efforts among people affiliated with the Willamette National Forest, PNW Station, and OSU. Monthly LTER/Cascade Center meetings, meanwhile, provided an ongoing venue for individual engagement with the group and for encouraging marginally involved participants to work more closely with that community. Beyond these structural issues, however, people associated with the Andrews increasingly identified with a common philosophical outlook. They synthesized and restated earlier, often unarticulated traditions of collaboration, long-term commitment, and applied theory. The concept of ecosystem management emerged as a critical, integrative theme. Members of the group advanced the concept as they conscientiously contributed their time to the process of devising the Northwest Forest Plan. By the end of the decade, it was a more carefully articulated philosophy shaping the self-identity and community priorities of the Andrews group. Leading scientists affiliated with the group described ecosystem management in a 1997 paper as an "emerging concept … [that] carries with it a gestalt of holism rather than reductionism, a subordination of human desires to ecosystem health, and recognition of a broader range of values in ecosystems than past practices have acknowledged." Although the group's work largely focused on forest lands, the authors emphasized that ecosystem management also works with landscapes other than forests. They explored the relation between concepts of processes perceived as "natural," such as disturbance

[57] "Blue River Landscape Monitoring Strategy, 4/18/97," 2-6.

events, and the concept of ecosystem management. They cautioned, however that ecosystem management requires more than simply attempting to mimic such "natural disturbance" events, noting the relatively "fine-grained mosaic of older, often uneven-aged, forest patches." Rethinking earlier notions of "scientific forestry" they concluded that ecosystem management is "more than science," and they restated an apparently obvious, but frequently ignored point: "Social responsibility, economic feasibility, political acceptability—all will shape the management paradigm that leads to ecological sustainability. Land management is not a scientific process. Though it should incorporate scientific ideas and information, it inevitably reflects substantial elements of consensus and compromise. …" Ultimately, Swanson and his coauthors suggested, ecosystem management builds from the philosophy that ecosystem scientists "must be prepared to create and accept roles in the management process."[58]

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[58] Ken Lertzman, Tom Spies, and Fred Swanson, "From Ecosystem Dynamics to Ecosystem Management." In: *The Rain Forests of Home: Profile of a North American Bioregion*, Peter K. Schoonmaker, Bettina von Hagen, and Edward C. Wolf, eds. (Washington, DC: Island Press, 1997), 361-382.

Chapter Eight: Managing Data and Building a Collective Memory of Science Through Time

By the end of the 20th century, the H.J. Andrews Experimental Forest (Andrews Forest) was as much an idea as a place. Scientists and forest managers went there to look for answers to problems they found in other landscapes. As one scientist explained in a 1997 interview, "Ultimately we would like all the work at the Andrews to … [say] something about fundamental processes rather than processes at the Andrews."[1] The Andrews group tended to attract and recruit people who similarly viewed the forest as a place to seek answers applicable elsewhere. For more than 50 years, scientists and managers idealized that place as a setting where they could test their ideas about science in relation to management policy. Over several decades, the Andrews group carefully integrated years of carefully maintained data into shared information management systems. In that way, they linked individual effort with broader themes and networks that bridged local, regional, national, and international boundaries. During the 1990s, people in the group worked to integrate this continuous stream of scientific data from multiple threads of research into focused, collaborative action. That process built on several decades of innovation in information management that transformed the way scientists communicated ideas, insights, and results. In that context, the group combined insights about ecosystem dynamics with principles of adaptive management to attempt ecosystem management on a landscape scale in neighboring drainages.

Their effort to implement ecosystem management on a landscape scale was more an act of self-realization than of sudden inspiration for the group. What seemed natural in the group eventually became their preferred strategy for managing the landscape centering their community. The place inspired new ideas, but ideas also inspired human actions that transformed the Andrews. In less than 50 years, the forest Roy Silen once perceived as a "forest primeval" was roaded and logged more intensely than neighboring drainages. In the last third of the century, however, the Lookout Creek drainage was relatively isolated from timber production on nearby slopes. As a result, by the end of the century, the Andrews once again seemed "pristine," at least by comparison with clearcut slopes on the surrounding national forest and private forest lands. The group's perceptions of the

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[1] Interviews with Gordon Grant by Max Geier on 6 and 10 October 97 at the FSL, Corvallis, OR, as transcribed by Elizabeth Foster, 26-27.

place moved through three distinct phases in less than 50 years: virgin timber, managed forest stands, and pristine ecosystem. In the late 1990s, the group introduced a fourth stage: managed ecosystem and managed landscapes. They expected that human activity would, thereafter, regulate that forest's ecological processes.[2]

Data Management: Institutionalizing a Collective Memory of Research and Community

The Andrews community attracted many different people for reasons unique to each individual, but at the end of the 20th century, it acted as a group that was more than the sum of its parts. The ongoing effort to manage five decades of data from the Andrews Forest reinforced that characteristic of the group. That data represented the collective memory of the Andrews, and it was an important component of the community. It attracted people to the group, it inspired new ideas, and it enticed people to stay with the Andrews. Julia Jones, for example, joined the group in the 1990s because she was convinced those data were "the best records" available for exploring "how hydrologic systems really work in practice." During the last two decades of the century, the group systematized and professionalized its stewardship of long-term records from the Andrews. The person who headed that effort was Susan Stafford, who joined the Oregon State University (OSU) faculty in 1979. Her accomplishments perhaps best represent the aspirations of the group for long-term stability and continuity. She guided an evolving system for maintaining and analyzing data, beginning with just one programmer in 1979. By 1998, her data management group had developed a Forest Science Data Bank that was a prototype for Web-based data sharing among the various Long Term Ecological Research (LTER) sites. Stafford's central role in building this prototype system also demonstrates the importance of OSU as an institutional framework for faculty and staff whose work as university employees and in campus facilities had supported the group effort at the Andrews Forest over the long term, since the early days of the International Biological Programme (IBP).[3]

The Andrews group of the late 1990s was a data-based, science-oriented, place-centered, and people-friendly community. People made it work, and the data

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[2] For a brief, accessible introduction to the concept of ecosystem management, see Ken Lertzman, Tom Spies, and Fred Swanson, "From Ecosystem Dynamics to Ecosystem Management." In: Peter K. Schoonmaker, Bettina von Hagen, and Edward C. Wolf, eds., *The Rain Forests of Home: Profile of a North American Bioregion* (Washington, DC: Island Trust, 1997), 361-382.

[3] Interview with Julia Jones, 6; interview with Susan Stafford, 15; communication from Logan Norris to Fred Swanson 9 September 2003.

Suzanne Remillard and Don Henshaw

Figure 52—Data management at the H.J. Andrews Experimental Forest was a continuing legacy and established foundation, but with the technological boom of the late 1980s and 1990s, the Andrews group transformed the concept of data management into an organizing principle of the research community. This series of photographs illustrates the rapidly evolving, technological framework that the Andrews group adapted to their purposes in those decades. New technology also created problems of long-term archiving of records collected in multiple, mutually incompatible formats, ranging from computer punch-cards, to computer tapes, to zip disks, to digital memory sticks. Gaging stations and other field equipment generated continuous, graphical output in hard-copy formats that varied over time. These multiple formats challenged data managers, who constantly innovated new approaches to making the ever-growing mountain of data accessible and secure as an ongoing legacy of the Andrews group.

Stafford's philosophy of applied statistics guided the forest science community in Corvallis, Oregon, through nearly 20 years.

system that helped them work together followed the organized principles of its founder. Stafford, who decorated her well-ordered office with sailing paraphernalia, often used nautical terms to explain a system for managing data that represented ecological processes on a forested landscape. Like many others active in the group near the end of the 20th century, she is a native of the Northeastern United States. She graduated from Syracuse University in New York (SUNY) in 1974, with an undergraduate degree in biology and an emphasis in mathematics. She earned a masters degree in quantitative ecology from SUNY in 1975, producing a thesis that tested computer models of commercial fishery stocks against archival records of fish populations on the Great Lakes. Stafford's thesis for the Ph.D. in applied statistics at SUNY in 1979, involved a model she developed for determining land values of forest and vacant lands in three counties in upstate New York. She explains of her graduate work, "I like to figure out how to bring an organizational arrangement to something to make it facilitate and expedite what we're all about."[4]

Stafford's philosophy of applied statistics guided the forest science community in Corvallis, Oregon, through nearly 20 years of evolving sophistication in thinking about the way they generated, used, and stored research data. She applied for an opening at OSU in 1979 on the advice of her major professor at SUNY, and continued in that position through 1998, when she left to accept an appointment as Chair of the Department of Forest Science at Colorado State University. In the intervening years, the Andrews group generated a mushrooming volume and variety of data, and demands from scientists for access to those data increased exponentially. Stafford's unit grew in tandem with the research program. Technology, as well as ideas, shaped the direction of the group's collective memory. They started with a mainframe computer, and then made the transition to personal computers (PCs) not connected to each other. As the group struggled with that atomized computing environment, Stafford linked them together in a local area network (LAN), and in 1987, she drafted a proposal for National Science Foundation (NSF) funding to develop a data management system for the LTER.[5]

Stafford's proposal to NSF, which she wrote in collaboration with Sollins, Swanson, and Gregory outlined a strategy for creating an "integrated science workbench for ecosystem research." It proposed to provide online access to the

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[4] Interview with Susan Stafford, 16.

[5] Interview with Susan Stafford, 16; H.J. Andrews LTER-Cascade Center for Ecosystem Management meeting notes (1 May 1998); communication from Fred Swanson August 1999.

group's data, including high-resolution graphics and computing power. Stafford's unit began with one workstation, and expanded to a system of 44 workstations and a local area network linking the PCs to the Forest Science Data Bank. One year later, Stafford led a collaborative effort that involved Bill Ripple, of the Environmental Remote Sensing and Application (ERSA) Laboratory, and many other people in the Andrews group on a proposal to link geographical information system (GIS) with remote sensing. That effort eventually connected the ERSA Laboratory to the Forest Science LAN. The proposal also secured "seed money" for hiring Barbara Marks as a support programmer. That funding was the first time Stafford was able to secure money from NSF to fund a person, rather than purchase hardware or software. The funding from NSF to support expenditures on staff and equipment for managing data generated by the LTER program set a precedent that helped Stafford secure other funds.[6]

The move to Web-based technology placed the group at the leading edge of some critical LTER initiatives. As a prototype site for the LTER, the Andrews group accepted the responsibility for testing new ideas and sharing the results with other sites in that network. Stafford approached data management at the Andrews with an appreciation for the group's potential for growth and its role as a model for other LTER programs. Beginning with the 1988 grant proposal, Stafford designed a system of data management that assumed the group "was always going to be growing." Growth accelerated during the 1990s, and computing needs grew accordingly. By 1994, people in the group were working with about 180 PCs. A year later, they had 280 PCs, and by 1998, about 500 PCs. The technology of data management also changed rapidly in that period, moving from paper documentation on data-entry forms to a tape library with automated access, to the LAN that included the Forest Science Data Bank and Web-based access by the late 1990s. The group's status as a flagship program in the area of information management helped them assemble a critical mass of technical experts more quickly, and act as an integrated unit. The Forest Science Data Bank also expanded beyond the Andrews program, providing data management services that supported other programs within and beyond the university by the late 1990s.[7]

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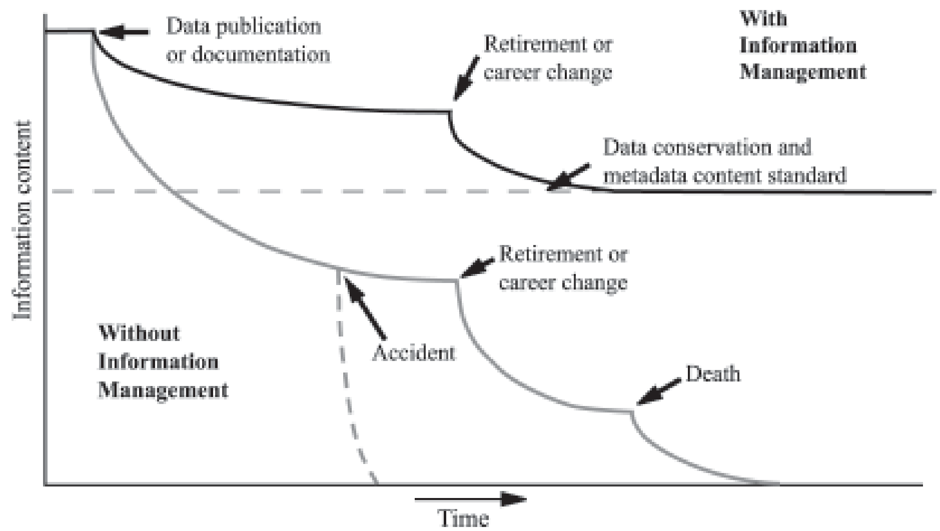
[6] Interview with Susan Stafford, 3-5.

[7] Interview with Susan Stafford, 6; communication from Fred Swanson October 2003.

Sidebar 8.1: Data and Information Management

The Issue: Good management of data and information is essential to long-term research and management efforts because without that information and data, a long-term study can lose significance as time passes. Environmental and research data collected with public funds are public data. Data can have unexpected uses and values, if the data are well-documented and available for use by others. The long-term nature of the LTER program makes it a highly suitable place to develop information management and sharing protocols. Good data management is critical to effective monitoring and adaptive management.

Loss of information generated by a science study. Good information management, including data conservation and good metadata, minimizes information loss. Modified from Michener et al. (1997).



The Roots: The tradition of scientists collecting and managing their own data took on new character in the "big science" days of the International Biological Programme when the National Science Foundation insisted on developing centralized databanks. Researchers have come a long way since those days in the early 1970s. Science carried out by large teams collecting long-term environmental measurements must be supported by a corporate data management system. The advent of Web pages and the Internet, other technological and cultural advances, strong pushes to conduct intersite science, and the sheer volume of data accumulated over years of ecosystem research have led to major advances in both expectations and accomplishments in information management.

