

# Stand Management



## Managing Woodlands in the Coastal Fog Belt

Managing woodlands in Oregon's coastal fog belt is different from managing inland forests. This publication discusses fog belt management approaches and reasons for choosing among them. It also covers characteristics of important timber species and how to match them to specific site conditions.

### The fog belt

The fog belt is a strip of land along the coast that is relatively cool and moist much of the year (see map, figure 1). In coastal valleys and lowlands, it may extend 15 to 20 miles inland. In other areas, it may be only a few miles wide.

Fog often shrouds the area during the summer—hence the term fog belt. During the winter, it receives heavy rainfall from storms coming off the Pacific Ocean. What snow does occur is usually wet and heavy, most often melting within a few days.

These cool, moist conditions favor the growth of conifers such as western hemlock, Sitka spruce, western redcedar, and Douglas-fir, and their competitors—alder, salmonberry, elderberry, and vine maple.

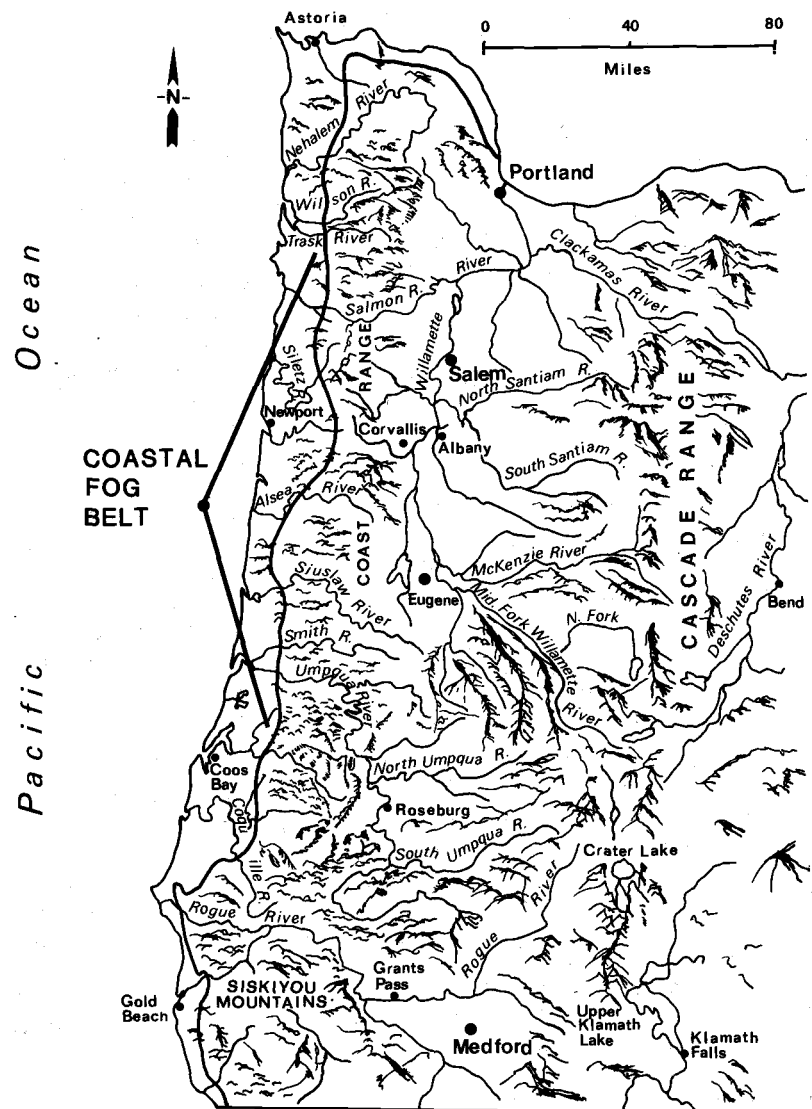


Figure 1.—The coastal fog belt



## Forest sites

Forest sites in the coastal zone have special features that can make management difficult. High winds often blast the coastal hills, breaking the tops out of fast-growing trees and toppling large trees. Heavy, wet snow and occasional ice storms also cause breakage.

The salt spray blowing off the ocean is toxic to some plants. Heavy rains saturate the soil in the winter, and poor drainage is a problem in many areas. In addition, newly planted conifer seedlings must compete with vigorously growing grass, herbs, and brush.

## Soils

Deep, rich forest soils characterize the Coast Range. They are well supplied with nitrogen because red alder, a nitrogen-fixer, often occupied the area during past centuries.

The mild climate combined with good soils makes for highly productive forest sites. They must be protected from excessive surface erosion, massive soil slumps, and compaction—especially during roadbuilding and harvest operations.

