

Evaluating the Health of Five Needle Pines: An Overview from the Pacific Northwest Region with Emphasis on Western White Pine and Sugar Pine in Southwest Oregon

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Background

- Five-needle pines are ecologically important components of Pacific Northwest forest ecosystems.
- Five needle pine mortality reported but not well quantified.
- Concerns include impacts due to:
 - Introduced pathogen *Cronartium ribicola*, cause of white pine blister rust (WPBR).
 - Native insect mountain pine beetle (*Dendroctonus ponderosae*) (MPB).

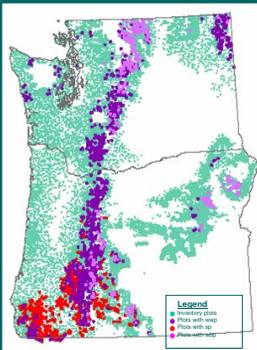
Current Evaluation

- 1) Regional assessment of the health and distribution of five-needle pines from available inventory data (FIA and CVS plots)
- 2) Detailed query of pine health from inventory plots across all lands in Southwest Oregon
- 3) Intensive survey of 110 forest stands with sugar pine or western white pine components on federal lands in Southwest Oregon
- 4) Intensive survey of 105 10- to 20-year-old plantations with western white pine or sugar pine components on federal lands in Southwest Oregon.



First Stage of the Analysis.....

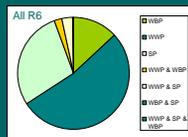
Regional Inventory Assessment



Query of Forest Inventory and Analysis, USDA Forest Service (R5 and R6), and USDI Bureau of Land Management inventory plot data collected 1991-2000 in Oregon, Washington, and R6 Forest Service lands in California.

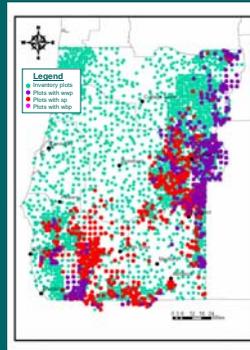
- 15,232 plots queried.**
- Western white pine (WWP), sugar pine (SP), and/or whitebark pine (WBP) on **2128 (14 percent)** plots.
- Plots with western white pine predominate (**58 percent**).
- 519 (24 percent)** plots report **five-needle pine mortality**.
- 559 (26 percent)** plots with **WPBR**.
- 232 (11 percent)** plots with bark beetle-caused mortality.
- No five-needle pines were reported on plots in the north and central Oregon Coast Range. Western white pine's historic range includes this region.
- No insect and disease data were collected for trees < 1" dbh .

Location of Inventory Plots Queried in Oregon, Washington, and California



Distribution of five-needle pine plots by species

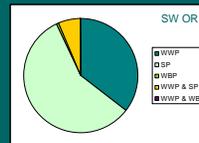
Southwest Oregon Inventory Assessment



•Query of FIA, FS R6, and BLM inventory plot data collected in 1993-1997 in Coos, Curry, Douglas, Jackson, Josephine, and Lane Counties in Oregon and R6 Forest Service lands in California

- 2,749 plots queried** (18 percent of the Regional analysis).
- Western white pine (WWP), sugar pine (SP), and/or whitebark pine (WBP) occur on **860 (31 percent)** plots.
- On plots with five-needle pines:**
- Plots with sugar pine predominate (64 percent). Only 4 inventory plots contained whitebark pine.
- Five-needle pine stocking averaged 6 percent of total trees per acre.
- WPBR was recorded on 234 (27 percent) plots. WPBR was associated with an average of 74 percent of all dead five-needle pines. An average of 32 percent of live five-needle pine stocking is infected.
- Bark beetle-caused mortality was recorded on 91 (10 percent) plots. Bark beetles were associated with an average of 86 percent of all dead five-needle pines.

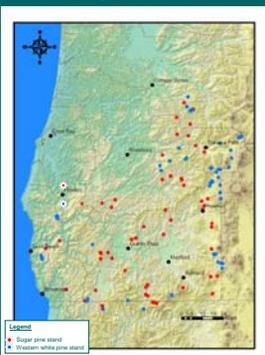
Location of Inventory Plots Queried in Southwest Oregon and California



Distribution of Five-needle Pine Plots by Species

Natural Stand Survey

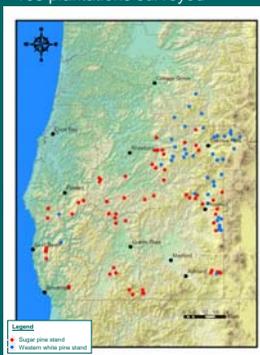
110 randomly selected stands



- Across Southwest Oregon WWP and SP are both in decline in natural stands.
- Regeneration is occurring; however, mortality and disease occur in all size classes.
 - Substantial and increasing losses in trees > 10' dbh.
 - WWP with high impacts in the 3-10" dbh range also.
- High levels of WPBR.
 - Causing topkill and branch dieback in trees >10" dbh
 - Mortality in trees < 10" dbh
 - Ribes presence not essential for disease.
- High levels of MPB-caused mortality
 - MPB most common in dense stands.
 - Current live basal area thresholds for SP (150 ft² /ac) and WWP (130 ft² /ac) exceeded in 55 percent of surveyed stands.
 - WWP and SP predisposed to MPB attack by WPBR
 - SP predisposed to MPB infestation by Armillaria root disease in the northern part of its SWOR range.
- Pine engraver (*Ips paraconfusus*) infestation common in WWP greater than 6" dbh, especially on ultramafic soils.

Plantation Survey

105 plantations surveyed



•63 SP and 43 WWP plantations were surveyed. Plantations were selected from local databases for 10 percent or more stocking of five-needle pines and represented a range of five-needle pine stock types from wild to WPBR-resistant.

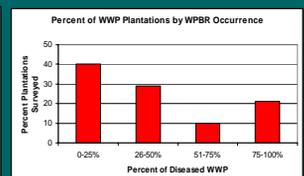
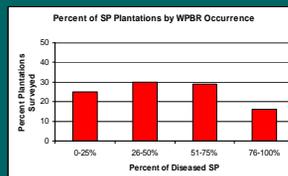
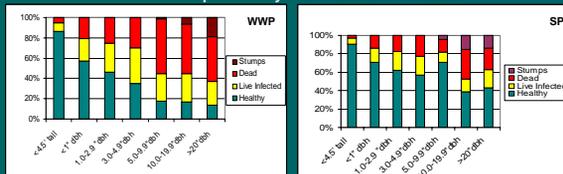
WWP Plantations:

- Average stocking of plantations was 234 total trees per acre with an average WWP stocking of 43 percent.
- 40 percent of WWP had WPBR.

SP Plantations:

- Average stocking of plantations was 184 total trees per acre with an average SP stocking of 37 percent.
- 43 percent of SP had WPBR.

Trees per Acre by Size Class and Condition



Acknowledgements

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