The Approach: Good data and information management is as much a matter of culture and attitude as it is technology and staffing. In the early days, staff hired as data managers often had difficulty getting scientists to invest the effort to document and submit data to the databank. The Internet and Web pages gave data managers and scientists common, public ground to work together to represent the accomplishments of the research team. The core of data and information management in the Andrews Forest program is the Forest Science Data Bank and the strong cadre of information managers who, although they work for different institutions, work as a single unit. The makeup and operations of this enterprise are constantly evolving in response to new opportunities and responsibilities for information management and sharing.

Results: Major commitments to data and information management are important parts of the foundation for conducting ecosystem science and management at the scale of the Andrews Forest program. As long-term data sets grow in length and number, and as spatial data grow in resolution and complexity, strong data management grows in importance for both research and land management. Web pages are proving to be a powerful medium for managing and sharing information on land management decisions, actions, and monitoring. The scope of information managed in a centralized, electronic form has grown from simple text and tables of numerical data to linked collections of photographs, spatial data, bibliographic data sets, personnel directories, and many other forms.

Figure 53—Susan Stafford, seen here addressing the Information Management Executive Committee at San Diego Super Computer Center in 2002, guided the Andrews group through the technological maze of the 1990s and built a data management system that became a model for other Long Term Ecological Research sites across the country.

In funding Stafford's grant proposal, the NSF required the Andrews group to "be a prototype in this regard," and that edict transformed the Andrews LTER workplace. It became, thereafter, a site for exploring new methods of data management, and the effort to maintain a Web presence opened those methods to scrutiny by people at other LTER sites and at other research organizations in the United States and in other countries. That reality forced the group into the arena of international relations as their research, and international interest in that research, brought them into contact with people making policy decisions and leading research initiatives around the world. Stafford and the group developed mechanisms for data sharing, storage, and analysis, to make data from research projects at the Andrews available more rapidly and to more people outside that community. Stafford balanced the NSF mandate to "have as much data online as possible as quickly as possible" against the rights of scientists to protect their intellectual property. Some sites in the LTER network made a distinction between their core data sets from the five major areas of work assigned to scientists in the program and the work assigned to their graduate students. The Andrews group, however, minimized that distinction and emphasized the importance and long-term potential of the work assigned to graduate students. Stafford's unit, therefore, designed a form to standardize the structure of their data, and worked with graduate students as well as program scientists to prepare their data in a format compatible with the Forest Science Data Bank. By the late 1990s, the group had either placed its data online in that format, or placed abstracts online for data that were only available in other

Stafford balanced the NSF mandate to "have as much data online as possible as quickly as possible" against the rights of scientists to protect their intellectual property.

Figure 54—Under the leadership of Susan Stafford and Don Henshaw, the Data Management component of the Andrews group was increasingly prominent in the Long Term Ecological Research (LTER) program. This photo of the LTER Information Management Executive Committee on the San Diego State Campus in 2002 includes (from left) Emery Boose, Peter McCartney, Helena Karasti, John Anderson, Kristin Vanderbilt, Barbara Benson, Susan Stafford, James Brunt, Karen Baker, John Porter, and Don Henshaw.

formats. These accomplishments only partially achieved the goals Stafford and others in the group intended, but they were nonetheless "pioneer" or "test cases for new ways of doing science."[8]

The effort to manage data was an integrative, adaptive strategy that linked university and agency scientists in the group with each other and with a global network of colleagues. The Quantitative Scientists group and the Forest Science Data Bank joined the emerging global network,[9] and that linkage further blurred the distinction between Forest Service and Forest Science data and people in the group. It also blurred the distinction between scientists and data managers. People who worked in Stafford's unit served in a consulting, collegial role rather than as gatekeepers to the world of data management. Everyone who worked with Stafford in the Quantitative Services group had at least some training in the biological sciences or in natural resources in addition to their technical skills in data management. They participated in the monthly LTER meetings, and they worked as

[8] Interview with Susan Stafford, 3-4; communication from Fred Swanson August 1999.

[9] Interview with Susan Stafford, 1.

collaborating consultants who understood the science goals, the potential implications of the data, and the importance of the work to the lives and ambitions of the scientists.[10]

The Andrews group worked to build its philosophy of "breaking down barriers" into the structure of data management. Stafford's goal was to "foster the idea that data management might be integrated into that whole research process." Toward that end, her unit devised a systematic procedure that specified distinct phases for designing and implementing a research plan. In the first phase, the Principal Investigator (PI) and associated researchers met with a statistician to identify and define the objectives of the research. They next met with a data manager to plan a format for the data that would be appropriate for long-term, archival storage in the Forest Science Data Bank. Then they implemented the study and began collecting data according to plan. Subsequent steps in the data management process required working with researchers on documenting and editing the data records, then analyzing, interpreting, and synthesizing the data. At the synthesis stage, field workers met with a statistician who helped them interpret the results to ensure statistically sound reasoning. The prominent nature of work at the Andrews in the late 20th century encouraged the group to adopt this model of structured data management because the potential for controversial findings or critical audiences was so great. Statistical rigor was a refuge from politically inspired criticism. The structured approach also supported and sustained the group's efforts to initiate and continue long-term scientific research. The systematic procedures that Stafford devised helped scientists structure their studies so that the boundary conditions, or limits of the work, were clearly stated up front—before the conclusions. In that way, they attempted to defuse some potential criticism by anticipating and acknowledging the limitations of their work. This front work also promoted more efficient study designs that ensured research efforts would generate data in formats useful and relevant to the concerns that prompted the work.[11]

The Human Variable: Fitting In and Winnowing Out at the Andrews

Stafford's unit supported efforts to systematize the work of the Andrews group, but human resources followed a more complex and less formalized logic than data

[10] Interview with Susan Stafford, 2-3.

[11] Interview with Susan Stafford, 3-4.

sets and computer networks. People were, nonetheless, an introduced and managed variable on the Andrews Forest by the end of the century. The group usually did not consciously select people who could join them in that place, but everyone who came to the Andrews survived an unconscious process of social selection, following a combination of personal and institutional decisions. Some, like Roy Silen in the earliest years of the experimental forest, had virtually no control over the process that brought them to or wrenched them away from this place. Others participated more directly in the decisions leading to their association with it. In more recent years, people associated with the Andrews commonly express their belief that "self selection" mostly determined who joined and stayed with this community. Actual mechanisms of recruitment, however, were often more complex than that phrase might suggest. Gordon Grant, for example, secured his permanent position with the Forest Service Research organization in the mid 1980s after working with the group for several years as a graduate student on soft-money funding. From his perspective, he simply "showed up" as a graduate student and worked his way—through his own actions—into a permanent position in the group. When a search opened, Dennis Harr asked Grant what he thought the person hired should do, and Grant responded, "Well, I don't know, something about mountain rivers." That roughly described Grant's emerging specialization. He explained his engagement with the group as an example of natural selection in a human context: "When you're early on in a group, a lot of your struggle is … to define that turf or define that domain. … There is a lot of niche selection going on, … it's an ecosystem."[12]

One characteristic of belonging to this group, by the 1990s, was to speak of how it functioned as if it really were an ecological, or natural organism. Whether or not the analogy to evolutionary processes accurately described how things actually worked in this human assemblage, people found their niche in the group by fitting their skills to the needs of the community, as more established members defined those needs. Sometimes that meant the new member alerted the group to a previously unrecognized need. In the five decades after the Forest Service established the experimental forest, people drawn to the place typically followed a route through several distinct stages of personal development related to their eventual role with the Andrews group. Those stages included (not necessarily in this order)

[12] H.J. Andrews LTER-Cascade Center for Ecosystem Management meeting notes (1 May 1998); interview with Gordon Grant, 12-13.

personal inclination, academic and career training, professional experience, discovery (of the place), inquiry (into opportunity), funding (locating and securing), mobilization (personal and professional), and socialization into the group. Individual will was not necessarily sufficient for involvement.

The particular pathway by which each member of the group came to the Andrews was unique, but most people were attracted to the community and its accomplishments more than the place. Personal relations and professional networks were especially important during the stages of discovery, inquiry, funding, mobilization, and socialization, and they were often contingent on earlier stages of training and experience. Some experiences and affiliations were especially crucial. People like M. Gordon "Reds" Wolman, Jerry Franklin, Art McKee, and Fred Swanson, for example, mentored or otherwise influenced many people who eventually converged at the Andrews Forest in the last three decades of the 20th century. Experiences at major research centers like Oak Ridge, Woods Hole, Luquillo, and Coweeta helped people develop contacts with other scientists and managers who traveled in the same professional circles as those who worked at the Andrews. Experiences at particular universities, notably including the University of Tennessee, Pennsylvania State University, Johns Hopkins University, the University of Georgia, or OSU served a similar function. Access to these networks of affiliation increased the likelihood a person would eventually become involved and secure long-term tenure with the group. People who developed a long-term involvement with that community, however, also needed a local network of support among people already working at the Andrews.

Experiences at major research centers like Oak Ridge, Woods Hole, Luquillo, and Coweeta helped people develop contacts with other scientists and managers who worked at the Andrews.

New recruits could choose to participate in any of several structured opportunities for communicating with other scientists and managers in the group. The monthly LTER meetings and the annual field gathering, HJA Daze, for example, encouraged precisely those kinds of linkages. People learned to recognize subtle signs that they were accepted in the group: they were invited to participate in events, they were accepted as legitimate participants when they showed up in group venues to which they were not directly invited, or they were given time on the agenda at field demonstrations or at the regular monthly meetings. That "face time" demonstrated their status in the group more than it offered an opportunity for gaining acceptance. Informal exchanges during field events were more important than going to formal meetings for those who hoped to elevate their standing with the group. People talked to each other while riding to and from the Andrews Forest and during excursions on that landscape. Acceptance, for some, also meant giving up habits learned in graduate school: they had to think beyond their own research and consider their personal and professional responsibility to the group.[13]

The emphasis on community was an important factor determining success at the Andrews and in the group. The experimental forest both attracted and repelled people, depending on their personal disposition toward the community culture of the group. Waring, who led the Andrews effort during the IBP, later distanced himself from that community because he was no longer comfortable working in a group context. A few people left because the group informally rejected them. In the words of one leader, some people "tried to get into the group" but failed to gain acceptance because others in that community considered them money hounds who wouldn't participate in meetings or other functions of the group. People who "just wanted the money," and "didn't want any strings attached to it" just "didn't work out."[14]

The point in their career at which people joined the group was also a factor in their decision to stick. At various times, Forest Service professionals, university professors, postdoctoral research assistants, technicians, graduate students, and undergraduate assistants found the group supportive and welcoming. It was a community of structured instability: many short-term associates ebbed and flowed around a smaller core of more secure, longer term associates. Their involvement with more-transient people who contributed new ideas and skills also helped people with more-permanent tenure link their work with more-contemporary ideas and insights. The makeup of that less-mobile core also changed with retirements, transfers, and new, permanent hires. The small cohort of long-term associates anchored core values for a group that studiously avoided defining itself, even as it earned a reputation for principled innovation and responsiveness to the shifting tides of public interest and management needs.

The characteristic fluidity and informality of the group was also a response to the limits of institutional funding through PNW Station, OSU, and the Willamette National Forest, and it demonstrates how the group's close connections with the NSF and its institutional culture began to affect how people interacted at the Andrews. By the late 1990s, Andrews-affiliated scientists who accepted short-term appointments at NSF were infusing insights from that experience back to the group. Entomologist Tim Schowalter, for example, was a tenured member of

[13] Interview with Gordon Grant, 13-14.

[14] Interview with Mark Harmon, 19.

the OSU faculty who worked with the Andrews group before and after his appointment as program director for ecosystem studies at NSF in 1992 and 1993. At that agency, he was one of many program directors who rotated through on short-term appointments. He observed how he and his temporary colleagues in Washington, D.C., introduced the smaller cadre of permanent NSF staff to current ideas and problems that researchers then faced in the field. From that experience, he learned how a small group of permanent staff could influence the decisions that more permanent colleagues made. He also learned, however, that people with short tenure, like himself, relied on people with longer tenure to supply continuity, stability, and a sense of what had been tried before.[15] When he returned to Corvallis, those insights informed Schowalter's actions in the group.

Personality and the Limits of Organic Community

People in the Andrews group tended to explain the functioning of that community in terms they borrowed from their studies of natural processes, and that tendency complicated their efforts to understand why they were successful. The group depended on people who could cooperate with other professionals while applying their own training and skills to achieve common goals. They needed people with adaptive and accommodating personalities, who also had relevant training, background, and experience. In the late 1990s, few people in the group could articulate a clear strategy for recruiting and retaining people with those characteristics. Many of them, however, embraced the ideal of a self-regulating, naturally adjusting, organic community. That concept suited their need to remain flexible, adaptive, and responsive in the tumultuous political environment of the 1990s, but it also freed them from the responsibility of critically examining their existing mechanisms of recruitment. It was, moreover, a vague and incomplete description of how and why new people typically joined and functioned in the group during that decade.

The group based its reputation and programs on an institutionalized system of structured instability: It relied on short-term, "soft-money" appointments to support long-term studies. That structure forced many people in the group to constantly consider other career options, and many of them left the Andrews community. Few of the people who helped plan and implement long-term studies remained with the group for more than a few years, but some did. It was a system that placed the burden of an uncertain future on individual people, and that uncertainty sometimes

[15] Interview with Tim Schowalter, 2, 17, 19-20.

strained relations in the group. Recruitment, retention, and departure proceeded with little formal discussion about who or how to recruit or how to encourage long-term tenure. The group relied, instead, on a process with the outward appearance of unstructured informality. The result, intended or not, was that group leaders avoided taking responsibility for the scope, purpose, profile, and inner workings of the community. Things just happened "naturally," and individual access to funding largely depended on each person's ability to identify and occupy an unchallenged niche with functional utility to the group.

