# SMC Quarterly

## College of Forest Resources, University of Washington

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## From the SMC Director David Briggs

The SMC Spring meeting was held on April 3-4 at McMenamin's in Troutdale, Oregon with 38 attending from 20 organizations. Students and faculty provided updates on projects and Doug St John gave a presentation on recent developments by Precision Forestry Cooperative researchers on RFID (radio frequency identification) tagging of trees and used of lidar to identify topographic features under the forest canopy and to recognize individual trees. The Wood Quality TAC discussed felled tree measurement protocols, the Silviculture TAC discussed a fractional design framework for a new set of installations that would involve levels of spacing, genetics, fertilization, and vegetation management treatments, and the Modeling TAC had a good discussion of issues and problems with current growth and yield models and features that would be important specifications in a future modeling effort.

*Edie Sonne, University of Washington Grad student presenting her research at the SMC Spring Meeting.*

This issue features an article summarizing some aspects of a Masters Thesis project completed by Edie Sonne at the UW College of Forest Resources. The study was funded by an external grant from King County Department of Natural Resources and supported by the USFS Pacific Northwest Research Station which performed all of the tree, log and lumber processing. The SMC field crew was hired as part of the effort to assist in final tree measurements, sample tree selection and harvesting and UW Pack Forest contributed harvesting equipment and space for the portable sawmill. The thesis title is "*Biosolid Fertilization and Thinning Influences on Stem Form, Log and Lumber Quality and Value: A Case Study for a Mature Douglas-fir Stand*". A future SMC Working Paper will be published on all aspects of this study.

In February, Leith Knowles, with the New Zealand Forest Research Institute, visited to review the research he is doing on Douglas-fir growth and yield using data sets from New Zealand, Europe, and from the SMC under our earlier memorandum of understanding. We plan to have an article on this project in a future issue and there will be a final report when the analyses are completed.

I would also like to bring to you attention the First International Precision Forestry Symposium which will be held on the University of Washington Campus on June 18-19 with a field tour on the following day. There are some incredible new technologies being developed that will revolutionize the scale and resolution of data that we are accustomed to using. This includes remote sensing using LIDAR; radio frequency identification tagging of seedlings, standing trees and products moving through the chain of custody; and GPS tracking and control of machinery to mention a few topics that will be covered. This information will create a counterpart revolution in how we think of forest planning and in how stands of trees and logs will be marketed in the future. I encourage you to review the enclosed materials and, as Chair of the symposium planning committee, hope to see you there.

# The Effect of Biosolid Fertilization and Thinning on Volume and Value of a 55 Year Old, Low Site Douglas-fir Stand

**Edie Sonne, Graduate Student, College of Forest Resources**
**University of Washington**
**David Briggs, Professor, M&E, Forest Products Management**
**Director, Stand Management Cooperative**

## *Introduction*

This study assessed the effects of biosolid fertilization and thinning on stem form, volume growth, log value, and recovery and value of visually graded lumber in a mature Douglas-fir (*Pseudotsuga menziesii*) stand treated in 1977. The study stand, referred to as the "Highway Thinning Research Site" is located on the University of Washington's Pack Forest near Eatonville, WA. It was scheduled for harvest in 1998, which provided an opportunity to evaluate the effect of the treatments. The US Forest Service Pacific Northwest Research Station and King County Department of Natural Resources collaborated to harvest and process the trees into lumber to assist in validating the AUTOSAW sawmilling simulator and to support this treatment analysis.

The stand was naturally established following a severe fire in 1922 and was estimated to be 55 years old at the start of treatments and age 76 at harvest. The stand has a low site index, 85 feet at 50 years. Before treatment, the site was heavily stocked with some plots having over 1000 trees per acre, and approximately 75% were under 7 inches dbh. In the winter of 1977-78, twelve 0.2 acre plots were established in the stand with six to be thinned and six to remain unthinned. The six plots designated for thinning were thinned to 250 trees per acre; the reduction in basal area was about 50% as most of the trees under 7 inches were removed. Table 1 summarizes initial and final conditions of the plots.

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The higher quadratic mean diameters in the thinned treatments reflect that these plots were thinned from below, meaning the suppressed smaller trees were removed and the dominant more vigorous trees remained. This may have resulted in a bias towards larger knot diameters and a larger juvenile wood core in the butt logs of the thinned treatments. Three thinned and three unthinned plots were treated with 42.2 tons/acre of dewatered sewage (18% solids). These were retreated in 1980 and 1989 with 21 tons/

Table 1: Initial and Final Stand Conditions

| Treatment | QMD (inches) | | Height (feet) | | Trees per acre | |
|---|---|---|---|---|---|---|
| | Initial | Final | Initial | Final | Initial | Final |
| Control | 6.57 | 9.21 | 86 | 111 | 842 | 551 |
| Thin | 8.43 | 12.20 | 80 | 103 | 262 | 158 |
| Biosolids | 6.66 | 10.62 | 82 | 110 | 702 | 388 |
| Thin/ Biosolids | 8.67 | 13.93 | 79 | 108 | 250 | 120 |

acre of dewatered sewage. In 1995 a second thinning was applied to the thinned treatments. Since the stand had dense stocking, was 55 years old, and was about 80 feet tall at the start of the study, it is unlikely that crown length was more than 50% of total height. Consequently, height to the live crown base is estimated to have been at approximately 40 feet.

