CAFS University of Washington Site Update

The Stand Management Cooperative (SMC)

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History: SMC has it's roots in RFNRP

- 1969 the Regional Forest Nutrition Research Project (RFNRP) was established to address how the forest industry and the forest related public agencies can achieve more efficient utilization and productivity of forest land
  - 28 members, 3 public, 25 private
  - The goal was $100,000 per year for a six-year forest fertilization project to finance the installation, measurement, analysis and reporting of 720 Douglas-fir plots and 288 western hemlock plots and to support graduate student research

Formation of the Stand Mgt. Co-op

- 1984 the University of Washington is selected as the host institute for the Stand Management Cooperative (SMC) to broaden and build on the RFNRP's cooperative research
- The SMC is composed of forest industry, state, provincial, and federal agencies, suppliers, and universities and other institutions who commit resources and expertise to the mission.
- The voting Policy Committee, composed of dues-paying members, controls policy with the goal of establishing the highest possible technical standards in carrying out its mission.

Current SMC Members

- American Forest Management
- B.C. Ministry of Forests
- Campbell Global
- Hampton Affiliates
- Manulife
- Nuveen Natural Capitol
- Oregon Department of Forestry
- Pacific Denkman
- Quinault DNR
- Rayonier Forest Resources
- Stimson Lumber
- Washington DNR
- Weyerhaeuser

SMC: Raison d'être

- Vision
  - To be the preeminent provider of silvicultural research information and analysis in the Pacific Northwest through the ongoing development of quality silvicultural and wood quality research information, by providing leadership and promotion of collaborative research synthesis throughout the region for the purposes of furthering global competitiveness of the forest products sector and improving environmental benefits to society.
- Mission
  - To provide a continuing source of high-quality information on the long-term effects of silvicultural treatments and treatment regimes on stand and tree growth and development and on wood and product quality.
- Objectives
  - Design & establish field research installations and conduct technology transfer to assist in the application of information gained from the research

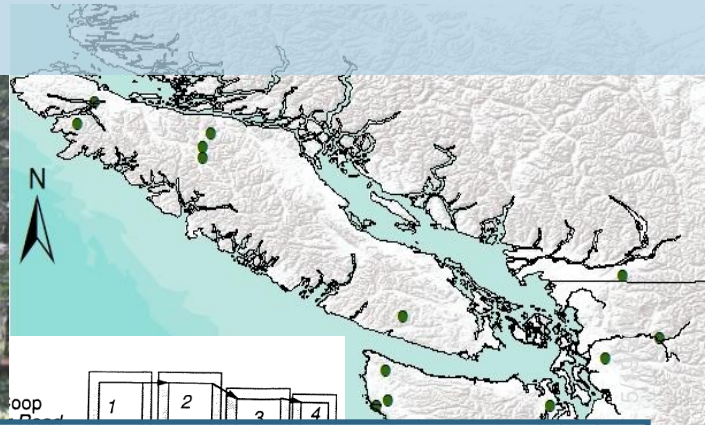
The Stand Management Cooperative is …

A field laboratory for the Pacific Northwest

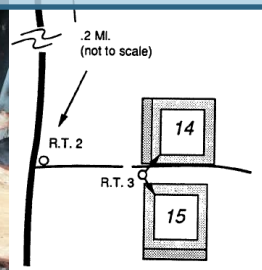
Research

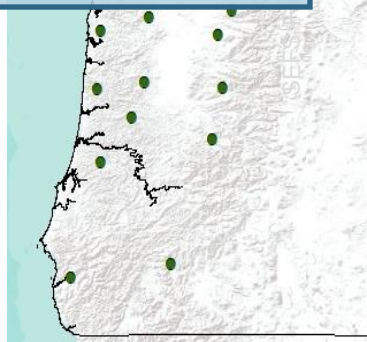
OUR BIGGEST PROJECTS/INSTALLATIONS

Spacing, Thinning, Fertilization Experiment (Type I: 1970s cohort)



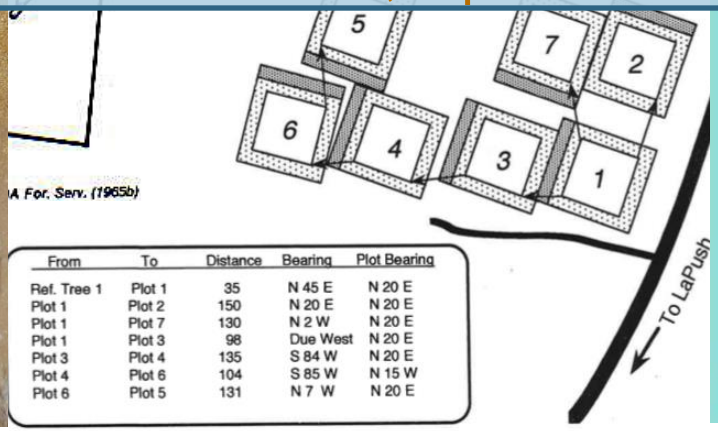
Biomass research objectives are to understand how tree dimensions, stand structure and other growing environment attributes (soil, topography, climate,…) influence biomass allocation to tree components



