

COLLEGE OF FORESTRY

Staff

David E. Hibbs

Professor Program Leader

Alison Luckett Bower

Senior Faculty Research Assistant

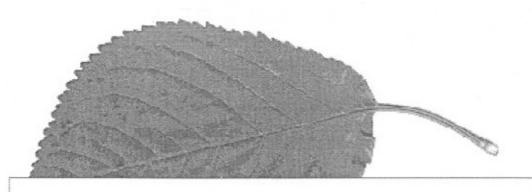
Department of Forest Science
College of Forestry
301F Richardson Hall
Oregon State University

Corvallis OR 97331-5752

(541) 737-6100

Hardwood Silviculture Cooperative

Annual Report



Highlights of 1999-2000

- All twenty-six Type 2 installations in the Red Alder Stand Management Study have had their 3 year growth measurement, which is the first measurement in a 12 year measurement cycle.
- The first thinning treatment (3-5 year thin) has been completed on twenty-one of the Type 2 installations.
- The second thinning treatment (15-20' height to live crown thin) has been completed on nine Type 2 installations.
- Ninth-year growth measurement has been completed on six Type 2 installations.
- All seven Type 3 (mixed red alder/Douglas-fir) installations have had their 3 year growth measurement, which is the first measurement in a 12 year measurement cycle.
- A new brochure describing HSC activities was produced for the general forestry audience.

Executive Summary

I am just stunned as I review the tremendous amount of work we have done, when I realize what we have accomplished. We have a network of manipulative research installations rarely matched in magnitude or geographic distribution outside of the Pacific Northwest. We have planted hundreds of thousands of seedlings, we have thinned and pruned many tens of thousands of stems, and we have created a data set containing almost 200,000 observations of tree growth.

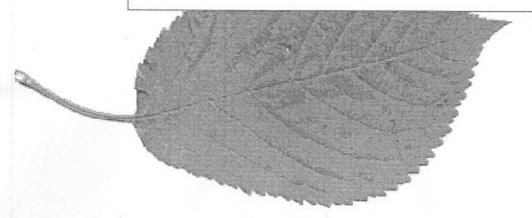
We are also over the biggest hump in our research plan, the huge effort involved in establishing installations and getting them through the permanent plot installation. This is done. We will have continuing needs for thinning and pruning treatments as plantations grow but this is a very manageable commitment. We can now look to the growing value of our data set as some of our installations approach the half-way point of a short sawlog rotation.

The value of the data set has been recently recognized by the forest modeling group of the British Columbia Ministry of Forests. The Cooperative is working with them on an agreement to share our data for the development of an alder growth model. This is an exciting development.

Sadly, Alison Bower is leaving the Cooperative. She has done an outstanding job of maintaining the research program, both in maintaining communication among cooperators and in getting the field work done. And she has put up with a group of guys with great skill. We will all miss her.

In the next year, I look forward to continuing to manage our installations, enlarging our data sets, and developing opportunities like the BC modeling proposal that will produce tools to improve the management of red alder.

Dave Hibbs Professor Program Leader



Contents

- 3 Highlights 1999-2000
- 4 Executive Summary
- 7 HSC History
- 8 Cooperative Research
- 11 People Behind Our Success
- 13 Related Research Outside the Cooperative
- 15 Directions for 2001
- 16 Appendix 1

HSC Management Committee Meeting Minutes

23 Appendix 2

HSC Financial Support Received in 1999-2000

HISTORY OF THE HSC

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.

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 alder to meet their specific objectives. Members invest in many ways to make the HSC a success. They provide direction and funds to administer the Cooperative. They provide the land for plantations and the field crews for planting, thinning, and making measurements.

The HSC's highest 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 addition to the 26 variable-density plantations, the Cooperative has related studies in four naturally regenerated stands. Ten years ago, naturally regenerated stands of alder 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.

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 plantation is planted with 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 is limited. The challenge is to find the right balance between the two species to maintain a beneficial relationship.

In the 11 years since the first plantation was established, we have learned a lot about seed zone transfer, seedling propagation, stocking guidelines, identification of sites appropriate for red alder, and the effects of spacing on early tree growth. Our ultimate goal is a better understanding of the effects of stand density on red alder growth and yield, and wood quality.

The Cooperative's red alder stand management studies are well designed and replicated. Over the next 20 years, we will harvest much from our investment. Our data set on growth of managed stands will make red alder one of the better understood forest trees of the Pacific Northwest.

