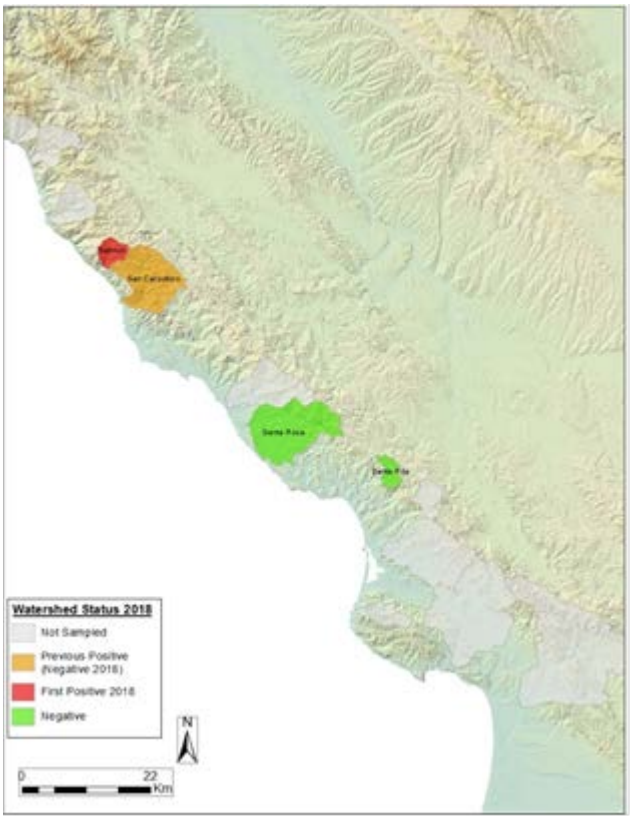
CALIFORNIA OAK MORTALITY TASK FORCE REPORT
FEBRUARY 2019

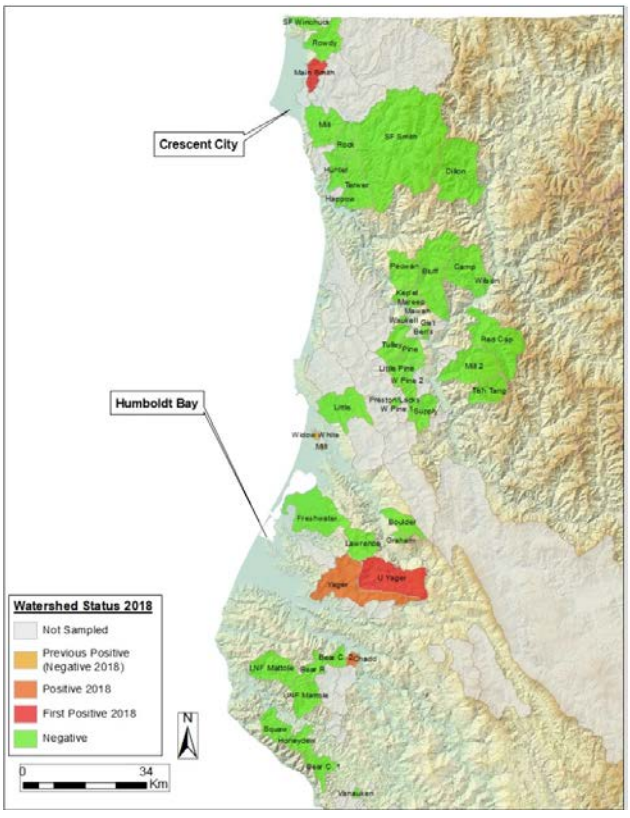
MONITORING - CALIFORNIA

Cooperative California *Phytophthora ramorum* 2018 stream monitoring survey results. In 2018, 52 streams were monitored for *Phytophthora ramorum* across northern and central coastal California by the UC-Davis, Rizzo lab; UC Cooperative Extension, Humboldt and Del Norte Counties; and numerous collaborators. (See results in Figures 1 and 2, below.) In Humboldt Co., two rivers were detected positive, Upper Yager Creek, a tributary of the Van Duzen River, and Chadd Creek, a tributary of the Eel River (previously positive in 2015). *P. ramorum* had previously been detected just downstream from the Upper Yager Creek site (in 2017 and again in 2018). In Del Norte County, *P. ramorum* was isolated in May from the main stem of the Smith River, making it the first recovery of a *P. ramorum* isolate in Del Norte County. To validate the finding additional samples will be collected and analyzed.

In Monterey County, Salmon Creek was detected as *P. ramorum* positive for the first time. Salmon Creek is northwest of San Carpoforo Creek, (San Luis Obispo County), which tested positive in 2017 but was negative in 2018. Two sites were monitored within San Luis Obispo County, but the pathogen was not recovered (Figure 1). Financial support for these surveys was provided by US Forest Service, Pacific Southwest Region, Forest Health Protection.

