Stand Management Cooperative Annual Fall Meeting

September 10-11, 2014

OSU, Corvallis, Oregon

ATTENDEES

B.C. Ministry of Forests, Louise de Montigny; **Bureau of Land Management,** George McFadden; Campbell Group, Dave Hamlin; **Green Diamond Resource Company,** Randall Greggs; **Hampton Resources,** Dennis Creel; **Hancock Forest Management,** Katie Bryant, Florian Deisenhofer, Matthew Kamp, James Vander Ploeg; **Lone Rock Timber Co.**, Chris Sexton; **Mason, Bruce, & Girard,** Doug Larmour; **NMBU,** Olav Hoeiboe; **Olympic Resource Management,** Ryan Schlecht; **Oregon Department of Forestry,** Tod Haren; **Oregon State University**, Andre Faria, Derek Gourley, Doug Maguire, Doug Mainwaring, Doug Rodman, Pablo Romero, Joo Sukhyun; **Plum Creek Timber Co.**, Conner Fristoe, Mic Holmes, Brian, Schlaefli; **Port Blakely Tree Farms,** Garet Waugh; **Quinault Indian Nation**, Mike Stamon, Larry Wiechelman; **Rayonier Forest Resources**, Candace Cahill, Kirk McEachern; **Roseburg Forest Products,** Eric Dinger, Sara Lipow, Mark Wall, Tony Powell; **Sierra Pacific Industries,** Josh Misenar; **Stimson Lumber Co**, Margret Banks, Roger Van Dyke; **University of Washington,** Greg Ettl, Bob Gonyea, Jason James, Maureen Kennedy, Kim Littke, Megan O'Shea, Stephani Michelsen-Corre, Eric Turnblom; **USFS PNW RS**, Dave Bell, Eini Lowell, Erin Smith-Mateja; **West Fork Timber,** Ryan Gordon, Gene McCaul; **Weyerhaeuser Company**, Greg Johnson, Scott Holub, Dave Marshall

The business meeting and field trip were held this year at Oregon State University, LaSells Stewart Center, Corvallis, Oregon beginning at 9:00 AM. There were 55 attendees from 23 organizations attending the business meeting and 32 attendees from 19 organizations joining the field trip. Candace Cahill, 2014 Policy Committee Chair opened the meeting welcoming the attendees, (see Agenda, Addendum 1).

Director Greg Ettl shared with members the sad news of Dave Briggs former SMC Director's passing away suddenly at home July 26th. Megan O'Shea added that Dave and his wife Anne had only recently returned from a fantastic National Geographic vacation trip to Mongolia and the Gobi Desert where he impressed many with his hiking forte in spite of his diminished sight. Dave was a long time member of the SEFS faculty, mentoring many students and will be remembered as the leader of the SMC and PFC Cooperatives as well as serving in numerous other capacities. Most of all, he was a kind man who always did what was best for the School. We will certainly miss him. Members honored Dave with a moment of silence.

David Briggs
Former SMC Director

ACCOMPLISHMENTS

We completed all field work planned for the 13/14 season, (see Work Scheduale, Addendum 2) and distributed data DVDs to members in August including completed measurements of Type I's: 8 full measurements, 19 RD checks, 5 plots marked for thinning. Type III's: 8 full measurements, 1 plot measured and marked for thinning, Type IV's, 3 full measurements. Type V's: 34 full measurements, 73 weather stations data collected and maintained, and 18 weather stations dismantled.

NSF-CAFS: Our NSF-CAFS Phase II funding proposal has been approved for the next 5 years. Phase II funding is now at 65K/y, down 5K from Phase I. In December, NSF informed Greg that SMC member overhead (F&A), will need to be at 10% in order for us to accept the CAFS award. We are currently working with the UW Office of Sponsored Program (OSP) to finalize the NSF agreement and the **temporary** change in our overhead rate. OSP has agreed to decrease SMC's indirect to 10% starting in 2015 continuing for the duration of our CAFS agreement. The NSF rate will go up from 26% to 54.5% (net $65,000 for research). CAFS funding is dedicated to voting results, this year Barry Goldfarb (CAFS Lead at NC State) dispersed the final Phase I funding to Rob, Eric and Monika Moskal (Director, PFC). Phase II proposal were submitted and have been approved.

Five SEFS Faculty and 4 students attended the CAFS Annual Meeting held in Coeur d'Alene in May with 4 faculty and 4 students presenting. Presentations included the ^{15}N fertilization project, the Type V paired tree study, Effect of genetic gain and spacing on wood quality of Type IV, and Influence of belowground biomass on Douglas-fir plantation yield: a remote sensing approach with terrestrial laser scanning (TLS) and ground penetrating radar (GPR) approach, all CAFS funded projects.

Meetings: SMC meetings held in 2014 included two all-member meetings, one Policy Advisory Committee (PAC) meetings, and a PAC Budget Notification. Items discussed at the February 24th PAC meeting included; 1) working with the university's Office of Sponsored Programs to decrease SMC's indirect to 10% as mandated by NSF-CAFS, 2) SMC's projected carryover for 2015, 3) an OSU graduate student Nathaniel Osborne to access to the SMC relational database to support development of a model for knot structure in Douglas fir. The work wills contribute towards a model system that produces glass log output in the ORGANON. The PAC agreed to permit Nathaniel Osborne, and he alone access to the SMC relational database to support his PhD research on the development of a model for knot structure in Douglas fir. Upon completion of his research the PAC would like a written report summarizing his findings and a presentation at either the Annual Spring Meeting in April or the Annual Fall meeting in September, 3) Eini Lowell will present a new CAFS proposal to augment Type V wood quality sampling at the SMC spring meeting and 4) Greg proposed hiring on part-time bases, an analytical analysis currently employed at SEFS to assist in wrapping up current SMC research projects. After some debate it was determined the best route would be to post a job announcement for a full time Forest Research Scientist 4, (see Addendum 3), who would work ½ time on the database and ½ time in one of the SMC research areas: nutrition, wood quality, growth modeling, or silviculture.

Graduate Students: Degrees completed in 2014: Jason James (MS), currently pursuing a PhD. Active students: Luyi Li (MS), Matt Norton (MS), Kevin Ceder (PhD), Jason James (PhD), Stephani Michelsen-Correa (PhD) and Marcella Menegale (PhD); Christine Dietzen (PhD), Kiwoong Lee (PhD), Hyunju Lee (PhD). Incoming students: John Kirby (MS).

SMC Research: Sixteen new articles were published in journals; four have been submitted and are in various stages of review. Faculty and student presentations were given at four conferences and 3 meetings.

- Other accomplishments in 2014:
    - Developed a PCT Analysis proposal, vetted it through the Silviculture TAC
    - Collected wood property data for wood quality evaluation on 22 plots at two GGTIV sites
    - Disseminated preliminary analysis of GGTIV wood property data
    - Developed "sunsetting" SMC Type I installations proposal

- Released draft (SMC)2 Working Paper for member comment
- Released beta-version of browser-based Plantation Yield Calculator
- Analyzed RFNRP data comparing fertilization response using retrospective “paired-tree approach”, reported to nutrition TAC
- Felled and measured 16 "young" western hemlock trees from buffers of four SMC Type I installations for biomass determination as part of "Phase II" of USFS funded project assessing
- Followed up on deep soil C and N sampling
- Initiated projects: stump and root decomposition, water-use efficiency from tree cores, mortality analysis of Type I installations

Budget: At the 2013 SMC fall meeting Greg established SMC’s limited ability for research given flat dues since 1995, as a result, members agreed to raise dues 10% and to shift extra funding to research and the hiring of a Research Scientist. The hiring process took longer than expected and wasn’t posted until August 2014, the goal is to fill the position by late fall. The combination of an increase in dues and ½ time database manager helped us increase 2014 carryover to $132,681, total available revenue, $770,719. The extra funding sets us up well for expanded research. In many respects we have been working to build exactly this type of balance so that we would have confidence that we can allocate sufficiently large amounts to allow new projects to come to fruition.

Institutional Funding totaled $373,144. The BC Ministry of Forests Research Branch contributed $27,800 to support measurement and treatment costs associated with SMC Installations in BC, Oregon State University and the USFS PNW Research Station provided the equivalent of about $45,344 in the form of salaries of scientists, facilities, and administrative support. Student TA support together with funding from the Gessel Fellowship reached approximately $300,000 this year.

A Summary of the 2014 Budget:

- Anticipated Revenue from Dues: $629,982 (WADNR and ODF dues are at 2013 rates)
  - We carried in $85,561 therefore $690,973 is available
  - $20K NCASI additional through 2014 ($640K total); $20K for 2015 being considered
  - Partial salary buyback by UW Extension for Rob 3 months per year, about $30K to spend on SMC work
  - Bioenergy grant from USDA, $321K to SMC (2011-2015), also funding to OSU and Weyerhaeuser for biomass work, new Springfield OR site located and work is underway
- Projected Expenses: $558,292 for salaries, travel, and overhead
  - Includes keeping the database manager position to ½ time until November 2014
  - 3 months of the new Research Scientist
  - 4% average salary raises for employees

Projected 2015 Budget:

- 2015 Formula Dues, $638,038
- Key changes in revenue:
  - WADNR and ODF at full dues but 2013 rate; we gained $12,321 as WADNR went from 75% to 100% [their budget cycle is July 1 to June 30].

  - We lost Longview (-$35,406) revenue this year
  - We gained $54,957 in dues, But net increase is $27,064

- The combination of an increase in dues and ½ time database manager helped us increase carryover of $132,681, total revenue, $770,719. Our recent award for NSF-CAFS Phase II funding means that our overhead will be reduced from 26% to 10% for the 5 years that we are funded under CAFS (option to apply for Phase III for total of 10 years). This will give us an additional ≈$50,000/y that we can spend on research.
- I project a $90,000 carryover even if we spend $130,000 on additional research projects this year. We have a good opportunity to get analysis done; projects could even be multiple year if needed.

A motion was made and seconed that we keep the dues the same and initiate a call for research proposals this fall, the motion passed with 17 members voting yes.

Ballots were cast to elect the new Vice Policy Committee Chair vacated by Candace Cahill. Candace took over the Policy Committee Chair from Dean Stuck whose term ended in 2014. Two members were nominated, Josh Misenar with Sierra Pacific Industries and Brian Schlaefli with Plum Creek Timber Co. Brian Schlaefli was elected Vice Policy Committee Chair.

