



Sudden Oak Death in Point Reyes National Seashore and Golden Gate National Recreation Area

Importance: *Sudden oak death is causing the demise of tanoaks and other tree species throughout Point Reyes National Seashore and Golden Gate National Recreation Area, as well as along much of the California coast.*

Sudden oak death (SOD) is a lethal forest disease that was first recognized in the mid-1990s. By 2001, scientists discovered that the pathogen *Phytophthora ramorum* causes SOD. While no one is certain of this pathogen's origins, evidence suggests it was likely introduced to the West Coast, possibly from Asia.

Many woody plant species, from California bay to coast redwood, may serve as hosts for *P. ramorum*. Some hosts suffer non-lethal leaf infections and serve to spread the pathogen's spores which are carried by wind, water, or soil. SOD is contracted by tree species such as tanoak that are most susceptible to *P. ramorum*. Common signs of SOD are brown leaves and lethal trunk and branch infections.



Lethal trunk and branch infections caused by SOD are sometimes visible as dark sap stains known as bleeding cankers.



Although it can take a few years for trees to die of SOD, their leaves turn brown in just a few months giving the impression that death is sudden.

SOD was first confirmed in Point Reyes National Seashore (PRNS) and northern Golden Gate National Recreation Area (GGNRA) in 2004 and is now affecting nearly 4,000 acres of forest. That there will be a cascade of ecological consequences is without question, but the extent of the damage is still uncertain. Fewer acorns could mean fewer rodents and hungrier northern spotted owls, clearings could invite invasion by exotic species, or erosion could increase, hence the need for careful SOD monitoring.

Monitoring Program: *Monitoring of SOD in PRNS and GGNRA has been on-going since 2007.*

The National Park Service and the Department of Environmental Science, Policy and Management at UC Berkeley conducted an initial assessment of SOD distribution in the parks in 2007 followed by the establishment of long term plots to monitor SOD progression and its impacts on different vegetation types. Selected plots were dominated by coast redwood or Douglas-fir mixed with similar basal areas (the combined area of trunk base cross-sections) of tanoak and were either healthy or already diseased. Precise data on plot species composition, disease progression, regeneration and fuel content were collected in 2007 and 2009 to establish the condition of the forests and assess changes over time.

Status and Trends: *SOD-induced tanoak mortality has been increasing, and much is being learned about the progression and effects of the disease.*

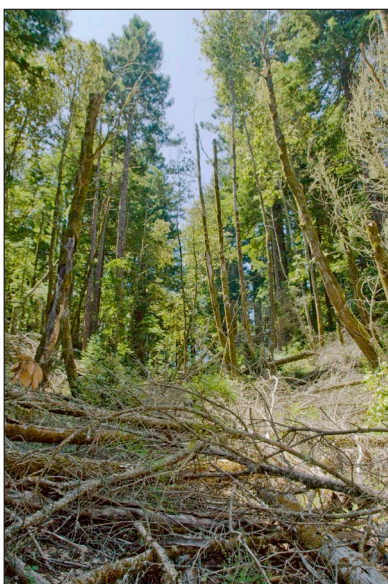
Between 2007 and 2009 new tanoak death was recorded in all plot types. The average annual tanoak mortality rate was around 8.1%, much higher than the natural annual tanoak mortality rate of 0.36% for California. Douglas-fir plots exhibited the greatest increases in mortality. Nearly 100% of their 2007 living tanoak basal area was dead by 2009. Redwood plots showed more advanced stages of tanoak decay in 2009 resulting from the fact that they were the first to be infected with SOD, however, 25% of their tanoak basal area remained alive. Some of the difference in mortality could be explained by greater numbers of other hardwoods, and potential SOD hosts, in the Douglas-fir plots. Data further suggest that redwood forests could suffer greater long-term ecological impacts from SOD because they lack the hardwood diversity found in Douglas-fir forests and therefore have fewer potential substitutes for tanoaks in the canopy.



Monitoring of long-term plots in Point Reyes and Golden Gate has been ongoing since 2007.
(© Jessica Weinberg)

SOD has also been linked to increases in fuel loads that could contribute to the spread of a wildfire. The greatest fuel increases were recorded in redwood plots where more advanced stages of decay have resulted in fallen tanoaks that could cause fires to burn longer and hotter. Increases in smaller fuels that could enhance fire spread were recorded in Douglas-fir plots.

In general the data did not suggest patterns to explain SOD severity. Instead, the random nature of SOD infection observed indicates that healthy forest patches near infected patches will likely become similarly infected in the future. Bi-annual monitoring of the SOD plots in PRNS and GGNRA will continue for as long as funding and researcher availability allow to further increase our understanding of the disease and its impacts.



Redwood-tanoak forests infected early on now have many fallen tanoaks that could increase wildfire severity. (© Jessica Weinberg)

How YOU Can Help: *Although there is no way to prevent SOD altogether, there is still a lot you can do to help discourage its spread:*

- If you find yourself in an infected area, avoid spreading SOD by using a dilute bleach solution to disinfect surfaces like shoes and tires that may have come in contact with vegetation.
- Use only firewood that is certified free of *P. ramorum*.
- Spread the word about SOD to others who spend a lot of time outdoors.

Additional Resources: *For more information on sudden oak death in PRNS and GGNRA, please visit*

- http://www.nps.gov/pore/naturescience/diseases_sod.htm
- <http://nature.berkeley.edu/comtf/>

or contact Alison Forrestel, Bay Area Network Fire Ecologist, 415 464-5200, Alison_Forrestel@nps.gov.