Figures 1 and 2. Central California and Northern California watersheds monitored for *P. ramorum* in 2018. Positive detections appear in red or orange.





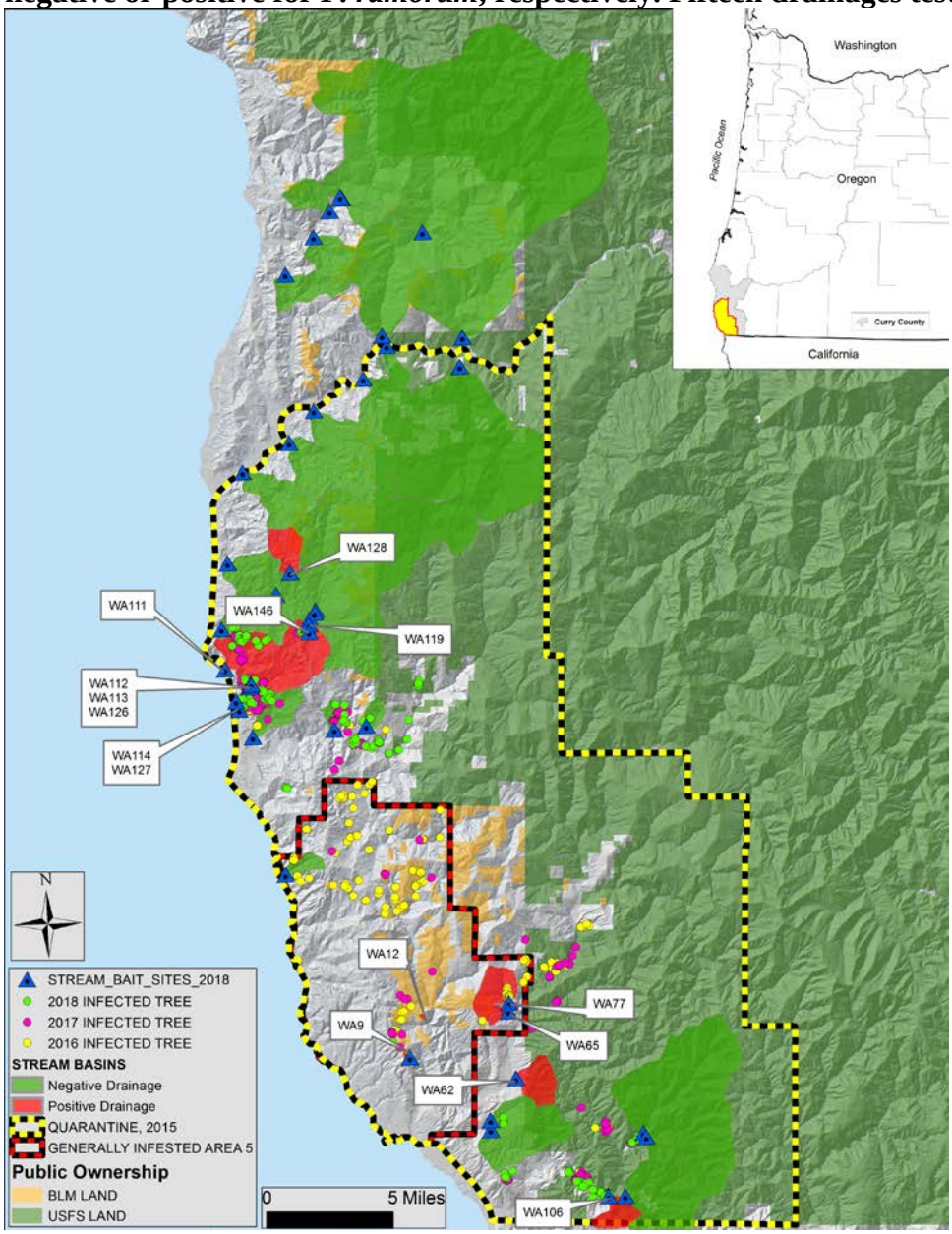
MONITORING AND MANAGEMENT – OREGON

In 2018, 43 new *P. ramorum* infestations were detected at or beyond the Oregon Generally Infested Area (GIA) (Figure 3), including new EU1 infestations and an intensification of two EU1 sites from 2017; all are well within the quarantine boundary (Figures 4 and 5). The Oregon Department of Forestry (ODF) has prioritized all EU1 infestations within the SOD quarantine area for treatment this year. For the 2017-19 biennium the ODF SOD budget available for treatments on private lands to date, including state and federal funds, is $2,375,600. Eradication treatments for EU1 infestations totaled 203 acres for 2018. Treatments are underway or planned on the remaining 455 acres of EU1 infestations detected in 2018, and surveying is underway in the surrounding areas. The GIA was expanded in the beginning of 2018 to encompass 89 square miles in and around the City of Brookings (Curry County).

