United States Department of Agriculture

Forest Service

National Response Framework for Sudden Oak Death

October 2011

US Forest Service, Animal Plant Health Inspection Service, National Association of State Foresters, and the National Plant Board

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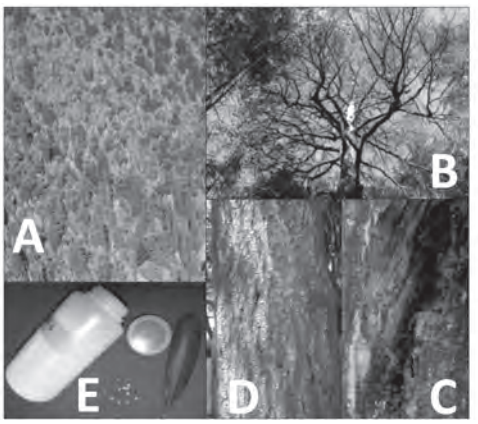

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Approval

This framework represents a combined national effort to address Sudden Oak Death caused by *Phytophthora ramorum* in forests and wildlands. We, the undersigned, approve this document and its intent toward better management of this disease.

USDA Forest Service

USDA Animal Plant Health Inspection Service

National Plant Board

National Association of State Foresters

National Framework for Managing Sudden Oak Death caused by *Phytophthora ramorum* in Forests and Wildlands

October 2011

US Forest Service, Animal Plant Health Inspection Service, National Association of State Foresters, and the National Plant Board

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Contents

Executive summary

Sudden Oak Death (SOD) caused by the invasive pathogen, *Phytophthora ramorum*, threatens oak woodlands, urban forests, and horticultural industries. Currently, the disease is established and regulated in forests and wildlands in California and Oregon. Given eastern oak species, and their associated understory forest plants have shown susceptibility to this disease, there is a potential risk to oak forests beyond the regulated areas. Sudden Oak Death is expected to have significant negative impacts beyond the known infestation should it become established, since the loss of oak would adversely affect ecosystem functions such as water quality, biodiversity, and forest structure.

The purpose of this framework is to outline a general plan to manage new finds of Phytophthora ramorum in forests and wildlands. The National Framework for Managing Sudden Oak Death caused by Phytophthora ramorum in Forests and Wildlands has been developed to link various levels of government, non-governmental groups, and private stakeholders to address the potential impact of Sudden Oak Death in forested landscapes. This framework has been assembled by a multi-disciplinary team of specialists, land managers, and researchers to provide an updated resource outlining detection, containment, and mitigation of P. ramorum should it be detected outside the current quarantine area. This report provides current information for P. ramorum in forest settings and centers on the following elements:

- Prevention – to limit the spread through known pathways.
- Detection – surveys in streams, vegetation, and on tree hosts.
- Response – new finds in forest require a multiple agency action.
- Management – containing through slash and burn reducing risk of spread.
- Restoration – resistance and non-hosts may provide key to recovery.
- Outreach – provides information transfer on all aspects of the disease.
- Research – continues to validate management and regulatory activities.

These elements are intended to help state foresters and agriculture officials, and local land managers prepare management options for new detections of P. ramorum in forests. The activities outlined here provide flexibility and are meant to be adaptive to specific field conditions. Success of the framework will require coordination and cooperation among local, state, and federal agencies. The framework does not set policy or direction for any agency. Themes common throughout the framework include partnerships, collaboration, communication, and education. This report does not address all the ramifications associated with P. ramorum. Instead, it is intended to highlight current management practice for the U.S. Department of Agriculture and its stakeholders that span Regulatory, Research and Development, State and Private Forestry, and the National Forest System. It further identifies current roles and responsibilities of the signatories; USDA's Forest Service and Animal and Plant Health Inspection Service, National Association of State Foresters, and the National Plant Board to better integrate our approach to managing SOD.

I. Introduction

Figure 1. SOD Distribution, provided by OakMapper.