## Important timber species

Special conditions found in the fog belt, such as the high water table and salt spray, make it necessary to choose carefully which tree species to manage. Fortunately, native species have capabilities that make them a good choice for the more difficult sites.

**Western hemlock** is favored by cool moist conditions; it is more prominent in the coastal forests than inland. It grows well in shady locations and grows rapidly as an individual tree and in a stand.

Hemlock forests produce up to 15 percent more volume per acre than Douglas-fir. The seeds germinate and grow on dead, rotted logs and other organic matter. They can also start on bare mineral soil that is exposed when you scrape leaf and branch litter from the surface of the forest floor.

Once it gets started, hemlock grows best on well-drained soils but

also tolerates moderately to poorly drained sites. Because it seeds in naturally and competes well with brush species, hemlock may offer a low-cost management option when compared to Douglas-fir.

**Sitka spruce** occurs naturally only in the coastal climate. It has the ability to tolerate salt spray and grows near the beach where it may appear to be "sheared" by strong coastal winds. It also grows in poorly drained areas.

The spruce tip weevil causes severe deformation of spruce trees by attacking the terminal leader. The weevil becomes a more serious problem further inland where the added warmth allows it to complete its destructive life cycle more quickly. Because of this, there has been little interest in managing areas for spruce.

In addition, spruce produces tough branches that stay on the trunk for years, creating a lower quality log and increasing harvest costs. However, there is probably no other conifer that grows as rapidly in the fog belt.

**Douglas-fir** also occurs in the fog belt. It requires well-drained soils for best growth.

The species is managed for its consistent, high value. It requires more expense and effort to establish than a stand of western hemlock. In addition, you must pay more attention to proper site preparation, weed control, and animal damage protection.

Forest fires and slash burning favor Douglas-fir because they reduce competing brush and hardwoods and help reduce animal damage.

**Western redcedar** also grows well in the coastal climate and in poorly drained areas. Although the heartwood of cedar (the dark brown wood in the center of the tree) is highly valued for shakes and shingles, few landowners manage this species. This is because of the great age needed to get significant amounts of heartwood—a cedar tree probably

needs to be at least 100 years old before enough heartwood forms to make the tree exceptionally valuable. Growth rates of cedar stands approach those of western hemlock and probably exceed Douglas-fir.

Dwindling supplies of old-growth cedar and developing pole and saw-log markets for small cedar may lead to more management of this species in the future.

**Red alder** is a hardwood tree that grows faster than any of the conifers during the first 20 years of stand establishment. Wherever tractor logging or site preparation exposes bare mineral soil, alder is likely to seed in. It often takes over the site, eliminating more desirable conifer species. Since the dollar value of alder is lower than conifers and the demand is variable, it often is considered a weed.

It can be economical to retain established alder stands until they reach marketable size. This depends on the age and condition of the stand and how far it is to the market.

## Minor species

There are several other coniferous species that are important locally in the fog belt.

Grand fir is found in creek bottoms and moist areas. Because it is tolerant of shady conditions and grows well in the Coast Range, it is a candidate for planting in mixtures with other species.

Port-Orford-cedar and redwood are found along the coast south of Coos Bay and Bandon. Both species produce high-value wood but are rarely managed on woodland properties.

Port-Orford-cedar is severely affected by *Phytophthora* root rot, a soil-borne disease spread along forest roads by logging trucks and other vehicles. This pathogen has made managing Port-Orford-cedar too risky.

In Oregon, redwood is at the northern extreme of its natural range and has a very limited management area.

Shorepine is found in boggy areas and sandy soils along the coast.

Although it is not commercially valuable, it is tolerant of salt spray and is used as an ornamental in the fog belt and elsewhere in the Northwest.

This publication will not discuss management of the minor species.

## Competing vegetation

Highly productive fog belt sites are capable of growing many plants. Shrubs such as salmonberry, thimbleberry, salal, vine maple, a variety of blackberries, huckleberries, and elderberries reach their maximum growth rate and size in this zone. Various herbs and grasses are quick to inhabit disturbed areas. All can create severe competition for young seedlings and saplings of the commercial tree crop.

Consider vegetation management options carefully—activities such as

logging and preparing for planting have a major effect on what becomes established and what dominates the site.

## Woodland management options in the coastal zone

### Factors to Consider

Forest management is a cyclical process—from establishment (or regeneration) to thinning, to harvest, and back to establishment. It may also include animal damage protection, fertilization, site preparation, and weeding.

A major factor determining your management operations is the present condition of the forest site. This will influence the way you manage the area for future forest

crops. The exact time you harvest will depend on market conditions as well as your objectives for managing the property.

Shrub and hardwood vegetation left after harvest can slow down tree planters and make planting spots difficult to find. Brush will resprout vigorously and compete with conifer seedlings.

