The following is a reproduction of the 2010 Sudden Oak Death Guidelines for Forestry. This version is incorporated by reference into the Forest Practice Rules, and as such has regulatory effect, but it is not the most recent version of the document. For more current information, interested parties may visit http://www.suddenoakdeath.org/.

Sudden Oak Death Guidelines for Forestry

A plant disease known as Sudden Oak Death is threatening coastal forests in California and Oregon. Currently found in 14 coastal counties from Monterey to Humboldt, the disease is caused by the pathogen *Phytophthora ramorum*. To date, hundreds of thousands of tanoak and oak have been killed by this disease. In addition, more than 30 other native tree and shrub species are susceptible to the organism, yet most of these species suffer only minor damage, limited to leaf spots or twig dieback. *P. ramorum* may be transported to new areas when infected plants, infested soil, or contaminated water are moved. This guide provides simple, practical information on how to work in forests without unintentionally moving the pathogen from one area to another.

Regulations

The following California counties have confirmed *Phytophthora ramorum* findings and are under State and federal quarantine: Alameda, Contra Costa, Humboldt, Lake, Marin, Mendocino, Monterey, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma. The organism has also been found in Curry County, southwestern Oregon. These quarantined areas are subject to regulations regarding the movement and use of susceptible plants. County Agricultural Commissioner's enforce both California and federal regulations.

The California State Board of Forestry and Fire Protection has approved the establishment of a Zone of Infestation (ZOI) for Sudden Oak Death (SOD) covering all portions of the 14 infested counties identified in the CDFA Section 3700 regulations. Pursuant to 14 CCR 917.9(a) [All Districts], the RPF shall identify feasible measures to mitigate adverse infestation or infection impacts from timber operations (PCR 4527). Long-term plans such as NTMP's should re-assess Sudden Oak Death mitigations within each proposed Notice of Timber Operations (14 CCR 1090.7). Other CAL FIRE permitted projects, such as Exemptions, are required to follow all operational rules, and must therefore be conducted in a manner that minimizes the spread of SOD.

Before moving susceptible plant material outside the regulated area, you must contact your local County Agricultural Commissioner for a permit or have an active harvest plan that either includes SOD mitigations or has a currently valid, negative finding, "free-from" survey. USDA Forest Service and other agency firewood permits may serve as your permit or compliance agreement. Current California regulations require a permit for movement of any regulated article from the 14-county regulated area to anywhere outside of those 14 counties. Current federal regulations require a permit (certificate) or treatment before moving any regulated plant material from the 14 infested counties to areas out of the state. Federal rules regulate soil movement from infested counties out of the state, but California does not currently regulate soil movement within the state. Currently there is no provision that allows moving any host material out-of-state under the federal regulations without removing all bark, or an approved treatment prior to shipment our-of-state. Even when bark is removed, a certificate must be obtained prior to shipment. State and Federal regulations apply when infected hosts are removed during timber operations. Regulated host material cannot leave the ZOI except as authorized through an approved harvest document with either a valid "free-from" survey or where mitigations have been addressed minimizing the spread of the pathogen. Mitigation measures must be discussed in harvest documents due to the declarations of the 14-county area as a Zone of Infestation by the Board of Forestry and Fire Protection Regulations even when host logs are not being moved offsite. NOTE: a free-from

survey is allowed only if the regulated articles are not moved interstate. The free-from survey is valid for a period of one year from the date of survey if no symptomatic hosts are found, or one year from the date of negative lab findings of symptomatic host samples.

Hosts, Symptoms, and Diagnosis

The symptoms of Sudden Oak Death can be dramatic (Photo 1), as with the mortality of large and small tanoaks, or subtle (Photo 2), such as leaf spots on California bay laurel. The nature and progression of the infection varies in each host species, and even within a given species. *P. ramorum* symptoms are difficult to distinguish from several other common diseases. Foresters may be more confident in their preliminary diagnosis and the need for laboratory analysis if they observe multiple external and inner bark symptoms as well as symptoms on other hosts in the immediate area. If you see several symptomatic host plants (Photos 3 & 4) next to bleeding oaks and tanoaks (Photos 5 & 6) you may be in an infested area.

Photo 1. Forest in Marin County with tanoak trees killed by Phytophthora ramorum*.*
(Photo by B. Tkacz, USDA Forest Service.)

Photo 2. California bay laurel (also called pepperwood, or Oregon Myrtle) showing leaf spots typical of Phytophthora ramorum*. (Photo by Bruce Moltzan, Missouri Department of Conservation.)*

Photo 3. Bay laurel leaf spots. (Photo by Matteo Garbelotto, University of California, Berkley.)

Photo 4. Rhododendron leaf spots. (Photo by B. Moltzan, Missouri Department of Conservation.)

Photo 5. Bleeding cankers on a coast live oak trunk. (Photo by Matteo Garbelotto, University of California, Berkeley.)

Photo 6. Bleeding cankers on a tanoak trunk. (Photo by Pavel Svihra, UC Cooperative Extension.)

Photo 7. Canker under bark on coast live oak trunk. (Photo by Matteo Garbelotto, University of California, Berkeley.)

California bay laurel is a good indicator plant to check for symptoms. Although damage is limited to leaf spots, these trees are often the first plants to show symptoms in a newly infested area. Note that on California bay laurel, leaf spots are typically near the leaf tip, they are not on every leaf, and they may be hard to see from far away. While inspecting for leaf spots, focus on lower branches as this is where the disease is commonly found and leaves are more accessible.

A more thorough guide to symptoms and list of susceptible species is available at www.suddenoakdeath.org. You can also find listings for upcoming diagnosis and treatment training sessions online.

