Lessons Learned from the USDA Forest Service, Pacific Southwest Region, Sudden Oak Death Management Program[1]

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Abstract

Over the past 15 years, the USDA Forest Service, Pacific Southwest Region, State and Private Forestry (S&PF) has provided grants which have supported over 200 projects to address sudden oak death (SOD) in California. To date, over $10 million has been provided by US taxpayers, plus an additional $8 million of non-federal matching funds. These funds have provided the infrastructure for California's SOD response: supporting laboratory diagnostics, monitoring, management, and education and outreach. Grantees have included CAL FIRE, five California universities, UC Cooperative Extension in four counties, a county agricultural department, two National Parks, two timber companies, the US Department of Interior Bureau of Land Management, three National Forests, four Native American Tribes, and a privately run forest pathology consulting company.

State and Private Forestry's responsibility is to provide technical and financial assistance to improve management of forest pests and diseases, it is not mandated to support research (the mandate of USDA Forest Service Research and Development). Nevertheless, each year when proposals are submitted in response to the annual "Request for SOD Management Proposals," lessons learned from previous projects, including applied research on the SOD pathogen (*Phytophthora ramorum*), have been relied on for proposal selection since current knowledge is a key factor in the probability for success and relevance of a proposal.

Pathogen biology and disease epidemiology were evolving quite rapidly between 2000 and 2010 and many management-oriented projects uncovered new information, such as evidence that *P. ramorum* is the primary pathogen involved in SOD and long-distance spread via windblown spores is possible. Early projects also discovered evidence to show that California bay laurel (*Umbellularia californica*) leaves can become infected and support substantial pathogen sporulation. S&PF CA SOD projects also led to improvements in techniques and strategies for pathogen monitoring. Stream baiting was developed and is effective for early detection. S&PF aerial surveillance, conducted each year for CA forests at risk for SOD, developed digital sketch maps to identify locations where trees (primarily tanoak, *Notholithocarpus densiflorus*) are symptomatic, identifying polygons for ground checking to determine if *P. ramorum* is present. Approximately 30 field verification projects have been conducted to date. Collectively, several monitoring techniques (stream baiting, aerial surveying, and field verification) have tracked the progression of SOD in California, facilitating management activities and spread model validation.

The key characteristic of the overall S&PF SOD program in California is service and support for land managers facing novel challenges presented by SOD. There is much work to be done. Currently *P.*

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ramorum is threatening Tribal lands in northern California (Hoopa, Karuk, and Yurok). As tanoak holds special cultural significance for these tribes, sudden oak death's impacts on these stands are multidimensional and represent a special concern.