

Coop Annual Report 1992-1993

Staff <<2>>

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Highlights of 1992-1993 <<1>>

\* Our primary efforts continue to concentrate on the Alder Stand Management installations. Three new Type 2 installations were planted and permanent plots installed in three 3-year-old plantations.

\* A symposium on the Biology and Management of Red Alder was held.

\* The draft of the book, Biology and Management of Red Alder, was completed and accepted for publication by OSU Press. The Washington Hardwood Commission has contributed \$10,000 toward publication costs.

\* The annual Technical Committee Meeting provided a forum in which to update members on progress, discuss problems in planting alder, present preliminary data on growth and survival, and develop plans to locate the remainder of the alder stand management study plantations.

\* Karl Buermeyer replaced Glenn Ahrens as the lead Assistant to the HSC. Bob Lewis, a student, and Catherine Cluzeau, a post-doc, have begun work on Phase II of the Wood Quality Project.

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## Introduction <<1>>

This report summarizes the activities of the Hardwood Silviculture Cooperative (HSC) during its sixth year of activities. Presently, red alder is the species of primary interest to the Cooperative. Our current emphasis is on timber production and the use of alder as an alternative species in areas infected with *Phellinus* root rot.

The Red Alder Stand Management Study continues as the HSC's highest priority project. We have focused on the establishment and maintenance of Type 2 installations (new plantations). We put substantial effort into working with Cooperators to identify potential installation sites and to ensure that all the steps necessary to successful installation establishment are followed.

The Effects of Management on Alder Wood Quality and Stem Form is the HSC's second priority research project. We have begun detailed planning for Phase II of this project and have secured a post-doc with crown and stem modeling experience to work with a graduate student on this subject.

The following report provides a more detailed review of our progress in these two major areas. Related research by HSC staff on alder and other hardwoods is also reviewed. In addition, the activities of our Policy and Technical Committees are summarized.

## Organizational Activities <<1>>

### Policy Committee Meeting - July 1992 <<2>>

The Policy Committee met on July 9, 1992. Progress of the two major Cooperative research areas, Alder Stand Management and Wood Quality, was reviewed. Revised estimates of costs for plot installation were presented, based on the first actual plots installed by the Cooperative and by Weyerhaeuser Co.

There was much discussion of the Cooperative's interest in soil sampling and concerns about the effects of consecutive alder rotations on soils. The result was a plan to coordinate the alder soils workshop (held Nov. 20, 1992).

The committee also reviewed the important lessons we have learned from the numerous alder plantings established in sites infected with *Phellinus*. The great variation in performance of

alder on these sites emphasizes our need to continue efforts to understand key factors affecting site productivity for alder.

After a discussion of future directions, the budget was reviewed and approved.

#### Technical Committee Meeting - April 1993 <<2>>

The Technical Committee met on April 13th at the Weyerhaeuser office in Longview, WA, with a field tour on the 14th. The business meeting began by introducing the newest member of the Co-op, States Industries of Eugene, OR.

New developments in 1992-1993 were presented, including the planting of three new alder plantations and the installation of three sets of permanent measurement plots in established plantations.

The need to strictly enforce nursery specifications for planting, culturing, and culling was emphasized in light of continuing problems with alder growing stock. The Cooperators decided that, in the absence of information to the contrary, interplanting study plantations to replace dead trees the year following initial establishment was acceptable. To delay more than one year could compromise the integrity of the data.

Preliminary vegetation, survival, and height growth data from 1991 and 1992 plantations, and remeasurement data from one plantation and one thinned natural stand were presented.

The status of the matrix of alder test plantations was discussed, as were ways to facilitate its completion by 1996. Commitments to locate sites needed to complete the matrix were obtained from those present. In addition, four cooperators agreed to find sites for mixed alder and Douglas-fir test sites in 1994 or 1995.

A proposed procedure for sampling soil from new alder plantations was discussed. The procedure was agreed to in principle, but Cooperators are consulting additional soil scientists about the adequacy of the proposed sample size.

Bob Lewis, a graduate student at OSU, and Dave Hibbs updated the progress of the alder wood quality study.

On April 14, the group visited the newly installed permanent plots on a Weyerhaeuser plantation. Also noted were microsite effects (especially frost) on growth and survival. The group then travelled to Packwood, WA, to visit a potential study plantation that has been abandoned due to heavy mortality, also due to site problems.

#### Cooperative Research <<1>>

##### Alder Stand Management Study <<2>>

The Alder Stand Management Study was initiated in 1988. Its goals are to develop an information base with which to model growth and yield of alder in managed stands, and the effects of various thinning regimes on growth, yield, and wood quality. This will be accomplished through manipulating a number of plantations (Type 2 installations) and natural stands (Type 1 installations)

over a range of physiographic regions (Figure 1).

