Managing Mature and Old-Growth Forests

A Position of the Oregon Society of American Foresters

The Oregon Society of American Foresters recognizes the unique characteristics and values that mature and old-growth forests provide. Although there are many definitions for old-growth and none are exact, we describe old-growth as forests having: large snags and downed logs; some patchiness (openings, sometimes brushy and caused partly by loss of large, dead and dying trees); one or more canopy layers; and trees of various size and ages, with some relatively large, old trees. Not all forestlands had or will ever achieve this kind of condition. Exact amounts, tree sizes, and ages for development of each of these forest attributes vary depending on forest type, and some are naturally more uniform or younger (e.g., lodgepole pine and aspen forests) due to frequent natural disturbances such as fire and wind. Mature forests, the stage of stand development preceding old-growth forests, contain some attributes of old-growth forests (e.g., some large diameter trees) but lack other key old-growth characteristics. However, not all mature forests will become old-growth because of natural disturbance (e.g., fire).

A common perception is that actively managing old-growth is inappropriate or incompatible with other values, resulting in proposals to set aside mature and old-growth forests and prohibiting any form of management. ***However, even where non-timber values are primary, active management of mature and old-growth forests may be necessary to promote and/or sustain ecological values over time.*** This is especially true of forests in dry fire-prone landscapes. Old-growth management may include everything from preservation to some level of prescribed burning, thinning trees of various sizes (to reduce competition and preserve big trees from the effects of drought and climate change, insects or disease), salvaging, and planting. Such treatments would not be needed every year; in fact, there may be many decades of inactivity between periods when management actions are most effective.

Therefore, a “one-size-fits-all” management approach to every mature or old-growth forest will not address the range of unique and dynamic forest conditions that occur. ***Rather, site-specific plans will be much more effective in achieving and maintaining old-growth characteristics. These plans should carefully consider local ecological conditions and objectives, social concerns, and policy constraints of the owners or managers.***

Issues

Concerns about mature and old-growth forests raise many management issues and challenges, which highlight important differences in perceptions, values and philosophies. A common issue is the invocation of a single, simple solution for a diverse and complex situation. This complexity is shown by the range of questions that must be addressed to effectively manage mature and old-growth forests on a site-specific basis, including: 1) the definition of an old-growth forest; 2) the potential uses and values of mature and old-growth forests; and 3) the detailed objectives and policy constraints for management. Similarly, disagreements have stemmed from widely varying public perceptions and preferences, including: 1) the idea that nearly all pre-European settlement forests in Oregon were old-growth; 2) the perception that mature and old-growth forests are permanent and unchanging over both time and space; and 3) contrasting views about the preferred approach or philosophy for managing mature and old-growth forests, e.g., from preservation to active management.

Current examples of old-growth management issues include policy directives or advocacy for specific tree diameter (e.g., 21 inches) and age limits (e.g., 80 years), at or above which no trees can be harvested. This approach greatly simplifies the definition of old-growth to a set of relatively arbitrary diameter or age criteria, and does not address the complexity and dynamics of old-growth forests, their development, or compatible management objectives.

Background

The definition of an old-growth forest is not exact (Helms 2004). A few large individual trees of old age do not constitute an old-growth forest. Old-growth forests often have a patchy appearance, trees of various sizes and some of very large size, and large snags and downed wood. However, no one single attribute, be it appearance, tree age, tree size, canopy structure (foliage layers), or species composition, can consistently define old-growth. The area or size of an old-growth forest is also important in this discussion. Old-growth stands of small acreage may not be effective habitat for old-growth dependent wildlife species, but may serve as "aesthetic" old-growth for the public and for educational purposes and provide important microsites that increase the ecological diversity of a forest.

The term "late-successional[1]" is sometimes used as an ecologically based descriptor of old-growth forests. Ecological definitions have value in that they are based on forest processes (e.g., succession and disturbance) and resulting forest structure. However, old-growth is often perceived by many as a qualitative forest condition; a condition that can invoke awe, wonder, inspiration or even veneration. Evidence of the range of popular definitions is shown in the simple descriptors placed on old-growth forests, such as cathedral, heritage, or ancient. These labels also carry preconceived or value-based notions of the attributes of an old-growth forest, although some old-growth forests may not be consistently viewed as "cathedrals" and some may not be "ancient" yet contain old-growth attributes. Lodgepole pine and aspen trees, for example, are not long-lived species and thus these forests may contain "old-growth" attributes that are unique to them and far different from old-growth species with longer life spans (Spies 2004). A forest type and site-specific understanding of a particular forest and its associated values is more useful than an inexact label.