Figure 3. Tanoaks killed by *P. ramorum*, NA1 lineage, near Brookings, Oregon. (Credit: Blakey Lockman, USFS, PNW Region, Forest Health Protection)

2018 OR stream monitoring results. Oregon's SOD Program monitored 47 streams for *P. ramorum* from early May 2018 to the beginning of December. *P. ramorum* was detected in 15 of the streams, which included four streams within the GIA (two were positive controls), seven streams within active EU1 treatment areas, one stream near an infestation on the Winchuck River, and three streams that were positive for the first time in 2018 so ground surveys are underway (Figure 4). Four helicopter surveys were flown in 2018 throughout the year, with 189 tanoak trees ground checked for the presence of *P. ramorum*. Overall, 668 samples were collected in 2018 by ODF staff, of which 260 were positive for *P. ramorum*.

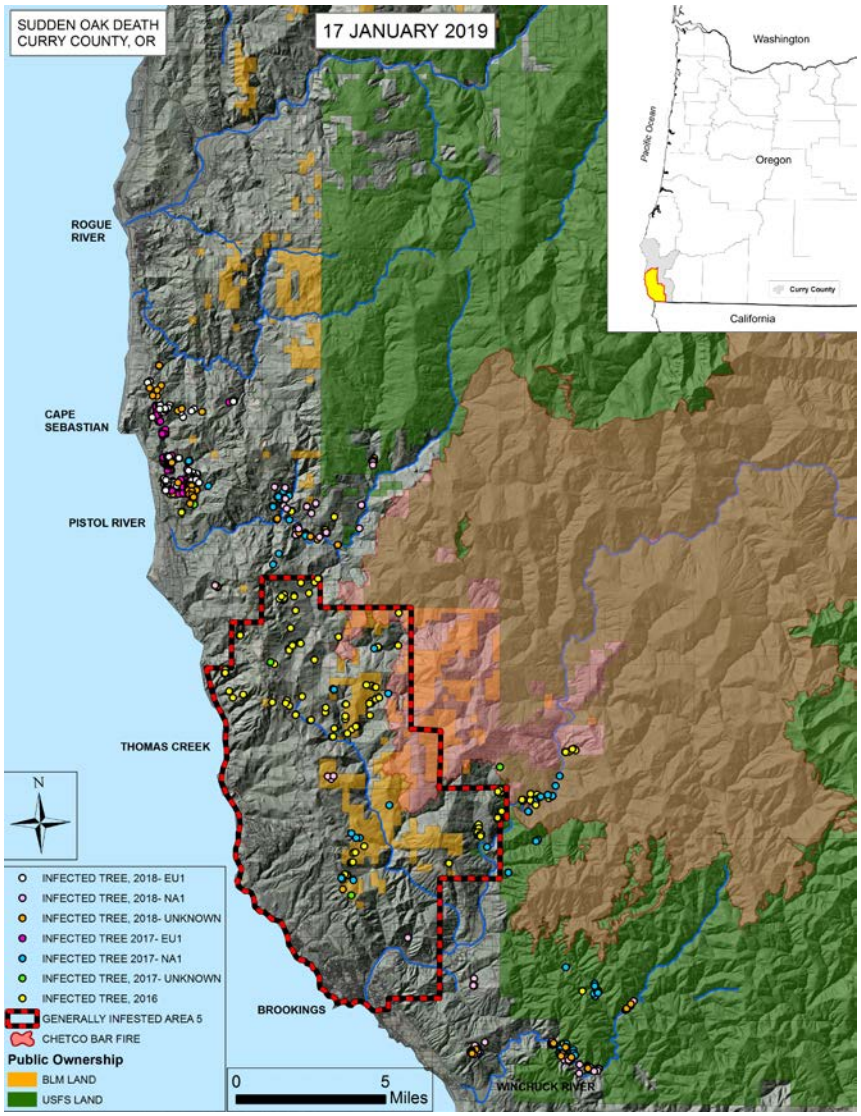
Figure 4. 2018 Oregon stream baiting drainages (47 total). Green or red drainages indicate negative or positive for *P. ramorum*, respectively. Fifteen drainages tested positive in 2018.



The Oregon SOD Task Force continued to meet throughout the year in 2018 and assisted with the selection of Mason, Bruce, Girard in Portland, OR to conduct a new economic impact analysis for SOD in Oregon. The Task Force co-conveners have introduced a House Bill in the Oregon State Legislature to appropriate $1.7 million to ODF to combat SOD. A new citizen science program has launched in Curry County for the early detection of SOD on private lands. ODF, Oregon State University, and US Forest Service are collaborating on the project to teach local landowners to deploy rain bucket or stream baits on their properties to detect *P. ramorum*. Additionally, OSU Extension developed a new guide for landowners on SOD, which includes

disease diagnosis, treatment options, and planting options after SOD infestations (https://catalog.extension.oregonstate.edu/em9216). For more information, contact Sarah Navarro, Sarah.Navarro@oregon.gov.