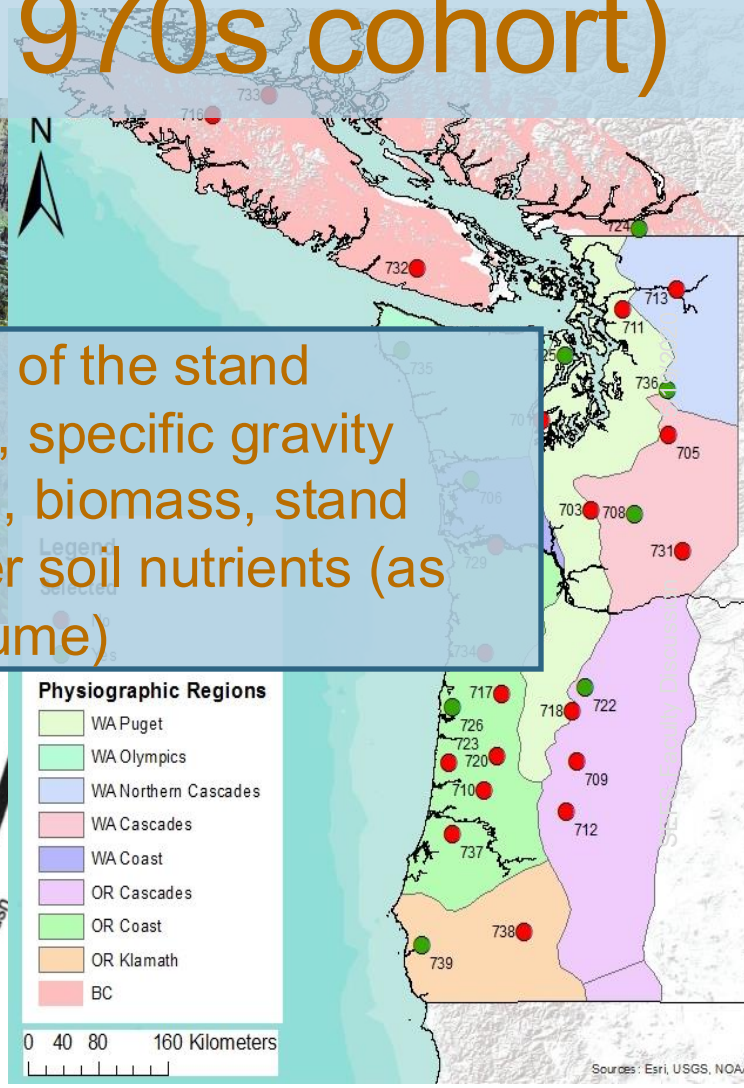


Spacing, Thinning, Fertilization Experiment (Type I: 1970s cohort)

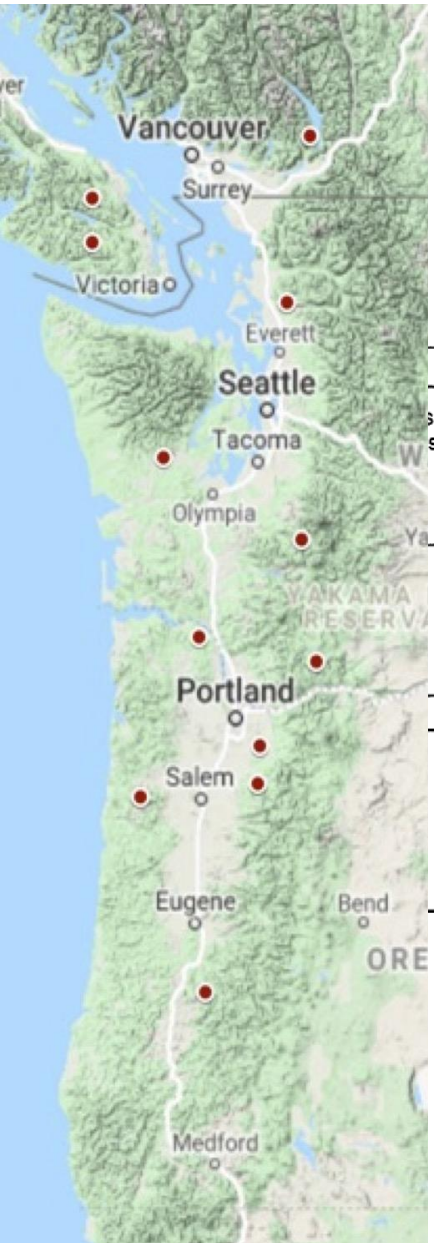
The "Sunset Project" – Examine effects of the stand treatments on branch and knot indexes, specific gravity (wood density) & other wood properties, biomass, stand mortality, soil carbon, nitrogen and other soil nutrients (as well as the usual tree form, taper & volume)