Mitigation & Management Recommendations

Infested forests

If possible, avoid working in areas that are known or appear to be diseased. If you cannot avoid infested areas, follow the sanitation practices below when working in the known infested areas. If you don't know if the site is infested, play it safe and assume that it is. Maps of infested areas are available online (see Resources). These maps do not note every diseased area but can give you a general idea of the infested areas in California.

Pathogen biology and risk of spread

Phytophthora ramorum prefers moist environments and cool temperatures, and can be found in living, dying, or recently dead plants. During wet periods, the organism seems to be most active and therefore most likely to start new infections. Its spores can be found in soil, water, and plant material. The risk of movement and spread of the organism is greatest in muddy areas and during rainy weather. If possible do not work in infested forests during the wet, rainy, and cool times of the year. Generally, avoid working in muddy conditions.

Sanitation and Recommendations

Timber operations which minimize or avoid the introduction, build-up, or spread of SOD are considered Best Management Practices (BMPs). Specific state and federal regulations must be followed, but BMPs should be incorporated, and could act as timber harvest plan mitigations. Infected host material (especially foliage) can be carried on logging equipment and vehicles and transferred to other sites. Mitigation measures to minimize the unintended movement of host material are recommended. The following (or similar) mitigation measures should be implemented to the extent practical and may be required for timber operations regulated by the State. Even if regulated articles do not move from the ZOI and are therefore not subject to state or federal regulations, CCR 919.9(a) still requires mitigation in timber harvest plans on state or private property for a pest covered by a ZOI.

• RPF (or LTO for most Exemptions) should inform personnel that they are working in an area with Sudden Oak Death disease, unauthorized movement of plant material is

prohibited, and the intent of mitigation measures is to prevent disease spread (14 CCR 1035.2). If some sites in the general operating area are found to be disease-free or have a low incidence of disease, consider initiating operations on these sites before moving to more heavily infested sites.

• To the extent practical and feasible, route equipment away from host plants and trees, especially in areas with disease symptoms. Locate landings, log decks, logging roads, tractor roads, and other sites of equipment activity away from host plants, especially areas with disease symptoms.

• Each time equipment or vehicles leave the site, the equipment or vehicles should be inspected by operations personnel for host plant debris (leaves, twigs, and branches). Host plant debris should be removed from equipment and vehicles prior to their departure. This applies to all equipment and vehicles associated with the operation, including logging equipment, log-hauling trucks, pick-up trucks, employee's personal vehicles, etc. An exception will be granted for equipment or vehicles that leave the site temporarily and will not be traveling to uninfected areas prior to their return.

• Conduct operations during the dry season. Utilize paved and rocked roads and landings to the extent possible.

• After working in an infested area, remove or wash off accumulations of soil, mud, and organic debris from shoes, boots, vehicles, and heavy equipment, etc. before traveling to an area that is not infested with Sudden Oak Death. Lysol® or a bleach solution can be used to disinfect shoes and boots after cleaning.

• Inspect loads of logs and equipment leaving the site to ensure that no host material is being transported without a permit. This may require cleaning mud from vehicle to remove host plant material imbedded in mud depending on conditions when the timber harvest is conducted. Consider establishing an equipment power wash station. The station should be located within the generally infested area; paved or rocked; well-drained so that vehicles exiting the station do not become contaminated by the wash water; located where wash water and displaced soil does not have the potential to carry fines to a watercourse (see "Saturated Soil Conditions" in 14 CCR 895.1); pay particular attention to sites where soil and organic debris may accumulate.

Firewood

If firewood from host material is being removed from the regulated area for commercial or private use, a compliance agreement must be in place. The information as to where and what is being removed, how it will be transported, specifically where it will be moved to, and during what time should be included in the harvest document if the document will act as the compliance agreement. If this information is not included in the plan, a separate compliance agreement may be necessary. Contact your local County Agricultural Commissioner to obtain any necessary compliance agreements not covered by the plan. Always secure loads completely when transporting firewood or other materials.

Treatments

There are treatments or processing protocols that can be done to minimize the risk of spread. Removing the bark allows the wood to dry and permits movement within the state and out of state with a certificate. If bark is removed or other parts are not used, burn the excess materials if possible. If burning is done, make sure it is done in a safe and approved manner. Burning poses no risk of spread since the organism is killed in the fire. When storing material, keep it dry and out of any standing water. Kiln drying also will kill the organism.

Drafted water

Infested water has not been proven to be a pathway for *P. ramorum* to cause new infections in forested areas but has been shown to cause new infections in nurseries. Hence, drafted water has the potential to spread spores of the pathogen onto roadside hosts during dust abatement operations. Spores of the pathogen have been recovered from water collected beneath infected hosts, as well as from creeks and streams in infested areas.

Water is not regulated under either state or federal quarantine regulations. However, the following practices may minimize the unintentional introduction of the pathogen:

• If water is drafted and used for dust control, draft water from areas upstream of known infestations or from uninfected drainages.

• If drafting from known infested watercourses, do not water roads with that source in areas that are not known to be infested.

• If water is being drafted under a 1600 Series agreement with the California Department of Fish and Game and or used in both infested and non-infested areas, they may require treatment with Ultra Clorox, like the recommended water treatment for *P. lateralis*, which causes Port-Orford Cedar Root Disease. The registration rate is 1 gallon of Ultra Clorox Bleach per 1,000 gallons of drafted water.

• Do not use untreated water from infested areas for irrigation of host species nursery stock. Off-road approaches to drafting sites should be sufficiently rocked to minimize accumulating infested soil on drafting vehicles.

Snag retention

As stem-infected oaks and tanoaks decline and die, they are invaded by other wood decaying organisms and bark beetles. Such trees are prone to early structural failure, often breaking off several feet above ground. When selecting snags or recruitment trees for snags as a benefit for wildlife use, do not select SOD-infected trees.