
Hardwood
Silviculture
Cooperative
OREGON STATE
UNIVERSITY
COLLEGE OF
FORESTRY

Why is red alder important?

There are numerous reasons to grow red alder. The primary reasons for HSC members are:

- Timber production
- Bio-diversity
- Soil nitrogen accumulation
- An alternative crop in conifer disease areas

The land base of the Pacific Northwest includes large areas that currently do support or could support hardwoods or a hardwood component. In these areas, the management of red alder for timber production, bio-diversity, nitrogen fixation, and disease management is increasing in popularity.

Finished alder wood has a light honey color that is widely used for furniture, cabinets, paneling, molding, and flooring. The demand for superior grade alder lumber remains high because logs from natural stands are rarely free from defect. For this reason, clear surface logs fetch a price competitive with Douglas-fir.

Hardwoods play a variety of ecological roles in the conifer-dominated coastal mountain ranges of the Pacific Northwest. For example, the abundance and diversity of birds is positively correlated with hardwood abundance in landscapes dominated by conifers. Alder is best known as a nitrogen-fixing species; it can contribute up to 200 lb/ac/yr of nitrogen to the forest soil. Having scattered alder patches and occasional alder trees within young stands can make very significant contributions to the soil nitrogen pool and so improve general tree growth. Alder may also be a good alternative to conifers in areas infected with laminated root rot, Swiss needle cast, and other conifer diseases.

Loading alder logs (above), a natural alder stand (above right), and the nitrogen-fixing root nodules (right).

Who we are:

The Hardwood Silviculture Cooperative (HSC) is a multi-faceted research and education program directed at red alder in the Pacific Northwest. The goal of the Cooperative, as established by its members, is to improve the management of red alder. The activities of the HSC have already resulted in significant gains in understanding regeneration and stand management, and have highlighted the potential of red alder to contribute to both economic and ecological forest management objectives.

Why we came together:

The HSC, begun in 1988, is a combination of industry and both federal and state agency members, each with its own reasons for pursuing red alder management. For instance, some want to grow alder for high-quality saw logs, while others want to manage red alder as a component of bio-diversity. What members have in common is that they all want to grow red alder to meet their specific objectives.

HSC members invest in many ways to make the cooperative a success. Members provide:

- Direction for the Cooperative
- Land used for plantations
- Crews used for planting, thinning, and making measurements
- Funds to administer the Cooperative

Getting started:

In the early days of the Cooperative, many obstacles had to be overcome before the first successful alder plantation was established. When regeneration from seed in the field failed, basic investigations into alder regeneration began. Since then, the Cooperative has planted more than 50,000 vigorous, healthy seedlings. The results of these trials were incorporated into a book called " The Biology and Management of Red Alder" in which the basics of regenerating and managing red alder are covered.