Sudden Oak Death (SOD) was first reported in 1995, followed thereafter by validating the causal agent as *Phytophthora ramorum* in 2000. Since that time, it has become established in 14 coastal counties from Monterey to Humboldt in California, as well as in Curry County in southwest Oregon (Fig 1). Science-based investigations have determined much on the basic etiology and epidemiology of the disease, from which management strategies have been proposed integrating early detection, containment, and treatment measures. While it was only realized in 2004 that nursery stock was a significant pathway, it is hypothesized that *P. ramorum* may have been introduced via nursery stock as early as the mid 1990's and has been moving for a decade or more in the industry throughout the United States. This has resulted in a broader need for joint state and federal action. Today a considerable level of modifications to nursery practices, on-going nursery certification, and outreach has helped to reduce further spread from these operations. Attempts to eradicate, or contain, or slow-the-spread of *P. ramorum* in forests has met with some success, but effective management remains an on-going challenge.

Importance

Figure 2. Revised Sudden Oak Death Risk Map, Koch & Smith, 2008.

Phytophthora ramorum is an invasive nonnative plant pathogen that continues to pose a risk to the nation's forest resources. Efforts based on modeling suitable climate, distribution of known plant hosts, and likelihood of introduction were used to express risk in the conterminous United States (Fig 2). Experiences in the United Kingdom and greenhouse tests on eastern oak species such as northern red oak (Quercus rubra), southern red oak (Q. falcata), and pin oak (Q. palustris) have shown these trees to be as susceptible to P. ramorum as their west coast relatives. However, to date bole cankering on these oaks has been limited, likely due to the lack of a widely distributed understory host with similar sporulating potential as that of the California bay lau-

rel. Bole cankering in the United Kingdom typically occurs in the presence of Rhododendron ponticum when it is growing in close proximity to susceptible oaks. New discoveries from the UK now indicate that bole cankers occur on Japanese Larch (Larix kaempferi), growing interspersed with beech and mature Douglas-Fir (Pseudotsuga menziesii). This may have further implications for North American species of Larix and Pseudotsuga. The USDA Forest Inventory and Analysis (FIA) data reveal that oak trees comprise two-thirds of the eastern North American forest cover types and dominate 68 percent of hardwood forests on roughly 191 million acres in the United States. Consequently, the impact of P. *ramorum* is expected to be significant should the disease become established in eastern oak forests. A recent investigation on common forest plant species in the eastern understory showed a wide range of susceptibility to *P. ramorum* demonstrating their potential as inoculum sources under climatic conditions conducive to disease development. Since the greatest prospect for spread of *P. ramorum* is through proven nursery hosts, much of our current regulation is directed by APHIS and states in nurseries that ship and receive regulated articles. This has significant financial impacts on the nursery industry within the quarantined areas, as well as shipping partners in the east. Predictive modeling has identified various scenarios in terms of 'potential' risk to eastern forests. However, 'actual' risk remains a question since no *P. ramorum* has been established on oaks outside of the current quarantined and regulated areas in the west.

II. Roles

The US Forest Service (FS) has developed this framework in partnership with the Animal Plant Health Inspection Service (APHIS), the National Association of State Foresters (NASF), and the National Plant Board (NPB). This alliance provides a truly national agency assembly that crosscuts and integrates USDA, state foresters, and state plant regulators. The framework does not seek to obligate resources or set policy within these entities, rather outlines a collaborative approach for managing SOD in forests outside the currently regulated areas. These roles and responsibilities may be changed as needed in the future. APHIS retains the regulatory authority for *P. ramorum* as outlined in 7 CFR, Part 301.92, Federal Quarantine established on February 27, 2007. This quarantine governs all regulated, restricted, and associated materials coming to the nation's borders, as well as their interstate shipment. State Departments of Agriculture, as directed by their State Plant Regulatory Official (SPRO), further restrict the intrastate movement of regulated, restricted, and associated articles in harmony with the federal quarantine within their states. In all cases, states

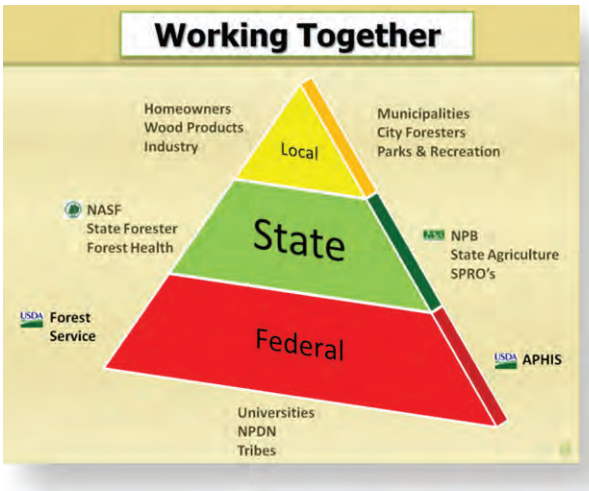

Figure 3. Many agencies must work together to implement effective SOD management.

