

SMC Quarterly News

Stand Management Cooperative
College of Forest Resources, University of Washington

1st Quarter 2009

www.standmgt.org



Dave Briggs, SMC Director

From the Director

It seems as though it was only yesterday that the SMC was celebrating its 20th anniversary but now as we enter 2009, we are one year from the 25th. We have certainly made some major strides since the 20th including completing the update of ORGANON, completing the young stand model, planting the genetic-gain-type IV (GGTIV) installations, and initiating the paired-tree fertilization trials. All of that is on top of the regular program of measuring and maintaining the Type I, II and III installations, conducting a variety of analyses, and continuing to attract and graduate Masters and PhD students. It seems that the Mission and core values of the SMC remain as important as ever and support remains strong despite all of the transformations within the forest landowner community. This issue features an article by Eric Turnblom, Keith Jayawickrama and Terrance Ye that summarizes the performance of the GGTIV installations after their first two growing seasons. There are also a number of brief announcements and project updates.

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University of Washington Proposal to join the Center for Advanced Forest Systems (CAFS)

Late last September David Briggs, Rob Harrison, Monika Moskal, Eric Turnblom and Sandor Toth submitted a proposal to the National Science Foundation's Industry-University Cooperative Research Centers (I/UCRC) program to become a member of CAFS. CAFS was formed in 2007 under the I/UCRC program with North Carolina State University, Oregon State University, Purdue University, and Virginia Polytechnic Institute and State University as the original members. Subsequently, the Universities of Georgia, Maine, and Washington

developed proposals to join CAFS that were due in September 2008. If accepted, UW would receive \$70,000 per year for five years. In December, NSF sent review comments on the proposal and a contract agreement for the UW to sign in order for it to become a member of CAFS. We returned acceptable responses to review comments in early January but the NSF contract that the UW needed to sign in order to join CAFS became a stumbling block as the UW wanted to have changes made in the contract. CAFS also scheduled a meeting on February 10-12, 2009 and we had made arrangements in December to attend on the assumption that approval would occur quickly. We had to cancel in late January since the UW was still working on contract revisions that were not sent until February 2nd. Amazingly we received approval on the same day. This was too late for us to attend the meeting but we'll discuss use of the year 1 funding at the SMC spring meeting.

Paired Tree Fertilization Project

Since the beginning of the Paired Tree Project, thirty-four installations have been installed from northern Vancouver Island to southern Oregon. Twenty-eight stands will be fertilized this winter and spring. Kim Littke has sampled soil pits at 26 installations. Preliminary soil data shows total N content to range between 5,000 and 21,000 kg N/ha. The next round of installations will take place this summer and fall. We are still looking for more installations, especially those on low productivity sites or with igneous parent materials. Please email Kim Littke at littkek@u.washington.edu for a copy of the Candidate Area Selection Form.

SMC Spring and Fall Meetings

The Spring meeting will be held on April 21 and 22. There was very strong support that we hold it at the Little Creek Casino in Kamilche, WA. so we have booked these dates there. We will have a business meeting in the morning of the 21st with research project updates and reports that afternoon and the morning of the 22nd. The Fall meeting will be held on September 22-23. We are looking at several possible locations. If you have a suggestions that would include an interesting field trip, please contact me. dbriggs@u.washington.edu.



Spring Meeting, April 21st and 22nd
Little Creek Casino in Kamilche, WA.
www.little-creek-casino.com

NWTIC Genetic Gain / SMC Type IV Trials: Age Three (3) Results

Eric Turnblom, Keith Jayawickrama, and
Terrance Ye

Introduction

The principal objectives of this trial were (1) to understand the long-term effects on productivity, quality, and diversity of Douglas-fir trees and stands when the latest advances in genetics, seedling culture, and early vegetation management are deployed in combination; (2) to compare the growth of genetically selected trees to unselected woods-run trees; (3) to compare the predicted genetic gains derived from progeny tests with realized gains in independent block plot trials; (4) to provide data to modify / update growth models for effects caused by genetic selection, intensive weed control and different spacing; and (5) to demonstrate volume gains on an area basis.

