

# Thoughts on Swiss Needle Cast



British Columbia, Canada

Washington, USA

Oregon, USA

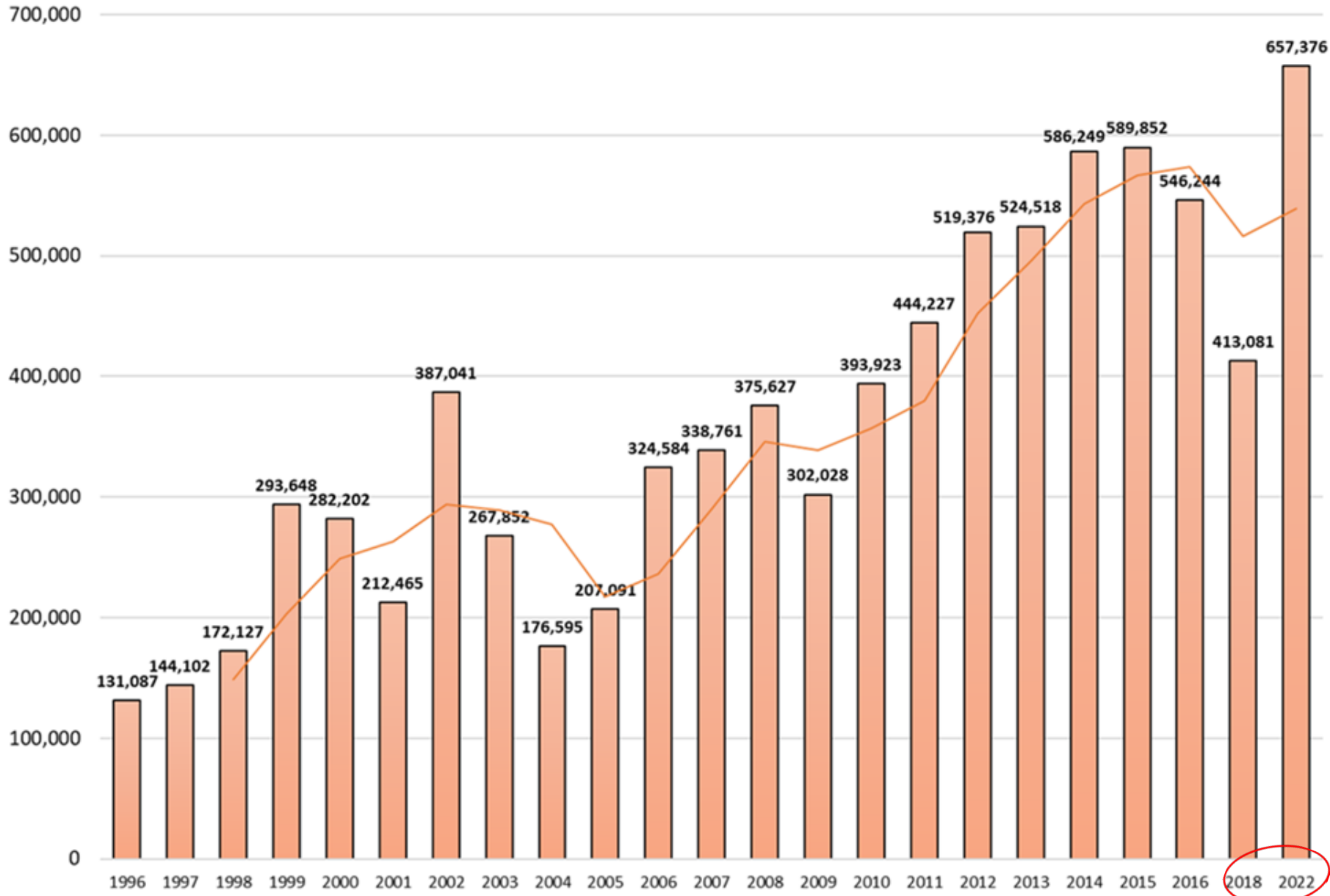
Pacific Ocean