## *Sampling and Data Collection Methods*

Starting in 1977, approximate biannual plot measurements were obtained. DBH was measured on all trees and a sub-sample was measured for total height. In 1998, four trees in each plot (48 trees in total) were chosen using a stratified random sample based on the plot quadratic mean diameter, felled, bucked into 32 foot lengths for harvesting, and then into 16 foot logs for sawmilling. "Juvenile" and "mature" wood, demarcated at 20 rings from the pith, was painted on the ends of the 16 foot logs. Logs were graded according to the Official Rules for the Puget Sound Log Scaling and Grading Bureaus (Northwest Log Rules Advisory Group, 1998). In addition, diameter, vertical position, and circumference position of every knot were measured on each 16 foot log.

The logs were sawn with a portable Wood Miser[tm] sawmill. Each piece of lumber was given a number that could be traced back to its original log, tree, and treatment. The overall value of lumber recovered may be understated for two reasons. First, this type of mill does not have as high a lumber recovery efficiency as industrial mills. Second, sawing was limited to 1 inch boards and 2 inch dimension with a maximum width of 8 inches. Consequently, opportunity to recover larger lumber that may have had greater value was precluded. While this limited the product mix and opportunities for improving grade, wider dimensions in a grade permit larger knots, one can argue that the trend in the wood products industry is towards smaller widths, with wide lumber being replaced by engineered substitutes such as I-joists and beams. The lumber was subsequently kiln dried, planed, and graded by the Pacific Lumber Inspection Bureau, according to the American Lumber Standards (ALS) (American Lumber Standard 1994). One-inch boards were graded using the ALS Alternate Board Grades, 2x4 dimension lumber was graded under Structural Light Framing rules, and 2x6 and 2x8 dimension lumber were graded under Structural Joists and Planks rules. In addition to lumber grade, the juvenile wood percentage at each end and the grade-limiting defect was recorded for each piece.

## *Volume Growth Results*

1977-1998 volume gains were 4314, 6248, 4937, and 8781 cubic feet per acre for the control, thinned, biosolids, and thinned with biosolids treatments (Table 2). The totals for the thinned treatments include estimates of the volumes removed in the 1995 thinning.

Table 2: 1977-1998 Volume Growth by Treatment

| Treatment | Added Growth/acre ($ft^3$) | Percent Gain Vs Control |
|---|---|---|
| Control | 4314 | - |
| Thinned* | 6248 | 45% |
| Biosolids | 4937 | 14% |
| Thin/Biosolids* | 8781 | 104% |

## *Log Quality and Value Results*

**Knot Size Distribution:** It was estimated that the base of the live crown was at approximately 40 feet in 1977 hence somewhere in the middle 32 foot log. The treatments would be expected to only affect branch diameter above this point, i.e., in the middle and top logs. Knot diameter distributions (Figure 1) were significantly different from the control distribution for all treatments in the middle and top 32 foot logs, with p-values ranging from <.001 to .031. In particular, there were more 1 – 1 ½ " and 1 ½ – 2" diameter knots in the thinned/biosolids treatment than in the control. Unexpectedly, the thinned with biosolids treatment had knot sizes on the butt log, that were significantly different from control (p<.001), with more knots in the ½”-1” and 1-1 ½” diameter classes. Since the live crown was estimated to be above the butt log this difference may be an artifact of the original stand conditions (e.g. thinning from below) or the tree sampling.

**Juvenile Wood:** Juvenile wood was measured as the first 20 rings from the pith, the treatment effects would only occur in the portion of the upper stem that had 20 or fewer rings in 1977. Since the stand was already 55 years old and about 80 feet tall, it is very likely that the transition from juvenile to mature wood had previously occurred in the first 32 foot log and that the transition point in 1977 was somewhere along the second 32 foot log. By the end of the study in 1998, the transition point was likely to be near the base of the top log. Growth over the 21 year period would not change the volume of juvenile wood in the bottom log but would drive down it’s juvenile wood percent and reduce the average percentage of juvenile wood in lumber pieces. However, in the upper stem, faster growth may have enlarged the diameter and volume of the juvenile region and increased percentage of juvenile wood found in lumber. Figure 2 shows that the thinned/biosolids treatment had the highest overall volume of juvenile wood in the butt log and middle log. The greater juvenile wood volume in the middle log was expected due to increased diameter growth before the transition to mature wood on this log was completed. However, the greater juvenile wood volume in the butt log was not expected since the transition to mature wood was complete prior to 1977. This may have arisen for reasons similar to those given for the larger knot diameters in butt logs of this treatment. Although the juvenile wood volume was larger in the thinned/biosolids treatment, this treatment has the lowest overall percentage of juvenile wood in lumber pieces from each log position (Figure 3). This is a result of continued rapid diameter growth after the transition to mature wood. There is little difference among top logs since these are small, young, and the juvenile to mature transition has not been reached along most of their length.

