



Center for Intensive Planted-forest Silviculture

- Established: 2007
- Director: Temesgen Hailemariam
- Staff: Doug Mainwaring, Sukhyun Joo
- Funding: Dues +
 - Current operating expenses ~140% of annual operating income from dues
- Field sites: none prior to 2024
- Primary objective:
 - Produce decision support tools for intensive management of Douglas-fir and western hemlock
- **Vision statement:**
 - ***Coordinating, facilitating, and conducting collaborative research between existing cooperatives, institutions, and researchers*** in a manner that synthesizes long-term and interactive effects of all possible treatments constituting a silvicultural regime; collaborative research is intended to include data sharing, collaborative analysis, and modeling, joint and complementary research on field installations; and partnerships for procuring external funding.



Membership

Representing ~7.3 million acres of intensively managed timberlands in western Oregon and Washington

- ~~Bureau of Land Management~~
- Campbell Global
- Green Diamond Resource Company
- Nuveen
- Manulife
- Lone Rock Timber
- Oregon Department of Forestry
- Port Blakely Tree Farms
- Rayonier
- Roseburg Forest Products
- Sierra Pacific
- Starker Forests
- Stimson Lumber Company
- Washington Department of Natural Resources
- Weyerhaeuser Company



Collaborative Research

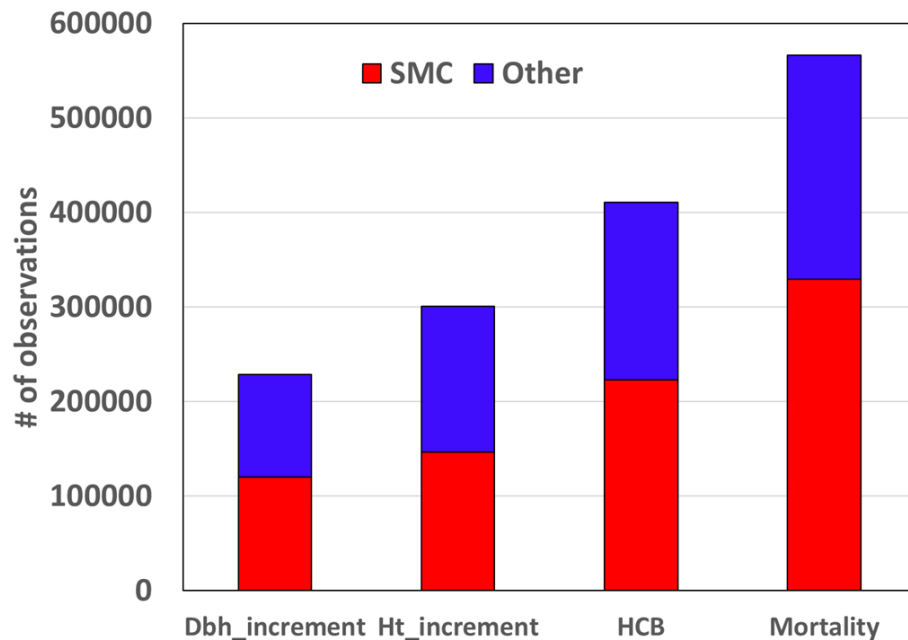
- Stand Management Cooperative (SMC, University of Washington)
- Vegetation Management Research Cooperative (VMRC)
- Swiss Needle Cast Cooperative (SNCC)
- Northwest Tree Improvement Cooperative (NWTIC)
- Hardwood Silviculture Cooperative (HSC)
- Intermountain Forestry Cooperative (IFC, UI)