45° N latitude line

Northwestern North America



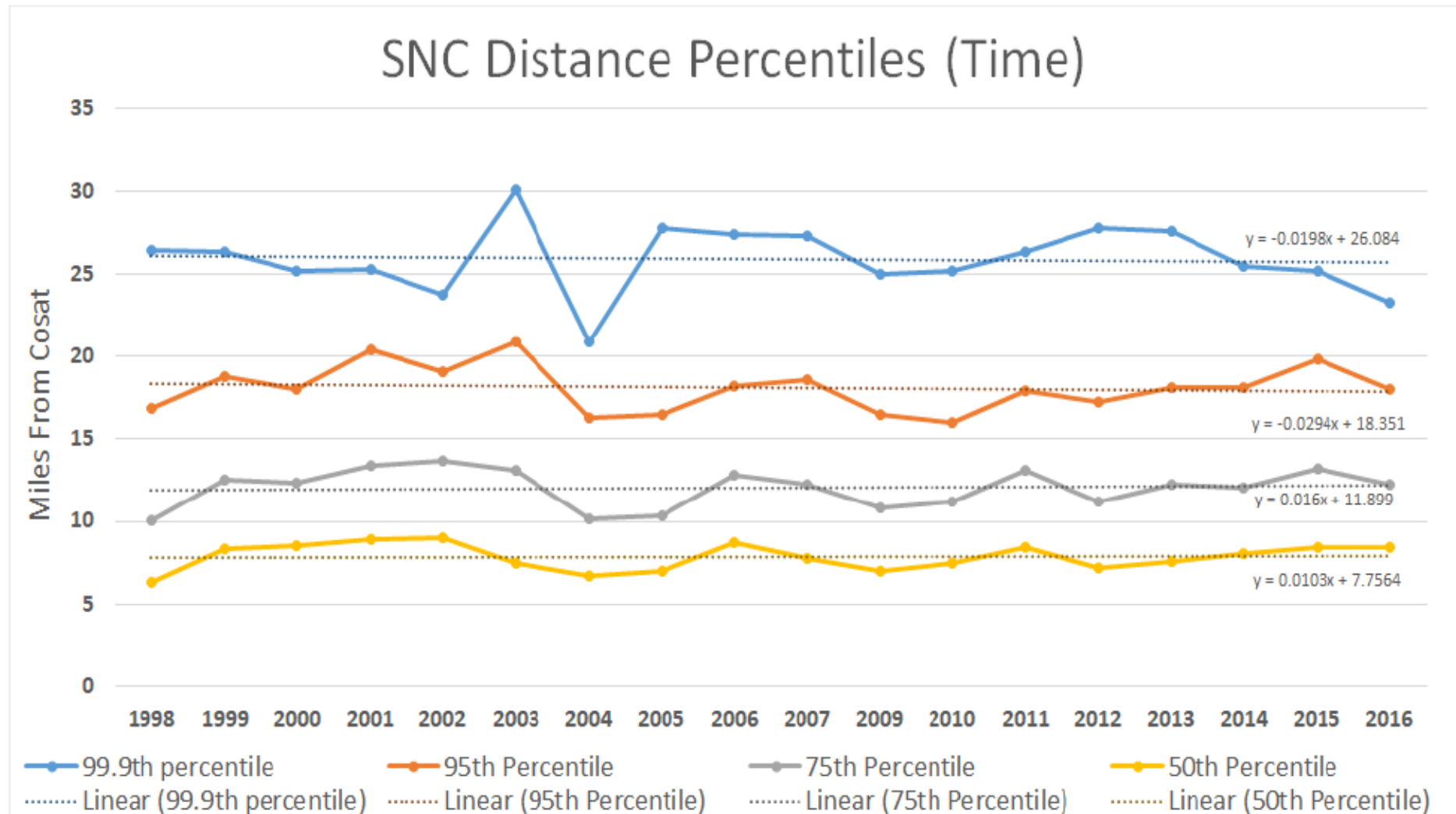
# Area of Doug-fir Forest with SNC Symptoms (Acres)