**Log Grade:** The official log grading rules use a combination of log small end diameter and knot diameter classes as key discriminants. Figure 4 shows the frequency of log grade by treatment and that all logs were No. 2, No. 3, or No. 4 Sawlogs. Only the thinned treatment, with fewer No. 2 Sawlogs and more No. 3 Sawlogs, had a log grade mix significantly different from the control (p=.03). Since No. 2 Sawlog, the most restrictive of these grades, permits knots up to 2.5 inches in diameter and since none of the sample trees had knots this large (Figure 1), the principal effect of the official log grades was simply to sort the study logs by diameter. Although there were substantial differences in percent juvenile wood, knottiness, and lumber value among the treatments, these differences were not reflected in the official log grades. This inability of the official grades led to illogical relationships with lumber grades. For example, the lumber grade mix from No. 2 Sawlogs was statistically different from that from No. 3 Sawlogs, (p<.001), but the No. 3 Sawlogs actually had higher quality lumber than the supposedly higher grade No. 2 Sawlogs.

**Log Value:** 1999 average annual log prices were obtained from the Log Lines 1999 Statistical Yearbook (Arbor-Pacific Forestry Services, Inc., 1999). Applying log prices by log grade and woods scale, the total value for the 12 sample trees in each treatments is presented in Table 3. The thinned/biosolids treatment produced higher log values throughout the tree.

Table 3: Log value per treatment (total value for the12 trees in each treatment)

| Treatment | Whole Tree | Butt log | Middle log | Top log |
|---|---|---|---|---|
| Control | $670 | $439 | $198 | $33 |
| Thinned | $657 | $486 | $161 | $10 |
| Biosolids | $745 | $490 | $215 | $30 |
| Thin/Biosolids | $1091 | $696 | $354 | $42 |

## *Lumber Quality and Value Results*

**Lumber Dimension and Grade Distributions:** Chi-Square Goodness of Fit tests revealed that the thinned treatment and the thinned/biosolid treatment had a significantly different lumber grade mix than the control treatment ($p<.0001$ and $p<.001$ respectively). The thinned-only treatment had relatively more Select Structural and No.1 grade lumber and relatively less No.2 grade lumber than the control. The thinned/biosolids treatment, on the other hand, had relatively less Select Structural and No. 1 grade lumber and relatively more No. 2 grade lumber than the control. The biosolids-only treatment was not statistically different than the control treatment ($p=.25$). When lumber grade distributions were compared by log position, the treatments had a significantly different lumber grade mix from the control only in the middle log (Table 4). This is a reasonable outcome for this stand. When treated, the juvenile to mature wood transition point and live crown base were above the bottom 32 foot log so treatments were not expected to alter butt log characteristics. There may have been lumber quality differences among treatments in the butt log had the mill sawn lumber larger than 2x8 or if the lumber had been machine stress graded which would incorporate the differences in juvenile wood percent (Fahey et al 1991). Wood in the top 32 foot log was mainly produced after the start of the study, regardless of treatment. These top logs are small in diameter, young, mostly producing juvenile wood, and have many live knots which would allow for little, if any, differentiation among treatments at this stage of development. Hence, only the middle 32 foot log, containing the base of the live crown and juvenile to mature wood transition at the start of the study, had significant changes in lumber grade mix.

**Lumber Value:** 1999 average annual prices for each grade and dimension were obtained from the Western Wood Product Association. Applying 1999 lumber prices by lumber grade and dimension, the total lumber value for the 12 sample trees in the treatments is presented in Table 5. The thinned/biosolids treatments produced more lumber value in the first two logs. Except for the thinning treatment, top log values were very similar.