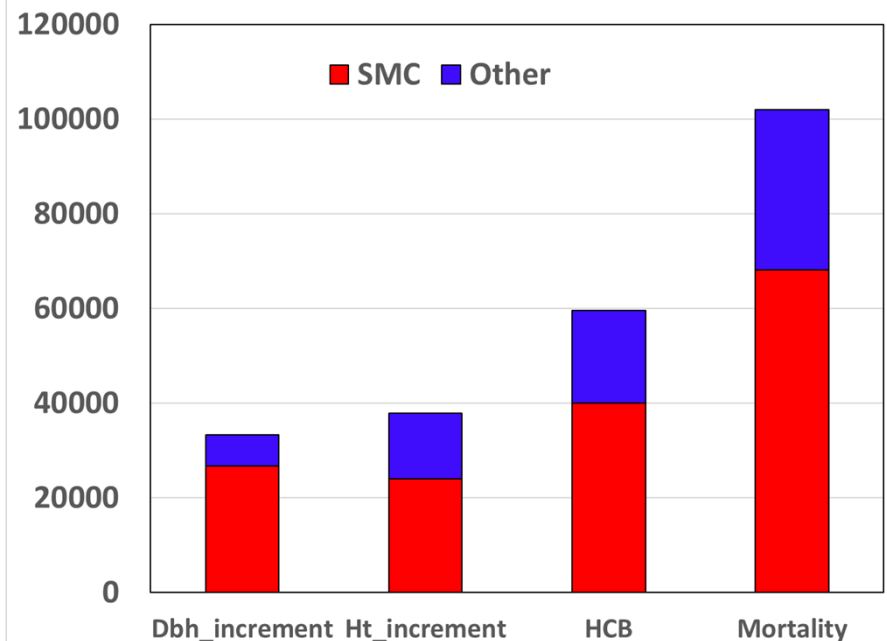
Collaborative partnerships, SMC

- **SMC: Database access in return for access to our products**

Douglas-fir dataset



Western hemlock dataset

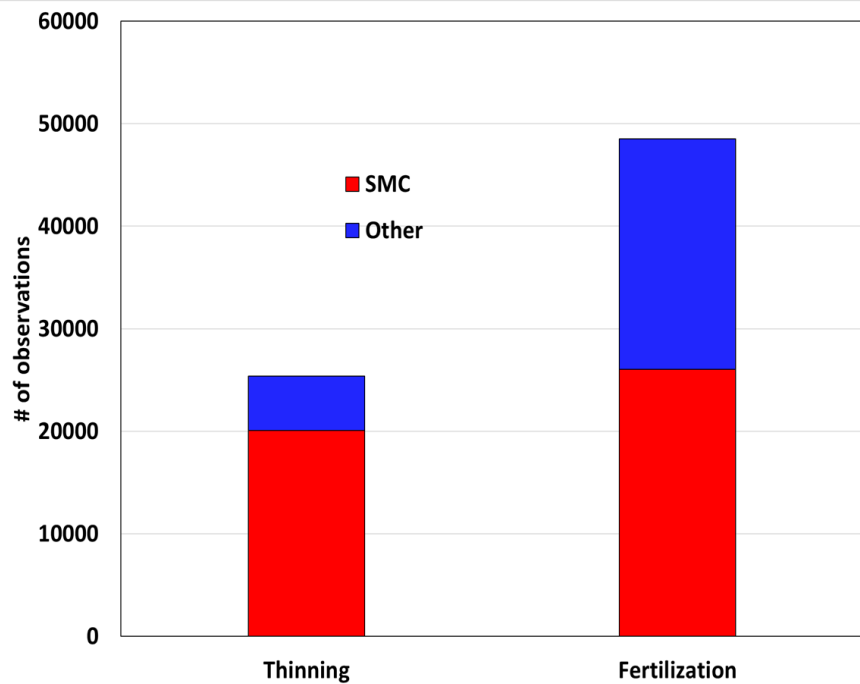




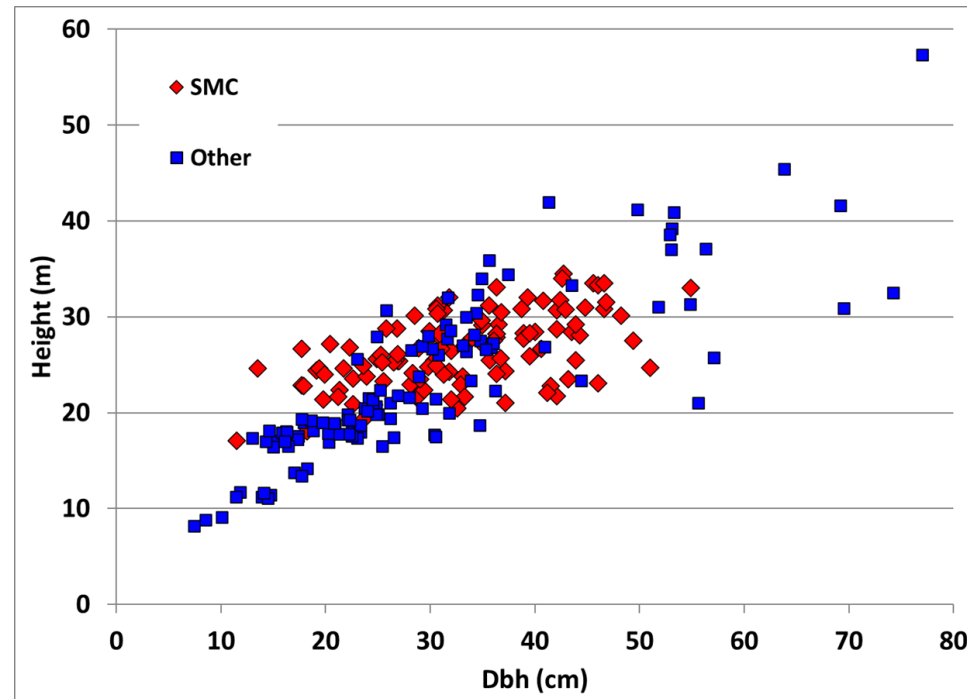
Collaborative partnerships, SMC

- **SMC: Database access in return for access to our products**

DF and WH treatment modifiers



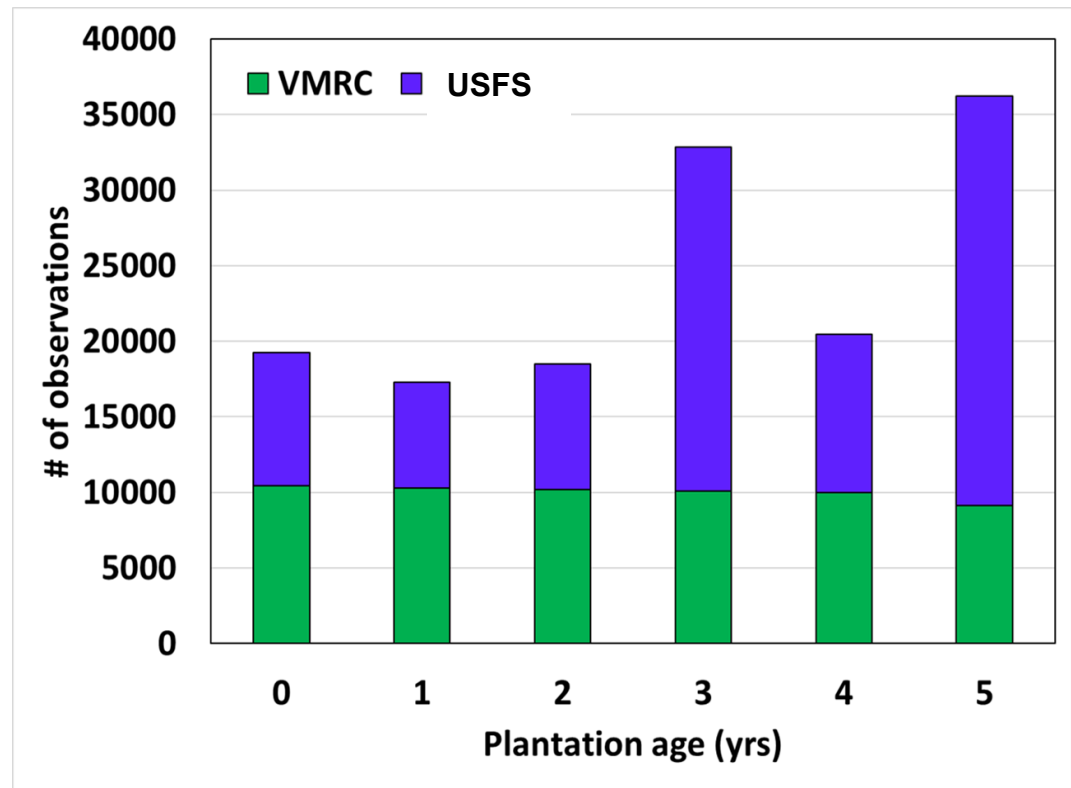
Douglas-fir biomass





Collaborative partnerships, VMRC and USFS

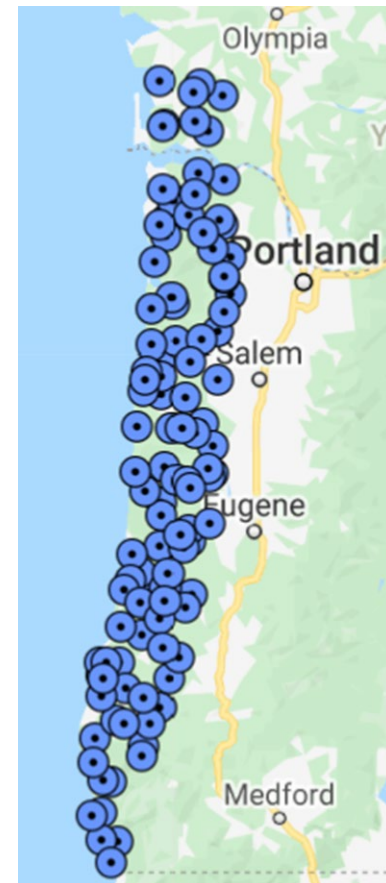
- Young stand data to establish growth of young plantations; influence of weed cover
- VMRC: Dataset access from Robin/Eric and Carlos/Max
- USFS: LTSP site data (Matlock, Molalla, and Fall River)





Collaborative partnerships, SNC

- **SNC: Analysis of monitoring plot network; full dataset access**
 - SNC growth impact plot network (1998-2008)
 - New research plot network (est. 2013) also provides a Coast Range CIPSANON validation plot network
 - ORGANON diameter and height increment modifiers (2014 and 2020)
 - SNC Taper effects (2015)





5-year strategic plan priorities

- Site/regional specificity within CIPSANON
- Validation/calibration of CIPSANON components
- Diameter productivity within CIPSANON
- Maximum carrying capacity in improved DF stands
- Operational plantation representation within CIPSANON
- Site index estimation improvement from remote sensing, regional data
- Continued validation of genetic gain multipliers
- Effect of silvicultural treatment on tree taper
- Using SAE, deep learning, and remote sensing to improve stand metrics
- Generating a validation plot network
- Error and sensitivity analysis of CIPSANON



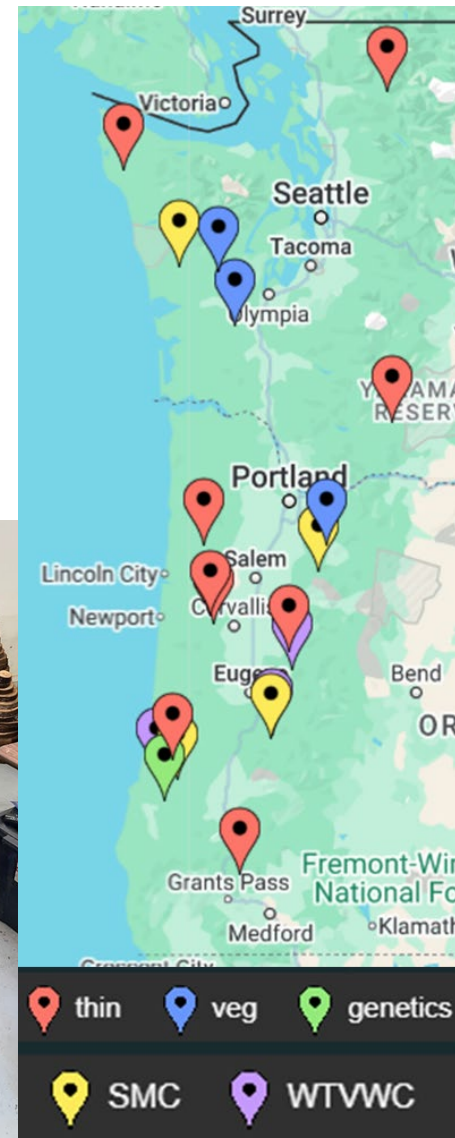
5-year strategic plan priorities

- Tree and stand defect analysis
- Calibrate/localize upper stem diameter for DF, WH
- Improved operational tree generator
- Updating CIPSANON source code
- Integration of CIPSANON, remote sensing, deep learning
- Crown ideotype within CIPSANON
- Geographic expansion of crown width, profile
- Web-based CIPSANON
- Redwood timber improvement cooperative
- Collection of crown measurements in overly dense hemlock stands
- Wood quality DLL

A swath of destructive sampling across the westside

- **Destructive sampling on 20 sites**

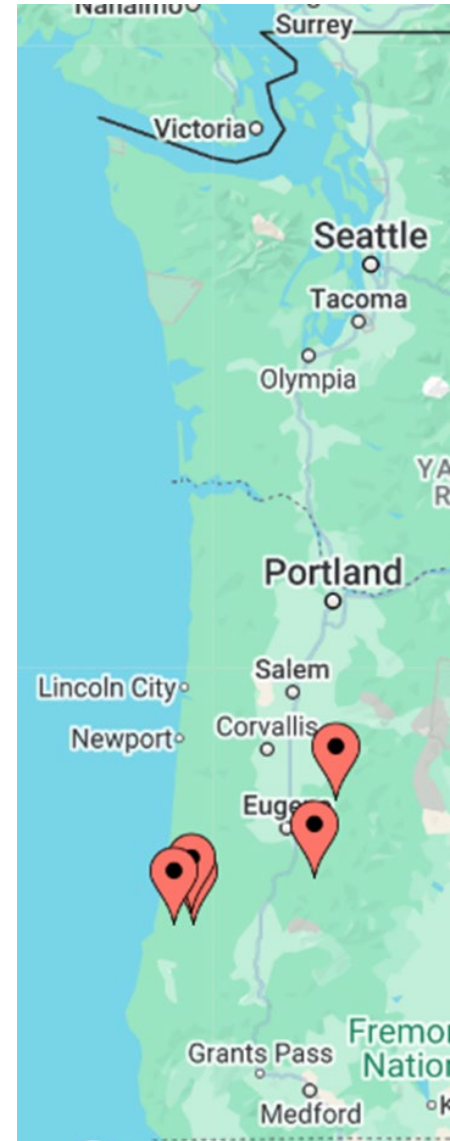
- Disks cover the range from BH to 10cm DOB
- Disks are awaiting a home
- Will be saved until a useful project for their use is identified
- We've sprinkled bait among the OSU Wood Science Dept., but we're easy...





Western taper, volume and weight Consortium

- **Made up of 7 industry and state agency partners**
 - Collect data for creation of an updated Douglas-fir taper dataset from across the westside
 - Plan is to sample 208 trees on 26 sites
 - Sites represent operational, intensively managed timberland
 - Consortium strongly encourages submission of external applications for bolt-on research
 - Potential availability of 168 rotation-aged trees scheduled for harvest

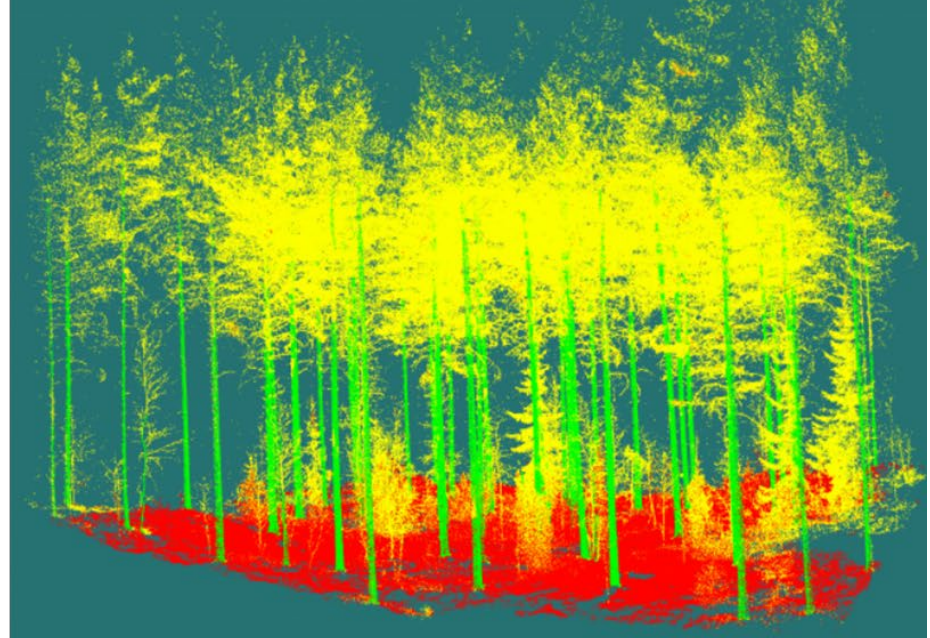




Linkage between modern and traditional measurements

- **Two funded SAE projects**
 - Small Area Estimation of stand attributes in Washington using 3D_NAIP and Sentinel-derived variables
 - The Interplay between Sampling Design and Small Area Estimation to Improve Stand- and Forest-level Estimates
- **Currently recruiting a PhD student to link growth and yield models (CIPSANON) to remotely sensed data**

- **OSU-based lab led by Bogdan Strimbu**
 - Source of equipment for scanning of taper trees (OSU-UI collaboration)
 - Large inventory of drones, sensors, and expertise
 - Generous lending policy (“you break, you buy”)



- **Managing forest soil carbon in relation to carbon markets.**

Already started working in this topic with an NGO that has close connections with big foundations.