TECHNICAL REPORTS

WOOD QUALITY TAC REPORT: Eini Lowell

No meetings in 2014. Eini said the base document for the measurement protocol for Sunsetting Type I Installations is near completion, (Addendum X); once the review is finalized work will start on a protocol for the Type II's. She added she was just informed that a Type I with a full complement of treatments (15) is going to be harvested. She proposed a meeting of the Installation Review Committee to review the info she presented last spring to work toward developing a protocol to submit to SMC members, noting not just wood quality data would come from a 'sun-setted' SMC installation. Greg Ettl pointed out that members seem to be split on supporting the paired tree plots, which makes it hard to agree on a project; he would like to see a "sub-set" of projects proposed] to meet more member's needs.

MODELING TAC REPORT: Dave Marshall

Dave said he did not have anything to report at this time.

NUTRITION TAC REPORT: Rob Harrison *(presented by Kim Littke)*

Nutrition updates were presented on the following four projects; 1. Paired-Tree & Paired/Plot, 2. 15N Study, 3. Deep Soils Project, 4. NARA LTSP Studies, 5. NARA Stump Project along with summaries on other projects and student funding.

1. Paired-Tree & Paired/Plot Studies, Kim Littke

The Type V paired-tree study is in the seventh year of measurements. At the end of the year, all of the installations will be measured for four-year fertilizer response and six-year response will be determined for half of the installations.

Current research in the paired-tree installations involves turning the two-year percent and significant fertilizer response models into maps that predict fertilizer response throughout the coastal Pacific Northwest. The boosted regression tree models using only mapped climate, site, and soil data were applied to 43,000 points to predict basal area, height, and volume response to fertilizer. Greater basal area and volume response was predicted in the Coast and Cascade Ranges and Olympic and Klamath Mountains due to low soil available water supply, steep slopes, and colder winter and spring temperatures in these regions. Significant volume response was predicted in similar regions as the percent response maps, but significant basal area response was predicted to be found in Oregon rather than Washington. The height response models differed from the basal area and volume response models due to different and sometimes conflicting predictors. Greater height response was predicted only in the Cascade Range. The maps of basal area and volume response are recommended for determining stands with the greatest potential for fertilizer response because the predictors in these models demonstrate regions with low soil productivity and low nitrogen cycling due to colder temperatures.

Future goals: Publish in Ecological Modelling journal, three recent publications

1. Littke et al., 2014 (Forest Science)
2. Littke et al., 2014 (Forest Ecology and Management)
3. Littke et al., 2014 (Canadian Journal of Forest Research)

2. 15N, Stephani Michelsen-Correa

Urea, NBPT, and CUF follow a similar trajectory for foliage uptake through week 10. However, by week 16, urea fertilized foliage had the highest δ15N signature followed by NBPT and CUF respectively. Preliminary results suggest greater uptake efficiency of urea, NBPT, and CUF when compared to ESN. As the fertilizer moves from the forest floor into the mineral soil **over** time, the δ15N signature of the mineral soil increases. At each of the sites ESN appears to persist in the forest floor longer than the other fertilizers. The Star Lake site may be an exception because that location has substantially less forest floor than the other sites. With less forest floor cover, the fertilizer readily moves into the mineral soil where it becomes available for plant uptake. In order for to the ESN type fertilizer to enter the mineral soil and become available for uptake by the vegetation, the polymer coating must dissolve. Conditions may not have been suitable for the coating to dissolve during this sampling time frame.

3. Deep Soils, Jason James

Effective soil depth has long been known as an important predictor of forest productivity, yet little information has been Effective soil depth has long been known as an important predictor of forest productivity, yet little information has been gathered in the scientific literature regarding the water and nutrient dynamics of deep regions of the soil. Tree roots often extend deep into soil, drawing up water as well as nutrients like nitrogen and calcium. Consequently, we sampled 16 soil profiles across the coastal Pacific Northwest to examine the relationships between tree growth and subsurface soil dynamics.

We sampled 7 Type I sites and 9 Type V sites. At Type I's, pits were excavated in both a fertilized and unfertilized plot. A single pit was excavated at Type V sites. In each pit, bulk density samples and chemical analysis samples were taken at depths of 10 cm, 20 cm, 50 cm, 100 cm, 200 cm… and every 50 cm to the bottom of the pit. The maximum sampling

depth was between 2 and 3.5 m at every site. At 10 sites, soil moisture sensors were installed at depths of 10 cm, 50 cm, 100 cm, and 200 cm; a temperature sensor was installed at 50 cm. These will gather data in short time intervals (once each hour) to allow us to track daily changes in volumetric water content. During periods of drought, deep tree roots can redistribute water to surface soil at night, increasing the available water supply during the day and helping to maintain photosynthesis despite lack of rain. The spatial and vertical distribution of sites monitored for hydraulic redistribution will allow us to examine when, where, and how much water is redistributed during summer drought in the Pacific Northwest, and we hope to relate this to forest productivity.

4. NARA LTSP Studies, Marcella Menegale

The increasing interest in energy production from woody biomass may possibly affect the uptake of carbon and nitrogen in soil due to the removal of branches and foliage during the timber harvesting. This study aims to look at the influence of organic matter removal during timber harvest. Its main objectives are to determine the influence of organic matter removal during timber harvest on the accumulation of C and N in soil layers below 1.0 m , to evaluate the effects of the presence or not of harvest debris in the soil as well as soil compaction on final productivity of Douglas-fir forest, and to assess which harvest type is more efficient in promoting nutrient cycling in the soil and conserving its chemical characteristics.

The installation of the equipments was completed in September/2013. Soil solution samples were collected monthly from February to April/2014. Data loggers were installed in the area in order to collect soil moisture data. Thus, it is possible to predict the movement of the water through the soil profile as well as determine the right moment for soil solution sampling. The acquired data show a lack of rain within the last 6 months. (from May/2014). The low soil moisture values in all the treatments evaluated explain the difficulty of collecting soil solution samples during this period.

Soil solution samples will continue to be collected on a monthly basis from the 20-cm and 100-cm lysimeters starting from November/2014 until the rainy season ends. Laboratory chemical analysis of DIN (NH4 and NO3), TN, and DOC will be performed immediately after sample collection.

5. NARA Stump Project, Matt Norton

There have been very few efforts to consider stumps in the life cycle analysis of Douglas-fir stands. We would like to know the rate of decomposition of stumps in a tree farm setting, their nutrient contributions to the system over time and at which point they cease to contribute nutrients to the landscape. Using a resistograph, measurements of stump density were taken on material both above and belowground. These will be used to determine decomposition level for a number of stumps cut at various points over the last 20 years. The primary site, for examples, had thinning events in 2010, 2006, 1999, and 1992. These stumps have been characterized by their features into decay classes and have had material taken to determine carbon and nitrogen concentrations and ratio. General characteristics that play a factor in decomposition, such as, stump diameter and the presence of rot or insects are all recorded. Measurements have been taken at several sites throughout the Puget sound, on stumps that were cut a roughly the same time, to try to also account for different rates of decomposition as a result of climatic factors. Data analysis will be done using event history modeling; the event being the year the tree was cut.

Other Products / Funding

- $20K NCASI additional through 2014 ($640K total); $20K for 2015 being considered
- Approx $300K/y equiv. TA/Gessel fellowships
- Partial salary buyback by UW Extension for Rob 3 months per year, about $30K to spend on SMC work
- Funding of $195,000 for 15N work finishing
- Bioenergy grant from USDA, $321K to SMC (2011-2015), also funding to OSU and Weyerhaeuser for biomass work, new Springfield OR site located and work is underway
- CAFS proposals for productivity and response modeling and study of role of deep soils in forest productivity

People / Graduate Students

- Three graduate students added 2012 continuing 2014
- Jason James (MS, Spring 2014), continuing PhD
- Stephani Michelsen-Correa (PhD)
- Marcella Menegale (PhD)
- Three started Fall 2013
- Christiana Dietzgen (PhD)
- Matt Norton (MS)
- Kim Littke postdoc
- Tom Terry consulting as he can
- All salaries currently funded either as TA's or with external funding.

SILVICULTURE TAC REPORT: Eric Turnblom

Progress on several ongoing projects was mentioned very briefly, and only during the Silviculture Project Status Report, including the ongoing work of the Installation Review Committee (IRC) that began in late Fall 2012. The review is informing the protocols being developed for Sunsetting Type I Installations. The IRC recommended several methods to appraise the usefulness of each installation, including mulitivariate "uniqueness" metrics and the information in "Criteria for judging utility of forest research trials and plots for answering future research questions" authored principally by Dick Miller. The IRC Chair requested a copy of said document and received it shortly prior to the Fall SMC.

The "SMC Plantation Yield Calculator," a browser-based tool derived from the Installation Performance Analysis is in the process of being updated. The Calculator makes the information contained in the "The $(SMC)^2$ Report" available in an easy to use, point and click fashion, displaying yield curves and yield tables. Unexpected delays were encountered on the updating, however, because the principal graduate student involved in that effort took an extended leave of absence from school beginning summer quarter in order to finish up several contract jobs.

Efforts are continuing to obtain funding for the Fundamental Research Project Proposal submitted to NSF by Burkhart, Weiskittel, and Turnblom (co-PIs) titled "Understanding and Modeling Competition Effects on Tree Growth and Stand Development Across Varying Forest Types and Management Intensities." The opportunity for this supplemental funding is made possible because each of the involved regional cooperatives being members of the Center for Advanced Forestry Systems (CAFS).

Work on obtaining pre-harvest estimates of western hemlock biomass in stems to a 4-inch top, branches and foliage on the main stem, and in tops (branches, foliage, stemwood estimated separately) coming from stands in a five county area on the Olympic Peninsula is nearing completion. Stands were stratified by age class, density class, and latitudinal class. Replicates of dominant and intermediate trees were obtained from each stand. Supplemental funding from the USFS was gained for this work upon successful completion of the pre-harvest slash residue study under the same Joint Venture Agreement.

A manuscript detailing the theory and conceptual framework behind the Tree List Generation Database mehodology was accepted for publication. This methodology is planned for use in the PCT Analysis project to create a small database for delivering tree lists from stands that have been pre-commercially thinned.

Extended Progress Reports were presented on the following topics: 1) Soil Parent Material and Nitrogen Fertilization effects on Wood Quality, 2) Pre-Commercial Thinning Analyis (SMC funded project), and 3) Wood quality impacts from genetic gain, spacing, and weed control.

