Environmental History and Restoration in the Western Forests

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WHAT DO environmental historians really want? We spend a great deal of time telling frightening stories about how things have gone wrong in human relationships with nature.

But what do we expect people to do with these declensional narratives? Whether or not we intend our work to be used in such a way, foresters increasingly rely on our stories of the past to justify our attempts at ecosystem management in the public forests of the American West. We need to be asking more clearly: How do we want managers and politicians to apply our histories? Should the past guide us anywhere in the future? What should be the relation between history, science, and management?

In the battle over the future of Western public forests, competing interests — from environmentalists, to traditional intensive foresters, to the wise-use movement — say they have history on their side in their efforts to make the forests better. But what exactly is a better forest? For many groups with widely divergent political agendas, a better forest is a forest from the past, or at least a forest from an imagined ideal past. Restoration of an imagined earlier ecosystem is the favored strategy for many federal agencies who feel that traditional management went badly wrong. But these restoration goals make critical, unexamined assumptions about history, ideal nature, and the role of humans in nature. This article will begin by reviewing some of the goals and criticisms of restoration, and then turn to a case study from the old-growth forests of eastern Oregon to illustrate the ways that cultural values influence the uses of history in forest restoration.

On Restoration and History

Like most environmental histories, restoration tells a declensional story about the world gone wrong. Unlike environmental history, however, restoration proposes something radical: to try to fix what has gone wrong. But since restorationists tend to focus on the physical changes and not the social, political, cultural, or economic context of those changes, their efforts often backfire — leading, not to an ideal past, but instead to an ever-more surprising future.

According to one recent textbook in the field, the goal of ecological restoration is "to take a degraded landscape and return it to its original condition."[1] The Society for Ecological Restoration (SER: the international professional society of restoration ecologists) has struggled with the definition over the last several years. In 1990, SER defined ecological restoration as

> the process of intentionally altering a site to establish a defined, indigenous, historic ecosystem. The goal of this process is to emulate the structure, function, diversity and dynamics of the specified ecosystem.[2]

In 1993, the official definition changed to:

> . . . the process of re-establishing to the extent possible the structure, function, and integrity of indigenous ecosystems and the sustaining habitats that they provide.[3]

The Natural Resource Council focused on the idea of humans as disturbers of ecosystems, defining restoration as "the return of an ecosystem to a close approximation of its condition prior to disturbance."[4]

Many European restorationists have disagreed with such interpretations of restoration that stress the return to an original, pre-disturbance, indigenous ecosystem. They argue that such an attempt makes little sense in a world of extensive human manipulations, where no single point in the past can be called original.[5] Yet most restorationists agree with the ecologist William Jordan III that only returning to a pre-European community can be called restoration; all the rest is mere rehabilitation.[6]

Restoration attempts to use human labor to return damaged landscapes to some earlier point in their history, with the assumption that earlier ecosystems were more sustainable than current ones. Scientifically, this is problematic. As the ecologist John Cairns argues, stochastic variation due to historical events is critical in the development of ecological communities. This means that it is impossible to predict the endpoint of a community from any set of beginning points, and that, therefore, it is not possible to recreate any ecosystem from the past or to recreate any currently existing reference site either.[7] The philosopher of science, Mark Sagoff, points out that since every ecosystem constantly changes, it is impossible to determine a baseline for restoration, a "normative state deserving to be maintained or restored."[8] Ecosystems are dynamic rather than static, and disturbance processes operate even in the

absence of human intervention. Assuming that all disturbances are harmful and that all human interventions damage an ecological system makes little sense, given current ecological understanding of ecosystem processes.

In arguing that restoration should return a site to its "original" condition, the implicit assumption is that before Europeans altered these landscapes, nature was undisturbed by humans. Yet, as environmental historians, paleoecologists, and geographers have demonstrated, nearly all ecosystems on earth have been affected by humans over many thousands of years. Human processes have had profound effects on landscapes that most people now think of as "natural." To ignore the roles of people in shaping successional processes in Midwestern oak savannas, Great Plains prairies, or Western ponderosa pine forests — to name just a few North American landscapes — is to miss a critical ecological point: namely, that repeated disturbance processes, many of them anthropogenic, shaped the landscapes we wish to restore. Excluding human disturbances as "unnatural" will assure that restoration of those communities cannot work.

One of the major recent debates in ecological restoration, just as in environmental history, concerns the boundaries between nature and culture. Restoration implies that even though attempts to engineer and manage ecosystems led to disaster, people can somehow manage and engineer ecosystems back to a previous, more desirable state.[9] Environmental philosophers, particularly deep ecologists, have taken great exception to this, arguing that what people restore is not nature but a Baconian dream of controlling nature through science. Eric Katz claims that restoration rests on philosophical assumptions that humanity can and should fix nature.[10] For example, the first textbook in restoration ecology urged restorationists to develop "an understanding of the workings of nature that would enable us to predict its behavior and to manage and control it to our liking." The ultimate goal of restoration, the textbook claimed, is to

> take control of our flora and fauna — make it, change it, or conserve it. In this way we will have become like the watchmaker — not just tinkerers, but craftsmen and engineers.[11]

Katz argues that this attempt to use science to control and engineer nature is at the root of the disastrous human relationship with nature.

In addition to the ecological and philosophical difficulties with restoration, there are political questions as well. Landscape changes are partly ecological in origin, but they also have roots that are political, cultural, and economic. Without addressing the ideologies and market forces that led to degradation, restoration has little chance of long-term success. Because of this, critic Constance Pierce sees restoration as an abuse of history, a Disneyland-like rendition of the past that distracts us from the real causes of environmental degradation. She argues that restorationists are trying to create moments from the past that are little more than museum displays, an effort that erases the complicated human and ecological history that led to changes.[12] Environmental historian Jack Temple Kirby agrees with this assessment, arguing that restorationists, obsessed with weeding out non-native species, fail to challenge patterns of industrial capitalism that led to problems in the first place. In his view, restoration is merely a bandage, not a real rethinking of power and place.[13]

Fighting a ground fire in ponderosa pine about 1910. *National Archives 95-FP-5-79B, Washington, D.C.*

Clearly, restoration involves ethical, historical, and ecological dilemmas about the boundaries between nature and culture, all dilemmas familiar to environmental historians. Although restoration has problems, it also offers some of the best hopes we have for transforming our troubled relationship to the land into something both sustainable and just. To support this, we will examine the history of forests in the Blue Mountains of eastern Oregon, where groups with widely divergent political interests now claim to be restoring damaged forest to healthier forests from the past. Rather than describing in detail the human or ecological changes in the Blue Mountains, as I did in *Forest Dreams, Forest Nightmares*,[14] I will focus on the dilemmas this story raises about restoration and its relation to environmental history.

