



CALIFORNIA OAK MORTALITY TASK FORCE

CALIFORNIA'S 2005 *PHYTOPHTHORA RAMORUM* PROGRAM

Phytophthora ramorum, the pathogen known to cause Sudden Oak Death, poses a serious threat to forests and horticultural nurseries worldwide. While this pathogen is known to infect at least 40 different plant genera, its distribution in California is limited, making an aggressive and comprehensive program necessary to minimize its spread. In North America, this quarantine pathogen is found in the redwood/tanoak and mixed-evergreen forests of 14 coastal California counties, as well as in Curry County, Oregon, where eradication efforts are ongoing. The pathogen has also been detected in 155 nurseries in 20 states as well as several nurseries in British Columbia. In Europe, *P. ramorum* has been found in hundreds of nurseries in 11 countries, as well as on several wildland trees in the UK and the Netherlands.

This document outlines high-priority *Phytophthora ramorum* management, education, research, and monitoring projects that will be implemented in 2005 by various agencies and organizations in California. The California Oak Mortality Task Force (COMTF), comprised of public agencies, nonprofit organizations, and private interests, is coordinating California's response to this pathogen. Through a collaborative effort, California's *Phytophthora ramorum* program is working towards sustaining forests and landscapes, safeguarding the nursery industry, and promoting public safety.

The goals for California's 2005 *Phytophthora ramorum* program are:

1. Minimize pathogen spread, provide management strategies and information to sustain California forests and nursery industry, and promote public safety

Minimizing Pathogen Spread

The potential for future infection and pathogen spread is not fully understood, though concern is great. Currently, there is no known cure, and only limited preventative measures available for susceptible oak and tanoak trees; therefore, the primary defense available at this time is to minimize the artificial spread of the pathogen to uninfested areas. To accomplish this, the following priorities have been identified for quarantine policy and enforcement:

- **Continue implementing and strengthening regulations to prohibit human movement of the pathogen.** Work to ensure enforcement is consistent throughout California by providing training sessions to regulated and non-regulated counties, coordinate outreach activities, and provide written materials and an up-to-date website. Provide research updates to regulatory officials so quarantine policies and enforcement guidelines reflect recent research findings. Identify funding and resource needs necessary for 2006 quarantine efforts.

- **Provide additional support to Northern California coastal counties with limited infestations.** Assist Humboldt County with their *P. ramorum* Slow-the-Spread Project and appeal to reduce the size of the County's regulated area. Use Humboldt County's delimitation pilot project as a template for other counties with isolated infestations.

Management Strategies

Effective management of *P. ramorum* infestations in California's wildland settings varies with local conditions. In Northern California, pathogen distribution is limited; infestations did not spread as fast as was initially expected. Del Norte County remains uninfested and the *P. ramorum* detections in Humboldt County are contained to a few square miles in an area that is geographically isolated from other known infestations. Mendocino County has only four infested sites. Since the infested areas in Northern California are relatively small, a more aggressive, slow-the-spread and early detection monitoring program will be implemented to protect forests and other resources in these areas. Along the Central California Coast (particularly Sonoma, Marin, Napa, Santa Cruz, and part of Monterey County), where the pathogen is common, management strategies will focus on containing the pathogen so new areas are not contaminated. To meet disease management goals, the following priorities have been identified:

- **Provide protection to Northern California coastal areas with limited infestations.** Continue to implement the Slow-the-Spread Project in Redway, Humboldt County. Continue working with landowners of infested sites for early pathogen detection, as well as removal and treatment of infected plant material. Continue monitoring water, soil, and vegetation in and around the project area, as well as throughout the north coast.
- **Improve treatment protocols and develop additional treatments.** Refine preventive pesticide application techniques with phosphonate, as well as improve training materials and guidelines for its use. Evaluate limiting pathogen spread at the stand level by selectively removing California bay laurel. Evaluate the effectiveness of protecting oaks via applying phosphonate on California bay laurel. Compare and assess treated and untreated plants for long-term effectiveness of phosphonate use.
- **Strengthen Sudden Oak Death management in known infested areas.** Work with land managers to develop *P. ramorum* management plans for infested parks and forests. Identify needs for monitoring, employee and public education, and quarantine compliance and sanitation practices for infested parks, open spaces, and forest lands.
- **Promote best management practices to limit pathogen spread.** Artificial pathogen spread may be limited by sanitation practices and other best management practices (BMPs). Update the 2004 best management practices handouts and continue outreach to outdoor enthusiasts, forest users, land managers, landowners, and related industries. Complete tri-fold brochure inserts on BMPs for general handout use.