1. Soil Parent Material and N-fertilization effects on Wood Quality; Luyi Li *(presented by Eric Turnblom)*

Many aspects of how site characteristics and management impact Douglas-fir wood quality are unclear, especially the effects of soil parent materials (SPMs), stocking, nitrogen fertilization and other conditions. The influence of SPMs and two nitrogen treatment levels on timber growth and wood quality of middle age Douglas-fir have been studied on paired-tree ("Beyond N" and "Type V") plots in the Pacific Northwest with the intent to enhance this understanding and provide information on the possible need to update wood property models for different stand conditions. Seven (7) sites that 'responded' to fertilization were selected for study. These sites are located from just south of the Washington Peninsula to the middle of the Willamette Valley, OR. SPMs included two replicates of glacial origin, two replicates of igneous origin, two of sediemtary and one mixed sedimentary / igneous. At two sites (one sedimentary the mixed) destructive samplling was possible, at which Log Resonance Acoustic Velocity (LRAV) was captured, as well as Tree Sonic Acoustic Velocity (TSAV) and collection of wood samples for specific gravity and growth ring analysis. Eight to ten trees were available from each site, roughly half were fertlized and the other half not. Trees were selected using stratified random sampling to ensure coverage of the current diameter distribution.

The highest values of LRAV were observed on the tree section from stump to Live Crown Base (LCB) for both destructively sampled sites followed closely by the butt log. In all cases, since these stands were putting on mature wood growth (> 20 yr b.h. age) fertlization enhanced LRAV values.

Variation in TSAV measured in the breast height region of the stem was evident. Although SPM did not produce a statitically significant effect, the younger stands (< 20 yr b.h. age) showed decreased TSAV readings across all SPMs when fertilzed, while the older stands exhibited slightly increased values. There was a very high correlation between LRAV and TSAV (r-squared = 0.92).

Overall, specfic gravity (SG) averaged between 0.4 to 0.5 g/cc. Glacial and Igneous SPMs dominated the high values of SG and in general, non-fertilzed tree SG values were greater than fertlized.

Late-Wood Percentage (LWP) was greatest in non-fertilzed trees across all SPMs, while it was greatest over all SPMs on Glacial sites; Igneous, Sedimentary and the mixed site all displayed about equal LWP.

Fertilzation had a decidedly significant impact on growth, effectively lowering Rings-Per-Inch values in those trees.

A new CAFS proposal to continue studying the impacts of site characteristics and fertilization on all western Washington and Orgeon sites, including the 'non-responders' was presented at the 2014 Annual CAFS meeting. The proposal was titled 'Wood Property Assessment of Trees from mid-rotation Coastal U.S. Douglas-fir Plantations on sites with varying Soil Parent Material that have undergone Fertilization using a paired-tree approach.'

2. Pre-Commercial Thinning Analyis

SMC members seek to maximize timber volume / value, but also place some degree of priority on less conventional tand attributes such as: live crown length, optimal branch bize, and perhaps other habitat values. The impacts of timing and intensity of a Pre-Commercial Thin (PCT) on these attributes are not well understood or publicized. SMC Silviculture TAC members identified this as a priority research area. The plan is to use existing SMC data, which contains PCT information from planned experiments initiated in two Silviculture Project Installation Types, i.e., Type I and Type III installations. Type I installations have two PCT levels (ISPA/2, ISPA/4) applied at varying ages and have two types of PCT (systematic, and Select Best Trees). Type III installations have two fully crossed factors each with two levels: Timing (categorized as Early vs. Late) and Intensity (categorized as Light vs. Heavy). The first objective is to describe stand yield.

Results were presented for cubic-foot volume including top (CVT) and quadratic mean DBH (QMD). Twenty-nine (29) installations were available for analysis, twelve (12) of which also had auxilary "Best Tree Selection" plots. Initial Stems Per Acre (ISPA) ranged from 250 to 700, age at PCT ranged from 5 to 17 y, and 30-yr total age Site Index (Flewelling, et al. 2000) ranged from 40 to 90 ft. A flexible function, the generalized allometric equation, was chosen for the analysis and modeling responses.

Through age 35, the oldest installation, volume (CVT) accumulation appears still to be increasing in ISPA, and in systematically thinned ISPA/2 and ISPA/4 stands such that ISPA > ISPA/2 > ISPA/4, as expected. The CVT accumulation in the Best Tree Selection plots, however, though greater than in systematically thinned plots at young ages, begins to lag behind them by age 30.

The trend seen CVT development in systematically space stands compared with best tree seletion thinning is, as expected, reversed for Quadratic Mean DBH (QMD); thus, QMDs are larger in the best tree selection stands up to about age 30 (a little younger in the ISPA/2 stands, a little older in ISPA/4 stands) then begin to lag behind their systematically spaced similar density counterparts.

The PCT analysis is continuing and will be covering addistional response variables such as live crown ratio, Scribner volume to a 4" top and will add Type III installations, as well. Currently plans are to produce stand and stock tables and to the extent possible, model indexes to wood quality based on the Largest Limb Diameter at Breast Height (LLDBH) will be developed. Expcted deliverables include: Models describing yields in stands with & w/o PCT across sites, densities, timings in an SMC Working Paper and a mechanism to deliver tree lists corresponding to defined reporting ages and useful combinations of input variables.

3. Wood Quality in GGTIV plantations; Jeff Comnick, Luyi Li *(presented by Eric Turnblom)*

The rationale behind this study is that the impacts of genetic selection for growth rate, spacing, and intensive early wee control are not well understood. The objective, therefore, is to determine the extent that these impacts, both singly and in combination, have on key wood traits (knot size, stiffness, density).

The field measurements in these 9 years-from-seed stands are finished so a full analysis of the collected data is now possible. The intent is to determine the relationship between controlled experimental factors (genetic gain, spacing, weed control) and key wood properties (Acoustic Velocity, Resistance, and Specific Gravity) and a log quality index (LLDBH). Also, relationships between these key wood traits and routinely measured stem form variables (DBH, Height, LCR, Volume) and key growth and site parameters are sought.

The largest significant effect on LLDBH is its allometric relationship to DBH, due to tree allometry, which causes a branch diameter difference of a little over 0.3 inches. This is followed by location, stands nearest the coast have on average breast height branches that are 0.2 inches larger in diameter than stands furthest away. Spacing causes a difference of almost 0.1 inches from the narrowest to the widest spacing (15 x 15' vs. 7 x 7').

Acoustic Velocity (AV) as determined by the TreeSonic instrument placed at breast height averages about 2.7214 km/s overall, exhibiting a very weak negative association with DBH – consistent with other literature on the subject. The same week negative correlation of AV DBH was found for AV with Height, LLDBH, and volume.

Specific Gravity (SG) was found to be weakly and negatively correlated with DBH, averaging 0.3483 g/cc, a low, but not unexpected value given these trees are still putting on juvenile wood growth. There was no observed loss in SG due to genetic gain level and not with weed control either.

Analysis of measured Resistance values is continuing. In the short term, finalized relationships are expected between genetic gain, spacing, and weed control and key wood properties as (and if) they are mediated by routinely measured stem form variables such as DBH, Height, LCR, etc. A final report will be submitted to cooperators and to a peer reviewed journal for publication. Re-assessment of these relationships will be attempted four to eight years from now.

Other Products / Funding

- $90K additional funding from USFS for hemlock biomass work through 2014 ($211K total)
- Funding of $47,000 for Wood Quality work in joint NTIC-SMC Genetic Gain / Type IV trials – finishing
- Approx $25K/y equiv. in Teaching Assistantships
- New CAFS proposal for Assessing Wood Properties in both responding and non-responding Type V paired-tree trials

Silviculture Scientists & Students

- Jeffery Comnick, SEFS Staff Research Scientist, made contributions to wood quality analyses and the SMC Plantation Yield Calculator
- Jason Cross, SEFS Staff Project Manager at ONRC, made contributions to the western hemlock biomass residues and pre-harvest biomass assessments
- Kevin Ceder, PhD Candidate (2015). Dissertation: Modeling vegetation dynamics in young, managed coastal Douglas-fir forests

- Luyi Li, pursuing MS (2014). Thesis: Douglas-fir wood quality properties in response to soil parent material and fertilization
- Zachary Beebe (undergraduate), pursuing his Senior Capstone Project working on assessing three extant taper equations, benchmarking them against the SMC Stem Section data set
- Armin Farahmandnia (undergraduate), pursuing his Senior Capstone Project working with the SMC Type III mixed DF/WH sites
- Colin Kirkmire (undergraduate), pursuing his Senior Capstone Project by examining impacts of browse events on height and diameter growth at Boxcar GGTIV site
- New Siviculture M.S. student entered the Sustainable Resource Management program September 2014
- All student salaries currently funded as combinations of TA-ships and external-to-SMC grants

Keith Jayawickrama followed Eric's presentation with a very brief update on happenings in the Northwest Tree Improvement Cooperative, OSU.

OTHER PRESENTATIONS

1. Using Uncertainty Assessment to Improve Empirical Models of Growth, Fire Effects and Fuel Consumption: Maureen Kennedy, UW SEFS

Uncertainty analysis helps to ascertain under what circumstances a model is useful, how to maximize the usefulness of the model, and to quantify the reasonable limits around which model predictions should be accepted. Two case studies were presented examining "why" and "how" of uncertanity assement:

Case study 1: Accuracy and sensitivity of FFE-FVS prediction of post-fire mortality

- Study Objectives
  - ✓ Re-measure plots in 2009 to assess:
  - ✓ How accurately does FFE-FVS predict stand-level post-fire mortality and stand conditions given pre-fire measurements?
  - ✓ How sensitive are FFE-FVS predictions to model scenarios?

