Photo © Bruce Newhouse

Strategy Habitat: Late Successional Conifer Forests (low and mid-elevations)

Ecoregions:

Late successional conifer forests are a Strategy Habitat in the Coast Range, Klamath Mountains, and West Cascades. Although late successional conifer forests occur at all elevations, the Conservation Strategy focuses on ones at low and medium elevations (primarily below 4,500 in elevation).

General Characteristics:

Late successional forests are defined by the plant species composition, overstory tree age and size, and the forest structure. They include characteristics such as a multi-layered tree canopy, shade-tolerant tree species growing in the understory, large-diameter trees, and a high volume of dead wood such as snags and logs. Historically, fire was the major natural disturbance in all but the wettest climatic areas. Depending on local conditions, fires in western Oregon conifer forests were moderate- to high-severity with fire return intervals averaging 100 to more than 400 years. The historic fire regime created a complex mosaic of stand structures across the landscape.

Ecoregional Characteristics:

West Cascades: Coniferous forests dominate the landscape of the West Cascades ecoregion. Late successional Douglas-fir forests are older forests (hundreds of years old), generally occurring below 3,500 feet, but sometime occurring up to 4,000 feet. Douglas-fir trees occur up to 5,000 feet, but do not dominate the forests at higher elevations. Western hemlock is almost always co-dominant and usually dominates the understory. Other common trees include grand fir and western redcedar in the northern portion of the ecoregions, or incense cedar, sugar pine, white fir and western redcedar in the southern portion of the ecoregion. The understory has shrub and forb species such as vine maple, salal, sword fern, Oregon grape, western rhododendron, huckleberries, twinflower, deerfoot vanillaleaf and oxalis. In the absence of disturbance, Douglas-fir forests eventually will convert to western hemlock.

Coast Range: Although there are several forest types in the Coast Range ecoregion, two types predominate: Sitka spruce and Douglas-fir. Sitka spruce forests occur within a narrow fog- and salt-influenced strip along the coast and extending up some valleys. Soils tend to be deep, acid and well-drained. Sitka spruce dominates the overstory, but western hemlock, western redcedar, Douglas-fir, big leaf maple, and red alder may be present. The lush understory has salmonberry, vine maple, salal, evergreen huckleberry, sword fern, deer fern, and a high diversity of mosses and lichens. Due to high precipitation, fires are rare and the primary disturbances include small-scale windthrow and storm surges. Inland, Douglas-fir forests dominate. These characteristic species are similar to those in the West Cascades Douglas-fir forests, described previously.

Klamath Mountains: Mixed conifer forests are characterized by conifers but have high tree diversity. Douglas-fir is usually dominant. Depending on site characteristics, other canopy trees include white fir, sugar pine, ponderosa pine, and incense cedar. Port-Orford cedar occurs on moist sites such as riparian areas. Jeffrey pine and knobcone pine occur on serpentine soils. Broadleaf trees such as tanoak, canyon live oak, golden chinquapin and Pacific madrone may occur in the subcanopy. Understories are mostly dominated by shrubs, but can be dominated by forbs, graminoids, or may be relatively open.

Conservation Overview:

Oregon's forests have long contributed to local economies through timber harvest. However, both timber harvests and a number of large fires have replaced much of late-successional forests with younger forests in western Oregon. Based on a comparison between historic (1850) and current vegetation maps, an estimated 25 percent of late-successional Douglas-fir mixed conifer forests remain in the Klamath Mountains, 23 percent remains in the West Cascades, and 8 percent remains in the Coast Range. In the West Cascades, less than 10 percent of historic

low-elevation and mid-elevation (more than 4,500 feet) late-successional forests remain. (Source: Oregon Natural Heritage Information Center spatial data sets).

Federal lands contain substantial acreages of mature and late successional forests, but many of these forests occur in a patchwork with much younger forests that are managed with shorter rotations to generate timber products. The younger forests still maintain their capacity to become older forests, and they often support many of the same wildlife species. However, late successional forests support a wide array of species. Many of these species require large patches of these older or mature forests to survive and may be sensitive to changes in the forest seral stage.