- **Forest nutrition and productivity.**

Hopefully, Kim Littke is there to talk about. I'd work with her on such topics.

CAFS-pertinent activities in the vicinity of the VMRC-shop

June 10, 2025

Carlos Gonzalez and Emily Von Blon

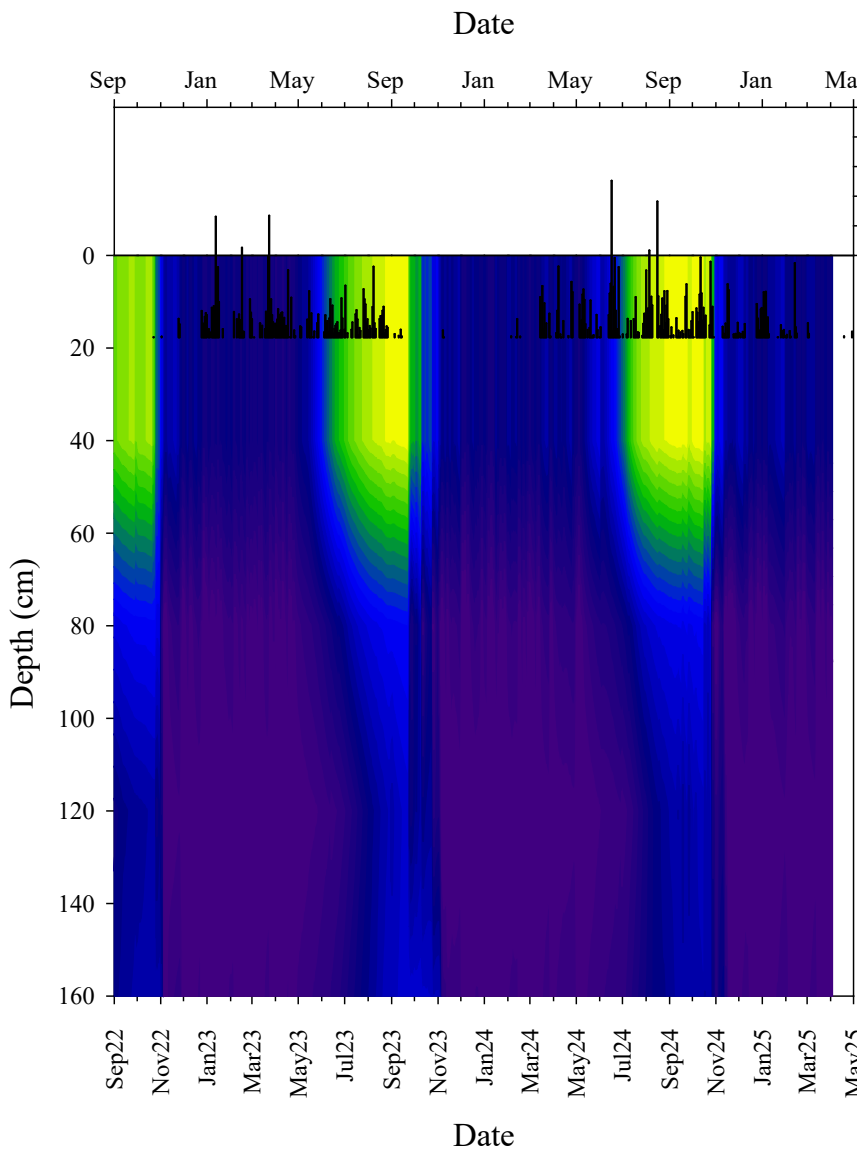


Long Term Monitoring of Soil Moisture Dynamics and Stand Water Use

