

## **Aerial and Ground Surveys for Mapping and Monitoring the Distribution of *Phytophthora ramorum***

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Since 2001, USDA Forest Service and California Polytechnic State University, San Luis Obispo have been collaborating for early detection and monitoring of the occurrence of *P. ramorum*, the pathogen known to cause Sudden Oak Death (SOD). The effort consists of annual aerial surveys to map hardwood mortality in overstory tree species including coast live oak (*Quercus agrifolia*), tanoak (*Lithocarpus densiflorus*), Shreve oak (*Quercus parvula* var *shrevei*) and California black oak (*Quercus kelloggii*). These aerial surveys are followed by ground surveys to locate and sample both symptomatic overstory and understory host plants. Over the past few years the surveys have focused on early detection within minimally infested counties or counties with no known occurrence of *P. ramorum* but share a common border with regulated (infested) counties. The team of cooperators includes assistance from University of California (UC), California Department of Food and Agriculture (CDFA), county agricultural commissioners and cooperation from numerous private and public entities. Success in the program can be looked at in at least two ways, 1) by identifying new disease infestations and 2) by not finding new disease infestations. Over the past four years, the combination of aerial survey and ground confirmation efforts have identified new fronts of infection and mapped the distribution of *P. ramorum* within counties, or portions of counties, not previously known to have the disease (including recent expansion into southern Monterey County and new finds in Lake County). Ground surveys targeted by areas mapped aerially are checked for new infestations and infestations that expand the current range of *P. ramorum*. Established sampling protocols are followed to determine if *P. ramorum* symptoms are evident in any of the susceptible plant species present. All samples are shipped to the appropriate laboratory for confirmation of *P. ramorum* as well as other *Phytophthoras*. Results from aerial and ground surveys conducted over the last four years were compiled and evaluated for over 1,000 discrete areas mapped from the air and hundreds of sites visited on the ground showing the distribution of *P. ramorum*-caused hardwood mortality across the landscape.