Case study 2: Uncertainty bounds for models of fuel consumed during fire (Consume and FOFEM)

- Study Objectives
  - ✓ Measure fuel consumption in prescribed burns throughout the eastern US to compare predictions of two models
  - ✓ Quantify uncertainty bounds and characterize bias of each model
- Summary
  - ✓ Most empirical models output point predictions
    - uuncertainty assessment allows us to put those predictions into context
  - ✓ Uncertainty analysis is valuable for large empirical and semi-empirical models
    - to illuminate model deficiencies
    - guide model improvement/development
    - inform users of appropriate model use of and confidence in model projections.
  - ✓ A barrier to assessment is the limited availability of quality independent data sets

2. Douglas-fir Through Fall Exclosure Experiment—Set Up and Early Results: Greg Ettl, UW SEFS

Greg Ettl described the construction and early results from a throughfall diversion experiment in a 35 year-old Douglas-fir plantation site at Pack Forest, near Eatonville, WA. The goal of the work is to assess the effects of enhanced drought on Douglas-fir production, and the potential of lower stocking to mitigate drought stress. The site consists of 4 large 0.16 ha plots: control, throughfall diversion, thinned, and thinned with throughfall diversion. The site is equipped with a weather station, tipping bucket, soil moisture probes, sap flow probes, and dendrometers**.**

3. Max SDI on RFNRP Plots: Andre Faria, OSU

Please contact Andre for a copy of his presentation, andre.faria@oregonstate.edu **.**

4. FVS Growth and Yield Model: Erin Smith-Mateja, US Forest Service

Users can obtain Forest Vegetation Simulator (FVS) software at the Complete Package or Components links: **http://www.fs.fed.us/fmsc/fvs/software/index.shtml** or by contacting Erin Smith-Mateja, eesmith@fs.fed.us.

5. Center for Advanced Forestry Systems (CAFS):

CAFS Director Barry Goldfarb, from NC StateUniversity gave an informative presentaion relating to the structure and history of CAFS, below are some highligths:

CAFS: What is it?

- An umbrella organization providing a mechanism to bring forestry research co-ops together, for:
- Enhanced research collaborations
- Enhanced networking for members, university researchers, graduate students.
- Modest funding from the National Science Foundation—part of the NSF Industry-University Cooperative Research Center program.

CAFS: How Does it Work?

- The co-ops remain independent—responding to their member priorities
- University faculty propose projects for the additional NSF funds.
- Project proposals are presented at the Annual Meeting.
- Members at the meeting give instant feedback.
- All Members vote to recommend funding.

CAFS: History:

- Took over from previous “center” in 2007, with four schools participating:
- NC State, Virginia Tech, Purdue, Oregon State.
- In 2009 added Georgia, Maine, Washington, Florida.
- In 2010 added Idaho.
- In 2014 added Auburn.

CAFS: Today:

- CAFS 2013 members (does not include Auburn members):
- 99 total members.
- 41 full members (>$25,000 annual co-op dues).
- 58 associate members (>$5,000 annual co-op dues).

- Dues totaled across all sites, a number of companies are members in multiple sites.
- No direct dues to "CAFS Central."

CAFS Funding Source:

- Total of $9.1 million including underlying Coop's
- NSF/IUCRC, $720,000
- Member Dues, $3,247,245
- Other Federal, $2,180,200
- Non-Fed Government, $160,000
- University, $1,241,673
- Other, $168,568
- In-Kind, $1,429,922

CAFS Projects:

- Approximately 45 completed or continuing projects (CAFS NSF funding, at least in part).
- 10 new proposals pending.
- Local support is very important.
- What would we not be able to do otherwise?
- Is there an opportunity to collaborate with another co-op/site?

SMC 2015 PLANS

With a 2014 carryover of $132,681, total available revenue for 2015 is $770,719. The extra funding sets us up well for expanded research. The question was brought up how do we exploit the data in such a way that benefits all, is this an issue all coop's face? Instead of trying to find a commonality of research, would it be beneficial to break into smaller landowner groups at the TAC meetings when identifying RFP's? Doug Maguire added in order to deliver worthwhile products and encourage collaboration the topic questions need to be specific. Greg will solicit requests of most important to members to facilitate the decision making process. Plans are for a TAC meeting December 8th at the Heathman Lodge in Vancouver, WA and an IRC meeting January 13, 2015 at Gifford Pinchot National Forest HQ, Vancouver, WA.

Spring meeting 2nd or 3rd week of April, perhaps a 2-day meeting with a workshop held at Pack Forest. Our fall meeting will be September 9th and 10th in Victoria BC. Louise and Megan will work on the logistics and keep us posted.

Meeting adjourned at 4:30.

SMC FALL FIELD TRIP SEPTEMBER 11, 2014

BLACK ROCK FOREST MANAGEMENT RESEARCH AREA, FALL CITY, OREGON

(see Addendum 4)

STAND MANAGEMENT COOPERATIVE FALL MEETING & FIELD TRIP
September 10-11, 2014 OSU, LaSells Stewart Center, Corvallis, OR

Addendum 1

	AGENDA	
Sept. 10th	**BUSINESS MEETING**	
8:30	Registration, coffee & rolls	
9:00	Welcome & Introductions	Dean Stuck, Policy Committee Chair
9:10	Accomplishments & Announcements ✓ 2014 at a Glance ✓ NSF CAFS Meeting	Greg Ettl
9:20	Director's Introductory Preface: SMC Budget and Research ✓ Policy Advisory Committee Meeting ✓ SMC Forest Research Scientist 4 Announcement ✓ Budget Projection and Dues Vote ✓ Vote for Vice Policy Committee Chair	Greg Ettl
	TAC PROJECT LEADER UPDATES	
9:50	Modeling	David Marshall
	Wood Quality	Eini Lowell
	Nutrition	Kim Littke
	Silviculture	Eric Turnblom
10:15	**BREAK**	
	TECHNICAL SESSION SMC Research	
10:30	Yield Performance of SMC Type I, II, and III Installations $(SMC)^2$ Analysis	Eric Turnblom
10:55	Deep Soil Carbon and Nitrogen	Jason James
11:05	Residence Time of Carbon and Decomposition of Douglas fir Stumps	Matt Norton
11:15	NARA LTSP Site - Lysimeters Study	Marcella Menegale
11:25	Fertilizer Response Between Paired-Tree Plots verses RFNRP	Kim Littke
11:35	Wood Quality in Type V's	Eric Turnblom
11:55	NWTIC Update	Keith Jayawickrama, OSU
12:00	**LUNCH**	
	TECHNICAL SESSION cont. **CAFS Research**	
12:45	Center for Advanced Forestry Systems (CAFS)	Barry Goldfarb, Director CAFS
1:00	PCT Analysis	Eric Turnblom
1:20	Fate of Nitrogen N-15 Studies of the Paired-tree Study	Stephani Michelsen-Correa
1:35	Wood Quality Genetic Gain / SMC Type IV trials	Eric Turnblom
	TECHNICAL SESSION Other Research	
1:55	Max SDI on RFNRP Plots	Andre Faria, OSU
2:10	FVS Growth and Yield Model	Erin Smith-Mateja, US Forest Service
2:40	Using uncertainty assessment to improve empirical models of growth, fire effects and fuel consumption	Maureen Kennedy, UW
3:00	Douglas-fir Through Fall Exclosure Experiment—Set Up and Early Results	Greg Ettl, UW
3:15	**BREAK**	
3:35	Summary, research discussion—next round of proposals this winter	
3:50	2015 Research Plan of attack 1. January workshop 2. Installation Review Committee (IRC) 3. Spring meeting date/location	
4:30	Adjourn	

Addendum 2

Table 1: SMC Work Schedule 2013-2014

Type I					
Inst.	Inst. Name	Job	Date	Status	Comments
705	East Twin Creek	RD check Plot 3	11/19/2013	finished	Plot 3 RD 54.1, wait
709	Mill Creek	RD check plot 4,5	9/26/2013	finished	Measured and checked flags (O.K.)
711	Kitten Knob	RD check Plot 2	10/8/2013	finished	Plot 2 RD 55.3, Marked
716	Quilla Creek	RD check Plot 3	11/8/2013	finished	
717	Grant Creek	Full measurement	3/13/2014	Finished	
718	Roaring River	Full measurement	4/24/2014	Finished	Plot 3 RD 51.5, wait, Plot 5 RD 54.9, marked
719	A-1510	Full measurement	3/6/2013	Finished	
720	Horton	Full measurement	3/11/2014	Finished	Plot 5 RD 46.4, wait
722	Silver Creek Mainline	Full measurement	4/3/2014	Finished	Plot 1 RD 53.5, wait Plot 10 RD?
723	Formader Ridge	Full measurement	1/16/2014	Finished	
724	Veddar Mt.	Full measurement	11/15/2013	finished	RD check plot 7 (unlikely)
726	Toledo	RD check Plot 1,9	11/4/2013	Finished	Plot 1 RD 50.5, marked
728	LaPush	RD check Plot 6	2/13/2014	Finished	Plot 6 RD 66.8, wait
729	Gnat Creek	RD check Plot 1	1/7/2014	Finished	Plot 1 RD 5?, wait
731	Dingle 4	RD check Plot 4	11/25/2013	Finished	Plot 4 RD 53.7, wait
736	Twin Peaks	RD check Plot 8	11/27/2013	Finished	Plot 8 RD 53.8, wait
738	Grave Creek	Full measurement	2/4/2014	Finished	Plot 2 RD 46.4 , marked Plot 5 RD 55.4, marked
Type III					
Inst.	Inst. Name	Job	Date	Status	Comments
903	Prather Creek	Full Measurement	1/30/2014	Finished	
909	Yellow House	Full Measurement	3/21/2014	Finished	
912	Nootka Sounde	Full Measurement	11/22/2013	Finished	
916	Bobo's Bench	Thin Plot 13	12/6/2013	Finished	Marked plot 13
926	R.F. Sale	Full Measurement	2/19/2014	Finished	
929	Quiladuc 34	Full Measurement	2/13/2014	Finished	
935	Skidder Hill	Full Measurement	3/17/2014	Finished	
943	South Shaw Creek	Full Measurement	2/28/2014	Finished	
948	Willipa	Full Measurement	5/1/2014	Finished	

Table 1: SMC Work Schedule 2013-2014 cont.