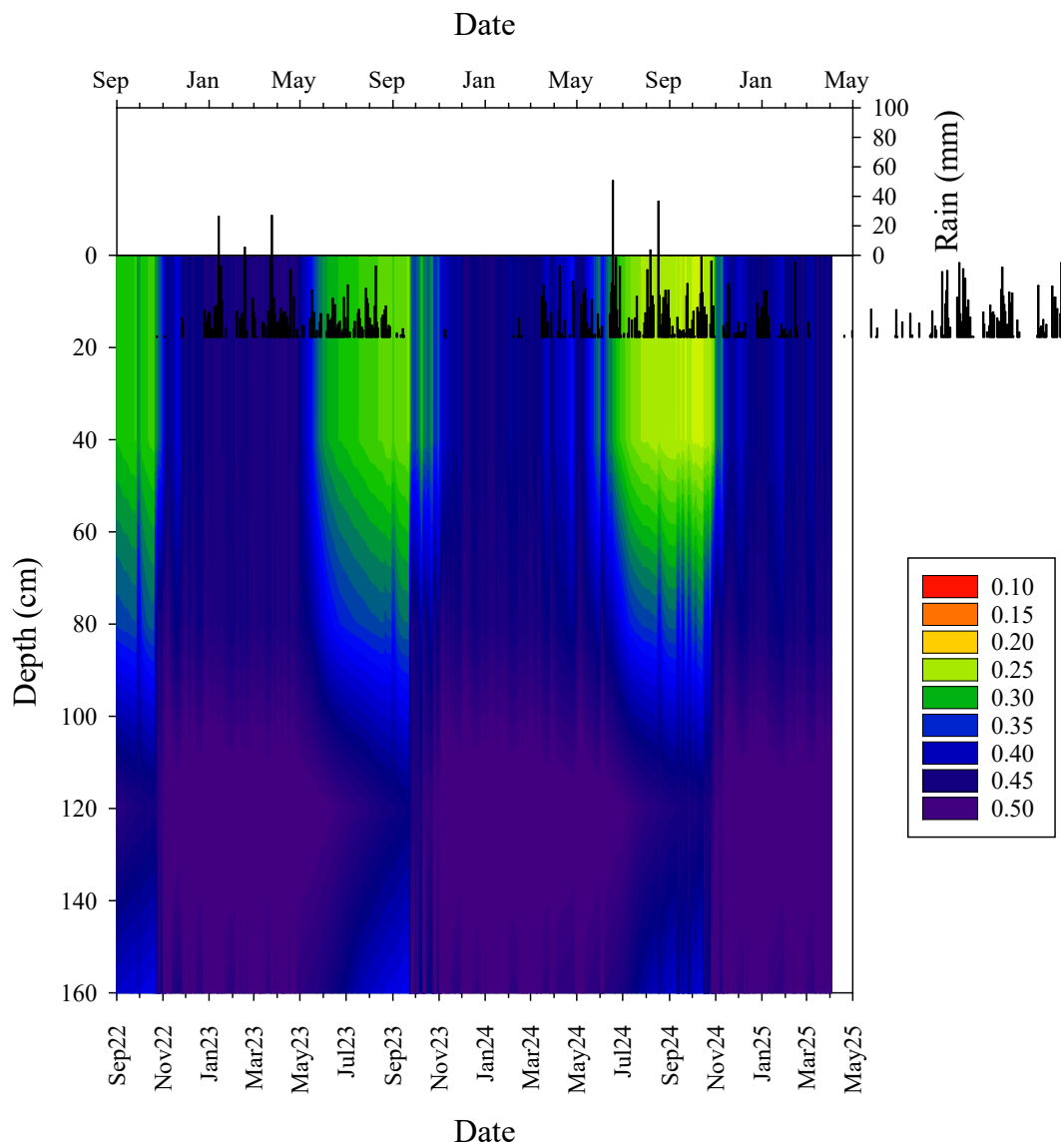
Carlos Gonzalez-Benecke

Grand fir

Control

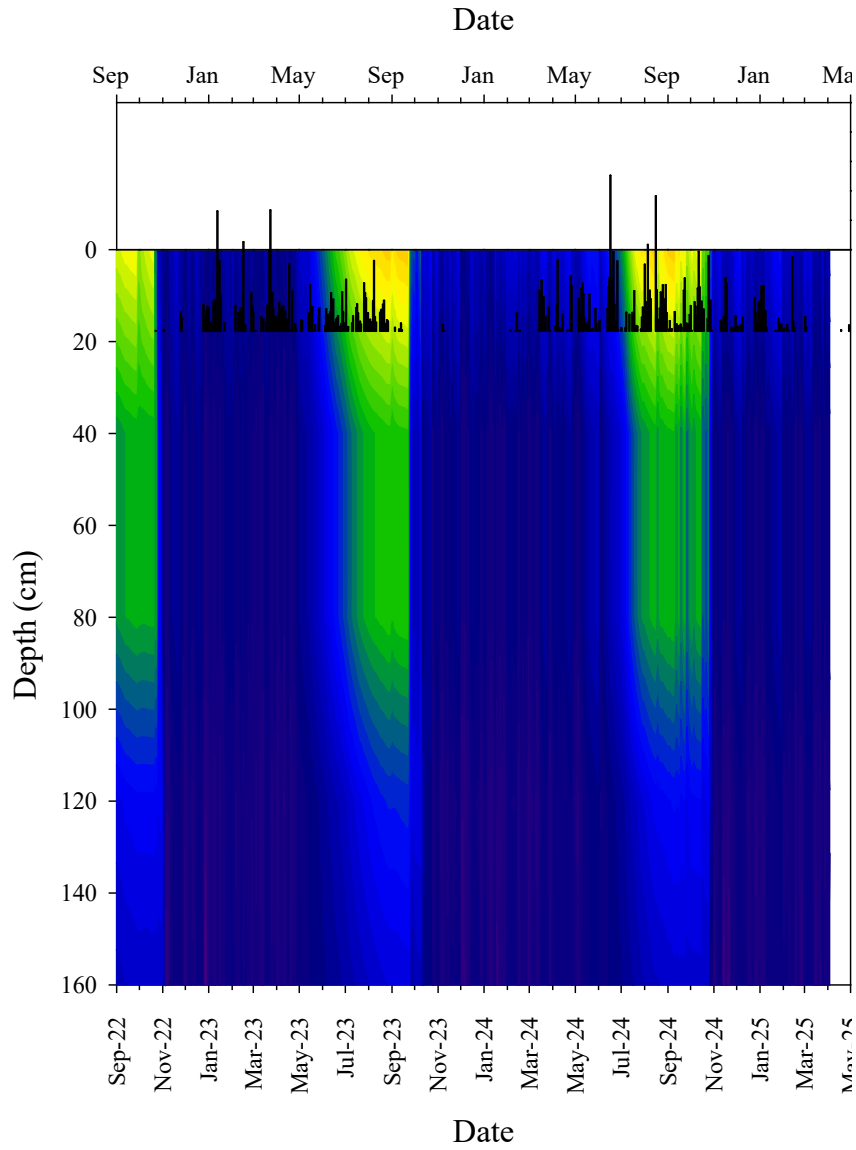


Sustained FVM

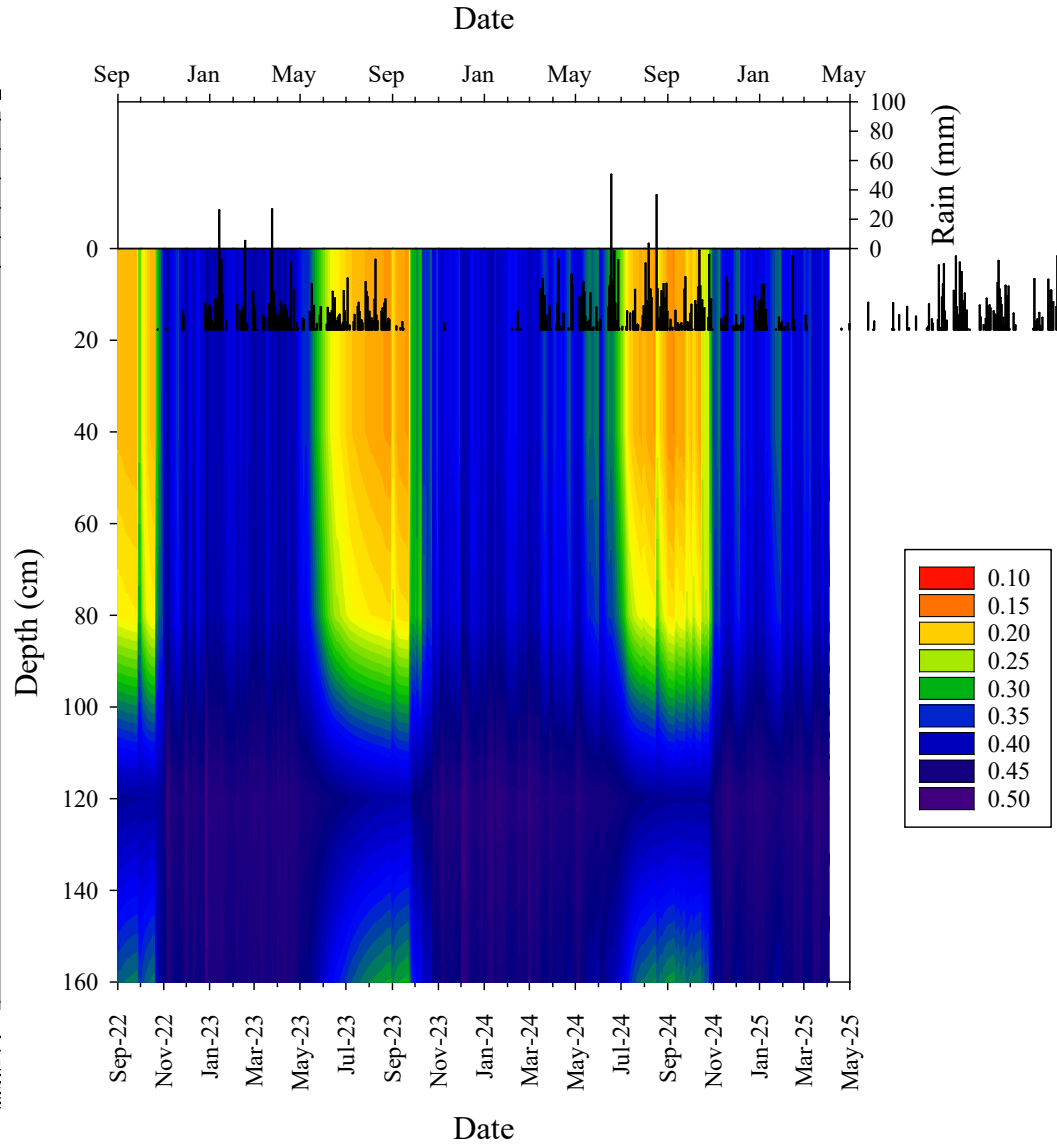


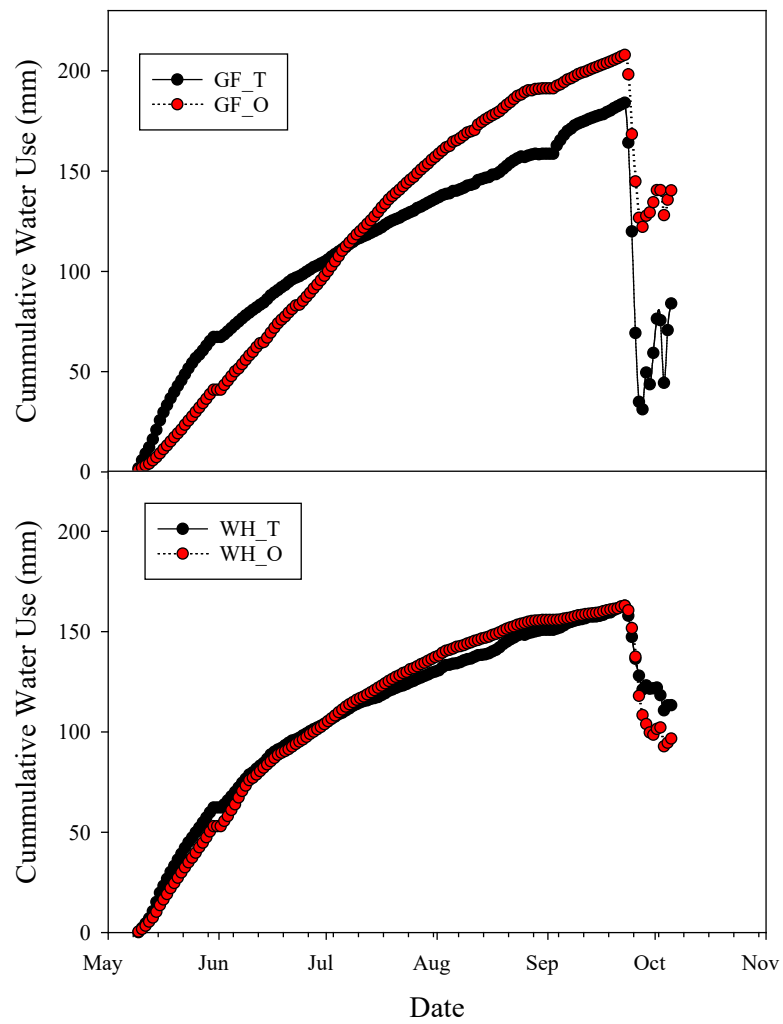
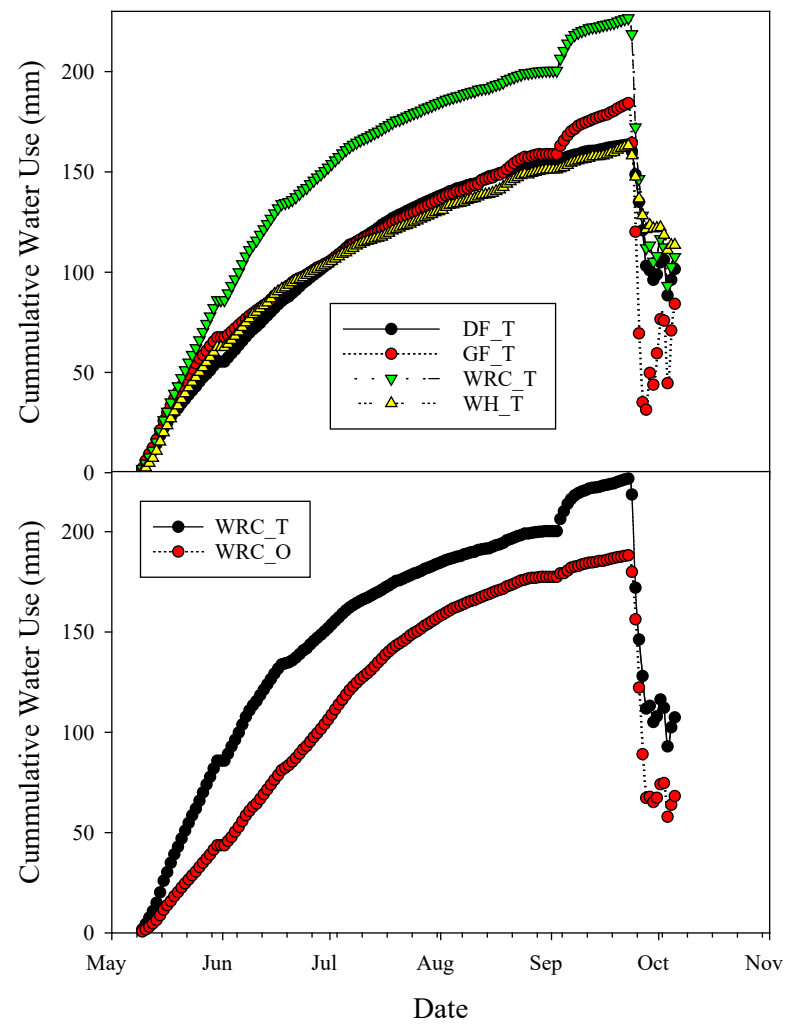
Western redcedar