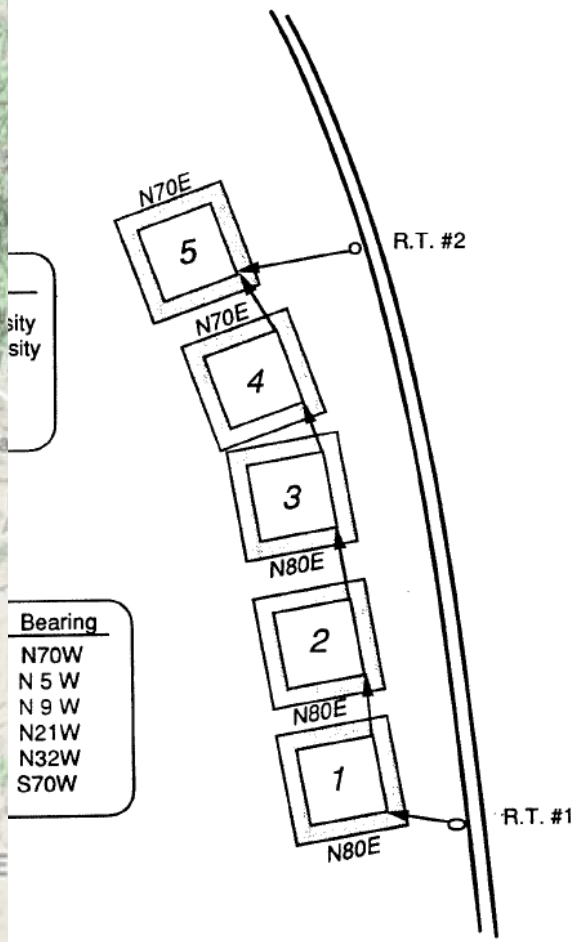


From	To	Distance	Bearing	Plot Bearing
Ref. Tree 1	Plot 1	35	N 45 E	N 20 E
Plot 1	Plot 2	150	N 20 E	N 20 E
Plot 1	Plot 7	130	N 2 W	N 20 E
Plot 1	Plot 3	98	Due West	N 20 E
Plot 3	Plot 4	135	S 84 W	N 20 E
Plot 4	Plot 6	104	S 85 W	N 15 W
Plot 6	Plot 5	131	N 7 W	N 20 E



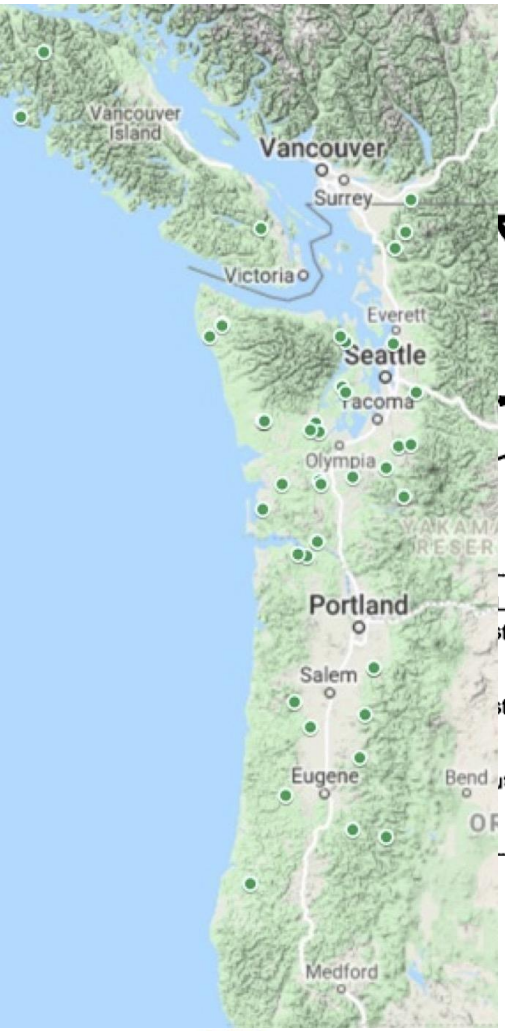
Commercial thinning Exp. (Type II: 1950s cohort)

