Summary of the results of the 2023 Sudden Oak Death (SOD) Blitzes

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The Sudden Oak Death (SOD) Blitz Survey Project enlists and trains volunteers to conduct a statewide survey for the presence of plant symptoms associated with the disease. The citizen-scientist volunteers collect symptomatic foliage in their local communities that is then tested by sterile culturing or by PCR genetic testing at U.C. Berkeley. In 2023, there were 28 distinct Blitzes in 28 locations across central and northern California. Over 10,000 trees were surveyed across 145,000 acres, and 1900 were returned to U.C. Berkeley for analysis. More than 400 volunteers were trained online and assisted with the survey this year.

In spite of the overall record levels of rainfall in 2023, and given that the SOD pathogen, an invasive and nonnative micro-organism known as *Phytopthora ramorum*, thrives and spreads during rain events, it was surprising to see that infection rates increased in only a couple of regions (Sonoma, Carmel-Big Sur, West Peninsula), while they remained relatively constant elsewhere, with the pattern and severity of outbreaks very comparable to those recorded last year. This may be due to rains being early, when temperatures were too cold for the pathogen, and then falling again late in the season, after many of the surveys had already been completed. This is confirmed by the higher rate of SOD positive leaves from leaf samples collected late in the season compared to those collected early in the season.

Based on the trends normally observed when plotting rainfall and infection rates by *P. ramorum*, the expectation is that cases of SOD may steeply increase in the next year, barring drought conditions in 2024. If you are in areas with confirmed outbreaks in 2023 and you have coast live oaks, Shreve oaks, or black oaks on your property, this may be the time to actively protect your trees. All mitigation and treatment actions should happen in the Fall and include, first and foremost, the elimination of small and medium sized bays (up to 20-inch diameter) whose canopy is within 15-30 meters from the trunk of an oak. For high value trees, phosphite treatments in conjunction with gypsum amendments may also be recommended. Likewise, avoid the pruning of large branches or of stems after the end of November as *P. ramorum* spores are spread and infection occur during the rainy season.

In 2023, SOD incidence increased in the Santa Lucia Mountains and in Big Sur, as well as in the Santa Cruz Mountains, in the SF Peninsula, and in parts of Sonoma County. However, areas with outbreaks previously recorded were negative as expected for a drought year (e.g San Carpoforo canyon or the area around Carmel Valley village). Likewise Napa Valley, Northern Marin, the East Bay east of the Berkeley-Oakland hills, the residential areas of the Peninsula close to but not on the slopes of the Santa Cruz Mountains were mostly devoid of active outbreaks. This includes parks like Filoli and Edgewood. The 2023 blitzes provided an intensive survey of the Midpeninsula Region Open Space District properties and of other parks and recreational areas on the Peninsula. Outbreaks are too many to list, but they include Huddart, Teague Hill, El Corte

de Madera, La Honda and La Honda Creek, Los Trancos, Monte Bello, Skyline Ridge, Long Ridge, Upper Stevens Creek, Saratoga Gap, Portola Redwoods, and Las Cumbres.

Plant nurseries in Golden Gate Park, Presidio, UC Berkeley Botanical Garden, and Tilden were negative , and Filoli was negative as well. As a result, all samples from San Francisco were negative, even if numerous outbreaks were detected in Southern Marin County.

The Southern Mendocino coast and the Anderson Valley, also in Mendocino County, experienced outbreaks in areas where SOD was previously detected. This may be a result of increased rainfall. Outbreaks in the Northern and Western parts of the East Bay were numerous, including a positive sample geographically associated with one of the oldest California infestations, South of Castro Valley. UC Berkeley property, North Berkeley, and El Cerrito/Arlington all have active outbreaks.

Most areas sampled on the North Coast, including many First Nation lands, were outside the known zone of infestation by SOD and remained negative in 2023. However two outbreaks about 7mi apart are still present in Del Norte County. The northern outbreak, about a mile in diameter, is caused by the EU1 lineage, while the Southern outbreak, also about one mile in diameter is caused by NA1 isolates similar to nursery isolates originally found in infected nursery stock. Although not likely, the two outbreaks could coalesce in less than a decade. Intermingling of NA1 and EU1 variants is to be avoided as these are different ecologically, and in terms of virulence, and can sexually reproduce when together. Sexual reproduction is not possible when only one variant (NA1 or EU1) is present.

All California isolates were tested to determine which variant group they belonged too. Except for the one outbreak in Del Norte County where EU1 variants are present, all California isolates belong to NA1, the one group of variants, best known as NA1 lineage that is widespread in California woodlands.

Finally, we are happy to report San Luis Obispo County was well surveyed and found to be free of SOD.