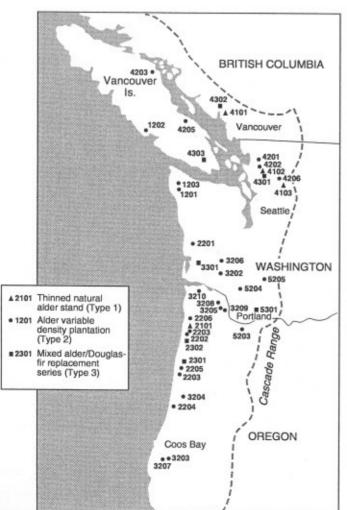


COOPERATIVE RESEARCH

Red Alder Stand Management Study

The Red Alder Stand Management Study is divided into three specific types of installations. Study installations are predominately located in the coastal mountain ranges of the Pacific Northwest from Coos Bay, Oregon to Vancouver Island, British Columbia. The three types of study installations are as follows:

- Type 1 is a natural alder stand thinned to 230 and 525 trees per acre. There are four Type
 1 installations.
- Type 2 is a variable-density alder plantation. At each site alder is planted in large blocks
 at densities of 100, 230, 525, and 1200 trees per acre. Each block is subdivided into
 several thinning and pruning treatments. There are twenty-six Type 2 installations.
- Type 3 is a mixed plantation of alder and Douglas-fir. Each site is planted to 300 trees per acre with five proportions of the two species. There are seven Type 3 installations.



 Location of installations for the Red Alder Stand Management Study.

The primary focus of the Red Alder Stand Management study continues to be the Type 2 variable-density plantations. Type 2 installations are distributed across a matrix of five ecological regions and three site qualities (Table 1).

In winter 2000, field work was completed on twentytwo installations:

- In the Type 1 installations, one had the 6 year measurement and one had the 9 year measurement.
- In the Type 2's a total of fourteen installations had field work. Specifically, plot layout and 3 year measurements were completed on the three youngest installations. Six installations were thinned; three for the first time (3-5 year thin) and three for the second time (15'-20' height to live crown). The 6 year measurement was completed on five installations. The 9 year measurement was completed on two.
- In the Type 3 installations, one had the 3 year measurement. Four had the 6 year measurement.

There are six Type 2 installations which have had 9 years of measurement. This is 23% of the total Type 2's. The information gathered in year 9 enables us to analyze the growth response to the first thinning treatment. The following is a preliminary look at one of these older sites. Installation 4201 is owned by Goodyear

Table 1. Matrix of Type 2 installations. Each successful installation identified by number, ownership, and year planted.

| Region | Site Quality | | | |
|-------------------|--|--|--|--|
| | Low | Medium | High SI ₅₀ :33+ M SI ₂₀ :21+ M | |
| | SI ₅₀ :23-27 M SI ₂₀ :14-17 M | SI ₅₀ :28-32 M SI ₂₀ :18-20 M | | |
| | | | | |
| | | | 1203 DNR '96 | |
| 2) Sitka Spruce | 2202 SNF '91 | 2203 NWH '92 | 2201 WHC '90 | |
| South | 2206 SNF '95 | 2204 SNF '94 | 2205 NWH '94 | |
| 3) Coast Range | 3204 SNF '92 | 3202 WHC '90 | 3203 NWH '92 | |
| | 3209 BLM '95 | 3205 ODF '92 | 3206 WHC '93 | |
| | | 3207 BLM '94 | 3210 OSU '97 | |
| | | 3208 ODF '97 | | |
| 4) North Cascades | 4205 BCMin '94 | 4202 GYN '90 | 4201 GYN '89 | |
| • | | 4203 BCMin '93 | | |
| | | 4206 DNR '95 | | |
| 5) South Cascades | 5205 GPNF '97 | 5203 BLM '92 | X | |
| returning kings | | 5204 WHC '93 | | |
| | | | | |

Nelson. It was planted in 1989 and has received all treatments except the thin at HLC 30' in the 525 trees per acre (tpa) plot. The site was originally occupied by red alder and birch with a heavy understory of salmonberry. Site index derived from 10 older alder trees on site was: SI_{20} =21.3m and SI_{50} =35m. The 100 largest trees per acre in the 230, 525, and 1200 tpa plots are already 15m or taller by age 9. If we look at the mean height in each density of our plantation, we are still seeing a better site quality expressed than the site index indicates. The slope of the line for the height of the 100 tpa is steeper than the lines for the other densities, indicating that trees in 100 tpa plot are maintaining their growth rate while the trees in the

other densities are slowing down. Although, the wider spaced trees are shorter overall.

Diameter growth appears to be slowing in the higher density plots by year 9, but not in the lower densities. This trend is indicated by the steeper slope of the lines for 100 and 230 tpa in Figure 3. The trees in the 100 and 230 tpa control have poor form and multiple stems. Therefore, it appears that the best planting density is somewhere between 230-525 tpa. In Douglas-fir, a height/diameter ratio>100 is a poor tree. But these red alder have a ratio of 95 and look ok. So once again, the rules for Douglas-fir do not apply to red alder.

If we compare the control plots to the thinned plots, we see some interesting trends. The 525 tpa plot that was thinned to 230 tpa has larger mean diameter for the 100 biggest trees than the 525

Definition of Acronyms

BCMin-British Columbia Ministry of Forests.

BLM-Bureau of Land Management.

DNR-Washington Department of Natural Resources.

GYN-Goodyear-Nelson.

GPNF-Gifford Pinchot National Forest.

MBSNF-Mt. Baker Snoqualmie National Forest.