ADS 2022  
657,376 acres

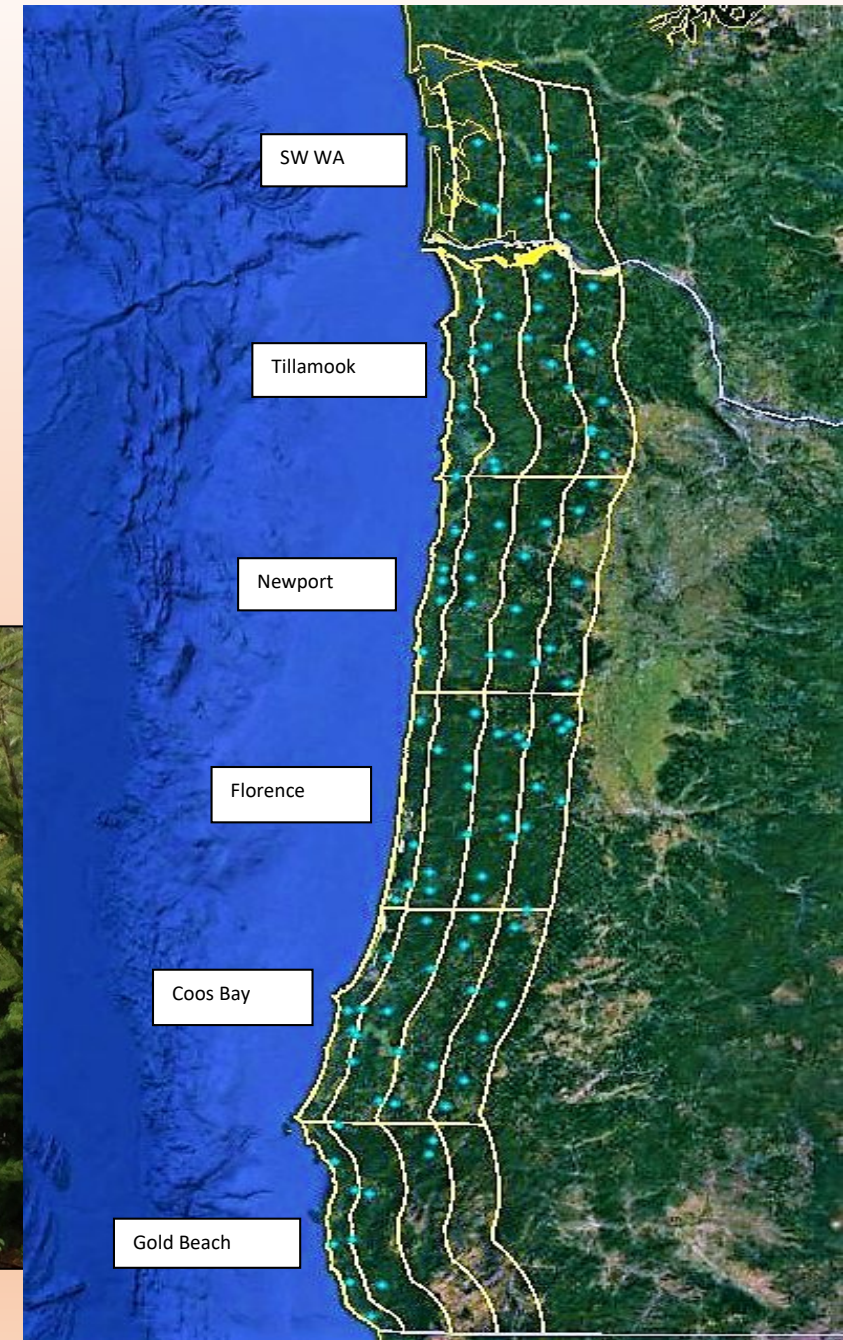


# Andrew Russo MF, analysis of ADS



# Swiss Needle Cast Cooperative Research and Monitoring Plot Network

- A plot network
  - California to SW Washington and 50 km inland.
  - British Columbia, Canada too!
- Growth impacts
- Climate relationships
- Epidemiology
- Associated studies