Restoration in the Blue Mountains

For nearly a century in the Blue Mountains, foresters have attempted to use the best ecological research of the day to transform old-growth forests into regulated, scientific forests. Ironically, this was an effort early foresters saw not as destruction, but as restoration. Early federal foresters felt that unregulated timber interests had begun to destroy the forests that America depended on, and, in particular, that industrial cutting practices were causing valuable ponderosa pine to be replaced with dense thickets of fir and lodgepole. Although early foresters in the Blues were convinced that they were restoring forests damaged by logging, they were far less concerned than current restorationists are with removing evidence of humans from the landscape. They wanted to do just the opposite: to restore not a wild forest from the slash piles left by logging, but a more productive, efficient, civilized forest — something we might now call reclamation. Foresters' best efforts to restore ponderosa pine led, ironically, not to the forest of their dreams, but to the nearly complete eradication of ponderosa pine across millions of acres of the Blues. It is now this transformed landscape, the Forest Service and the timber industry tell us, that desperately needs scientific restoration (and intensive management) to return it to its original condition.

When whites first came to the Blue Mountains of eastern Oregon and Washington in the early 19th century, they found a land of lovely open forests full of yellow-bellied ponderosa pines five feet across. These were stately giants the settlers could trot their ponies between, forests so promising that people thought they had stumbled into paradise. But they were nothing like the humid forests to which Easterners were accustomed. Most of the forest communities across the inland West were semi-arid and fire-adapted, and whites had little idea what to make of those fires.

After a century of trying to manage the forests, what had seemed like paradise was irrevocably lost. The great ponderosa pines were gone, and in their place were thickets of fir and lodgepole. The ponderosa pines had resisted most insect attacks, but the trees that replaced them were the favored hosts for defoliating insects such as spruce budworm and the Douglas-fir tussock moth. As firs invaded the old ponderosa forests, insect epidemics swept the dry Western forests. By 1991, on the five-and-a-half million acres of Forest Service lands in the Blue Mountains, insects had attacked half the stands, and in some stands, nearly 70 percent of the trees were infested.[15]

Even worse, in the view of foresters and many locals, was the threat of catastrophic fires. Although light fires had burned through the open pines every ten years or so, few exploded into infernos that killed entire stands of trees. But as firs grew underneath the pines and succumbed to insect damage, far more fuel became available to sustain major fires. Each year the fires seemed to get worse and worse. By the beginning of the 1990s, one major fire after another swept the inland West, until it seemed as if the forests might entirely go up in smoke.

Forest change comes about not just because people cut down trees, but because they cut down trees in a world where nature and culture, ideas and markets, tangle together in complex ways. On one level, the landscape changes resulted from a series of ecological changes. Heavy grazing removed the grasses that earlier had suppressed tree germination, allowing dense thickets of young trees to spring up beneath the older trees. When the federal foresters suppressed fires, the young firs grew faster than pines in the resultant shade, soon coming to dominate the forest understories. High grading — removal of the valuable ponderosa pine from a mixed-conifer forest — helped change species composition as well. But the story is much more complex than this. Changes in the land are never just ecological changes: people made the decisions that led to ecological changes, and they made those decisions from a complex set of motives.

To restore and protect ponderosa pine forests, early foresters felt they needed to keep out fire, encourage the growth of young trees, and replace old trees with young ones. Old growth seemed to threaten the future by taking up the space that young trees needed to grow, and fire seemed even worse, for it actually killed young trees. Since foresters were certain that young trees were the future of the forest, fire and old growth seemed clearly the enemy.

To understand these decisions to suppress fire and remove old growth, we need to understand their scientific, cultural, and economic contexts. In 1906, the basic premise of the new Forest Service was simple: if the United States was running out of timber, the best way to meet future demands was to grow more. More than 70 percent of the Western forests were old-growth stands — what foresters called "decadent and overmature," which meant forests that were losing as much wood to death and decay as they were gaining from growth.

Because young forests put on more volume-per-acre faster than old forests, foresters believed that old-growth forests needed to be cut down so that regulated forests could be grown instead. Regulated forests were young and still growing quickly, so they added more volume in a year than they lost to death and decay. The annual net growth could be harvested each year, without ever depleting the growing stock.

Scientific forestry seemed impossible until the old growth had been replaced with a regulated forest. For example, in 1911, C. S. Judd, the assistant forester for the Northwest region, told the incoming class of forestry students at the University of Washington that a timber famine was on its way unless the Forest Service did something quickly. Since the forest was running out of trees, the way to fix the problem was to get National Forest land to grow trees faster. As Judd put it, "the good of the forest . . . demands that the ripe timber on the National Forests and above all, the dead, defective, and diseased timber, be removed."[16] The way to accomplish this was to "enter the timber sale business" and heavily promote sales. This would get rid of the old growth, freeing up land to "start new crops of timber for a future supply."[17] Foresters saw old growth not as a great resource but as a parasite, taking up land that should be growing trees.

The unregulated forest was something to be altered as quickly as possible for moral reasons, to alleviate what one forester, Thorton Munger, termed "the idleness of the great areas of stagnant virgin forest land that are getting no selective cutting treatment whatsoever."[18] The problem was not just with old growth or dying timber; the problem was with a forest that did not produce precisely what people wanted; a recalcitrant, complex nature marked by disorder and what the forester George Bright called in 1913 "the general riot of the natural forest."[19]

This logic shaped a Forest Service that, in order to protect the forest, believed it necessary to first cut it down. Beginning in 1902, across the 5.5 million acres of public forests of the Blue Mountains, federal foresters focused on liquidating old-growth pine to make a better "nature." By replacing slow-growing "decadent" forests with rapidly growing young trees, the Forest Service hoped that the human community and the forest itself would become stable and predictable.[20]

Foresters believed that disease, dead wood, old growth, and fire all detracted from efficient timber production. In other words, they were assuming that the role of the forest was to grow trees as fast as it could, and any element that was not directly contributing to that goal was bad. Whatever was not producing timber competed with trees that could be producing timber. Any space that a dead tree took up, any light that a fir tree used, any nutrients that an insect chewed up — those were stolen from productive trees. If timber trees did not use all the available water, that water was wasted. If young, vigorous pine did not get all the sun, that sun was lost forever. These assumptions made it difficult for foresters to imagine that insects, waste, disease, and decadence might be essential for forest communities; indeed, that the productive part of the forest might *depend* on the unproductive part of the forest.

