Management Principles for Maintenance

In Fire-Prone Federal Forest Lands

By Michael Newton[1]

Introduction

This essay identifies some useful strategies for fuel and regeneration management that will minimize difficulties in avoiding and suppressing fires while improving productivity of federal forests. It is no accident that these strategies are widely used on private lands, and that there is an obvious connection between fuel management and risks to high productivity of these lands for timber and for habitat for many wildlife species. The main purpose is to free up a federal agency to use approaches successfully used by private practitioners, and to bring attention to the forest protection needed when public and private lands interlock as in checkerboard ownerships. Topics addressed here include methods for controlling vegetation with herbicides to reduce competition with conifers and ameliorate hazardous fuels, snag management to maintain habitat with minimum risk of fire are briefly described here, and a system of sustainable forest management adaptable to federal lands to accomplish multiple objectives while protecting adjacent private lands. The potential benefits of applying these principles is a major feature of this conversation. The intent of this essay is to provide information about herbicides and snag management and intensive long-rotation management so that all who observe outcomes of forest management can be aware of the need for the restoration of pro-active approaches in federal forest lands. A proposal for study of fire-influenced streams is recommended. Dealing with these constraints and opportunities will necessarily depend on removing several critical administrative constraints.

Administrative constraints and implications for neighbors and community

The intermingled sections of federal land on O&C Trust properties expose four miles of interface along boundaries with private landowners to events on this ownership. This is a large risk factor for adjoining private ownerships. It cannot be helped except by land trading. There are several important administrative decisions leading to changes in management of federal forests that have led to elevated risks to neighbors, failure to maintain diverse habitats, and failure to maintain yields in support of the O&C Land Trust Charter. These decisions must be reversed in order to meet federal land management goals along with risk reduction to neighbors.

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These federal actions would greatly improve the degree to which the federal government would reduce risks of wildfire, and meet land-use objectives according to federal law and the O&C charter:

1. Reverse the decision to commit roughly 80 percent of federal forest lands, including O&C Lands, under the Northwest Forest Plan, to Late Successional Reserves (LSRs) in order to protect northern spotted owls (NSOs). It is now understood that this action did not have the desired effect on the NSO; among other limitations, it provides no action to renew early seral habitat or maintain the Douglas-fir forest while providing harvests. It fails altogether to meet the O&C charter's goals.
2. Prohibition of complete snag falling in fire-sensitive areas, hence failure to protect neighbors as well as its management goals.
3. Limitation of reliance on even-aged management with clearcutting to achieve long-term habitat, yield and safety goals; allow adoption of long-rotation, even-aged intensively managed forests.

The first two of these simply accentuate evidence that the interpretation of the Endangered Species Act cannot exclude the role of disturbance in maintaining either landscape level diverse habitat or continuity of function in any given stage of development. These are dynamic systems that need periodic renewal. The plan must adapt to the land and its natural history along with the possibility that destructive fires will destroy entire stands of old forest and most of the habitat it provides. The second addresses the destruction associated with lightning risks and need for major reduction in frequency of snags in high-threat areas. This is a result of preserving the snags on all acres as well as the minimum-disturbance management system. This conflict involves increased risks to neighboring lands and the liabilities that result from deliberate maintenance of hazards. The third of these would mandate on federal lands the adoption of a management scheme that would eliminate nearly all the limitations of the NW Forest Plan, while providing greatly enhanced yields and guaranteeing that all stands would be managed at some period of their lifetimes, for all benefits all the time, with each benefit gradually shifting around entire landscapes. This plan would address most or all of the problems that follow.

The O&C Land Trust and U.S. Forest Service lands in the Pacific Northwest occupy a range of sites representing a gradient in which fires become more frequent with southerly and eastern directions, with adjustments for elevation and rainfall. Low elevations in southwestern Oregon and California are especially driven by histories of frequent fire. The dominant species of trees in our most productive forests include Douglas-fir as a regional definer of the forests of the Pacific Northwest. The natural propagation of this species throughout its range followed fires that killed most or all of existing local stands without destroying the seed crop in crowns of

standing burnt trees, whether fires were anthropogenic or natural. Thus this species was a pioneer in dominating subsequent vegetation. Both terrestrial and aquatic ecosystems have naturally adapted to this history. Management of these lands must consider the need for handling this risk factor in a constructive way, substituting harvests and controlled burns for wildfire, and acknowledge the role of frequent fires as a direct conflict with LSR designation.