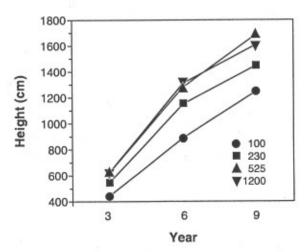
NWH-Northwest Hardwoods.

ODF-Oregon Department of Forestry.

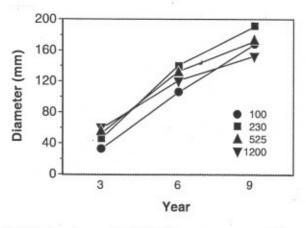
OSU-Oregon State University Forest Research Laboratory.

SNF-Siuslaw National Forest.

WHC-Washington Hardwood Commission.



Mean height growth of the 100 largest trees per acre in four densities.



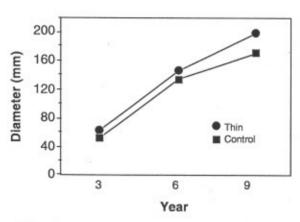
Mean diameter growth of the 100 largest trees per acre in four densities.

tpa control plot (Figure 4). But the mean height in the thinned plot is shorter than the unthinned, control plot. This decrease in height growth is typical after thinning (Figure 5).

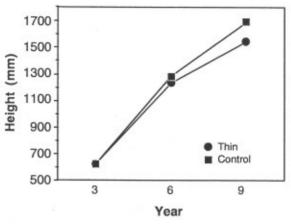
It is clear that the 1200 tpa plot benefitted from thinning in both diameter and height growth. In the control plot, the loss of growth rate in year 6 is visible even among the 100 largest trees (Figure 6 and 7). Therefore, a better comparison of growth is between the 1200 tpa thinned plot and the 525 control plot, here growth is not statistically different (Figure 4&6, Figures 5&7). We did not gain much growth by planting dense and thinning, but we did gain in form and stem quality.

It should be kept in mind that this is only one sitye and the trends here may not persist when we look at all twenty-six type 2

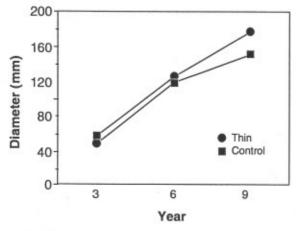
installations. It will be an exciting day when our data set is substantial enough to ascertain grwoth and yield trends for the ecological range of red alder.



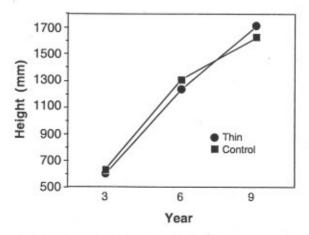
 Mean diameter growth of the 100 largest trees per acre in thinned plot and corresponding 525 tpa control plot.



Mean Height growth of the 100 largest trees per acre in thinned plot and corresponding 525 tpa control plot.



Mean diameter growth of the 100 largest trees per acre in thinned plot and corresponding 1200 tpa control plot.



Mean height growth of the 100 largest trees per acre in thinned plot and corresponding 1200 tpa control plot.

PEOPLE BEHIND OUR SUCCESS

Featured Cooperative Member-Siuslaw National Forest

HSC members invest in many ways to make the Cooperative a success. Members provide direction for the Cooperative, land for plantations, crews for field-work, and funds for administration. Our ability to establish 37 research installations and managing these installations for 12 years is a strong testament to our members dedication and commitment to alder research.

As a new addition to the annual report, we would like to introduce you to one of our member organizations, the people and the sites they own and manage.

This year's featured member is the Siuslaw National Forest. The Siuslaw National Forest (SNF) manages 620,000 acres in the Costal Range of Oregon. The SNF is headquartered in Corvallis, Oregon and has three district offices: Hebo, Waldport, and Mapleton. Each of these district offices has red alder study installations. Wayne Patterson represents the SNF on the Management Committee and primarily works out of the Hebo district office.

Hebo Ranger District is located near the coastal town of Lincoln City. Folks at the Hebo District have taken a very active role in the success of the Cooperative. Under the direction of Wayne and John Johansen, they planted and continue to manage four installations:

- 1. Battle Saddle-Type 1 Thinned natural stand established in 1991 (Figure 1, 2101)
- 2. Pollard Alder-Type 2 variable-density plantation established in 1991 (Figure 1, 2202)
- Mt. Gauldy- Type 2 variable-density plantation established in 1995 (Figure 1, 2206).
 This site has the distinction of being on the most difficult terrain in the entire study.
- Cedar Hebo- Type 3 mixed Douglas-fir/alder plantation established in 1995 (Figure 1, 2302)

The Pollard Alder site is one of our oldest Type 2 installations. It has had two thinning treatments and two pruning lifts. Initially, this site was planted with septoria-infected stock. It was re-planted in 1992. In 1994, there was another fungal outbreak which affected growth but, by 1998, most trees have recuperated and there is little evidence of the damage. Both Pollard Alder and Battle Saddle are frequent tour sites for the HSC Management Committee.