Stands of alder, for example, typically have a dense growth of salmonberry and other shrubs in the understory. Harvesting the alder can leave considerable waste material (slash) on the site. In addition, the salmonberry is sure to develop into a brush field.

Therefore, in the fog belt, it is absolutely critical to plant during the first winter following timber removal. This will help get commercial tree species growing before brush takes over.

Table 1.—Characteristics of major timber species in or near the coastal fog belt

Characteristic	Douglas-fir	Western hemlock	Sitka spruce	Western redcedar	Red alder
<i>Site requirements</i>					
Drainage tolerance	Grows only on well-drained sites	Tolerates moderate drainage	Tolerates poor drainage	Tolerates poor drainage	Tolerates poor drainage
<i>Biological risks</i>					
Root rots	Locally high	Locally moderate	Low	Low	Low
Insects	Low	Low-moderate	High	Low	Low
Big game <sup>a</sup>	High	Low	Low	High	Low
Mountain beaver	High	Moderate	Low	Low	Moderate
<i>Management characteristics</i>					
Intensity of required management	High	Low	Moderate	Moderate	Low
Market opportunities <sup>b</sup>	Excellent	Good	Good	Fair	Poor
Market value	High	Medium	Medium-high	Medium-high	Low
Products/year	Saw logs & Poles/25-60	Saw logs/25-60 Pulp/25-35	Saw logs/25-50 Pulp/25-35	Saw logs 30-100 + Shake-bolts/100 +	Firewood/10-20 Pulp/15-20 Saw logs/25-35
Management restrictions	Must have cash for site preparation, vegetation management, and animal damage protection	Low intensity management possible	Restricted to fogbelt only	Little known about intensive management	Retain well-established stands only

<sup>a</sup> Seedlings are susceptible until they are 4 feet high.

<sup>b</sup> Markets vary depending on local mills.

Consider carefully which conifer to work with or encourage on your woodlot. You might choose a more intensive capital-demanding system of managing for Douglas-fir that produces a high-value product, or a less intensive management system directed at producing greater volumes of a less valuable (at least, at the present time) species, such as western hemlock.

Managing for a mixture of species is also good strategy. Table 1 summarizes some of the characteristics to consider in choosing species.

Your objectives and constraints determine the type of management scheme you select and carry out. If you have many acres, few cash flow problems, and the time needed to keep track of intensive management operations, you might choose to manage for Douglas-fir. On the other hand, if you wish to keep capital investments to a minimum and reduce administrative efforts, you might choose to manage for hemlock.

## Managing Douglas-fir

Douglas-fir traditionally has demanded high log prices but is difficult to manage on coastal sites because it is less capable of surviving competition from brush and alder. It also is more susceptible to animal damage by deer, elk, and mountain beaver.

The following steps usually are necessary for successful Douglas-fir management:

- **Site preparation.** Employ a thorough slash treatment by: Scarification using a tractor with a brush blade or rake where the slope is less than 30 percent, yarding unmerchantable materials, and broadcast burning.
- **Tree planting.** Plant large, vigorous seedlings that are capable of rapid initial growth. Such seedlings can survive if browsed by wildlife. About 400 to 500 trees per acre are usually planted at a 10- by 10-foot spacing.

- **Animal damage protection.** Rigid plastic tubing usually is necessary where mountain beaver populations are high. In some areas it may be necessary to trap the mountain beaver before planting to assure plantation survival. Use flexible netting where rodents such as rabbits or mice are the primary problem. Paper budcaps are effective and inexpensive for preventing terminal browsing by deer and elk. You can also use chemical game repellents to prevent deer damage.

- **Weed control.** One, two, or more herbicide treatments may be necessary to assure establishment of a good Douglas-fir plantation. Aerial or hand chemical applications or manual brush removal are commonly used release methods. Effective site preparation can reduce the need for repeated weedings.

- **Precommercial thinning.** When trees are 10 to 15 feet tall, thin to about 300 trees per acre. If planting, brush control, and animal damage protection have been successful, most of these trees will be Douglas-fir. Leave hemlock, western redcedar, and Sitka spruce if vigorous Douglas-fir are not present.

- **Commercial thinning.** When trees reach marketable size (8 to 10 inches in diameter), carry out a commercial thinning. Leave 170 to 200 crop trees per acre after the first commercial thinning. Additional thinnings may be made later in the forest's life.

- **Harvest** when the stand is mature.

## Western hemlock management

The stumpage or mill value for western hemlock averages about 80 percent of that for similar-sized Douglas-fir. But hemlock and hemlock-spruce combinations do produce more wood volume per acre.

You can plant hemlock into areas that have had less site preparation

than is needed for Douglas-fir management—such as areas where mature timber has been logged and yarded and slash merely crushed.

Hemlock often will fill in by natural seeding if a nearby hemlock stand is old enough to produce seed. This natural filling-in process often produces poor spacing (distribution) of trees—especially on areas more than 200 feet from the seed source.