Type IV					
Inst.	Inst. Name	Job	Date	Status	Comments
604	Boxcar	Full Measurement	4/30/2014	Finished	
605	Left Court	Full Measurement	11/16/2013	Finished	Wood Quality Study
606	Wynochee	Full Measurement	9/13/2013	Finished	Wood Quality Study

Type IV					
Inst.	Inst. Name	Job	Date	Status	Comments
821	Adna 1 (flat)	Full Measurement	Dropped	Dropped	Download weather data
822	Adna 2 (slope)	Full Measurement	Dropped	Dropped	Download weather data
823	Arrowhead Lake	Full Measurement	12/23/2013	Finished	Download weather data
824	Oppiet Rd	Full Measurement	12/23/2013	Finished	Download weather data
825	Cherry Grove 1 (flat)	Full Measurement	1/9/2014	Finished	Download weather data
826	Cherry Grove 2 (slope)	Full Measurement	1/9/2014	Finished	Download weather data
855	Buck Lake	Full Measurement	12/12/2013	Finished	Download weather data
856	Murphy	Full Measurement	12/12/2013	Finished	Download weather data
857	Cherry Valley	Full Measurement	12/24/2013	Finished	Download weather data
858	Tiger Lake	Full Measurement	12/17/2013	Finished	Download weather data
859	Duckabush	Full Measurement	10/25/2013	Finished	Download weather data
860	Lake Aldwell	Full Measurement	10/24/2013	Finished	Download weather data
861	Disco Bay	Full Measurement	10/25/2013	Finished	Download weather data
862	Electron	Full Measurement	1/2/2014	Finished	Download weather data
863	Buckley	Full Measurement	1/3/2014	Finished	Download weather data
864	Oil City	Full Measurement	10/24/2013	Finished	Download weather data
865	Hoquim Road	Full Measurement	10/23/2013	Finished	Download weather data
866	Battleground	Full Measurement	11/26/2013	Finished	Download weather data
867	Cougar	Full Measurement	10/2/2013	Finished	Download weather data
868	McClellan Mt.	Full Measurement	10/2/2013	Finished	Download weather data
869	Mitchell Hill	Full Measurement	1/2/2014	Finished	Download weather data
870	Newaukam Creek	Full Measurement	1/3/2014	Finished	Download weather data
871	Echo Glen 2	Full Measurement	1/2/2014	Finished	Download weather data
872	Mineral 2	Full Measurement	10/10/2013	Finished	Download weather data

Table 1: SMC Work Schedule 2013-2014 cont.

Type IV					
Inst.	Inst. Name	Job	Date	Status	Comments
873	Tilton River West	Full Measurement	10/9/2013	Finished	Download weather data
874	Morgan Creek	Full Measurement	9/24/2013	Finished	Download weather data
875	Old River Road	Full Measurement	11/5/2013	Finished	Download weather data
876	Tilton River East	Full Measurement	10/10/2013	Finished	Download weather data
877	Wood Road	Full Measurement	1/8/2012	Finished	Download weather data
878	Les Smith	Full Measurement	1/8/2014	Finished	Download weather data
879	Black Rock 2	Full Measurement	12/5/2013	Finished	Download weather data
880	Mitchell Creek	Full Measurement	12/9/2013	Finished	Download weather data
881	East Humptulips 2	Full Measurement	10/24/2013	Finished	Download weather data
882	Upper Rock Creek	Full Measurement	9/24/2013	Finished	Download weather data

Table 2: SMC Work Schedule 2014-2015

Type I					
Inst.	Inst. Name	Job	Date	Company	Comments
701	Mason Lake	Full Measurement		Green Diamond	RD check plot 4, unlikely
702	Adam River	Full Measurement		BC	
703	Longbell Road	Full Measurement		DNR	RD check plot 10, likely
705	East Twin Creek	RD check		Hancock	RD check plot 3, likely
713	Saulk Mt.	RD check		Grady lake	RD check plot 10, unlikely
715	Davie River	RD check		BC	RD check plot 6, Likely
716	Quilla Creek	RD check		BC	RD check plot 3, likely
725	Sandy Shore	Full Measurement		Olympic	
726	Toledo	Full Measurement		Plum Creek	RD check plot 4, unlikely RD check plot 9, unlikely
727	American Mill	Full Measurement		Rayonier	
728	LaPush	Full Measurement		Rayonier	RD check plot 5, 6, likely
729	Gnat Creek	Full Measurement		ODF	RD check plot 1, likely Plot 4, likely Plot 6, likely
730	Big River	Full Measurement		Green Crow	
731	Dingle 4	Full Measurement		USFS	RD check plot 4, likely
732	100-Lens Creek	Full Measurement		BC	RD check plot 7, likely
733	Stowe Creek	Full Measurement		BC	
734	Upper Canada Creek	RD check		Hampton	RD check plot 5, likely
736	Twin Peaks	RD check		Hancock	RD check plot 8, likely Plot 12, unlikely
737	Allegany	RD check		ODF	RD check plot 2, likely
Type II					
Inst.	Inst. Name	Job	Date	Status	Comments
802	Catt Creek	Full Measurement		DNR	ask about thinning
810	J2 Nnaimo River	Full Measurement		BC	
812	Panther Creek	Full Measurement		USFS	

Table 2: SMC Work Schedule 2014-2015 cont.

Type III					
Inst.	Inst. Name	Job	Date	Status	Comments
915	Big Tree	Full Measurement		Weyco	
922	Holder 1A	Full Measurement		DNR	
930	Forks 1	Full Measurement		Rayonier	
931	Forks 2	Full Measurement		Rayonier	
932	Forks 3	Full Measurement		Rayonier	
942	Cat Ballew	Meas. Plots 0,11,12,18,24		DNR	Thin Plots 0,11,12,18,24
Type V					
Inst.	Inst. Name	Job	Date	Status	Comments
827	Nestucca	Full Measurement		Weyco	
828	Bunker Creek	Full Measurement		Weyco	
829	Grants Pass	Full Measurement		Weyco	
830	Weikswoods Flat	Full Measurement		Weyco	Dropped
831	Rancho Ranchera PP	Full Measurement		Plum Creek	
832	Clarke Creek PP	Full Measurement		Plum Creek	
833	Clarke Creek DF	Full Measurement		Plum Creek	
834	Dudley	Full Measurement		Plum Creek	
835	Weikswoods Slope	Full Measurement		Weyco	Dropped
836	Rabbit Creek	Full Measurement		Green Diamond	
837	Mill Creek #2	Full Measurement		Green Diamond	
838	Star Lake	Full Measurement		Green Diamond	
839	Russel Ranch	Full Measurement		DNR	
840	Coyote Ridge	Full Measurement		DNR	
841	Cascadia Tree Farm	Full Measurement		Cascade TC	
842	Scott Mountain	Full Measurement		Cascade TC	
843	DeVore Mountain	Full Measurement		Lone Rock	
844	Brush Creek	Full Measurement		Lone Rock	

Table 2: SMC Work Schedule 2014-2015 cont.

Type V					
Inst.	Inst. Name	Job	Date	Status	Comments
845	Hanes Ranch	Full Measurement		Roseburg	
846	Armstron-Janicki	Full Measurement		Pilchuck	
847	Victoria	Full Measurement		Pilchuck	
848	McKinely	Full Measurement		Pilchuck	
849	Pender Harbor	Full Measurement		BC	
850	Steel Creek	Full Measurement		BC	
851	Upper Campbell	Full Measurement		BC	
852	Fanny Bay	Full Measurement		BC	
853	Copper Canyon 1	Full Measurement		BC	
883	Alderbrook C.C.	Full Measurement		Green Diamond	
884	Carson Lake	Full Measurement		Green Diamond	
885	Stoner	Full Measurement		Green Diamond	
886	Beeville rd. South	Full Measurement		Green Diamond	
887	St. Helen's	Full Measurement		Weyco	
888	Fall River Fertilization	Full Measurement		Weyco	
889	Deadhorse	Full Measurement		Weyco	
890	Ditch creek road	Full Measurement		Hancock	
891	Red Hill	Full Measurement		Roseburg	
892	Castle Rock	Full Measurement		Weyco	
893	Frozen Creek	Full Measurement		Roseburg	

Addendum 3

FOREST RESEARCH SCIENTIST 4

Req #:	111425
Department:	SCHOOL OF ENVIRONMENTAL & FOREST SCIENCES
Appointing Department Web Address:	http://www.cfr.washington.edu/
Job Location:	Seattle Campus
Job Location Detail:	Stand Management Coop, Bloedel Hall 164
Posting Date:	08/29/2014
Closing Info:	Open Until Filled
Salary:	Salary is commensurate with experience and education.
Notes:	As a UW employee, you will enjoy generous benefits and work/life programs. For detailed information on Benefits for this position, click here.

The University of Washington (UW) is proud to be one of the nation's premier educational and research institutions. Our people are the most important asset in our pursuit of achieving excellence in education, research, and community service. Our staff not only enjoys outstanding benefits and professional growth opportunities, but also an environment noted for diversity, community involvement, intellectual excitement, artistic pursuits, and natural beauty.

The School of Environmental and Forest Sciences (SEFS), a unit within the College of the Environment, seeks a full time Forest Research Scientist 4.

RESPONSIBILITIES: The Research Scientist for the Stand Management Cooperative (http://www.cfr.washington.edu/research.smc/) will manage a large, long-term database and conduct research in one of the following priority areas: forest nutrition, forest growth modeling, silviculture, and or wood quality, and ideally with interest in more than one SMC priority area. The Stand Management Cooperative (SMC) was established in 1985 to provide a continuing source of high-quality data, analysis, and outputs on the long-term effects of silvicultural treatments and treatment regimes on forest stand and tree growth and development, and on wood and product quality. The Stand Management Cooperative is composed of federal, state, Canadian provincial agencies, private companies, suppliers and universities conducting research on long-term forest production in the Pacific Northwest. The Stand Management Cooperative has 527 research installations in western British Columbia, Washington, and Oregon with close to two million records in the current database, with more data being added over time. We seek an innovative scientist to work with other scientists from the University of Washington, Oregon State University, University of British Columbia and potentially other universities with which we cooperate in research. The successful candidate will also have opportunities to partner with: Washington Department of Natural Resources, Oregon Department of Forestry, the Bureau of Land Management, the United States Forest Service, and private industry on creating tools, and technology transfer to inform management for a variety of landowner goals.

General Description: The forest scientist will join a dynamic team stationed at the University of

Washington in Seattle. Primary responsibilities will include managing the SMC database, working with SMC members, staff, scientists, and students to acquire data from a large permanent plot network. On a day-to-day basis the scientist will maintain the database and organize field measurements, and work on research projects related to the database and SMC research priorities. The scientist will work as part of a team, but is expected to conduct independent research in one or more of the priority areas. The scientist will contribute to the SMC newsletters, annual report, meeting presentations, and peer-reviewed publication of research. The scientist must have excellent verbal and written communication skills in order to work well with multiple stakeholders.