retain the 'lead' regulatory authority and may impose less than entire state quarantine boundaries if efforts to contain and mitigate *P. ramorum* are made in the natural environment. State departments of forestry and natural resources can assist with containment efforts by working closely with landowners to manage their forest resources. The management of SOD across the nation will be complicated and depend on connecting many levels of local, state, and federal governments, as well as non-governmental groups and private stakeholders (Fig 3, page 4).

III. Responsibilities

APHIS administers the federal regulatory SOD program to prevent or minimize human-assisted interstate spread of ***P. ramorum*** from regulated and quarantined areas. This is done through the implementation of mitigation and eradication strategies in nurseries found with ***P. ramorum***. In addition, APHIS conducts studies and develops technology through its Center for Plant Health Science and Technology (CPHST) necessary to support regulations for ***P. ramorum***. Many states actively participate in annual SOD nursery surveys through their Cooperative Agricultural Pest Survey (CAPS) programs. Throughout, APHIS works cooperatively with the FS in preparing USDA programmatic environmental impact statements.

The FS works with willing partners and has no regulatory authorities on non-FS lands. FS continues to implement suppression projects when necessary directly on National Forest System (NFS) lands, and in cooperation with other Federal agencies, such as the Department of Interior's, Bureau of Land Management (BLM), state, tribal, and private land ownerships. Since 2006, the FS has conducted stream detection and monitoring surveys for high risk pathways on NFS lands, and works closely with state and private partners to determine presence or absence of *P. ramorum* on their lands. In addition, the FS continues to conduct research and methods improvement through research and technology development staffs, as well as supporting education & outreach activities to improve management of *P. ramorum*. The FS also works closely with APHIS and other Federal agencies in preparing USDA programmatic environmental impact statements needed to meet NEPA requirements on federal lands.

The National Association of State Foresters (NASF) is comprised of state forestry agencies across the nation. The national organization and its members work to develop and promote programs and activities that advance the practice of forestry, the conservation and protection of forest lands, and the protection of forests in the urban environment. Working through regional groups, NASF serves to improve management practices unique to *P. ramorum* across diverse forest resources in the US, in cooperation with partners and stakeholders, especially private forest land owners. Efforts to broaden interaction of NASF with other agencies are on-going and serve to better coordinate response strategies to *P. ramorum*. By improving the information transfer among state foresters, some of the direct benefits are to increase awareness of the SOD issue, especially to new state foresters and those not currently dealing with this disease. State forestry agencies provide supportive roles when implementing stream baiting surveys. Forestry and agriculture departments are often separate agencies within state government. Since invasive species impact both agronomic and forest products, many states have already formed joint in-

terdepartmental groups to develop appropriate response plans and strategies. It is essential for state agencies to work across department lines to best respond to *P. ramorum.*

The National Plant Board (NPB) provides national representation of the regional plant board's recommendations to foster effective and harmonized plant health programs across the US. The NPB provides guidance on principles, policies, and methods in the field of pest prevention and regulation. Much of their work requires direct communication with the public and private agencies and organizations on plant health and plant pest regulatory issues which affect each state as they seek to protect agriculture, horticulture, forestry, and the environment at state, national, and international levels. Since membership in this group is comprised of their State Plant Regulatory Official (SPRO), these individuals have the responsibility and authority to determine how their respective state will manage and respond to new incursions of *P. ramorum* in the forest. Many state agricultural departments are conducting *P. ramorum* surveys in their nurseries through the Cooperative Agricultural Pest Survey Program (CAPS) or the National P. ramorum Survey as directed by APHIS.