A complete revision of management on federal lands is needed to meet all management objectives as outlined in the O&C Charter. Our research and others has made clear in long-term studies that all the biological and economic objectives now assigned for LSRs can be achieved with general adoption of these guides associated with even-aged management:

1. All fire-prone lands would be put under a plan with management in *even-aged,* Douglas-fir-dominant, stands in quarter-section or larger units, and in aggregations of smaller units.
2. Landscape arrangements of cutting histories would create manageable groups of large- and small-scale habitats with each stage of succession somewhere in functional-sized mini-checkerboards.
3. In southwestern Oregon and northern California, active management with rotations of 150-180 years is feasible on poor sites, 120-150 on better sites, with multiple commercial thinnings through about 70-80 years.
4. Yields would be *much higher than in any management system now extant* on local O&C or private lands as a by-product of maintaining these landscapes. It would not fluctuate.
5. Half the federal landscape would always be in stands with old-growth features indefinitely while being rotated slowly withinlarge landscapes.
6. Stands recently harvested and regenerated, often as sprayed units along with periodic commercial thinnings, would provide premium early- as well as late-seral habitat now missing on LSRs;. Vegetation management prescriptions to promote ideal composition of residual forage to be used by wildlife while minimizing competition to wide-spaced conifer seedlings.
7. Road maintenance needed to maintain these stands, along with opportunities for snag management and density control, will sharply reduce fire risks.

The above points may be augmented. They reflect a set of policy changes with greatly reduced costs and greatly increased revenues on federal lands. They reduce risks on all forest lands. There are many risks avoided with Long-Rotation Even-Aged Management and many benefits in all categories of real environmental management. Of great importance in the above management system is fuel management. Cycles of replacement-type fires vary with rainfall and humidity patterns. Parts of Southwest Oregon have a natural fire frequency of as little as

50 years; some in the Olympic Peninsula perhaps >500 years. The above even-aged management scheme would regulate fire-type disturbances. Much of southwestern Oregon and northern California are occupied by evergreen brush and hardwoods that now burn too frequently to have Douglas-fir or ponderosa pine dominate the regeneration; these shrubs and hardwoods often have seeds with very hard coats that tolerate high temperatures, and for which fire is the stimulus for germination leading to immediate recovery of brush instead of conifers. Control of early seral vegetation can enhance both conifer growth and forage, and break the cycle of wildfire that depends on the sclerophyll forest.

Elevated yield of forest products as a by-product of landscape management on O&C lands is an important benefit of both intensive management and habitat maintenance. Much of the O&C land in SW Oregon Districts of BLM was "withdrawn" from timber management for many years because of the cost and futility of attempts to reforest after fires or harvest. Our experiments reported that well-protected regeneration reflects that most of the sclerophyllic shrub/hardwood forests are far more productive for all resources after spraying than was envisioned before the decade of FIR research by Oregon State University, as evidenced by my studies that remain under observation.

The 2013 and previous years' extensive fire problems in SW Oregon have led to a) high reforestation costs and low yields on federal lands subject to re-burns because of agency decisions/agreements to *not use herbicides or clearcutting,* b) High fire suppression costs on intermingled private lands managed for both fuel reduction and commercial timber production, and c) a set of rules on federal lands that prevent reduction of fire hazard in the form of large numbers of snags in both Matrix (permits harvesting) and LSR areas, and which lead to fires that spread to private lands. The following paragraphs outline key elements of long-term programs facilitating recovery and protection of burned-over and adjacent green timber

<u>Vegetation Management</u>

Forest fires are driven by fine fuels desiccated by hot dry weather, accompanied by wind. Fuel continuity is a major risk factor. Large tracts of unbroken forest fuel lead to large fires. Fuel breaks and clearcuts are important management strategies in putting boundaries where fires can be stopped. The role of clearcutting in harvesting of forests accompanied by slash treatment is important in creation of gaps in fuel. The role of herbicides in creating fuel breaks as well as facilitating seedling growth on public as well as private lands can be seen clearly. Our research on effects of competition on Douglas-fir and ponderosa pine regeneration shows highly significant reduction in forest productivity if conifers must compete with hardwoods and shrubs that also become poor forage when out of reach. The multiple role of excess broad-leaved species as fuel, suppressor of forage plants, and competitors to conifers

places a high priority on preventing significant development of these plants when managing for fire safe, productive forests and their wildlife habitats. The role of competition is quantitative.

The public perception that herbicides are dangerous when used in forests is not supported by the registration process at state and federal level, nor the scientific effort in providing data on efficacy as well as safety to wildlife, water and the humans who handle them. The public is not exposed at any point. Recent complaints near Eugene, Oregon, have led to costly evaluations of how children could have 2,4-D in their urine. Results indicate that virtually all Americans have traces of 2,4-D levels in their urine, in quantities too small to detect until recently, and to be present in quantities less than a millionth of levels needed to cause illness. Human exposure is not a health issue, it is a political issue. Science absolutely does not support the current restriction of herbicides from federal use.