Table 4: Chi-square goodness of fit probabilities for treatment comparisons of lumber grade distributions

| Control compared with… | Whole tree (2" and 1" separated) | Butt log | Middle log | Top log |
|---|---|---|---|---|
| Thinned | <.001 * | .054 | <.0001 * | .15 |
| Biosolids | .25 | .401 | .01* | .25 |
| Thin/Biosolids | <.001 * | .06 | <.0001 * | .37 |

* denotes statistical differences

Table 5: Lumber value per treatment (total value of lumber in each treatment)

| Treatment | Whole Tree | Butt log | Middle log | Top log |
|---|---|---|---|---|
| Control | $1078 | $662 | $356 | $60 |
| Thinned | $1210 | $767 | $414 | $29 |
| Biosolids | $1197 | $731 | $400 | $65 |
| Thin/Biosolids | $1650 | $1042 | $549 | $58 |

Table 6: Per Acre Gains in Volume, Log Values and Lumber Value by Treatment

| Treatment | Added Growth Per acre ($ft^3$) | Log $/acre | Log $ Gain/acre | Lumber $/acre | Lumber $ Gain/acre |
|---|---|---|---|---|---|
| Control | 4314 | $5,868 | - | $8,111 | - |
| Thinned* | 6248 | $9,493 | $3,625 | $13,794 | $5,683 |
| Biosolids | 4937 | $7,010 | $1,142 | $10,219 | $2,107 |
| Thin/Biosolids* | 8781 | $14,937 | $9,069 | $18,820 | $10,708 |

## Summary and Conclusions

The average log and lumber value per unit volume based on Tables 3 and 5 respectively were applied to the per acre volume changes to create Table 6.

On a per acre basis, Table 6 shows the increases in log revenue and lumber revenue associated with each treatment. The thinned/biosolids treatment gained $9,069 in log value and $10,708 in lumber value over the control treatment. Gains for the separate thinned and biosolids only treatments were $3,625 for log and $5,682 for lumber and $1,142 for log and $2,107 for lumber respectively. To determine if any of these treatments were worthwhile, one must subtract appropriate harvesting and milling costs, and discount the remainder to the start of the study. This is only the beginning of the financial analysis since one should compare the result with the opportunity cost of harvesting the stand then (at age 55) and investing in a new stand.

The results from this study should be viewed with two cautions. First, they are applicable only to stands of similar age, site, and stocking that received similar thinning and biosolids treatments. Second, the log and lumber values are dependent on the processing and grading conditions. Had the logs been graded using the more refined system of log sorts (Bowers 1997), had the sawmill sawn larger dimensions, or had machine stress grading of the lumber been used, the valuation results might be quite different. Further research would be needed to examine other stand conditions and alternative log and lumber grading methods.

## References

American Lumber Standard. 1994. Western Lumber Grading Rules. Western Wood Products Association, Portland, OR.

Arbor-Pacific Forestry Services, Inc. 1999. Log Lines 1999 Statistical Yearbook. 10th Edition.

Bowers, S. 1997. Key to Douglas-fir log grades. Forestry Extension, Oregon State University, Corvallis, OR.

Fahey, T.D., J.M. Cahill, T.A. Snellgrove, L.S. Heath. 1991. Lumber and Veneer Recovery from Intensively Managed Young-Growth Douglas-fir. Research Paper PNW-RP-437. USDA Forest Service Pacific Northwest Research Station, Portland, OR.

Western Wood Products Association. 1998. Coast F.O.B. Price Summary. The Association. Portland, OR.