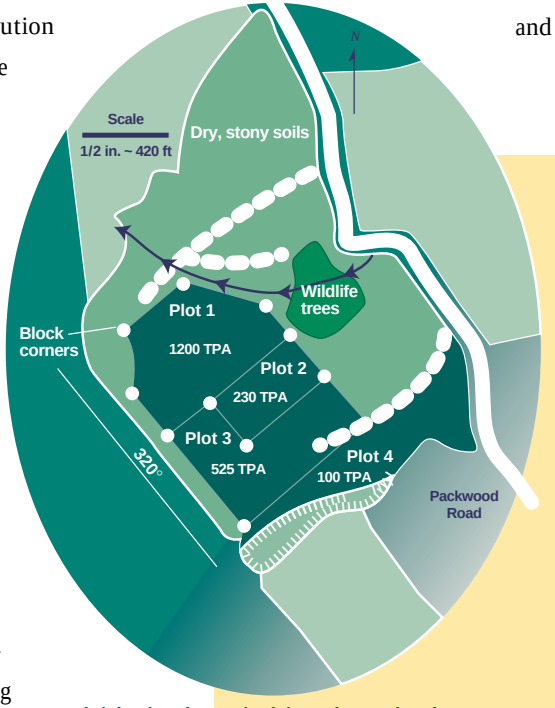
4 year old red alder plantation

Research program

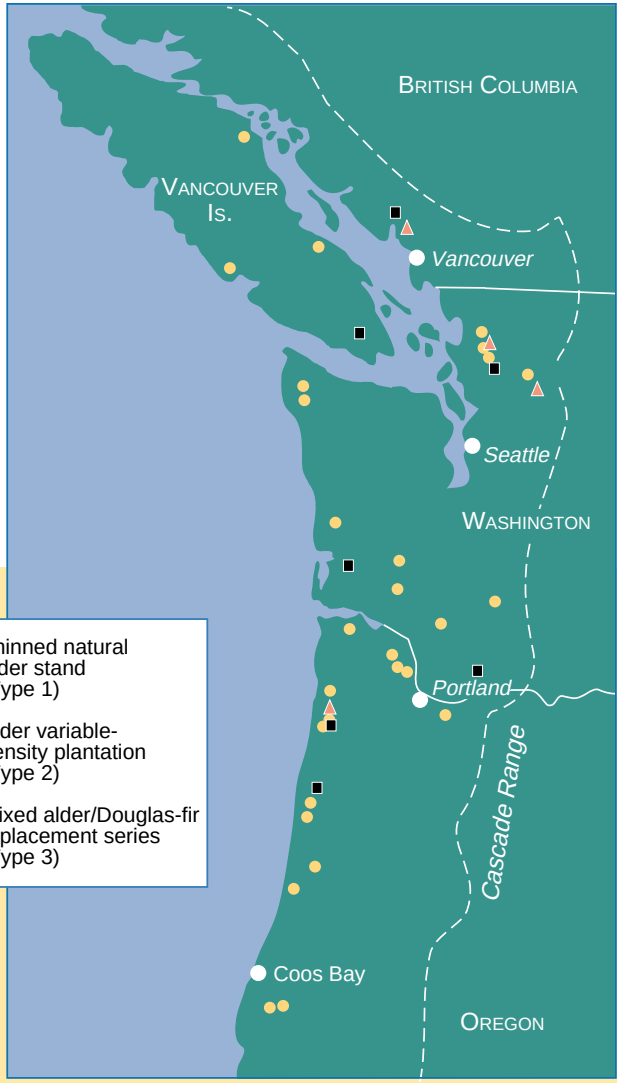
Plantation management

The HSC's current priority is to understand the response of red alder to spacing in plantations. To accomplish this, the Cooperative has installed 26 variable-density plantations extending from Coos Bay, Oregon to Vancouver Island, British Columbia. The plantation distribution covers a wide range of geographic conditions and site qualities. At each site, cooperators planted large blocks of alder at densities of 100, 230, 525, and 1200 trees per acre. Each block is subdivided into several treatments covering a range of thinning and pruning options.

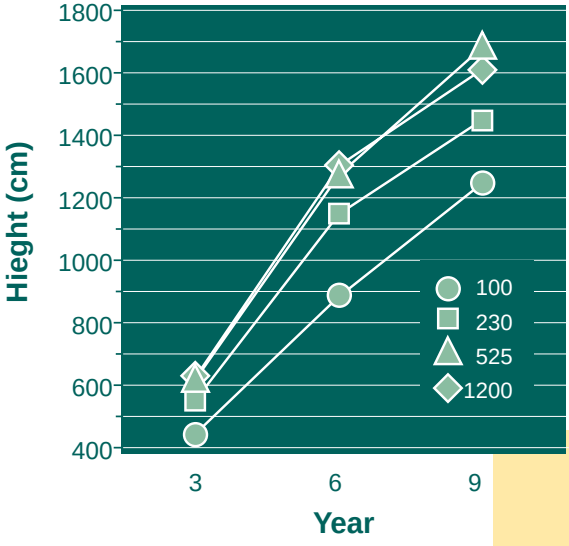
In the 10 years since the first plantation was established, we have learned a lot about seed zone transfer, seedling propagation, stocking guides, and identification of sites appropriate for red alder. Our ultimate goal is a better understanding of the effects of stand density on red alder growth and yield,