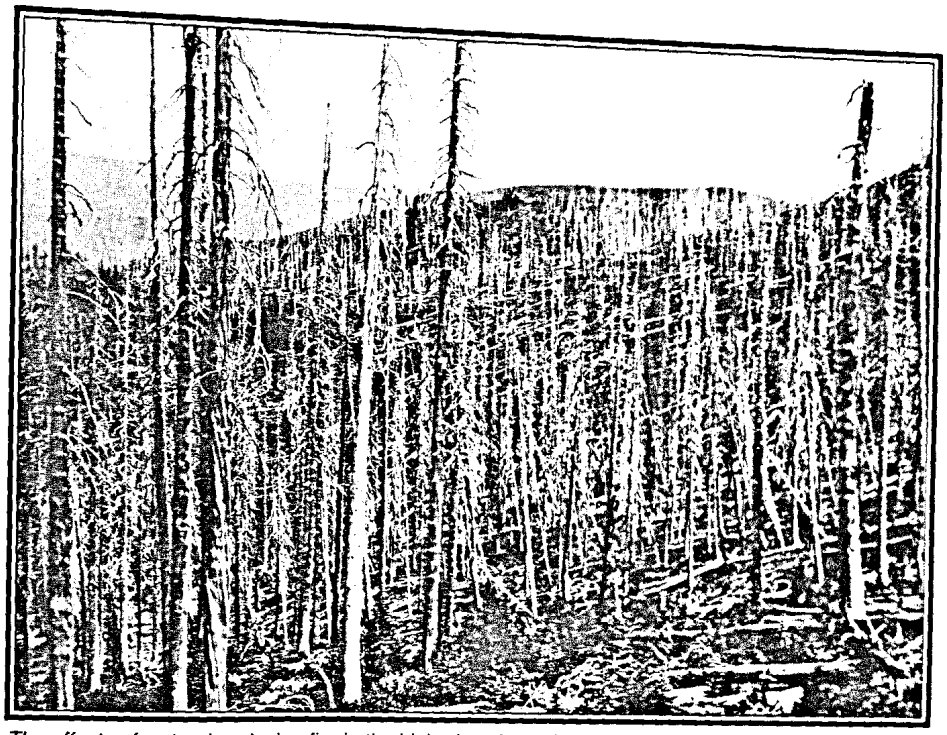
Liquidating Old Growth

Cultural ideals alone are not enough to transform forests: technology, markets, and political conditions all play important roles as well. Until World War I, for all the foresters' desire to cut old growth, the Forest Service sold little in the Blues.[21] Forest Service timber was inaccessible, prices were set so high that few contractors were willing to invest, and the industry still had enough private stock to make sales of federal timber unattractive. After the war, however, markets for public ponderosa pine opened up, since there were few remaining accessible stocks on private land, and the Forest Service began heavily to push sales of ponderosa pine in the Blues. This in turn enabled them to begin seriously the campaign to regulate the forests by liquidating old growth. Contrast this to the stands of public Douglas-fir on the west side of the Cascade and Sierras, where private stocks of Douglas-fir timber remained so high that little public fir was sold until after World War II. In the ponderosa pine lands of the inland West, the industry had many small private holdings: for example, private holdings of ponderosa pine north of Enterprise were depleted within six years after completion of the mill in Enterprise, when the industry had to turn to public holdings on what was then the Wenaha forest. Throughout the Forest Service, most foresters agreed on the ideal of transforming old growth into productive timber. But since markets for the old growth opened up at different times for different regions, intensive harvests began during different decades.[22]

The Forest Service believed that to ensure local prosperity, old-growth forests needed to be converted to regulated forests that could produce harvests forever. But to regulate the forests, planners needed markets for that timber, and they needed railroads to get the timber out to the markets. Railroads were extraordinarily expensive, particularly after the First World War. Financing them required capital, which often meant attracting investments by Midwestern lumber companies. But these companies were only going to be interested in spending money on railroads if they were promised sales large enough and rapid enough to cover their investments. The results in the Blues, as across the West, often damaged both the land and the local communities that depended on that land.

Throughout the Blue Mountains in the 1920s, Forest Service planners encouraged the construction of mills that had annual capacities well above what the Forest Service could supply on a sustained-yield basis. On the Malheur Forest alone, for example, two large sales

during the 1920s offered over two billion board feet of pine, out of only seven billion on the entire forest. Two mills followed — one capable of processing 60 million board feet a year; and another that could process 70 to 75 million board feet each year.[23] With mill capacities reaching 135 million board feet a year, it would take only 15 years — not the 60 years of the cutting cycle — to process the two billion board feet in these sales, and only 52 years to process all the ponderosa on the entire forest.



The effects of a stand-replacing fire in the high-elevation subalpine fir forests on the Umatilla National Forest, 1913.
M. N. Unser, 1913, USDA Forest Service

Even though the Forest Service sales program started out conservatively, it quickly gained a momentum that seemed to overwhelm the good sense of foresters. Throughout the 1920s, foresters set up plans knowing that harvests would drop by at least 40 percent, leading to probable mill closures in the 1980s.[24] This, unfortunately, is exactly what happened. Harvests collapsed at the beginning of the 1990s — not because of environmentalists or spruce budworm, but because planners set it up that way in the 1920s, figuring it was a reasonable price to pay for getting forests regulated as fast as possible.

The training of early foresters was heavily influenced by European silviculture, which had as its ideal a waste-free, productive stand: nature perfected by human efficiency. Early Blue Mountains foresters believed that to make the forests sustainable, they needed first to transform decadent old growth into vigorous, regulated stands. Yet until the First World War, they never tried to implement these ideals, largely because there were few markets for the trees. It was neither economically nor technologically feasible to cut the forests heavily enough to bring about intensive sustained-yield forestry.

After World War I, however, the Forest Service established extremely high rates of ponderosa pine harvests, creating the ecological and economic conditions that directly led to the forest health crisis of the 1990s. Why did the Forest Service promote such high harvests? Desire for profit, power struggles, bureaucratic empire building — each of these played an institutional role, but none can explain the motivations of individual foresters. To make sense of their decisions, we need to examine the links between ideals and material reality in American forestry.