REQUIREMENTS: The successful candidate will hold at least one degree in forestry, quantitative methods, and/or a closely related discipline. Candidate must be proficient in Microsoft Access (including Access BASIC), R, SQL Server (or other enterprise database), Visual Studio (or similar IDE), .NET/PHP (or similar). Additional programing languages and knowledge of advanced statistics is a plus. Candidate must have demonstrated experience in database design and implementation, user interface design, and web design and development. At least 4 years of work experience, a publication history, and a Master of Science in Forestry or related quantitative discipline is required.

Equivalent education/experience will substitute for all minimum qualifications except when there are legal requirements, such as a license/certification/registration.

DESIRED: Preference will be given to candidates with a PhD and/or additional experience in one or more of the SMC priority research areas.

Condition of Employment:
Appointment to this position is contingent upon obtaining satisfactory results from a criminal background check.

Application Process:
The application process for UW positions may include completion of a variety of online assessments to obtain additional information that will be used in the evaluation process. These assessments may include Workforce Authorization, Criminal Conviction History, Cover Letter and/or others. Any assessments that you need to complete will appear on your screen as soon as you select “Apply to this position”. Once you begin an assessment, it must be completed at that time; if you do not complete the assessment you will be prompted to do so the next time you access your “My Jobs” page. If you select to take it later, it will appear on your "My Jobs" page to take when you are ready. Please note that your application will not be reviewed, and you will not be considered for this position until all required assessments have been completed.
The University of Washington is a leader in environmental stewardship & sustainability, and committed to becoming climate neutral. Apply for this job The University of Washington is an equal opportunity, affirmative action employer. To request disability accommodation in the application process, contact the Disability Services Office at 206-543-6450 / 206-543-6452 (tty)

Black Rock Forest Management Research Area

George T. Gerlinger Experimental Forest

Oregon Department of Forestry

Doug Maguire (Associate Professor and Silviculture Extension Specialist, Oregon State University, Corvallis, OR)

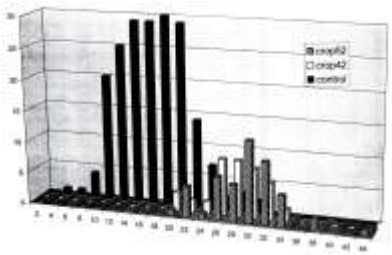
David Marshall (Research Forester, USDA-Forest Service PNW Research Station, Olympia, WA)

Brad Withrow-Robinson (Assistant Professor and Extension Forester, Polk, Marion and Yamhill Counties, Oregon State University Extension, Yamhill County, McMinnville, OR)

Pablo Romero (Master student, Forest Engineering and Resources, College of Forestry, Oregon State University, Corvallis, OR)

September 2014

Research



Demonstration

Education

The Black Rock Research Area is a unique and important public resource. Research activities at the Forest have made significant contributions to the scientific understanding of stand growth and development, and on the design of modern field experiments.

Black Rock is very relevant to the economy and environmental quality of Oregon. It provides information and experiences central to managing forests in a manner that meets public needs and expectations in the 21st Century.

Local History

Black Rock was once an thriving logging and milling town along the little Luckiamute river, 6 miles west of Falls City. In its heyday at the turn of the 20th Century, the town had sawmills, a couple saloons, a post office, a school house and company stores. There were shake and clapboard houses for family men and bunkhouses for the single men. Other workers commuted daily by rail from Falls City and Dallas (15 miles to the east) to work in the woods and in the mills.

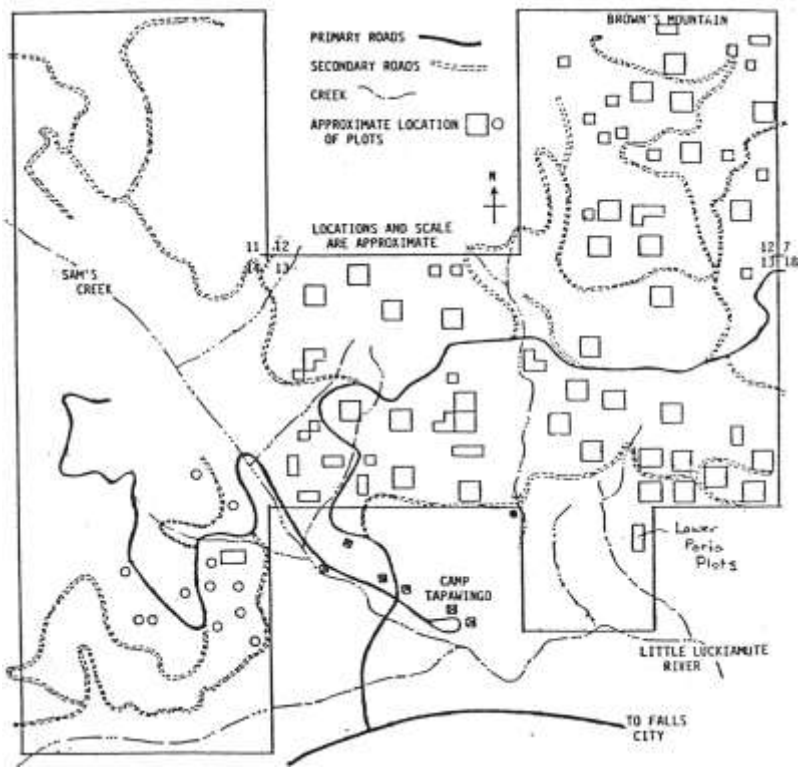
The Great Western Logging Company, forerunner to Willamette Industries, logged the forest near Black Rock. The company was started in 1903 by Louis Gerlinger and acquired by his son George Gerlinger in 1905. At the turn of the century, trees were felled and bucked by hand with cross-cut saws. The logs were hi-lead yarded and transported to mills at Black Rock and Dallas by railroad. When all the old growth in the area was harvested, the mills shut down and Black Rock became a ghost town. The 1000-acre Experimental Forest was donated to the Oregon Department of Forestry by the Gerlinger family in the early 1950's.

The old growth forest that supported the town of Black Rock had been dominated by tall straight Douglas-fir, with little defect. The stand averaged 42 trees and 415 ft² of basal area per acre. As with most naturally regenerated stands, spacing was uneven. Stocking varied from 16 trees and 212 ft^2 of basal area per acre to 64 trees and 504 ft^2 basal area per acre.

Current stands are dominated by Douglas-fir that reseeded naturally following harvest and burning of residual slash. Establishment was rapid, around 1909. In 2000 the stands were approximately 91 years old.

Research and Demonstration Activities

Research activities began on the forest with preliminary commercial thinning tests around 1952 (when the stand was about 43 years old). Research was initiated by the late Dr. Alan Berg and continues to be directed by the Department of Forest Science, College of Forestry, Oregon State University. The replicated growing stock studies for which the forest is best known were initiated in 1957. Many corollary studies were started later, bringing the number of plots established on the Experimental Forest to a total of 64, covering 45 acres. Many are still being tracked, while others are inactive.

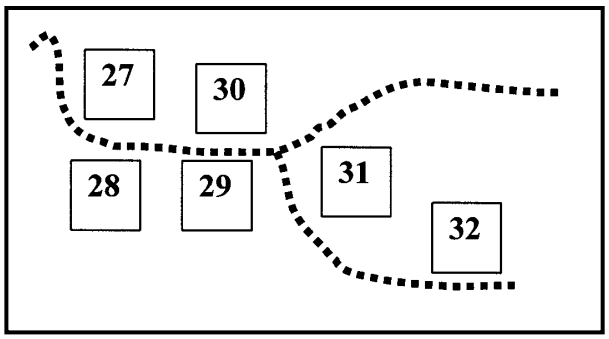


Map of George T. Gerlinger Experimental Forest

Constant Levels of Growing Stock

This study consists of three thinning treatments, maintained within a given range of basal areas for about 14 years, and an unthinned control. Each treatment plot is 1 acre with a treated buffer. The experiment is blocked, with four replications. The following levels of basal area (trees 8 inches and over) were maintained:

Treatment	Plot in Replication II	1958 following treatment
Control (unthinned)	Plot 27	(486 trees, 212 ft^2)
160-190 ft^2 ("light thinning")	Plot 29	(374 trees, 163 ft^2)
130-160 ft^2 ("moderate thinning")	Plot 28	(362 trees, 188 ft^2)
100-130 ft^2 ("heavy thinning")	Plot 30	(375 trees, 172 ft^2)



The replication was given a "conditioning thinning" in 1958 to bring plots to a more uniform level of initial density. Treatment thinnings followed in 1960, 1965 and 1972. Thinnings were done in an operational manner and logs were skidded by horse or rubber tired skidder. Marking left the better formed more vigorous trees and removed the less desirable trees while maintaining relatively even spacing. Hardwoods were not removed unless they were competing with leave trees.

Crop Tree Thinning and Underplanting

Demonstration Plot 31 generates perhaps the greatest interest and discussion among professional foresters, wildlife biologists and laypeople. This unreplicated plot was thinned in 1958 to only 53 trees and 75 ft^2 of basal area per acre. Hemlock seedlings from four different provinces were planted at a 4 ft. by 4 ft. spacing in 1959 (losses replanted with wildings in 1960). The objective of this trial was to develop a two-storied mixed-species stand.

Plot 31 1958

Laminated Root Rot

Laminated Root Rot is caused by the fungus *Phelinus weirii* and is an important ecological force in and around Black Rock. *P. weirii* was and is active in the area and accounts for many undertstocked pockets. Infection centers occupied nearly 5 percent of the forest in 1979 (Lawson et al. 1983)

Mixed Species Plantings

"Lower Poria" unit. This 35 acre unit is heavily infected with laminated root rot. After harvest in 1989 the unit was planted to ponderosa pine (1990) and later interplanted with western white pine (about 1992) in the middle and eastern portions. A mix of cedars was planted in 1990 on the western edge. Permanent plots are currently being established to monitor the development of mixed-species stands and to track the performance of root rot resistant species.

Site Characteristics
Topography: a mix of gentle benches and steep pitches
Elevation: 700 to 2000 feet
Aspect: generally south facing
Site Class: mostly III but ranges from II to IV
Soils: developed from both sedimentary and igneous rocks, in the Honeygrove, Klickitat and Peavine series
Precipitation: about 80 inches annual rainfall

Research and Demonstration Findings

See attached graphs and tables

Important Findings

- After 90 years, biological rotation age had still not been reached. Periodic annual increment (PAI) still exceeds mean annual increment (MAI).
- Volume growth rate of the plots is a function of BOTH level of growing stock and stand structure.
- Douglas-fir regeneration appeared after heavy thinning (residual basal area 100-130 ft^2/ac), but is scarce to absent in other treatments.
- Ground vegetation has essentially been excluded from the crop tree thinning with its dense understory of western hemlock, but becomes progressively more abundant with increasing thinning intensity: control > light > medium > heavy thinning.
- The two-tiered stand produced by crop tree thinning to 50 trees per acre and underplanting with western hemlock has strong potential as late seral wildlife habitat.
- Volume production (thinned + standing volume) and current volume growth is greatest in the crop tree thinning.
- Crown ratios and height to diameter ratios warn against current thinning in the control plots, but they improve successively with increasing thinning intensity.

