



CALIFORNIA OAK MORTALITY TASK FORCE REPORT MARCH 2011

NURSERIES

The NA2 *P. ramorum* genotype has been detected in retail nurseries in five California counties. Originally only confirmed in Sacramento County in 2005, it has since been found there in 2008 and 2009. It has also been found in San Mateo (2008), Contra Costa (2009), Placer (2010), and Sonoma (2010) Counties. The Sacramento County nursery has made efforts to eliminate the pathogen from the premises; it was not detected in the March 2010 survey. The Sonoma and Contra Costa County nurseries have had repeat confirmations in previous years; however, it is unknown if the positives have always been the NA2 genotype. The San Mateo County nursery has had all three genotypes (NA1, NA2, and EU1) and only sells within the infested area. According to the USDA Animal and Plant Health Inspection Service *P. ramorum* regulations, nurseries in the infested counties that do not ship out of the infested area must adhere to CDFA nursery standards of cleanliness. Infected plants must be destroyed but the nursery is not required to undergo the USDA confirmed nursery protocol. The NA2 genotype is also showing up with greater frequency in Washington state nurseries (as reported in the March 2010 COMTF newsletter).

A nursery in Cowlitz County, Washington that has had *P. ramorum*-positive water onsite since 2008 has been found to have a new positive water location on the southeast corner of the nursery along a county road right of way. The new location drains into two separate small streams. The Washington State Department of Agriculture has placed water baits in these two streams to detect any potential spread of the pathogen. The genotype detected in all of the water positives to date has been NA1.

The Oregon Department of Agriculture (ODA) started the 2011 Federal Order Survey of interstate shippers on March 1, 2011. In addition to the required inspection and testing, ODA will be checking for issues such as standing water and presence of leaf debris in the nurseries. The goal is to help nurseries identify ways *Phytophthora* could be entering their establishment.

MONITORING

Fifteen *P. ramorum*-positive water samples were confirmed in Washington state in January 2011. The only new location was the Cowlitz County nursery (see "Nurseries"). All other locations have had prior water positives. Little Bear Creek (King, Snohomish County) has been positive since 2010 (the mouth of the creek on the Sammamish River was first positive in 2009). All genotypes have consistently been NA2. The two current confirmations were from locations that have previously been positive. The perimeter of the former nursery site near Gig Harbor, Pierce County continues to be positive (since 2009). All genotypes have been NA2 with the exception of one NA1 sample in 2010. Five positives have currently been identified at the site: two from the south retention pond of the former nursery, two from the drainage ditch immediately south of the nursery, and one from the terminal end of Wollochet Creek which empties into Puget



Sound. The King County nursery perimeter ditch, which empties into the Sammamish River, has been positive since 2010. Seven samples were confirmed in 2010 and two have been positive in 2011. All samples have been the NA1 genotype. The Rosedale Stream, Pierce County (near Gig Harbor) has had numerous positives since 2006. The genotype of the current sample was not determined, but previous samples typed as NA1. Additional tests are pending.

REGULATIONS

[An amendment has been made to the January 28, 2011 Federal Order \(DA-2011-04\)](#) requiring advance notification for certain shipments of *P. ramorum*- host nursery stock. The counties of Santa Barbara (CA), Ventura (CA), Lincoln (OR), and Kitsap (WA) have been removed from the list of affected counties. This action was taken because Santa Barbara and Ventura Counties only detected *P. ramorum* on trace-forward plants and not on host plants grown within the interstate shipping nursery premises; Lincoln County has no *P. ramorum*-positive interstate shippers; and Kitsap County does not have an interstate shipping nursery that has previously tested positive for the pathogen. The amended Federal Order is immediately effective and supersedes the Federal Order dated January 28, 2011 (DA-2011-04). All other counties listed in the January 28 Federal Order (DA-2011-04) as an affected quarantined and regulated county in California, Oregon, and Washington remain the same.