Control



Sustained FVM







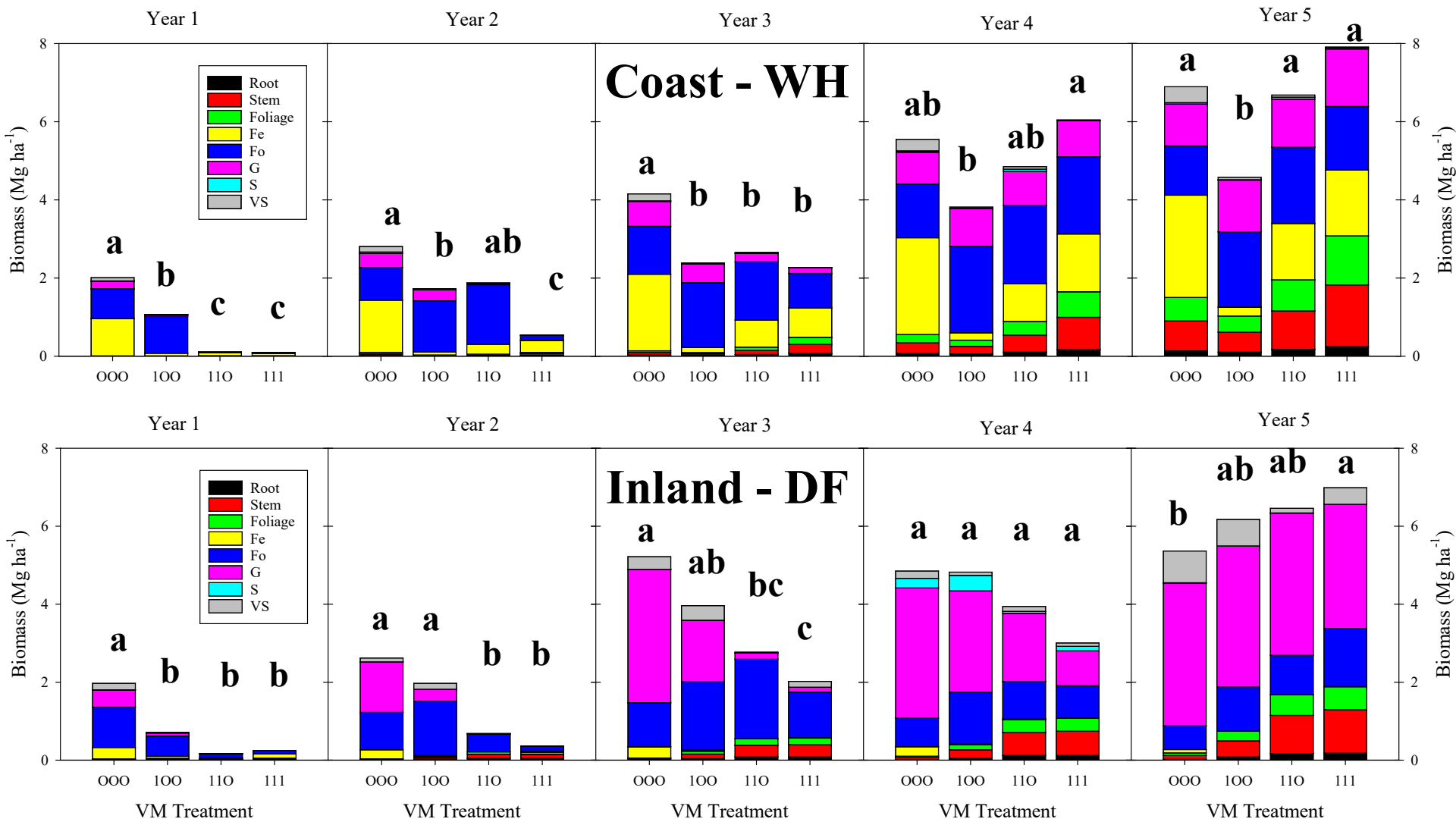
Oregon State
University



Long-Term Monitoring Nutrients Stock

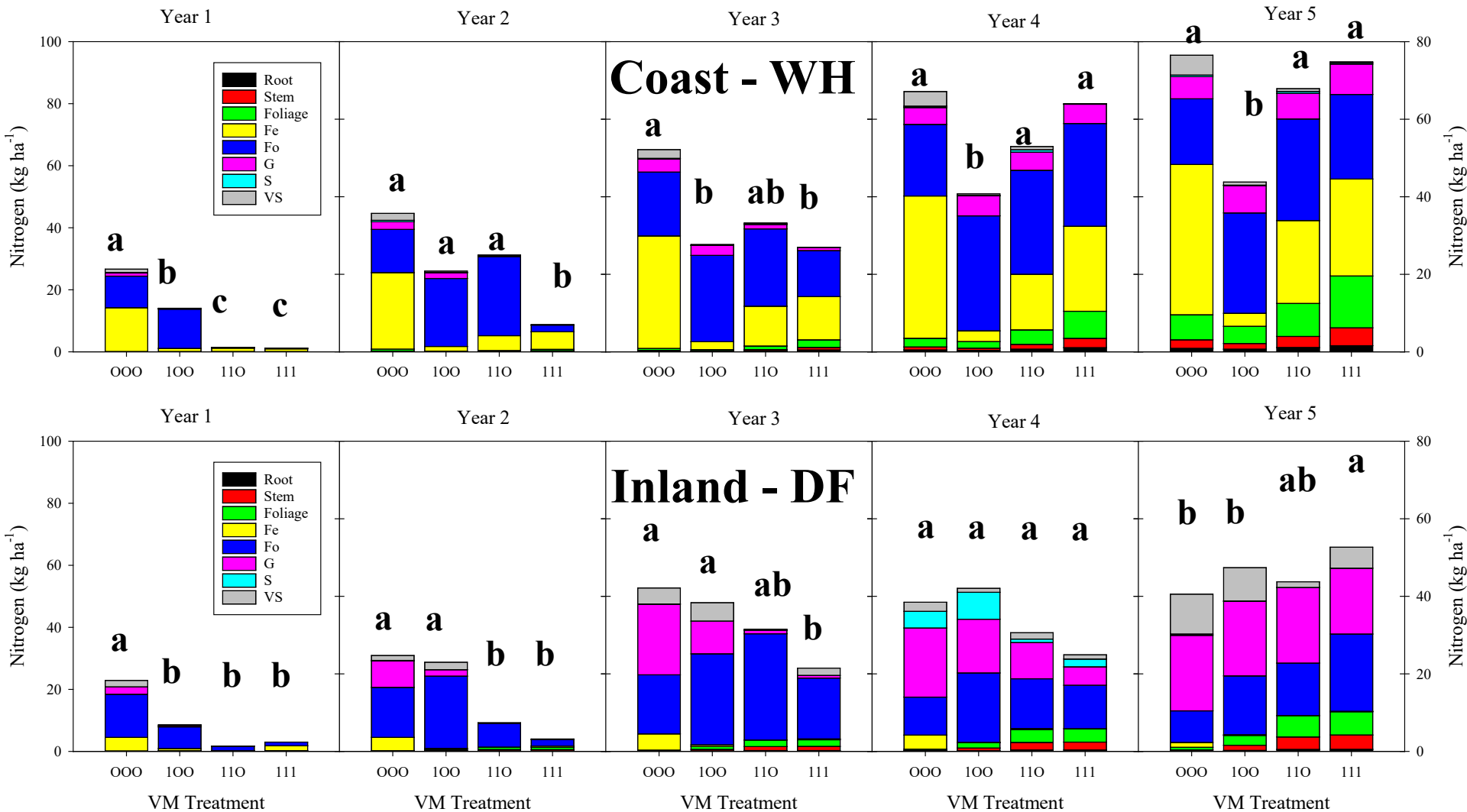
Results

Biomass



Results

Nitrogen

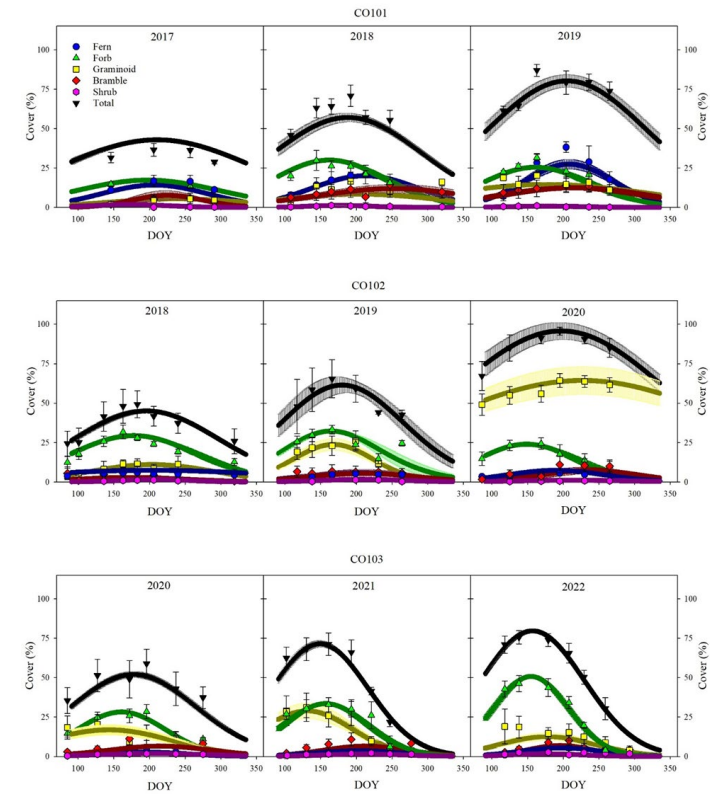


Decision Support System for Douglas-fir and western hemlock survival and growth

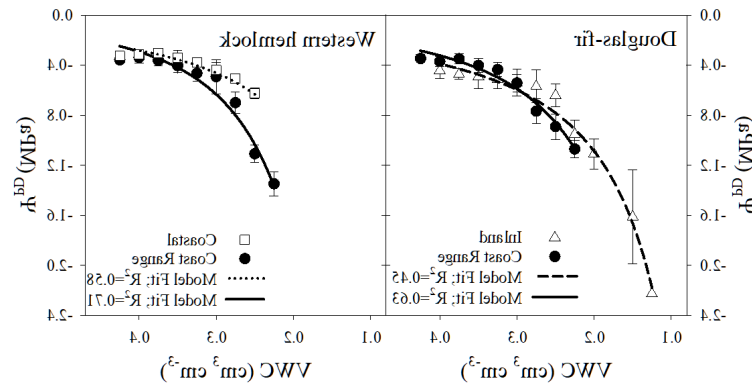
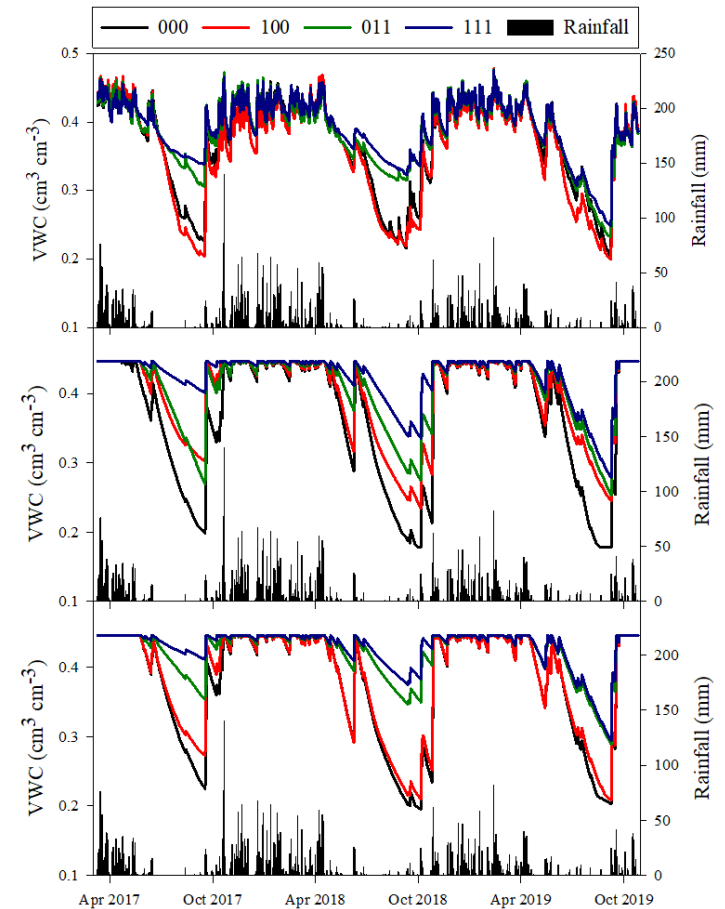
Carlos Gonzalez-Benecke et al.

Mark Kimsey et al.

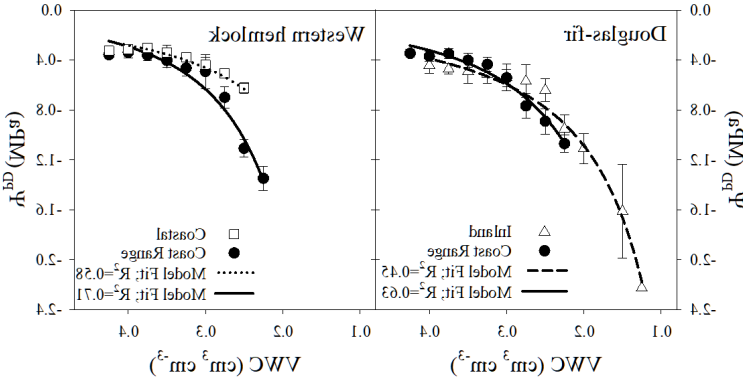
Using Results from COSInE



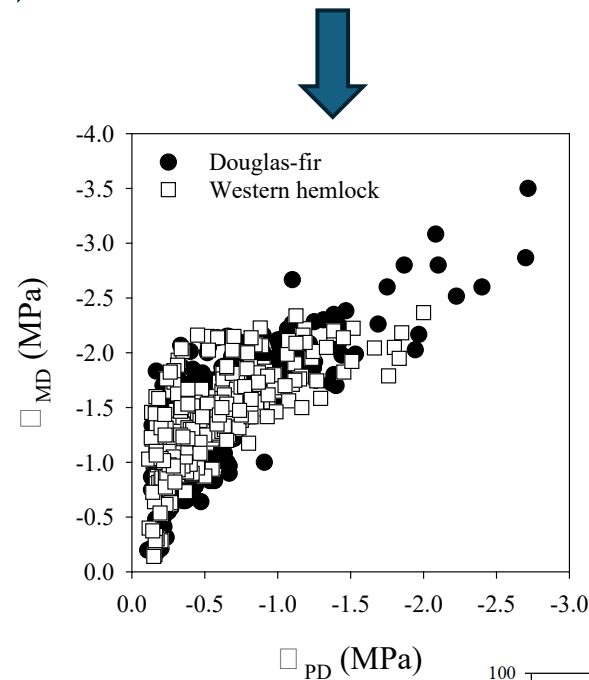