Figure 5. Location of sites infested with *Phytophthora ramorum* in southwest Oregon that were discovered in 2016-2018.



NURSERIES

California Department of Food and Agriculture (CDFA) *Phytophthora ramorum* Program 2018 Summary Report. Eleven nurseries were confirmed positive for *P. ramorum* in California in 2018, down from sixteen positive nurseries in 2017 (see Table 1, below). The USDA Official Regulatory Protocol for Nurseries Containing Plants Infected with *Phytophthora ramorum* Confirmed Nursery Protocol (CNP) was implemented at all positive nurseries as directed by the CDFA Nursery Advisory No. 02-2018 published in May 2018. The CNP outlines enforcement actions to prevent further spread of *P. ramorum* and is the protocol currently accepted by the

CDFA for delimitation, mitigation, and disposal of nursery stock, soil, and other articles at nurseries which are infested with or may have been exposed to *P. ramorum*.

Three nurseries shipping *P. ramorum* host material interstate from California were found to be positive for *P. ramorum* in 2018. Two of the positive interstate shippers were already under Federal Order DA-2014-02 compliance and will continue to receive biannual inspections. One interstate shipping nursery found to be newly positive for *P. ramorum* in 2018 will now begin biannual DA-2014-02 compliance inspections. This brings the total number of California nurseries under DA-2014-02 compliance to six. Federal Order DA-2014-02 requires enhanced inspections including soil and water sampling and is mandatory for previously positive nurseries if they wish to continue shipping *P. ramorum* host material interstate.

Table 1. *P. ramorum*-Positive Nurseries by Year for California

Year	Non-quarantine county		Quarantine county		Total
	Production	Retail	Production	Retail	
2018	2	3	2	4	11
2017	1	3	5	7	16
2016	1			1	2
2015					0
2014	1				1
2013			1		1

Approximately 6,100 *P. ramorum* program regulatory samples were submitted to the CDFA Plant Pest Diagnostics Laboratory for processing in 2018. A total of 210 samples were determined to be positive for *P. ramorum:* 183 from foliage, 26 from soil, and one from water. Positive plant species consisted of *Camellia, Rhododendron* (azalea), *Cinnamomum camphora* (camphor tree), *Quercus agrifolia* (coast live oak), *Laurus nobilis* (sweet bay), and *Viburnum tinus* (laurustinus).

The California Department of Food and Agriculture (CDFA) receives funding from the United States Department of Agriculture (USDA) to administer the cooperative *Phytophthora ramorum (P. ramorum)* program. The CDFA assists and reimburses the county agricultural commissioners as they enforce Federal Domestic Quarantine 7 CFR 301.92 regulations at the 288 establishments regulated for *P. ramorum* in California (see table 2, below). Program funding allocated to the CDFA for the *P. ramorum* program has not changed since fiscal year 2015/16. For more information, contact Carolyn Lambert, Carolyn.Lambert@cdfa.ca.gov.

Table 2. Total establishments under compliance for *P. ramorum* in California

Establishment Type	Number of Establishments
Host/Nonhost Nursery Stock in Soil (Exhibit B and Exhibit J)	165
Greenery, Garland, and Wreaths (Exhibit D)	9
Soil (Exhibit F)	1
Tree Farm (Exhibit I)	11
Wood and Wood Products (Exhibit C), Green Waste Origin Facility (Exhibit E), Biomass/Cogeneration (GW2), Compost Facility (Exhibit G/GW4), Landfill (GW6), Green Waste Transporter (Exhibit H/GW10), Transfer Station (GW12)	102
Total Number of Establishments	**288**

Oregon Department of Agriculture *P. ramorum* Program, 2018 Summary. In 2018, fourteen nurseries participated in the Oregon Department of Agriculture (ODA) *Phytophthora ramorum* Nursery Certification Program. Of these, eight are interstate shippers and are regulated at the federal level (DA-2014-02). As intrastate shippers, the other six nurseries are regulated by Oregon state quarantine requirements (7 CFR 301.92 and OAR 603-052-1230). Within the past four years, the number of participating nurseries has decreased, from sixteen in 2016 to twelve in January 2019, since three nurseries closed and one was released from the program upon meeting the full requirements.

In the spring season, a total of 1,779 foliar, one water, and no soil samples were collected and tested. Of this total, 1,601 were collected from eight interstate nurseries and 178 were collected from four intrastate nurseries. There were 27 confirmed positive plants from ten nurseries across six counties (Clackamas, Marion, Columbia, Polk, Washington, and Lincoln). The pathogen was detected in *Mahonia repens* (6), *Choisya ternate* (2), *Pieris japonica* (1), *Viburnum davidii* (1), *Rhododendron* spp. (16), and *Mahonia x media* (1). One *Mahonia aquifolium* was confirmed as inconclusive by both the ODA and USDA. The plant was re-sampled and tested negative.