Part of the controversy over herbicides is that those unaware of demands of weed control have no information about the non-chemical methods of control. Cutting the brush by hand or saw, or pulling up by roots has been evaluated at some length. Oregon's State Industrial Accident organization has summarized medical claims from injuries or other negative effects of this kind of work. Over a two-year period, medical treatment for aerial application of herbicides was required at the rate of one accident per one hundred thousand acres. treated. For hand cutting with saws and other cutting equipment, there were eight accidents per thousand acres. The ratio of medical costs was 1:10,000. The decision to cut brush by hand reflects a gross misunderstanding of safety by those who make this decision. Alternatively, the decision leads to an abandonment of vegetation control either for protection of plantations or reduction of fuel. There is a very important need for public information about the consequences of this decision.

In short, with the hundreds of thousands of commercial applicators handling chemical weed killers, intoxication by herbicides has been observed *only when associated with direct ingestion* or near immersion in technical concentrate, i.e. direct, massive contact or deliberate ingestion of very large amounts, as in attempted suicides. The millions of dollars needed to register the uses of these products by the general public have provided a great deal of evidence, and provision of safety when used according to each herbicide's legally mandated label. No such regulations exist for alternatives available for controlling forest vegetation, and none of the available information offers evidence that manual weeding in forests provides comparable control either of fuel or of plant competition. The very small amount of chemical applied to each square foot of land is of no toxicological consequence unless one is evaluating vascular plants. The EPA's "Silvicultural Chemicals and Protection of Water Quality" manual defines levels of potential stream contamination that may be reached with no effect on aquatic biota, protected by large safety factors.

Snag management

Coniferous forests prone to fires typically have long, hot dry summers. This is why fires in forests with fine fuels are so intense and devastating. Areas in southwest Oregon support abundant vegetation from which a great deal of leaf-fall and dying shrubs or lower branches of trees provide instant flash-fuel. Other areas with more rainfall do not create so much fuel during the dry season, hence are less fire-prone. Moreover, southwest Oregon is in a broad geographical band of frequent electrical storms that crosses from northwestern coastal California into southwest Oregon, eventually passing along the Cascade Mountains. Lightning strikes occur in all kinds of topography, but they are most frequent in snags located along ridges. The dry forests of southwest Oregon are burned with high frequency. Presence of dead trees (snags) functions as highly flammable lightning rods, are most likely in old-growth stands.

Snags are habitat for various hole-nesting and bark foraging birds. They are important habitat. They *do not need to be present on ridgelines or on all acres*. If restricted to lower slopes, common sense suggests that they will be struck less often, and the fires less subject to the winds that spread fires quickly. Obviously, there are exceptions to the latter topic, but matters of this kind are statistical. And statistics would appear to support restricting snags to lower slopes. Moreover, if it is necessary to retain snags on upper slopes, these trees can be topped by climbers to make them shorter and less attracting to lightning. Under what circumstances are LSR rules (presently 5 snags per acre?) justified in retaining snags on every acre?

Harvesting and Regeneration: Silvicultural Systems

Few, if any, of the O&C Trust Lands in southwest Oregon are being harvested in ways that sharply reduce risk of fires; according to the Washington Office of the Forest Service, there is an 80 million-acre backlog of hazardous fuel reduction activity on federal forests. Unlike local industry lands, residual green and dead trees are left in large numbers and groups, in contrast to strategic locations of required snags in private lands far from accumulations of fuel or strategically sensitive ridgelines. The limitation of harvesting to partial cuts on Matrix lands and negligible harvesting in LSRs exacerbates the above problems.

Long-term maintenance of federal lands must rely on even-aged cultures in long rotations in order to perpetuate Douglas-fir management. Above, note the reference to long-rotation systems, with commercial thinnings at several intervals, thinning from below. Our experiments directed toward this approach suggest that on average to poor sites, no more than about 40 trees per acre need persist to rotation ages of up to 180 years, reduced to that level for the last 70 years of the rotation to ensure mature-forest habits while still providing high yields at rotation. Our data indicate that harvest by-products of such rotations will yield mean

annual yields of 700 to nearly 1000 gross Scribner volume per acre per year on sites IV and III on federal land in SW Oregon, and 1000 to 1500 per acre per year on sites II and I in NW Oregon. By the process of creating early seral cover and reforestation with widely-spaced plantations (200-300 TPA, such yields are an important benefit to County revenue. The concern for low rates of return in long rotations is not relevant on federal land where nobody but taxpayers have an investment in standing timber. Although internal rate of return is low, absolute return on investment in these stands is extremely high because they make maximum growth between ages 70-120. Comprehensive research by Dr. Robert Curtis, of US Forest Service PNW Research Station, established these data over very long periods, and are confirmed in my research on a variety of sites in western Oregon.