In addition to managing their own installations, the Hebo folks have been providing the field crew to thin, prune, and measure three Northwest Hardwood Sites for which there is no cooperator. This field work would not get done with out them. They have generously provided this service for the last three years. I think it is accurate to say that the breadth and depth of this study would have been compromised if it was not for the efforts of Wayne, John, and the entire Hebo crew! All the folks pictured (Figure 8) have been involved with one or more aspects of the management of the Coop's alder plots. Many of them go way back, having worked on these sites since the inception of the Cooperative.



 Siuslaw National Forest- Hebo District crew at the Pollard Alder Type 2 study installation. Names from left to right: Mo Jeffries, Don Clauson, Nancy Craft, Wayne Patterson, Matt Ruedy, John Eckhardt, Lori Duley, Steve Garza, John Johansen, Rex Wheeler (legs behind Johansen- he is extremely camera-shy), Skip Bailey.



 Siuslaw National Forest- Waldport District crew at the Keller-Grass Type 2 study installation. From left to right: Bob Bodle, Ed Obermeyer, Eric Stolsig, Greg Armstrong.



Waldport Ranger District is located in the coastal town of Waldport, Oregon. Ed Obermeyer and his crew manage one Type 2 site called Keller-Grass (Figure 1, 3204). It was planted in 1992. Initial survival was poor due to poor stock and the site was inter-planted in 1993. It has been thinned once and pruned twice. The site is on a very steep, west facing slope which makes it one of the more challenging sites to work on. The trees are growing very well in spite of an understory of salal which we since have found to be an indicator of poor site quality for red alder.

The Mapleton District has recently re-located in the coastal town of Florence, Oregon. Dan Karnes, Leonard Larson and Terry Statler manage one Type 2 site called Cape Mountain (Figure 1, 2204). It was planted in 1994. Initial

survival was poor due to the heavy competition from salmonberry and the site was inter-planted in 1995. The salmonberry continues to be a problem at this site. In 1999, this site had its first thinning and pruning lift.

The Siuslaw National Forest has been a driving force in the Cooperative since our beginning. Tom Turpin, now retired, was their original representitive. Tom was involved in alder research before the cooperative began, and was instrumental in the formation of the HSC. Upon his retirement, Tom passed the Baton to Wayne Patterson who has made the Cooperative a research priority. Wayne has contributed time, energy and people to ensure the goals for the Cooperative are met and the integrity of the study is maintained over time.

The dedication of the Siuslaw National Forest and all our members¹ is the reason the HSC has been involved in alder research for 12 years. Thanks to their contributions, alder is fast becoming one of the better understood forest trees in the Pacific Northwest.

Footnote1 A complete list of HSC cooperators is on page 23.

10. Siuslaw National Forest- Mapleton District crew at Cape Mountain Type 2 study installation. Names from left to right: Terry Statler, Leonard Larsen, Daniel Karnes.

RELATED RESEARCH OUTSIDE THE COOPERATIVE

The Center for International Trade in Forest Products (CINTRAFOR) recently released a Competitive Assessment of the Hardwood Lumber Industry in the Pacific Northwest, based on a survey of managers of hardwood firms in the PNW (CINTRAFOR News Vol. 15 #1. Spring 2000). The paper includes information ranging from factors affecting firm competitiveness to challenges and threats specific to the industry.

Hardwood lumber production in the Pacific Northwest increased over 200% between 1983 and 1997, with annual exports of red alder surpassing \$160 million. Yet, less than 1% of private and industrial timberlands are being managed for hardwood production. While PNW hardwoods are finding increased market acceptance, little research has been done to identify factors affecting the industry's success. CINTRAFOR researchers surveyed 13 hardwood lumber producers operating in western Washington, western Oregon, and northern California about the factors affecting their firm's success. Ten companies responded. These ten companies produce approximately 450 MBF of lumber, accounting for over 95% of the annual hardwood lumber production in the PNW. Exports totaled approximately 126 MBF, or 28% of total production. Both large and small producers sell a substantial percentage of their lumber directly to the end-user.

Problems and threats confronting producers were grouped into three categories: domestic regulatory issues, domestic resource issues, and international regulatory issues:

Domestic Regulatory Issues

Respondents indicated that state taxes, federal regulations, and state forest practice regulations all had a negative impact on their firms' competitiveness.

Domestic Resource Factors

Respondents rated raw material procurement as important. And they perceived increasing raw material price and price volatility to have an extremely negative impact on competitiveness. Quality of labor and resource quality were each generally perceived to have relatively little impact, while resource availability had a slightly positive impact on their firms' competitiveness.

International Regulatory Factors

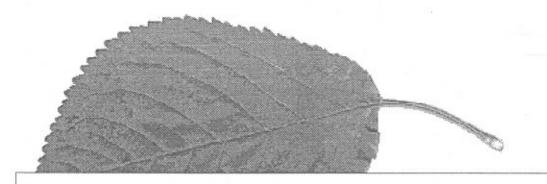
Environmental certification of wood products and tariff barriers were perceived to have a more negative impact on the competitiveness of hardwood producers than non-tariff barriers and regional trade agreements, although the difference in score was small.