The trial was established over two years, with three sites established in 2004-5 and three more in 2005-6. Data were collected on total height, height-to-crown base, crown width, basal diameter, and dbh (if trees had reached breast height) at each site after two seasons in the ground, on a total of 12,845 trees. While age-3 data are typically not subjected to detailed analysis or even collected in Douglas-fir progeny tests, this trial had different objectives. NWTIC therefore undertook an analysis of the basic response variables of height and basal diameter, to verify if any trends are observable at this early age. SMC undertook an analysis of the response variables crown width and mortality.

Study design

Three factors are used in factorial combination in this study: genetic gain level of seedlots (3 levels; no gain, g1, i.e. woods-run, intermediate, g2, and elite, g3), density (three levels; low, s1, intermediate, s2, high, s3), and weed control (standard, v1, and complete, v2). For genetic gain level, the base population (woods-run) is taken from a random sample of 50 wild trees distributed throughout the Grays Harbor breeding zone. The intermediate population is a mix of pair crosses among 20 parent trees chosen to represent an intermediate level of genetic gain. The elite population is a mix of crosses among clones of the 20 best parent trees in each breeding unit designed to represent a high level of genetic gain.

For spacing, low density is 200 Stems Per Acre (SPA), represented by 15 × 15' square spacing, intermediate density is 440 SPA (10 × 10'), and high density is 889 SPA (7 × 7').

Standard vegetation control level is one complete weed kill (producing at least 80% bare ground) at time of site preparation and no weed control thereafter, while complete vegetation control maintains at least 80% bare ground until crown closure. Therefore there are 18 treatment combinations.

The experiment uses a randomized general block design, with an embedded response surface treatment design, that is, most replication occurs at the middle spacing for all genetic gain levels, with fewer reps near the extremes of spacing and gain. The standard vegetation control level has the fewest replications. In total, there are six sites (statistical “blocks”), 22 plots per site, and 64, 100, and 250 trees per plot in the low, intermediate, and high density plots, respectively.

Data analyses

Response variables (height, basal diameter, crown width, and survival) were analyzed at the individual installation and individual tree and family level, as well as at the stand level, but only the stand (plot) level averages are reported here. Linear models were fit to the data that included terms for all main effects and all potential two- and three-way interactions between all the factors. All model terms were considered as fixed except for the random error.

In the cases where the difference among seedlots was statistically significant, the realized gains for the two genetically improved seedlots were estimated with the formula:

$$\Delta G2 = (\bar{g}_2 - \bar{g}_1) \times 100 / \bar{g}_1 \text{ and } \Delta G3 = (\bar{g}_3 - \bar{g}_1) \times 100 / \bar{g}_1.$$

Results and Discussion

There is strong evidence ($p < 0.0001$) supporting the large observed differences among test sites for all response variables analyzed, i.e., height, basal diameter, crown width, and survival by age three. The differences are likely due to site productivity, weather / climate, and other local effects, etc.

Genetic gain had a statistically significant effect, with intermediate and elite seedlots showing 2.97% and 5.83% realized gains for height over the base population, respectively (Figure 1). No meaningful difference among seedlots was expressed for basal diameter at this age, all averaging about 0.6 inches. This is probably because basal diameter is more variable than height, due the influence of branch clusters, stem swelling, differences in planting depth, lean, etc. Gain level did not affect survival, averaging 81% across all sites. There was mild evidence ($p = 0.0384$) that crown widths were 4% narrower on the elite gain level trees as compared to the woods-run gain level (Figure 2). The intermediate gain level exhibited crowns that were intermediate in width between woods-run and elite,

but were not statistically different from the woods-run widths.

Stand density had no significant effect on height growth by age three. Stand density did, however show marginal significance on basal diameter (0.044), with mean basal diameter at intermediate density being greater than at either high or low density. Survival was slightly better in the densest planting, 7 x 7 ft., however the result was not statistically significant at this age. Crown width was apparently unrelated to stand density at this age.