Plot 31 1970

Summary

Extensive commercial harvest in recent decades and catastrophic disturbances like the Tillamook Burn have created large areas in western Oregon covered with dense young forest stands on both public and private lands.

Many questions remain about how to manage these young stands to meet the variety of outcomes that society expects from our forests. These outcomes include recreational opportunities, protection of water

resources, development of diverse habitats and contributions to County and the State's economic base. Newer studies focus on managing younger mixed-species stands but it will take decades for many of the more interesting results to emerge from these young stands.

Black Rock is unique in what it can contribute to our understanding of stand development and future forest conditions. It is one of the oldest examples of how young second growth stands respond to and develop under active management. It is an important guidepost in managing our forests in western Oregon to achieve desired future conditions.

Vegetation

Tree species include: Douglas-fir (*Pseudostuga menziesii*), with scattered grand fir (*Abies grandis*), western hemlock (*Tsuga heterophylla*), bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus trichocarpa*), bitter cherry (*Prunus emarginata*), Pacific dogwood (*Cornus nuttallii*). Red alder (*Alnus rubra*) is dominant along streams. Recent plantations include Valley ponderosa pine (*Pinus poderosa*), western white pine (*Pinus monticola*), western redcedar (*Thuja plicata*)and incense-cedar (*Calocedrus decurrens*). Common understory shrubs include Oregon grape (*Berberis nervosa*), vine maple (*Acer circinatum*), ocean spray (*Holodiscus discolor*), red huckleberry (*Vaccinium parvifolium*) and salal (*Gaultheria shallon*).

Important Questions addressed at Black Rock

- How do different stand densities provide for meeting different management objectives?
- Which densities provide conditions suited to habitat for specific species, yields of desired timber, etc.?
- What do the growth trends and stand structures imply about appropriate rotation lengths?
- What are trade-offs between mortality and growth at different stockings?
- What might be suitable management regimes for older, previously unmanaged stands?

More information

Curtis, R.O. and D.D. Marshall. 1993. Douglas-fir rotations – Time for reappraisal? Western Journal of Applied Forestry 8:81-85.

Lawson, T.T., A.B. Berg and E.M. Hansen. 1983. Damage from Laminated root rot at the Black Rock Forest Management Research Area in western Oregon. Forest Research Laboratory, Oregon State University, Corvallis, Oregon. Research Note 75. 7 p.

Acknowledgements

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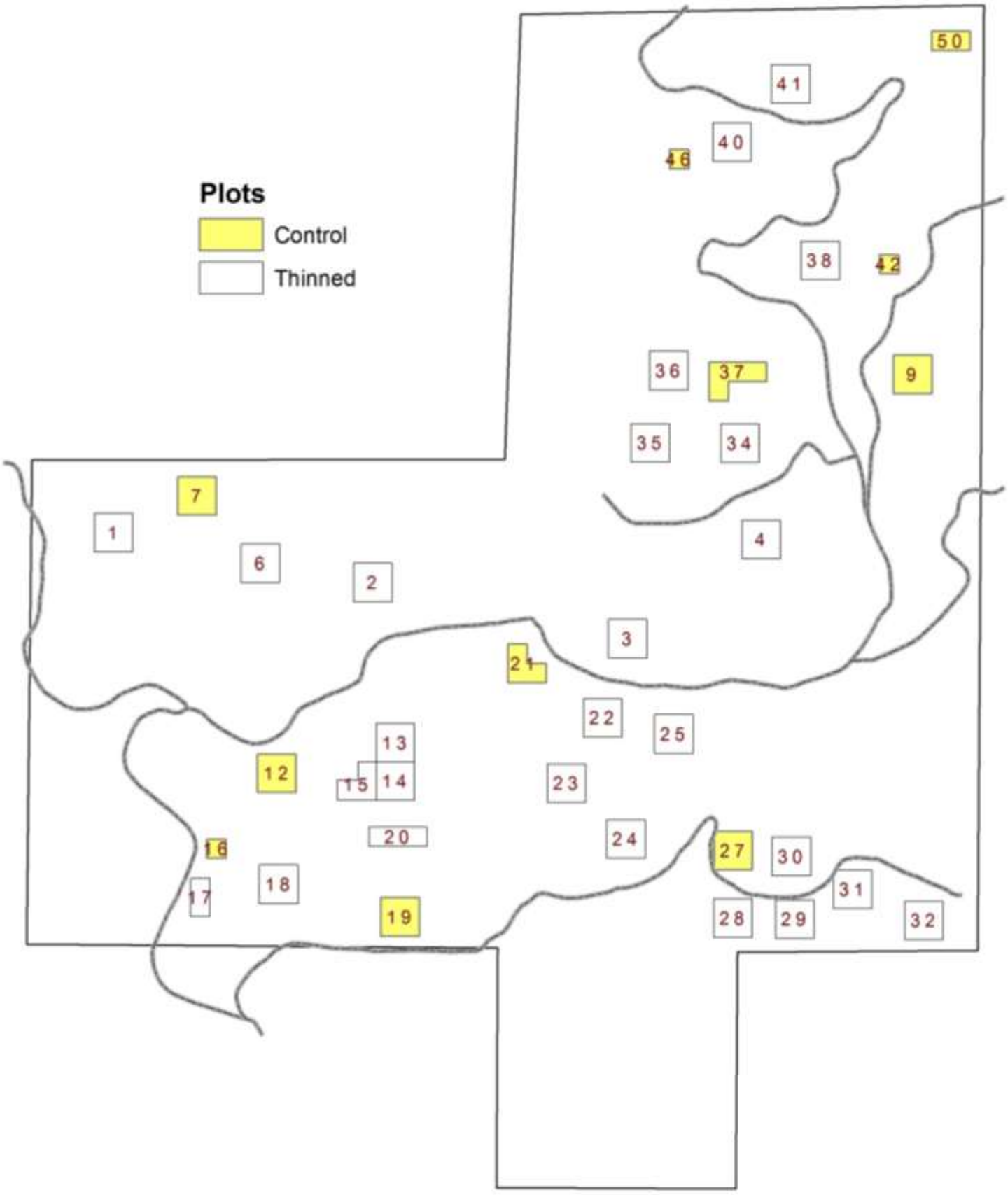
Summary of thinning treatments

Plot	Plot size (ac)	Treatment	# thinnings	Mean d/D ratio	Initial BA	% BA rem.	Mean BA	Final BA	Block
27	1	Control	-	-	-	-	-	-	
28	1	Medium	4	1.06	46	14	35	32	B
29	1	Light	4	0.92	47	12	40	38	
30	1	Heavy	4	1.13	47	20	32	26	
31	1	Crop tree	1	0.91	50	65	17	17	
32	1	Crop tree	3	0.97	44	31	19	12	
38	1	Medium	5	1.08	54	14	37	34	
40	1	Light	5	1.04	53	10	44	40	D
41	1	Heavy	5	1.16	58	18	35	28	
46	¼	Control	-	-	-	-	-	-	

Some descriptive plot level estimates for the first and last measurements (all units in metric).

Plot	date	Age	BA	VOL	D_q	CSA	N	SDI	gBA	gVOL	H_{40}	SI
27	1957	47	47.4	461.4	23.1	92.4	1139	971.6	47.4	461.4	29.2	34
27	2012	101	81.7	1357.3	48.6	67.5	440	1247.4	99.4	1551.0	45.8	34
28	1957	47	41.4	397.4	23.0	90.1	997	848.7	45.7	438.5	30.2	35
28	2012	101	53.5	896.9	54.3	42.8	232	781.9	93.5	1356.5	46.8	35
29	1957	47	44.6	474.1	25.2	90.2	892	882.3	47.1	499.2	31.9	37
29	2012	101	70.9	1356.4	59.9	57.5	252	996.4	103.3	1747.2	52.8	37
30	1957	47	42.8	397.9	24.0	99.6	965	861.5	47.0	436.1	28.9	34
30	2012	101	59.8	944.0	56.8	54.6	237	858.4	98.8	1334.7	45.8	34
31	1957	48	33.5	427.9	36.6	106.2	373	588.5	49.7	626.3	36.2	41
31	2012	102	72.5	1419.2	85.6	58.4	126	884.8	105.6	1825.4	56.3	41
32	1957	45	38.4	401.4	26.7	164.7	687	743.1	44.1	460.5	33.3	40
32	2013	100	50.8	950.6	82.7	35.5	96	631.0	88.1	1348.9	53.2	40
38	1957	44	47.2	394.0	22.5	100.7	1213	978.6	53.9	452.1	25.9	33
38	2012	98	78.4	1271.6	57.2	67.0	306	1123.8	117.2	1621.5	45.8	33
40	1957	41	50.2	414.4	22.8	125.7	1226	1033.4	53.2	438.5	25.9	34
40	2012	95	84.5	1356.4	55.1	67.2	353	1226.5	119.0	1672.3	45.8	34
41	1957	40	51.2	349.9	22.2	108.2	1337	1065.8	58.0	397.6	23.3	33
41	2012	94	78.8	1182.2	55.4	75.6	331	1144.8	124.9	1538.6	44.5	33
46	1960	43	54.5	378.8	18.1	126.1	2105	1227.2	54.5	378.8	23.8	29
46	2012	95	91.2	1132.4	36.3	92.8	880	1563.0	112.1	1278.1	37.7	29