A "Workshop on APHIS/National Plant Board *P. ramorum* Regulatory Program Review and USFS Framework for Sudden Oak Death in Wildland Forests" was held February 16-17, 2011 in Washington DC. Convened by the Continental Dialogue for Non-Native Forest Insects and Diseases, Address *P. ramorum* Initiative, the meeting brought together about 50 state and federal regulators, researchers, nurserymen, forest industry representatives, environmentalists and forest health specialists to look at ways of working together to limit pathogen spread. Comments on the APHIS/National Plant Board *P. ramorum* Regulatory Program Review from a nursery and forestry perspective, presentations, and other meeting materials have been posted at <http://www.continentalforestdialogue.org/events/pramorom/presentations.htm>. For information on the Address *P. ramorum* Initiative and how to join, go to <http://www.continentalforestdialogue.org/initiatives/default.aspx#Address>.

MANAGEMENT

A public information meeting will be held in Brookings, OR on 3/7/11. At the meeting, the Oregon Department of Agriculture, Oregon Department of Forestry, USDA Forest Service, and Oregon State University will provide an update on the Curry County *P. ramorum* infestation and obtain input from public and private stakeholders regarding the future of the eradication effort there.

In 2009, DEFRA implemented a five-year *Phytophthora* Program to reduce the rate of spread of *P. ramorum* and *P. kernoviae* as well as address the impacts of these pathogens on the nursery trade, heritage gardens, forests, and other industries. The initial goal of reducing the incidence of disease was to achieve a level at which less than 1% of



inspections resulted in a positive finding of either pathogen. The first year (April 2009 to March 2010), less than 0.5% of inspections yielded positive confirmations. The biosecurity measures adopted by the UK Plant Trade resulted in a further fall in the number of confirmations found following inspections during the first half of the 2010/11 year to 0.2%. As part of the program, the Plant Health and Seeds Inspectorate and *Phytophthora* officers working throughout England and Wales have been asked to double the number of inspections of susceptible host plants to ensure that any infection is identified early so measures can be taken to minimize the chance of spread. This, in combination with the ongoing biosecurity, is hoped to reduce the incidence of positive findings for both pathogens.

RESEARCH

Cormier, R.; Seavy, N.; Jennings, S.; and Gardali, T. 2011. Abundance Patterns of Landbirds in the Marin Municipal Water District over Fifteen Years: 1996 to 2010. PRBO Conservation Science. Available online at http://marinwater.org/documents/PRBO_Report_MMWD_Landbirds_2010.pdf.

Abstract: Populations of many landbirds have declined in recent decades, highlighting the importance of monitoring to detect population changes early to inform decision makers when additional management actions or research is warranted. PRBO Conservation Science monitored the abundance of landbird populations on Marin Municipal Water District lands from 1996 to 2010. Using these data, we analyzed trends in abundance for 42 species. Of these species, 36 (86%) were stable over the 15 years of study. Four species showed population declines: Steller's Jay (*Cyanocitta stelleri*), Western Scrub-Jay (*Aphelocoma californica*), Spotted Towhee (*Pipilo maculatus*), and California Towhee (*Melospiza crissalis*). Two species were increasing: Anna's Hummingbird (*Calypte anna*) and Olive-sided Flycatcher (*Contopus cooperi*), and the Oregon Junco (*Junco hyemalis*) showed a marginal increase. While we don't know the cause of the declines, the timing corresponds with the emergence of West Nile Virus (for which jays are relatively susceptible) and Sudden Oak Death Syndrome (where the loss of acorns may have affected jay diet). When we compared MMWD trends to trends estimated from Breeding Bird Surveys for all of California, we found more species are stable or increasing on MMWD lands, and many species that are declining across California are stable on MMWD lands. Because the overwhelming majority of birds on MMWD lands had stable or increasing trends, we propose that protected lands of MMWD area are important for maintaining a diverse breeding bird community in Marin County.