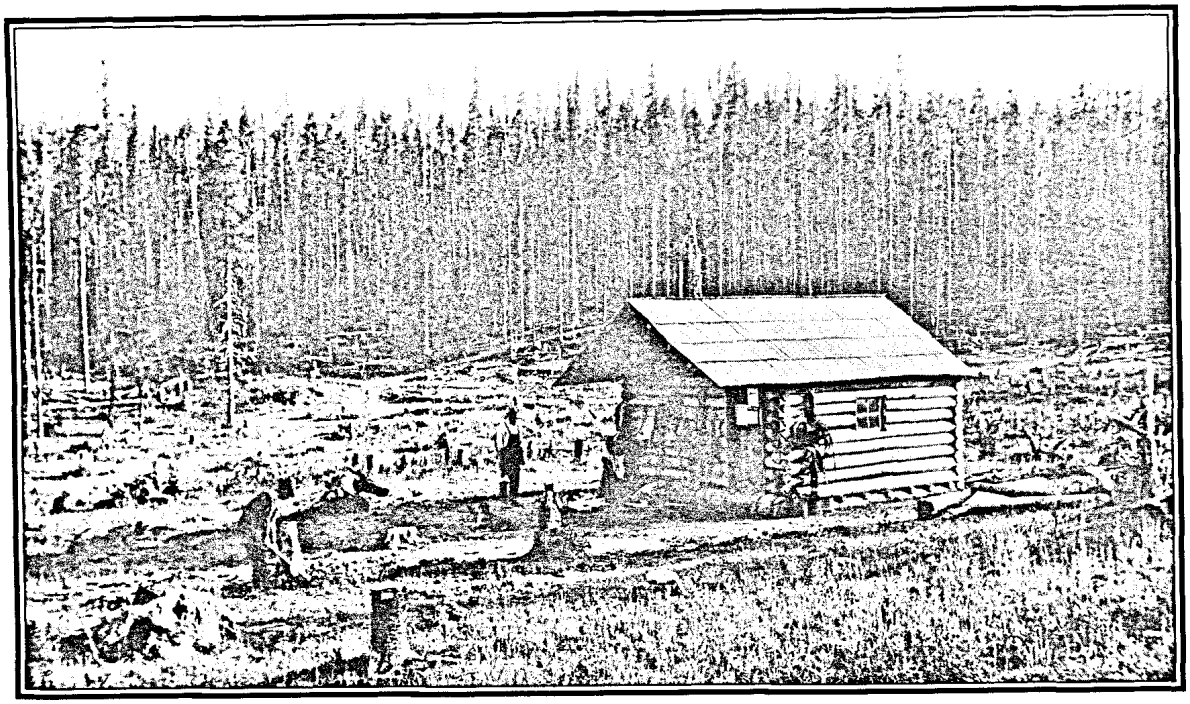
Federal foresters shaped the Western landscapes according to a complex set of ideals about what the perfect forest ought to be. In turn, these visions were shaped by available logging technology, developing markets for forest products, the costs of silvicultural practices, and what the historian Rich Harmon has called "the unrelenting pressures . . . aimed at government officials to make public resources available for private profit."[25]

After World War II, managers became ever more enamored of intensive forestry even though no one had yet proven any of its claims. No one had managed to regulate a Western old-growth forest. But the Forest Service was optimistic all the same — surely, someday soon, with the help of loggers, silviculturists would be able to transform all the Western forests into vigorous young stands growing at top speed.[26] And when that day finally came, the Forest Service estimated that loggers could harvest 20 billion board feet a year forever.[27] There hardly seemed to be an end in sight to what managers thought forests could eventually produce.

The forest health crisis changed all this. Just before the Forest Service published the 1991 Forest Health report, loggers had harvested over 860 million board feet a year of timber from the Blues — nearly 600 million of this from federal lands. But by 1993, harvests had slowed to a trickle. A lot of money, a lot of timber, and a lot of jobs were at stake. In an unusual admission of guilt and confusion, the Forest Service stated that this crisis was caused by its own forest management practices — yet no one could agree exactly which practices caused the problems, much less how to restore the forests.

Different Visions of the Past

Most people now agree that a forest health crisis now



The Clearwater Ranger Station, formerly a trapper's cabin, in a logged-over lodgepole forest in the Wenaha Forest, now the Umatilla National Forest.
M. N. Unser, 1913, USDA Forest Service

threatens the Blues, but few people agree on the solution. For many locals who are dabbling in the wise-use movement, restoration means returning to an imagined past: a time before the Forest Service came. They tell an interesting, if deeply problematic, story of what life had once been like. Before the feds came, locals say, everything was different. They say they lived in plenty, and worked out their own problems. The grass was thick, the trees were abundant, the mills were running, the towns were thriving. Then came the Forest Service, which took away access to resources and individual control over land. The implication here is that if we get rid of the federal government, we'll regain control over our place and our lives again.

One of the most vocal advocates of this point of view is Ted Ferrioli, of Malheur Timber Operators in John Day, Oregon, representative of the wise-use movement in the Blues. Much of the movement's activities in the Blues is funded by mill owner D. R. Johnson, the man who "owns" John Day, as one local resident complained. Johnson has become one of the richest men in Oregon from the federal timber that surrounds John Day, and the town itself is becoming poorer as Johnson gets richer. Nevertheless, Johnson and Ferrioli argue that the local forest supervisor's refusal to put up more timber for salvage sales is what is destroying John Day. These ideas are nothing new. In 1940, on Malheur National Forest, J. H. Allen, a county judge, wrote to Senator Rufus C. Holman, trying to get rid of Forest Service grazing regulations and run as many cattle as he liked wherever he wanted. To justify this, he turned to an idealized past, where Indians and white men roamed the hills in unregulated freedom, claiming that

> when white man first came into this section, he took his sheep and cattle and grazed them on our higher mountain slopes. He camped where he pleased and he grazed and he salted his stock where he pleased, and when he handed the area over to the Forest Service, he gave them a paradise compared to what we now have.[28]