The USDA Confirmed Nursery Protocol (CNP) was enacted at all ten positive nurseries. Through delimitation surveys, an additional 26 plants, one soil sample, and one water sample were confirmed as positive. Two of the positive plants (*Rhododendron* sp.) and the soil were from a nursery in Clackamas County. All plants within the quarantine area were destroyed by the grower. The infested soil was detected in a greenhouse underneath a confirmed positive plant. The owner opted to chemically treat the soil and to no longer place plant material of any kind in that area of the greenhouse. The remaining twenty-four plants came from a nursery in Marion County (*Mahonia repens* and *Mahonia aquifolium*). The CNP was enacted at this property several times and ODA staff sampled ~1,359 plants as a result. Traceback investigations revealed that all plants in the blocks surveyed were part of a single shipment received from a nursery in Washington State. In response, Washington State Department of Agriculture staff conducted a traceback survey at the nursery, finding that most of the plants in the original beds had been pulled. They sampled four plants of those that remained and found no additional positive plants.

The positive water came from a nursery in Columbia County, but *P. ramorum* was never detected in subsequent sampling and re-testing. Inspectors evaluated the water treatment system at the nursery and found that the nursery is following best management practices by treating its irrigation water with chlorine. The positive soil came from a second nursery in Marion County and had initially tested as inconclusive. After three months, the soil was confirmed positive for *P. ramorum* by USDA. During the waiting period, the grower had proactively destroyed all plant material in the positive block by burning all plants on top of the positive area. In September 2018, ODA returned and re-tested the soil in this block at multiple locations and detected no *P. ramorum*. The grower will no longer place plant material in this area. All results from delimitation surveys of the other seven nurseries came back negative for *P. ramorum*.

During the fall survey season, 1,343 foliar, one soil, and no water samples were tested. Nearly all samples tested negative for *P. ramorum*. ODA had four samples test inconclusive for *P. ramorum*. These were sent to USDA for final confirmation in December 2018. Due to the

government shutdown, results are pending. These samples were from three nurseries in Washington, Lane, and Marion Counties.

Licensed nurseries that are not part of either the state or federal *P. ramorum* programs are subject to annual inspections. In 2018, twenty-four samples were tested as part of annual general licensing inspections and all results were negative for *P. ramorum*.

Program funding has remained constant over the past five years, and no changes are anticipated for the upcoming years. In October 2017, Dr. Elizabeth Savory joined the ODA as the new Plant Health Program manager. Together with Gary McAninch, she shares supervisory duties over the *P. ramorum* Certification Program. Chris Benemann has been with the program since 2016 as the program specialist. Melissa Lujan has been the program coordinator since 2013. For more information contact Chris Benemann, sbenemann@oda.state.or.us.

Washington Department of Agriculture (WSDA) 2018 *P. ramorum* summary report.
In May 2018, WSDA conducted the required certification sampling for Washington's only nursery operating under the DA-2014-2 regulations. Sampling results were negative for *P. ramorum* at this 'opt-in' nursery. The nursery completed six consecutive surveys (bi-annually for 3 years since 2015) and was released from its required USDA compliance agreement.

In 2018, WSDA inspected eight of the eleven 'opt-out' nurseries. These are nurseries that 'opted-out' of the Federal DA-2014-2 regulations and can no longer ship interstate. Host material appeared free of symptoms, and no samples were collected. WSDA confirmed the eleven'opt-out' nurseries are not shipping interstate.

No trace-forward investigations were conducted in Washington in 2018. WSDA did not receive notice of any host plants shipped from out of state nurseries found positive for *P. ramorum*. One unofficial investigation was conducted in Washington in 2018. *Mahonia repens* from a Washington state nursery shipped to an Oregon landscape nursery were found positive after being in Oregon for six months. An investigation revealed that all of the *Mahonia repens* at the Washington nursery had been dug and sold, but a cohort bed of *Mahonia repens* grown from the same seed source was tested and found negative for *P. ramorum*.

WSDA continues to assist the USDA at a botanical garden in Kitsap County found positive for *P. ramorum* in 2015. Quarterly surveys were performed throughout 2018. Surveys were conducted in areas near previous positive sites and in large buffer areas around previously positive sites. All plant samples collected were negative for *P. ramorum*. In July 2018, a water bait from a small pond below the mitigated areas of the garden was confirmed positive. A second water bait at the same pond location was found positive through PCR by the WSDA Plant Path laboratory in December 2018. The sample is awaiting confirmation by the USDA after the partial Federal government shutdown is resolved.

The WSDA Plant Pathology lab processed 1,197 regulatory samples in 2018. This includes nursery, botanical garden and other locations sampled for *P. ramorum*. Two water baits were determined to be positive in 2018; all other plant and water bait samples were negative. The last *P. ramorum* positive plant sample from Washington State was detected in January 2016. For more information contact, Scott Brooks, SBrooks@agr.wa.gov.