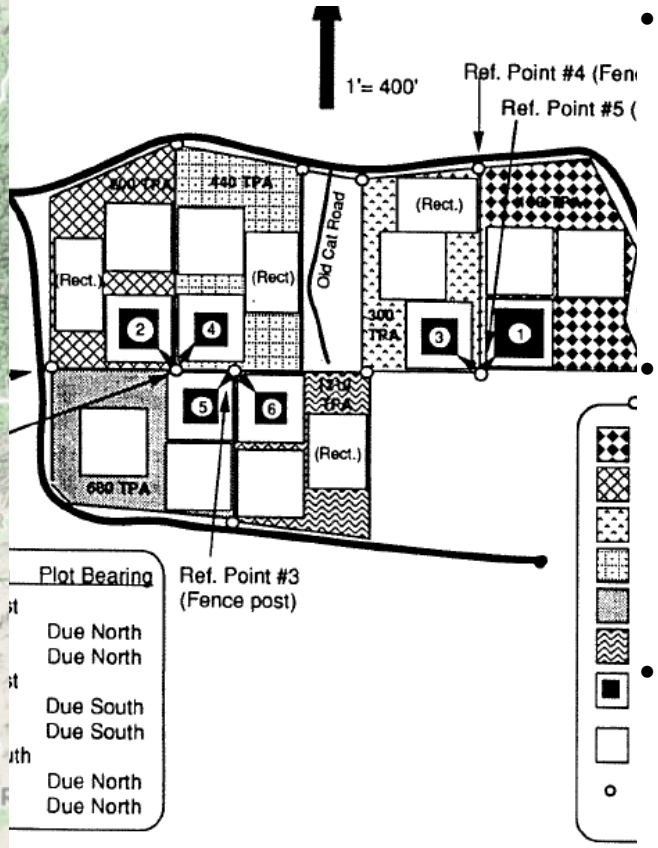




- Established between 1986 and 1991 in Douglas-fir plantations that were approaching commercial thinning stage and considered to approximate the expected future condition of the Type I installations
- Five plots, one unthinned control and four following thinning regimes based on Curtis' relative density constitute the treatments
- Originally, 12 installations, 60 plots; currently 4 installations, 20 plots

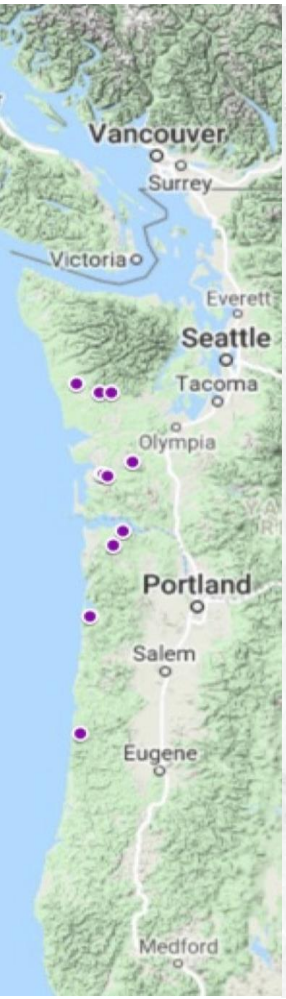
Planting Density & PCT Experiment
(Type III: 1980s & ‘90s cohort)

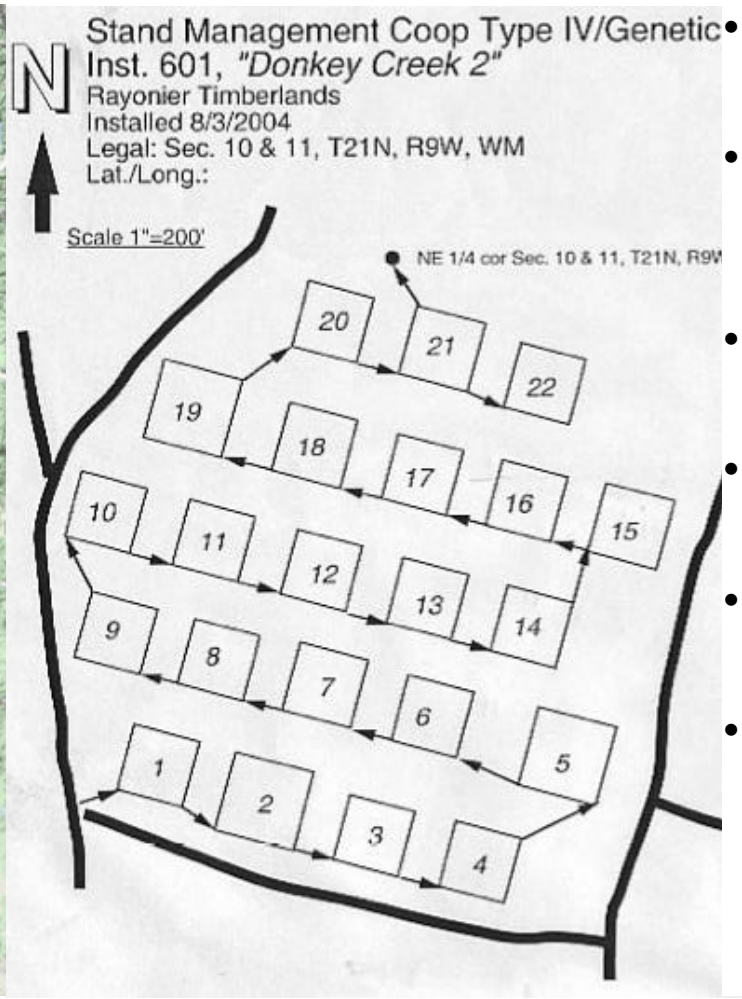




- Planted between 1985 and 2001 with the best current regeneration practices at 100, 200, 300, 440, 680, and 1210, stems per acre. Plantings were at least 3 acres per spacing to provide experimental material for future research.
- A control measurement sample plot was established in each spacing. In the three widest spacings additional plots were established to create a matrix of density x Pre-commercial thinning
- 47 installations; of which 38 are Douglas-fir, 6 are western hemlock, and 3 with a 50/50 mix of Douglas-fir and western hemlock. Collectively they have 564 plots.

