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Effects of sudden oak death on plant community structure and regeneration in the Big Sur ecoregion of California

Margaret R. Metz[1], Kerri M. Frangioso[1], Allison C. Wickland[1], Ross K. Meentemeyer[2], and David M. Rizzo[1]. (1) University of Califorina Davis, (2) University of North Carolina, Charlotte

Background/Question/Methods
Sudden oak death is an emerging infectious forest disease caused by the recently discovered generalist pathogen *Phytophthora ramorum*. Lethal infections are concentrated in several ecologically important species, including tanoak (*Lithocarpus densiflorus*) and various oak species in the genus *Quercus*. The disease has killed potentially millions of trees in coastal forests of California and may be dramatically changing the ecological dynamics and biodiversity of these systems. In 2006 and 2007 we installed 280 500-m^2 forest monitoring plots on public and private lands in several watersheds throughout the Big Sur ecoregion to assess impacts of sudden oak death on stand composition and dynamics of coastal forests in this global biodiversity hotspot. The plots were randomly located in two forest types (mixed-evergreen oak woodlands, redwood-tanoak) across differing levels of fire history and disease severity. In each plot, we mapped and measured all standing live and dead stems > 1 cm DBH, counted seedlings and advanced regeneration, and quantified plot-level measures of coarse woody debris, vegetation cover, canopy height and prevalence of *P. ramorum*.

Results/Conclusions
Approximately 20% of all host trees in the region were killed since the establishment of this disease in the mid-1990's, with levels of tanoak mortality exceeding more than 60% in some stands. The composition of understory seedlings differed with latitude and proximity to the coast, gradients that reflect variation in the abiotic environment and history of disease spread in the region. Community analyses examining differences in the advanced regeneration among plots with varying levels of *P. ramorum* infection and mortality revealed a significant correlation between understory composition and the amount and species identity of standing dead basal area. The total basal area of live tanoak and oak species also predicted the composition of understory seedlings. The high levels of tree mortality observed in Big

Sur will greatly change the abiotic and biotic characteristics found in local forest stands. This has the potential to profoundly impact the trajectory of natural forest regeneration in infected stands compared to uninfected stands and affect regional biodiversity as disease continues to spread.