Hemlock can survive in the shade of brush and alder; it often will grow through the brush. If alder is dense, however, it soon will dominate the site and suppress hemlock growth.

Here are the steps necessary for successful western hemlock management:

- **Site preparation.** Treat slash enough to allow access for tree planting. Create as little bare mineral soil as possible during site preparation to prevent invasion by red alder.

- **Tree planting.** Plant western hemlock seedlings in protected areas, out of direct sunlight if possible. Soil should be rich, moist, and high in organic matter or duff. Often, only 200 to 300 seedlings per acre are necessary depending on the expected amount of natural seeding. A good planting-stock alternative is hemlock wildings from nearby roadsides that border forested areas. (See EC 1121, *Transplanting Wildings*, available for 50¢ plus 25¢ postage from Bulletin Mailing Office, OSU, Corvallis 97331.)

- **Animal damage protection.** Monitor damage from mountain beaver and trap if necessary.

- **Weed control.** Monitor alder or brush regrowth. If it tends to dominate the site, treat the area chemically or mechanically depending on the size of the area and your desires.

- **Precommercial thinning.** When trees are 10 to 15 feet tall, thin to about 300 trees per acre. If plantation establishment has been successful, most of these trees will be western hemlock. Some Sitka spruce, western redcedar, or Douglas-fir may be present and can be favored if desired.
- **Commercial thinning.** Thin when the stand reaches marketable size (8 to 10 inches in diameter). Leave 170 to 200 trees per acre after the first thinning. Additional thinning may be made later in the forest's life. Hemlock is especially sensitive to thinning damage because it has thin bark and surface-feeding roots. Extra care is necessary during logging to avoid damage to residual trees and excessive soil compaction.
- **Harvest** when the stand is mature.

## Red alder management

Red alder is managed only when a well-established stand (more than 6 to 20 years of age) is present on the area. In such cases, it is more economical to carry the alder through to maturity than convert to hemlock or fir. By managing the alder, you avoid the expense of an immediate conversion.

Use a precommercial thinning to space the alder so it will reach a merchantable size quickly. A typical spacing for young alder allows about 120 to 150 trees per acre.

It is important to space the trees evenly during thinning because they are likely to become crooked whenever two or more are close together. Alder leans toward openings in the forest canopy; this reduces the form and dollar value of the log.

Take care during harvest to avoid excessive scarification of the area; otherwise, alder may retake the site. One or more vegetation control actions (chemical or mechanical) usually will be necessary to suppress brush and alder while a conifer stand becomes well established.

## Mixed stand management

Mixed stands of western hemlock, Sitka spruce, and Douglas-fir have some management advantages. At an age of 60 to 80 years, mixed stands of hemlock and spruce have produced 15 to 30 percent greater volume than pure stands. Therefore, it may be desirable to encourage mixtures from a yield point of view.

At certain times and places, forest insects and pathogens can be a problem in managing coastal forest stands. Mixed stands offer some "insurance" against losses from these pests. You can do this by planting a mixture or by retaining a natural mixture during thinning operations.

Western hemlock is subject to attack by the hemlock looper and sometimes suffers from Armillaria root rot. Douglas-fir is susceptible to laminated root rot. Sitka spruce is deformed by the spruce weevil. Each species differs in susceptibility to browsing or clipping by deer, elk, mountain beaver, rabbit, and mice.

Locally, one species may be affected more than another by such problems. For example, Douglas-fir

is particularly susceptible to laminated root rot. On sites where this pathogen is known to exist, you can favor redcedar (a resistant conifer) or red alder (an immune hardwood) in a mixture with other species.

Avoid planting Sitka spruce on warm sites, such as south exposures at the interior edge of the fog belt, because the weevil will cause severe damage. Also, encouraging a mixture of spruce and Douglas-fir with western hemlock will create a less favorable situation for hemlock looper attack.

Encourage mixtures either during planting or during precommercial thinning. Depending on the site, you might mix Douglas-fir or Sitka spruce with hemlock during planting. During precommercial thinning operations, you can encourage a mixture by eliminating some of the more numerous species present. Natural seeding will occur most often in stands adjacent to cutover areas.

## Summary

Managing woodlands in the fog belt is a difficult task requiring patience, skill, hard work, and persistence. This publication discusses some of the peculiarities and opportunities to consider in carrying out your management tasks.

Advice and assistance are available from your local State Forestry Department service forester and the Oregon State University Extension Service.

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This publication was prepared by William H. Emmingham, Extension silviculture specialist, and Mike Bondi, Extension forestry agent (Clatsop County), Oregon State University. It is one of a set prepared for the *Woodland Workbook*. The Extension forestry agent who serves your county has additional information.

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