Experts predict that the supply of red alder will decline 25% by 2003. There are two primary factors driving this decline in supply. First, there are very few intermediate-age alder stands to replace the mature stands that are currently being harvested. Second, restrictions

to logging in riparian zones may put much of the mature alder off limits. Inspite of these factors, respondents did not consider resource ownership to have an important impact on competitiveness.

Respondents also identified factors that influence a firm's reputation, such as maintaining high quality control standards and communicating regularly with customers, as very important to a firm's competitiveness. Efficient manufacturing was also rated as being important. Product differentiation and distribution were perceived to be somewhat important, while marketing activities did not have an important impact on their firms' competitiveness.

In a separate project, interviews with European furniture and panel manufactures found that the light reddish hue and subdued grain appearance of red alder have made it extremely popular in the European furniture industry where natural looking furniture has been fashionable. Even though red alder constitutes less than 3% of total US hardwood lumber production, it ranks fourth in total volume and third in total export revenue among all hardwood species exported. In 1997, revenue from export of red alder was \$161 million and equated 10.3% of the total US hardwood lumber exports, up from 6.8% in 1995. Red alder exports declined substantially in 1998 however, with the most significant losses in Germany, Italy, Taiwan and Japan. While European manufacturers report that consumer tastes have changed, affecting demand for alder furniture, other factors cited include: fluctuations in international exchange rates, consolidation within the hardwood industry in the PNW, rising red alder prices, inconsistent supply and delivery, and competition from European beech.



Direction for 2001

The goals for 2001 are a continuation of our long term objectives:

- Continue treatment and measurement of Red Alder Stand Management Study installations.
- · Pursue alder growth and yield modeling proposal from the BC Ministry of Forests.
- · Continue efforts to recruit new members.
- · Archive data and maintain the data base
- Recruit a new faculty research assistant to replace Alison Bower.

APPENDIX 1.

HSC Management Committee Meeting Minutes

Summer Management Meeting July, 1999

July 7th - Meeting:

The Management Committee met on July 7 and 8, 1999 at the Best Western Cottontree Inn, Mount Vernon, Washington. For both days, the mornings were spent indoors and the afternoons in the field.

The meeting began at 8:00 am with welcome and introductions. Next, Alison reviewed the 1999 field season. Twenty-two installations had field activity in 1999. Of these, 13 were measured (4 of which had the 9-year measurement), 5 were thinned for the first time, and 4 were thinned for the second time. On 2 sites the second thinning was combined with the 9-year measurement to save a total of 6 worker days (2 crews of 3 people for 1 day). Thanks to all cooperators for providing the crews to get the work done! This is an exciting time because many installations are mature enough to see significant differences in growth between treatments and sites. The schedule for field activities for winter 2000 were handed out. The discussion moved to the topic of pruning. Trees will heal more quickly if they are pruned early in life, i.e. 3 years old, and early in the year, i.e. just before bud break. Clear wood is produced 2-3 years after pruning, even though there may still be a scar on the outside bark.

Next, Kevin Brown of BC Ministry of Forests presented preliminary results from an ongoing fertilization trial in young red alder in British Columbia. The study is located in laminated root rot areas that are recommended for red alder production. All sites supported an alder stand prior to harvest. The site quality matrix ranges from very moist, rich soils to moderately dry, poor soils. First-year responses of 1-0 alder seedlings to phosphorous (P) additions in outdoor sandbeds showed increased growth with increased concentration and application rate. Concentration threshold for growth response appears to be 2-2.2 mg g⁻¹ in leaf tissue with the greatest increase observed between 3 and 5 mg g-1. Application levels ranged from 0-400 kgP ha'1. Application rates greater than 100 kgP ha'1 improved growth and phosphorus concentration in plant tissue. Best results were observed when application rate was greater than 200 kgP ha-1 and concentration was greater than 3 mg g-1. The nodule/ root ratio increased with increased P concentration above 2.2 mg g-1, but root weight ratio and shoot weight ratio did not change with increased P concentration. Fertilization in young alder plantations was effective when competing vegetation was removed 1 meter around each tree. Stem volume increased by 20% in plots with vegetation was removed even when no phosphorus was applied. In plots where vegetation removed and P applied at 40 g/tree, the change in stem volume was 66%. Kevin feels that 40 g/tree of P is too little for trees larger than seedlings, and had application rate been higher the change in stem volume would have been greater. Stem volume change was greatest on a very moist site with rich to very rich

soils. It was poorest on a very moist to wet site with very rich soil. Change in stem volume occurred mostly as diameter growth.

Dave Hibbs said that in his phosphorus fertilization trial on 4 alder Nelder installations no growth difference was observed with application of 125 kg/ha Super P. He hypothesized that the phosphorus got bound up by the competing vegetation. Dean Debell observed the best response to fertilization in areas where trees were under water for part of the year. Hillslopes had a lower growth response than alluvial areas. Flooding soluble phosphorus makes it immediately available, but may decrease availability over time. Everyone agreed that the biggest factors effecting uptake is: source, application technique (banded), and concentration.