People who wanted to participate in the group had to secure a consensus of support from other people in that community, with virtually no help from a more systematic structure of authority. The ability to do that was a critical factor of what some people in the Andrews community termed "self-selection," but in fact, it amounted to selection by an undefined group of people. In one example, Harmon recalls he disagreed with another scientist on how to develop an NSF grant to support water balance and nutrient studies at the Andrews Forest. That disagreement led to a personality conflict, and the two scientists "just did not get along." Eventually, other scientists whose appointments depended on grant money "lost confidence" that the other alternative would continue their tenuous funding, and they expressed their support for Harmon's ideas. Forest managers associated with the group also viewed this process as an example of natural selection. Eubanks, for example, observed that the "right people moved in and out of there to the point where you had the right chemistry." Even if that "self-selection" process did not actively include everyone in the group, Eubanks concluded, "Everybody was welcomed," and those who were left out of the loop often continued to participate in other ways.[16]

People who developed strong personal and professional ties with others in the group had a better chance of building a consensus of support for their projects.

People who developed strong personal and professional ties with others in the group had a better chance of building a consensus of support for their projects and for securing funds through the Andrews community. In that sense, personality could be as important as academic qualifications. The vague system of reaching a group consensus required people to trust an unspecified number of people who participated in that process, all without technically signing on to any bylaws or membership agreements. Accepting that system required a leap of faith, and that was an imposing barrier for anyone who previously experienced or feared discrimination. It was an especially important concern in those periods when people

[16] Interview with Steve Eubanks, 15; interview with Gordon Grant, 12-13; interview with Mark Harmon, 24.

Figure 55—Bill Emmingham took this photo of his graduate advisee, Gabriel Tucker, working at a field site on Watershed 10 in May 1975 during the International Biological Programme. In the photo, Tucker is changing the chart on the circular thermograph recorder used to measure soil and air temperature. Two decades later, Tucker returned to work with the Andrews group.

could opt for career opportunities in other programs with more structured policies defining authority and career ladders. The Andrews system required people to trust the intentions of colleagues, and it tended to attract those with an a-priori reason to trust others already in the group, either through previous experience or mutual involvement. However attractive or unattractive the place may have been for professional reasons, personal relations were critical components of recruitment and retention in the Andrews community.

Some people first established a place for themselves in the group by demonstrating an ability to “fit in” with a particular person in that community, thereby earning a chance to develop a niche for themselves. Gabriel Tucker demonstrated that ability early in his career, establishing connections that enabled him to rejoin the group at several different points over the span of three decades. His participation spanned various roles and eras, from undergraduate assistant to cooperating faculty on permanent appointment, and from the IBP through the young-stand studies of the late 1990s. Throughout, Tucker was closely involved but not a leader with the group. His career illustrates the convoluted mechanisms that attracted people to the Andrews Forest, launched them on a career away from it, and brought them back to the group at a later stage in their lives.

A common characteristic that helped people fit in at the Andrews was a personality shaped by wanderlust, a broad but intense interest in science, and an outsider's curiosity about the Northwestern United States. Tucker's experience followed that common pattern, which in this respect resembled Dyrness', McKee's, and Harmon's earlier examples. He set out with only a vague interest in pursuing a career in natural resources and a family heritage of scientific work. His father was a biochemist, and Tucker aimed to distinguish himself in a different scientific arena. Like Franklin, he initially saw himself as a forest ranger. He studied forestry at the University of Pennsylvania, where he did lab work for a professor who subsequently moved to the University of Arizona. He followed his mentor to Arizona, helped him set up his lab, and then transferred to OSU, where he enrolled in the forest science option in the Department of Forest Management. In 1974, his junior year at OSU, Tucker linked up with Bill Ferrell, who had guided Franklin's master's thesis nearly two decades earlier. Ferrell recommended Tucker for an assignment with Chuck Grier, who worked with Franklin and Waring on the IBP. Tucker was technically qualified but had little relevant experience when he interviewed with Grier for a position as a research assistant. He won the job with his answer to the question, "Do you fly fish?" Tucker, who was not a fisherman, responded "I can learn fast," and Grier assigned him to assist Steve Running, a technician working with Waring.[17]

Some people were less willing to adapt to the Andrews group than others, and those with a more independent disposition often sought opportunities elsewhere. Tucker's personality suited Running, a loner who avoided the transient research community centered on the temporary housing known as Gypsy Camp, near the entrance to the Andrews. Running headed a component of Waring's work on the primary production segment of the IBP. That work was intended to develop simulation models relating plant productivity and photosynthesis to the physiological state of the plant; specifically, to determine whether the plant's stomates were open or closed. Tucker spent 2 years (1974-1976) working closely with Running, and eventually wrote an undergraduate thesis based on his work at the Andrews Forest. That effort largely focused on Watersheds 6, 7, and 8. The first two of these watersheds were logged in that period, while the third was left uncut as a "control" in keeping with the paired watersheds research model. Tucker's field work with Running on that changing landscape included a series of brief, but focused and

[17] Interview with Gabriel Tucker, 1-2.

intense, 15-minute intervals of hard work, interspersed with nearly 2 hours of waiting for the next period of activity. Wherever possible, Running spent that downtime fly-fishing. He largely avoided contact with other scientists in the group, and he left near the end of the IBP to earn his Ph.D. at the University of Colorado. He eventually secured a faculty appointment at the University of Montana, and by the 1990s, he was a leading national and international expert in remote sensing and large-scale modeling.[18]

Like many of his contemporaries, Tucker traced a circuitous career path that followed professional networks and funding opportunities back to the Andrews Forest in the early 1990s, first as a postdoctoral research fellow seeking a funded position, and subsequently as a cooperating scientist with a faculty appointment at Evergreen State College in Washington in the latter part of that decade. His meandering course had much in common with others who joined the group in the second decade of the LTER. He began with generalized goals, struggled to find a focus, maintained his personal networks, and ultimately found himself at the Andrews Forest. He spent 6 years with the Peace Corps in Africa, followed by 5 years in a Ph.D. program at Cornell University. He returned to the Andrews in 1991 a married man with kids to support. He needed work, and he applied for a postdoctoral appointment at OSU. During his hiatus from the group, Tucker kept in touch with McKee and Running at national meetings of the Ecological Society of America. Those contacts drew him back to the group, and they continued after his appointment at Evergreen State College, in 1995. Ultimately, they led to his cooperating role in the uneven-age management study at the Andrews through the end of that decade.[19]

Many people who joined the group during the 1990s had previous experience with other scientists in that community, even if they were not involved in the Andrews community at the time they met. The ability to initiate and develop close friendships with other scientists and sustain those relations for long periods and across great distances was a personality trait common in the group. Julia Jones, who joined the Andrews community in the same year Tucker returned to OSU (1991), had similar, pragmatic reasons for that move. She also had previous experience with key people in the group. Her initial involvement at the Andrews Forest, however, was relatively later in her career, by comparison with Tucker. A native of Maryland, Jones grew up spending summers at her family's lakeside

[18] Interview with Gabriel Tucker, 2-3; interview with Waring, 3.

[19] Interview with Gabriel Tucker, 8-10, 12.

A few people with no direct role at the Andrews Forest had a major impact on the character of the community centered on that place.

camp in the New Hampshire woods and later earned a bachelor's degree in economic development at Hampshire College. It was an experimental college, with no grades or credits. Students completed degrees by negotiating a series of contracts with individual faculty members. That self-directed experience was good training for her eventual role at the Andrews. She went overseas to earn a master's degree in international relations from the Johns Hopkins School for Advanced International Studies in Bologna, Italy, and completed a Ph.D. in geography and environmental engineering at Johns Hopkins University with a study of deforestation in Tanzania. At Hopkins, Jones worked under the tutelage of the famed geomorphologist, "Reds" Wolman, and shared an office with fellow graduate student, Gordon Grant.[20] That association, remote from the Andrews Forest, ultimately linked her with the group.

A few people with no direct role at the Andrews Forest had a major impact on the character of the community centered on that place, and Wolman was one of those people. Jones and Grant brought common graduate school experiences, and the insights they drew from Wolman, to their association at the Andrews Forest. Those insights included a philosophy of encouraging self-directed, independent work with minimal oversight, as well as concrete theories about hydrology and geomorphology. Jones taught at the University of California at Santa Barbara from 1983 through 1991, holding a joint appointment in geography and environmental studies. Because of her acquaintance with Grant, Jones included examples from the watershed studies at the Andrews in her course on watershed science at Santa Barbara. Jones discovered that long-term research at just a few places, including Hubbard Brook and the Andrews Forest, "dominated" the literature on hydrologic response and other general watershed topics.[21]

Family and professional networks brought Jones to Corvallis in the early 1990s, and the promise of funding to pursue research at the Andrews Forest subsequently brought Jones into the group. Working at the Andrews Forest or the group, in other words, was not an initial goal leading Jones to this involvement. She abandoned a tenured appointment at the University of California Santa Barbara and accepted a soft-money appointment with the Andrews group primarily because her husband had already secured a position as research assistant in the soils department at OSU. A chance meeting in Edinburgh, Scotland, with Logan Norris, the

[20] Interview with Julia Jones, 1, 2, 8, 9.

[21] Interview with Julia Jones, 1, 9.

Figure 56—Julia Jones (3rd from left) leading a stream survey during a graduate student field geomorphology class.

Department Chair of Forest Science at OSU, then alerted Jones to the potential for NSF funding. Grant subsequently hired her as a research assistant working on streamflow studies until her own grant came through. She gained visibility in the Corvallis Forestry Sciences Laboratory when Norris assigned her a temporary office in that building, and Swanson, thereafter, invited her to attend LTER meetings. Later, when a position opened in the Geosciences Department at OSU, Jones landed a tenure-track appointment.[22]

Relatively few Andrews associates landed secure, tenured positions after coming to the group on soft-money appointments. The protective umbrella of a tenure-track position was generally more elusive. Bob Griffiths and Andy Moldenke, for example, built successful careers without the long-term security of a tenured appointment. Others, like Running and Tucker, found tenured positions elsewhere, while either curtailing their involvement with the group (as with Running), or devising elaborate strategies whereby they could hold those positions while continuing remote cooperation at the Andrews Forest (Tucker). Still others, including Sherri Johnson, became deeply involved with the group but faced the initial likelihood that their long-term career prospects lay elsewhere. Johnson eventually was able to convert that initial, tenuous appointment into a more permanent appointment as a Forest Service employee assigned to work at the Andrews Forest. Many others in similar circumstances were less fortunate, and only a very few, such as

[22] Interview with Julia Jones, 4-5.

Susan Stafford, stepped directly into a tenure-track niche tailored to the growing needs of the group, or secured a tenure-track position at OSU after beginning their association with the Andrews community, as did Jones. The path did sometimes go the opposite direction. Some scholars who secured tenure-track appointments at OSU in positions unrelated to the Andrews community, like Tim Schowalter, later began working more closely with the group while pursuing their own research agendas. In Schowalter's case, those interests eventually led him away from the group and into a new Department Chair position at Louisiana State University. In short, different people had divergent, even contradictory motives for becoming involved with the group and the group viewed this complexity as a source of vitality.

Personality was an important variable determining how long a person was willing to work on a series of short-term appointments. Some people thrived under that arrangement, whereas others found it a strain. A few actually found it liberating, by comparison with the constraints and demands that university faculty faced on the road to tenure. Moldenke and Griffiths illustrate the combination of personal sacrifice, professional productivity, collaborative enthusiasm, and adaptive opportunism supporting science efforts at the Andrews in the 1990s. Both of these scientists worked on soft-money appointments for three decades at OSU, made critical contributions to the group in leading and supporting roles, and enthusiastically advocated the collaborative accomplishments of that community. In short, they exemplify the spirit of self-selection as two scientists who "caught the vision," held their focus through a sustained period of uncertainty regarding future funding for their positions, and built successful careers on that tenuous foundation.

An early exposure to the world of grant-funded research and a family heritage of doing world-class science helped some people adjust to a career with the Andrews group. A life funded with soft-money appointments, in such cases, offered a freedom that tenure-track appointments often did not. A person's past experience writing grant proposals built confidence and dispelled concerns about what would happen at the end of each new project. Moldenke, for example, grew up in a household accustomed to weekly visits from world-class biologists. Both of his parents were scientists, and his father was a "world-famous" botanist. The younger Moldenke followed the family bent through an undergraduate degree in biology from Wesleyan University in 1966 and earned a Ph.D. in biological sciences from Stanford University in 1971, working under the direction of Paul Ehrlich.

Moldenke's connection with the Andrews began with his work for the IBP at Stanford University. He first met McKee at an IBP meeting, and that link with McKee eventually led him into the group.[23] After he left Stanford, Moldenke continued with the IBP at the University of California, Santa Cruz, until he moved to Corvallis to accompany his spouse, who had found employment at OSU. Moldenke's freelance status and spirit freed him from bureaucratic constraints at OSU, where he found "tremendous bureaucratic pressure" that otherwise impeded collaborative work by many of his colleagues with tenured positions.[24]

The attraction of the Andrews group, for a long-term, soft-money associate like Moldenke, was unquestionably people, not place.

The attraction of the Andrews group, for a long-term, soft-money associate like Moldenke, was unquestionably people, not place. He found "nothing unusual" about the experimental forest apart from the fact that it had "a little more old growth than most other places." It was convenient relative to other useful field sites, but more important, the group offered Moldenke an intellectual home and opportunities for interdisciplinary exchange. He participated in that community, and he joined efforts to educate other people about the group's work. He spent 7 years as co-principal investigator on an NSF grant with McKee developing the Research Experiences for Undergraduates program. He also collaborated with McKee and others in the group on a sustainable forestry program administered through Chemeketa Community College, in Salem, Oregon. He secured another 5-year grant from NSF to provide teachers at high schools and middle schools with handson training in ecology during the summer, in an effort to instill cutting-edge science into teaching curricula in secondary education. That effort embodied the collaborative spirit of the group. People, Moldenke argues, are an enormous, under-used asset with "tremendous potential" to assist agency scientists by gathering data that otherwise would never be collected. His ultimate goal is to "get more people in the public involved in 'science.'"[25]

Some people who participated in the science of the Andrews group during the 1990s worked nearby for many years before they were even aware of that collaborative community. Griffiths, for example, began a series of short-term appointments with the group in the early 1990s, after a long, previous history working on soft money at OSU. He adapted his skills to fill a specific niche the group identified

[23] Interview with Andy Moldenke, 1-2, 4.