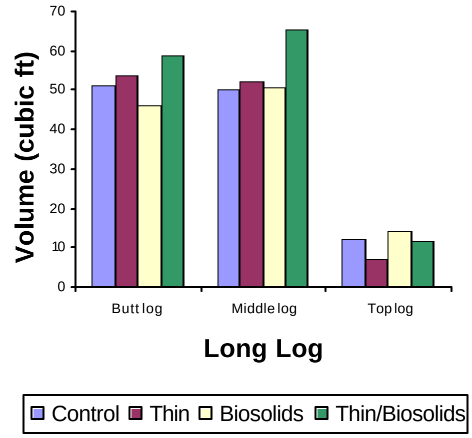


**Figure 2: Volume of Juvenile Wood by Long Log and Treatment**

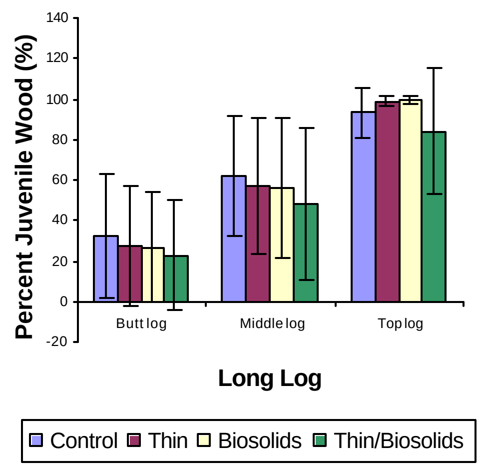


**Figure 3: Average juvenile wood percent per piece of lumber by long log and treatment**

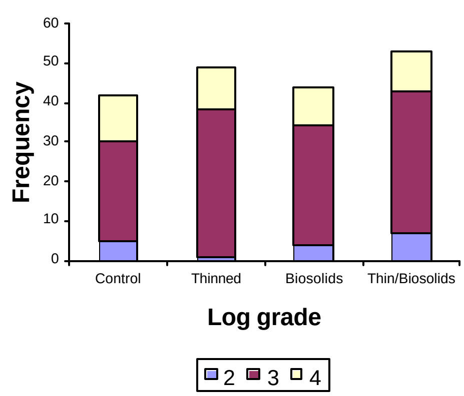


**Figure 4: Log Grade Distribution-counts of logs in each log scale grade according to treatment**

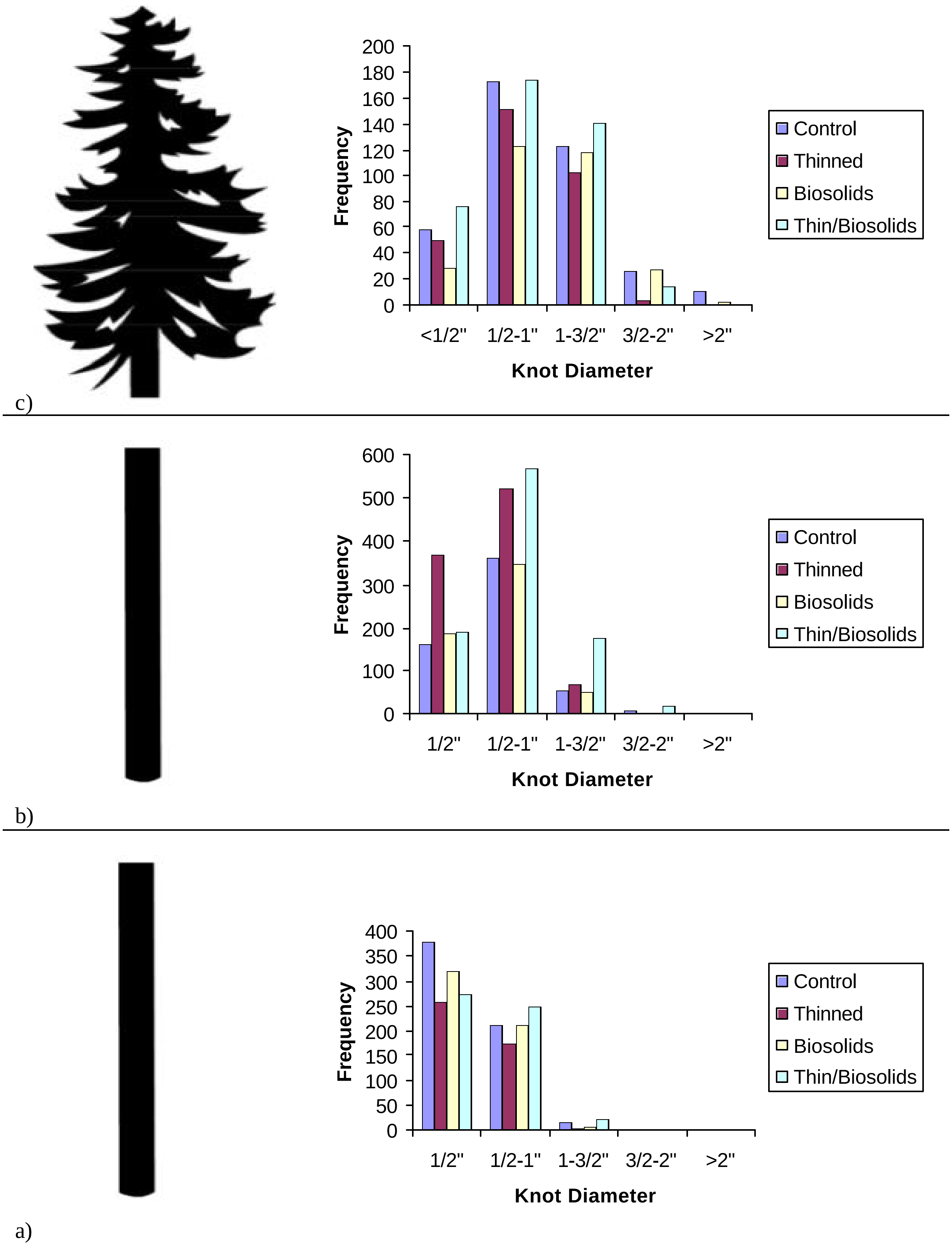


**Figure 1: Knot Size Distribution by Long Log: a) butt log b) middle log c) top *log***

# New Personnel Collecting Lysimeter Leachate at SMC Doug-fir Sites

**Dr. AB Adams**
**University of Washington**

This winter A.B. Adams joined Rob Harrison and the Carbon Sequestration project that is supported by the Center for Research on Enhancing Carbon Sequestration in Terrestrial Ecosystems. The project is scheduled to run for 2 more years. A.B.'s specific task is to maintain the four lysimeter installations located on SMC plots at Port Gamble (Olympic Resource Management), Cedar River (City of Seattle), Mud Mountain (The Campbell Group) and Radio Hill (Weyerhaeuser). In addition, six other sites will be sampled for soil analyses. The sites were chosen based on stand structure, soil history (glacial vs. volcanic), and treatment (control versus urea fertilization). This work is done in conjunction with Oak Ridge National Labs and the Hanford Research Station. Oak Ridge is involved with the fractionation of organic compounds at different depths and treatments. Jim Amonette of Hanford is involved in alkalinity studies for which we are providing some data.

