

The Forests

The temperate “rain forests” of western Oregon and Washington represent maximal development of temperate coniferous forests in terms of extent and size, and have produced some of the greatest biomass accumulations of any plant formations in the world (Franklin and Dyrness 1973). These forests are characterized by the dominance of conifer tree species, the large size and longevity of the trees, and the high productivity of the forests. They also have been some of the most intensively managed forests in the world.

A thorough description of the physical and environmental setting and the historic and current forest vegetation of western Oregon and Washington is beyond the scope of this document. The information presented below is a cursory overview of the principal features of the environment and vegetation with an emphasis on the habitat that is provided for landbirds.

Forest Types

Coniferous forests in western Oregon and Washington include five climax forest types or vegetation zones; the coastal Sitka spruce zone, the widespread low-elevation western hemlock/western redcedar zone, the mid-elevation Pacific silver fir zone which occurs primarily in the Cascade and Olympic Mountains, the subalpine mountain hemlock zone of the Cascade, Olympic, and Klamath Mountains, and the mixed-conifer zone of the Klamath/Siskiyou Mountains (Franklin and Dyrness 1973) (Table 2). Beyond these general broad-scale geographic characterizations, local forest types often depend on elevation, aspect, and/or rainfall amounts. The text below and Table 2 provide a general description of the characteristics of each of the five forest types.

Sitka Spruce Zone: This narrow zone along the Pacific coastline often is only a few miles wide. Most of the zone occurs below 150 m (500 ft) in elevation. It is characterized by a relatively mild climate with minimal fluctuations in moisture and temperature regimes, high rainfall amounts with frequent fog and low clouds, and dense, tall conifer trees with a limited hardwood component.

Western Hemlock Zone: This is the most extensive forest vegetation zone in western Oregon and Washington, and the most important in terms of timber production. Although it is called the western hemlock zone based on potential climax species, Douglas-fir forests dominate large areas, and western hemlock often does not become dominant or codominant until late successional stages. It can extend from sea level up to 900 m (3,000 ft) in elevation, but most of the zone occurs below 600 m (2,000 ft). A wet, mild, maritime climate and a dense, tall forest canopy characterize this zone. Because of its extent and accessibility, most of the western hemlock zone has been disturbed by logging, fire, or human development.

Pacific Silver Fir Zone: This mid-elevation zone between the western hemlock and subalpine mountain hemlock zones is transitional in terms of precipitation and temperature regimes. The climate is cooler and wetter than the western hemlock zone, and approximately half the precipitation occurs as snow with a significant winter snowpack. It generally occurs from 600–1,200 m (2,000–4,000 ft) in elevation, but can occur up to 1,350 m (4,500 ft). It is characterized by dense forests of tall conifers.

Table 2. Forest types and vegetation characteristics of coniferous forests in western Oregon and Washington.^a

Forest Type	Elevation Range	Dominant Tree Species	Common Shrubs	Common Herbaceous Plants
Sitka Spruce	0–150 m (0–500 ft)	Sitka spruce, western hemlock, western redcedar, Douglas-fir	huckleberry, salmonberry, devils club	sword fern, Oregon oxalis, evergreen violet
Western Hemlock	0–900 m (0–3,000 ft)	Douglas-fir, western hemlock, western redcedar, red alder, big-leaf maple	salal, vine maple, huckleberry, oceanspray, rhododendron, Oregon grape, California hazel	vanillaleaf, sword fern, trillium, twinflower, evergreen violet
Pacific Silver Fir	600–1,200 m (2,000–4,000 ft)	Pacific silver fir, noble fir, western hemlock, Douglas-fir	Oregon grape, salal, vine maple, huckleberry	beargrass, twinflower, trillium, ladyfern, vanillaleaf
Mountain Hemlock	1,200–1,800 m (4,000–6,000 ft)	Mountain hemlock, subalpine fir, noble fir	huckleberry, Cascade azalea	beargrass, dwarf blackberry, one-sided wintergreen
Mixed-Conifer	300–1,800 m (1,000–6,000 ft)	Douglas-fir, grand fir, white fir, red fir, Pacific madrone, sugar pine, Ponderosa pine, Incense-cedar	vine maple, Pacific yew, manzanita, Oregon grape, Pachistima, huckleberry, dewberry, ceanothus	twinflower, vanillaleaf, whippervine, beargrass