[24] Interview with Andy Moldenke, 2.

[25] Interview with Andy Moldenke, 5, 15.

and encouraged him to occupy. Originally from Ohio, Griffiths followed a circuitous path to the Andrews Forest. He attended Oberlin College as an undergraduate in pre med and earned a degree in zoology-chemistry in 1961. After a 3-year stint in the Navy, and a brief career working for a pharmaceutical company, he entered the graduate program in biology at San Jose State University and finished his MA degree in 1968. At San Jose, Griffiths linked up with a marine microbiologist who was a protégé of the OSU microbiologist, Dick Morita. That connection brought Griffiths to Corvallis for his doctoral research, building on his earlier work with marine micro-organisms. Marine microbiology was a far stretch from studies of forest soils, and the group had to actively recruit Griffiths. It was not a case of self-selection.[26]

Incidental contacts between colleagues at OSU sometimes led people to invite a third party to participate in a project related to the group. An OSU colleague who knew Griffiths mentioned his work to some other people in the group, and that conversation led to a meeting with Griffiths. Kermit Cromack approached Griffiths with the suggestion that the group's work on nutrient cycling indicated some potential for interesting studies of mycorhizzal mats of forest soil. Waring reinforced that initial contact with an invitation for Griffiths to evaluate a thesis for one of his students. By that time, Griffiths, who completed his Ph.D. in 1972, had been working at OSU for nearly two decades, mostly in oceanography. Funding in that field, however, was tight in the early 1990s, and Griffiths made the move to the Corvallis Lab to work with the group, beginning in 1992. By 1998, he was still contributing to long-term research efforts at the Andrews Forest, although he was officially retired after nearly three decades on soft-money appointments at OSU.[27]

Access and acceptance were not difficult for someone who the group actively recruited, but for people who did try to "self-select" themselves as members of the Andrews community, it was tricky. At the opposite end of her career from Griffiths in the mid 1990s, Sherri Johnson secured a soft-money, postdoctoral appointment with the LTER group in Corvallis after actively pursuing leads through her professional networks. By the time she joined the Andrews community, Johnson was already well acquainted with their work, the LTER, and leading scientists in the Andrews group. She also had direct links with the people and programs at the Andrews. Her academic career stretched from Kansas

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[26] Interview with Robert Griffiths, 1, 2.

[27] Interview with Robert Griffiths, 1, 2, 5-6, 9.

to the University of Montana, in Missoula, with a detour into the business world and conservation work. At Missoula, she developed an interest in water, ecology, and geology, and she pursued graduate studies at the University of Oklahoma, earning a Ph.D. in 1996. Johnson's major professor at Oklahoma was Alan Covich, who was a principal investigator on a study at the Luquillo LTER site in Puerto Rico, and he subsequently chaired the Fish and Wildlife Department at Colorado State University, where Susan Stafford later accepted an appointment to chair the Forest Science Department.

The LTER connection at Luquillo was a venue for Johnson to broaden her range of professional contacts while gaining field experience working on a major NSF grant. She met Swanson at joint LTER meetings in the early 1990s. By that time, she had already heard about the program at the Andrews, and her meeting with Swanson generated real enthusiasm for that place. She was impressed with his "gestalt feeling" about landscapes and streams, and she was drawn to the idea of studying them in association rather than as isolated components of the ecosystem. At the 1993 All Scientists LTER meeting, Johnson shared a room with Jones. The next year, while attending an intersite meeting of LTER hydrologists, Johnson encountered Grant. She connected with Jones and Grant on the basis of her own studies of ecological disturbances from a hurricane at the Luquillo site and those connections motivated her initial efforts to join the group.[28]

Multiple contacts in the Andrews group attracted Johnson to that community, but even so, acceptance was elusive. Johnson initially contacted Stan Gregory about the possibility of "doing a postdoc" with him, but despite some vaguely encouraging words, she discovered that "following through was hard" because "people here are so busy." Then, at the 1993 All Scientists LTER meeting, she "hit up" Jones with the idea of securing a postdoctoral appointment with the group. The results were hardly encouraging. Jones initially responded that she was "not ready for a postdoc" and had too many other pressing demands on her time. At a later meeting of the Ecological Society of America, nearly 2 years later, Johnson suggested the idea to Jones a second time, with more promising results. She followed up with a written proposal, and Jones suggested a few ideas she "might be interested in." Johnson was particularly interested in working with Jones to learn her techniques of spatial analysis, to "take stream research to more of a landscape scale." Johnson also approached Grant with similar ideas. Despite encouraging

[28] Interview with Sherri Johnson, 1-3.

comments from both Jones and Grant, and despite Johnson's contacts with some of the more prominent scientists in the group, they didn't have a "specific project" for her and "nothing was really coming up." Johnson, subsequently, wrote her own proposal to fund an independent position with the group, and concluded, "Persistence plays a big role in trying to work with a group like this, because they are so busy."[29]

The group had come a long way from its early years when Franklin and Dyrness searched for ways to attract more people to the Andrews Forest in a desperate bid to keep it open. By the time Johnson began sending out feelers in 1996, the phenomenon of someone seeking access to the group was so unremarkable that she had difficulty attracting attention. Even her direct contacts and ability to bring in her own funding did little to smooth her way or generate active support from leaders in the group. The Andrews, by that time, was an established, reputable, and enviable site with facilities that Johnson describes as "plush," even by comparison with Hubbard Brook or Coweeta. It had a reputation for interdisciplinary exchange and collaborative relations with forest managers that was unique and particularly appealing to Johnson. The setting in the Northwest, and the potential for strengthening the link between basic and applied research also were major attractions. States in the Midwest, for example, offered more direct support for research and education, but Johnson wanted to be in the Northwest badly enough to move there on a soft-money appointment. Universities like OSU, she observed, "take advantage" of the attraction the region holds for people from other parts of the country. In Corvallis, she found other people, like herself, willing to build a career on a series of soft-money appointments. Johnson had not encountered that kind of enthusiasm in other places where she had worked. In that city, she found an environment, people, and community that encouraged a "more interdisciplinary" outlook. The work was "leading edge," it was bigger than any one person, and the interaction between state and federal agencies on the OSU campus made it "interesting." She also discovered a "physical environment" that encouraged people to interact in public spaces: "In Oklahoma no one was ever interested in what I was doing in streams. People [here] see me down in the stream and they go 'What are you doing down there?'"[30]

She also discovered a "physical environment" that encouraged people to interact in public spaces.

[29] Interview with Sherri Johnson, 8.

[30] Interview with Sherri Johnson, 9-10, 12-14, 20.

Community Concerns About Significance, Scale, and Focus, in Retrospect

Shared data, and the integration of new data with previous records, gave new meaning to earlier work at the Andrews Forest during the 1990s, and the group became more conscious of its history. Few of the people who worked there in the first few decades after it was established had expected their work to be the focus of controversial public debate. They certainly hoped, however, that it might inform management decisions. More than a generation after the first research studies were implemented at the Andrews Forest, those hopes were realized. Stafford's unit integrated those and subsequent studies into the data-sharing network the group assembled in the last two decades of the 20th century. By the second decade of the LTER, the fundamental characteristics of the site, the people, and their research and management priorities were closely interrelated. It was a place transformed by a community. People there perceived the landscape through the lens of a constantly changing set of shared values. The changing face of that landscape inspired them, and their actions changed the place. They imposed a series of management templates on the Andrews Forest while documenting changes in that landscape. Their efforts produced a stream of data they openly shared with people beyond their own community. The group remade itself and the Andrews Forest in a process of coevolution that seemed natural to the changing membership of that community. New scientific theories, management initiatives, and funding priorities, influenced the group's perception of the place and the potential for research there. Even the ideal of appropriate research and its significance changed over time, along with the people and the place. By the end of the 20th century, the group was a prominent and influential community of established researchers and managers. It had a reputation that attracted people who expected their work to influence management decisions on regional, national, and global scales.

People interacted with each other and with the landscape of the Andrews in ways that helped them break down barriers among people from different agencies and academic disciplines. Scientists used the place to help them explain and demonstrate their ideas to forest managers. The place also helped forest managers explain their concerns and priorities to the research community and to the public, and to help them understand the practical implications of their ideas. People tested their theories in the real world of the Andrews Forest, in the company of other people who documented and analyzed the results. It was also a place where scientists could go to explore questions other people posed about natural processes, and it

Figure 57—Although computer manipulation of data effectively distanced some researchers from field work, this view of Don Henshaw collecting high-resolution global positioning system monument data on the Santiam Airstrip Benchmark in 1992 demonstrates how the increasingly portable computing technology of that decade could also move data management into closer association with fieldwork.

was a place of education where people shared ideas with students at all levels. As more people became concerned about the possible effects of logging on streams, they demanded answers to those questions from public agencies. That political pressure encouraged scientists to study a broader range of issues. Some of the issues could be explored at the Andrews Forest, but others had to be examined on a larger landscape or across long spans of time. As a result, the group began exploring archival records and other research sites. The boundaries of their work expanded in time and space. The group's studies, consequently, generated data that spanned greater distances and more years. Scientists scrambled to develop the tools they needed to handle the greater amount of data generated by that work and to understand and represent processes that worked on spatial and temporal scales so large that most people could not easily grasp their significance. Computer-generated models were especially appealing. The trend toward computerized manipulation of data, however, distanced the people who analyzed the data from the people who did the field work. The group tried to bridge that gap by developing a systematic procedure to encourage collaboration at an early stage, but that formal process could not fully replace the physical experience of living and working under field conditions. Few scientists who began working at the Andrews Forest in the 1990s experienced what one scientist described as a 3-month field season living in a “stinky trailer” with clothes that never dried out. Gordon Grant suggests that without that visceral, physical experience, new recruits might miss out on something that helped forge the group’s character and emotional attachment to the Andrews as a real and unique place. “This,” Grant explains, “is where the science meets the river.”[31]

The intimate link between people and place eroded as the program reached beyond the Andrews Forest and assumed a scale beyond the capacity of direct experience. Fewer of the people who joined the group in the 1990s spent as much time in the field as was common in earlier decades. A greater proportion of the group spent more time working with computers and archival records, writing papers, and going to meetings. Even those people who spent the majority of their time in the field often had limited firsthand knowledge of the projects others in the group had installed at the Andrews Forest or at other, remote sites. The Andrews was still a place where ideas encountered reality, but the group spent more time developing structured opportunities to take people out to that Forest on programmed tours. People in the group and other visitors, increasingly, had to be shown where the science met the river (and the forest) because for most of them, the science had grown beyond their own personal experience.[32]

As the group adapted its tools and methods to the demands and possibilities of the computer age, people in the Andrews community worked to reconcile their professional lives with their personal experience. The experience of Gordon Grant illustrates the paradox of a place-centered community comprised of people who spend much of their time distant from that place. He is at once native and alien to the region and the Andrews Forest. Although he was born in New York, Grant’s childhood experiences in Oregon shaped his perceptions of Northwest rivers. And, although he grew up in Oregon, Grant headed east to learn new ways of thinking about rivers in the region he left behind. As a Forest Service scientist, he built intricate computer simulations from data describing processes across a matrix of time and space that no longer existed, except in human concept. He, nevertheless, eloquently articulates an ethic of personal experience in pursuit of scientific abstraction. He expresses an appreciation for the bond between people and the

[31] Interview with small watersheds group, 12.

[32] Interview with small watersheds group, 12-13.

landscape while acknowledging an innate sense of personal alienation and a lifetime quest for reconnection. During his childhood, shortly after Grant's family moved to Oregon, they went to see the McKenzie River White Water Parade, held the weekend before fishing season opened. At that parade, Grant sat on the shore watching "drunks" go through the rapids, and thinking "how much I wanted to be on the river." He found the whole experience "so different" from his background growing up in "very much an East Coast family," and he was the only person in that family who "bonded" with the western landscape and the traditions linked with that region.[33]

Privilege, Access, and Authority in a Science-Based Community

The Andrews community was a welcoming environment for people with family backgrounds that encouraged a scientific bent but established difficult standards of accomplishment for their children. By the 1990s, that community included many people who had spent much of their lives learning to feel comfortable with their own heritage, and they found a home in this group. Like Moldenke, Waring, and many others in the group, Grant came from a family of high-achievers and academics, and he felt the pressure of their expectations. In an effort to step out from the shadow of his father, a developmental biologist at the University of Oregon, Grant sought his own level in the hydraulic West. After a brief stint at Reed College, a prestigious private school in the Willamette Valley, he dropped out to pursue a meandering career as a handyman and river guide in Oregon, California, and Idaho. After 5 years of introducing other people to nearby rivers, Grant found his calling. He returned to college at the University of Oregon and wrote an honors thesis exploring the people and ecology of the Willamette River. As he interviewed people on and about the river for that project, Grant also explored related science questions. In that context, he encountered Swanson during a campaign to establish an environmental studies program at the University of Oregon. Swanson later drew Grant into an association with that group.[34]

A prominent characteristic of the LTER cohort of the Andrews community was personal and professional mobility through high-profile academic programs and research facilities.

A prominent characteristic of the LTER cohort of the Andrews community in the last decade of the 20th century was personal and professional mobility through high-profile academic programs and research facilities. The Andrews was a nationally prominent program offering career opportunities throughout that period. People with broad experience in other high-profile programs often built a web of

[33] Interview with Gordon Grant, 1.

