

## Pre-Epidemic Mortality Rates for Common Host Tree Species in California

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Understanding the impacts of *Phytophthora ramorum* on forests requires knowledge of pre-disease distribution, abundance, and rates of change for affected species. This study estimated pre-epidemic mortality rates for common host tree species using inventory data from statewide inventories of private (and some public) forestland in 1981-84 and 1991-94.

Mortality rates that were developed represent the average annual mortality for trees that were at least 12.5 cm in diameter at 1.4 m above the ground at the time of the first (1981-84) inventory. Natural mortality for all tree species combined was estimated at one half of one percent of trees per year. When trees that were harvested or culturally killed were included, the mortality rate doubled to one percent of trees per year.

Species that are known hosts to *Phytophthora ramorum* with sufficient sample numbers to estimate mortality included bigleaf maple (*Acer macrophyllum*), California bay laurel (*Umbellularia californica*), California black oak (*Quercus kelloggii*), canyon live oak (*Quercus chrysolepis*), coast live oak (*Quercus agrifolia*), Douglas-fir (*Pseudotsuga menziesii*), madrone (*Arbutus menziesii*), coastal redwood (*Sequoia sempervirens*), and tanoak (*Lithocarpus densiflorus*). In the 1990s, these host species were estimated to predominate by basal area on more than 1.56 million hectares of forestland within the quarantined counties of Alameda, Contra Costa, Humboldt, Marin, Mendocino, Monterey, Napa, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma.

Estimated pre-epidemic natural mortality rates for tree host species ranged from 0.1 percent to 0.6 percent of trees per year. When harvested or culturally killed trees were included, estimated average annual mortality for these host species ranged from 0.4 to 1.5 percent of trees per year. Overall, growth exceeded natural mortality and harvest for host species between 1981-84 and 1991-94 for a substantial net increase of biomass and volume. One of the greatest rates of change occurred in tanoak, which increased in biomass and volume by more than 15 percent over the decade; by 1994 tanoak was the most common tree species in the quarantined counties, exceeding both Douglas-fir and coastal redwood.