RESEARCH

Conrad, A.O.; McPherson, B.A.; Lopez-Nicora, H.D.; D'Amico, K.M.; Wood, D.L. and Bonello, P. 2019. Disease incidence and spatial distribution of host resistance in a coast live oak/sudden oak death pathosystem. Forest Ecology and Management. 433: 618-624.

Sudden oak death (SOD) results in extensive mortality of native populations of red oak (*Quercus* spp.) and tanoak (*Notholithocarpus densiflorus*) in coastal California and Oregon. The pathogen, *Phytophthora ramorum*, causes a syndrome in *Q. agrifolia* (coast live oak, CLO) characterized by bleeding stem cankers, attacks by bark and ambrosia beetles, and development of the endophytic fungus, *Annulohypoxylon thouarsianum*. The study examined disease incidence and resistance in CLO within Northern California stands that had no apparent prior exposure to the pathogen. Seven years after artificial inoculation of mature trees distributed between two separate stands in a California wildland, 27% of CLO expressed resistance to *P. ramorum*, while 61% died (N=149). The remaining trees were alive but symptomatic. External and subcortical canker lengths, measured approximately one year post-inoculation, were significant predictors of CLO resistance and survival seven years post-inoculation. Spatial analysis also revealed that variation in CLO susceptibility to *P. ramorum* is aggregated on the landscape, suggesting that more resistant and susceptible trees tend to co-occur and that resistance is a heritable trait. From 2011 to 2017 the incidence of natural infections in a second cohort of non-inoculated trees increased from 2.0% (N=447) to 13.2% (N=423). Altogether, these findings suggest that estimating the frequency and determining the spatial distribution of resistant trees on the landscape can be used to identify sites that should be targeted for germplasm collection and habitat conservation.

He, Y.; Chen, G.; De Santis, A.; Roberts, D.A.; Zhou, Y. and Meentemeyer, R.K. 2019. A disturbance weighting analysis model (DWAM) for mapping wildfire burn severity in the presence of forest disease. Remote Sensing of Environment. 221: 108-121.

Forest ecosystems are subject to recurring fires as one of their most significant disturbances. Accurate mapping of burn severity is crucial for post-fire land management and vegetation regeneration monitoring. Remote-sensing-based monitoring of burn severity faces new challenges when forests experience both fire and non-fire disturbances, which may change the biophysical and biochemical properties of trees in similar ways. In this study, we develop a Disturbance Weighting Analysis Model (DWAM) for accurately mapping burn severity in a forest landscape that is jointly affected by wildfire and an emerging infectious disease – sudden oak death. Our approach treats burn severity in each basic mapping unit (e.g., 30 m grid from a post-fire Landsat image) as a linear combination of burn severity of trees affected (diseased) and not affected by the disease (healthy), weighted by their areal fractions in the unit. DWAM is calibrated using two types of inputs: i) look-up tables (LUTs) linking burn severity and post-fire spectra for diseased and healthy trees, derived from field observations, hyperspectral sensors [e.g., Airborne Visible InfraRed Imaging Spectrometer (AVIRIS)], and radiative transfer models; and ii) pre-fire fractional maps of diseased and healthy trees, derived by decomposing a pre-fire Landsat image using Multiple Endmember Spectral Mixture Analysis (MESMA). Considering the presence of tree disease in DWAM improved the overall map accuracy by 42%. The superior performance is consistent across all three stages of disease progression. Our approach

demonstrates the potential for improved mapping of forest burn severity by reducing the confounding effects of other biotic disturbances.

Hunter, S.; Williams, N.; McDougal, R.; Scott, P. and Garbelotto, M. 2018. Evidence for rapid adaptive evolution of tolerance to chemical treatments in *Phytophthora* species and its practical implications. PLoS ONE 13(12): e0208961. doi.org/10.1371/journal.pone.0208961.

Chemical treatments are used widely in agricultural and natural settings to protect plants from diseases; however, they may exert an important selection pressure on plant pathogens, promoting the development of tolerant isolates through adaptive evolution. Phosphite is used to manage diseases caused by *Phytophthora* species which include a large number of the most economically damaging plant pathogens worldwide. Phosphite controls the growth of *Phytophthora* species *in planta* without killing it; as a result, isolates can develop tolerance to phosphite after prolonged exposure. We investigated the inter- and intra-specific variability in phosphite tolerance of eleven *Phytophthora* species, including *P. ramorum*, an internationally important, highly regulated pathogen. *Phytophthora ramorum is* a good model system because it is comprised of multiple genetically homogeneous lineages. Seven species were found to be consistently sensitive to phosphite based on the low Effective Concentration (EC) 50 values of all isolates tested (amount of phosphite required to inhibit mycelial growth by 50% relative to growth in the absence of phosphite). However, *P. ramorum*, *P. lateralis*, *P. crassamura* and *P. cambivora* showed intraspecific variability in sensitivity to phosphite, with at least one isolate showing significantly higher tolerance than the other isolates. Within the three *P. ramorum* evolutionarily divergent lineages tested, NA1 was the most susceptible to phosphite, the NA1 and EU1 lineages showed intralineage variability and the NA2 lineage showed a decreased sensitivity to phosphite overall as all isolates were relatively tolerant. This finding is relevant because NA1 is dominant in the wild and can be controlled using phosphite, while the EU1 lineage has recently been identified in the wild and is phosphite-tolerant, making the treatment approach potentially less effective. *Phytophthora ramorum*, *P. lateralis* and *P. crassamura* are either selfing, homothallic species, or are known to reproduce exclusively clonally, indicating tolerance to phosphite can emerge even in the absence of sexual recombination.

