CALIFORNIA'S 2004 SUDDEN OAK DEATH (*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 species, its distribution is limited, making an aggressive and comprehensive program necessary to minimize its spread. In North America, this quarantine pathogen is currently found in coastal redwood/tanoak and mixed-evergreen forests in 12 coastal California counties, as well as in Curry County, Oregon, where eradication efforts are underway. The pathogen has been detected in several nurseries in California, Oregon, Washington, and British Columbia. *P. ramorum* has also been found in hundreds of nurseries in 11 European countries and 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 2004 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 Sudden Oak Death. Through a collaborative effort, California's Sudden Oak Death program is working towards sustaining forests and landscapes, safeguarding the nursery industry, and promoting public safety.

The goals for California's 2004 Sudden Oak Death (*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 yet clear, though concern is great. Currently, there is no known cure and only limited preventative measures for Sudden Oak Death; therefore, the primary defense available 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, written materials and via other coordination activities. To keep the regulations current, updates will be provided to regulatory officials so quarantine policy and enforcement reflect recent research findings.

Determine resource needs for 2005 enforcement and seek adequate funding for quarantine program.

- **Provide clear direction to respond to new detections in previously uninfested areas**. Assist USDA Animal and Plant Health Inspection Service (APHIS) in development of a protocol for response to new finds of *P. ramorum* in wildlands outside the regulated area. Facilitate communication between regulators in the Western states.

- **Provide protection to Northern California coastal areas with limited infestations.** Assist Humboldt County in *P. ramorum* slow-the-spread project and appeal to reduce the size of Humboldt County's regulated area.

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 within a few square mile 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. Contact landowners for approval to remove and destroy infested trees. Monitor water, soil, and vegetation in the project area. Survey uninfested areas of Humboldt County for new infections.

- **Improve treatment protocols and develop additional treatments.** Refine preventive pesticide application techniques with phosphonate, improve training materials and guidelines for its use. Set up a research plot to evaluate limiting pathogen spread at the stand level by selectively removing California bay laurel.

- **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. Complete a set of handouts in 2004 with best management practices, including sanitation guidelines, providing guidance to outdoor enthusiasts, forest users, land managers, landowners, and related industries.

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 Sudden Oak Death.** Update the Task Force website (www.suddenoakdeath.org) so photos, maps, and other documents are current, downloadable, and easy to find. Expand the research and management web pages. Update Sudden Oak Death briefing papers and provide tables to track funding, research, and outreach activity. Revise pest alerts and other outreach materials so they reflect current research findings

- **Provide direction for California's Sudden Oak Death program.** Revise and complete California's Sudden Oak Death strategic plan and develop priorities and a work plan for 2005. Provide a funding needs document.

- **Continue ongoing assessment of Sudden Oak Death-related** needs for industries impacted by the disease, including the nursery industry, arboriculture, forestry, utility companies, green waste and cottage industries, public agencies, horticulture industry and others. Concerns of homeowners, landowners, outdoor enthusiasts, media, environmentalists, Native Americans, policy makers and the general public will also continue to be determined and addressed.

- **Offer outreach and assistance to affected parties.** Continue to provide assistance to Tribal Nations to prevent pathogen spread and protect Tribal lands and resources. Complete the California nursery diagnostic guide. Provide training sessions for all 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*. Each of the more than 40 affected species responds differently to the pathogen. Consequently, research is needed on each of the species to understand how it is impacted by the pathogen and the role the species 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. pseudopsyringae* and other *Phytophthora* species with habitats similar to *P. ramorum*.
- Use the elucidation of the *P. ramorum* genome to improve diagnostic tests and understand pathogen virulence.
- 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.
- Investigate frequency and importance of root infection in horticultural hosts.

- Determine the economic impacts *Phytophthora ramorum*.

Monitoring

California's *P. ramorum* monitoring program will focus on early detection, rather than mapping of pathogen distribution in heavily infested areas. Early detection will facilitate pathogen containment, and in some cases, eradication. To locate new infestations in a timely manner, the following monitoring priorities have been identified:

- Continue to refine the State risk model and use predictions to target survey locations.

- Implement a watershed monitoring network.

- Focus aerial and ground-based surveys on uninfested areas bordering infestations, such as Del Norte, Humboldt, Lake, San Benito, Southern Monterey, and San Luis Obispo Counties.

- Carry out a ground-based early detection survey in high-risk uninfested areas.

- Maintain a web-accessible database of pathogen distribution.

For more information on California's 2004 Sudden Oak Death program, go to the Task Force website at: www.suddenoakdeath.org or contact Lucia Briggs, California Oak Mortality Task Force Coordinator, at lbriggs@nature.berkeley.edu or by phone at (510) 642-5938.