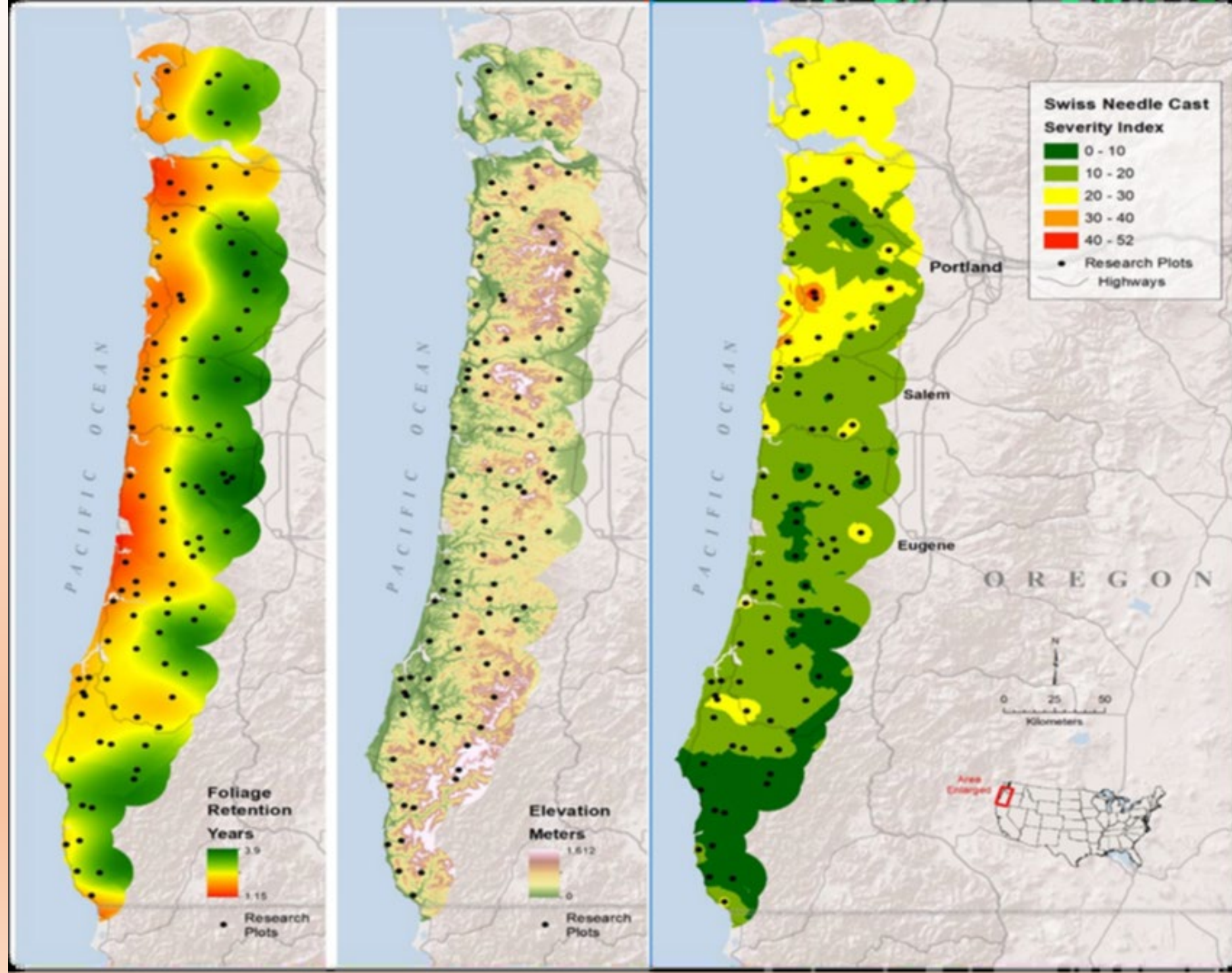


Network is being used to advance understand of SNC distribution and epidemiology

Maps:

Needle retention

Disease severity



# Foliage Retention is Key to Growth Impacts

Maguire, Mainwaring et al.