Peterson, E.K.; Larson, E. and Parke, J.L. 2019. Film-forming polymers and surfactants reduce infection and sporulation of *Phytophthora ramorum* on rhododendron. Plant Disease. Early View. doi.org/10.1094/PDIS-05-18-0802-RE.

Phytophthora ramorum, cause of sudden oak death and ramorum leaf blight, can persist undetected in infested nurseries. Many conventional fungicides are effective in reducing or delaying symptom expression, but some may confound visual detection of infected plants. We tested film-forming polymers (FFPs) and surfactants for their ability to reduce infection and sporulation of *P. ramorum* on rhododendron. FFPs (Anti-Stress, Moisturin, Nature Shield, Nu-Film and Vapor Gard) and surfactants (Tergitol, Zonix and an unregistered AGAE product) were screened in detached leaf assays. Anti-Stress, Nu-Film, Zonix and a Nu-Film-Zonix mixture were additionally tested for durability, protection against exposure to infested water, and a reduction in sporulation. FFP effectiveness was retained for at least three weeks exposure to overhead irrigation and rain. Relative to controls, foliar treatments protected rhododendron branches exposed to infested water. No treatments prevented symptom development when

applied post-infection, but leaves treated with Anti-Stress, Zonix and the Nu-Film-Zonix mixture produced significantly fewer sporangia relative to controls. Application of FFPs and surfactants to quarantined, potentially infected plants offers a management tool for reducing infection and sporulation but not symptom expression, thereby limiting disease spread without interfering with disease detection.

Redekar, N.R.; Eberhart, J.L. and Parke, J.L. 2019. Diversity of *Phytophthora*, *Pythium*, and *Phytopythium* species in recycled irrigation water in a container nursery. Phytobiomes. First Look. http://dx.doi.org/10.1094/PBIOMES-10-18-0043-R

Recycling of irrigation water increases disease risks due to spread of waterborne oomycete plant pathogens such as *Phytophthora*, *Pythium* and *Phytopythium*. A comprehensive metabarcoding study was conducted to determine spatial and temporal dynamics of oomycete communities present in irrigation water collected from a creek (main water source), a pond, retention reservoirs, a chlorinated water reservoir, and runoff channels within a commercial container nursery in Oregon over the course of one year. Two methods, filtration and leaf baiting, were compared for the detection of oomycete communities. Oomycete communities in recycled irrigation water were less diverse but highly enriched with biologically active plant pathogens as compared to the creek water. The filtration method captured a larger portion of oomycete diversity, while leaf baiting was more selective for plant-associated oomycete species of *Phytophthora* and a few *Pythium* and *Phytopythium* species. Seasonality strongly influenced oomycete diversity in irrigation water and detection with leaf baiting. *Phytophthora* was the major colonizer of leaf baits in winter, while all three genera were equally abundant on leaf baits in summer. The metabarcoding approach was highly effective in studying oomycete ecology, however, it failed to distinguish some closely related species. We developed a custom oomycete ITS1 reference database containing shorter sequences flanked by ITS6 and ITS7 primers used in metabarcoding and used it to assemble a list of indistinguishable species complexes and clusters to improve identification. The predominant bait-colonizing species detected in recycled irrigation water were the *Phytophthora citricola*-complex, *P. syringae*, *P. parsiana*-cluster, *P. chlamydospora*, *P. gonapodyides*, *P. irrigata*, *P.* taxon Oaksoil-cluster, *P. citrophthora*-cluster, *P. megasperma*-cluster, *Pythium chondricola*-complex, *Py. dissotocum*-cluster, and *Phytopythium litorale*.

Swiecki, T.; Quinn, M.; Sims, L.; Bernhardt, E.; Oliver, L.; Popenuck, T. and Garbelotto, M. 2018. Three new *Phytophthora* detection methods, including training dogs to sniff out the pathogen, prove reliable. California Agriculture. 72(4): 217-225.