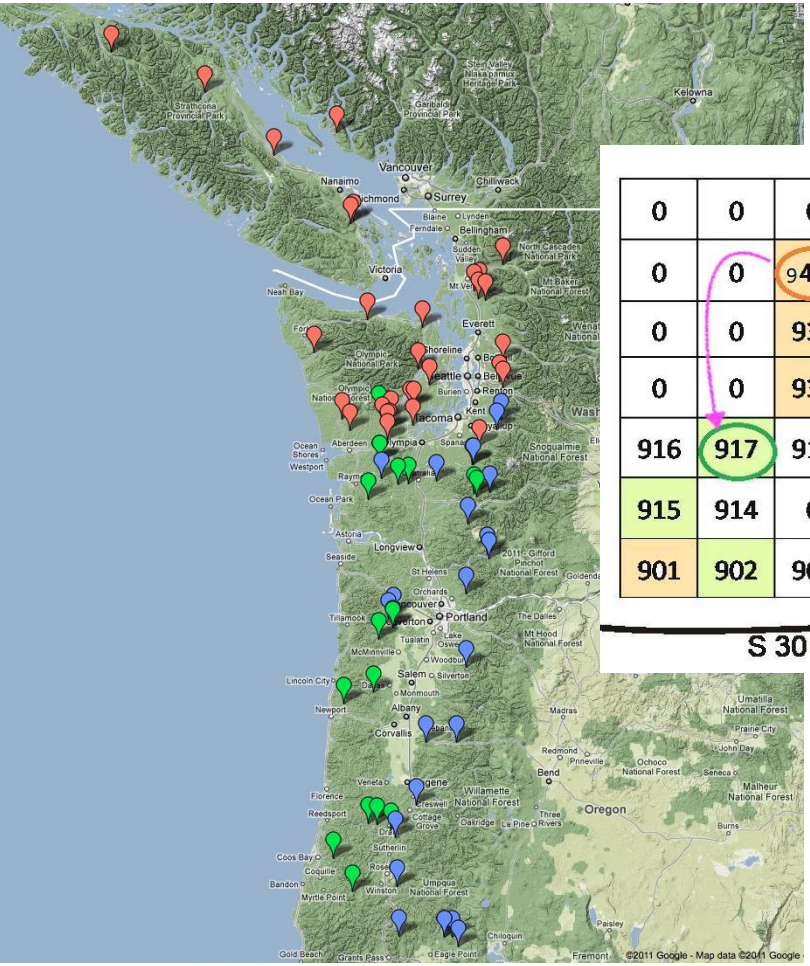
Gen. Gain/Spacing (Type IV: 2000, 2010s cohort)





- Realized genetic gain trials run jointly with Northwest Tree Improvement Cooperative
- Douglas-fir trials planted in 2005 and 2006, in which different spacings are tested: 7x7, 10x10, and 15x15
- Vegetation control levels are current practice and complete until crown closure
- Temperature, precipitation gages and lysimeters at each installation
- Six installations, 132 plots in the Grays Harbor breeding zone
- Western hemlock trials planted in 2017 and 2018 using two gain levels "improved" and "woods run." Eight (8) installations, 32 plots across WA and OR

SPM, Soil Type Effects on Tree, Stand Nutrition Exp. (Type V)