*Dr. Adams is shown here collecting lechate from one of the 3 tube lysimeters installed at each plot in Doug-fir thinned plots. By pumping air into the tube, water is forced out of the other vacuum tube and into a collecting bottle (visible in the lower left of the photo). After collecting the soil water, the one-way valve is turned around and moved to the suction tube of the pump and the tube is recharged to -80 pps of pressure.*

Prior to working on carbon sequestration, A.B. worked in Rob's lab on the interaction of Pacific madrone pathology with soil structure and chemistry. This work originated when A.B. worked with a nonprofit research organization that he founded in 1995. This organization worked with various nonprofit groups in developing spatial databases and in particular they worked with Geographic Information Systems. In conjunction with the Center for Urban Horticulture and Save the Magnolia Madrones, A.B. was the senior editor on a symposium proceedings volume entitled "The Decline of Pacific Madrone" in which he authored 3 chapters. This book is available for purchase at the Center for Urban Horticulture through Gene Robbins.

Still earlier as a graduate student A.B. worked for the School of Forestry with Chad Oliver and Bob Zazoski in the Nooksack Cirque. During this research, he was the team botanist allowing for utilization of his training in plant taxonomy. His plant taxonomy background was obtained at the University of Tennessee where he received a Masters of Science. Both his Masters and PhD work involved quantification and qualification of leaf phenolics. His earliest work involved characterization of flavonoid glycosylation patterns in two taxa of Trillium. His doctoral research involved studying the effect of soil moisture and grazing history on the nutritional quality of red alder leaves. Specifically, he studied how variation in leaf phenolics and nitrogen affected the relative fitness of tent caterpillars. He feels most at home working in soils of the Pacific Northwest where there is a variable plethora of phenolic compounds. Dr. Adams' received a Bachelor's of Science degree in Economics from Vanderbilt University prior to his work in biology.

An interesting part of Dr. Adams' past was related to a fortunate (or unfortunate depending on how you view the outcome) coincidence that occurred in the earl1980's. A.B.'s graduate office was adjacent to the University of Washington Geophysics USGS monitoring facilities. Prior to the March of 1980, he was viewing the seismometers daily as he came to work. With the increase in seismicity that occurred when Mount St. Helens awoke, the Geophysics people needed help fast. Availability and logistics were of the essence, and so he was hired for what turned out to be 5 years of seismometer maintenance. It was during this period that he became interested in mapping. Today he teaches a three quarter sequence in Cartography and Geographic Information Systems at Shoreline Community College with the Civil Engineering Program. Rob and A.B. also are mapping soils of western King County in conjunction with the King County Roads Department and an Innis Arden Neighborhood Association. Hopefully, these spatial database methods will find relevance to SMC's database and research.


*Lysimeters are installed at the surface (O horizon), into the A, B and C horizons. This photo shows the variation in color of the solutions that are extracted from the soil at variable depths. The bottle to the left labeled O was from the surface lysimeter (zero tension) and the bottle to the right was at a depth of 30-34 inches.*

Not surprisingly, A.B.'s hardest and most rewarding job is his family. His wife is finishing her second year in UW medical school. They have a nine-month old boy that is struggling with biped locomotion, a five-year old girl attending Laurelhurst kindergarten and a daughter who is at Davidson College in North Carolina. It can be said that there is never a dull moment on the home front. The email address for A.B. Adams is abadams@u.washington.edu.

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# FEEMA-Financial Evaluation of Ecosystem Management Activities

In the past 9 months several financial analysis software packages of potential interest to SMC members have been made available on a PNW Research Station website, www.fs.fed.us/pnw/data/soft.htm. One of those is a Windows version of TREEVAL. The TREEVAL software calculates the net present value (NPV), soil expectation value (SEV) and harvest volume for management regimes for Douglas-fir plantations including thinning, pruning, fertilization, and regeneration harvesting. The necessary stand growth information is most easily provided to TREEVAL from the ORGANON growth and yield simulator. TREEVAL presents yield and financial information in both graphical and tabular form. The next upgrade of TREEVAL will deal with plantations that include a mixture of Douglas-fir and hemlock.