$$ET_{gf} = a \cdot (FASW^b) \cdot (BD^c) \cdot (T_{mean}^d) \cdot (Fof^f) \cdot (G^g) \cdot (W^h)$$



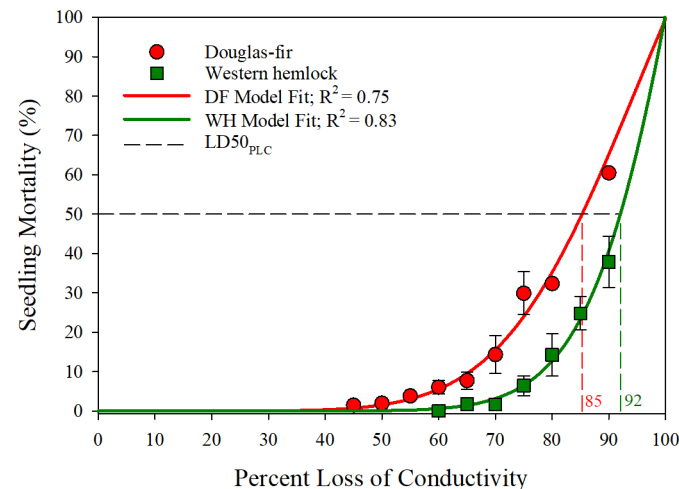
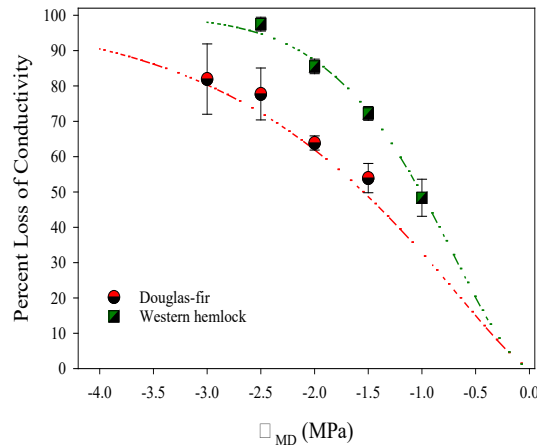
Using Results from COSInE



$$\Psi_{MD} = (a \cdot \Psi_{PD} + b \cdot T_{max} + c \cdot RH)$$



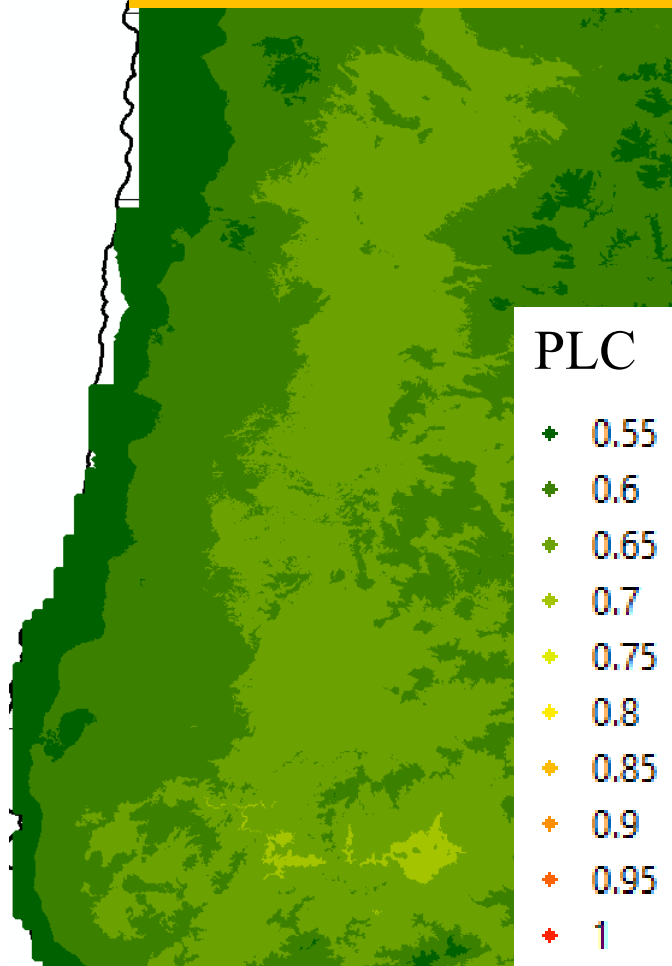
In Situ k_{nat} expressed as
PLC matches the VCs



Model application

Maps of PLC and Mortality

PDWP = -0.7 MPa
 Ψ_{50} = -1.5 MPa



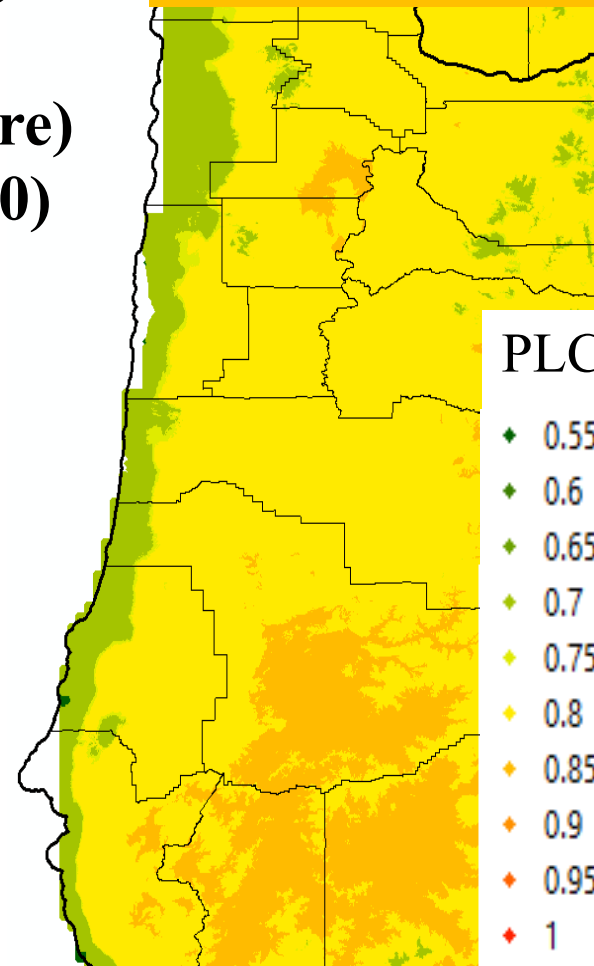
PLC

- ◆ 0.55
- ◆ 0.6
- ◆ 0.65
- ◆ 0.7
- ◆ 0.75
- ◆ 0.8
- ◆ 0.85
- ◆ 0.9
- ◆ 0.95
- ◆ 1