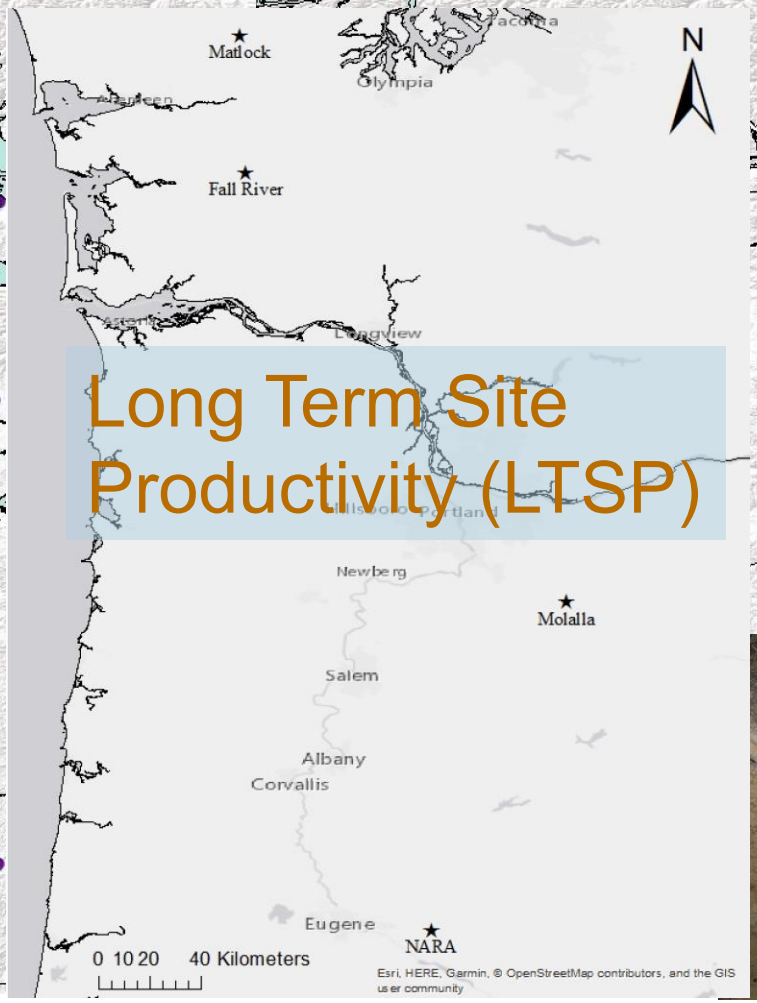


0	0	0	945	946	947	9
0	0	944	943	942	941	9
0	0	931	932	933	934	9
0	0	930	929	928	927	9
916	917	918	919	920	921	9
915	914	0	913	912	911	9
901	902	903	904	905	906	9

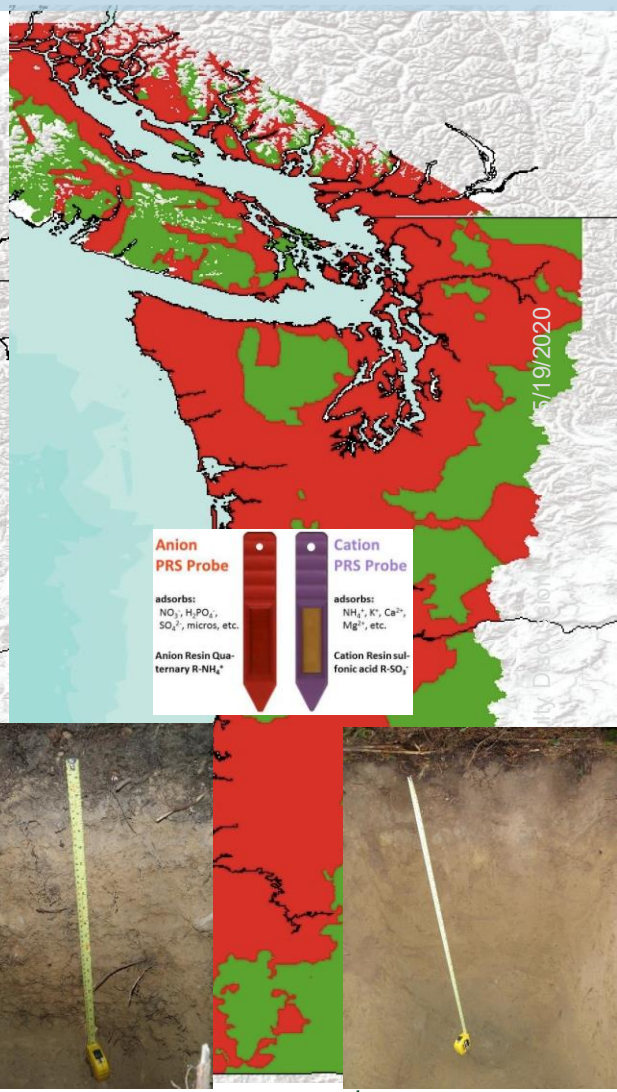
S 30 E

- Established between 2008 and 2011 in Douglas-fir plantations using paired-trees to study response after mid-rotation fertilization. There are two treatments, 0 and 224 Kg N/ha as urea as a single-tree fertilization
- Purpose is to study the climate, soil, and physiographic factors that affect fertilization response in basal area, height, and volume
- Each installation has 12-20 tree pairs, soil moisture and temperature sensors, and precipitation gauges
- There are 73 installations in total