The original version of the DF PRUNE software has become obsolete because spreadsheet software was upgraded to the point where the original version was no longer fully functional. The present version (1.2) is developed for running on EXCEL95 and later versions. There are no changes in the calculations so results are fully consistent with the earlier version. The DF PRUNE software is a spreadsheet program designed to estimate the expected financial return from pruning Douglas-fir. The program is based on the average product recovery for unpruned logs from a single stand that received frequent thinnings. The DF PRUNE program incorporates recovery information for unpruned young-growth Douglas-fir and can be used to assess the economic potential of pruning for a wide range of management regimes. A new version (1.2) of PP PRUNE is also available for running on EXCEL95 and later versions to help in the financial analysis of pruning in ponderosa pine.

There is now a version of the FEEMA (Financial Evaluation of Ecosystem Management Activities) software for western Oregon and Washington (FEEMA WS) in beta test. It is almost identical in design and appearance as the original FEEMA software that was released for eastern Oregon and Washington and the northern Rockies. The release version of FEEMA WS should be available by the time this newsletter is out. The FEEMA software calculates for most species the expected net value of a stand of timber to a potential purchaser. It estimates volume, grade recovery, and value of products, then subtracts manufacturing, hauling, and harvesting costs to arrive at an expected net return. Its primary purpose is as a planning tool to evaluate the financial feasibility of implementing various ecosystem management practices involving small diameter timber removal.

For additional information contact rfight@fs.fed.us.

# Conferences and Meetings

**April 17-22 2001-Wetland Delineation with Emphasis on Soils & Hydrology. Memphis, Tennessee.** Contact: Wetland Training Institute, PO Box 31, Glenwood, NM 88039. For more information please visit their web site: http://www.wetlandtraining.com, or contact them at: getinfo@wetlandtraining.com.

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**April 25-26, 2001 and May 23-24, 2001-Advanced ArcView GIS Applications in Natural Resources. College of Forestry, Oregon State University, Corvallis, Oregon.** For more information please visit their web site: http://www.cof.orst.edu/cof/extended/conferen/advarc/.

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**May 21-23, 2001-Global Positioning System (GIS) Training. Charles L. Pack Experimental Forest Eatonville, Washington.** For more information please visit their website: http://www.ruraltech.org/default.html, or contact Larry Mason, Rural Technology Initiative, University of Washington, (206) 543-5772 or email larrym@u.washington.edu.

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**June 17-20 , 2001-First International Precision Forestry Symposium. University of Washington, Seattle, WA.** If you wish to receive mailings regarding the Call For Papers and the Conference Announcement, reply to Forestry Continuing Education at ForestCE@u.washington.edu with your mailing address, or visit the website:http://www.cfr.washington.edu/outreach/prefor/index.html

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**July 11-19, 2001-IUFRO Canopy Processes: Linking Structure and Function in Canopies, Troutdale, Oregon.** For more information, please visit their web page: http://www.cof.orst.edu/cof/extended/conferen/canopy/.

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**August 12-18, 2001-A jointly sponsored IUFRO and the University of British Columbia, Faculty of Forestry, conference on Forest Models for Sustainable Management will be held in Vancouver, B.C., CANADA at the Forest Science Center, University of British Columbia.** For more information about the conference, please see their website at www.forestry.ubc.ca/forestmodel or EMAIL Dr. Valerie LeMay at the conference EMAIL address: forestmd@interchange.ubc.ca**.**

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**July 22–27, 2001-IUFRO Working Party on Molecular Biology of Forest Trees : Tree Biotechnology. Stevenson, WA**. Contact: Conference assistant (541) 737-2329; fax (541) 737-4966; or visit their website: http://www.fsl.orst.edu/tgerc/iufro2001/index.htm.

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**July 24–27, 2001 IUFRO 5--Needle Pine Breeding and Genetic Resources. , Grants Pass, OR.** Contact: College of Forestry (541) 737-2329; fax (541) 737-4966; web- site: http:www/cof.orst.edu/cof/extended/conferen/

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**August 15 through September 15, 2001-Forest Ecology for International Students, Charles L. Pack Experimental Forest Eatonville, Washington.** For more information please visit their web site: http://www.cfr.washington.edu/Outreach/feis2001/feis.html, or contact the English Language Programs, Box 354232 University of Washington, Seattle, WA 98195, USA Telephone: 206- 685 6349, Fax: 206- 685 9572. FEISinfo@u.washington.edu

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**September 13-17, 2001-SAF National Convention Forestry at the Great Divide, Denver, CO.** For more information please visit the SAF website: http://www.safnet.org/calendar/natcon.htm.

