



L.W. Schatz Demonstration Tree Farm 2015 Annual Report

2015 Annual Report

Carbon, Water-use, and Regeneration after Variable-density Retention in Evergreen Mixed-conifers

Inside this issue:

Carbon, Water-use, and Regeneration after Variable-density Retention in Evergreen Mixed-conifers	1
Research at the Tree Farm in 2015	3
Anticipated Research Projects for 2016	3
Summer Operations and Maintenance in 2015	4
Tree Farm as an educational tool	4
Forestry Advisory Committee and HSU President Visit the Tree Farm	5
Staff & contact information	6

In late 2014 Department of Forestry and Wildland Resources faculty collaborated to develop a multi-disciplinary project at the L.W. Schatz Demonstration Tree Farm. Preliminary work for the project, “Carbon, Water-use, and Regeneration after Variable-density Retention in Evergreen Mixed-conifers” began in 2014. In the last months of 2014 the Silviculture class selectively harvested the study site. The trees were harvested using a variable-density retention prescription. By 2015 the project was well underway with a team of researchers, undergraduates and faculty beginning the first year of the two year project to evaluate the ecosystem services and effects of the variable density retention treatment. Since the start of the project over one hundred students, faculty and researchers have participated in the project.

2015 Project Quick Stats

- 6 Faculty Members
- 2 Graduate Students
- 100+ Undergraduate Students
- 5 Classes: Silviculture, Forest Restoration, Silvics, Forest Measurements and Forest and Range Soils

During this first year field research was initiated to study the regeneration, understory light, tree growth and carbon storage, soil carbon content, soil moisture, and tree water use at the study site.

In spring 2015 the Forest Restoration class planted redwood and Douglas-fir seedlings in three patches, with low, medium, and high canopy openness, representing no, moderate, and heavy harvest treatments. Following the planting the Silvics class measured the basal diameter on all of the seedlings.



Seedling planted at the study site

Dr. Aaron Hohl stem-mapped all of the trees in the treatment area and a portion of the trees in the control area to estimate above ground carbon storage. Carbon calculations for the site were developed to generate the estimates of above ground carbon. Dr. Susan Marshall and her graduate student Hollie Ernest and multiple undergraduates began collecting data on below-ground organic car-

Continued on page 2

Carbon, Water-use, and Regeneration after Variable-density Retention in Evergreen Mixed-conifers (continued from page 1)



Dr. Susan Marshall and Hollie Ernest in one of the trenches



Wade Polda helping measure growth and water potential in redwood and Douglas-fir seedlings



Dr. Pascal Berrill and student in FOR 431-Forest Restoration planting seedlings.

bon. Two trenches were excavated to one meter at the project site. Soil samples were taken on a grid system from the trench and data collected on organic matter content (loss on ignition), bulk density, gravimetric water content, root weights and proximity to forest vegetation.

Dr. Andrew Stubblefield and his graduate student Kirsten Reddy installed 60 trees with sapflow probes in the thinned and unthinned Douglas Fir stands. The data from the probes will be used to quantify forest stand water use. The probes and associated dataloggers and solar power systems have been collecting continuous data since April 2015.

Dr. Lucy Kerhoulas and undergraduate senior Wade Polda (Biology Department, Botany Major) measured water potential in the redwood and Douglas-fir seedlings throughout the entire growing season and measured seedling height and basal diameter at end of growing season. Initial results showed that in the patch with the greatest canopy openness, seedlings of both species were significantly less water stressed compared to seedlings in the medium and low canopy openness patches. This suggests that heavy harvests with low density retention produce the best growth and health of the next cohort. The coast redwood seedlings were significantly less water stressed compared to the Douglas-fir seedlings but also grew significantly less than Douglas-fir seedlings. This was likely due to reduced stomatal conductance and photosynthesis to conserve water.

Dr. David Greene with the help of undergraduate Forestry student Larry Breshears conducted germination surveys along linear transects to study the sexual recruitment within the treatment and control areas. The sexual regeneration was dominated by Douglas-fir and grand fir. Douglas-fir showed much higher subsequent summer mortality than grand fir. The germinants provided adequate stocking in the harvested area; while in the adjacent control areas the regeneration density was 20 times lower and was composed solely of the more shade tolerant grand fir.

This project is not only producing significant research on the ecosystem effects of variable density retention forestry treatments but is also providing unique opportunities for faculty and students. Undergraduate and graduate students have received training and hands-on research experience through participation in the project. Faculty in the department have been able to develop their own research and collaborate throughout the project. The project will continue for another year of field measurements in 2016.

Research at the Tree Farm in 2015

Investigating the Potential for Forest Thinning to Augment Summer Flows in Northern California Watersheds

Dr. Andrew Stubblefield and graduate student Kirsten Reddy installed sapflow probes to collect data on forest stand water use in thinned and unthinned Douglas Fir stands at the Tree Farm. This research is a component of the multi-disciplinary project detailed on page 1.

Root:Shoot Biomass

Dr. Pascal Berrill and his graduate student Walter Kast continued work on the root:shoot biomass project researching relationships between above ground biomass, and below ground root biomass for three local tree species. Saplings were planted in two separate research plots by previous students in the Forestry program. Results so far show promising relationships from



Crown Widths and sapling stem diameter to predict below ground mass. Currently work involves creating linear equations for each species to determine the amount of root biomass broken from the saplings during excavation.