[34] Interview with Gordon Grant, 2-3.

contacts that linked them directly or indirectly with the Andrews group. Grant joined that science community in the first decade of the LTER era and remained with the group through the end of the century. He spent 2 years after graduating from the University of Oregon presenting his thesis in a series of public slide shows in the Willamette Valley and then began graduate work at Johns Hopkins University, in Baltimore, Maryland. He admired the academic traditions of the Northeastern United States, and he "really wanted to go to the East Coast" to "test" his "affinities" for the academic lifestyle. He initially considered Yale and Cornell, but this child of a biochemist was an experienced river guide who had studied geomorphology with Swanson, and Swanson had links with the U.S. Geological Survey. Grant learned "through the grape vine" that Johns Hopkins was the place to go if he was interested in working with rivers at the U.S. Geological Survey.[35]

The elite academies of higher education on the East coast were an obvious place to build professional networks, and by the late 20th century, the Andrews Forest attracted people from those networks. At Hopkins, Grant worked with M. Gordon "Reds" Wolman, who "wrote the book" on the science of rivers. Grant's connection with Wolman, and his chance encounter with Gordie Reeves, who worked at the Corvallis Forestry Sciences Laboratory, helped Grant renew his acquaintance with Swanson. These connections ultimately helped Grant secure funding and office space in the Corvallis Forestry Sciences Laboratory, where he worked while completing his doctoral degree from Johns Hopkins. He met Reeves at a barbeque after a run on the McKenzie River with a commercial rafting company, and in the course of their conversation, Reeves suggested Grant should look at some papers Swanson and Lienkaemper had written. Grant later wrote to Swanson, asking for copies of the papers. Swanson sent back the papers, asking, "What's the Wolman group doing?" The "group," to which Swanson referred, included Grant's office mate at Hopkins, Julia Jones, who joined the Andrews community about a decade after Grant began his work at the Corvallis Forestry Sciences Laboratory. Grant later met Swanson at a symposium on the Mount St. Helens event, and during that encounter, Swanson suggested that if Grant wanted to do something in Oregon, Swanson would help him secure funding to support that work.[36]

[35] Interview with Gordon Grant, 4-5.

[36] Interview with Gordon Grant, 5-6.

Al Levno, July 1987

Figure 58—Watershed Management Project Group. Otis Hinton, Neil Cane, Craig Creel, Gordon Grant, Dennis Harr, and Ross Mersereau doing measurements for pool retention work on Lookout Creek.

Transitioning into the Andrews group, for any new recruit, was more than a simple matter of securing funding. It was a mentoring process that introduced the new associate to other scientists in the community on terms that encouraged their interest and collaboration in his work. In Grant's case, Swanson invited him to join a group of students on a field excursion to the Andrews, where Franklin, Waring, Sollins, Fredriksen, and Harr joined them to talk about their research projects. They assembled in a circle at a parking lot in Blue River, and they went around the circle introducing themselves to the group. Grant was particularly struck by the relative ease with which they welcomed him into their circle as a "walk-on from the East Coast." The bewildering number and variety of people, personalities, and scientific interests at the Andrews could be disconcerting, but for someone who could identify a niche, it was also inviting. Grant spent most of his first day at the Andrews bouncing around logging roads in a van filled with other scientists and graduate students. He came away impressed with the variety of academic disciplines there and with an idea that he could find a niche as a river specialist. He quickly identified Gregory and Sedell as people with similar interests, but they tended to focus more on the habitat functions of the stream, whereas Grant was more focused on the "physical structure and dynamics of mountain streams." He was interested in rapids, and how and why they formed, but he tried to link that interest to the habitat issues that concerned other people in the group who were ecologists, not geomorphologists.[37]

The expanding scale of the group's research created new niches for people who joined the group in the last two decades of the century. Grant had previously considered the Andrews a place that focused mostly on small-scale, small-watershed issues. Sedell, Swanson, Gregory, and others, however, had taken their ideas beyond small watersheds with the river-continuum concept, and that shift created an opportunity for Grant to find a place in the group for his studies of the physical characteristics of larger rivers.[38] People like Grant found a place in the Andrews community by establishing rapport with others in the group who shared similar or compatible interests. They wove those individual relations into a web of interlocking affiliations. The assembled group functioned as an assortment of individual affiliations that were joined together from the bottom up, not from the top down, but they were not a random, or even self-selecting sample of the available talent in the broader scientific community beyond the Andrews.

The Paradox of Structured Informality and the Myth of Accidental Community

At its root, the group was a set of informal relations that combined into an ordered community capable of acting in its own, collective self-interest. Informal connections were more important than formal introductions or positions in the group. For some people, as with Johnson, only a concerted, determined effort enabled her to seize onto one of those threads of individual affiliation and use it to weave a fragile niche of belonging in the group. For others, such as Grant, access was a more simple, almost "natural" transition, in which the structured informality of their initiation seemed, from their perspective, virtually un-orchestrated. The informal tone of the monthly LTER meetings, the HJA Daze, and similar "pulses" fostered that illusion of unstructured ease, but these efforts required hard work and diligent commitment to the group. Leaders in the group held innumerable meetings behind the scenes, and many people spent much of their time on committee work, demonstrating a willingness to follow through, even at the sacrifice of personal goals. That leadership core succeeded largely because they were able to build the illusion of a self-regulating community, relatively shorn of bureaucratic trappings, wherein

[37] Interview with Gordon Grant, 6-7.

[38] Interview with Gordon Grant, 7.

individuals could pursue their own interests and freely collaborate, with impunity. The next cohort of Andrews associates, however, faced the difficult task of learning how to sustain this apparently unstructured, yet oddly permanent community. Most agreed that the Andrews Forest was the key ingredient to what made things work.

The group had constructed a dual identity for the Andrews Forest by the end of the 1990s. On the one hand, it was a developed place with urban amenities that could support a large population of scientists and staff. A developed system of roads linked dormitories, laboratories, meeting rooms, and conference halls with a mapped, plotted, surveyed, and documented outdoor laboratory. On the other, they promoted the "pristine" character of the place as a setting for spiritual renewal, mystical and professional inspiration, and reconnection with nature. They gave tours of the place that typically began at the headquarters site, where members of the group guided visitors through a maze of buildings, offices, meeting halls, and laboratories, then loaded them into vans and chauffeured them along developed roads to various points of interest and study sites, culminating in a lunch break at Carpenter Saddle. From there, guests could look down the Lookout Creek drainage to the west, and compare that landscape with the view of recently logged units on the Willamette National Forest to the east. By the late afternoon, they returned to the headquarters site for a barbecue or catered dinner in the outdoor pavilion. Students and other workers temporarily living in the surrounding dormitories often joined the festivities, and trails tempted visitors away from the headquarters site to explore stands of timber and riparian settings along the lower portion of Lookout Creek. It was a constructed landscape at once accessible, impressive, developed, and interpreted. It was a forest where carefully cultivated myths served a scientific purpose. Little in this place happened by accident.

It was a constructed landscape at once accessible, impressive, developed, and interpreted.

Conclusion

The purpose of the Andrews Forest and group, by the late 1990s, was to provide a venue in which scientists could work collaboratively with forest managers to inform public policy and to promote the ideal of ecosystem management. Even as the group worked to sustain basic, long-term research, it was also working to demonstrate that ecosystem management could work on a landscape scale. The people involved in that effort often used the language of ecosystem management to describe how they became involved and why they stayed. They encouraged the idea among their visitors that the group was "self selecting," had "naturally evolved," and that any effort to consciously manage people in that community would likely "wreck it." Mechanisms of authority in the group were subtle, often hidden, and seldom openly discussed. Much happened behind the scenes, while loosely structured monthly meetings maintained the climate of informality, openness, and inclusiveness. Personal networks made it work, but as the number of people involved in the group increased, along with the amount of capital invested in the infrastructure projects at the Andrews Forest, people outside that community scrutinized those mechanisms more closely. The group was responsible for a site that served as a prototype for other parts of the LTER network. As one product of their involvement in that science-based network, the group promoted collaboration between managers and scientists, leading to policies that applied the most current concepts of ecological research. The useful fiction that people in the Andrews community were themselves an example of "natural" selection, ultimately conflicted with the idea that other sites could be managed along similar lines. The place was more prominent than in previous decades, and the political implications of ecosystem management forced the group to reexamine its own history and consciously plan its future.

Chapter Nine: An Ecosystem of Ideas Grounded in a Place of Inspiration

Throughout the history of the H.J. Andrews Experimental Forest (Andrews Forest), applied studies were an important, sometimes dominant element of the research accomplished at that site. Since the early 1970s, however, people in the Andrews group tended to focus more on how the ecosystem actually functions and less on how foresters might maximize timber production or even manage forests for multiple uses and environmental protection. Broader issues and institutional priorities continue to inform, limit, or encourage people who worked at the Andrews Forest, and people in the group often express the hope that their work will inform public policy. Those concerns, however, do not sufficiently explain the group's struggle to understand forest ecology and related ecosystem processes in that setting. These people were largely motivated by the firm conviction that they were doing necessary, interesting, and rewarding work.

A deep respect for the beauty of the Andrews Forest encouraged each person to believe that their work in that place mattered, and that sensibility grounded their science in the real world of that particular, forested landscape and the streams that coursed through it. Gregory observes that a visit to that place is an aesthetic and intellectual experience that motivates and rejuvenates people: "It has a diversity of old systems and young systems, and wet systems and dry systems, and has lots of pieces, but they're also really valuable. They're beautiful, aesthetically beautiful. They're scientifically intriguing." This character of the place, he argues, "stimulates us. Every time we go back, it charges our batteries." The place, he suggests, contributes to the reputation of the group: "Reviewers come out and they see the Andrews … and they give it a nice look and then say, 'Boy, this is so beautiful.'" That characteristic, he concludes, helps account for the group's ability to attract people to soft-money appointments: "If you're sitting in Blacksburg, Virginia, you don't get many opportunities to sit next to a creek in a 500-year-old forest.

On the landscape of the Andrews, people developed long-term working relationships and partnerships that facilitated work across disciplines and in partnership with people in different administrative structures. Those relationships helped the group weather the ups and downs of funding that were constantly in flux. They promoted a sustaining outlook that merged persistence on key research themes with attentiveness to the issues of the day. In similar ways, those long-term, working relationships supported the consensus-oriented, leadership style that the group embraced as a cultural ideal and attempted to implement as an operative reality. Perhaps most importantly, those continuing attributes were punctuated by periods of recruitment, when new people joined the group, infusing it with new energy, enthusiasm, and creative ideas in a community that idealized, and attempted to realize, an ethic of respectful, shared leadership, careful stewardship, and collaborative decisionmaking.

The Andrews Forest and Community, in Retrospect, 1948 to 1998

Scientists learned from their early experiences at the Andrews Forest that as long as they depended on support from just one institution, their programs were vulnerable. Silen, for example, built strong personal and professional ties with local residents in the vicinity of Blue River while installing long-term studies he intended to continue through the end of his career. In the end, however, the Forest Service summarily reassigned Silen, and discontinued many of the studies he began there. His successors, Rothacher, Franklin, and Dyrness, seldom engaged the local community in Blue River as they battled agency proposals to undercut or terminate support from the Pacific Northwest Research Station (PNW Station) for the Andrews. They lived in proximity with district staff at Blue River, but they kept their distance from those national forest colleagues and focused, instead, on marketing the place to scholars at Oregon Station University (OSU). They promoted its potential for significant research and they invited anyone who was interested to join their group. They hosted brown-bag seminars in Corvallis to encourage interdisciplinary exchange, but they found stronger common ground at the Andrews. In that place, they built a sense of shared community on a foundation of volunteerism, enthusiasm, personal connections, and commitment to scientific research. People participated because they "caught the vision," but individual enthusiasm wasn't enough to sustain the group. They needed funding and other resources. To sustain their science goals, the group built links with national and international associates.

Funding from the National Science Foundation (NSF) strengthened the group during the International Biological Programme (IBP), but that infusion of resources favored basic research over applied studies. The NSF support attracted new people to the group and strengthened its ties with other IBP sites and academic programs. The IBP funding structure, however, was not sustainable, and it included NSF oversight that required a more structured framework for coordinating the group's work at the Andrews. The IBP project also attracted a new cohort of scientists accustomed to working in more-established and formalized research programs. Waring, who emerged from that cohort, helped the group link its community traditions with the more structured lines of responsibility that were required for managing projects funded through NSF. Under his leadership, people who failed to "catch" the revised vision of efficiency and productivity lost access to funding. Professionalism was more important than volunteerism by the early 1980s.

The late 1970s and early 1980s were years of retrenchment, winnowing, and renewal that centered on the problem of upgrading facilities to support ongoing research at the Andrews Forest. Franklin and McKee led a smaller core of Andrews collaborators in this effort. Under their leadership, the group emphasized the need for long-term commitment to productive science. They fostered a group ethic of personal sacrifice and interdisciplinary collaboration that maximized the utility of funding secured through various grants and programs. Their initial "facilities" proposal to the NSF emphasized the group's earlier research accomplishments with only skeletal facilities and the trademark virtues of volunteerism, minimalism, and efficiency at the Andrews.

The Long Term Ecological Research (LTER) and related programs attracted a cohort of associates to the Andrews who arrived in the 1980s, often without prior experience.

The Long Term Ecological Research (LTER) and related programs attracted a new cohort of associates to the Andrews who arrived in the 1980s, often without prior experience. With their help, the revitalized group built a paradoxical system: they established long-term programs of research with short-term funding and staffed them with fixed-term, "soft-money" appointments. They also struggled to define a new model of leadership more appropriate to their evolving identity. The group included people with a more diverse assortment of specialties and training than in previous years, and they pursued multiple threads of research too diverse for any one person to direct. Several new leaders assumed more authority, and several former leaders either left the group or continued in less dominant roles. Those who led the group through this period continued Franklin's concept of periodic "pulses" of scientific energy focused on a specific landscape in an effort to promote a collaborative environment for intellectual inquiry. They also transformed the monthly LTER meetings into a regular touchstone for their increasingly dispersed community of cooperating scientists and forest managers. They encouraged a group ethic of concerted, self-conscious community-building: collaborative community was hard work, but it was also necessary and rewarding work.

