

Phytophthora ramorum Detection and Monitoring in Western Washington Waterways, 2011



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Introduction

Phytophthora ramorum, 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. In California, hundreds of thousands of tanoak and oak trees have been killed by *P. ramorum* since first detected there in 1995 (Figure 1). The pathogen can also be moved long distances in nursery stock because of its ability to survive in plant material, soil and water.



Figure 1. *P. ramorum* caused oak mortality in Big Sur area of California.

Western Washington is at risk for *P. ramorum* caused diseases and *P. ramorum* spread due to the presence of known hosts in the natural environment (Figure 2), suitable climatic conditions (extended periods of moist weather and mild temperatures) and the presence of plant nurseries with positively identified *P. ramorum* 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 2. Example of rhododendron understory found in some western Washington forests. Rhododendron is susceptible to *P. ramorum*.

Survey and Monitoring: 2003 - 2010

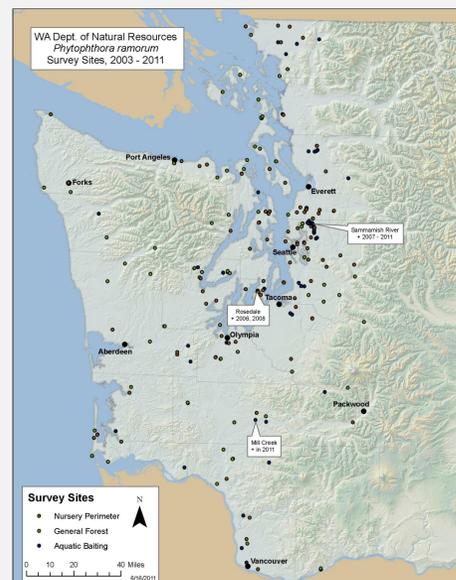


Figure 3. Washington DNR *P. ramorum* survey and monitoring sites, 2003 – 2011.

The Washington Department of Natural Resources (DNR) has been conducting aquatic monitoring and forest and nursery perimeter surveys since 2003 (Figure 3). Until 2006, *P. ramorum* had only been detected in western Washington nurseries. In 2006, an aquatic detection site established in a stream running through a *P. ramorum* positive nursery, resulted in positive *P. ramorum* samples from the water. Since 2006, detection and monitoring efforts for *P. ramorum* have primarily focused on water courses associated with nurseries identified as containing *P. ramorum* plant stock. From 2007-2010, *P. ramorum* was detected multiple times in the Sammamish River, King Co., WA using stream baits (Figure 3). During the 2010 survey season, three tributaries of the Sammamish River were positively identified with *P. ramorum*, indicating there were at least three entry points of *P. ramorum* inoculum into the Sammamish River. However, it remained unclear where the detected *P. ramorum* inoculum was originating from.

Objectives

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

Methods

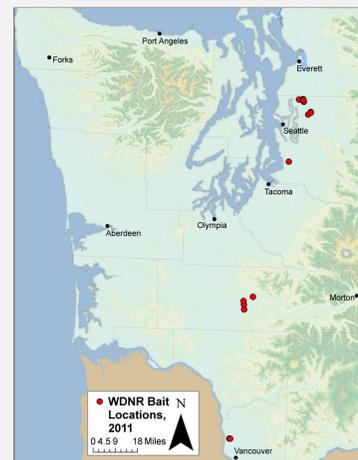


Figure 4. Location of Washington Dept. of Natural Resources 2011 *P. ramorum* stream baiting traps.

- o Sites established in February, 2011
- o Two *Rhododendron* leaf traps at each site
 - o 11 sites
 - o 4 watersheds
 - Sammamish River, King Co.
 - Green River, King Co.
 - Whipple Creek, Clark Co.
 - Mill Creek, Lewis Co.
 - o 5 additional sites selected following *P. ramorum* positive detections
- o Replicates from Feb. to July



Figure 6



Figure 5. Waterway and surrounding vegetation of positive *P. ramorum* site.



Figure 7

Figures 6-7. Each bait bag is a wire mesh envelope with slots for 4-5 rhododendron leaves. 2 bait bags are attached with rope, then the set is attached to a weight and placed into the waterway. The traps are left in place for approximately two weeks, then the leaves are collected for processing and new leaves are put into the traps.

Stream Baiting Results

- o Four new *P. ramorum* positive stream baiting sites
 - o Bear Creek (tributary of Sammamish River) (Figure 8)
 - o Little Bear Creek (tributary of Sammamish River) (Figure 8)
 - o Mill Creek, 2 sites (Lewis Co., WA)
- o Two repeat *P. ramorum* positive stream baiting sites (Figure 8)
 - o Associated with Sammamish River
 - o 1 repeat since 2009
 - o 1 repeat since 2010
- o 4 likely entry points of *P. ramorum* inoculum into Sammamish River

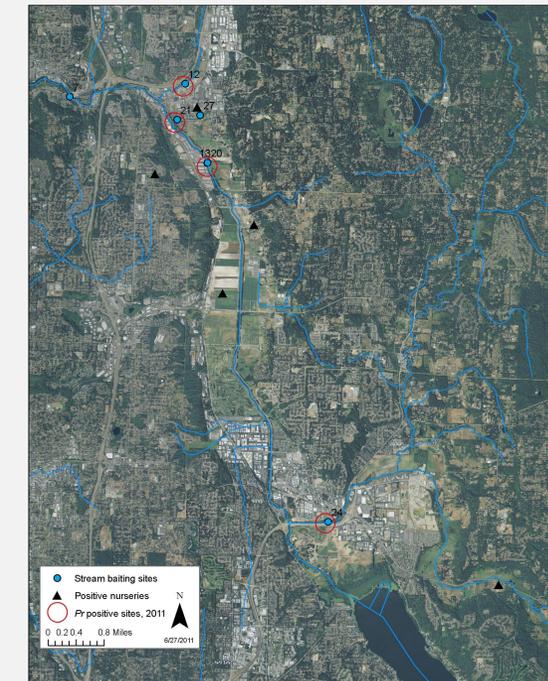


Figure 8. Map of stream bait sites in Sammamish River, King Co., WA. Positive *P. ramorum* sites circled in red (left). Pictures of positive *P. ramorum* sites below.

- = direction of waterway flow
- ★ = location of stream bait traps with *P. ramorum*



Site 21



Sites 13 & 20

Discussion

During our 2011 *Phytophthora ramorum* monitoring, six positive sites were identified. Four of the positive sites were new locations, while two of the positives sites were repeats from 2010 and 2009. Four of those were associated with the Sammamish River in King County, a river where positive samples have been found since 2007. The other positive waterway was a creek located in a forested area in Lewis County. The source of the *P. ramorum* inoculum remains uncertain, but in the waterways associated with the Sammamish River, genetic evidence from Dr. Gary Chastagner's lab (Washington State University) is pointing to previously positive nurseries. There have been no *P. ramorum* streamside plant infections found in association with the waterway positives, indicating that *P. ramorum* is not spreading from the waterways into the surrounding vegetation.

Questions may be directed to Daniel Omdal at daniel.omdal@dnr.wa.gov. This research was funded by a grant from the USDA Forest Service. This institution is an equal opportunity provider. Poster printed March, 2012.