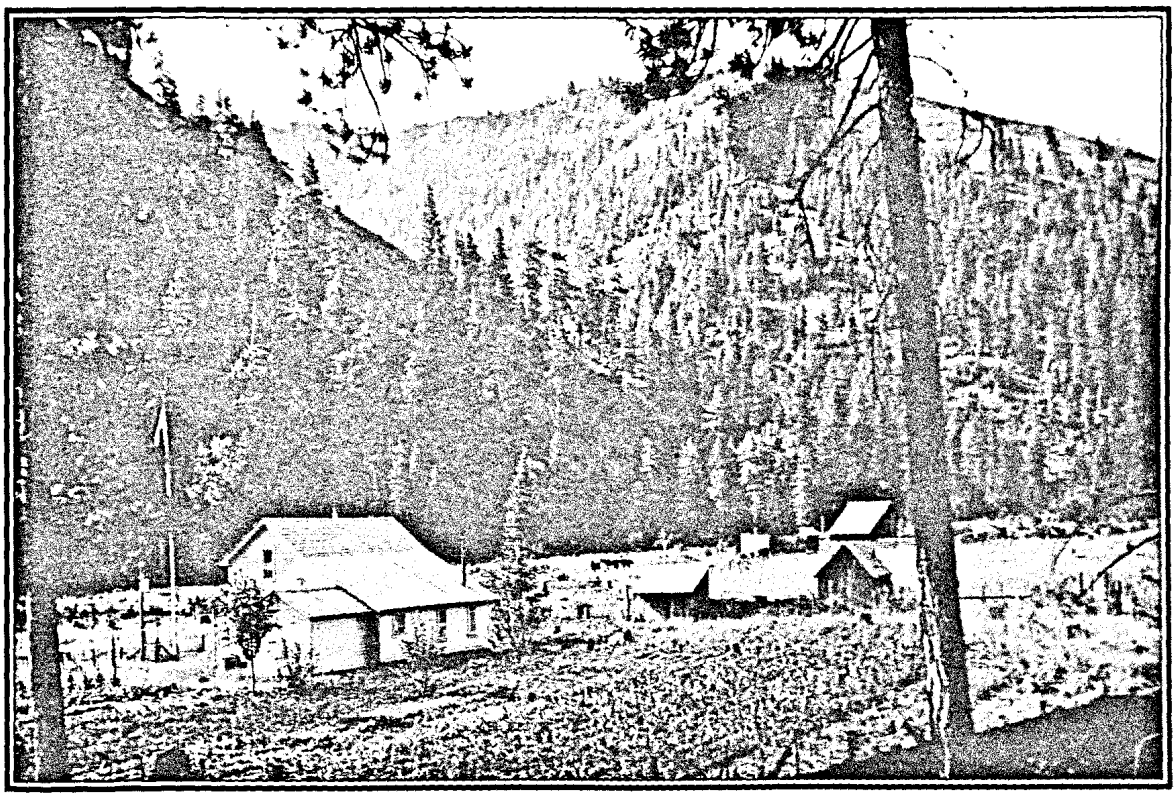
But this imagined past bears little resemblance to the cultural, economic, or ecological conditions that existed before the arrival of the Forest Service.

Before 1902, most residents of the small hill towns had had minimal useful access to resources. Midwestern timber companies were cutting heavily throughout the watersheds of the Blues. They monopolized access to railroads, while California ranching operations controlled access to water. Most logging took place along railroads owned by David Eccles of Utah, who founded the Oregon Lumber Company in Baker in 1889, financing construction of the Sumpter Valley Railway, which reached Baker to Sumpter by 1897. Logging was also intense in the ponderosa forests within the upper watershed of the Grande Ronde River. In 1890, the Smith-Stanley Lumber Company built a mill at Stumptown, later Perry, and installed the first bandsaw in northeast Oregon. The mill was later sold to the Grande Ronde Lumber Company, a large concern funded by Midwestern capital. By 1895 there were 200 loggers at work on the Upper Grande Ronde, harvesting between 15 and 20 million board feet each year from the watershed.[29] Just as today, locals had little control over the forests that surrounded them; restoring this grubby past is hardly what locals are thinking of when they talk about what things used to be like.

Many environmentalists have very different ideas about restoration. They say the best way to restore the

forest is to leave the land alone, stop logging, and let nature heal itself. Leaving the forest alone may work in the higher elevations, and roadless areas — places that have been minimally altered by the last 90 years of logging and fire suppression and so are in little need of restoration. But the lower elevation forests are a very different matter. Logging, road building, fire suppression, and grazing have degraded the soil and water-holding capacities of these forests and have increased fuel loads dramatically — and the result is a forest much less resilient to disturbance. Ecosystems have different levels of resilience to disturbance — defined as the ability to undergo change and then return to a similar, but not exact, configuration. Resilient forests may still experience catastrophic fires that reduce the forest to ash, but eventually trees return. On a site that has been degraded past its ability to resist disturbance, trees may not be able to recolonize the site. Resilience does not mean an absence of change; instead, it refers to what happens after the change. Intricate biological relationships can contribute to resilience. This relationship is dynamic rather than stable, fluctuating over time as climates and ecosystems change. Actions that upset those relationships, however, may bring about unpredictable, undesirable, and irreversible changes.[30] If we simply removed ourselves from these forests at this point, letting the forests burn might prevent the re-establishment of ponderosa pine forests for centuries. Forests usually gain resilience to disturbance not because of the properties of individual organisms, but because of ecological interactions. Restoring ponderosa pine alone, in other words, would not make a forest fire-resistant; it is the spacing of pine in relation to other trees in the forest (the landscape pattern), as well as the kinds of understory shrubs, the soil fauna, the mycorrhizae, and the water-holding abilities of the soil that allow certain forests dominated by pine to resist the effects of frequent light fires on soil nutrients. Resilience, in Dave Perry's words, "emerges from a complex of factors, including interactions and landscape pattern." These interconnected relationships within a forest will change over time even in the absence of human disturbance, but human actions can nonetheless disrupt those relationships to the extent that forests will not persist.[31] Leaving these forests alone may seem like the easiest thing to do, but it is unlikely to be sufficient, since we have so radically altered the forest communities.

For many foresters, restoration means intensive management, not an end to management. Their ideal past is one of wide open stands, with few trees per acre — a past they hope to return to with the help of heavy logging. The restoration of forest health has become intensely politicized since 1995, when President Clinton signed the Budget Rescissions Act, setting into motion a salvage logging program. The salvage rider suspended the Endangered Species Act, the Clean Water Act, the National Forest Management Act, and a host of other environmental laws across millions of acres — all under the guise of forest health. Proponents of the rider argued that heavy salvage logging would fix the forest health crisis, and restore ponderosa pine to the inland West. The effect, in just the first few months, was to triple or quadruple logging in many areas, returning harvests to the inflated levels of the late 1980s. Because many



Near the Tucannon Ranger Station, the south-facing slopes have open forests dominated by ponderosa pine, while the north-facing slopes have denser forests with more fir.
M. N. Unser, 1913, USDA Forest Service

presettlement mixed-conifer communities used to be open and parklike, proponents of salvage logging have argued that we should log out the dense understory of fir now present in these forests. As Eric Pryne wrote in the *Seattle Times*, "Careful logging and burning would help return the forests to their original condition, and reduce the scope of future wildfires."[32] Industry representatives immediately assured the public that restoration meant intensive salvage operations to save the forests. Representative Larry LaRocco, the Democrat from Idaho who pushed hard in Congress for the salvage rider to "save" the forests, argued that "the scientific consensus is going to carry the day."[33] The pressure to restore forest health gives managers the justification for something that looks very much like business as usual.