The group's structure of long-term research supported with short-term funding depended on cooperative relations among the Willamette National Forest, PNW Station, and OSU. Station scientists, staff, technicians, university faculty, and

Al Levno, October 1988

Figure 59—By the late 1980s, the Andrews group was consciously celebrating its history of accomplishments, as evident in this photograph of award recipients at the H.J. Andrews Experimental Forest's 40th year anniversary review.

students in Corvallis supplied the critical mass of forest and stream science expertise, academic credibility, and access to physical resources. The Willamette National Forest staff at Blue River supplied management expertise vital to accomplishing LTER and other research goals. Scientists at the Andrews Forest began to seek opportunities for working more closely with forest managers, and Kerrick encouraged those efforts as forest supervisor for the Willamette National Forest. The result was a more confident and assertive scientific community that enthusiastically embraced applied research and collaborated with forest managers.

Many people who joined the group in the 1980s came from other LTER programs where researchers had access to more well-equipped field research facilities than were available at the Andrews. The place attracted people interested in the work the group was doing there, rather than people who were impressed with the creature comforts of the place. Their connections with leaders at other LTER sites helped the group integrate programs at the Andrews with related work at those other research facilities. These factors, and the eruption of Mount St. Helens, helped the group expand its geographic focus. Swanson personified the new profile of the group, with a broad-ranging, interdisciplinary background and experience with a variety of collaborative programs of research from the east coast to the tropics and in the West. Together with McKee, he merged the enthusiasm of the IBP experience with the spirit of open inquiry, the mission-focused professionalism of those who joined the Andrews group to begin the LTER work, and the place-grounded science and localized identity that had anchored the group since 1948.

As national leaders debated various strategies for securing habitat for the northern spotted owl, Andrews associates moved their discussions beyond the owl to include broad landscape themes. They rapidly coalesced around a more diffuse assortment of leaders, notably including Swanson, McKee, Burditt, and Cissel, who added a broader, national perspective to the management side of the collaborative group at Blue River. These leaders managed the group's transition from studiously vague and informal traditions to a more formalized framework of interaction more closely aligned with what the cohort of scientists recruited to the Andrews during the 1980s had experienced at other LTER sites.

Capital projects transformed the headquarters site and the group during the 1990s. People who joined the group in this period worked for an established program with a visually impressive, physical infrastructure of lab facilities, dormitories, meeting rooms, roads, plots, reference stands, flumes, gages, and well-documented, long-term experiments. They could draw on a half-century of continuous records from monitoring, intensive mapping efforts, experimental studies, prolific publication, and photographic collections. The group also had a sophisticated system for managing data and for seamlessly integrating new studies with previous work. It was an influential group, with members on presidential advisory panels that shaped federal policy for regional application (the Northwest Forest Plan) and with national and international implications.

At the local scale, the group waged a campaign to secure a tenured appointment for Mark Harmon and established him as a prominent leader of the Andrews community. Harmon subsequently gained appointment in 1999, making a professional leap from soft-money, postdoctoral funding to an endowed position as a tenured full professor and Richardson Chair in Forest Science at OSU. Harmon's appointment was not assured, despite his record of professional success and the full support of the group. Minutes from the monthly LTER meetings also indicate the search was "exceptionally competitive." The appointment positioned Harmon to "fully take over" leadership of the LTER as principal investigator for the NSF LTER grant, replacing Swanson in that role in 1999.[1]

By the end of the century, the group managed real assets of human and physical capital capable of arousing envy and resentment. Critics included the writer, Alston Chase, who prominently featured people associated with the group in his

[1] Communication from Fred Swanson August 1999; H.J. Andrews LTER-Cascade Center for Ecosystem Management meeting notes (4 August 1999).

Al Levno, 21 June 2000

Figure 60—An annual gathering of associates of the Andrews group took on the appearance of a large family reunion, as evident in this group photo of "HJA Daze" participants in 2000 at the headquarters site on the H.J. Andrews Experimental Forest.

polemical attack on the concept of ecosystem management.[2] Closer to home, Sherri Johnson, who joined the group after prior experience at the Luquillo Experimental Forest in Puerto Rico, had to cope with envious, if admiring colleagues at that LTER site who insinuated she was joining a group of well-funded "elitists" at the Andrews Forest.[3] The group struggled to reconcile its idealized past of virtuous self-sacrifice with its real character in the 1990s, when it enjoyed an almost embarrassing wealth of resources by comparison with earlier years and with many other research sites. Amidst programmed celebrations commemorating the 40- and 50-year anniversaries of the experimental forest, most people in the group continued to espouse the ideal of a self-selecting, naturally adjusting, organic community, and one member, whose involvement dated back to the IBP years darkly warned, "If we look too closely at how this thing works, we'll wreck it."

Most people in the group continued to espouse the ideal of a self-selecting, naturally adjusting, organic community.

Scientific Method and the Spirit of Inquiry

The group's effort to understand its own past, despite some uncertainty about how that effort might affect the functioning of this science-based community, was part of its long-term planning process. In the late 1990s, the group commissioned a community history, scheduled conferences to commemorate the forest's 50th

[2] Alston Chase, "*In a Dark Wood: the Fight Over Forests and the Rising Tyranny of Ecology"* (NY: Houghton Mifflin, 1995).

[3] Interview with Sherri Johnson, 23.

Rollie Geppert, 18 July 1979

Figure 61—This view of Fred Swanson speaking to a large group in field/roadside setting with vans in background dates from the late 1970s, but it depicts an experience that is still familiar to most visitors to the H.J. Andrews Experimental Forest (Andrews Forest) in the early 21st century. Many long-term collaborative relationships begin with people from different academic backgrounds and disciplines riding together and sharing ideas in the back of a van on a "show me" tour of the Andrews Forest.

anniversary, and convened a "futuring" session. In these ways, people in the group explored the intersections of their past, present, and future in an effort to define and understand the character of a community that had consciously avoided formal definition. That effort demonstrated the group's collaborative style of leadership and its shared sense of stewardship for the Andrews and the legacy of prior work there. By the end of the 20th century, people who worked together at the Andrews joined a community of scientists and forest managers with a shared commitment to research with an applied purpose.

For more than 50 years, people sought inspiration and validation for their scientific and policy ideas at the Andrews Forest. In this place, scientific hypotheses inspired experimental manipulations that changed the landscape, and the group monitored the results. In the process, people in that group articulated their separate visions into collaborative action. They combined scientific insight, managerial initiative, and personal networks. They gained insights about how ecosystems function, developed theories about adaptive management, and applied them on a landscape scale. In a sense, it was an act of self-realization. The Andrews group, like the ecosystems they studied, functioned as a complex system of dynamic interaction among interdependent networks. It was an ecosystem of ideas and actions, and what seemed natural within the group also seemed like an obvious strategy for managing the landscape centering their community. Together, they linked scientific inquiry at the Andrews Forest with people, place, and community. Their efforts contributed to the emergence of "ecosystem management" as a guiding policy in the Forest Service before the end of the 20th century.

The Real World of the Andrews Forest

A shared commitment to the real world brings everything home for the Andrews Forest and group. The group is built around a shared body of knowledge that is linked with a particular place. With unprecedented resources and an expanding network of qualified expertise, the group constructed a dual identity for the Andrews Forest at the end of the 20th century: It was a developed place with urban amenities that could support a large population of scientists and staff in dormitories with kitchens, onsite laboratories, meeting rooms, large conference halls, and a developed system of roads linking these facilities with a mapped, plotted, and carefully surveyed and documented outdoor laboratory. As Fred Swanson observes, however, the group provides a context that amounts to more than the sum of these parts. It is an organic community that collectively sustains and builds on a body of knowledge that is the product of thousands of scientist-years of work encapsulated in writings and oral traditions. That body of knowledge includes countless informal exchanges—stories told in hundreds of field trips, in classrooms, and in student advisement sessions that survive largely in oral traditions and memories of face-to-face conversations. The Andrews Forest is a physical reminder of those conversations—a totem of sorts with multiple faces. For many people in the group it was a "pristine" setting for spiritual renewal, mystical and professional inspiration, and reconnection with nature. It was, however, also a constructed landscape at once accessible, impressive, developed, and interpreted. Most importantly, it was a place where pragmatic and thoughtful people frequently congregate to test their ideas against each other and in a real-world setting. The Andrews Forest is a real place, but it is also an idea and an ideal that transcends that place and encourages people to think more critically about the world in which they live, and the ecological processes of which they are a part.

The Andrews Forest is a physical reminder of those conversations—a totem of sorts with multiple faces.

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Many people provided support, assistance, guidance, and access without which this book would not have been possible. In addition to the numerous people who agreed to sacrifice a significant amount of their time to make themselves available for the oral history interviews, as cited throughout the text, many other people provided significant behind-the scenes support and encouragement. The project originated with the group's decision in 1996 to commission a history of the Andrews Forest to commemorate the 50th anniversary of the establishment of the experimental forest. A steering committee comprised of Fred Swanson, Art McKee, Al Levno, Ted Dyrness, Martha Brookes, and Cindy Miner provided invaluable guidance during early meetings that framed the focus, structure, and approach of the work as based on oral history interviews of various, representative voices. A subset of that committee, notably including Swanson, McKee, Dyrness, and Brookes, reviewed an initial prospectus and preliminary outlines for the book and suggested needed revisions and possible alternatives. Swanson, McKee, and Dyrness were especially helpful in facilitating early communication with potential interview candidates and secured office space and funding to support the project. Swanson, McKee, Dyrness, and Brookes also provided detailed edits on multiple drafts of the manuscript, suggesting many useful insights and details that helped flesh out murky discussions, and tactfully suggesting areas in which the manuscript was veering off into confused terrain.

Fred Swanson also brainstormed and authored the sidebars that accompany each chapter, with the support of Kathryn Ronnenberg, who converted ideas and text into a visually integrated reality of graphics and explanatory materials. Theresa Valentine put together maps and revised into a more printable format (see inside the front cover of this book) the complex timeline that the Andrews group collaboratively generated, graphically depicting the chronological development of work at the Andrews Forest and the different players who related to various themes of research at that site, over time. Al Levno and Ted Dyrness were indefatigable in locating and identifying a wide range of relevant photos to support the work, and Martha Brookes and Don Henshaw also tracked down photos from their personal collections and donated them to the Forest Science Data Bank for publication in this work. Suzanne Remillard pulled together widely scattered photographs selected from various formats and collections into a more systematic, CD-based collection that facilitated final photo selection, placement, and crediting. Tami Lowry coordinated final preparation of the manuscript, and facilitated communications with production staff at PNW Station. Carolyn Wilson skillfully shepharded the manuscript through final production stages. A staff of 12 transcriptionists, whose names appear in the footnotes in connection with the particular transcripts on which they worked, supported early efforts to move the interviews from the original tapes into a more accessible form for review and analysis in a timely and efficient manner. It would be impossible to list all of the other people who supported this project in innumerable ways over the past few years, but I am especially grateful for Cindy Miner's unwavering support for this project, and for supporting the history series at PNW Station. It is also impossible to exaggerate Fred Swanson's unwavering support and enthusiasm for the project, and I am especially grateful for the many thoughtful insights and tactful comments that he has provided over these past 9 years. Our innumerable, casual conversations over that time, have advanced my understanding of matters that go far beyond the scope of this book. I have, therefore, incurred a debt in the course of this project that would be impossible to repay. In a project lasting more than 10 years, finally, I am deeply indebted to my spouse, Gilda, and my daughter, Mitra, who have sacrified much to this effort.

Metric Equivalents

When you know:	Multiply by:	To Find:
Acres	0.405	Hectares
Board feet	.00236	Cubic meters
Cubic feet	.0283	Cubic meters
Cubic feet per second per square mile	.010933	Cubic meters per second per square kilometer
Feet	.3048	Meters
Inches	2.54	Centimeters
Miles	1.609	Kilometers
Square miles	2.59	Square kilometers
Celsius (°C)	1.8 and add 32	Fahrenheit

Note on Sources

As documented throughout the text, this book is largely based on oral history interviews conducted by the author during 1997 and 1998, and on a large collection of primary, unpublished documents, including administrative memos, letters, and other uncatalogued, manuscript records to which the Andrews group provided the author open access. These records are currently held in the Long Term Ecological Research (LTER) library room at the PNW Station Forestry Science Laboratory in

Corvallis, Oregon. In addition to this collection of primary materials, the LTER library room also houses a large quantity of "gray literature"—official reports and records—generated by members of the Andrews group over the years. Some of these were published as internal reports by various agencies and organizations. Others were simply unpublished papers and reports filed for administrative purposes only.

Beyond these primary collections, this study relied on several published bibliographies of research associated with the Andrews Forest, which provided a helpful, chronological summary of significant publications linked with the people whose names surfaced in oral history interviews. The published articles and monographs listed in those bibliographies were also available in the Forestry Sciences Laboratory storeroom, and they documented, from the authors' perspectives, the purpose, results, and significance of their research.

The published bibliographies are now available online at the H.J. Andrews Experimental Forest Web site, http://www.fsl.orst.edu/lter/index.cfm under the "Publications" link http://www.fsl.orst.edu/lter/pubs.cfm?topnav=11 as the "Master List" http://www.fsl.orst.edu/lter/pubs/biblio/master.cfm?frameURL=http://wwwdata.forestry.oregonstate.edu/lterhja/show_cat_person_id_list.asp&topnav=80.

On the same Web site for the Andrews Forest (the Andrews Forest Home page), the "Data" link http://www.fsl.orst.edu/lter/data.cfm?topnav=8 provides access to the Forest Science Data Bank (FSDB). This FSDB link includes, among other resources, a link to the "Image Library" http://www.fsl.orst.edu/lter/data/cd_pics/cd_lists.cfm?topnav=116 and provides ready access to the photos that were selected for use in this book. They are listed by the 3-letter CD reference code (e.g., AAC, AAD, etc.) that forms the prefix for each photo cited in this work (e.g., AAA_001). The site also includes a link to the data-use policy for data posted on the FSDB: http://www.fsl.orst.edu/lter/data/access.cfm?topnav=98#CITATION.