Historically, old-growth forests had great commercial value when harvested for timber products, and they supported the development of many Oregon communities. Although still valuable and prized for certain uses, large trees from old-growth forests currently are used less for timber because changes in log supply have forced most mills to retool to manufacture forest products from younger and smaller trees. Old-growth forests now are recognized for much broader values, including wildlife habitat, recreation, genetic reservoirs, watershed functions, carbon storage, scientific research, sites that preserve our North American heritage, and simply their awe-inspiring character.

Forests with older trees can be found in different ownerships, each managed under unique objectives and legal requirements including, in the case of federal lands in Oregon, specific mandates for old-growth management. Not all of these older forests contain all of the features of a fully developed old-growth forest, but many of them contain old-growth elements such as large live and dead trees. Private landowners have greater leeway in setting their own management objectives and related actions. Although little fully developed old-growth remains in private ownership, forest landowners in Oregon must leave some level of snags and downed logs in harvest areas. In general, as long as applicable regulations concerning fish and wildlife habitat protection are met, private landowners in Oregon may harvest trees in these older forests, some of which may meet an ecological definition of old growth.

Old-growth forests have important and diverse values that may not conflict as much as often believed. It is notable that large areas of state lands in Oregon with mandated timber production goals now are being actively managed with longer harvest rotations to create valuable old-growth-like habitat features for fish and wildlife, while also generating economic benefits for local communities. This approach has not satisfied all interests and significant pressure to produce forests with mature and old-growth features persists. For example, recent attempts have been made to further restrict management practices on private and state lands through regulatory changes and ballot initiatives to maintain or promote mature or old-growth forests for non-timber

[1] Succession is the natural, gradual supplanting of one plant community type over another, with a "late-successional" community often considered as part of a final, long-term stage before a catastrophic event (e.g., wildfire) repeats the process, initiating "secondary" succession.

values. However, it is the mix of forests ownerships managed for a range of forest conditions (young to old) that together produce a forest landscape with very high overall ecological and socioeconomic value.

As a collection of living, dying and dead organisms with many natural influences, old-growth forests are constantly changing and some have a finite "lifespan." This would be true even in the absence of human influences. The common perception is that before pre-European settlement, nearly all forests in Oregon were old-growth. Although direct evidence is limited, studies have concluded that the amount of old-growth before European settlement varied over the centuries from about 30 to 70 percent across forested landscapes in northwest Oregon (Teensma et al. 1991, Wimberly et al. 2000, Wells and Anzinger 2001, USDA Forest Service 2003). Today, approximately 6.5 million acres of mature and old-growth forests exist in western Oregon and Washington (USDA Forest Service 2003). All forests, including old-growth forests, will eventually succumb to natural, destructive disturbances (e.g., wildfires, windstorms, insect infestations) and then regenerate over time. Although we may be able to protect old-growth forests from some disturbances, it is not possible to protect them from all disturbances, and values for which old-growth is desired may not be adequately maintained without planning for growing old-growth forests of the future.

The management strategy used for old-growth values depends on the mix of ecological goals and the environment in which the forest occurs. Where biodiversity is the primary goal, conservation of old-growth is based on a range of management strategies ranging from passive to active management. In many cases mature and old-growth forests and associated values can benefit from active management as a substitute for natural disturbances (e.g., wildfire) and processes that have been reduced or altered by human needs or activities. In some situations it can be effective to mimic natural processes like fire and insect outbreaks with silvicultural techniques (e.g., thinning and prescribed fire). This is particularly true in fire prone forest types or in uniform plantations once intended primarily for timber production. These actions may reduce or avoid the undesirable impacts of catastrophic natural events to both the site being managed and the surrounding area. There can even be instances where substantial tree harvesting may serve as an effective surrogate for natural disturbances that promote desirable old-growth characteristics, particularly if some dead wood and large trees are left on site. With a blend of ecological, social and economic objectives, landowners can use active management strategies to produce some key old-growth features in stands managed also for timber production, including long rotations and the retention of large live and dead trees.