**<<figure 1>>**

Three new Type 2 installations were planted in the spring of 1993, one in the northern coast range (Weyerhaeuser), one in the southern Cascades (Weyerhaeuser) and one in the northern Cascades (B.C. Ministry of Forests). Of the six planted in 1992, four were interplanted in 1993 to fill in for mortality attributed primarily to drought conditions. Another of the 1992 plantations will need to be replanted or replaced in 1995, as appropriate planting stock was not available.

Permanent measurement plots were installed and third year measurements taken on three of the Type 2 installations planted in 1990. The other two planted that year will not be useable for growth and yield studies due to heavy mortality. Site conditions were responsible for the poor performance on these sites, and can be noted for use in determining the suitability of future sites for growing alder. Third year measurements were also taken on a Type 1 installation in the southern Sitka Spruce Zone.

Accounting for the two 1990 plantations lost, and the 1992 plantation that will be delayed until 1995, 14 of the 30 planned Type 2 installations are currently on track. Table 1 compares the number installed with the number planned at the present, within the matrix of physiographic regions and site quality classes. Site index (SI) is based on the average height in meters of an alder stand at 50 years.

**<<table 1 >>**

Plans are to plant six installations in 1994, seven in 1995 and three in 1996 to complete the matrix of 30 Type 2 installations. A possible Type 1 installation site has been located on the Mt. Baker-Snoqualmie National Forest. Appropriate natural stands have proven very difficult to find, and achieving the original goal of ten Type 1 installations seems doubtful at this point. Reconnaissance of suitable sites for mixed alder and Douglas-fir test plantations will begin this summer.

Three major problems encountered in establishing Type 2 installations have been: 1) attempting to plant sites that are too harsh (drought and frost), 2) difficulty finding suitable sites; this is due to lack of uniform terrain and to slowdowns in harvest levels, particularly on public lands, and 3) poor planting stock quality. We are learning the limitations of site in establishing alder stands, and this information should prove useful in selecting more appropriate sites in the future. Planning harvest units with an objective of installing study areas, as is being done on the Siuslaw National Forest, could help solve the second constraint. HSC staff and cooperators need to continue to work closely with nursery personnel, and to enforce growing and culling specifications to improve the quality of the seedlings being provided.

The draft of a procedure to collect basic soils information and archived soil samples near the time of stand establishment was

distributed at the Technical Committee meeting. This would allow for growth and yield results in the future to be analyzed based on changes in soil properties that may be caused by a rotation of alder on the site. The procedure was agreed to in principle, and is being examined by additional soil scientists before the decision to implement is made. There was some concern that the minimal sample procedure that was proposed might not be intensive enough to yield meaningful results.

#### Alder Wood Quality and Stem Form <<2>>

We have two goals for our Alder Wood Quality and Stem Form project: 1) provide immediate information about the effects of stand management on wood quality and 2) guide our future work on this topic on permanent plot installations in the Stand Management Study. These goals are being pursued in two separate studies.

The first of these studies, the Lumber Recovery Study, was reported on last year. This was a cooperative study with the PNW Timber Quality Project in which we supplemented their log-to-lumber and grade recovery project with tree and stand data.

The second of these studies, tree growth and self-pruning as a function of spacing and re-spacing, has begun in earnest this year. We have outlined three objectives for the current effort:

- Develop equations that describe branch growth, branch mortality, and crown lift as a function of spacing.
- Quantify the effects of spacing on stem taper.
- Examine the effects of re-spacing on branch, height, and bole diameter (taper) growth.

Data will be collected from research plots with a well known history of controlled spacing. Repeated-measure data sets will be used where available. Where data sets are not available and where destructive sampling is allowed, data sets for height growth, diameter growth, and crown lift will be reconstructed. We have four primary candidate sites for sampling (Table 2).

#### <<table 2>>

A Master's student, Bob Lewis, has begun organizing this project. He is responsible for on-the-ground work and basic data analysis. A post-doc, Catherine Cluzeau, will be building on the basic analysis to develop models of alder crown and stem responses to spacing and re-spacing. Catherine recently completed her Ph.D. with the INRA silviculture group in Nancy, France. She has worked with growth models of Douglas-fir and ash.

The time schedule for the project calls for field work to be completed by the end of summer, 1993. Data analysis and modeling will be done during the winter of 1993-1994.

#### Other Applied Research <<1>>

## Thinning in Red Alder <<2>>

Two red alder stands were thinned five (Siletz) and ten (Olney) years ago. The Siletz site in central coastal Oregon was thinned mechanically (chain saw) at age 20 to two spacings plus control. The 5-year results of the Olney site in northwest Oregon were reported in Hibbs et al. (1989). Four treatments were applied at age 14: control, chemically thinned-narrow spacing, chemically thinned-wide spacing, and mechanically thinned-wide spacing.