IV. Prevention

Prevention is recognized by program managers as an essential first step. However, because it is often attempted through the quarantine process, it is one tool and should not be viewed as a stand-alone solution. From the forestry perspective, as trees die from SOD, their movement as logs require regulatory treatments to mitigate the threat or otherwise the material must be used locally. Actions taken before hosts are infected should seek to limit primary pathways of spread to minimize the risk of SOD to the east. Successful prevention strategies are based on evaluating the risk, constructed from sound biological understanding of the causal agent. Nurseries are the first line of prevention, since they can serve as focal points in regulated areas in the west and ship to markets across the United States. Significant efforts to prevent movement of contaminated plant material are on-going and improved since nurseries were first implicated as a high risk pathway in 2004. Best Management Practices (BMP's) in nurseries are constantly being revised and improved as our understanding of this pathogen and its biology becomes available. Reduction of inoculum by removing infected trees and other sporulating hosts at disease centers reduces further spread of *P. ramorum*. Excluding the pathogen through prevention can be enhanced by outreach and education.

V. Detection

Since *P. ramorum* is a federally regulated pathogen a strict chain-of-custody must be followed and ultimately confirmed by APHIS, or one of its designated diagnostic labs. Sudden Oak Death, (SOD) is presently confirmed in 14 counties along the central coast of California, and the southwest corner of Curry County in Oregon. The disease has not been detected in forest landscapes outside the endemic areas on the Pacific coast. The US Forest Service began conducting annual detection surveys through its National Stream Baiting Program in 2006. This survey is voluntary and administered in collaboration with state forestry or other natural

resource agencies and supporting laboratories with funding, training, and logistical assistance provided by the US Forest Service. The areas to survey are determined from the climate/host type risk map, and/or confirmed trace forward nursery, or repeated stream bait positives, which serves to prioritize and focus monitoring frequency. These surveys continue to monitor the natural environment and are facilitated by state partners (17 states) to bait high risk sites. Once a positive sample is determined, intensive ground surveys of potential stream-side vegetation hosts should be undertaken as soon as possible to determine the source of the stream positives. These surveys must use local experts and be coordinated through appropriate state and federal agencies. Depending on jurisdictions and types of treatment needed, all stakeholders must be convened to develop the plan of action from the beginning of the event if not before the event actually happens. The key to successful management of *P. ramorum* is through early detection.

VI. Response

The decision to respond can be conceptualized as follows (Fig 4): A newly verified *P. ramorum* find must be thoroughly evaluated and confirmed by APHIS. If a stream positive is detected in a watershed, local effort to locate the source should be made as soon as possible. Response teams should be assembled from appropriate plant health specialists from state agriculture and forestry and corresponding experts from APHIS and the FS. This team should conduct upstream vegetation surveys on known or at risk species to determine if *P. ramorum* has established from the waterway to the landscape. Finally, if trees and herbaceous plants are found to be sources of inoculum, an intensive forest survey should be conducted to delimit and evaluate the extent of SOD in the forest. If *P. ramorum* is clearly established in the environment in a new area, eradication may not be feasible given the length of time the pathogen has been present. The focus should then be on containment and mitigating the impact. Regulators, such as the SPRO are then responsible for notification of the public once *P. ramorum* has been confirmed. State and federal regulators will then need to recommend the appropriate quarantine action to be taken within their perspective state. For example, the Oregon quarantine, as determined by the Oregon Department of Agriculture, encompasses 162 square miles, all in the Brookings area of Curry County, whereas in California the state regulates to the boundaries of the 14 counties where *P. ramorum* is known to be established in the natural environment.

Figure 4. APHIS establishes a chain-of-custody, State Plant Regulatory Official (SPRO) works with State Plant Health Director (SPHD) to set regulatory parameters, detection surveys testing positive with stream baits triggers search for probable vegetation hosts, if found early, attempt to eradicate, otherwise contain, and do long term restoration.

VII. Management

Figure 5. Oregon slash and burn treatment. Alan Kanaskie, Oregon Department of Forestry

In order to manage *P. ramorum* in a forest, it is critical to determine the extent of the infestation. This is why early detection efforts through stream baiting, aerial detection and ground surveys are vital to improve the effort to mitigate this disease. Our ability to manage SOD in forests is limited; however methods developed to slow-the-spread of the disease suggest promising results (Fig 5). The applicability of on-going efforts to contain SOD demonstrated in Oregon to other areas can only be implied, since it is uncertain how *P. ramorum* will behave in eastern forest types. Early detection remains integral to successful containment. Control strategies in California continue to focus on hazard tree removal, prevention of pathogen spread, as well as education and outreach. The Oregon model is currently being replicated to address a new find of *P. ramorum* in northern Humboldt County in the Redwood Creek Watershed Range in California.