Complete vegetation control did not appear to affect height, nor mean basal diameter, nor crown width, but did appear to affect survival ($p = 0.0237$). Under complete vegetation control, survival was about 4% greater than on plots undergoing standard vegetation control.

The correlations between age-3 ht predicted values for crosses in the GGTIV and the age-10 HT Gain predictions were 0.51 with *Gain1* and 0.54 with *Gain3*.

We expect the differences between different levels of the various treatment factors to increase as the trees grow older and larger.



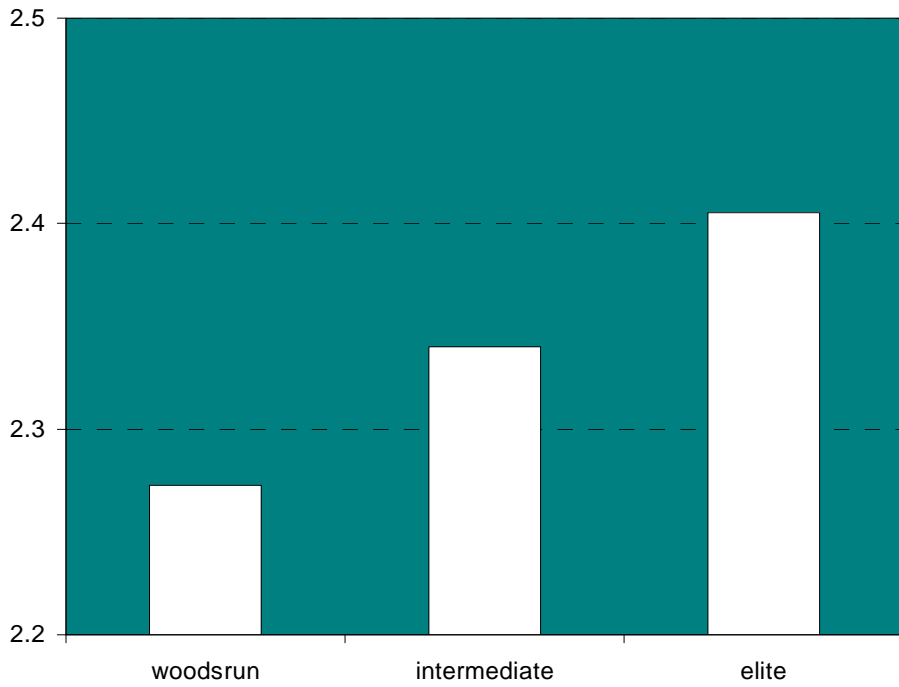


Figure 1. Average height (feet) in relation to gain level in the GGTIV study trials.