Next, Dean Debell of Washington DNR presented 10 year results of the DOE study at Yelm, WA. on the influence of spacing, irrigation, and phosphorus fertilization on tree growth and stand development in red alder plantings. This study was designed to develop guidelines for intensive management of hardwoods to maximize productivity. The study site was not a typical red alder site. It was originally a savanna/ prairie, and then converted to a seed orchard as well as other agriculture uses. Red alder was planted at 3 spacings: 0.5x0.5m, 1x1m, and 2x2m. The site was divided into high irrigation and low irrigation treatments, and then sub-divided into fertilized and not fertilized treatments. Weeds were controlled on all treatments. Dean found that irrigation was significantly correlated to survival, quadratic mean diameter (QMD), height, and basal area. Fertilization was significant to survival only. Spacing was significant to QMD and height. Initial survival was 70% in plots without irrigation or fertilization and 97% in irrigated and fertilized plots. By year 3, survival had declined significantly in the plots with no irrigation or fertilization, while the treated trees grew and developed rapidly. The advantage of irrigation was less in the widest spacing. There was an initial benefit of tight spacing (.5x.5 m) in the high irrigation plot where QMD and height were bigger than the low irrigation .5x.5 m plot. The wide spacing was a benefit in the low irrigation plot; however tree form was poor. The narrow spacing was of benefit to the high irrigation trees. Overall irrigation upped the site index by 3 meters, but all treatments are tracking the same line on the density diagram. The primary effect of site index is not to change the trajectory, but how rapidly the trajectory line is followed. Mortality happens faster on better sites.

July 7th - Field Tour:

We toured the Type 2 Humphrey Hill Installation. This Goodyear Nelson site was planted in 1989, and has received all treatments except the thin at HLC 30' in the 525 tpa plot.

July 8th - Meeting:

Dave Hibbs opened the meeting with the topic of budget and membership. We have had numerous gains and losses in membership. Member gained is the Washington Hardwood Commission. Potential new members are University of Washington's Pack Forest and Weyerhaeuser. We are losing Gifford Pinchot National Forest, and may lose BC Ministry of Forests. Both members may continue to manage their sites, but will likely not pay dues. The decrease in budget means Alison will be shifted to another project part-time and will not be available for data analysis. On the positive side, we have cut travel and field expenses. The

decrease is due to the streamline to data collection protocol. The budget is balanced for fiscal year 2000, but beyond this year we may have problems.

We need new members, and towards this goal a brochure is in the works. The need for a brochure was expressed at the January 1999 meeting, and since that time we have been working on it. The proto-type was handed out for comment and there were many constructive suggestions. We will continue to work on a less technical brochure to hand out to interested organizations and the general public.

Next, Dean Debell presented findings on density and regularity of spacing affect on development of red alder stands- 20 year results from the Apiary, Oregon trial. The study was located on a Northeast slope of the Coast Range. It was previously a Douglas-fir stand infected with laminated root rot. The soil is well drained loam. The red alder site index is $SI_{20} = 24m$. Spacing was such that the planting blocks were both square and rectangle. Spacings were: .6x1.2m, 1.2x1.2m,1.2x1.8m, 1.8x1.8m, 2.5x2.5m. After 20 years, the tallest trees were in the two rectangular blocks. The largest mean diameter was in the 2.5x2.5 m block, but the two rectangles have larger mean diameters and greater basal volume than any of the other square blocks. The 1.2x1.8m rectangular block had the fewest trees at age 20 of all the blocks, and the .6x1.2m had fewer trees than the 1.2x1.2m at age 18. The superior performance of the rectangle blocks was not observed until they went through a period of high mortality.

Do rectangles vs. squares represent real differences in performance? The site had uniform productivity, normal growth patterns to age 10, and a consistant change of growth pattern between ages 10 and 20. Dean hypothesized that the higher density in the rectangle is beneficial and enhances differentiation by increased mortality and subsequent survival growth. This fits with the literature on benefit of neighbors in alder and silver birch stands. Managerial implications of these findings is that rectangles may eliminate or postpone early thin. Dense rectangles may accelerate natural pruning with less growth-loss than square blocks.

July 8th - Field Tour:

We toured the Clear lake Type 2 installation. This Goodyear Nelson site is 9 years old, and has had all treatments except the 30' HLC thin in the 525 tpa. Next we visited the Type 1 off Janicki Road. This Washington DNR site is a natural stand of alder that was thinned in 1991 when it was 14 years old. Our final stop was an alder thinning study by George MCFadden, the silviculturist for Washington DNR Northwest Region. George's objective in this study is two-fold; he is testing the thinning response of a 21 year old red alder stand, and the ability of western red cedar to survive and grow in the understory. Red alder overstory is a common riparian condition. Redcedar is a desirable riparian component, so this study will be useful in developing and evaluating riparian enhancement projects in which these species are involved.

Winter Management Committee Meeting-January 2000

January 11th- Meeting:

The Management Committee met on January 11 and 12, 2000 at the Embarcadero Resort Hotel in Newport, Oregon. For both days, the mornings were spent indoors and the afternoons in the field.

