

The Big Sur Ecoregion Sudden Oak Death Adaptive Management Project: Ecological Monitoring¹

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Abstract

The Big Sur area is one of the most ecologically diverse regions in California. Land preservation efforts are well established in Big Sur, including numerous preserves, state parks and the Los Padres National Forest. However, there are still many conservation threats that cut across these areas including exotic species (plants, animals, and pathogens) and alterations of key natural processes such as a fire. Big Sur provides an ideal environment to address questions on the ecological consequences of *Phytophthora ramorum* due to the extensiveness of the forests, the relatively high impact of the disease in this area and the diversity of environments and disturbance histories. The Big Sur Ecoregion sudden oak death adaptive management project is a collaborative effort that brings together researchers (University of California Davis, UC Berkeley, UC Santa Barbara, University of North Carolina-Charlotte, United States Department of Agriculture - Forest Service) and land managers (Big Sur Land Trust, Santa Lucia Conservancy, Los Padres National Forest, UC Reserve System, Monterey Peninsula Regional Parks, California State Parks, private land owners). The main objectives of this project are to 1) establish a network of ecological monitoring plots; 2) evaluate impacts of sudden oak death (SOD) on ecosystem composition and dynamics; 3) develop a SOD management plan that compliments other landscape management goals; 4) test the efficacy of management actions; and 5) develop an outreach program that involves local communities.

To fulfill objectives 1 and 2, we are establishing a network of long-term ecological monitoring plots across the Big Sur Ecoregion. High-resolution, digital aerial photography integrated into a geographic information system (GIS) were used to map habitat types and tree mortality associated with *P. ramorum* in the Big Sur region. This information was the basis for a model built to randomly generate the location of the ecological monitoring plots stratified by forest type, level of tree mortality, fire history and land ownership (public versus private). In the plots, comprehensive data on the environment, vegetation, forest structure, disease level and site history is being collected. The location of each plot is spatially referenced and will be entered into a GIS database for analysis with other variables such as fire frequency, land use history and climate. Plots will be re-sampled over multiple years to monitor change.

Of the 300 proposed plots, 175 were established in the 2006 field season. Of these 175 plots, 99 contained trees that tested culture positive for *P. ramorum*. A preliminary look at the results shows that numerous plots have 100 percent infection of tanoak (*Lithocarpus densiflorus*) and sometimes coast live oak (*Quercus agrifolia*). In the *P. ramorum* positive plots, 72 percent of living tanoaks, 11 percent of living coast live oaks and 3 percent of living Shreve's oaks (*Quercus parvula* var. *shrevei*) were symptomatic. Standing stem mortality in

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positive plots was 23 percent for tanoak, 25 percent for coast live oak and 27 percent for Shreve's oak. However, standing mortality can be a misleading metric as many of the trees have fallen over and even decomposed in older infection sites. The high volume of large (>20cm in diameter) downed coarse woody debris found in positive plots as compared to negative plots (2.6 times the volume of tanoak and 3.4 times the volume of coast live oak in positive plots) supports this. A preliminary look at the data also suggests that variable levels of mortality are occurring in different stem size classes. For example, the standing mortality for tanoak stems in the larger stem size classes (>20cm) is more than 3 times that of the smaller stem size classes (1 to 5cm).

All 300 plots will be established by the end of the 2007 field season and the data collected will be used to a) evaluate the current distribution and spread of *P. ramorum* across the Big Sur region and b) provide baseline data on forest community composition and dynamics. Understanding the current spatial distribution of *P. ramorum* on the landscape, how this distribution is changing, and the underlying influences on establishment and spread of *P. ramorum* will be critical to making management decisions.

Key words: *Phytophthora ramorum*, sudden oak death, forest ecology, monitoring, Big Sur.