The Web site includes a cross-referenced system of searchable links. Records and files generated in the course of this oral history project are also scheduled to be deposited in the Forestry Sciences Laboratory Library with links to the FSDB.

The sidebars, which appear in each of the main chapters, were authored for this book by Fred Swanson, with graphics developed for this book by Kathryn Ronnenberg. The citations in those sidebars refer to the following publications:

Ackers, S.H. 2004. Long-term population monitoring of northern spotted owls: recent results and implications for the Northwest Forest Plan. In: Arabas, K.; Bowersox, J., eds. Forest futures: science, politics, and policy for the next century. Lanham, MD: Rowman & Littlefield Publishers, Inc.: 155–173.

Beschta, R.L.; Pyles, M.R.; Skaugset, A.E.; Surfleet, C.G. 2000. Peakflow responses to forest practices in the western cascades of Oregon, USA. Journal of Hydrology. 233: 102–120.

Cissel, J.H.; Swanson, F.J.; Weisberg, P.J. 1999. Landscape management using historical fire regimes: Blue River, Oregon. Ecological Applications. 9(4): 1217–1231.

Cohen, W.B.; Harmon, M.E.; Wallin, D.O.; Fiorella, M. 1996. Two decades of carbon flux from forests of the Pacific Northwest: estimates from a new modeling strategy. BioScience. 46(11): 836–844.

Cohen, W.B.; Spies, T.A. 1992. Estimating structural attributes of Douglas-fir/western hemlock forest stands from Landsat and SPOT imagery. Remote Sensing of Environment. 41: 1–17.

Dale, V.H.; Swanson, F.J.; Crisafulli, C.M., eds. 2005. Ecological responses to the 1980 eruptions of Mount St. Helens. New York: Springer. 342 p.

Denison, W.C. 1973. Life in tall trees. Scientific American. 228(6): 74–80.

Dyrness, C.T. 1967. Mass soil movements in the H.J. Andrews Experimental Forest. Res. Pap. PNW-42. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 13 p.

Faustini, J.M. 2000. Stream channel response to peak flows in a fifth-order mountain watershed. Corvallis, OR: Oregon State University. 339 p. Ph.D. dissertation.

Forman, R.T.T.; Sperling, D.; Bissonette, J.A. [et al.]. 2003. Road ecology: science and solutions. Washington, DC: Island Press. 481 p.

Forsman, E.D.; Meslow, E.C.; Wight, H.M. 1984. Distribution and biology of the spotted owl in Oregon. Wildlife Monographs. 87(April): 1–64.

Franklin, J.F.; Cromack, K., Jr.; Denison, W. [et al.]. 1981. Ecological characteristics of old-growth Douglas-fir forests. Gen. Tech. Rep. PNW-118. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 48 p.

Franklin, J.F.; Forman, R.T.T. 1987. Creating landscape patterns by forest cutting: ecological consequences and principles. Landscape Ecology. 1(1): 5–18.

Franklin, J.F.; MacMahon, J.A.; Swanson, F.J.; Sedell, J.R. 1985. Ecosystem responses to the eruption of Mount St. Helens. National Geographic Research. Spring: 198–216.

Franklin, J.F.; Spies, T.A. 1991a. Composition, function, and structure of old-growth Douglas-fir forests. In: Ruggiero, L.F.; Aubry, K.B.; Carey, A.B.; Huff, M.H., tech. eds. Wildlife and vegetation of unmanaged Douglas-fir forests. Gen. Tech. Rep. PNW-285. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 71–80.

Franklin, J.F.; Spies, T.A. 1991b. Ecological definitions of old-growth Douglas-fir forests. In: Ruggiero, L.F.; Aubry, K.B.; Carey, A.B.; Huff, M.H., tech. eds. Wildlife and vegetation of unmanaged Douglas-fir forests. Gen. Tech. Rep. PNW-285. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 61–69.

Froehlich, H.A. 1973. Natural and man-caused slash in headwater streams. In: Loggers handbook, Vol. XXXIII. [Place of publication unknown]: Pacific Logging Congress: [Not paged].

Garman, S.L.; Cissel, J.H.; Mayo, J.H. 2003. Accelerating development of late-successional conditions in young managed Douglas-fir stands: a simulation study. Gen Tech. Rep. PNW-GTR-557. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 57 p.

Gregory, S.V.; Boyer, K.L.; Gurnell, A.M., eds. 2003. The ecology and management of wood in world rivers. American Fisheries Society Symposium 37. Bethesda, MD: American Fisheries Society. 444 p.

Gregory, S.V.; Swanson, F.J.; McKee, W.A.; Cummins, K.W. 1991. An ecosystem perspective of riparian zones. BioScience. 41(8): 540–551.

Harmon, M.E. 1991. Long-term experiments on log decomposition at the H.J. Andrews Experimental Forest. Gen. Tech. Rep. PNW-280. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p.

Harmon, M.E. 2001. Moving towards a new paradigm for woody detritus management. Ecological Bulletins. 49: 269–278.

Harmon, M.E.; Franklin, J.F.; Swanson, F.J. [et al.]. 1986. Ecology of coarse woody debris in temperate ecosystems. In: MacFadyen, A.; Ford, E.D., eds. Advances in ecological research. Orlando, FL: Academic Press, Inc.: 15: 133–302.

Harris, L.D. 1984. An island archipelago model for maintaining biotic diversity in old-growth forests. In: New forests for a changing world: Proceedings of the 1983 convention of the Society of American Foresters. Washington, DC: Society of American Foresters: 84-03: 378–382.

Johnson, S.L.; Swanson, F.J.; Grant, G.E.; Wondzell, S.M. 2000. Riparian forest disturbances by a mountain flood — the influence of floated wood. Hydrological Processes. 14: 3031–3050.

Jones, J.A. 2000. Hydrologic processes and peak discharge response to forest removal, regrowth, and roads in 10 small experimental basins, western Cascades, Oregon. Water Resources Research. 36(9): 2621–2642.

Jones, J.A.; Grant, G.E. 1996. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research. 32(4): 959–974.

Jones, J.A.; Swanson, F.J.; Wemple, B.C.; Snyder, K.U. 2000. Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks. Conservation Biology. 14(1): 76-85.

Li, H.; Franklin, J.F.; Swanson, F.J.; Spies, T.A. 1993. Developing alternative forest cutting patterns: a simulation approach. Landscape Ecology. 8(1): 63–75.

Lienkaemper, G.W.; Swanson, F.J. 1987. Dynamics of large woody debris in streams in old-growth Douglas-fir forests. Canadian Journal of Forest Research. 17: 150–156.

Maser, C.; Cline, S.P.; Cromack, K., Jr. [et al.]. 1988. What we know about large trees that fall to the forest floor. In: Maser, C.; Tarrant, R.F.; Trappe, J.M.; Franklin, J.F., tech. eds. From the forest to the sea: a story of fallen trees. Gen. Tech. Rep. PNW-229. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; U.S. Department of the Interior, Bureau of Land Management: 25–45.

McDade, M.H.; Swanson, F.J.; McKee, W.A. [et al.]. 1990. Source distances for coarse woody debris entering small streams in western Oregon and Washington. Canadian Journal of Forest Research. 20: 326–330.

Meehan, W.R.; Swanson, F.J.; Sedell, J.R. 1977. Influences of riparian vegetation on aquatic ecosystems with particular reference to salmonid fishes and their food supply. In: Johnson, R.R.; Jones, D.A., tech. coords. Importance, preservation and management of riparian habitat: a symposium. Gen. Tech. Rep. RM-43. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 137–145.

Michener, W.K.; Brunt, J.W.; Helly, J.J. [et al.]. 1997. Nongeospatial metadata for the ecological sciences. Ecological Applications. 7(1): 330–342.

Murphy, M.L.; Hall, J.D. 1981. Varied effects of clear-cut logging on predators and their habitat in small streams of the Cascade mountains, Oregon. Canadian Journal of Fisheries and Aquatic Sciences. 38: 137–145.

Nakamura, F.; Swanson, F.J. 1993. Effects of coarse woody debris on morphology and sediment storage of a mountain stream system in western Oregon. Earth Surface Processes and Landforms. 18: 43–61.

Nakamura, F.; Swanson, F.J.; Wondzell, S.M. 2000. Disturbance regimes of stream and riparian systems—a disturbance-cascade perspective. Hydrological Processes. 14: 2849–2860.

Sedell, J.R.; Richey, J.E.; Swanson, F.J. 1989. The river continuum concept: a basis for the expected ecosystem behavior of very large rivers? In: Dodge, D.P., ed. Proceedings of the international large river symposium. Canadian Special Publication of Fisheries and Aquatic Sciences 106. [Place of publication unknown]: [Publisher unknown]: 49–55.

Silen, R.R. 1955. More efficient road patterns for a Douglas-fir drainage. The Timberman. 56(6): 82–88.

Spies, T.A.; Franklin, J.F.; Klopsch, M. 1990. Canopy gaps in Douglas-fir forests of the Cascade Mountains. Canadian Journal of Forest Research. 20(5): 649–658.

Spies, T.A.; Ripple, W.J.; Bradshaw, G.A. 1994. Dynamics and pattern of a managed coniferous forest landscape in Oregon. Ecological Applications. 4(3): 555–568.

Swanson, F.J.; Cissel, J.H.; Reger, A. 2003. Landscape management: diversity of approaches and points of comparison. In: Monserud, R.A.; Haynes, R.W.; Johnson, A.C., eds. Compatible forest management. Dordrecht, The Netherlands: Kluwer Academic Publishers: 237–266.

Swanson, F.J.; Gregory, S.V.; Sedell, J.R.; Campbell, A.G. 1982. Land-water interactions: the riparian zone, Chapter 9. In: Edmonds, R.L., ed. Analysis of coniferous forest ecosystems in the western United States. US/IBP Synthesis Ser. 14. Stroudsburg, PA: Hutchinson Ross Publishing Co.: 267–291.

Swanson, F.J.; Johnson, S.L.; Gregory, S.V.; Acker, S.A. 1998. Flood disturbance in a forested mountain landscape. BioScience. 48(9): 681–689.

Swanson, F.J.; Lienkaemper, G.W.; Sedell, J.R. 1976. History, physical effects, and management implications of large organic debris in western Oregon streams. Gen. Tech. Rep. PNW-56. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 15 p.

Thomas, J.W.; Forsman, E.D.; Lint, J.B. [et al.]. 1990. A conservation strategy for the northern spotted owl: a report of the Interagency Scientific Committee to address the conservation of the northern spotted owl. Portland, OR: U.S. Department of Agriculture, Forest Service; U.S. Department of Interior, Bureau of Land Management, Fish and Wildlife Service, National Park Service. 427 p.

Thomas, R.B.; Megahan, W.F. 1998. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon: a second opinion. Water Resources Research. 34(12): 3393–3403.

Triska, F.J.; Cromack, K., Jr. 1980. The role of wood debris in forests and streams. In: Waring, R.H., ed. Forests: fresh perspectives from ecosystem analysis: proceedings of the 40th annual Biology Colloquium. Corvallis, OR: Oregon State University Press: 171–190.

U.S. Department of Agriculture, Forest Service; U.S. Department of the Interior, Bureau of Land Management. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. [Place of publication unknown]. 74 p. [plus attachment A: standards and guidelines].

Van Sickle, J.; Gregory, S.V. 1990. Modeling inputs of large woody debris to streams from falling trees. Canadian Journal of Forest Research. 20(10): 1593–1601.

Vannote, R.L.; Minshall, G.W.; Cummins, K.W. [et al.] 1980. The river continuum concept. Canadian Journal of Fisheries and Aquatic Sciences. 37(1): 130–137.

Wallin, D.O.; Swanson, F.J.; Marks, B. 1994. Landscape pattern response to changes in pattern generation rules: land-use legacies in forestry. Ecological Applications. 4(3): 569–580.

Wallin, D.O.; Swanson, F.J.; Marks, B. [et al.]. 1996. Comparison of managed and pre-settlement landscape dynamics in forests of the Pacific Northwest, USA. Forest Ecology and Management. 85: 291–309.

Wemple, B.C.; Jones, J.A. 2003. Runoff production on forest roads in a steep, mountain catchment. Water Resources Research. 39(8): 8-1 to 8-17.

Wemple, B.C.; Swanson, F.J.; Jones, J.A. 2001. Forest roads and geomorphic process interactions, Cascade Range, Oregon. Earth Surface Processes and Landforms. 26: 191–204.

Wondzell, S.M.; Swanson, F.J. 1996a. Seasonal and storm dynamics of the hyporheic zone of a 4th-order mountain stream. I: Hydrologic processes. Journal of the North American Benthological Society. 15(1): 3–19.

Wondzell, S.M.; Swanson, F.J. 1996b. Seasonal and storm dynamics of the hyporheic zone of a 4th-order mountain stream. II: Nitrogen cycling. Journal of the North American Benthological Society. 15(1): 20–34.

Afterward (by Fred Swanson)

This book examines the history of the community of scientists and land managers working at the H.J. Andrews Experimental Forest (Andrews Forest) though its first 50 years. Since the 50th anniversary of the Andrews Forest in 1998, the context and composition of the Andrews Forest community and program have changed in major ways, yet retain their essential mission and character. The summary themes in the "Conclusions" of Max Geier's history of the research and management communities of the Andrews Forest provide useful dimensions for charting how the program, the Andrews Forest group, and the larger contexts in which they function, evolved in the 1998–2005 period.

The place

The Andrews Forest itself remained a compelling, charismatic landscape. The towering Douglas-fir forests, with lush drapery of lichens and moss and the fast, cold streams reminded scientists and land managers why their work was important, and why to continue even in periods of bureaucratic and other struggles. From the time of Roy Silen there remained a sense of, "We do this work in this place for this place."

The people

The Andrews Forest remained a seedbed for discovery built on the foundation of long-term working relationships among scientists and land managers. Continuing overlap of generations of scientists and managers working at the Andrews Forest sustained the core culture of the program. For example, the spread of years in which the signatory principal investigators (PIs) on the Long Term Ecological Research (LTER) grant for 2002-2008 first began working at the Andrews Forest spanned nearly three decades: Swanson (1972), Harmon (1981), Jones (1989), Johnson (1996), and Barbara Bond (1999). Processes, such as preparation of the LTER renewal grant proposal, were important opportunities for collaboration and for evolution of a team's work culture.