After five years at Siletz, mortality was observed only in control plots. Diameter growth of crop trees increased up to 54% with thinning. There was a suggestion of developing trends in height growth (less growth at wider spacings) and total basal area growth (more in thinned plots). After ten years at Olney, early flashback problems were largely overcome. In addition, the reduction in height growth with thinning (not a result of flashback) was overcome, and there were indications of a compensatory response. Total basal area growth was greater by up to 60% in thinned treatments. Clear bole length increased in the control and chemical-narrow treatment (Figure 2). Size and number of epicormic branches did not change from the fifth year results.

Plotting the growth trajectories on a size-density diagram aided in interpretation for management (Figure 3). The thinning effect of the narrow treatments appears effective for 10 to 15 years; the effect of the wide treatments may last for 15 to 20 years. Forest managers can combine this information on thinning intensity and growth response and duration with management objectives to develop management strategies for red alder.

<<figure 2>>

<<figure 3>>

[[[Gretchen is doing drawings for me on thinning:]]]

## Cottonwood Clones in The Willamette Valley <<2>>

The hybrid cottonwood project was established to conduct research and technology transfer for hybrid cottonwood culture. A ten-acre sandy-loam site along the Willamette River in northeast Corvallis was cleared, fenced, and tilled by OSU College of Forestry personnel. 3400 cuttings of 29 different clones, donated by James River Corporation and Washington State University were planted on the site in the spring of 1991. Four of the clones are planted in large growth and yield plots that include three different spacings; an additional 22 clones are planted in smaller clone evaluation plots. The area was tilled several times during the first and second summer seasons to control weeds, and mortality was replanted with four-foot-tall cuttings. A weed control demonstration area was also established using local black cottonwood cuttings.

Second year growth in most clones was exceptional, many

clones doubled in height. Clone #194-527 had the greatest mean height and diameter (6.1 meters and 5.8 cm). This represents a 158% increase in mean height and 380% increase in diameter in the second growing season. Clone #184-411 had the greatest mean height gain in the second growing season (290%). The tallest tree was 8.1 meters (Clone #50-179). Total height and diameter for the five best and three worst performers are presented in Figure 4.

Weed control will continue into the third year, and height and diameter growth will be measured again this winter.

<<figure 4>>

#### Riparian Zone Management Study <<2>>

As part of the COPE (Coastal Oregon Productivity Enhancement) program, several investigators, led by David Hibbs, are involved in a six-year study of the vegetation dynamics in riparian areas. The major goal is to explore management alternatives for optimizing the many riparian resources. The three parts of the study are:

1. A chronosequence examination of buffer strip conditions in relation to management activities, geography and vegetation characteristics.
2. Development of tree regeneration systems through the use of replicated seedling trials with several levels of overstory and understory manipulation.
3. Development of a methodology for decisions concerning management for diversity and optimization of resource values.

Sampling for the chronosequence portion of the study was completed in the summer of 1992, and analysis of data collected over the three years of the chronosequence study is underway. Future plans include examination of spatial variability of vegetation in riparian zones, continued monitoring of permanent sample sites, and continued measurements at the two sites for examining tree regeneration systems.

#### Hardwood Availability and Supply <<2>>

Congress appropriated approximately \$800,000 for a "Red Alder/ Hardwood Value Added Project" for 1992-93. The impetus is that increased utilization of northwestern hardwoods may support new or expanded value-added manufacturing, perhaps providing some mitigation of the softwood timber crisis. HSC staff raised some questions as to the certainty of hardwood supplies, particularly in light of the general lack of management aimed at sustaining hardwood resources.

As a result, Glenn Ahrens is working with the USDA Forest Service, PNW Station on several projects addressing hardwood

availability and supply issues (\$30,000 total budget). These projects are:

1. Hardwood Policy Paper - An examination of the policies, objectives, and practices of important forest landowners with respect to effects on hardwood resources in Oregon and Washington. What is the likely future of the hardwood resource given current policies? Are policies changing to favor sustainable hardwood supplies?

After decades of under-utilization, hardwood inventories reached an all-time high in the 1980's. However, there appears to be very little planning or management to maintain this level of supply. For red alder in Washington, harvest now exceeds growth, and inventory is starting to decline. In many cases, higher prices for hardwood logs accelerates the liquidation of existing hardwood stands, but values are still not high enough to favor continued management of hardwoods for many landowners.