Elliott, M.; Sumampong, G.; Varga, A.; Shamoun, S.F.; James, D.; Masri, S.; and Grunwald, N.J. 2011. Phenotypic differences among three clonal lineages of *Phytophthora ramorum*. Forest Pathology 41:7–14. DOI: 10.1111/j.1439-0329.2009.00627.x.

Summary: There are three major clonal lineages of *Phytophthora ramorum* present in North America and Europe named NA1, NA2, and EU1. Twenty-three isolates



representing all three lineages were evaluated for phenotype including (i) aggressiveness on detached *Rhododendron* leaves and (ii) growth rate at minimum, optimum, and maximum temperatures. Closely related species *P. foliorum* and *P. hibernalis* were included in phenotypic tests since these species are encountered in nursery surveys for *P. ramorum*. Isolates from the NA2 and EU1 lineages were the most aggressive and isolates from the NA1 group were the least aggressive. The NA1 lineage of *P. ramorum* was the most variable in aggressiveness and growth rate. The variability in the NA1 lineage was due to the presence of non-wild type (nwt) isolates. There was no significant difference in growth rate among NA1 wild type (wt), NA2, and EU1 lineages at any temperature tested. The difference between wt and nwt *P. ramorum* isolates is discussed.

Kovacs, K.; Václavík, T.; Haight, R.G.; Pang, A.; Cunniff, N.J.; Gilligan, C.A.; and Meentemeyer, R.K. 2011. Predicting the economic costs and property value losses attributed to sudden oak death damage in California (2010-2020). *Journal of Environmental Management* 92: 1292-1302.

Abstract: *Phytophthora ramorum*, cause of sudden oak death, is a quarantined, non-native, invasive forest pathogen resulting in substantial mortality in coastal live oak (*Quercus agrifolia*) and several other related tree species on the Pacific Coast of the United States. We estimate the discounted cost of oak treatment, removal, and replacement on developed land in California communities using simulations of *P. ramorum* spread and infection risk over the next decade (2010-2020). An estimated 734 thousand oak trees occur on developed land in communities in the analysis area. The simulations predict an expanding sudden oak death (SOD) infestation that will likely encompass most of northwestern California and warrant treatment, removal, and replacement of more than 10 thousand oak trees with discounted cost of \$7.5 million. In addition, we estimate the discounted property losses to single family homes of \$135 million. Expanding the land base to include developed land outside as well as inside communities doubles the estimates of the number of oak trees killed and the associated costs and losses. The predicted costs and property value losses are substantial, but many of the damages in urban areas (e.g. potential losses from increased fire and safety risks of the dead trees and the loss of ecosystem service values) are not included.

Swei, A.; Ostfeld, R.S.; Lane, R.S.; and Briggs, C.J. 2010. [Effects of an invasive forest pathogen on abundance of ticks and their vertebrate hosts in a California Lyme disease focus](#). *Oecologia*. DOI: 10.1007/s00442-010-1796-9.

Abstract: Invasive species, including pathogens, can have important effects on local ecosystems, including indirect consequences on native species. This study focuses on the effects of an invasive plant pathogen on a vertebrate community and *Ixodes pacificus*, the vector of the Lyme disease pathogen (*Borrelia burgdorferi*) in California. *Phytophthora ramorum*, the causative agent of sudden oak death, is a nonnative pathogen killing trees in California and Oregon. We conducted a multi-year study using a gradient of SOD-caused disturbance to assess the impact on the dusky-footed woodrat (*Neotoma fuscipes*) and the deer mouse (*Peromyscus maniculatus*), two reservoir hosts of *B. burgdorferi*, as



well as the impact on the Columbian black-tailed deer (*Odocoileus hemionus columbianus*) and the western fence lizard (*Sceloporus occidentalis*), both of which are important hosts for *I. pacificus* but are not pathogen reservoirs.