The meeting began at 8:00 am with welcome and introductions. Dave Hibbs announced that Alison Bower will be leaving in the next 6 months and we have begun to look for her replacement. A progress report on the winter 2000 field season was given by Alison Bower. There are 22 sites which have activity this winter, of which 10 have been completed. The field work that is left to complete is mostly on the sites where we need to hire a crew. The ODF site off of Apairy Road was thinned for the second time this winter (15-20' HLC thin). It has an extra 1200 tpa plot which we thinned to 100 tpa. We will thin extra plots on other sites to 100 tpa as available, to compare with the standard thinning density of 230 tpa. All in all the field season is going smoothly. Districts are making an effort to provide enough personnel to run two crews which makes the work go much faster.

Karl Buermeyer gave an overview of the oak acorn survey being conducted by the PNW Research Station in Olympia, Washington. The survey is for Oregon white oak, also called Garry Oak (Quercus garryana). This is the only native oak in British Columbia, Washington, and the northern half of Oregon. Oak acorns are a food source for many animals including the endangered western grey squirrel. The PNW has embarked on this project because little is known about this oak species. The oak-prairie ecosystem in which it is found is disappearing due to urbanization, and threatened by encroachment of native and exotic species. A history of low intensity, frequent fires enabled the oak-prairie habitat to be established and maintained. In the absence of fire, Douglas-fir and western hemlock seed into prairies. Some burning has been re-initiated in Oregon and Washington.

The purpose of the survey is to determine the frequency and condition of acorn crops over the region. Acorn surveys are conducted mid September to mid October by volunteers. Open grown trees produce the most acorns all over the tree. Crowded trees tend to produce acorns only on the top of the tree. 159 trees were surveyed in the Longview-Oak Harbor-Whiby Island areas, and 35 trees in the Columbia Gorge area. More surveys are needed in all areas except Olympia, Washington. Analysis on first year surveys will look at production vs. environment and are due to be completed in April. But some general observations are that open grown trees produce the most acorns. Crowded trees in small areas have poor acorn production, but collectively an oak woodland can have high productivity. A woodland comprised of mostly young trees with a few old oaks has poor production. High productivity on open grown trees as well as in closed woodlands seems to be a contradiction. It will be interesting to see how this contradiction relates to thinning. Acorn predation by the Filbert moth and weevil appears to be a big problem. Infected acorns drop early which mean that infestations might be controlled by fire. Acorn production is poor in wet areas of Washington, but in Oregon we commonly see oak in the wet valley bottoms. This discrepancy may be due to soil differences. It is too early to ascertain the consistency in acorn crop, but it seems to vary considerably with location. Dave Hibbs said he has only witnessed 2 good acorn crops in the 16 years he has been in the Willamette Valley. Mistletoe is an issue in the Willamette Valley but not in other areas.

PNW is looking for volunteers to survey for Sept-Oct 2000. Please contact Dave Peters for further information. Dave Peters 360-753-7654.

Next, Greg Filip, Director of the Swiss Needle Cast Cooperative, gave a presentation on the disease epidemic. Swiss Needle Cast (SNC) is a native disease in Oregon. It became a big problem in Europe in 1920's when inland Douglas-fir was planted. The disease has severely limited the amount of Douglas-fir grown in Europe. New Zealand planted the

coastal Douglas-fir but also got SNC. In Oregon, Christmas-tree farmers have controlled the disease for decades with fungicide because bud-break is uniform. But in natural stands bud-break is not uniform. The northern Oregon Coast Range (Tillamook area) has experienced a dramatic increase in Douglas-fir mortality, with no slowdown in sight. Areal photos show the disease moving in to old-growth stands which were previously thought to be resistant. Resistance is also decreasing in progeny sites with families that showed initial resistance. It is not known why only Douglas-fir is affected.

Traditionally, SNC attacks new needles and causes effects in 3-5 year old needles, but the rate of SNC development has increased to kill 2nd year needles. Fruiting bodies plug stomates with tree mortality occurring in as little as 3 to 5 years. Sporés are released and infection occurs in June. Warm, moist conditions promote build up of spores, as well as surface spread of hyphae through summer into fall. The epidemic tends to build up in place as opposed to a spread, with the greatest bulid up within 18 miles of the coast. But it is showing up everywhere, even as far east as La Grande, Oregon.

Why here, and Why now?

There is no scientific answer to these questions. But the SNC has several hypothesis which they are testing:

- Change in species composition in the Coast Range, with a disproportionate amount
 of Douglas-fir in the spruce/hemlock zone. Historically, there was about 20%
 Douglas-fir; presently there is about 80%.
- Genetic susceptibility of off-site planting stock. The Tillamook Burn was replanted with seed from all over the Pacific Northwest including Willamette Valley Douglas-fir, which is most susceptible.
- · Tree nutrition may effect susceptibility.
- Management practices.
- Atmosphere pollutants and oceanic effects.