The Northwest Forest Plan and National Fire Plan are both large, comprehensive natural resource planning efforts that include some federal forests in western Oregon. The Northwest Forest Plan identifies conservation priorities for species affected by loss and fragmentation of large patches of late successional forests, assessing over 1,000 species (See the Northwest Forest Plan description in Appendix II). The federal plan is expected to provide at least 50 percent probability that populations of most species would stabilize with either good or only moderately limited distributions on public lands. For the majority of species, the probability of stable, well-distributed populations is estimated at 75 percent (USDA/USDI 1994). The adaptive management component of the Northwest Forest Plan has not been fully implemented. Adaptive management approaches could be used to experimentally deal with risk of uncharacteristically severe wildfires, restore wildlife habitat features, and accelerate the development of characteristics such as multi-layered canopies.

Late Successional Reserves established under the Northwest Forest Plan were intended to ensure enough high quality habitat to sustain identified species. However, many of the federal lands that are designated as late-successional reserves do not include forests at the late-successional stage, while others are relatively small "checkerboards" of forests embedded in a matrix of private industrial timber lands, particularly in the Coast Range and Klamath Mountains. There is a potential for the amount of late successional forests to increase over time, under current state and federal policies.

Many of the Late Successional Reserves are in Fire Regime Condition Class II or Condition Class III, where the risk of loss of key ecosystem components is moderate or high. This risk is particularly acute in the Klamath Mountains, where recent large-scale severe wildfires have impacted wildlife habitat. In addition, all planning efforts are limited by understanding of landscape management and by ecological data availability. The outcome of these decisions, and the ultimate long-term impacts of these plans, is unknown.

Dead Wood isn't Dead

Dead wood is a vital habitat component. Woodpeckers excavate nesting cavities and forage for insect larvae in standing dead trees. The cavities they create provide shelter and nest sites for a wide variety of mammals and birds. Black bears crawl inside the base of decaying trees or hollow logs in search of warmer winter shelter. Amphibians, reptiles and small mammals travel through networks of downed logs, making vital connections between habitat and potential mates. Both standing dead wood, or snags, and downed dead wood thrown to the forest floor from storms or timber harvest are vital to many forest species, and provide nutrients and structure for a habitat brimming with wildlife. Salamanders, frogs, snakes, woodpeckers, swifts and other small birds, bats, squirrels, moles, voles, mosses, lichen, liverworts and bryophytes use snags and/or logs, while hundreds of species of insects, mollusks, slugs, mites, microbes and bacteria are abundantly attracted to it. These bugs busily recycle the dead matter into usable organic material, and make nutrients available for plants in soils. Large logs attract masses of carpenter ants, which in turn attract birds and mammals.

Dead wood links terrestrial and aquatic systems, too: when it falls into streams, dead wood provides necessary cover and breeding grounds for invertebrates, amphibians and fish. Nutrients infuse the water, and the large complex structures help to create pools of still water where young fish and aquatic invertebrate larvae can develop or hide from predators. One of the best ways to maintain the benefits of dead wood in the forest is to simply maintain existing snags and logs, where possible. Where dead wood is deficient, snags can be created through girdling, topping or fungal inoculation. Depending on the tree species and site characteristics, snags last from a few years to a few decades before falling to the forest floor and continuing their value as logs. In fact, large trees may provide habitat for more wildlife species, and provide habitat for a longer time, after they have died than they did while they were alive. For more information, see:

http://www.ccffa-oswa.org/index.html

http://www.fs.fed.us/pnw/pubs/brochures/dec-aid.pdf

The National Fire Plan is attempting to address the historic fire suppression and the impacts of recent catastrophic and uncharacteristic wildfires, recommending a variety of active management techniques for forests to increase fire safety and evaluation of their effects on fire behavior and the effectiveness of suppression [see the Statewide Perspectives and Approaches chapter for more information on altered fire regimes]. Results of implementing the National Fire Plan and its effects on both public safety and forest habitats are continually being evaluated.

In the Coast Range, three-quarters of the ecoregion is in state and private ownership. Oregon Department of Forestry manages 550,000 acres in the Coast Range ecoregion, primarily in the Clatsop, Tillamook, and Elliot State Forests. The Northwest and Southwest State Forest Management Plans provides management direction for all Board of Forestry Land and Common School Forest Lands. The plans include management strategies for 16 resources, including fish and wildlife, timber, recreation and water resources. The plans describe long-term desired future conditions, which include 10-30 percent in older forest structure. Most private forest lands are currently managed intensively for timber values using relatively short rotations, which will limit future development of late successional habitats in many areas.