Abundances of *P. maniculatus* and *S. occidentalis* were positively correlated with greater SOD disturbance, whereas *N. fuscipes* abundance was negatively correlated. We did not find a change in space use by *O. hemionus*. Our data show that SOD has a positive impact on the density of nymphal ticks, which is expected to increase the risk of human exposure to Lyme disease all else being equal. A positive correlation between SOD disturbance and the density of nymphal ticks was expected given increased abundances of two important hosts: deer mice and western fence lizards. However, further research is needed to integrate the direct effects of SOD on ticks, for example via altered abiotic conditions with host-mediated indirect effects.

Vercauteren, A.; Boutet, X.; D'hondt, L.; Van Bockstaele, E.; Maes, M.; Leus, L.; Chandelier, A.; and Heungens, K. 2011. Aberrant genome size and instability of *Phytophthora ramorum* oospore progenies. Fungal Genetics and Biology. *In Press* DOI:10.1016/j.fgb.2011.01.008.

Abstract: The functionality of the sexual cycle in the heterothallic pathogen *Phytophthora ramorum*, causal agent of Sudden Oak Death, has recently been demonstrated. Sexual reproduction could create genotypic variation and increase the pathogen's ability to adapt to other host plants or changing environments. Genetic characterization using co-dominant microsatellite markers and flow cytometry of single-oospore progeny of crosses between a European A1 isolate and North American or European A2 isolates revealed a considerable number of non-Mendelian inheritance events. This includes inheritance of more than two alleles at a locus and non-inheritance of alleles from one parent at another locus. The progenies were mitotically unstable: zoospore and hyphal tip derivatives of the progenies showed genotypic rearrangements and phenotypic variation. Flow cytometry confirmed variation and instability in DNA content of the single-oospore progenies. This indicates that single-oospore progenies not only display aberrant genomic and phenotypic variation due to meiotic irregularities, but also extra variation as a result of post-meiotic genomic rearrangements.

RELATED RESEARCH

Grünwald, N.J.; Martin, F.N.; Larsen, M.M.; Sullivan, C.M.; Press, C.M.; Coffey, M.D.; Hansen, E.M.; and Parke, J.L. 2011. Phytophthora-ID.org: A Sequence-Based *Phytophthora* Identification Tool. Plant Disease Volume 95, Number 3, Pages 337-342. DOI: 10.1094/PDIS-08-10-0609.

Jacobi, W.R.; Crump, A.; and Lundquist, J.E. 2011. Dissemination of Forest Health Research Information in the Rocky Mountains. Journal of Forestry, January/February, Pages 43 – 49.



Jung, T.; Stukely, M.J.C.; St. J. Hardy, G.E.; White, D.; Paap, T.; Dunstan, W.A.; and Burgess, T.I. 2011. Multiple new *Phytophthora* species from ITS Clade 6 associated with natural ecosystems in Australia: evolutionary and ecological implications. *Persoonia* 26: 13–39. DOI: 10.3767/003158511X557577. Available online at <http://www.persoonia.org/Issue/26/02.pdf>.

RELATED TOPIC

The establishment of a statewide firewood task force is underway. The initial meeting was held in Davis, CA on 2/16/11 at the request of the California Forest Pest Council. At the Council's 2010 annual meeting, a firewood resolution was brought forth by the USDA Forest Service, State and Private Forestry, Forest Health Protection calling for the formation of a statewide task force to address issues related to the spread of invasive pests and pathogens via the movement of firewood. The resolution directs the task force to: engage concerned stakeholders; synthesize, evaluate, and publicize relevant information; develop best management practices and appropriate outreach materials; and identify and support appropriate research, management, and educational programs. For more information, contact Don Owen, task force chairman, at Don.Owen@fire.ca.gov.