Restoration

Restoration efforts to improve ecological function to the landscape or restore with non-susceptible hosts have yet to be accomplished. There are indications that resistance within tanoak and coast live oak in areas previously impacted by SOD does exist. Long term restoration will benefit from efforts to identify and propagate this resistance. Efforts to plant non-host plants may provide the best immediate response when SOD is present. Conservation of ecologically important oaks in an overall *P. ramorum* restoration program may one day be achieved through planting resistant hosts as these are developed. Landscape restoration strategies must be based upon sound ecological principles that include treatments that help recover resilience of ecosystems that have been degraded, damaged, or destroyed due to SOD. In the meantime, prevention and containment will continue to be our best management options, because once established *P. ramorum* is difficult to eradicate.

VIII. Outreach

All stakeholders should assist the media to provide science-based information on SOD to the general public. Timely updates concerning the science, quarantines, and the status of regulated articles will improve response programs and promote a consistent message. One of the best sources for updated material can be found at the California Oak Mortality Task Force (COMTF) website: www.suddenoakdeath.org. States that do not have *P. ramorum* in their forests may wish to consider SOD training and education workshops in advance to reach groups such as master gardeners and arborists. Public meetings in the affected community should

seek to bring together all affected stakeholders. The FS continues to organize and support information exchange between local agencies, community officials, and the forest industry to explain the benefit of proposed mitigation efforts. Newsletters, direct emails, press communications, and local news broadcasts are also critical in building support for proposed SOD management activities.

IX. Research

Since the discovery of the invasive *P. ramorum* in California and Oregon, a dedicated effort to understand the biology through research continues to provide support for measures to manage this disease. The volume of work is considerable and has been extensively reviewed in Sudden Oak Death and *Phytophthora ramorum*: A Summary of the Literature, PSW-GTR-234, www.fs.fed.us/psw/publications/documents/psw_gtr234. Notwithstanding these advances, answers to broader landscape questions are still needed. The role of stream positives and potential risk to oaks in eastern watersheds remains uncertain. More research is needed on factors that prevent *P. ramorum* success in eastern oak forests to improve certainties in our risk modeling efforts. In addition, improving existing stream baiting methods (bait-o-bottle) are on-going to increase detection efficiency, which will expedite rapid response to SOD.

Researchers are studying fungal antagonists such as *Trichoderma* species for use in nurseries to reduce *P. ramorum* viability in contaminated soil. Other promising techniques include the use of cedar chips on trails to reduce human-assisted movement of the disease, and chemicals such as Agri-fos® to protect high value trees. Advances in molecular biology are allowing for better tracking of the pathogen in nursery stock, nursery runoff, and waterways. Finally, in response to recent detections of *P. ramorum* in the UK, new efforts to examine the risks posed to conifers in the US are currently underway.

Further research on *P. ramorum* and its epidemiology are still needed. These research efforts will require funding that may be limited and will take time to produce useable results.

X. Conclusions

The purpose of this document is to alert and inform state foresters, agriculture officials, and legislative staff of the on-going invasive threat of Sudden Oak Death to the nation's oak resources. The implementations of specific activities outlined in this framework are flexible and based on the best available information at this time. All stakeholders have shared roles and responsibilities to develop contingency plans by working together to detect SOD as early as possible to reduce its movement outside the regulated areas. The FS has responsibility in developing, implementing, and promoting innovative management strategies in response to threats to the nation's forests. Likewise, APHIS has a regulatory role to prevent further spread of damaging agents and protecting natural resources. State forestry and agriculture agencies have corresponding roles within their respective states; especially the SPRO who must determine the extent of any regulatory action needed once SOD has been positively confirmed.

