

FROM ONE EXTREME TO ANOTHER: HOW HISTORIC PRECIPITATION IMPACT PESTS AND DISEASE IN CALIFORNIA'S FORESTS

Californians are breathing a collective sigh of relief as drought conditions that have plagued the state for years are finally subsiding after a historically wet winter. However, the relief has come at a cost as extreme flooding and heavy snowfall have caused significant damage to the state's infrastructure as well as to the state's forests. The sudden shift from one climatic extreme to another naturally raises questions about whether such a drastic change is good for forest and soil health. The answer depends on the location.

In areas with pre-existing forest health problems, particularly where the soil types facilitate waterlogging or forests are dominated by trees that require well-drained soils, this season's flooding may create new issues. For instance, root-infecting pathogens are a major concern. Many of these pathogens are non-native and have been transported to susceptible stands of trees through a variety of human activities since they can survive in mud and can be transported in flowing surface or subsurface waters.

In areas where water tables are high or impermeable layers are present in the subsoil, the extended soil saturation caused by this winter's flooding is likely to promote increased tree root damage by Phytophthora species. Phytophthoras are plant-damaging water molds that cause plant diseases such as Port Orford-cedar root disease and potato blight.

Depressed growth in bishop pine trees in coastal Sonoma and Mendocino Counties over the past few decades can be linked to these soil types and pathogens. When extreme wetness promotes root infection and consumption by Phytophthora species, the tree is unable to take up enough water for normal growth when followed by extreme dryness.



An example of Port Orford-cedar root disease on the roots and forest canopy.

CAL FIRE's Forest Pathology and Entomology Program staff are concerned about the impacts native and invasive forest insects and diseases have on forest health. Program staff consists of four personnel that provide technical assistance on insects and diseases affecting trees and forests to landowners, private foresters, and state agencies, and cooperate with a variety of agencies throughout the entire state of California. The biological evaluations and integrated pest management information they provide help guide affected landowners in managing their lands and help keep the forests of California healthy for generations.

Learn more about California's forest pests [HERE](#).



The bark beetles have causing widespread mortality in the forests and forested communities in California are all native.

Furthermore, extended wet conditions increase the number of infectious spores produced by a variety of forest pathogens, particularly when these conditions persist into late spring when ambient air temperatures increase. Increased flooding as snow melts may also promote erosion in areas where slope stability has been compromised, such as recently burned areas. Stands with accumulations of storm-downed trees may also be vulnerable to increased populations of insects like pine engravers and Douglas-fir beetles.

On the other hand, the extended wet conditions will undoubtedly be good news for some vegetation types where extended water deficits have led to bark-beetle caused mortality over entire landscapes, such as the true fir-dominated stands of the northern Sierra Nevada. Hopefully, this period of soil water recharge will enable some of the conifers in these stands to renew their chemical defenses against insect attack.

It is crucial to note that trees stressed by the many years of drought will need a few good years of water to repair and recharge. While some areas may benefit from the extended wetness, others will face new challenges as a result. As such, the consequences of this season's extreme weather conditions will undoubtedly continue to be felt for years to come.