EDUCATION AND OUTREACH

A new UC publication “Protecting Trees from Sudden Oak Death before Infection” is now available at <http://anrcatalog.ucdavis.edu/pdf/8426.pdf>. The document includes information on First Steps for Tree Protection; Encouraging Tree Health: Forest Stewardship and Integrated Pest Management across the Landscape; Resources for information on SOD biology and management; and information and resources on Phosphonate Control.

CALENDAR OF EVENTS

- 3/9 - SOD Treatment Workshop; Meet at oak outside of Tolman Hall, UC**
Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. This class is free and will be held rain or shine. To register, or for questions, email kpalmieri@berkeley.edu, and provide your name, phone number, affiliation and license number(if applicable), and the date for which you are registering. For more information, go to <http://nature.berkeley.edu/garbelotto/english/sodtreatmenttraining.php>.
- 3/15 – Guidelines for Managing Oak Rangelands; four-part webinar series;**
University of California Division of Agriculture and Natural Resources; 10:00 a.m. – 12:00 p.m.; Intended for oak woodland landowners, certified range managers, and registered professional foresters; This series is designed to create an awareness of the importance of managing oak woodlands and to present alternative management strategies.; Registration is \$25. The series will continue on 3/22, 3/29, and 4/5. To register, go to <http://ucanr.org/oakwebinar>. Registered participants will receive follow-up log-in instructions. For more information, contact Richard Standiford at (510) 643-5428 or standifo@berkeley.edu.



- 4/16 – Guidelines for Managing Oak Rangelands; webinar series field trip to Sierra Foothill Research and Extension Center; 10:00 a.m. – 3:00 p.m.;** For more information, see the 3/15 listing above or contact Richard Standiford at (510) 643-5428 or standifo@berkeley.edu.
- 4/20 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC** Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. For more information, see the 3/9 listing above.
- 4/30 – Guidelines for Managing Oak Rangelands; webinar series field trip to** Hopland Research and Extension Center; 10:00 a.m. – 3:00 p.m.; For more information, see the 3/15 listing above or contact Richard Standiford at (510) 643-5428 or standifo@berkeley.edu.
- 5/11 - SOD Treatment Workshop; meet at oak outside of Tolman Hall, UC** Berkeley Campus; 1 – 3 p.m.; Pre-registration is required. For more information, see the 3/9 listing above.
- 5/16 – 5/18/2011 - National Workshop on Climate and Forests; DuBois Conference** Center; Northern Arizona University Campus, Flagstaff Arizona; For more information, go to <http://www.safnet.org/natworkshop11/index.cfm>.
- 6/21 – 6/23/2011 - Coast Redwood Forests in a Changing California: A Symposium** for Scientists and Managers; University of California, Santa Cruz; For more information on the conference, go to <http://ucanr.org/sites/redwood>.
- 7/31 – 8/5/2011 – Disease and Insect Resistance in Forest Trees: Fourth** International Workshop on the Genetics of Host-Parasite Interactions in Forestry; Valley River Inn; 1000 Valley River Way; Eugene, OR 97401; To register, or for more information, go to http://ucanr.org/sites/tree_resistance_2011conference/. For questions, contact Richard Snieszko at rsnieszko@fs.fed.us; Katie Palmieri at (510) 847-5482 or kpalmieri@berkeley.edu; or Janice Alexander at (415) 499-3041 or jalexander@ucdavis.edu.
- 10/5 – 10/6/11 – The Seventh Meeting of the Continental Dialogue on Non-Native** Forest Insects and Diseases; Boulder, Colorado; For more information, contact Debbie Lee at dlee@resolv.org or (202) 965-6381 or Beth Weaver at bweaver@resolv.org or (202) 965-6211. For more information about the Dialogue go to: www.continentalforestdialogue.org.
- 11/8 – 11/11/11 - 2011 IUFRO Forest Protection Joint Meeting, Research Groups** 7.02 – 7.03; Colonia del Sacramento, Uruguay; More information will be forthcoming. For questions, contact Alina Greslebin at agreslebin@ciefap.org.ar.