Late successional conifer forests are particularly important for wildlife, mosses, and lichens. Depending on ecoregion, Strategy Species associated with late sccessional conifer forests include ringtail, fisher, marbled murrelet, northern spotted owl, red tree vole, American marten, Oregon slender salamander, Johnson's hairstreak (butterfly), and Roth's ground beetle.

Limiting Factors in Late Successional Conifer Forests:

Factor: Loss of some structural habitat elements: Where historic stands were perpetuated for 200 to more than 1,000 years, commercial forest lands are now harvested every 80 years or less, which discourages the establishment of large-diameter trees. In addition, the amount of large-diameter snags and large-diameter logs has been reduced over time through wildfire and timber harvest in many areas.

Approach: Develop programs, incentives, and market-based approaches to encourage longer rotations and strategically located large-diameter tree tracts. Where feasible, maintain structural elements such as large-diameter cull trees, snags and logs. Create snags from green trees or high-cut stumps where maintaining snags is not feasible or where snag management goals are not being met.

Factor: Loss of late-successional stand size and connectivity: Late successional forest stands have been greatly reduced in size and connectivity, particularly at lower elevations. This can impact species that are highly adapted to late successional conditions and /or species that have limited ability to move over long

H.J. Andrews Experimental Forest

Located in the heart of the central Cascade Mountains, the H.J. Andrews Experimental Forest is an innovative and unique resource for the long-term, integrated, and collaborative study of forest ecosystems. The Andrews Experimental Forest is the Pacific Northwest's only Long Term Ecological Reserve (LTER), one of only 26 sites established by the National Science Foundation to promote synthesis and comparative research across sites and ecosystems and among other related national and international research programs. The USDA Forest Service and Oregon State University work together to manage the forest, bringing dozens of scientists to the facility each year to conduct projects on many aspects of forests. The forest was established over 50 years ago, and became part of a national network of long-term ecological research sites in 1980. Researchers have the ability to manipulate large tracts of land, to study the results of different management practices in the most real-world scenario possible. Recent studies at the Forest are highly integrative, including the study of how forest practices affect streams and watershed dynamics. There is a continued emphasis on understanding how to predict the effects of land use, disturbance and climate change on the structure, function and composition of forested ecosystems. For more information, see:

http://www.fsl.orst.edu/lter/

http://www.fs.fed.us/pnw/exforests/hjandrews.shtml

distances to find new suitable areas. It also allows edge species to compete with ones adapted to extensive interior forest habitat.

Approach: Maintain existing plans to protect and develop habitat that has been identified as important to species of conservation concern. Use active management to accelerate development of late successional structural characteristics in key areas to expand existing late successional patches into larger areas to provide greater blocks of habitat for species with large area requirements or those that require interior forest habitat and are vulnerable to "edge effects." Continue to carefully plan forest practices to maintain connectivity, particularly when species vulnerable to fragmentation are present. Seek opportunities to coordinate management of public and private lands, whenever possible, to address conservation needs. Use voluntary conservation tools such as financial incentives and forest certification to achieve conservation goals on private lands. Carefully-implemented land exchanges in the Bureau of Land Management checkerboard areas offer potential to improve connectivity and habitat values.

Factor: Altered fire regimes: Particularly in the Klamath Mountains ecoregion, fire suppression has altered forest composition and structure, increasing the risk of large-scale, uncharacteristically severe wildfires. In the last few years, large wildfires like the Biscuit Fire have impacted late successional forest stands in the Klamath Mountains and West Cascades. Dense, brushy understories and land ownership patterns make it challenging to reintroduce fire in many areas. Efforts to reduce fire danger can help to restore habitat, but require careful planning to provide sufficient habitat features that are important to wildlife (e.g., snags, down logs, hiding cover).

Approach: Use an integrated approach to fuels management and forest restoration that considers historic conditions, wildlife conservation, natural fire intervals, and silvicultural techniques. Reintroduce fire where feasible; prioritize sites and applications. Maintain important wildlife habitat features such as snags and logs at a level to sustain wood-dependent species. Support implementation of the adaptive management component of the Northwest Forest Plan to experimentally address wildfire risks. Monitor results and use adaptive management techniques to ensure efforts are meeting habitat restoration and wildfire prevention objectives with minimal impacts on wildlife.

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