Variable density red alder plantation layout



Location of HSC study sites

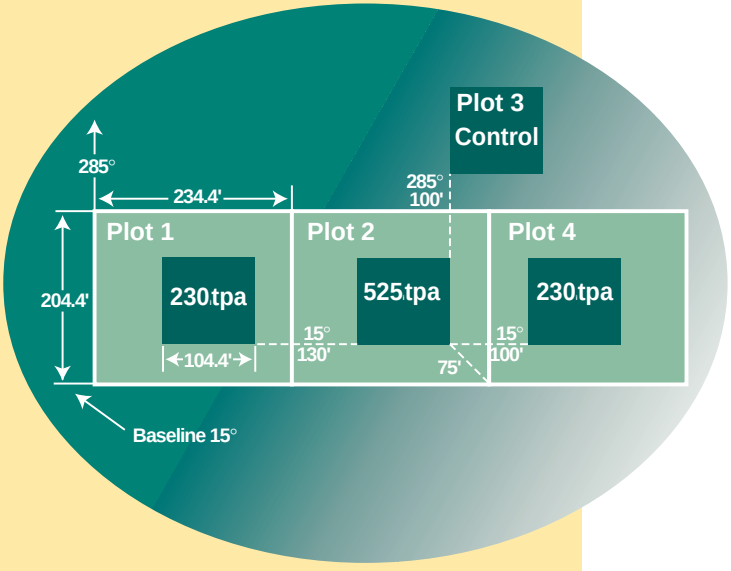


Planting density (trees per acre) affects height growth

and wood quality recovery. In 1998, we got our first real look at differences in growth between the densities. Results are available on the HSC web-page http://www.cof.orst.edu/coops/hsc.

Thinning in natural stands

In addition to the 26 variable-density plantations, the Cooperative has related studies in four naturally regenerated stands. Ten years ago, naturally regenerated stands up to 15 years old and 5 to 10 acres in size were sought as a means of short-cutting some of the growing lag time before meaningful thinning results could be obtained from the plantations. It came as a surprise to find only 4 naturally regenerated stands of the right age and size in the entire Pacific Northwest. Once the stands were identified, crews thinned them to 230 trees per acre and 525 trees per acre. Although studies in these stands are not as controlled as those on the plantations because the source of seed and original conditions are unknown, information from these stands contributes to understanding site quality, silvicultural strategies, growth and yield of managed stands, and wood quality recovery.

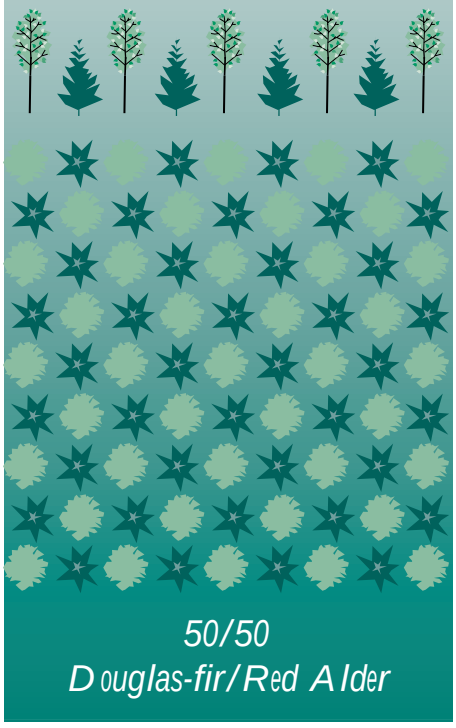


Naturally regenerated, red alder stands thinned to two densities

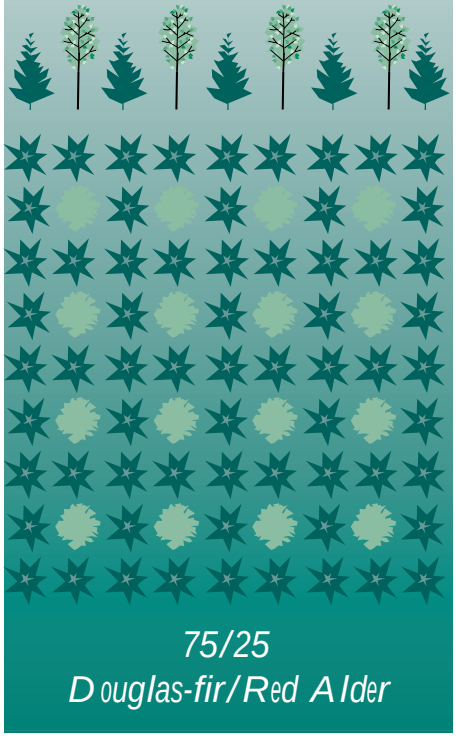
Mixed-species plantations

The HSC has also established seven mixed plantations of alder and Douglas-fir. They are located on ground designated as Douglas-fir site class III or below. These low site qualities are often a result of nitrogen deficient soils. Each site is planted at 300 trees per acre with five proportions of the two species. The site layout is designed to look at the interactions between the two species. We are finding that in low proportions, alder can benefit the Douglas-fir when soil nitrogen levels are low. The challenge is to find the right balance between species to maintain a beneficial relationship. In a contrasting approach, if red alder and Douglas-fir are planted as alternating crops; alder can improve soil fertility and thus growth of a subsequent plantation of Douglas-fir.