The SNC cooperative was established in 1997. It is comprised of state, federal, tribal, and private members. Their projects are concentrated in several areas:

- Basic biology of the disease
- · Tree growth impacts
- Survey and detection via aerial photos, satellite images, and ground plots
- Strategies for control

Strategies for control are:

- Plant mixed species stands- Industry reluctant to convert to alder.
- Chemical fungicide- a healthy needle can support up to 18 species of fungus; as the SNC infection increases, the number of fungal species decreases.
- Balanced fertilizer- Infected trees often have deficiency in calcium, magnesium.
 Application of sulfur improves the color and basal area growth of infected trees.
- Prune lower crown branches.

- · Control vegetation to reduce stress on Douglas-fir.
- · Limit thinning- trees appear worse after thinning, may be due to increased stress.
- Prioritize stands for treatment.
- Develop resistant Douglas-fir- not much progress in this area so far.

Next, Glenn Ahrens talked to the group about the Hardwood Forestry Education Program sponsored by the Western Hardwood Association. The general purpose of the program is to provide a forester to give presentations or workshops on hardwood forestry to landowner and forester audiences throughout the Pacific Northwest. The program has produced 34 events, reaching an estimated audience of 1000 people.

We (the HSC) provide the primary source of good demonstration sites, alder management information and findings that Glenn uses in his program. Interest in alder management is increasing in light of the Swiss Needle Cast epidemic. Glenn plans to expand into regions that have had little education in hardwood management.

It is hard to convince some people that alder is profitable. Often these people have not done well with alder in the past because they have cut natural stands with only 20% saw logs which yields \$50/1000 at a \$500/1000 market. Therefore, any management that will increase percent of saw logs will greatly increase the profit. In one case study, a stand thinned as late as year 25 still was able to capture a 30% increase in the number of saw logs at rotation.

Our members, as well as the general public, are requesting information on growth and yield for managed red alder stands. Is it time to begin modeling? The group is divided on this question. We would all like to see modeling begin but the financial burden could be immense. There were several ideas put forth:

- Have a consultant develop the model for free and then charge users, including the HSC.
- Use modelers already working for member organizations as part of that member's in kind contribution.

The need for modeling is clear, but are our plantations old enough to provide an accurate look at thinning response?

- One approach is to adapt OREGONON based on natural stands and add in thinning response later.
- Users need a basic model that represents Chambers empirical yield, but also reflects
 what we know about management.

We need to decide priorities and direction, in order for the group to agree on our level of effort for an alder model. Dave Hibbs will investigate funding and direction for modeling and report back at the June 2000 meeting. We will create a road map for our modeling goals at that point in time.

The new and improved HSC brochure was distributed. This is our "PR" piece targeting the general forestry, landowner audience. Anyone wanting additional copies contact Alison 541-737-6100 or Alison.Bower@orst.edu

January 11th- Field Tour

The afternoon was spent measuring one of the orphaned Type 2 sites near Siletz.

January 12th- Meeting:

The meeting began with a discussion of the impending change in overhead charged to all cooperatives by OSU. Overhead will be increasing by 23%. The increase is not suppose to start for 5 years and it will begin at 13% and gradually increase up to the 23%. This change was mandated by the Vice Provost of Research Toby Hayes. Basically, no one is happy about this change and many feel it is an exorbitant sum. Members of the VMRC sent a letter of protest. Norm Andersen warned that such an increase will put DNR over their dollar treshold and would make collecting dues difficult. According to Norm, OSU and UofW are the only two schools that charge forestry coops overhead. Bill Volker pointed out that cooperators make big contributions for which the university is not charged.

Next, Alison presented the issue of form pruning in our Type 2 and 3 installations. The manual calls for all installations to be form pruned in year 3. Some installations have been form pruned and some have not. It was decided that all plots in installations in the 3 to 6 year old range should be form pruned. Installations older than 6 years will be left as is. The status of form pruning will be documented in the files. If a tree is less than 4 feet tall and has multiple stems then it will not be form pruned until year 6 because the tree is already having trouble surviving.

Doug Belz observed that we need a variable that identifies the height at which forking occurs on merchantable size trees (age 12). Also, we need an epicormic branching code.

The group agreed to two additions to measurement protocol:

- In year 12, measure the height at which forking occurs on all forked trees in all treatments.
- A code for epicormic branching will be added to the existing condition codes: Epicormic branching will be condition code 11; where 1=damage 1=epicormic branching.

January 12th- Field Tour:

Wednesday afternoon was spent measuring an orphaned Type 3 installation near Siletz. It snowed about 1 inch while we were working.

APPENDIX 2.

Financial Support Received in 1999-2000

| Cooperator | Support |
|--|-----------|
| BC Ministry of Forests | \$8,500 |
| Bureau of Land Management | \$8,500 |
| Goodyear-Nelson Hardwood Lumber Company | \$4,500 |
| Oregon Department of Forestry | \$8,500 |
| Siuslaw National Forest | \$8,500 |
| USDA Forest Service PNW Station | In kind |
| Washington Department of Natural Resources | \$8,500 |
| Washington Hardwood Commission | \$8,500 |
| Subtotal | \$55,500 |
| Forestry Research Laboratory | \$50,773 |
| Total | \$106,273 |