Where Has All the Root Rot Gone?
Ground truthing bear and root disease damage in western Washington

Daniel Omdal, Melanie Kallas-Ricklefs, and Jeff Moore, Washington State Department of Natural Resources


Bear damaged tree

Introduction

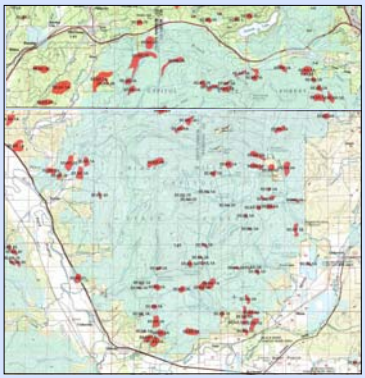
In 2002, approximately 1.8 million acres in western Washington contained trees killed or defoliated by insects and/or diseases. Bear damage, identified on more than 100,000 acres, was the most widespread west-side disturbance agent noted in the 2002 aerial survey. Damage caused by root disease, which when occurring in young Douglas-fir plantations and viewed from the air is virtually indistinguishable from bear damage, was noted on only 781 acres! Our objective was intended to validate bear damage and to determine the frequency with which root disease was found within these polygons.


Heterobasidion annosum diseased tree


Armillaria root disease

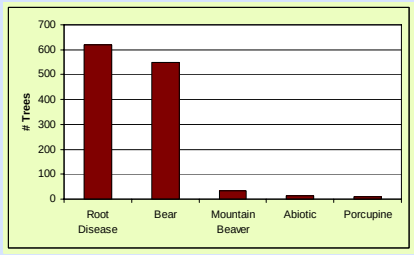
Methods

One hundred and three polygons, identified by the 2004 aerial survey data to have bear damage, were identified using the WA Department of Natural Resources aerial survey database. At each of the first ten dead trees within each polygon, the bole was examined for animal damage and the roots were exposed with a Pulaski to examine them for root disease.

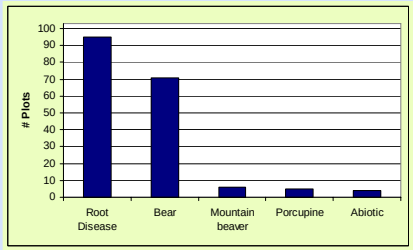

Aerial survey map of Capitol State Forest, WA, 2004. Each red polygon is labelled with a mortality agent and how many trees per acre is affected by the mortality agent.

Results

- 1,223 recently dead trees examined
  - Primary mortality agents were fungi and bears



- Bear damage occurred on 69% of polygons
- Root disease occurred on 92% of polygons



  - Root disease occurred as *Phellinus weirii*, *Heterobasidion annosum*, or *Armillaria* spp.
    - *Phellinus weirii* most frequently observed observed on 56% of dead trees

Bear damage and root disease survey locations in western Washington.

Results

- Bear damage was the primary mortality agent (i.e. associated with more trees than any other agent) on 54% of the polygons
- Root disease was the primary mortality agent on 44% of the polygons
- When areas with high bear densities (such as Capitol State Forest) were removed from data set:
  - Bear damage was the primary mortality agent on 44% of the remaining polygons
  - Root disease was the primary mortality agent on 54% of the remaining polygons

Discussion

The results indicate that root diseases, which clearly play significant roles as mortality agents in the forests of western Washington, are under--represented in Washington's annual aerial survey. Given the difference by which these two agents impact forest stands, as well as the different approaches available to mitigate the impacts of these two disturbance agents, more effort should be made to accurately assign damage codes to these polygons. Ground truthing is a reliable means of discrimination between damage caused by bears and root disease.

Natural Resources
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