Very low foliage retention near Tillamook

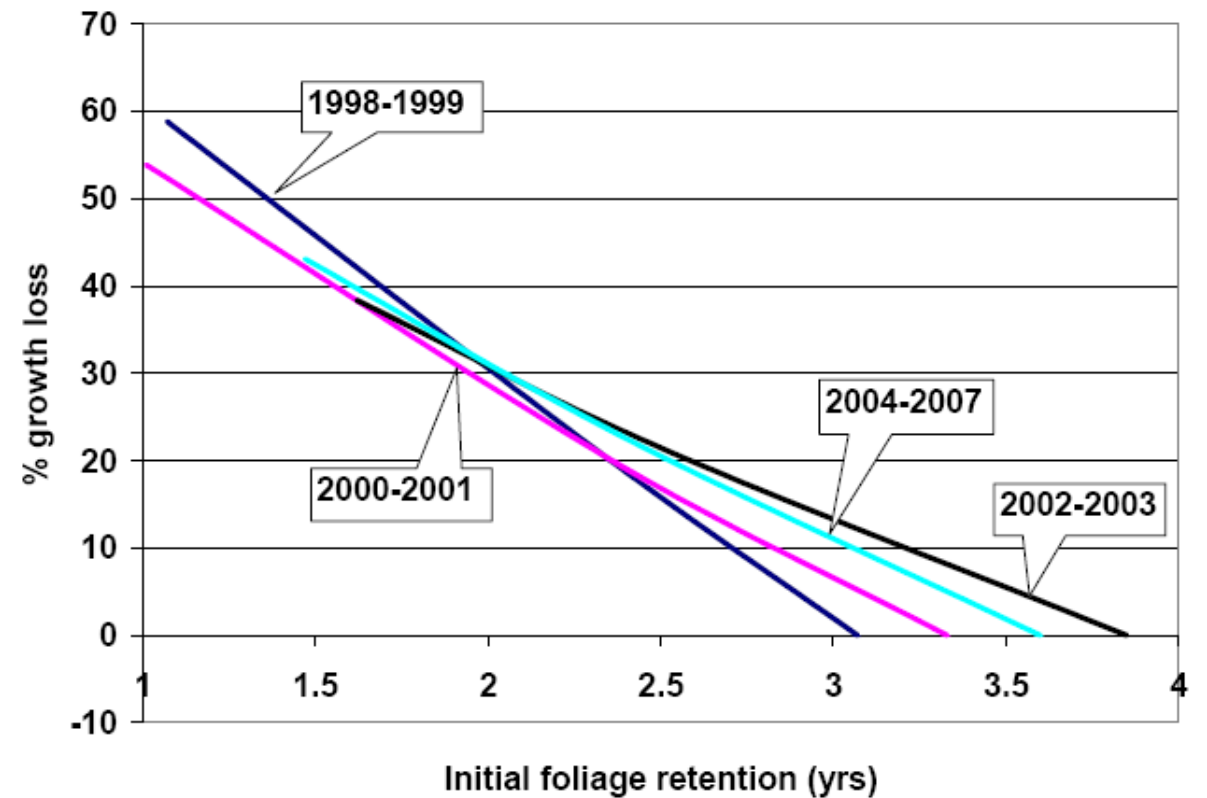


Figure 3. Implied relative growth losses for the four GIS growth periods. Ranges of foliage retention represent those measured at the start of each growth period.

# Management

Silvicultural Decision Guide for Swiss  
Needle Cast in Coastal Oregon

Ritokova, Shaw, Mainwaring. 2022.

OSU Extension Publications: EM 9352

Available at website:

<https://extension.oregonstate.edu/pub/em-9352>



85 yr-old severely infected stand



# Silviculture

- We have a good framework for nuanced management of SNC in DF
  - SNC Silviculture Guide
- We are improving Growth and Yield metrics/Organon – CIPS
  - **SNCC Research and Monitoring Plot Networks**
  - Relationship of growth to disease severity and needle retention
  - Mainwaring works
- Prediction and landscape variation maps and models



SNCC Spring Field Tours

# Collaborations!

- SNCC has a great track record of collaborations with anyone working on SNC
- Scientific Organizations we participate in:
- IUFRO 7.02.11. Foliage and Twig Diseases
- Western International Forest Disease Work Conference

- Coops
  - CIPS
  - NW Tree Improvement Coop
  - VMRC
- California, Oregon, Washington Agencies, Industry, Academics and Extension
- Canadian Partners
  - BC Forestry
  - University of British Columbia

# Thoughts about SNC: Tolerance

- Tolerance of DF for disease
  - How does this work exactly?
  - Needle retention, disease severity and internal leaf fungal abundance relationships.
    - We thought this was linearly related but it is a bit more fuzzy than that.
    - How does tolerance influence these relationships?



Two different seed sources in common garden at Norton, OR

esa

ECOSPHERE

Climate of seed source affects susceptibility of coastal  
Douglas-fir to foliage diseases

NICHOLAS P. WILHELMI,<sup>1</sup>† DAVID C. SHAW,<sup>2</sup> CONSTANCE A. HARRINGTON,<sup>3</sup>  
JOHN BRADLEY ST. CLAIR,<sup>4</sup> AND LISA M. GANIO<sup>5</sup>

# Thoughts about SNC: Temperature (Winter)

- Temperature in winter is a key epidemiological factor
- Can this explain differences in disease severity observed in:
  - Simple structure of shorter stands vs. complex structure of taller stands
- Is leaf level temperature the key to everything?



Summer in  
British Columbia

# Thoughts about SNC: Leaf morphology and leaf age

- Is it possible that leaf anatomy and morphology could explain differences in severity?
  - Epicuticular waxes
  - Stomate anatomy or number
  - Astrosclerids within the leaf
- Why is only current year foliage infected?
- What is it about older needles that differs with regard to infection?



# Thoughts SNC: Inoculation methods

- Currently we don't have a good method to inoculate trees for research.
  - Most lab trials have failed
- We take potted trees out to the coast and leave them for a month
- Develop an indoor method of inoculation
  - USFS Doreena Genetic Center near Cottage Grove
  - White pine blister rust inoculation rooms



FIG. 1. Ascospores of *P. gaeumannii*. A–D. Typical ascospores. E. Ascospore germination on water agar. Bars = 10  $\mu$ m.



