Evaluating *Neonectria* in Red Alder on State Lands in Western Washington: Extent, Severity and Associated Ecological Conditions

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Rationale

Stem defects of red alder (*Alnus rubra*) were initially noted in Washington state in 1998 on Weyerhaeuser timberlands. The symptoms observed ranged in severity from spot-like bark lesions (Figure 1) to severe canker-caused tree mortality (Figure 2). After further investigation, the fungal pathogen *Neonectria major* was found in association with the cankers on the stems and branches of living and recently killed trees, as well as recently thinned slash. This canker fungus is of concern because alder is a keystone nitrogen fixing species and the value and utilization of red alder continue to increase in the Pacific Northwest.

Example of red alder plot.

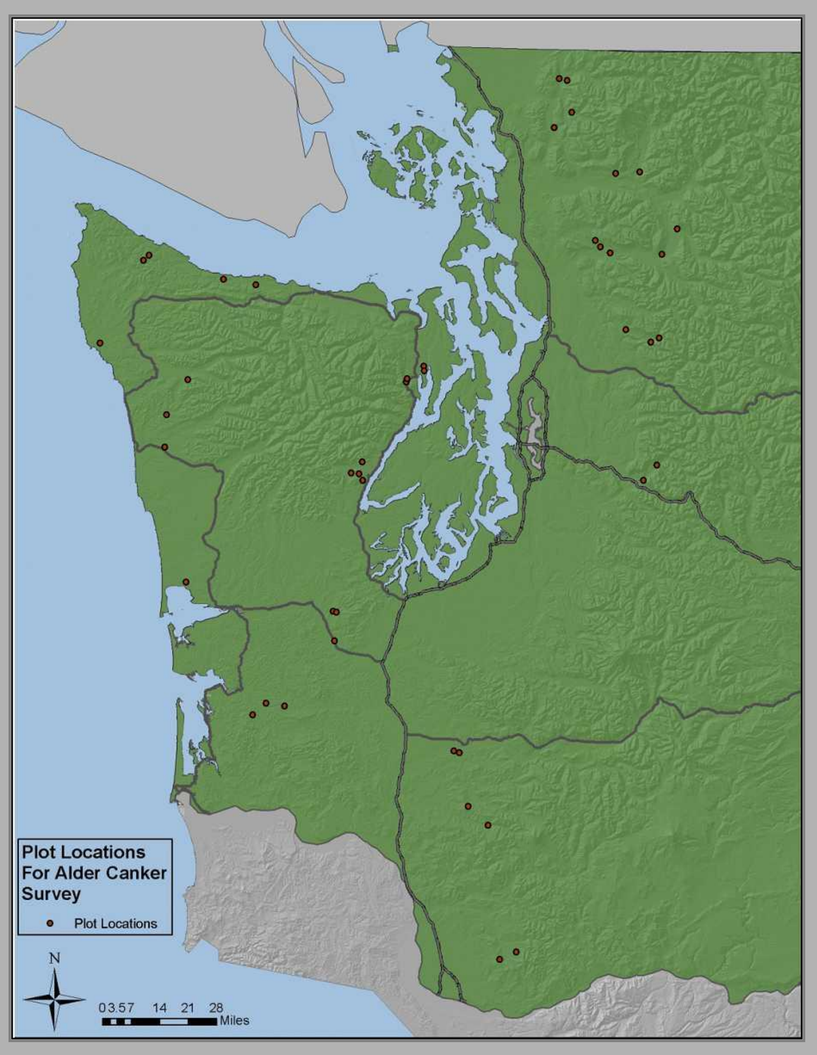


Figure 1. Spot-like bark lesions on red alder, also referred to as Type 1 cankers. Photo courtesy of Craig Cootsona, UW M.S. thesis.

Figure 2. Canker-caused tree mortality, also referred to as Type 3 cankers. Photo courtesy of Craig Cootsona, UW M.S. thesis.

Figure 3 (Below). Type 2 cankers on red alder.