Addendum 4


Plots
Control
Thinned
50
41
40
46
38
42
36
37
9
35
34
7
1
6
2
4
3
21
22
25
13
12
15
14
23
20
24
27
30
16
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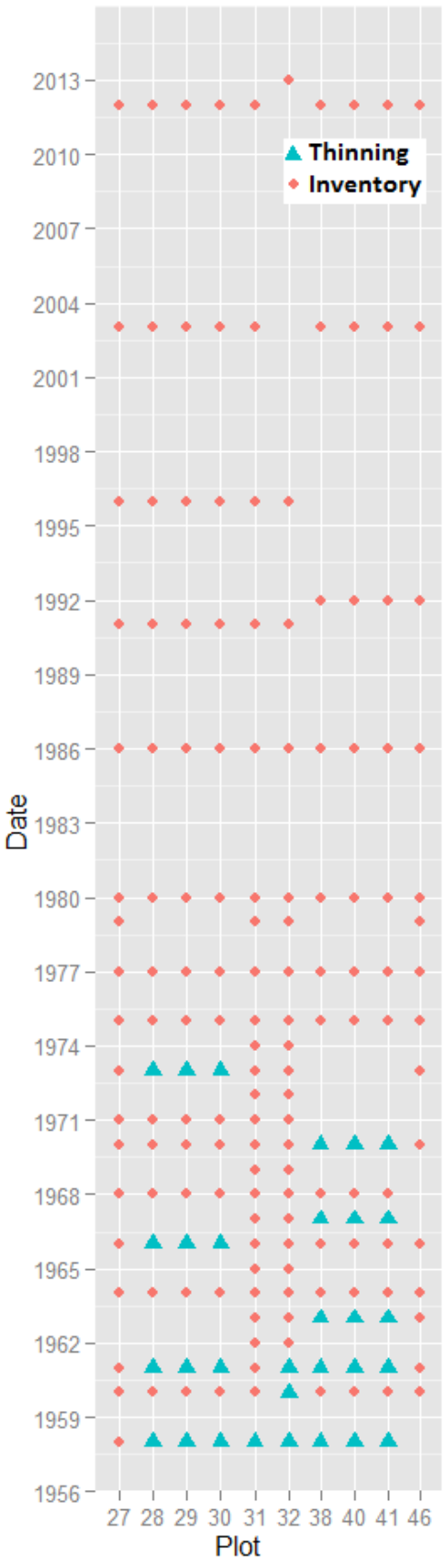
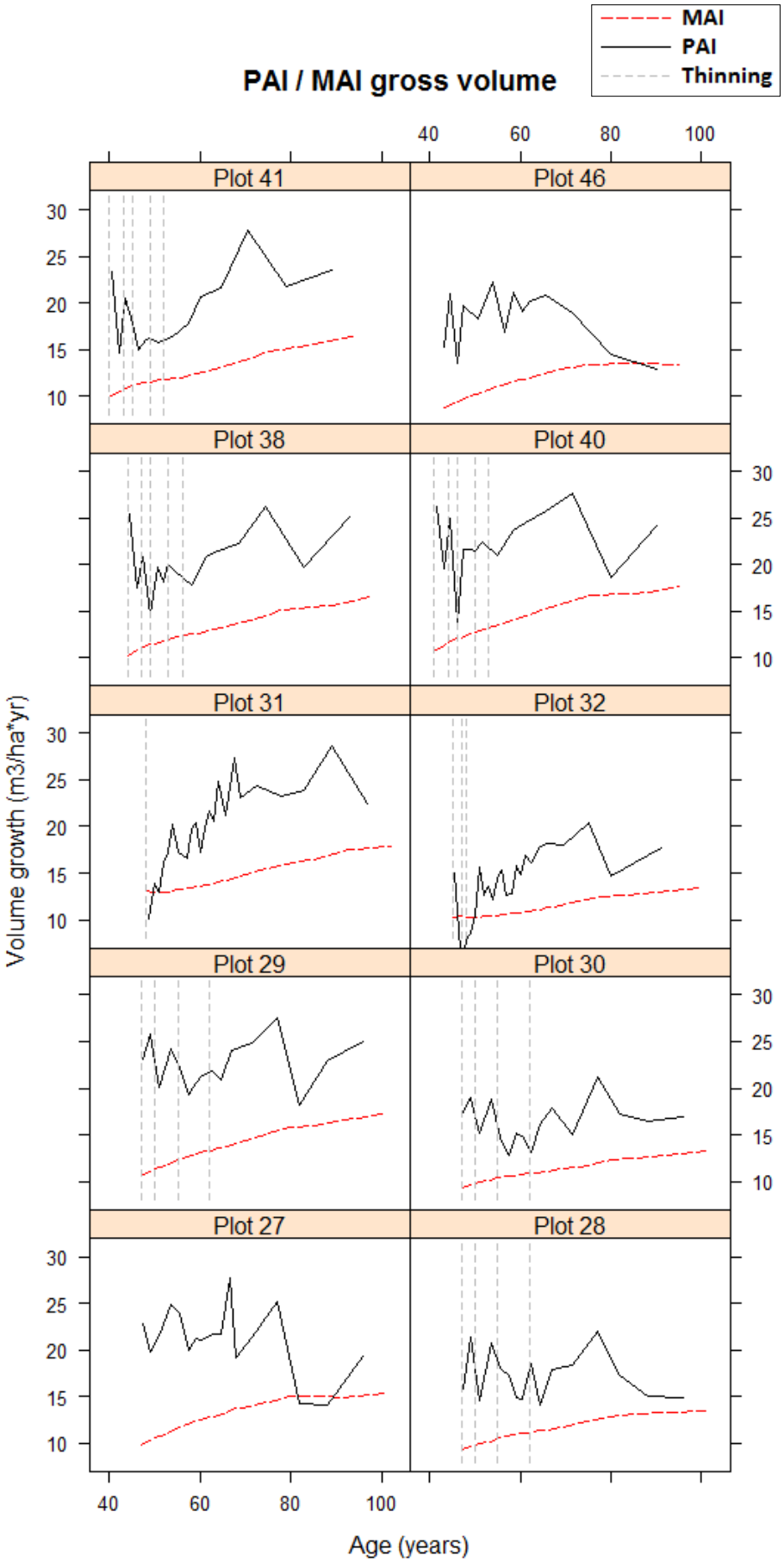
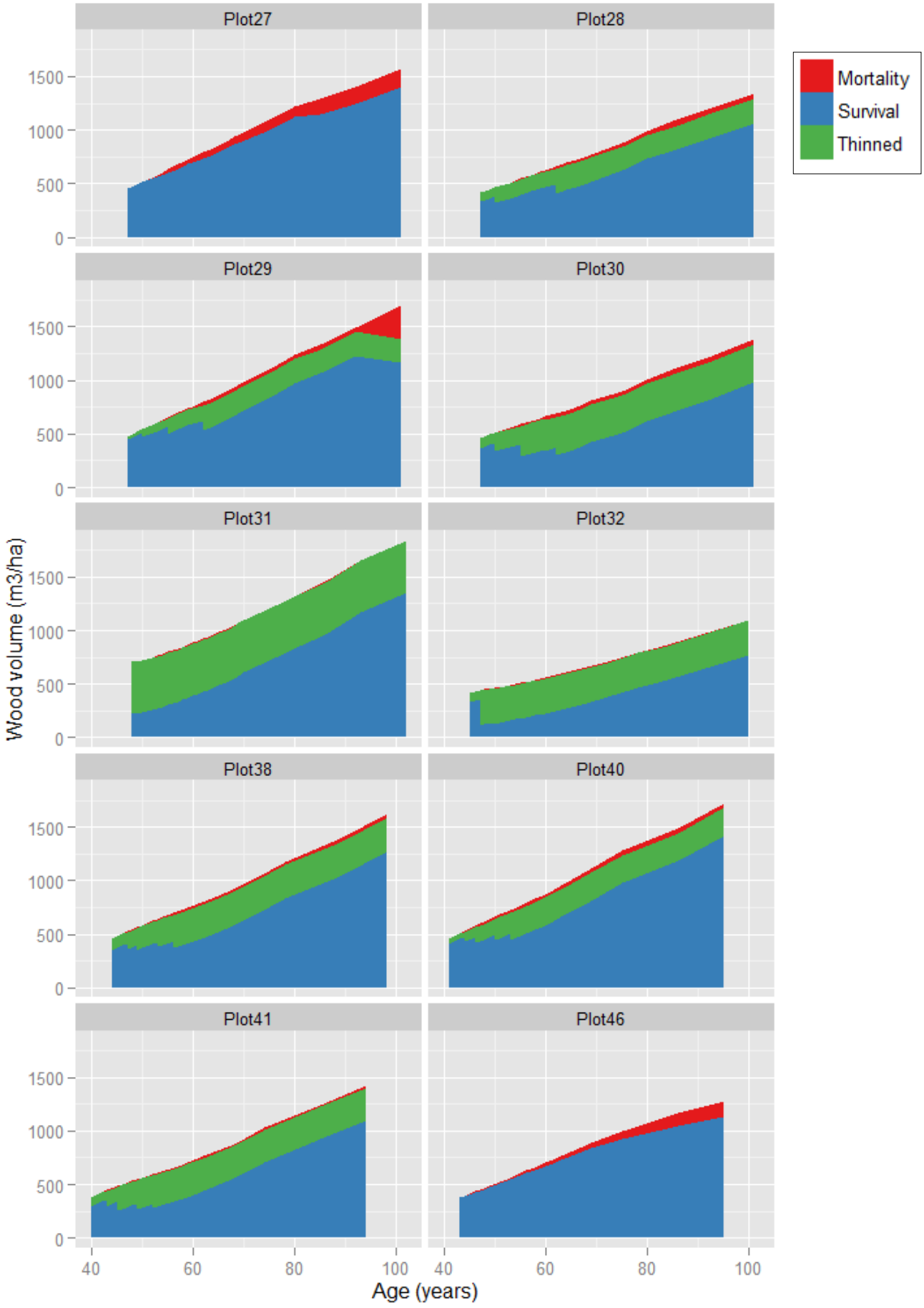
17
19
28
29
31
32


Thinning
Inventory
Date
2013
2010
2007
2004
2001
1998
1995
1992
1989
1986
1983
1980
1977
1974
1971
1968
1965
1962
1959
1956
27 28 29 30 31 32 38 40 41 46
Plot


PAI / MAI gross volume
MAI
PAI
Thinning
Plot 41
Plot 46
Plot 38
Plot 40
Plot 31
Plot 32
Plot 29
Plot 30
Plot 27
Plot 28
Volume growth (m3/ha*yr)
Age (years)


Plot27
Plot28
Plot29
Plot30
Plot31
Plot32
Plot38
Plot40
Plot41
Plot46
Mortality
Survival
Thinned
Wood volume (m3/ha)
0
500
1000
1500
40
60
80
100
Age (years)