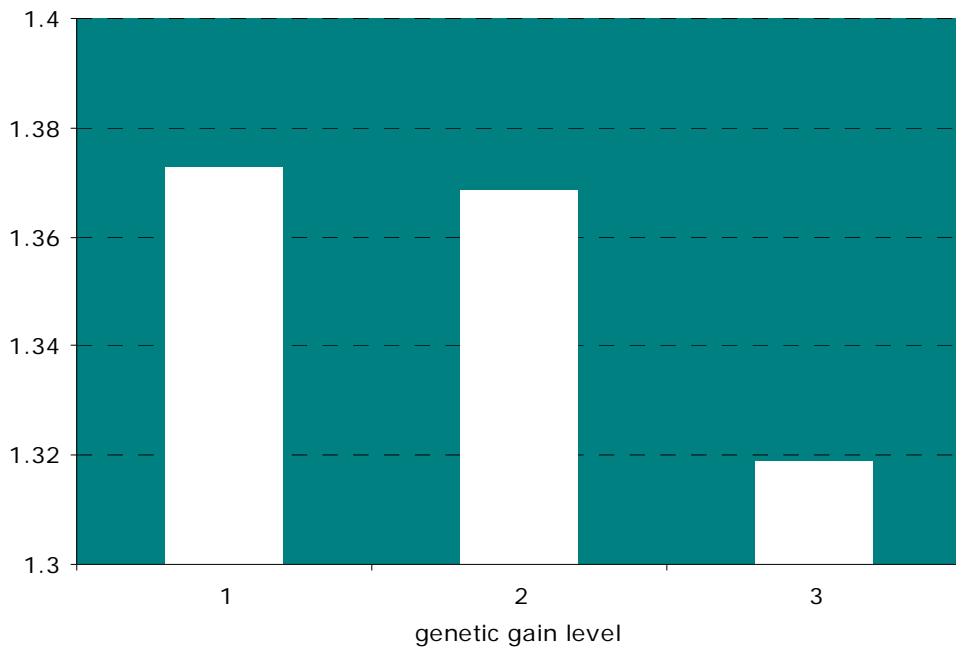


Figure 2. Average crown width (feet) in relation to gain level in the GGTIV study trials.

New CFR PhD Student, Carol Shilling

Carol Shilling, a new PhD student with the College of Forest Resources in Professor Rob Harrison's soils lab at the University of Washington, joins us from Germantown, Maryland. Carol received her master's degree in environmental biology from Hood College where her research explored the flooding of valleys to make manmade lakes and the resulting effect on surrounding vegetation type exploring whether the plant species directly adjacent to the lake changed from dry habitat species dominance to wet habitat species dominance. Carol also holds a master's in secondary education and a Maryland state advanced professional teaching certificate. In the previous five years, she taught advanced placement environmental science and biology with Montgomery County Public Schools in Gaithersburg, Maryland. She has conducted research in teacher summer intern programs with the National Institutes of Health assisting in the development of radiotracers for Alzheimer's disease assessment and research with the University of Maryland Center for Environmental Science conducting Red Tide (*Karenia brevis*) nutrient studies.

Carol is working with Tim Harrington of the USDA Forest Service and Tom Terry of the Stand Management Cooperative studying the effects of competing vegetation control, and woody debris removal on Douglas-fir biomass and stem allometry as well as nutrient allocation. She will compare current 5th year growth studies at Molalla, Oregon and Matlock, Washington research sites with previous 5th year growth studies at the Fall River, Washington research site. The sites vary in precipitation and soil characteristics and are part of the USDA Forest Service Long Term Site Productivity studies.

In her free time, Carol enjoys hiking, camping, boating and general exploration of the natural environment. She is looking forward to exploring the Pacific Northwest. Among her favorite spots so far are the Hoh Rainforest and Ruby Beach of the Olympic National Forest.



Carol Shilling, PhD student with the College of Forest Resources

Make sure you visit the new SMC web page at <http://www.standmgt.org>



Abstracts and Publications

Wood from planted forest: A global outlook 2005-2030.
Carle, Jim and Peter Holmgren. Forest Products Journal
58.12 (Dec 2008): p6(13).