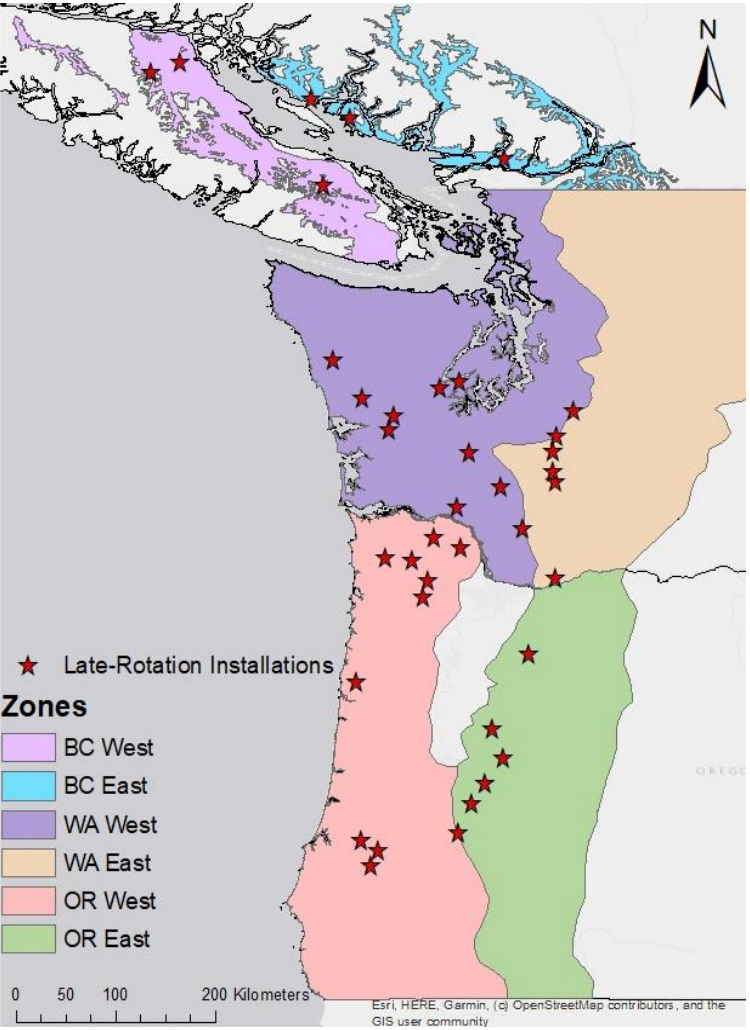
SPM, Soil Type Effects on Tree, Stand Nutrition Exp. (Type V)



Long Term Site Productivity (LTSP)



Paired-plot Late-rotation Fert. Exp. (Type VI)



- Established between 2016 and 2018 in Douglas-fir plantations using paired-plots
- Purpose is to study the effects of late-rotation fertilization on tree and stand responses in yield and other characteristics including carbon and wood quality
- Two treatments, 0 and 224 Kg N/ha as urea
- Installed in stratified random sampling fashion, allocating sites proportionally to regional timberland area among four ecoregions in the US and two ecoregions in BC
- Thirty six (36) sites total (30 in WA & OR, 6 in BC).

The CAFS UW Site (SMC) Partners

The CAFS UW Site (Stand Mgt. Co-op)

Since SMC began …

25 PhD's awarded for SMC research projects

74 Masters degrees awarded for SMC research projects

57+ Undergraduates field research experiences & Senior capstones

Cooperative

SILVICULTURE ▪ NUTRITION
WOOD QUALITY ▪ MODELING

CAFS University of Washington Site Some Current Projects

- CAFS Project 20.82 – Deconstructing Site Index: Updated Height over Age Curves for Douglas-fir, Western Hemlock, and Mixed Stands
- CAFS Project 20.84 – Physiologic Response to Commercial Fertilization Programs in Pacific Northwest Forest Plantations
- CAFS Project 16.69 – Stand and Tree Responses to Late-Rotation Fertilization
- CAFS UW Site Project (SMC) – Type V wh

CAFS Univ. WA Site – Current Projects

Single Stand

Location:

Latitude [42.0,49.0]:

45.6

Longitude [-124.65,-119.9]:

-123.45

Species:

- ○ Douglas-fir
- ◉ Western hemlock
- ○ Mixed hem-fir

Initial Condition:

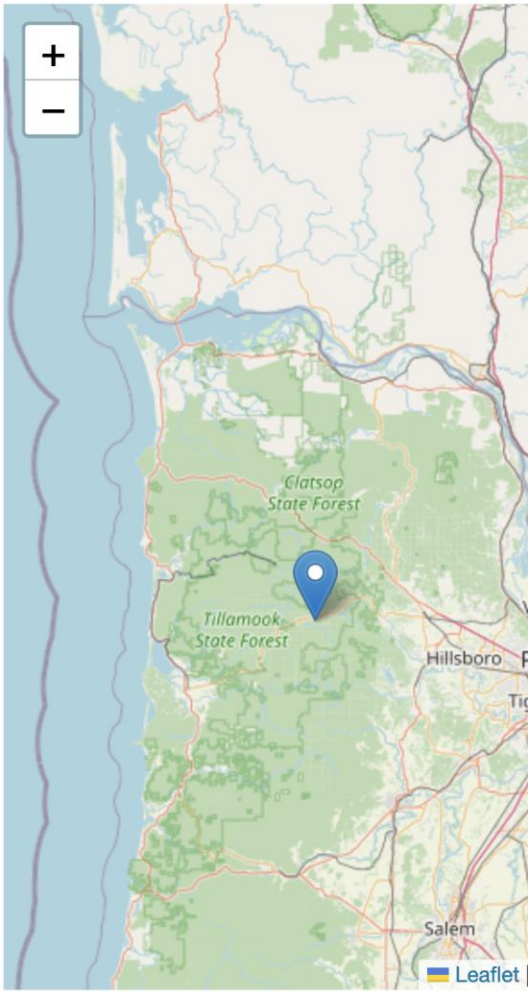
Planting Density (200 - 900):