Information to Sustain California Forests and the Nursery Industry

As Sudden Oak Death has spread to more counties and jurisdictions, the need to facilitate communication between disparate entities has greatly increased. Through a coordinated approach, impacted groups will be afforded a platform to express concerns and explain issues, develop strategies and pool resources, define funding needs, and cooperatively implement ideas. To meet the goal of providing information and coordination in a timely and up-to-date manner, the following priorities have been identified:

- **Synthesize, organize, and update information on *Phytophthora ramorum*.** Maintain and expand the Task Force website (www.suddenoakdeath.org) so photos, maps, and other documents are current, downloadable, and easy to locate. Expand the research web page to include information on outcomes of funded research as well as other research updates. Expand the management web page, providing more user-specific information for affected entities, such as pesticide applicators and nursery industry professionals, as well as information on Slow-the-Spread projects and other management efforts. Update *P. ramorum* briefing papers and provide documentation on funding, research, and outreach activity. Update pest alerts and other outreach material to reflect current research findings. Develop a general regulations overview document. Provide year-at-a-glance summary reports of monthly *P. ramorum* activities. Assist other entities in development of outreach materials for a broader audience, including other state and national organizations.
- **Provide direction for California's *Phytophthora ramorum* program.** Develop California's long-term *Phytophthora ramorum* Strategic Plan and update the annual Strategic Plan. Define goals, objectives, and a work plan for 2006. Provide a funding needs document for use with State, federal, and other potential funding mechanisms.
- **Continue ongoing assessment of *Phytophthora ramorum*-related needs** for industries and groups impacted by the pathogen, including the nursery industry, arboriculture, forestry, utility companies, green waste and cottage industries, public agencies, horticulture industry, and others. Concerns and needs of homeowners, public and private landowners, outdoor enthusiasts, media, environmentalists, Native Americans, policy makers, and the general public will also continue to be determined and addressed. Continue to build ties with the CA nursery industry.
- **Offer outreach and assistance to affected parties.** Continue to provide assistance to Tribal Nations to help prevent pathogen spread and protect Tribal lands and resources. Focus training efforts in unregulated California counties, prioritizing them according by proximity to natural infection in regulated counties. Continue to provide training sessions for all other interested persons on pathogen recognition, treatment, sanitation, and regulations.

2. Further the understanding of Sudden Oak Death, *Phytophthora ramorum*, associated organisms, and environmental factors contributing to tree and plant mortality, in addition to identifying ecological impacts

Sudden Oak Death research and monitoring are the basis for policy, management, and education. Trees, shrubs, and herbaceous plants are all susceptible to *Phytophthora*

ramorum. As each of the more than 40 affected genera responds differently to the pathogen, research is required for each to understand how it is impacted by the infection and the role it plays in spreading disease. Additional research is also needed to develop practical treatments. Research priority areas include: pathogen biology, transmission and epidemiology, impacts of *Phytophthora ramorum* on ecosystem components, management and disposal, pathogenicity and resistance, plant nursery issues, and monitoring research.

Current research needs (most projects are underway) include:

- Compare the behavior and genetics of the North American and European populations of *P. ramorum*. Determine pathogen origin and how it was introduced to Europe and North America.
- Determine mechanisms for short and long distance spread in wildlands.
- Continue to investigate the role of *P. nemorosa*, *P. pseudosyringae*, and other *Phytophthora* species with habitats similar to *P. ramorum*.
- Use the elucidation of the *P. ramorum* genome to improve diagnostic tests, understand pathogen virulence, and develop effective treatments.
- Continue to develop a network of research plots in coastal redwood/tanoak and mixed-evergreen forests to determine pathogen spread, intensification, and impact.
- Determine factors driving pathogen spread in horticultural nurseries, including the effect of plant density, irrigation, potting mix composition, fertilization, and fungicides.
- Determine susceptibility of various cultivars of rhododendrons, Pieris, camellia, and other horticultural plants.
- Determine the viability of chlamydospores in soil, potting mix, compost, woody and herbaceous tissues, as well as recontamination rates of *P. ramorum* composted material.
- Investigate frequency and importance of root infection in horticultural hosts.
- Determine economic impacts from *P. ramorum*.
- Determine accuracy and precision of diagnostic methods used for *P. ramorum*.
- Determine extent of host resistance for coast live oak and evaluate application in a resistance breeding program.
- Determine the role of selected vertebrates (including humans) in local spread of the pathogen.
- Develop treatment strategies for Christmas tree plantations.

Monitoring

California's *P. ramorum* monitoring program will include early detection of the pathogen in new areas, and mapping of pathogen distribution in heavily infested areas. Early detection will facilitate pathogen containment, and in some cases, eradication or containment. To meet monitoring goals, the following priorities have been identified:

- Focus aerial and ground-based surveys on uninfested areas bordering infestations.

- Carry out aerial and ground-based early detection surveys in high-risk uninfested areas.
- Characterize the distribution of mortality in forests in heavily infested counties (Marin, Santa Cruz, Sonoma, and Big Sur area of Monterey County).
- Maintain a web-accessible database of pathogen distribution.
- Quantify forest impacts of *P. ramorum* in CA. Develop figures for number of trees killed and infected.
- Refine monitoring protocols for use in nurseries. Evaluate monitoring in water, soil, pots, and plants.
- Monitor San Luis Obispo watersheds for disease.

For more information on California's 2005 *Phytophthora ramorum* program, go to the COMTF website at: www.suddenoakdeath.org or contact Katie Palmieri, COMTF Public Information Officer, at palmieri@nature.berkeley.edu or by phone at (510) 847-5482.