Abstract

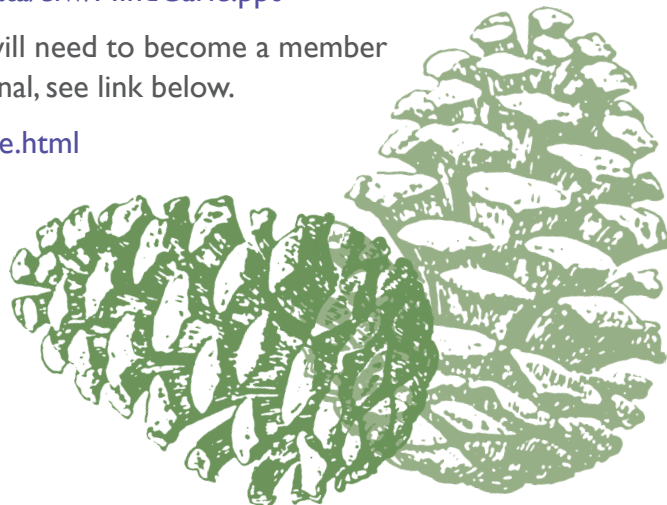
Planted forests constituted only 7 percent of the global forest area, or about 271 million hectares, in the year 2005, but they contributed a higher proportion of overall forest goods and services. In recent years, the broader significance and importance of planted forests have been recognized internationally, and standards for their responsible management have been established, relating to social and environmental as well as economic benefits. As one of the important provisions from planted forests, this study examined their future potential production of wood. From a baseline survey of 61 countries, 666 management schemes were established for planted forests, taking into account tree species, rotation lengths, production potential and end uses of wood. With an assumed average efficiency rate of 70 percent, the potential industrial wood production in 2005 from planted forests was estimated at 1.2 billion [m.sup.3] or about two-thirds of the overall wood production in that year. Scenarios until 2030 (detailed) and 2105 (simplified) were developed, indicating that wood production from planted forests may increase considerably. Results are provided with breakdowns by region, species groups and end-use categories. It is concluded that the significance of planted forests, and recognition of their contributions to a range of development goals, are likely to increase in coming decades.

To view the article as a PowerPoint presentation visit

<http://www.fao.org/forestry/foris/data/efw/MIndCarle.ppt>

To view the complete article you will need to become a member of the Forest Products on-line journal, see link below.

<http://www.forestprod.org/FPJonline.html>



Abstracts and Publications cont.

Determining stand value and log product yields using terrestrial lidar and optimal bucking: A case study. Murphy, Glen. Journal of Forestry, Volume 106, Number 6, September 2008 , pp. 317-324(8).

Abstract

Nine plots in three Douglas-fir stands of different tree sizes were scanned using terrestrial lidar systems. Tree locations in each plot and their stem profiles were automatically detected using commercially available software. Actual stem profile measurements were made on all trees after felling. Stems were optimally bucked based on log specifications and prices for two log markets: the western United States and New Zealand. Stand values and log product yields were estimated for the terrestrial lidar-derived data and compared with estimates based on the actual stem profiles. Stand and undergrowth density and tree size affected the accuracy of automated stem detection and stem profile measurements. After manual adjustments for stem quality and height, lidar-derived estimates of average stand value and log product yields were within 7% of actual estimates. Differences were noted between stand types and markets. Suggestions for future research are provided.

US Forest Service bark beetle research in the western United States: Looking toward the future. Negron, Jose F., Bentz, Barbara J., Fettig, Christopher J., Gillette, Nancy; Hansen, E. Matthew; Hayes, Jane L.; Kelsey, Rick G., Lundquist, John E., Lynch, Ann M., Progar, Robert A., Seybold, Steven J. 2008 Source: Journal of Forestry. 106(6): 325-331.

Abstract

Bark beetles cause extensive tree mortality in coniferous forests of western North America and play an important role in the disturbance ecology of these ecosystems. Recently, elevated populations of bark beetles have been observed in all conifer forest types across the western United States. This has heightened public awareness of the issue and triggered legislation for increased funding for state and federal agencies to address issues associated with bark beetle outbreaks. Recently, US Forest Service, Research and Development entomologists from the western research stations met with US Forest Service, State and Private Forestry, Forest Health Protection entomologists, our primary stakeholder, to identify bark beetle research priorities. These include vegetation management; ecological, economic, and social consequences of outbreaks; fire and bark beetle interactions; effects of climate change on bark beetle populations; and chemical ecology.

On-line

<http://www.treesearch.fs.fed.us/pubs/30829tions; and chemical ecology>



Abstracts and Publications cont.

A guide to LIDAR data acquisition and processing for the forests of the Pacific Northwest. Gatziolis, Demetrios; Andersen, Hans-Erik. 2008. Gen. Tech. Rep. PNW-GTR-768. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 32 p.