440

☐ **Measurement Data:**

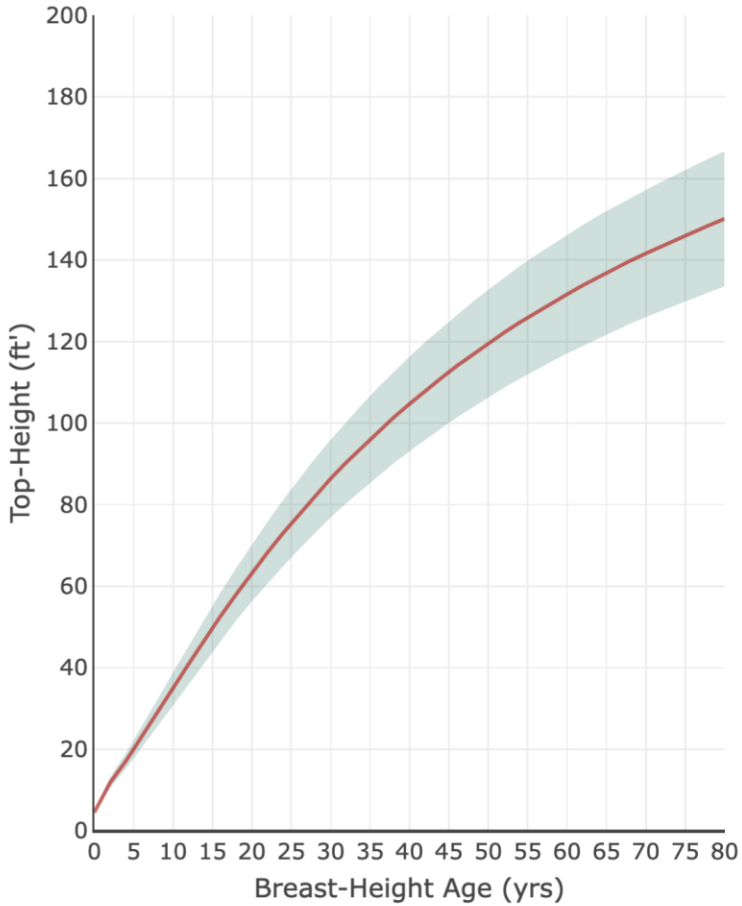
Submit Reset

Mapped Location:



Predicted Top Height by Breast-Height Age

with prediction error invterval



Strategic Planning Process

- Policy Committee
  - Reviews and approves Strategic Plan
- Strategic Planning Committee
  - periodic review of mission, goals, & objectives
  - develop outlook & priorities of future needs of members
- TAC's
  - Develop experimental designs, field measurement protocols, etc.
  - Develop research plans, proposals for external funding, etc.
  - Develop appropriate collaborations with other cooperatives
- Idea Generation & Future Needs Assessment
  - From members, TAC's, etc.

Strategically Planned Project List

Project #	What is your organization	Total
1	Multi-Type analyses - Synthesis of results across all Type I and III installations	29
8	Carbon sequestration and modeling in intensively managed plantations	20
11	Understand how genetics influences product yields, site index, and wood quality	16
3	Analyze Type I thin and fertilization interactions - Summarize growth & yield; predictability from soils, knot changes, acoustics	15
7	Map soil productivity - Combine PRS soil probe data into shapefile to create raster product of soil nutrition	14
10	Develop alternative measures of site productivity, examine hybrid approaches and climate change	14
5	WH Grouped-Tree Fertilization Study	13
9	Model volume growth and wood quality including treatment, climate, and soil effects; add to extant models	13
4	Modeling fertilization response according to climate, site, and soil variables; Type V and VI	11
2	Geo-reference SMC installations	10
6	Type I sunset - Gather tree measurement, wood quality, and soil samples on sunset installations	10

The CAFS UW Site Team

- Jason Cross: Mathematician, Silviculture Analyst
- Joe Dahlen: Wood Quality Project Lead
- Kim Littke: Nutrition Project Lead
- Doug Mainwaring: Modeling Project Lead
- Eric Turnblom: Silviculture Project Lead, Site Dir.
- Julie Larson: Affiliated Faculty Member
  - Rachel A. Woods Professor of Regeneration Ecology

Continued Motivation for CAFS UW Site (SMC) Membership

The cost of establishing and maintaining long-term research on the scale necessary to build an adequate regional database and understanding is beyond the capabilities of any single organization

- Needed are reliable estimates of response to silvicultural treatments and management regimes, understanding of how product quality and value are influenced by these treatments and regimes, and methods for designing regimes that will produce high yields of wood with desirable properties
- This goal can only be met through a cooperative effort of land owners, processors, research agencies, and universities. The SMC was formed to create the pool of funding, scientific talent, and long term continuity necessary to achieve this mission