Using:

- FVM (Cover%)
- Weather
- Soil (BD, Texture)
- Physiology (Ψ_{50})

PDWP = -1.5 MPa
 Ψ_{50} = -1.5 MPa



PLC

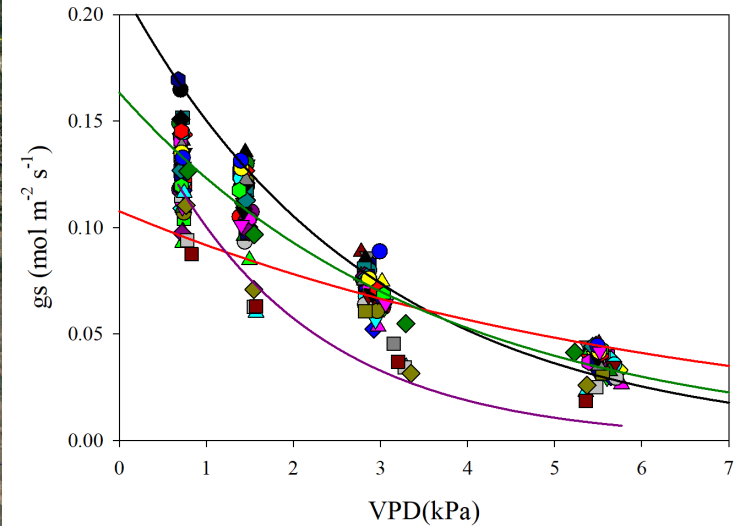
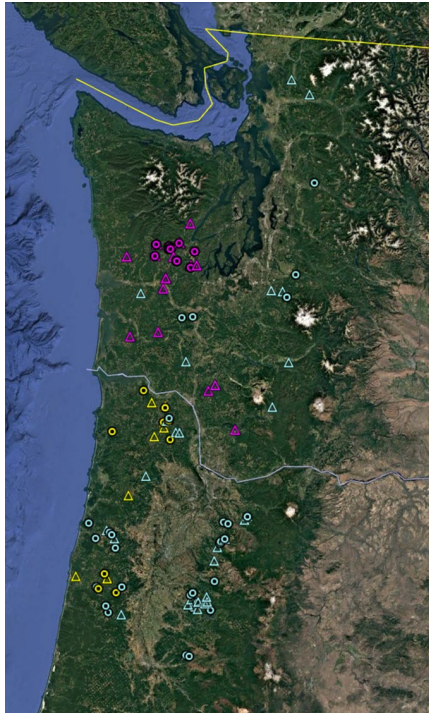
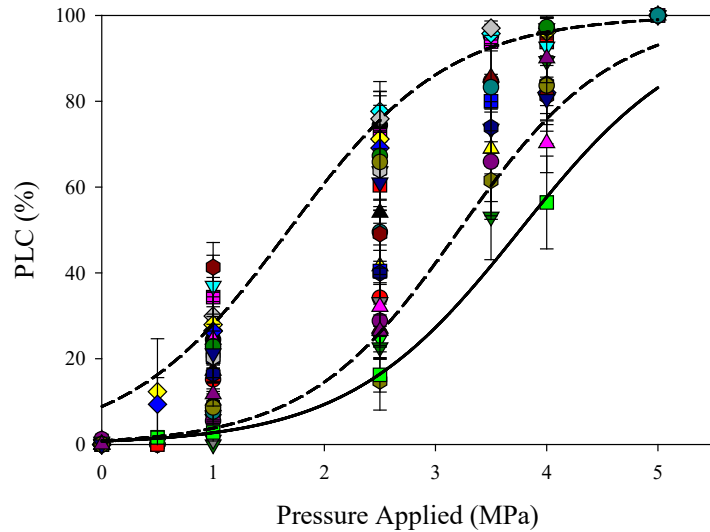
- ◆ 0.55
- ◆ 0.6
- ◆ 0.65
- ◆ 0.7
- ◆ 0.75
- ◆ 0.8
- ◆ 0.85
- ◆ 0.9
- ◆ 0.95
- ◆ 1

GEnESIS

Genetic Environment and Early Silviculture Interactions Study

Carlos Gonzalez-Benecke

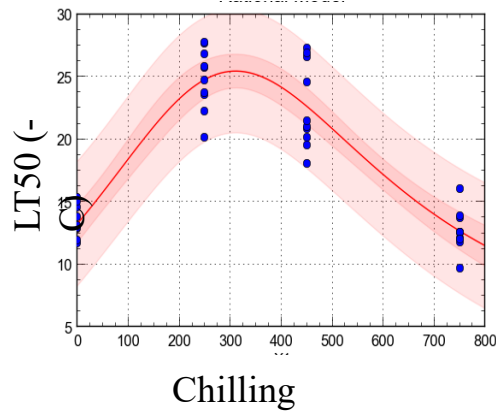
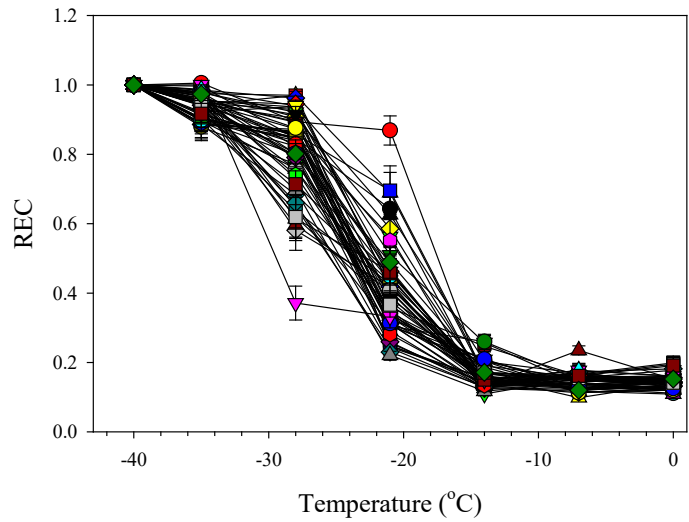
GENESIS Phase 1: Laboratory Measurements



Heat Tolerance (T50)

Photosynthetic Capacity (αx)