It is clear that once established in a forest, complete removal of the *P. ramorum* has a low likelihood of success given its broad host range, available pathways for spread, and complex biological life history. It takes continued diligence, collaboration, and constant monitoring; especially given many invasives have a long lag periods prior to fully expressing their disease potential. Collaborative management in practice has many challenges, but with lessons learned in CA and OR it may be possible to successfully mitigate the negative impacts of *P. ramorum*. To this end, the USDA Agencies and their partners continue to address the on-going threat of Sudden Oak Death.

Case Histories

Stream Detection–Georgia Forestry Commission

In 2010, the Georgia Forestry Commission conducted a follow-up to water positives in northeast Georgia to determine the presence or absence of *P. ramorum* blamed for west coast tree mortality. Stream baiting sites targeted watersheds near previously positive nursery sites with the assumption that many of these plants were sold and planted locally and could be causing further infections in the landscape undetected. Stream-baiting has been on-going in this area since 2008 (Fig 6). A cooperative effort was formed between Georgia Forestry Commission, US Forest Service, Georgia Department of Agriculture, Animal and Plant Health Inspection Service, and Clemson University to conduct a vegetation survey along the streams in this area. No vegetation samples collected during these surveys tested positive for *P. ramorum*. Stream baiting will continue at this site as part of an on-going SOD monitoring strategy. In the case of nursery positives, APHIS continues to implement the confirmed nursery protocol and take steps to eradicate. This illustrates the importance of a collaborative approach across agencies outside the existing regulated areas in the west, which will be the key to successful SOD management if the disease establishes in eastern oak forests.

Figure 6. Stream baiting using rhododendron leaves to detect P. ramorum. Steve Oak, USFS.

Vegetation Response–Washington Department of Natural Resources

In 2009, P. ramorum was found in a ditch outside a nursery on salal (Gaultheria shallon) and was eradicated following implementation of the APHIS confirmed nursery protocol in Pierce County, WA. This find demonstrates how watersheds can act as pathways when associated with previously positive nurseries. Since the initial discovery, the WA DNR has taken steps to contain and eradicate the isolated vegetation find. Road crews work to clear infected brush from the hillside, and then set it on fire to destroy potential sources of the disease (Fig 7). Urgency in this case is twofold, first salal is used by the floral indus-

Figure 7. Road crews work to burn road-side salal to contain SOD in the state of Washington, 2011.

try and shipped across the country, and second the disease may spread to native plants within the state, such as the state flower, the coastal rhododendron (Rhododendron macrophyllum). Once P. ramorum is found in the water, the options to reduce the spread are limited to efforts within the nursery to further reduce introductions to stream water via nursery water runoff. Best Management Practices (BMP's) in nurseries may seek to critically evaluate control points such as overhead irrigation in an attempt to minimize further spread of the pathogen. Early detection and on-going monitoring in this case triggered a response to eradicate this previously underestimated host.

Sudden Oak Death–Redwood Creek, California

In 2010, *P. ramorum* was detected by stream baits from Redwood Creek near Orick, CA. This is considered an important find, since it represents a significant jump of the previously known northern limit of SOD in Humboldt Co., CA. In order to locate the origin and source, additional stream sampling was conducted and road-based surveys of symptomatic bay leaves throughout the watershed were taken. Aerial surveys were then flown over the entire area, pin-pointing a collection of dead tanoak near a residential area known as 'Redwood Valley' (Fig 8). This detection is considered of recent origin, and attempts are underway to eradicate or contain SOD within the known area of infestation to prevent northward spread in Del Norte County and avoid quarantine expansion. In addition, eradication is being attempted to protect important resources, such as Redwood National Park and Hoopa Tribal lands, located to the north and east of the zone of infestation, respectively. A collaborative eradication effort was taken involving many stakeholders who have committed to aggressively attempting eradication. Industry has led the

