Sudden Oak Death in Oregon Forests, 2001-2005

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Sudden Oak Death (SOD), caused by *Phytophthora ramorum*, was first discovered in Curry county, Oregon in July 2001. Aerial photo records suggest that it was probably present there since 1998 or 1999. The disease occurs in forests and in forest-urban interface areas. The primary hosts in Oregon forests are tanoak (*Lithocarpus densiflorus*), Pacific rhododendron (*Rhododendron macrophylum*), and evergreen huckleberry (*Vaccinium ovatum*).

Symptoms on Evergreen huckleberry

P. ramorum-caused lesions on bole of tanoak

Rhododendron leaves infected by *P. ramorum*

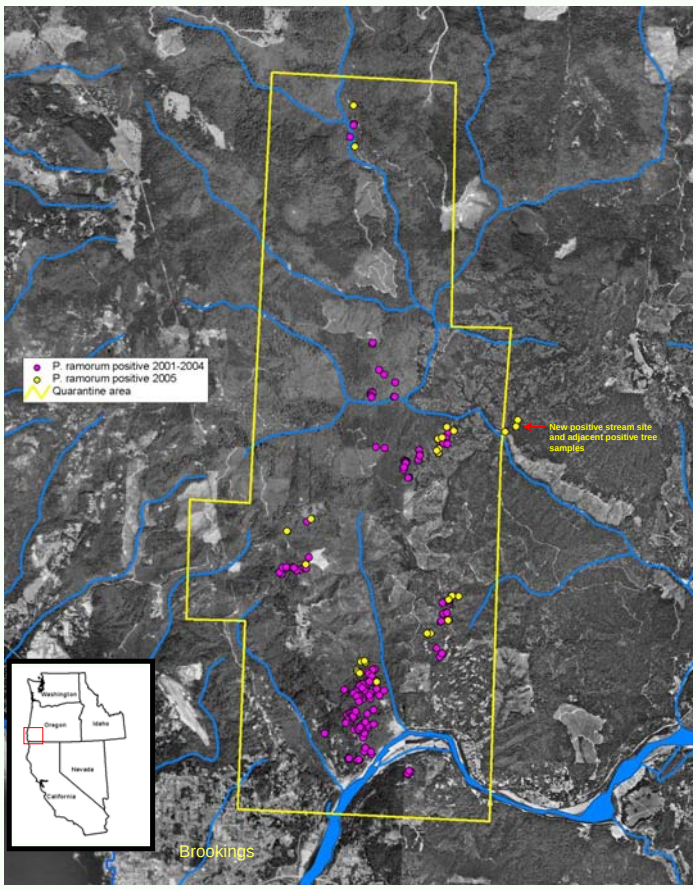
Aerial and Ground Surveys

Aerial view of a patch of dead tanoaks, June 2005.

Each year we conduct at least two fixed-wing aerial surveys searching for recently killed tanoaks in the forests of southwest Oregon. We then use a helicopter to obtain accurate latitude and longitude coordinates of dead trees. All dead tanoaks identified from the air are visited on the ground to determine cause of death and presence or absence of *P. ramorum*. We also conduct ground-based surveys to look for early indicators of infection on hosts in the vicinity of all known infestations of *P. ramorum* . We have also installed 29 National Protocol Wildland SOD survey plots, and have not detected *P. ramorum* on any of those plots.

SOD National Protocol Wildland Survey plots

Sudden Oak Death in Oregon, November 2005



SOD Detections from 2001 to 2005

Each year most new infected trees tend to occur close to existing infested sites and in a northerly direction from these sites, following a pattern consistent with aerial spread by prevailing rainy season winds.

Year	Number of tanoaks infected with *P. ramorum*	Number of new disease patches	Total acres in new disease patches each year
2001	100+	9	40
2002	85	12	8
2003	49	12	12
2004	30	9	10
2005	48	9	18
TOTAL		51	88

The Eradication Effort

Since 2001 we have been attempting to eradicate the pathogen by cutting and burning all infected host plants and adjacent apparently uninfected plants. Host species sprouted prolifically during the year following cutting and burning, and infected tanoak sprouts were found on half of infested sites. Follow-up treatments now include the chemical and mechanical destruction of sprouts to reduce survival of the pathogen. Since early 2005, tanoak trees are injected with the herbicide Arsenal (imazopyr) two weeks prior to cutting to prevent sprouting.

Eradication site immediately following burning

Eradication site one year later

Eradication site after herbicide treatment

Stream Water Monitoring

Rhododendron leaves suspended in stream water. Zoospores of *P. ramorum* are attracted to and colonize the leaf. Sections of the leaf are then plated on a selective medium, and yield colonies of the pathogen.

From March to December, 2005, we baited streams at 50 locations distributed from near the California border north approximately 20 miles. *P. ramorum* was isolated from baits at 8 of these sites at least once, most of them associated with known infested sites within the quarantine zone. One of the stream positive sites was located slightly east of the quarantine boundary. Two infected trees subsequently were found near this site, triggering expansion of the quarantine area.

Stream baiting sites

Monitoring Within Eradication Sites

Collecting soil samples from an eradication site.

We collect soil samples periodically from within infested sites and bait them with viburnum leaves. If *P. ramorum* is present in soil, zoospores swim to and infect the baits. We also collect symptomatic and non-symptomatic plants samples for direct isolation and PCR testing. In 2005 we collected soils (130 samples) and plant material (832 samples) from within the 33 sites that were treated in 2004 or earlier. We recovered *P. ramorum* from soils at two sites in the spring of 2005. We did not recover *P. ramorum* from any plant samples in 2005. The very low frequency of recovery from plant and soil samples (0.2%) suggests very low inoculum levels within eradication sites.

Conclusions

Despite several new occurrences of *P. ramorum* in 2005, distribution of the pathogen in Oregon forests remains within a small (11 square miles) quarantined area near Brookings. Extensive and intensive surveys in the forests of SW Oregon have failed to detect the pathogen beyond this area, suggesting that efforts to eradicate the pathogen and quarantine actions have combined to slow the spread of SOD. Eradication efforts will continue for several years.

Acknowledgements

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