Importantly, reduction of old-growth stand density by thinning understory trees has been shown to improve tree health and vigor (Stone et al. 1999, Latham and Tappeiner 2002, McDowell et al. 2003), in turn improving their resistance to bark beetles while also reducing the risk of stand-replacing wildfire; this is particularly important in dry forest ecosystems. Such actions can be especially valuable for extending the life of existing old-growth trees and forests while other younger forests develop into an old-growth condition. Thinning in mature forests may hasten the development of old-growth structural characteristics (Bailey and Tappeiner 1997; Acker et al. 1998). Similarly, Newton and Cole (1987) reported substantial successes in achieving large trees and old-growth character in westside Douglas-fir after extended periods after heavy thinning, and that long rotations with such management could combine old-growth features on large parts of the landscape while producing some high quality timber. Where stand-replacement fire has destroyed existing old-growth forests, active restoration can effectively re-establish conifers to help ensure the potential and timely progression towards future old-growth conditions. Without reforestation and vegetation management, re-establishment of conifer forests in some areas may take centuries, particularly on sites that burned uncharacteristically hot and face severe competition from plants that limit conifer establishment.

Conclusions

Oregon's forest owners and managers have different goals that lead to a range of management approaches that promote diverse old and young forests with high ecological and social values. The overall pattern and distribution of forests is an important consideration in sustaining a broad range of values from our forests, and in providing for old-growth features and functions as forests change over time.

Misunderstandings and disagreements about the management of old-growth can be reduced by addressing key questions and considerations raised in this discussion, including careful attention to local conditions and concerns. Like the management of other forests, success of old-growth forest management will be greatly enhanced by current knowledge and experience-tempered, site-specific plans prepared by professional foresters and other specialists; that is, plans that carefully account for site-specific conditions, detailed management objectives, and applicable legal mandates and social concerns.

Selected References

Acker, S.A., T.E. Sabin, L.M. Ganio, and W.A. McKee. 1998. Development of old-growth structure and timber volume growth trends in maturing Douglas-fir stands. Forest Ecology and Management 104:265-280.

Bailey, J.D., and J.C. Tappeiner. 1998. Effects of thinning on structural development in 40- to 100-year-old Douglas-fir stands in western Oregon. Forest Ecology and Management 108: 99-113.

Franklin, J.F., K. Cromack, Jr., W. Denison, A. McKee, C. Maser, J. Sedell, F. Swanson, and G. Juday. 1981. Ecological characteristics of old-growth Douglas-fir forests. General Technical Report PNW-118. USDA Forest Service Pacific Northwest Forest and Range Experiment Station, Portland, OR. 48 p.

Helms, J.A. 2004. Old-growth: what is it? Journal of Forestry 102(3):8-12.

Kimmins, H. 1992. Balancing Act: Environmental Issues in Forestry. Univ. British Columbia Press, Vancouver, BC.

Kohm, K.A. and J.F. Franklin (eds). 1997. Creating a forestry for the 21st century. Island Press, Washington, D.C.

Latham, P., and J. Tappeiner. 2002. Response of old-growth conifers to reduction in stand density in western Oregon forests. Tree Physiology 22:137-146.

McDowell, N., J.R. Brooks, S.A. Fitzgerald, and B.J. Bond. 2003. Carbon isotope discrimination and growth response of old *Pinus ponderosa* to stand density reductions. Plant, Cell Environment 26:631-644.

Newton, M., and E.C. Cole. 1987. A sustained-yield scheme for old-growth Douglas-fir. Western Journal of Applied Forestry 2(1):22-25.

Oregon Society of American Foresters. 2003. Active Management to Achieve and Maintain Healthy Forests. Available at: www.forestry.org/policy/index.html.

Spies, T.A. 2004. Ecological concepts and diversity of old-growth forests. Journal of Forestry 102(3):14-20.

Stone, J.E., T.E. Kolb, and W.W. Covington. 1999. Effects of restoration thinning on presettlement *Pinus ponderosa* in Northern Arizona. Restoration Ecology 7:172-182.

Teensma, P.A., J.T. Rienstra, and M.A. Yeiter. 1991. Preliminary reconstruction and analysis of change in forest stand age classes of the Oregon coast range from 1850 to 1940. Technical Note T/N OR-9. USDI Bureau of Land Management, Portland, OR. 9 p.

USDA Forest Service. 2003. New findings about old-growth forests. Science Update. Issue 4. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. Available at: http//:www.fs.fed.us/pnw.

Wells, G. and D. Anzinger. 2001. Lewis and Clark Meet Oregon's Forests: Lessons from Dynamic Nature. Oregon Forest Resources Institute, Portland, OR.

Wimberly, M.C., T.A. Spies, C.J. Long, and C. Whitlock. 2000. Simulating historical variability in the amount of old forests in the Oregon Coast Range. Conservation Biology 14:167-180.

Position adopted by the Oregon SAF Executive Committee October 31, 2005 and supported with 96% approval in member referendum December 2005. This statement will expire October 31, 2010, unless after thorough review it is renewed by the Committee.