

# Phytophthora ramorum Detection and Monitoring in Western Washington Waterways, 2014



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## OBJECTIVES

- 1) Detect *Phytophthora ramorum* (*Pr*) outside of plant nurseries.
- 2) Eradicate *Pr* when detected in landscape and forested ecosystems.
- 3) Reduce the ecological threat that *Pr* could pose on landscape and forested ecosystems in western Washington.

## INTRODUCTION

*Phytophthora ramorum* (*Pr*), an exotic plant pathogen, is the causal agent of Sudden Oak Death (SOD), ramorum leaf blight and ramorum dieback. The pathogen can move aerially through landscapes with wind and wind-driven rain, such as in the forests of Oregon and California (Fig. 1). The pathogen can also be moved long distances in nursery stock.

Western Washington is at risk for *Pr* caused diseases and *Pr* spread due to:

- hosts in the natural environment (Fig. 2)
- suitable climatic conditions (moist weather and mild temperatures)
- presence of plant nurseries with *Pr* infected host stock

To date, the pathogen has only been detected in locations that are either at or near plant nurseries in western Washington.



Figure 1. *Phytophthora ramorum* caused tree mortality near Carmel, CA. Photo by J. Moore, USFS Region 5.



Figure 2. Example of Rhododendron (susceptible to *Phytophthora ramorum*) understory found in some western Washington forests.

## SURVEY AND MONITORING 2003 - 2013

The Washington Department of Natural Resources (WA DNR) has been conducting aquatic monitoring and forest and nursery perimeter surveys since 2003 (Fig. 3). Until 2006, *Phytophthora ramorum* (*Pr*) had only been detected in western WA nurseries. In 2006, an aquatic detection was made in a stream running through a *Pr* positive nursery, resulting in positive *Pr* samples from the water. Since 2006, detection and monitoring efforts for *Pr* have focused on waterways associated with nurseries containing, or previously contained, *Pr* plants.

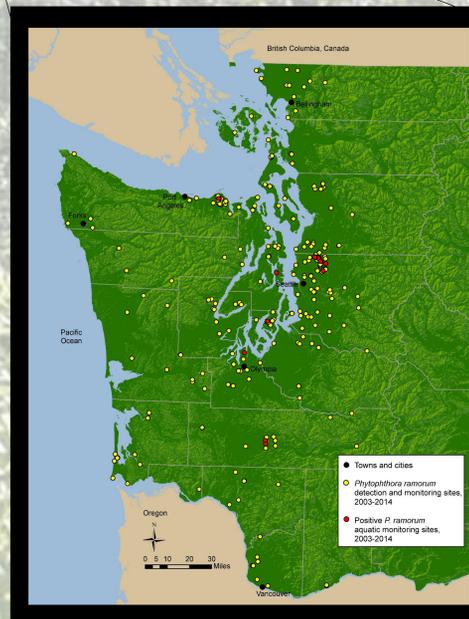


Figure 3. WA DNR *Phytophthora ramorum* monitoring, detection and survey sites, 2003-2014.

## 2014 METHODOLOGY

- Sites established in January, 2014
- Mix of stream baiting and bottle of bait detection method at each site (see details below\*)
  - 17 initial sites
    - selected by following *Pr* positive detections in nurseries
  - Replicates in March, May, June

\*In 2013, we changed our sampling methodology from stream baiting to the Bottle-of-Bait (BOB) method. Stream baiting involved placing rhododendron leaves into a mesh envelope (Fig. 5 & 6), then floating the envelope in the target waterway for one to two weeks. Stream baiting required two visits to the site for one set of samples.

BOB requires only one visit to each site for each set of samples. Multiple individual water samples are collected at each site and combined together in a large bottle. Rhododendron leaves are then placed into the bottles or are hole-punched into tiny pieces and those small pieces are placed into the water (Fig. 7 & 8). The leaves and the water incubate for 72 hours. The leaves and leaf pieces are then submitted to a lab for analysis and detection of *P. ramorum*.



Figures 5 & 6 (above). Stream baiting bags filled with Rhododendron leaves used for *Phytophthora ramorum* aquatic detection.



Figures 7 & 8 (above and right). Entire Rhododendron leaves and small leaf pieces incubating in water collected from *Phytophthora ramorum* monitoring waterways.

## RESULTS AND CONCLUSIONS

In 2014, seventeen *Pr* stream baiting sites were established in western WA waterways. **Positive samples were found in one waterway on Bainbridge Island in Kitsap County.** Since aquatic sampling began in 2005, *Pr* has been detected in water samples from eight waterways in western WA: two in King County and one in Clallam, Clark, Kitsap, Lewis, Pierce, and Thurston counties. Diseased plants have only been found associated with one of the waterways in 2010 (Pierce County) and were destroyed. *Pr* aquatic monitoring and detection work will continue in 2015.