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**September 17–20, 2001-Fifth International Airborne Remote Sensing Conference and Exhibition. San Francisco, CA.** Contact: Veridian Systems/Airborne Conferences (734) 994-1200; fax (734) 994-5123; Email: wallman@erim-int.com; website: www.erim-int.com/CONF/IARSC.html

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**September 19-21 2001-Continuous Cover Forests - Assessment, Analysis, Scenarios. IUFRO Division IV Meeting, Gvttingen, Germany.** Call for papers is now open. Please reply to Mrs. Stachowiak:elojews@uni-forst.gwdg.de. (Note, this is a change of dates. The meeting was originally scheduled for 10-12 October 2001).

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**October 7-10 2001-International Conference on Image Processing. Thessaloniki, Greece.** Contact: Diastasi. Tel: +30-31-938-203. Fax: +30-31-909-269. Email: diastasi@spark.net.gr.

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**December 10-12, 2001-The International Mountain Logging and 11th Pacific Northwest Skyline Symposium. Seattle, WA.** For more information please visit their website: http://depts.washington.edu/sky2001/, or contact Symposium Director: Professor Peter Schiess, schiess@u.washington.edu.

# Abstracts of Publications

**Plant Succession Following Logging and Burning in the Western Cascades of Oregon. Ecology, Vol. 54, No. 1. (Jan., 1973), pp. 57-69**

Vegetative changes were documented for 7 years on permanent milacre plots located in three clearcut logged units in the western Cascade Mountains of Oregon. Plant cover and composition were observed the year prior to logging the old-growth Douglas-fir forest, after logging but before burning, and during each of five growing seasons following broadcast slash burning. Total plant cover was 15.2, 49.3, and 75.5% in the first, second and fifth years after slash burning, respectively. Invading herbaceous species dominated from the second through fourth growing seasons after burning but by the fifth year residual herbaceous species regained dominance. Differences in disturbance from logging and burning strongly influenced successional trends. In undisturbed soil areas, residual species, such as Vine Maple, Redwood Sorrel, and Salal, dominated. Areas disturbed by logging but unburned supported a wide variety of both residual and invader species. Light to severely burned sites were largely occupied by invaders such as Snowbush, Fireweed, and Willowherb. Although often obscured by varying degrees of disturbance, relationships between early stages of succession and prelogging plant community were discernible. For example, of the species considered characteristic of five undisturbed plant communities, only 13 percent were absent from the plots 5 years after burning. The invaders Snowbush, Agoseris, and Slender Cudweed thermale were restricted to sites previously supporting rather xeric communities; while Black Raspberry and Pearly Everlasting were found on plots characteristic of the more mesic communities.

**R. B. Smith. Relation of Topography and Vegetation to the Occurrence of Douglas-Fir Dwarf Mistletoe at its Northern Limits in British Columbia. Ecology, Vol. 53, No. 4. (Jul., 1972), pp. 729-734.**

The northernmost occurrence of Douglas-fir dwarf mistletoe is near Sicamous, British Columbia. Its presence in the Interior Western Hemlock Zone, characterized by a higher summer precipitation than the parasite's usual habitat is partially explained by an ecological survey of infected and neighboring uninfected stands. The parasite is concentrated on a steep, southwest-facing slope which possesses many of the same floristic features as the drier Interior Douglas-fir Zone, including the tendency for perpetuation of almost pure Douglas-fir stands. In contrast, the adjacent northwest-facing slope, which supports vegetation characteristic of the Western Hemlock Zone, is free of A. douglassi. Because of the restriction of A. douglassi to a single host in this area, and its relatively slow rate of spread, the extension of the parasite into areas within the Western Hemlock Zone would undoubtedly be checked except in edaphically dry situations or where continuous disturbances such as logging favor the host tree, Douglas-fir.

**C.W. Licata, R.B. Harrison, and B.L. Flaming. University of Washington, College of Forest Resources. Effects of Forest Management on Mineralization of Organic Matter in a Coastal Douglas-Fir Stand.**

This study is designed to evaluate how various levels of logging residue in a post-harvest situation affects mineralization rates of selected essential elements. Specifically the test hypothesis is mineralization varies over time and is affected by the amount of logging debris remaining on site after harvest. The treatments that will be evaluated for this project include a bole-only removal, with and without competitive vegetation control, and a total-tree plus removal. We will complete a field incubation utilizing mixed-bed exchange resins, placed in nylon bags and inside PVC tubes. Resins have been used in several studies and are accepted as a method to determine the availability of nitrogen and other nutrients because of their ability to absorb free cations and anions. Sampling periods are designed to capture the fall and spring seasons when mineralization of organic matter should be at a peak based on presence of moisture in the soil profile. Information derived from this study will enable land managers to better assess the impacts of silviculture on site productivity. By looking at the chemical characteristics of the forest floor, we can get an idea of when particular nutrients are becoming available or are remaining immobilized and thus having an influence on stand development.

**C. T. Dyrness . Early Stages of**