# Vegetation types

- Coastal zone distinct vegetation type: *Picea sitchensis*/*Tsuga heterophylla*.
- From Franklin and Dyrness. 1973. Natural Vegetation of Oregon and Washington. USFS

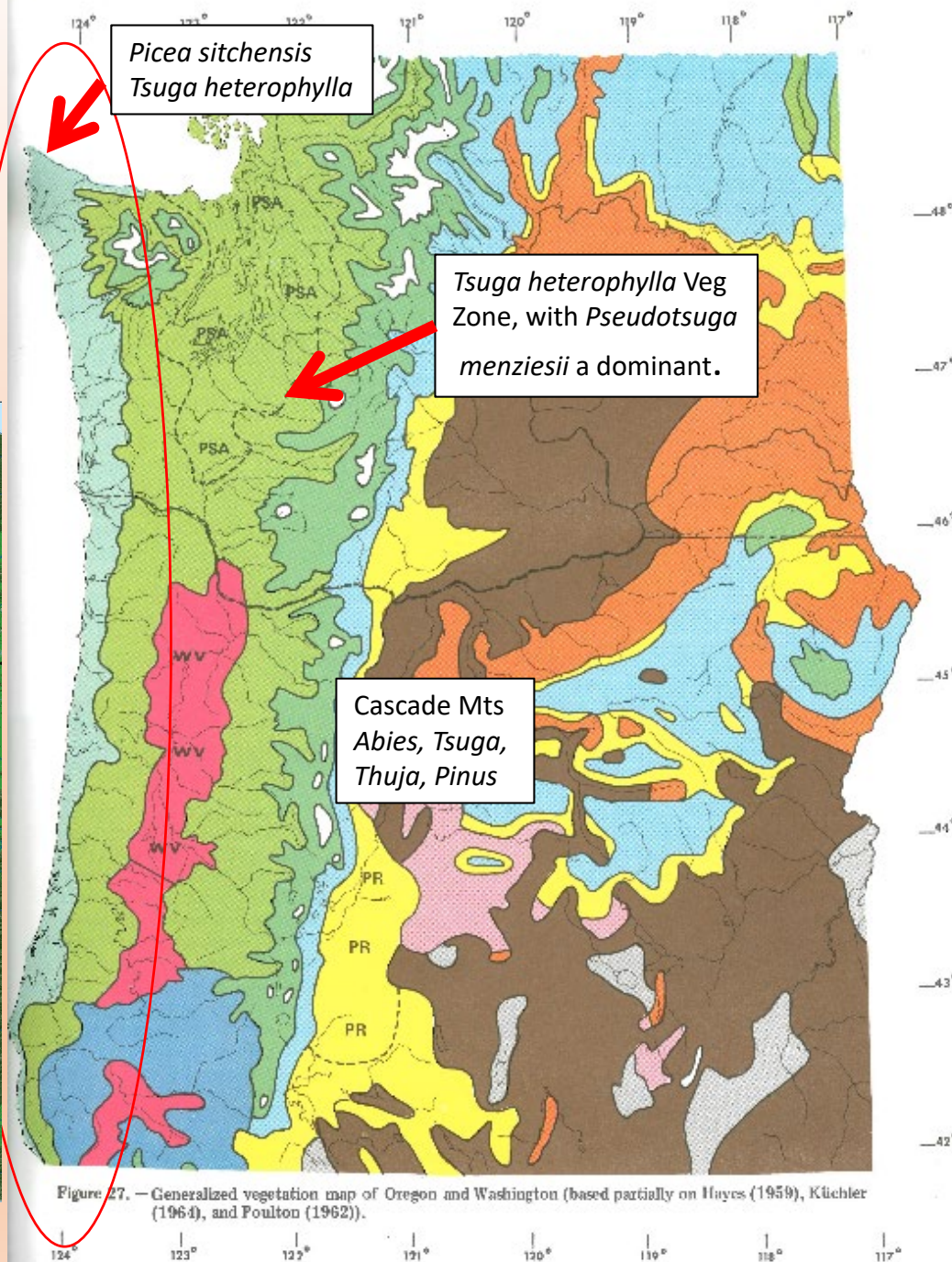


Figure 27. — Generalized vegetation map of Oregon and Washington (based partially on Hayes (1959), Küchler (1964), and Poulton (1962)).