Left: The Root:Shoot biomass study site, Right: excavated seedling

Research Projects Anticipated for 2016

Epiphyte diversity and water exchange within bigleaf maple crowns

Dr. Lucy Kerhoulas will begin studying and quantifying epiphyte communities in bigleaf maple trees at the Tree Farm. The study will also investigate water exchange between epiphytes and host trees and how this resource sharing may influence plant physiology.

Investigating the Potential for Forest Thinning to Augment Summer Flows in Northern California Watersheds

Dr. Andrew Stubblefield and graduate student Kirsten Reddy will continue their work investigating the impact of forest thinning on dry season flows in small streams and creeks in Humboldt County. This research is a component of the collaborative project (see below).

Carbon, Water-use, and Regeneration after Variable-density Retention in Evergreen Mixed-conifers

The multi-year, collaborative project examining the impact of variable-density Retention in Evergreen Mixed-conifers on carbon storage, water use and regeneration will continue field measurements for a second season. The carbon content of forest soils, duff, litter, logging slash and standing and downed trees will also be measured in 2016.

Summer Operations and Maintenance in 2015

As in past summers, significant maintenance and improvement projects were done over the summer in 2015. Forestry students, Larry Breshears and Jacob Monroe were the 2015 summer maintenance crew, along with Gordon Schatz, Tree Farm Manager.

The Tree Farm building was painted in the late summer of 2015. General maintenance of the facility was conducted including mowing, cleaning and landscaping of the surrounding area. The saws and other power equipment were brought into town for annual maintenance.

A significant amount of maintenance was conducted on the Tree Farm acreage. Storm debris and downed trees were cleared from roads, trails and culverts. The roads and turnout were mowed and trails were brush cut. Trees were also pruned and brush removed along road-sides to improve visibility.

Tree Farm as Educational Tool



Students in FOR 431—Forest Restoration planting seedlings

FOR 331: Silvics, FOR 431: Forest Restoration

Multiple classes participated in the research associated with the Carbon, Water-use, and Regeneration after Variable-density Retention in Evergreen Mixed-conifers project. During spring 2015 the Forest Restoration class planted 15 Douglas-fir and 15 coast redwood seedlings in three patches, for a total of 45 seedlings per species. Following the planting, the Silvics class measured the seedling height, basal diameter and water potential (a measure of water stress) at the beginning of the first growing season.

SOIL 460: Forest & Range Soils Management

Following the variable density retention thinning, students in SOIL 460 began a soil survey of the research plot. The soil survey provided baseline information for the conditions of the plot at the commencement of research. Since there are multiple research projects being done on this plot (water stress, pollination, regeneration of trees, variable density retention methods) they will all benefit from this information. Students produced a professional style report based on the soils data gathered at the research plot.

Forestry Advisory Committee and HSU President Visit the Tree Farm

In September 2015 the Forestry Advisory Committee visited the L.W. Schatz Demonstration Tree Farm with Humboldt State University President Lisa Rossbacher. The group also included the Forestry & Wildland Resources Department faculty and College of Natural Resources and Sciences Dean Steve Smith. The mission of the Forestry Advisory Committee (FAC) is to support and promote the Forestry Program as part of the Forestry & Wildland Resources Department at HSU. The committee is made up of a cross-section of representatives from industry, federal and state agencies, alumni, and Native American Tribes.

The trip served as an opportunity for President Rossbacher to learn about programs, opportunities and research at the

Tree Farm. The tour included an overview of Schatz Tree Farm property as well as a chance to meet Gordon Schatz, the on-site Tree Farm Manager. The group also toured and viewed the experimental variable retention harvest area.

The trip also allowed for members of the FAC to discuss of HSU's role in training the next generation of Registered Professional Foresters (RPFs). The group discussed the regional and state economic importance of the Forestry Products Industry and California forest landowners with President Rossbacher. The tour culminated in lunch and an open discussion with the Advisory Committee about the forest products industry, forest landowners, and the importance of forestry education.



From left to right: Faculty, President Rossbacher and the FAC tour one of the research sites. Dr. Lucy Kerhoulas discusses her research measuring the water stress of seedlings at the research site. President Rossbacher and the FAC have lunch and discuss forestry issues.

Contact Information

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L.W. Schatz Demonstration Tree Farm

The L.W. Schatz Demonstration Tree Farm's mission is to provide a demonstration tree farm operation for the benefit of the students and faculty of Humboldt State University and as an example for owners of small timberland parcels. The Tree Farm enables experimentation and research regarding the growing, harvesting, and replacement of trees on timberland. The Tree Farm aims to utilize as many square feet as practical for production of commercial wood crops. The Tree Farm serves as an outdoor classroom for educational purposes and also enables public educational assistance to landowners through publications, photos, lectures, symposia, and tours.



Department of Forestry & Wildland Resources

Tree Farm Advisory Committee

David Greene, Chair, Department of
Forestry and Wildland Resources

Steve Smith, Dean, College of Natural
Resources and Sciences

Pascal Berrill, Assistant Professor, De-
partment of Forestry and Wildland
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Tree Farm Staff

Gordon Schatz, Tree Farm Manager
George Pease, Technician
Sara Hanna, Research Associate and
Coordinator

Larry Breshears, summer crew
Jacob Monroe, summer crew

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