2. Hardwood Management Workshops - These workshops are intended to inform and update practicing foresters about hardwood management options. The focus is on foresters who advise non-industrial private landowners, as a major portion of the hardwood growing stock occurs on these lands. These owners play a significant but unpredictable role in determining the future of hardwood resources. The Oregon workshop was held on May 4-5 in cooperation with the Oregon Department of Forestry. The Washington workshop is planned for October 12-13 at Pack Forest in cooperation with the University of Washington and Washington State University Extension Service.

3. Hardwood Compendium - The objective is to produce a compendium of information on the inventory, silviculture, harvesting, manufacture, wood properties, and product potential of significant northwestern hardwood species. The goal is to synthesize and update scattered or incomplete information and make it available under one cover.

#### Basic Research <<1>>

Basic research explores fundamental principles pertinent to hardwood silviculture. These studies provide a basis for future applied research, ideally leading to innovative technology and better management. Most basic research is conducted by graduate students with funding from outside the HSC, although Cooperator participation is encouraged. Peter Giordano and David Hibbs continue to work on a study of structure, dynamics, and regeneration in forested riparian zones of the Oregon Coast Range; currently, there are no students associated with this project.

Klaus Puettmann, a student formerly associated with the HSC,

is now Assistant Professor of Silviculture at the University of Minnesota. He is teaching basic silviculture and studying the dynamics of mixed-species forests.

#### Educational Activities <<1>>

#### Reports <<2>>

The Cooperative produces reports and other documents for its members. In the past year, the Cooperative produced the following report:

- \* Density Management Guide for Red Alder

#### Books <<2>>

The book, *Biology and Management of Red Alder*, edited by David Hibbs, Dean DeBell, and Bob Tarrant, has been submitted to and accepted for publication by OSU Press. Editing and production requirements lead to a predicted publication date of early 1994.

#### Presentations <<2>>

*Biology and Management of Red Alder*. A symposium held in November, 1992 in Corvallis. During the two-day program, the following HSC members gave presentations:

- Glenn Ahrens
- Dean DeBell
- David Hibbs
- Alex Dobkowski

Master Woodland Manager. Dave Hibbs led sessions on hardwoods for two groups of woodland owners in this Extension program. Cottage Grove and Oregon City.

Hardwood Management, a two day program for ODF, Extension, and consulting foresters by Glenn Ahrens and David Hibbs. May, 1993 in Salem.

Alder Soils. Two meetings to present and discuss information and information needs on the effects of red alder on forest sites. These meetings, coordinated by Glenn Ahrens, Dave Hibbs, and Karl Buermeyer, included a number of scientists working with forest soils in the northwest. Nov. 1992 in Corvallis, and Feb. 1993 in Issequah, WA.

Alder Regeneration and Management on the Gifford Pinchot National Forest. A one-day presentation and field trip to discuss the potential and problems of managing alder in the Cascades, conducted by Glenn Ahrens in November 1992.

Directions for 1993-1994 <<1>>

- Establish one Type 1, six Type 2, and three mixed alder/Douglas-fir installations for the Alder Stand Management Study. Continue reconnaissance and site selection for future installations.
- Install permanent plots on two Type 2 installations, and remeasure one Type 1 installation.
- Develop quantitative relationships for spacing and re-spacing with crown and stem growth and with direct characteristics of wood quality.
- Complete editing and publication of Biology and Management of Red Alder.
- Continue growth of the Cooperative.

Appendix 1: Publications <<1>>

Giordano, P.A. and D.E. Hibbs. 1993. Morphological response to competition in red alder: the role of water. *Functional Ecology*. In Press.

Hibbs, D., D. DeBell, and R. Tarrant. In press. *Biology and management of red alder*. OSU Press. Includes chapters by HSC members G. Ahrens, D. DeBell, A. Dobkowski, D. Hibbs.

Hibbs, D.E. and B.J. Yoder. 1993. Development of Oregon white oak seedlings. *Northwest Science* 67: 30-36.

Puettmann, K.J., D.S. DeBell, and D.E. Hibbs. 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.

Puettmann, K.J., D.E. Hibbs, and D.W. Hann. 1992. The dynamics of mixed stands of *Alnus rubra* and *Pseudotsuga menziesii* extension of the size-density analysis to species mixture. *Journal of Ecology* 80: 449-458.

In preparation:

Ahrens, G.R. and M. Plank. Effects of tree growth rate and stand characteristics on lumber recovery from red alder. Manuscript in preparation for *Journal of Forestry*.

Hibbs, D.E., L. Bouvarel, and E. Teissier du Cros. In review.  
Performance of red alder seed sources in France. Canadian  
Journal of Forest Research.

Hibbs, D.E., C. Bastien, L. Bouvarel, and E. Teissier du Cros. In  
preparation. Genetic characterization of red alder in French  
provenance trials.

Appendix 2: Financial Support Received in 1992-1993 <<1>>

<appendix 2:\tables93>