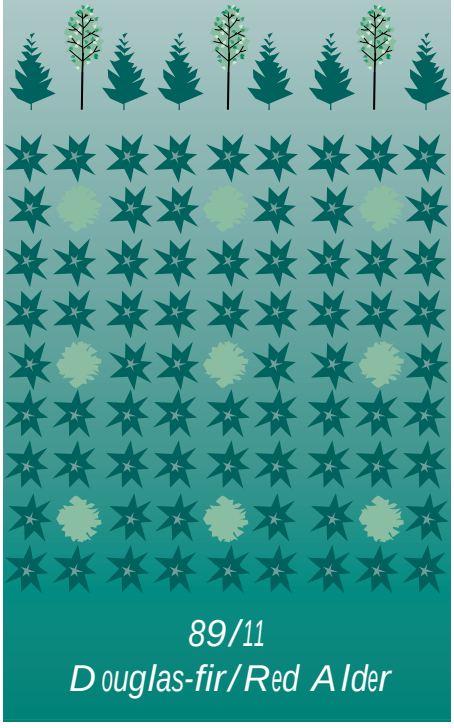
The Cooperative's red alder stand management studies are well designed. And they are replicated on a scale rarely attempted in forestry. Over the next 20 years, we will harvest much from what we have invested. Our data set on growth of managed stands will make red alder one of the better understood forest trees of the Pacific Northwest.



50/50
Douglas-fir/Red Alder



75/25
Douglas-fir/Red Alder



89/11
Douglas-fir/Red Alder

Education:

The HSC makes a special effort to provide information and educational opportunities to cooperators in the form of:

- Tours of study sites.
- Presentations and workshops on a wide variety of alder-related topics.
- Discussions with regional forestry professionals.
- Training of field personnel by HSC researcher.
- Publications on red alder

An HSC field tour

Publications:

Ahrens, G.R., A. Dobkowski and D.E. Hibbs. 1992. Red alder: guidelines for successful regeneration. OSU Forest Research Laboratory, Special Publication #24.

Hibbs, D.E. 1995. Managing red alder. Oregon State University Extension Services, The Woodland Workbook, publication EC 1197.

Hibbs, D.E. 1995. Silviculture of red alder stands. In P.G. Comeau, G.J. Harper, M.E. Blanche and J.O. Beateng (eds.). Ecology and Management of B.C. Hardwoods. Workshop Proc. Dec 1-2, 1993. B.C. Ministry of Forests. FRDA Rep. Richmond B.C.

Hibbs, D.E. and A. A. Ager. 1989. Red Alder: Guidelines for seed collection, handling, and storage. OSU Forest Research Laboratory, Special Publication #18.

Hibbs, D.E., D.S. Debell and R.F. Tarrant (eds.). 1994. Biology and Management of Red Alder. OSU Press, Corvallis, OR. 256 p.

Knowe, S.A. and D.E. Hibbs. 1996. Stand structure and dynamics of young red alder as affected by plantation density. Forest Ecology and Management 82:69-85.

Puettmann, K.J., D.S. Debell and D.E. Hibbs. 1993. Density management guide for red alder. OSU Forest Research Laboratory, Research Contribution 2.

Puettmann, K.J., D.W. Hann and D.E. Hibbs. 1993. Evaluation of size-density relationships for pure red alder and Douglas-fir stands. Forest Science 39:7-27.

Highlights

The HSC has been conducting research on red alder for more than 10 years. Much has been accomplished in this time:

- Tested and disseminated procedures for alder seedling production
- Improved the understanding of site quality and its effcets on form and growth
- Estanblished a vast array of research sites from Coos bay, Oregon to Vancouver Island, British Columbia
- Produced a data set on young alder stand growth and development second only to that for Douglas-fir in the Pacific Northwest
- Provided numerous tours and educational programs
- Produced publications ranging from seed collection to density management plus the book, Biology and Management of Red Alder
- Developed a web site for Cooperators and other natural resource managers:

http://www.cof.orst.edu/coops.hsc

For more information about the Hardwood Silviculture Cooperative, contact:

David Hibbs
Department of Forest Science
Oregon State University
Corvallis, OR 97331-5752