Definitions of forest health are at the root of these justifications for salvage logging, and these definitions reflect long-held cultural ideals of what a virtuous forest should look like. According to the Idaho Policy Planning Team, the best measure of forest health is when mortality is 18.3 percent of gross annual growth — the definition offered by the Society of American Foresters.[34] By this definition, intensively managed industrial forests in Idaho are in a much healthier condition than non-industrial forests, and old growth is in the worst condition of all, since mortality and growth are nearly equal. Therefore, the Idaho report concludes, intensive, industrial management is what keeps forests healthy. Early foresters justified liquidating old-growth pine forests for exactly this reason — so young, healthy, rapidly growing forests could take their place.

Salvage logging tries to restore the forests by focusing on just one element, the ecological changes in tree structure, ignoring the policies and the cultural ideals that led to the changes. It ignores the ideological basis of forest health problems, and so it ends up with a proposal that repeats the same errors that created the changes. Salvage logging ignores the political forces that led to forest devastation: namely, an economic and political system that made forests into storehouses of commodities to feed distant markets and fill distant pockets. And it gets the ecology wrong, since it does not realize that ideology and politics shape the ways one sees ecology.

For example, at the heart of the desire to save the forests with intensive management is a critical assumption that no one has yet tested — the hope that by making current forest overstories look like they used to look, we will make fires behave as they used to behave. One hundred years ago, when light fires burned frequently in some mixed-conifer forests, those forests were open, with minimal fuel loads, little organic matter on the ground, and few firs in the understory. But after years of fire suppression and intensive management, the forest is a different place. Even light fires may now have surprising effects. After decades without fire, increased litter has led to cooler microclimates near the forest floor and increased soil moisture. Root structures have changed in response, with more roots clustering close to the surface. In those conditions, even a very light fire may singe tree roots, killing old ponderosas if the soil moisture is low. The important point here is that history matters: the world has changed, so that simply rearranging the trees will not return a forest to its earlier condition. Recent prescribed burns near Bend, Oregon, for example, consumed between 32 and 69 percent of the forest floor. After repeated moderate underburns in these ponderosa stands, growth slowed significantly. The duff layer in many places has also increased with fire suppression, forming an insulating mat over the soil. In the Southwest, prescribed burns led to the ignition of heavy layers of duff that after burning formed an insulating ash cap, forcing heat into the soil, burning hot enough to kill small roots near the surface, which led to the death of 40 percent of the stand after three years.[35]

What we need to restore forest health is not just more science, more reserves, or fewer bureaucrats (although all these might help), but a broader understanding of past cultural ideals and economic forces that transformed forest communities. We also need a new vision of restoration and its relation to history. The goal of restoration should be not to bring humans back to the original, wild past, but instead to do the opposite: to restore elements of the wild back into humanized, managed landscapes.

This may sound quixotic, but several private foresters in the region are trying to do just this. Bob Jackson and Leo Goebel work a forest site that lies on a moist north slope near the town of Joseph in the Wallowa Mountains of eastern Oregon. Over the past 40 years, working for the Forest Service and Boise Cascade and growing disgusted with them both, Jackson and Goebel have developed an alternative vision of good forestry built out of their experience and out of their passion for a particular place and the obscure creatures that live there.[36]

On their land, the most valuable species were high-graded off about 70 years ago, and soil organic matter was badly depleted by clearcutting. Jackson and Goebel's primary goals have been to restore the soil fertility by nurturing dead wood and to restore a variety of species native to the site — ponderosa pine, larch, grand fir, and Douglas-fir. Growing soil means growing diversity, they argue, not just in trees, but in insects, birds, spiders, bugs, and dead wood. When they are in the woods, one of their primary concerns is counting spiders, since they think many of the spider species only return when the soil is in better condition. They hate clearcutting, fearing that while it might bring in more money all at once, short-term profit comes at the cost of soil, young trees, and organic matter. Instead, they selectively harvest, waiting until each tree is at least 18 inches in diameter. To increase growth rates, they thin young trees by hand, opening up space and light for the trees they leave behind. To get the long, knot-free lengths that bring in the best money, they do what is

