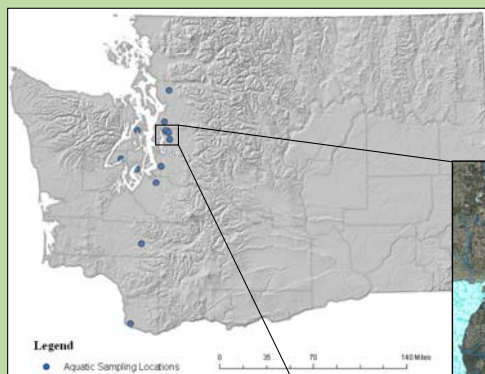


# Monitoring *Phytophthora ramorum* in Western Washington Waterways

Dan Omdal and Amy Ramsey, Washington State Department of Natural Resources

## Introduction

*Phytophthora ramorum*, the causal agent of Sudden Oak Death (SOD), ramorum leaf blight, and ramorum dieback, is responsible for killing native oak and tanoak trees in California and Oregon. Western Washington is at high risk for SOD due to the presence of known *P. ramorum* hosts in the natural environment, suitable climatic conditions (extended periods of moist weather and mild temperatures), and the presence of nurseries receiving positively identified *P. ramorum* host stock. While Washington's native oak species (Oregon White Oak) is not threatened by *P. ramorum*, Pacific madrone, maple, cascara, huckleberry, rhododendron, grand fir, and Douglas-fir are some of the susceptible native hosts. In early summer 2007, ten aquatic sites in western Washington were established and monitored for the presence of *P. ramorum*. One positive sample was detected and subsequently five more stream-baiting sites were established in efforts to detect the originating location of the *P. ramorum* infected material.



To left: map showing 2007 *P. ramorum* aquatic monitoring sites; Below: map showing aquatic sampling locations along Sammamish River (yellow) and locations of nurseries with positive *P. ramorum* plant stock (red) within watershed.



## Results

- ◆ 132 total aquatic samples collected
- ◆ *P. ramorum* positive samples in one stream\* (see *P. ramorum* Positive Results section for more information)

## Discussion

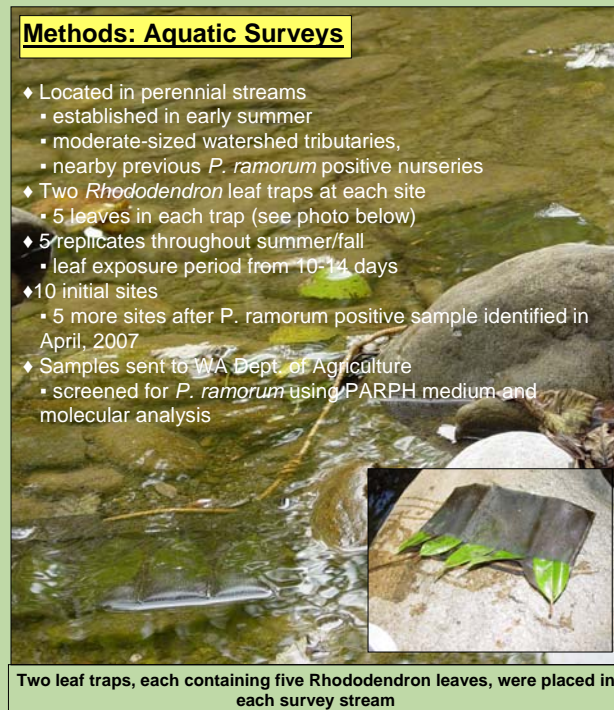
In April, 2007, *P. ramorum* was found in the Sammamish River, a waterway running between Lake Sammamish and Lake Washington in Seattle, WA. Delimitation aquatic sampling conducted by the Washington Department of Natural Resources has not resulted in any further positive *P. ramorum* samples. Delimitation aquatic sampling was also conducted by the Washington State Department of Agriculture (WSDA) and one positive *P. ramorum* sample was found in July, 2007, upstream from the initial positive sample.

After a streamside vegetation sampling conducted by the WSDA staff resulted in no further positive samples and a continued uncertain origination point of the *P. ramorum* inoculum, a molecular study was initiated.

The molecular study was a collaborative effort between Jennifer Falacy of WSDA and Norm Dart and Gary Chastagner of Washington State University. Genomic DNA was extracted from positive *P. ramorum* vegetation samples collected from nurseries in the Sammamish River vicinity and compared to the DNA extracted from the April, 2007, positive *P. ramorum* aquatic sample.

## Methods: Aquatic Surveys

- ◆ Located in perennial streams
  - established in early summer
  - moderate-sized watershed tributaries,
  - nearby previous *P. ramorum* positive nurseries
- ◆ Two *Rhododendron* leaf traps at each site
  - 5 leaves in each trap (see photo below)
- ◆ 5 replicates throughout summer/fall
  - leaf exposure period from 10-14 days
- ◆ 10 initial sites
  - 5 more sites after *P. ramorum* positive sample identified in April, 2007
- ◆ Samples sent to WA Dept. of Agriculture
  - screened for *P. ramorum* using PARPH medium and molecular analysis



## \**P. ramorum* Positive Results

- ◆ 2 positive *P. ramorum* samples from Sammamish River
    - One from WA DNR, April
    - One from WA Dept. of Agriculture, July
  - ◆ Vegetation sampled around stream
    - WA Dept. of Agriculture
    - all *P. ramorum* negative
  - ◆ Molecular Analysis comparing positive *P. ramorum* aquatic samples to positive *P. ramorum* nursery samples
    - No clear link as to where inoculum in Sammamish River came from\*\*
- \*\*more information in discussion section

The April, 2007, positive *P. ramorum* aquatic sample did have the same molecular fingerprint as a vegetation sample collected from a Washington nursery, but the nursery was outside of the Sammamish River watershed. The origination point of the *P. ramorum* inoculum baited in the Sammamish River remains unknown.