The lack of federal management to reduce shrubs and hardwoods without increasing fine fuels is also suggested as a risk factor as well as a factor that ensures lower yields. My research in both the Roseburg and Medford Districts of BLM land, along with FIR studies, observed that the growth of planted trees with very low brush competition provides a realistic expression of the true land productivity. Experiments with moderate to severe competition show much poorer seedling growth and excessive mortality, leading to underproductive stands, or failures, *and poor forage*.

Incomplete control of unpalatable shrubs, especially evergreen species, also threatens heavy mortality of planted seedlings and increased costs of planting. The inability to plant widely spaced trees and depend on high survival limits ability to minimize fine fuel development in the plantations. On moderately poor to average sites, having seedlings widely spaced reduces the time needed to achieve merchantable size, and enhances the intermediate yields of forage associated with commercial thinning. It also avoids the cost and fuel loads associated with pre-commercial thinning.

Reference is made to the proposed “Pilot” projects. These rely on leaving residual patches of green timber and snags for habitat with less continuity than observed in long-rotation, even-aged culture. They rely on hand control of competing cover. They do *not* minimize slash, do not enhance regeneration growth, and do not create large clearcuts where opportunities exist for fire breaks or highly accessible early-seral habitat. They do allow some harvest. Long term data for evaluating their prognoses are not available, and intensive data collections are not anticipated. Meanwhile, there is abundant evidence in adjoining private lands that harvested stands with slash burned or piled, and planted with widely spaced plantations protected by vegetation control are relatively safe from locally initiated fires and are productive for timber and early seral habitat.

Of great importance with long rotations and substantial clearcuts is the biodiversity these stands provide. Emphasis in the news is in the importance of old growth for habitat. Dr.

Matt Betts, of Oregon State College of Forestry, has focused on biodiversity in clearcuts as well as thinned and uncut mature forests. He and his team have observed, for example, 17 species of ground-nesting birds and their predators that thrive in clearcuts but do not abound in mature forests. My work with comparisons of clearcut, cleared and sprayed, and uncut stands reveal the need for both standing and cleared areas, with different cover attracting different species of plants; riparian forests attract yet another suite of species. Our data illustrate that periodic commercial thinnings complement the early-seral habitat generated by clearcutting, and with each entry, there is a period of renewal of understory forage and plant species diversity and abundance. The same thinning accelerates old-growth features in the overstory and subsequent growth in mature tree sizes, leading to old-forest habitats in less time than in naturally regenerated and unthinned stands. Our work also provides evidence that opportunities exist for spraying to enhance desirable species in such stands as late as age 70. The same studies reveal that, depending on levels of thinning, underplanting various shade-tolerant conifers is successful with very modest additional investment after each thinning. This approach is clearly a multiple-resource approach that achieves objectives on purpose rather than as random events that may or may not occur.

Of great importance is that well distributed clearcuts with slash properly treated will be excellent fire breaks in which too little fuel is present to build up heat. Wide spacing of planted trees (12-14-foot square),weeded, will provide sparse fuel with well developed forage for at least two decades and decrease cost of reforestation and pre-commercial thinning.

Summary

Federal and private forests operate under different constraints. Public land constraints of several kinds need to be modified or removed to allow pro-active resource-benefited management of lands and habitats, with very substantial yield of by-products to aid counties and their economies. Practices on private commercial forest lands appear capable of handling fires initiated within their ownerships, with reforestation practices ultimately suited to terrain and habitat needs, and need little discussion here. Ensuring that consequences of fire on streams and their buffers are known is an important opportunity with large implications for stream buffers on half a million acres of private lands in Oregon, along with the fishery they protect. It is the thesis of this essay that high costs are preventable, risks can be reduced, and habitats improved while dollar yields will rise under moderately intensive management for multiple use. This is as intended under the charter of O&C Land Trust lands.

Absent a change in the public land constraints that prohibit the use of herbicides to control brush species after tree planting and limit the amount of snags that can be felled and removed to provide fire breaks, the federal lands in the Douglas Complex burn will revert to

brushfields with snag overstories and prime targets for reburns. Unfortunately the private landowner who reforests adjacent to this extreme fire hazard will be at risk as well.