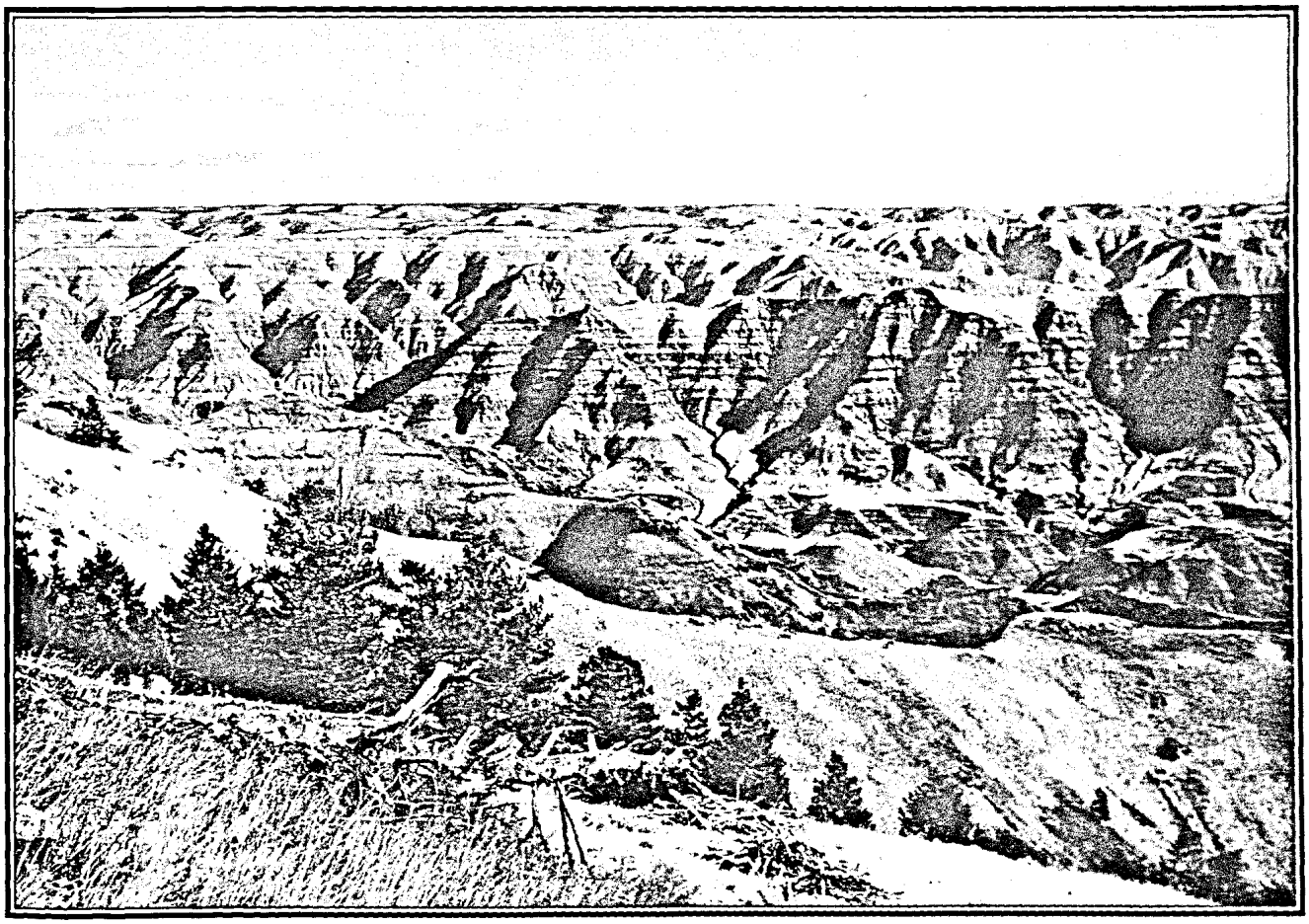
called "limbing," a labor-intensive effort that involves cutting off low branches while the tree is still growing. To control insect damage, Jackson and Goebel grow as many different tree species as possible, and keep the dead wood thick on the ground. By doing their own work, they can keep skid trail, yarding sites, and roads down to about 5 percent of each harvest area, reducing soil compaction. In the Forest Service, that figure is 20 percent. All these practices require a great deal of careful hand labor and an extensive knowledge about the forest itself. Few contractors could afford to pay people to take this much care for the land; Jackson and Goebel do it because they have a great deal of attachment to both the place and to their craft.

Although they work the land intensively, the forest looks much like old growth — multi-layered, multi-aged, with numerous trees over 18 inches in diameter, a rich soil, abundant snags, and a forest floor thick with dead wood. Trees do not grow in rows, and there is nothing neat or tidy about the place — but it is a productive, working forest all the same.

What is the cost of all that care? How much do they lose in timber production? The Forest Service estimates that on these north-facing slopes, the forest could yield 100 board feet per acre per year. Jackson and Goebel say that they can harvest 400 board feet per acre per year without decreasing their timber base. By fostering elements of old growth — tree diversity, complexity, arthropod diversity, dead wood — they argue that they can get four times the production with one-fourth the soil compaction of comparable Forest Service sites in the neighborhood. These are radical claims, and to the best of my knowledge, no one has scientifically tested them (although there is a great deal of interest among the forest ecologists in the nearby LaGrande Range and Forestry Experimental Station).

Jackson and Goebel's sustainable forestry work has managed to bring together political factions in the area who normally refuse to speak to each other. In 1994, a representative of Hells Canyon Preservation Council was burned in effigy by representatives of the local county movement — yet both of these groups now agree that what Jackson and Goebel are trying to do is the best hope for the region's troubled forests. Groups in Wallowa County with very different political goals — from the Nez Percé tribe, to ranching and wise-use advocates, to environmental groups — have managed to collaborate on a watershed plan proposing that Jackson's and Goebel's sustainable forestry practices be applied to small private forests throughout the county.[37]

Jackson's and Goebel's decision to restore forest productivity by suppressing fire, increasing soil organic matter, and managing for a mixed-age, mixed-species forest makes sense for their particular place, given their



Even in the extreme landscapes of Hells Canyon, huge trees manage to grow in the protected draws. *USDA Forest Service, Washington, D.C.*

specific goals of making a living there without destroying the forest's ability to persist. Many details of the Jackson and Goebel model would be different in other, much drier inland forests, where fire suppression is not a viable option. This approach is well suited to moist north-facing slopes. Throughout the Blues, sites such as this one were once largely covered with mixed-conifer forests: Douglas-fir, grand fir, larch, lodgepole, Engelmann spruce, and ponderosa pine all grew in small patches. Light fires were rare, while medium intensity fires burnt here and there about every 40 to 80 years on average, and stand-replacing fires came about every 200 to 300 years (during the last 2,000 years, anyway). These infrequent and irregular fires, along with insect outbreaks, windstorms, and droughts, shaped a diverse forest with different tree species and ages. Working in a high-elevation, north-slope forest, Jackson and Goebel focus their attention on organic matter in the soil and feel strongly that prescribed fire would be a disaster. Frequent fires, no matter how light they are, deplete soil of organic matter, sulfur, and available nitrogen over the long term. On sites once dominated by open ponderosa forests — which were once about 60 to 80 percent of the forests across the Blues — 80 years of federal fire suppression has backfired badly. South-facing slopes and lower elevations are much drier, and light fires once burnt through every decade on average, keeping the forests open and favoring ponderosa over Douglas-fir and grand fir. When fire was suppressed, firs began to grow thickly in the shade of the pines. These replacement firs, growing on dry sites, are now extremely vulnerable to drought, insect epidemics, and stand-replacing fires. Wide-scale forest restoration on these lands will have to restore surface fires somehow, an issue that the Jackson and Goebel example doesn't help with.

Yet the basic framework of the Jackson and Goebel model does apply to other forests. Theirs is one example of a general principle that can be adapted to other forest communities on many different, particular sites. They have turned the industrial forestry model on its head: instead of transforming decadent old forests into young intensively growing forests, they have turned cutover forests into something much more like old growth — and made a living out of it as well.