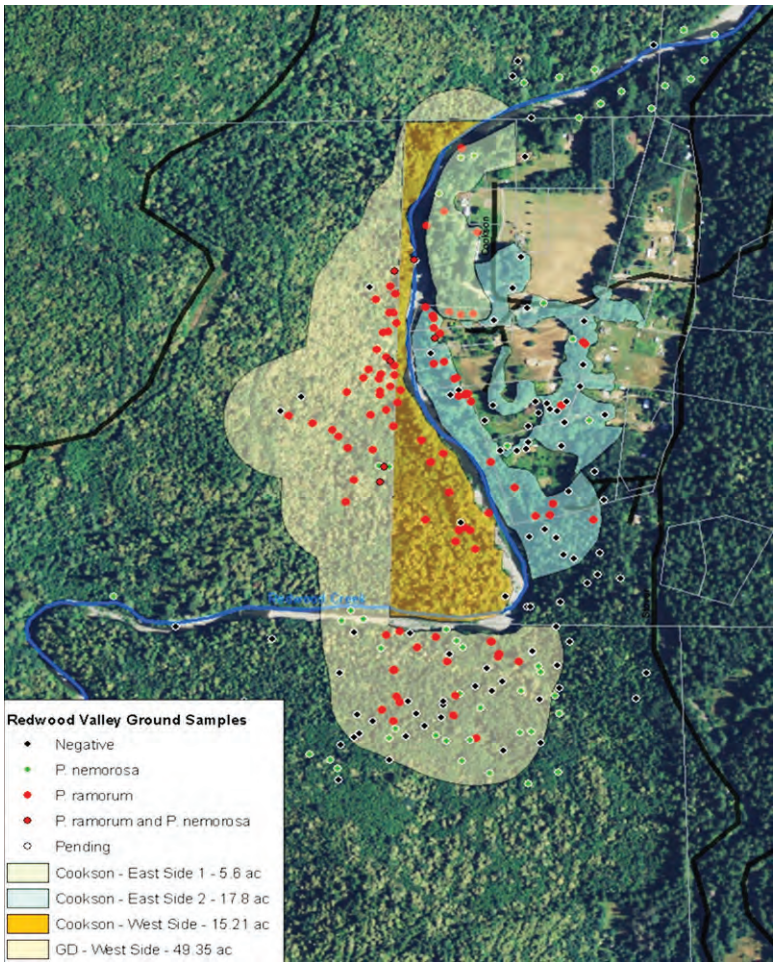

Figure 8. Confirmed positives from symptomatic foliage of tanoak and bay along Redwood Creek, CA. Phil Cannon, US Forest Service.

way on their properties with herbicide treatments using Imazapyr and glyophosate in order to reinforce containment. Management success will depend on multi-agency cooperation, communication, and a commitment to the objectives set forth in this action response plan. Managers must consider the costs and expected long term benefits to ensure project performance. Although it is anticipated and expected that these management activities will lead to a reduced threat from the current *P. ramorum* infection at Redwood Creek, it is expected that post-treatment sampling will also be necessary. Monitoring in Redwood National Park and nearby state parks will be an on-going priority.

Oregon Containment Response–Oregon Department of Agriculture and Oregon Department of Forestry

Since the fall of 2001, state and federal agencies have attempted to contain *P. ramorum* within infested sites of Curry County in southwest Oregon by cutting and burning all infected host plants and adjacent target hosts. This guidance is based on the best available science, and has adapted as new information for management has become available. As a result, only a 162 square mile area in southwest Curry County is quarantined (Fig 9). This containment effort is essential otherwise nurseries and forest industry would come under tighter control, (perhaps to the county level as in CA), negatively impacting commercial business to the north or statewide. Treatments seek to establish a containment zone that would include vegetation cut and burned located at least 300 feet from the nearest infected plant or adapted accordingly. This approach requires all tanoaks, regardless of size, be felled and all understory brush and fern species cut. Other target hosts include evergreen huckleberry and rhododendron when it does not conflict with safe burn operations. In addition, conifers up to 16- inch diameter are felled