Over the 1998-2005 period, leadership of the research program shifted from scientists whose roots with the Andrews Forest began in the International Biological Programme (IBP) era of the 1970s and in the early years of LTER to those whose first contact with the forest began in the early 1990s, or even more recently. In this period, the duties of forest director passed from Art McKee to Kari O'Connell; those of LTER PI passed from Fred Swanson to Mark Harmon to

Barbara Bond (starting in 2006); and those of lead Pacific Northwest Research Station (PNW Station) scientist passed from Fred Swanson to Sherri Johnson. New Oregon State University (OSU) scientists and science leaders stepped forward to direct important areas of research, such as Roy Haggerty (geosciences), Kate Lajtha (botany and plant pathology), Jeff McDonnell (forest engineering), and Elizabeth Sulzman (crop and soil science). In the Willamette National Forest, where change in leadership is typically more frequent than in science positions, John Cissel and then Jim Mayo passed duties as research liaison to Cheryl Friesen; Mary Allison assumed duties as ranger of the McKenzie River Ranger District (the combined Blue River and McKenzie Ranger Districts) from John Allen, and Dallas Emch became supervisor of the Willamette National Forest.

Despite all this change, the main partnerships among workers in a given field, among disciplines, and between research and land management remained strong and productive.

Leadership and Organization

As the scope and complexity of the Andrews Forest facilities and operations has grown over the history of the forest, leadership roles for the various parts of the program were distributed across a core group of Forest Service and university leaders making decisions on a consensus basis. This pattern persisted in the 1998-2005 period, but the players shifted. Under the leadership of Mark Harmon as LTER PI, the science team conducted business in a consistent series of meetings scheduled over each year. The Executive Committee, composed of signatory PIs plus the forest director, dealt with core management issues for the LTER program. A “PI Powwow” of all investigators who manage research budgets was held twice a year to cover budget planning (November) and research planning (May). Regular, monthly meetings, open to all interested participants, continued to be the main venue for conducting general business and for the Executive Committee to hear from the group. The group continued other important opportunities to communicate internally and externally, including the annual June field day for sharing findings in the forest and the annual, day-long symposium on campus in the winter. In addition, the research liaison managed quarterly meetings to guide the work of the research-management partnership. Representatives of the leadership of the Willamette National Forest, Eugene office of the Bureau of Land Management, and the research community took part in these sessions.

The Andrews Forest LTER program has demonstrated its importance as a training ground for science leadership. Such a program attracted people who like working in interdisciplinary groups and addressing larger, socially-relevant questions. Work in this environment encouraged an intellectually and fiscally entrepreneurial spirit and collaboration across wide-ranging networks of colleagues. Participants in the Andrews Forest program built on the spirit and leadership experience there to become leaders in other programs, such as a new, OSU program in Ecosystem Informatics (applications of math and computer sciences in the ecological sciences) funded by the National Science Foundation (NSF) and the university, and new national science initiatives to develop networks of ecological and hydrological observatories.

Shifting Context

The major regional and national science, management, and policy themes at the time of the 50th anniversary of the Andrews Forest persisted through 2005, but with notable developments. Science and policy issues related to global change, especially climate and land use change, remained dominant. Federal forest policy was still governed by the Northwest Forest Plan, which entered its second decade with a series of retrospective assessments revealing low rates of forest cutting, continued decline of the northern spotted owl despite increases in the extent of old-forest habitat, and other expected or surprising findings. Thus, topics with roots in basic science in the Andrews Forest in the 1970s reemerged as focal points of public debate and policy in 1998–2005. This historical perspective raises the question of what current work may have major impact on science and policy in the future. The Blue River Landscape Study, based in part on use of natural disturbance regimes in landscape planning, for example, may contribute an approach that complements planning that emphasizes the needs of individual species. This work may influence future policy decisions with impact similar to the 1970s work on old growth and northern spotted owls.

But the future of forestry in the region remains quite uncertain: What will be the level of harvest from federal, state, and private lands in the context of a shifting global marketplace, changing attitudes of citizens of the region, and other factors? How will disturbance regimes of fire, insects, and other processes adjust to a changing climate? How will altered disturbance regimes affect forests and watersheds? How will these aspects of changing social and environmental conditions affect the relevance and usefulness of different research paths? The uncertainty enveloping these questions seems to grow rather than diminish with time.

Large-scale planning and science programs with a footprint that includes the Andrews Forest and Andrews Forest scientists provide a context for exploring new research themes. For example, the Willamette River Basin Futures Project (Baker et al. 2004), led by David Hulse (University of Oregon) and Stan Gregory, examined the history of ecological change in the watershed over the past few centuries and projected the consequences of three policy scenarios 50 years into the future. Major programs on the horizon that have already engaged scientists who work at the Andrews Forest include the National Ecological Observatory Network, Hydrological Observatories of the Consortium for Advancement of the Hydrological Sciences, Inc., and revision of management plans for national forest of the region and Bureau of Land Management lands in western Oregon. Participation in such large-scale programs shows the relevance of the Andrews Forest program as a source of concepts and technical knowledge. This work in large-scale projects provides opportunities to extend and test concepts broadly, and it stimulates thinking about new topics and new terrain.

Study Themes: Persistence–Flexibility

As of 2005, the Andrews Forest program continued to balance persistence on perennial themes with attentiveness to the socially and scientifically relevant issues of the day. In terms of persistence, the dominant research themes of the LTER grant renewed in 2002 had been major themes at the Andrews Forest for several decades: water; forest dynamics; disturbance by fire, floods, and other processes; cycling of carbon and nutrients; and biological diversity. Applied research in 1998-2005 focused on continuing the Blue River Landscape Plan and Study and silviculture studies initiated earlier in the 1990s.

Several new science and education programs originating in this period built on the foundations of earlier work; highlights included:

- Barbara Bond and Mike Unsworth secured NSF funding to take a fresh view of small, experimental watersheds with more than 50 years of hydrology research. They are investigating the watersheds as airsheds by sampling the chemistry of cool air draining out of the watersheds in order to measure respiration in the entire forest ecosystem of the watershed.
- Sherri Johnson, Stan Gregory, and Linda Ashkenas have led the Andrews Forest component of the Lotic Intersite Nitrogen Experiment (LINX), involving many natural ecosystems across the United States and sites of intensive land use, even cities. Isotopically labeled nitrogen is introduced to

streams and its fate is tracked downstream and into the adjacent terrestrial plant and animal communities. The LINX study revealed high rates of nitrogen uptake in streams and also transfer of nitrogen from streamwater into terrestrial vegetation and animals rather far removed from the stream.

- Julia Jones, Mark Harmon, and others capitalized on the long, strong history of information management in the Andrews Forest program to initiate a new graduate education program in Ecosystem Informatics, which brings together math, computer sciences, and earth and ecological sciences from a dozen departments in OSU. This new program, funded by NSF through an Integrated Graduate Education and Research Training grant and the university, will train dozens of Ph.D. students and pioneer cross-disciplinary work among faculty.
- Fred Swanson and Kathleen Dean Moore (Philosophy, OSU), Director of the Spring Creek Project for Ideas, Nature, and the Written Word, developed a new collaboration between the Andrews Forest ecosystem group and nature writers. This program, termed Long Term Ecological Reflections and conducted in parallel with Long Term Ecological Research, engages the practical knowledge of environmental sciences, the clarity of philosophical analysis, and the expressive power of the written word to find new ways to understand our relation with the natural world. Just like scientists, writers visit the forest, collect observations, and publish their findings. The writers visit long-term ecological reflection plots, such as a site in Mark Harmon’s 200-year log composition experiment. In that setting the first writer in residence, Robert Michael Pyle (2004), wrote that taking the long view in ecological research and reflection requires “faith in the future—even if you won’t be there to see it for yourself. … Maybe looking to the future is a way of hoping there will still be something to see when we get there. Maybe it’s the only way to make sure of it.” A fitting description of the spirit of work at the Andrews Forest.

Financial Picture

The funding picture for the Andrews Forest program has a long history of ups and downs, relying on base-level funding from the principal partner institutions, but new initiatives and even many ongoing, long-term projects have relied on the uncertain world of competitive grants. During the 1998–2005 period, budget crunches affected each of the partner institutions–PNW Station, Willamette

National Forest, and OSU. The national forest substantially reduced staffing and services, mainly as a consequence of the reduced amount of timber cut from the national forest after 1990. Funding of OSU and the PNW Station also tightened in general because of stable or declining budgets and increased costs. Perhaps the most tenuous funding situation was the research-management partnership, particularly for the adaptive management area, which supported several long-term studies of management of landscapes and young forest plantations. Despite the sometimes gloomy financial climate, leaders of each institution continued to express strong support for the Andrews Forest program.

Accomplishments

The Andrews Forest program was highly productive in the 1998-2005 period in both traditional ways and in addressing themes new to the group. A constant stream of journal articles and communications to a more general readership emerged from the Andrews Forest. Jon Luoma (1999, 2006), a freelance writer, published *The Hidden Forest: The Biography of an Ecosystem* describing the process of discovery about forest ecosystems using work at the Andrews Forest as the dominant example of how the work is done and what has been discovered. Leaders in the Andrews group were major players in regional, national, and international efforts to synthesize and communicate state-of-knowledge ideas on diverse themes, including wood in rivers of the world (Gregory et al. 2003), the social and ecological history and potential futures of the Willamette River basin in western Oregon (Baker et al. 2004, Hulse et al. 2002), road ecology (Forman et al. 2003), and use of bioregional assessments in the Pacific Northwest and elsewhere in the United States (Johnson et al. 1999). Studies in the research-management partnership, especially the Blue River Landscape Plan and Study (Cissel et al. 1999), which explores the use of forest history to guide management, continued to draw interest in terms of possible influence on future approaches to forest landscape management.

The Future

Clearly the traditions of the Andrews Forest continue, beginning with the inspiration drawn from the beautiful forest landscape itself, which remains a strong physical and intellectual rallying point that nurtures and stimulates the community. The tradition of balancing long-term persistence in basic research with the need to address science and management issues of the day has been sustained through several generations of researchers and land managers working in close partnership. The many benefits of working in this close partnership and the significance of the Andrews Forest LTER program as a training ground for science leadership have become more evident over the years. Openness to exploring new approaches in science and education, and new linkages with the humanities, have enlivened the program over the years, and recent developments are in keeping with this tradition. The successes achieved through these aspects of the Andrews Forest program reinforce the importance of keeping them a part of standard operating practice in the Andrews Forest group in the future. In sum, the Andrews Forest program continues with the necessary work.

Literature Cited

Baker, J.P.; Hulse, D.H.; Gregory, S.V. [et al.]. 2004. Alternative futures for the Willamette River basin, Oregon. Ecological Applications. 14(2): 313–324.

Cissel, J.H.; Swanson, F.J.; Weisberg, P.J. 1999. Landscape management using historical fire regimes: Blue River, Oregon. Ecological Applications. 9(4): 1217–1231.

Forman, R.T.T.; Sperling, D.; Bissonette, J.A. [et al.]. 2003. Road ecology: science and solutions. Washington, DC: Island Press. 481 p.

Gregory, S.V.; Boyer, K.L.; Gurnell, A.M., eds. 2003. The ecology and management of wood in world rivers. American Fisheries Society, Symposium 37. Bethesda, MD: American Fisheries Society. 431 p.

Hulse, D.; Gregory, S.; Baker, J.P., eds. 2002. Willamette River planning atlas: trajectories of environmental and ecological change. 2nd ed. Oregon State University Press. 182 p.

Johnson, K.N.; Swanson, F.J.; Herring, M.; Greene, S., eds. 1999. Bioregional assessments: science at the crossroads of management and policy. Washington, DC: Island Press. 395 p.

Luoma, J.R. 1999. The hidden forest: the biography of an ecosystem. New York: Henry Holt and Co. 228 p.

Luoma, J.R. 2006. The hidden forest: the biography of an ecosystem. Corvallis, OR: Oregon State University Press. 228 p. (Republished with a new foreword by Jerry Franklin.)

Pyle, R.M. 2004. The long haul. Orion. 23(5): 70–71.

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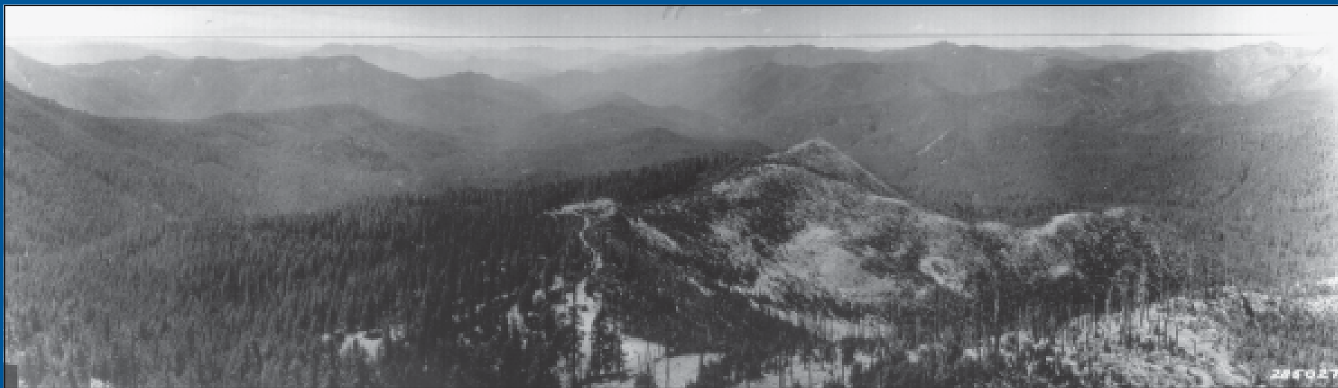
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