Multiple species of *Phytophthora* have been identified in production facilities of plants used in reforestation and restoration projects. There's a risk that infected plant stock will lead to *Phytophthora* species establishing and spreading in habitats that, having never experienced their presence, may be highly susceptible to infection. Eradication of these pathogens, once introduced into wildlands, is impossible. Thus, monitoring nursery stock is key, but sampling large production lots is still prohibitively complex and expensive. We tested three new sampling approaches that are practical for large production lots: baiting of small portions of symptomatic plant material pooled from multiple samples in addition to whole plant sampling; baiting of bench irrigation leachate; and training dogs to identify the pathogens. The first two methods

detected *Phytophthora* with a high confidence level directly from batches of plants, but they are not designed to identify each infected plant specifically. Trained dogs identified individual batches of soil and water containing *Phytophthora* with a 100% accuracy and the research is continuing, to see if dogs can recognize the pathogen from individual infected plants and plant parts and discriminate its smell from other scents.

RELATED RESEARCH

Frankel, S.J.; Alexander, J.; Benner, D. and Shor, A. 2018. Coordinated response to inadvertent introduction of pathogens to California restoration areas. California Agriculture. 72(4): 205-207.

Garbelotto, M.; Frankel, S. and Scanu, B. 2018. Soil-and waterborne *Phytophthora* species linked to recent outbreaks in Northern California restoration sites. California Agriculture. 72(4): 208-216.

Hansen, E.; Reeser, P. and Sutton, W. 2018. *Phytophthora chlamydospora*. Forest Phytophthoras. 8(1):dx.doi.org/10.5399/osu/fp.8.1.4566.

Ireland, K.B. and Kriticos, D.J. 2019. Why are plant pathogens under-represented in eco-climatic niche modelling? International Journal of Pest Management. DOI: 10.1080/09670874.2018.1543910.

Orozco-Fuentes, S.; Griffiths, G.; Baggaley, A.W.; Parker, N.G.; Holmes, M.J., Ettelaie, R. and Smith, J. 2019. Early warning signals in plant disease outbreaks. Ecological Modelling. 393: 12-19.

Reed, S.E.; English, J.T. and Muzika, R.M. 2019. *Phytophthora* species detected in two Ozark forests with unusual patterns of white oak mortality. Plant Disease. 103(1): 102-109.

Rodríguez-Padrón, C.; Rodríguez, A. and Siverio, F. 2018. Survey in nurseries and irrigation water reservoirs as sources of oomycetes found in avocado orchards in the Canary Islands. Plant Disease. https://doi.org/10.1094/PDIS-08-18-1412-RE.

Sims, L.L.; Chee, C.; Bourret, T.; Hunter, S.; Garbelotto, M. *In press.* Genetic and phenotypic variation of *Phytophthora crassamura* isolates from California nurseries and restoration sites. Fungal Biology. https://doi.org/10.1016/j.funbio.2018.11.012.

PERSONNEL

The California Oak Mortality Task Force sends retirement best wishes to Kathy Kosta, plant pathologist with CDFA. Kathy retired in November 2018 after 29 years of service. Kristina Weber and Suzanne Rooney Latham will assume some of Kathy's responsibilities and Carolyn Lambert will continue to be CDFA's point of contact for the *P. ramorum* program.

FUNDING

The USDA Forest Service, Pacific Southwest Region, Forest Health Protection, is seeking pre-proposals for "Conducting Activities Related to Monitoring, Extension, Management and Mitigation of the Sudden Oak Death Disease Caused by *Phytophthora ramorum*." Funding is available for 2019-2020 projects and the deadline for submission is February 15, 2019. For more information, contact Phil Cannon at pcannon@fs.fed.us.

MEETINGS

The **Sudden Oak Death Seventh Science and Management Symposium**, "Healthy Plants in a World with *Phytophthora*" (SOD7) will be held June 25- 27, 2019 in the Presidio, San Francisco and feature research and field activities for *Phytophthora ramorum* as well as progress to address Phytophthoras in native habitats, restoration areas and damage to native California plants. An optional field trip on Thursday, June 27 will visit Mt. Tamalpais to view symptoms and management responses to *P. ramorum* and other Phytophthoras. The conference will also feature a visit to the Presidio Nursery to view their *Phytophthora* management program. For more information, see the conference website, https://ucanr.edu/sites/sod7/.

The **2019 California Forest Pest Council Insect and Disease Field Tour**, intended for all land managers, ecologists, vegetation managers, and the general public, will take place in the Fort Bragg (Mendocino Co.) area on July 16, 2019. The tour will visit several sites north and south of Fort Bragg to look at a variety of forest pest issues on both private and public properties, including current topics such as sudden oak death, bear damage, balsam woolly adelgid in grand fir, bishop pine decline, and *Phytophthora cinnamomi* damage. This is a "Save the Date" request; more information will be forthcoming at www.caforestpestcouncil.org within the coming months.

CALENDAR OF EVENTS

06/25 - 27– 2019 Sudden Oak Death Seventh Science and Management Symposium. The Presidio, San Francisco. For more information see https://ucanr.edu/sites/sod7/.

07/16/2019 California Forest Pest Council Insect and Disease Field Tour, Fort Bragg. For more information, see Meetings section above or contact Chris Lee, christopher.lee@fire.ca.gov.