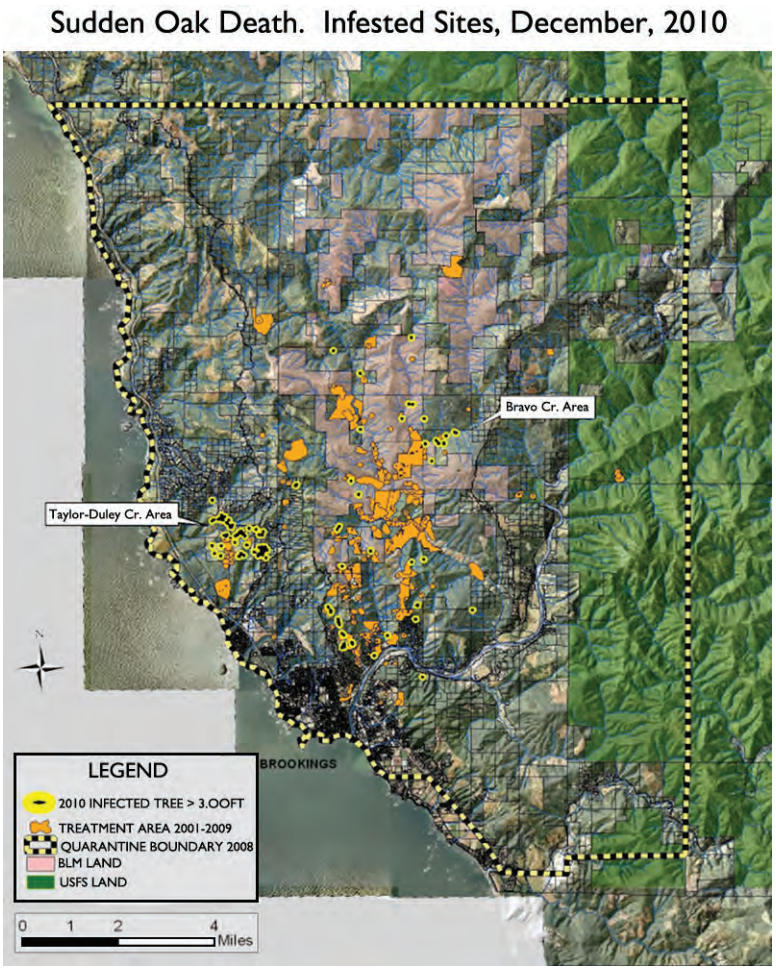

Figure 9. Curry County Oregon Quarantine.

as part of the operation. Conifers that are cut are generally not removed from the site. Since tanoak acts as the primary source of *P. ramorum* in Oregon, in areas where they form closed canopies are prioritized, cut and piled in addition to the limbs and foliage. The objective in burning is to achieve complete consumption of all foliage and material under 4-inch- diameter within the eradication zone. Follow-up treatments are recommended which seek to further cut, pile, and burn re-sprouts in successive years. This on-going effort involving multiple agencies, led by the Oregon Departments of Agriculture and Forestry has kept the established quarantine localized within Curry County and continues to provide the best model for responding to SOD in forested landscapes, assuming resources are available.

Appendix A

Framework Development

Executive Group – Establishes outline and oversees the Technical Working Group.

Technical Working Group – Serves to lead and coordinate SOD readiness and provide an overview of current science in the framework.

Technical Review Team – Provides comment on the framework.

External Review Team – Includes FHP Director's impacted by SOD.

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Appendix B

Links

National Association of State Foresters (NASF)
http://stateforesters.org/

National Plant Board (NPB)
http://nationalplantboard.org/

National Association of State Departments of Agriculture (NASDA)
http://www.nasda.org/

National Plant Diagnostic Network (NPDN)
http://www.npdn.org/

Phytophthora ramorum /Sudden Oak Death (APHIS)
http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/

California Oak Mortality Task Force (COMTF)
http://www.suddenoakdeath.org

Sudden Oak Death, Forest Health Protection, Southern Region
http://www.fs.fed.us/r8/foresthealth/programs/sod/sod.shtml

Additional Links

7 CFR, Part 301.92
http://ecfr.gpoaccess.gov/cgi/t/text/textidx?c=ecfr&sid=562f21e2392fbc87c7ce9b896acaff10&rgn=div6&view=text&node=7:5.1.1.1.2.24&idno=7.

The Principal Laws Relating to USDA Forest Service State and Private Forestry Programs
http://www.fs.fed.us/spf/coop/library/SPF-CF%20handbook.pdf

Sudden Oak Death and ***Phytophthora ramorum***: A Summary of the Literature
http://www.fs.fed.us/psw/publications/documents/psw_gtr234.

SOD Distribution Map
http://oakmapper.cnr.berkeley.edu/pdf/California.pdf

The Nature Conservancy GIS Map of Sudden Oak Death Risk
http://gis.tnc.org/data/MapbookWebsite/map_page.php?map_id=137