Coming soon.....Summer 2025





Oregon State
University



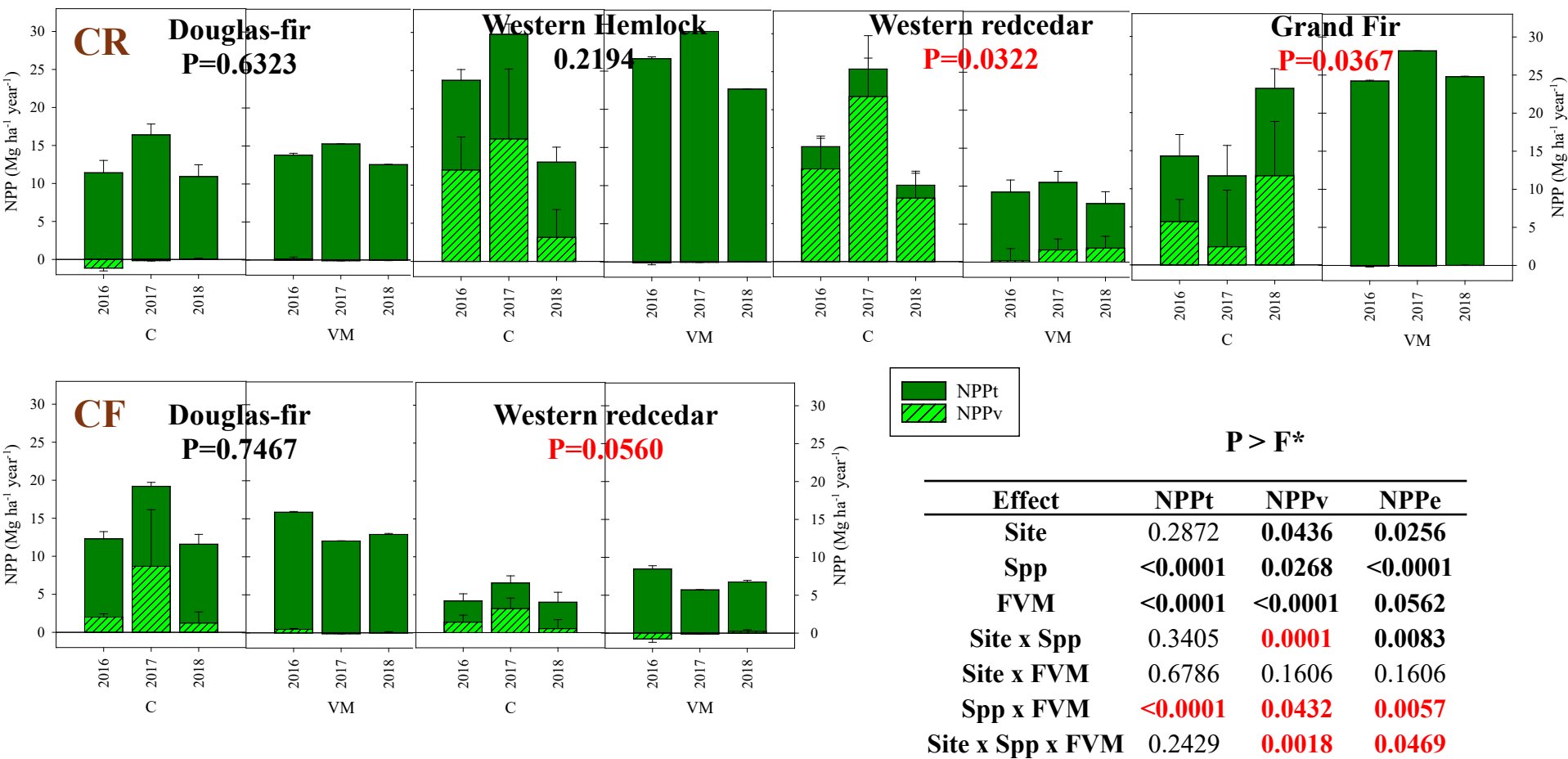
Thanks



Long Term Monitoring Stand Biomass and NPP

Carlos Gonzalez-Benecke

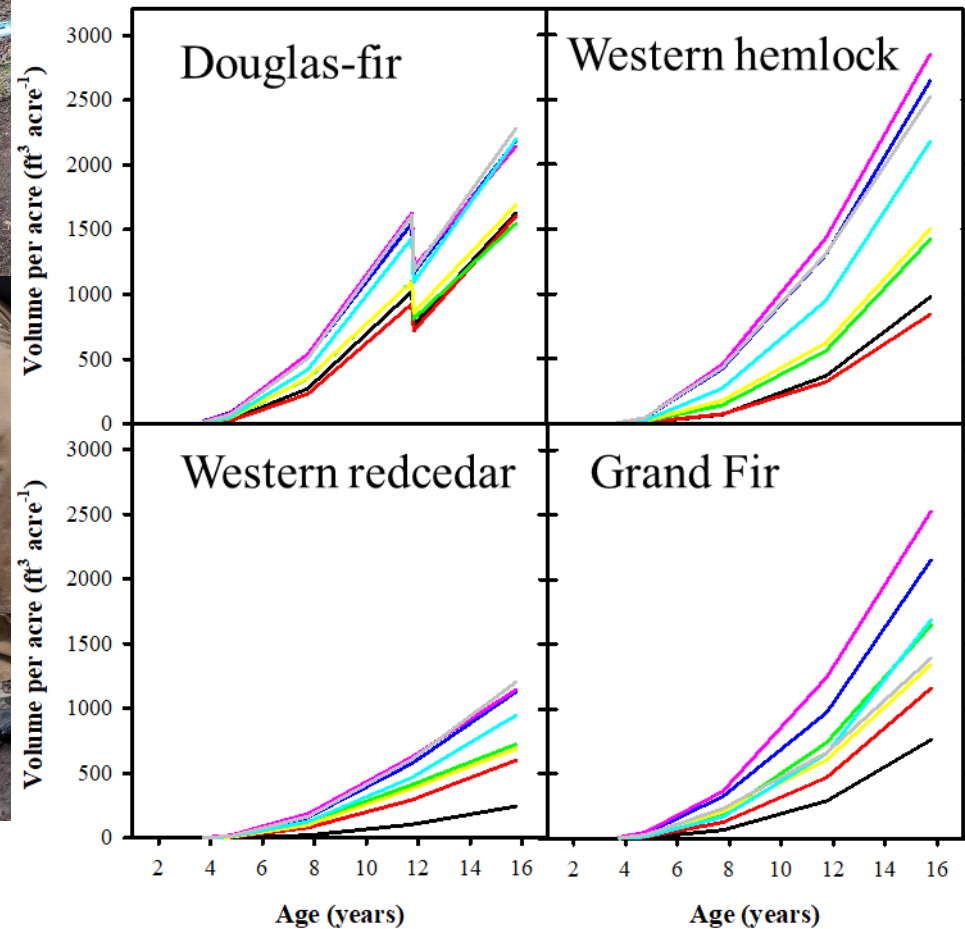
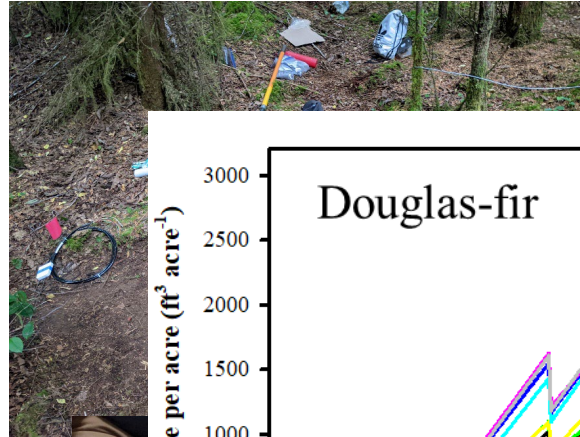
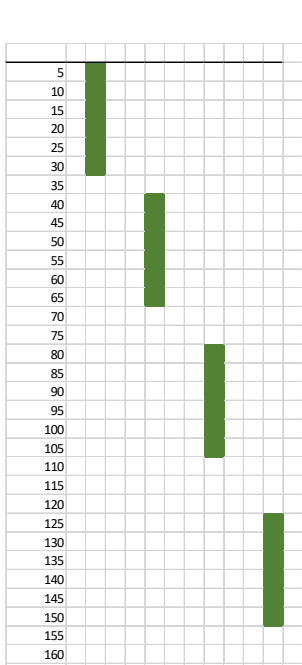
Results: NPP ($\text{Mg ha}^{-1}\text{year}^{-1}$)



Methods

At each plot, 8 soil moisture sensors were installed at 4 depths (2 points per plot)

0-30 cm
40-70 cm
80-110 cm
120-150 cm



Methods: Biomass / NPP

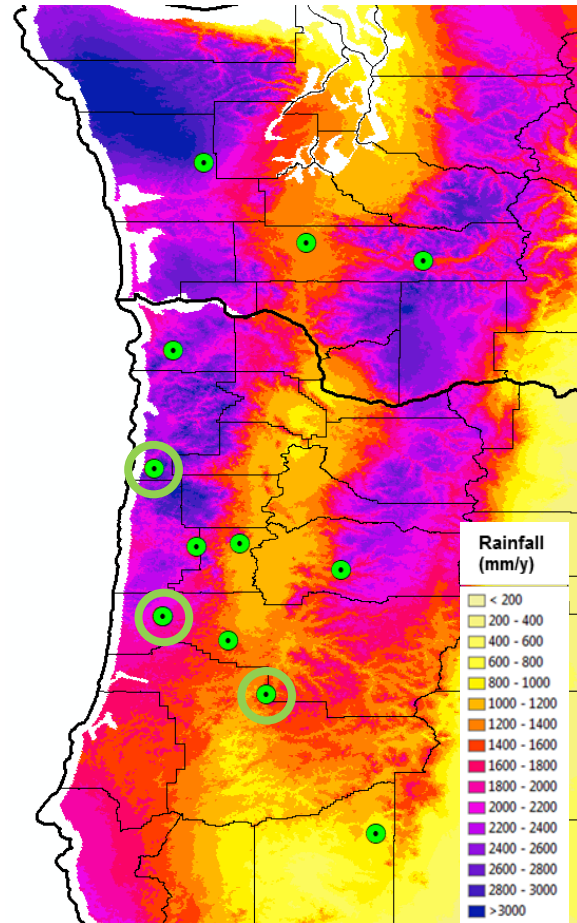


Methods

Biomass

Seedlings

3 sites CO101, CO102, CO102
2 species WH and DF
4 treatments OOO and 111
3 years 1, 2 and 3
6-8 seedlings x site x spp x trt x year



Foliage



Stem

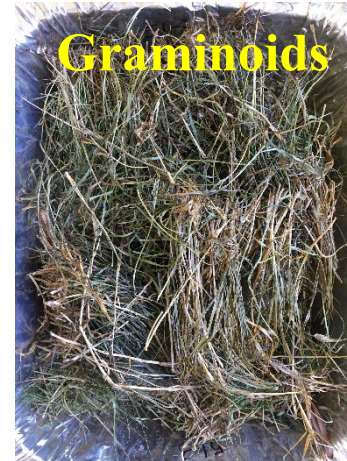
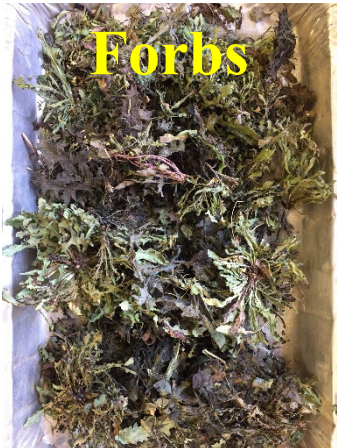


Roots

Methods

Biomass

Vegetation



Methods

Nutrients



A & L Western Laboratories, Inc.

1311 Woodland Avenue, Modesto CA 95351 209-529-4080
10220 SW Nimbus Avenue Bldg. K-9, Portland OR 97223 503-968-9225

REPORT NUMBER: 23426

CLIENT NO: 8202

SEND TO: OREGON STATE UNIVERSITY
278 PEAVY HALL
CORVALLIS OR 97331

GROWER: OREGON STATE UNIVERSITY

SUBMITTED BY: CARLOS GONZALEZ

DATE OF REPORT: 06/22/22

PAGE: 1

PLANT ANALYSIS REPORT

SAMPLE ID	REPORT OF ANALYSIS IN PERCENT								REPORT OF ANALYSIS IN PARTS PER MILLION									
	Nitrogen N	Sulfur S	Phosphorus P	Potassium K	Magnesium Mg	Calcium Ca	Sodium Na	Chloride Cl	Iron Fe	Aluminum Al	Manganese Mn	Boron B	Copper Cu	Zinc Zn	Nitrate-Nitrogen NO ₃ -N	Phosphate PO ₄ -P	Molybdenum Mo	
C283	1.09	0.09	0.13	1.88	0.11	0.22	0.02		64	131	107	9	4	44			< 0.5	
C284	0.82	0.21	0.17	1.03	0.12	0.22	0.02		96	285	234	10	2	17			< 0.5	
C285	0.18	0.08	0.04	0.33	0.10	0.16	< 0.01		3	< 0.5	254	7	1	5			< 0.5	
C286	1.37	0.30	0.17	3.10	0.24	1.42	0.11		127	156	62	23	11	31			< 0.5	
C287	1.11	0.20	0.20	2.71	0.28	1.09	0.34		128	275	114	26	10	55			< 0.5	
C288	0.92	0.15	0.13	1.94	0.20	0.69	0.08		105	189	113	21	9	27			< 0.5	
C289	1.05	0.12	0.17	1.48	0.27	0.40	0.02		52	625	100	20	6	22			< 0.5	
C290	1.24	0.16	0.17	1.79	0.30	0.38	0.02		63	881	102	25	8	47			< 0.5	
C291	0.91	0.14	0.10	1.62	0.26	0.35	0.03		42	738	55	20	5	49			< 0.5	



102 samples WH (36 foliage, 36 stem, 36 roots)
123 samples DF (41 foliage, 41 stem, 41 roots)
99 samples vegetation (21 Fern, 24 Forb, 23 Graminoid, 22 V/S, 9 Shrub)

Results

Phosphorus