Abstract

Description: Light detection and ranging (LIDAR) is an emerging remote-sensing technology with promising potential to assist in mapping, monitoring, and assessment of forest resources. Continuous technological advancement and substantial reductions in data acquisition cost have enabled acquisition of laser data over entire states and regions. These developments have triggered an explosion of interest in LIDAR technology. Despite a growing body of peer-reviewed literature documenting the merits of LIDAR for forest assessment, management, and planning, there seems to be little information describing in detail the acquisition, quality assessment, and processing of laser data for forestry applications. This report addresses this information deficit by providing a foundational knowledge base containing answers to the most frequently asked questions.

On-line

<http://www.treesearch.fs.fed.us/pubs/30652>



Upcoming Meetings and Events

March 5, 2009. Preparing for the Carbon Market: Forestry Offsets.

Sheraton Portland Airport Hotel, Portland, Oregon.

<http://www.westernforestry.org>

March 9, 2009. Forest Practice and Ecosystem Processes Affecting Soil Carbon Storage and Organic Matter Turnover. Northwest Forest Soils Council – Winter Technical Meeting 2009.

Gifford Pinchot National Forest Headquarters, Vancouver, WA.

<http://soilslab.cfr.washington.edu/nwfsc/>

April 20-21, 2009. SMC's Annual Spring Meeting.

Little Creek Casino
Kamilleche, WA.

May 26 - 29, 2009. 13th Symposium on Systems Analysis in Forest Resources SSA FR09 Announcement and Call for Presentations.

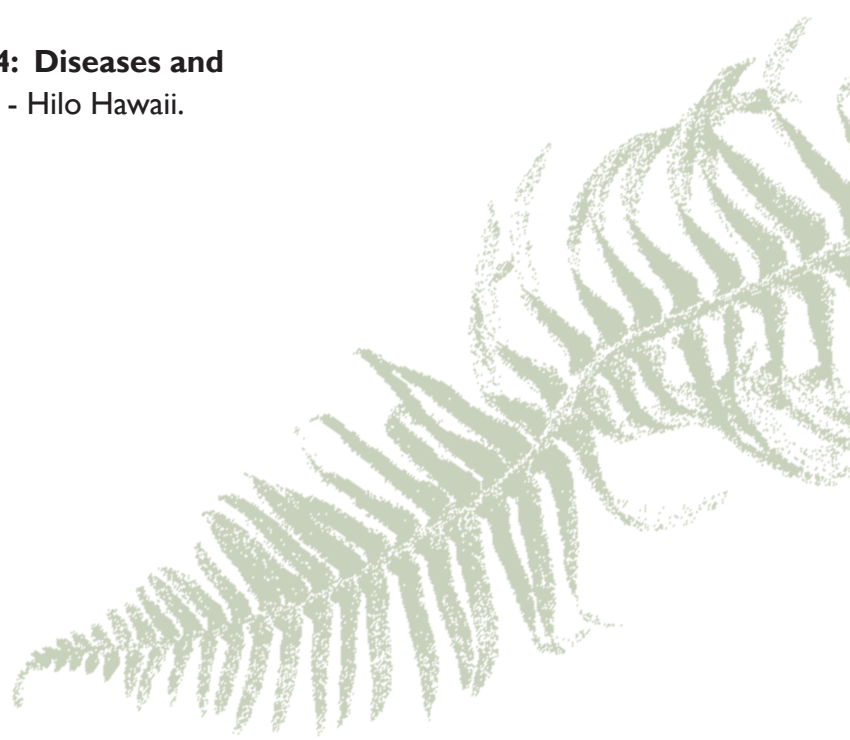
Francis Marion Hotel Charleston, South Carolina.

<http://www.safnet.org/meetings/othermeetings.cfm>

July 10-17, 2009. IUFRO Working Party 7.03.04: Diseases and Insects in Forest Nurseries.

Hilo Hawaiian Hotel - Hilo Hawaii.

<http://www.westernforestry.org>



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