Methods

45 sites surveyed on state lands in western Washington

Measurements and characters for each site:

- Basal area
- Elevation
- Biogeoclimatic zone
- Soil type
- Aspect
- Average stand age

30 trees examined at each site

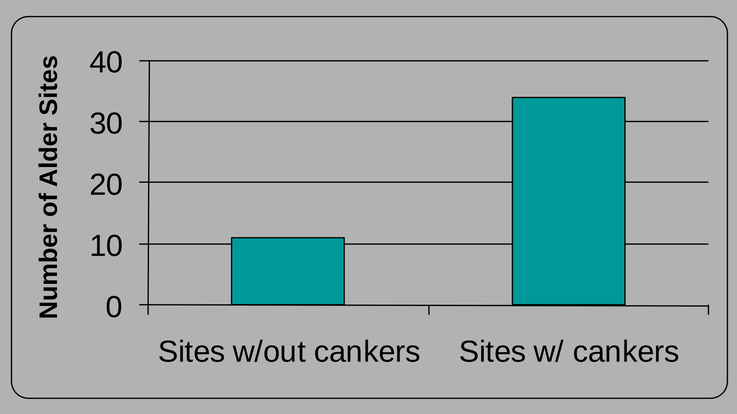
Measurements and characters for each tree:

- Diameter at breast height
- Canker presence and type
  - Type 1
  - Type 2
  - Type 3
- Crown class
  - Dominant
  - Co-dominant
  - Intermediate
  - Suppressed

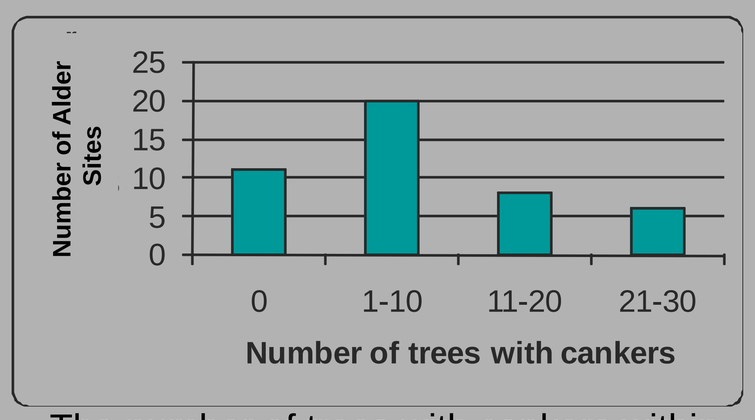
Results

There were no site or individual tree variables that significantly explained the presence or absence of cankers.

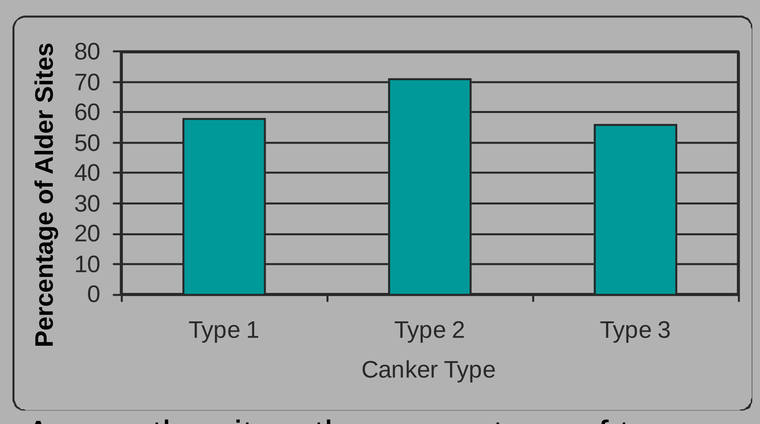
Neonectria perithecia were identified on 20% of the sites surveyed, but were only found on 1.5% of the trees.



34 sites had trees with cankers, while 11 sites did not.



The number of trees with cankers within each site. 20 sites had only 1-10 trees with cankers.



Across the sites, the percentage of trees with Type 1, 2, and 3 cankers ranged from 56-71%.

Discussion

Our results indicate that although *Neonectria major* is widely distributed across western Washington, it appears to be acting as a rather benign pathogen on red alder in naturally regenerated, riparian associated ecosystems. Cankers are common on red alder, yet rarely are they more than superficial. No attempt was made to determine the aggressiveness of *N. major*, but in most cases the fungus did not appear to discolor the xylem or cause major structural defects. Even though several Type 3 cankers were observed in this survey, in no case were they responsible for alder mortality. It remains unclear how climate change will affect the virulence of this pathogen on red alder.

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