2015 UC Davis Sudden Oak Death Project Summary

The Plant Pathology lab at the University of California, Davis has been studying Sudden Oak Death in Big Sur since 2006. In the first few years of our research we set up a network of 280 long-term ecological monitoring plots throughout the Big Sur area from Carmel, south to the San Luis Obispo County line. Many people have contributed to a huge field sampling effort over the years to document the rapidly changing forest. During the last 2 summers we resurveyed 90 long-term monitoring plots, 40 redwood/tanoak in 2013, and 50 mixed-evergreen plots 2014. This survey included the measurement of all trees, sampling for pathogens, quantifying dead, woody fuel in the plot, and sampling litter and soil for nutrient analysis. We test all material not only for the presence or absence of *Phytophthora ramorum* (the pathogen responsible for SOD) but for the presence of other species of *Phytophthora* as well.

Beyond our normal sampling protocol, we have 2 dedicated PhD students currently using the Big Sur plot network for their dissertations. Among the many things they are looking at are:

- The interactions of the different species of *Phytophthora* that we find distributed across the landscape. Especially the interactions that occurred during the 2008 fires and the current drought. Soil samples taken from the plot are screened for *Phytophthora* and compared to vegetation sampling results collected from the surrounding vegetation. This year, we will be re-sampling plots where we isolated *Phytophthora* from the soil to see what affect the drought is having on the survival of pathogens found therein.
- The future of our forests. By looking at the type and size of tree seedlings and saplings in our plots we can predict what might replace the 100,000's of trees lost to SOD. By creating sub-plots within the larger plot, where no one walks, we can tag seedlings to monitor individual growth and survival.
- We are tediously collecting detailed information on the number and size of basal re-sprouts on those amazingly resilient trees out in the forest. One question we hope to answer is how long a diseased tanoak can re-sprout and persist as a shrub once it is top-killed by fire, or by SOD, or a combination of the two.
- Two years ago, temperature sensors were set out in all of the redwood plots to measure the variety of microclimates in the area. The fires of 2008 may have knocked-back the disease in some severely burned areas, but since then re-sprouts have filled in the understory, potentially creating a suitable climate for the pathogen to re-establish. Since the temperature sensors only have a battery life of a little over a year, they will be collected for analysis this summer.

Want to hear a good thing about the current drought? The pathogen doesn't like the extreme dry conditions and appears to be surviving only in optimal locations right now. This has given us an opportunity to make head-way against the spread of the disease. Data collected by public citizens throughout the state during UC Berkeley's SOD Blitz each spring show that the pathogen has contracted only into areas that are highly suitable for the pathogen. This year our local SOD Blitz will be on Saturday May 23rd (www.sodblitz.org). If we target areas for management where we find the pathogen now compared to wetter years, we may be able to reduce the pathogen over a large area.

Beyond preventatively treating individual trees against SOD, there is mounting evidence that shows true oak species (*Quercus* sp.) have a significantly lower probability of ever contracting SOD when there are not any bay (*Umbellularia californica*) trees within 30 feet of the base. Bay removal is currently the best

long-term technique to save true oaks on a large scale. In response to last year's SOD Blitz results, small understory bays were targeted for removal in the Coastlands neighborhood as part of a fuel reduction project and also along a particularly scenic part of the Oak Grove trail in Pfeiffer Big Sur State Park. Additionally, last November we established a management site on Big Creek Reserve with the aid of UCSB students to preserve a 1 hectare (2.3 acres) area of oak woodland. The management site in Big Creek resides in a coast live oak (*Q. agrifolia*) dominated forest that had a low density of small sized bay trees. The site was specifically chosen for ease of access, to minimize the amount of bay removal that had to be done, and is paired with a control site where no bays will be removed. Eventually we hope to establish a number of management sites across the state to save trees, and to scientifically test the efficacy of bay removal across a geographical gradient.

This summer in conjunction with the Marin Municipal Water District, USFS, and Cal Fire our lab at UC Davis is embarking on the first ever restoration project in an area severely affected by SOD. Work will happen north of Mt. Tamalapais around one of their reservoirs and involves: mastication to reduce and change the structure of dead woody fuel, biomass removal to encourage natural redwood and Douglas-fir recruitment, and replanting with canyon live oak (*Q.chrysolepis*) and California nutmeg (*Torreya californica*) in an effort to bring back tree canopy cover. We plan on establishing plots in managed areas to measure the accomplishments of different techniques.

Next year we hope to hold a community meeting to disclose new findings. We plan on presenting information gleaned from the Big Sur plot network and from research being done around the state. Please don't hesitate to contact me with questions.

Thanks for all your support,

Kerri Frangioso
Big Sur Sudden Oak Death Project
University of California, Davis
Plant Pathology Lab
kfrangioso@ucdavis.edu
530-219-1575