^a Franklin and Dyrness (1973)

Mountain Hemlock Zone: This is the highest forested zone in western Oregon and Washington, extending from about 1,200 m (4,000 ft) to timberline in the Cascade Mountains and on the Olympic Peninsula. Mountain hemlock is dominant at lower elevations, and is replaced by forest patches of subalpine fir at higher elevations. It is the coolest and wettest forested zone in western Oregon and Washington. Most precipitation occurs as snow, and snowpacks and snow duration often last up to six months or more. It is characterized by short to medium tall conifers in dense forests and forest patches interspersed with shrublands, grass meadows, and debris chutes.



Mixed-Conifer Zone: This forest zone includes the ecologically complex region of the Klamath Mountains ecoregion of southwestern Oregon where environmental and floristic diversity make this perhaps the most biologically diverse region in the United States (Whittaker 1960). It includes mixed vegetation zones of Douglas-fir, true firs (e.g., grand fir, white fir, red fir), pines, and hardwoods including oaks and Pacific madrone. These forests occur from sea level to 1,800 m (6,000 ft) in elevation, and climate tends to be milder and drier than elsewhere in western Oregon and Washington.

Forest Succession

As stated earlier, we use successional stage as the primary organizational category for describing bird-habitat relationships. For purposes of this document, successional stage categories are coarse-level descriptions of habitat characteristics derived in part from forest succession patterns described by Oliver (1981). In reality, there is a gradient or continuum of habitat characteristics with undefined breakpoints, and successional stage is subject to site-specific conditions and management actions. Additionally, catastrophic events, either natural (e.g., wildfire) or anthropogenic (e.g., tree harvest) can not only reset the successional stage but also result in a mixing of successional stage features when attributes are retained as legacies from the previous stand.

Our emphasis in this document is not on a detailed description of the stages of forest development, but on describing the habitat conditions most important to landbird conservation within the general framework of successional stage. To facilitate that, we use five categories to characterize successional stage (Table 3), but also further lump those into three general successional stages:

- ◆ Early-successional refers to the seedling/sapling stage
- ◆ Mid-successional refers to the pole and young forest stages
- ◆ Late-successional refers to the mature and old-growth stages

The typical successional pattern in unmanaged forest, particularly in the western hemlock/western redcedar zone, begins with a dense layer of broad-leaved shrubs, followed by rapid growth of coniferous trees, and a relatively long period of dense patches of Douglas-fir until natural mortality begins to open up the forest and allow development of an understory. When the forest begins to open up, western hemlock invades to establish a subcanopy and eventually a multi-layered canopy with Douglas-fir. If succession proceeds without disturbance, western hemlock may replace Douglas-fir at 400–500 years. Douglas-fir is often the dominant (often sole dominant) tree species up to the old-growth successional stage in several vegetation zones, due to its propensity for rapid reproduction in open or early-successional conditions and its longevity.

Table 3. Successional stages and characteristics of coniferous forests in western Oregon and Washington.

Names	Age	Structural Characteristics	Tree Canopy	Tree Size	Unique Characteristics
Seedling/sapling grass-forb; stand initiation; regenerating	0 to 15–20 years	Variable: dominated by herbs and shrubs early with developing trees	Open; 0–30% tree cover	<10 feet tall	Even-aged cohort of new seedlings
Pole forest stem exclusion	15–20 to 30–40 years	Little to no understory vegetation (ground and shrub)	Dense closed canopy	<10 in dbh	Dominance of the initial cohort of trees to the exclusion of others
Young forest understory reinitiating	30–40 to 60–80 years	Development of understory herbs, shrubs, and shade tolerant trees	Mixed open and closed	10–21 in dbh	Thinned naturally or mechanically
Mature forest multi-layered	80–150 years	Moderate structural and compositional complexity with a moderately developed sub-canopy and shrub layer		21–32 in dbh	
Old-growth	>150 years	High level of structural and compositional diversity; replacement of long-lived pioneer species such as Douglas-fir with climax species such as western hemlock		>32 in dbh	High degree of decadence and an abundance of downed woody debris