What matters for forest persistence in the inland West may be exactly what large-scale forestry has tried to remove, and what Jackson and Goebel have encouraged — death and decay, the dark stinky unnerving heart of the wild forest. They have shown that you do not need to trade this wild core off for a living. The choice is not necessarily between untouched forests and industrial monocultures; nor is it between keeping people out and the kind of boom and bust economy that industrial logging has fostered in the Blues ever since the first mill went up. The Forest Service thought science would let its foresters leap past the constraints of a local place — in this case, a cold, high land with fragile soils, fires and floods, insects and droughts, a place of extremes. Jackson and Goebel have done well not by trying to eliminate those constraints, but by restoring them, blending human culture and care with wildness.

But what can wildness mean in this intensively humanized context? What makes their forest different from Boise Cascade and the Forest Service's tree farms? The critical difference is the presence of functioning communities, where ecological (and, we hope, evolutionary) processes function with some autonomy. In contrast, most industrial tree farms are designed so that ecological interrelationships are fragmented to the point that they do not function without extensive inputs of petrochemicals. Trees exist in isolation, each one cut off from potentially competing plants by herbicides. Managers line these trees up in rows and begin to think that nature is just a collection of parts. From these machine-like forests, one learns a kind of contempt for nature; one starts believing that people can actually control both the trees and the forest.

Functioning communities do something else: they teach us the limits to human control and omniscience. A restored forest, while not entirely wild, can tell two major interconnected stories, one about change and another about the links between people and the land. Restorations at their best do not erase human history, but instead they point out the different ways people have altered the landscape, while also showing the ways the land has affected people by setting ecological constraints. What you learn when you walk in the woods with Jackson and Goebel is that all the cultures who have depended on the Blues forests have changed them in different ways, reshaping them to fit their own needs and desires. But for all the stories they wrote upon the land, none of them ever controlled the forest. People can study ecological communities, change them, pull them apart, and try to restore them: but they never have full control of ecological processes. These are lessons that both restorations and environmental histories can teach — lessons about the limits to human control that we badly need to learn.

Managers have always insisted that they can engineer the forest to produce what people desire, but the forest is far too complex for that. No matter how many facts we accumulate and how many theories we test, we will likely never have the knowledge to manipulate natural systems without causing unanticipated changes. When we manage ecosystems, all we are really doing is tinkering with processes we are just beginning to understand. There is no doubt that we can push succession in different directions — but rarely are those directions the ones we intended. The more managers alter a forest, the less they can predict the paths that succession will take. Each road we build, each stand we cut and replant with another species, each application of herbicide and pesticide adds another confounding layer of possibilities. This is startling, since the changes managers have made

in the forest have been aimed at making succession *more* predictable, not less — making more of what we want and less of what we do not want.

Much as we try, we cannot actually substitute our version of nature for the nature out there — instead, we can only play around with it a bit, tugging on this process, pushing a little on that one, adding our own agents of mortality — loggers — onto those that are always going to be out there — decay, insects, fire, and wind. Given the limits of our present understanding of forest complexity, health problems cannot become the justification for wholesale applications of thinning, burning, and salvage. We know little about how these forests function now, much less how they functioned in the past, so we need to try to recognize the limits to our knowledge and control.

Across the West, the places where we should be considering restoration are not the wilderness areas or unroaded landscapes — places where many managers now call for intensive logging in the name of forest health. Instead, we should focus on the places that have already been intensively transformed to fit human ideas of what a civilized forest should be. Those are the areas most in need of restoration. Rather than trying to return landscape to an imagined original condition, restoration does best when it offers a way of working with the continuum of humanized landscapes that occupy much of the planet — from reserves that have been minimally influenced by industrial society to urban landscapes where trees grow inside metal cages in the sidewalk. Restoration can return elements of wildness to all these managed landscapes.

What is most valuable about restoration is not the answers it gives, but the questions it raises about how people can live in a place, while also allowing nonhuman members of the community to live there, too. At its best, restoration reveals the many interconnected layers of human and natural history in a forest.

NOTES

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3. Society for Ecological Restoration, 1993, published on web site: http://nabalu.flas.ufl.edu/ser/definitions.html.
4. U.S. Natural Resource Council, Restoration of Aquatic Ecosystems (Washington, D.C.: GPO, 1992).
5. For example, see Peter Bowler, "Shrublands: In Defense of Disturbed Land," *Restoration and Management Notes,* 10 (1992): 144-149.
6. William Jordan, interview with author's class, Feb. 13, 1995.
7. John Cairns, *Restoration Ecology: Protecting our National and Global Life Support Systems* (Boca Raton, FL: Lewis Publishers, 1995), 221.
8. Mark Sagoff, "The Role of Ecological Science in Ecological Restoration," abstract for 1996 SER meetings, published at http://nabalu.flas.ufl.edu/ser/Rutgers/Scope.html.
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10. Eric Katz, "The Ethical Significance of Human Intervention in Nature," *Restoration and Management Notes,* 9 (1991): 90-96.
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14. Nancy Langston, *Forest Dreams, Forest Nightmares: The Paradox of Old Growth in the Inland West* (Seattle: University of Washington Press, 1995).
15. William Gast, *et al., The Blue Mountain Forest Health Report,* USDA Forest Service (Washington, D.C.: GPO, 1991).
16. C. S. Judd, "Lectures on Timber Sales at the University of Washington, February 1911," Forest Service Research Compilation Files, National Archives, Region VI, Entry 115, box 136.
17. Judd, "Lectures on Timber Sales."
18. Thorton T. Munger, "Basic Considerations in the Management of Ponderosa Pine Forests by the Maturity Selection System, 1936," Umatilla National Forest Historical Files, Supervisor's Office, Pendleton, OR.
19. George Bright, "Relative Merits of Western Larch and Douglas-fir in the Blue Mountains, Oregon" (1913), Forest Service Research Compilation Files, National Archives, Region IV, Entry 115, box 135.
20. For a detailed discussion of these ideals, see Langston, *Forest Dreams,* chapter 4. For a few examples of statements by early foresters about old growth, see C. S. Judd, "Lectures on Timber Sales at the University of Washington, February 1911," Research Compilation Files 136, Henry Graves, *Annual Report of the Forester 1912,* USDA Forest Service (Washington, D.C.: GPO, 1912), 16. Thorton T. Munger, "Basic Considerations in the Management of Ponderosa Pine Forests," and letter by C. J. Buck, Regional Forester, to Blues supervisors, Sept. 15, 1936; Umatilla National Forest Historical Files, Supervisor's Office, Pendleton, OR.
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33. Larry LaRocco, quoted in article by Eric Pryne, "Unease Over Logging to Control Fire," *Seattle Times*, Sept. 10, 1994.
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