

HIGH-ELEVATION FOREST MONITORING

IMPORTANCE – Whitebark and foxtail pine are five-needle white pines that occupy high-elevation Sierra Nevada treeline and subalpine habitats, environments often too harsh for other tree species to thrive. Because these pines often occur in pure to nearly-pure stands, they can have a large influence on key ecosystem processes and community dynamics, such as regulating snowmelt and stream flow and providing habitat and food resources for birds and mammals. These pine species are currently threatened by the combined effects of *Cronartium ribicola*, a non-native fungus that causes the disease white pine blister rust, outbreaks of the endemic mountain pine beetle, and climate warming. Severe declines in whitebark pine are occurring nearly range-wide, and the species is warranted for listing as a federally endangered species. Whitebark and foxtail pine reach their southernmost distribution in the Sierra Nevada range where health conditions are currently the best for both species.



Jim Syvertsen attaching tree number tag in a whitebark pine monitoring plot in Yosemite. Photo: Jennie Skancke.

PROJECT STATUS – Sierra Nevada Network staff worked in collaboration with two other Pacific West Region Inventory & Monitoring networks (Klamath and Upper Columbia Basin) to finalize the monitoring protocol, which was published in 2012. In 2011, a four-person crew installed and sampled eleven whitebark pine plots in Yosemite National Park and seven foxtail pine plots in Sequoia National Park. A serious accident occurred with a field crew member in Kings Canyon National Park on September 8th. Field work was halted for the season to review the accident and evaluate safety procedures.

Data from plot surveys will be used to determine white pine forest community dynamics in Yosemite, Sequoia, and Kings Canyon national parks, including changes in tree species composition, forest structure, rates of birth, death, and growth. Factors affecting tree health and reproduction including incidence and severity of white pine blister rust infection, mountain pine beetle infestation,



Foxtail pine stand in Sequoia National Park. Photo: Linda Mutch.

dwarf mistletoe infection, canopy kill, and female cone production are also recorded. Blister rust and mistletoe were not detected in any plots, and only one live whitebark pine tree in Yosemite had signs of mountain pine beetle.

DISCUSSION – As a result of the forest crew accident, we have improved safety standards and practices for this project and our program. As we obtain additional years of data, we will be able to improve understanding of white pine stand dynamics at local and regional scales. Landscape-scale monitoring improves our chances of detecting changes of concern in these forests - such as blister rust infections or occurrence of mountain pine beetle. Early detection of undesirable change gives managers an opportunity to share information with other agencies and organizations and determine if mitigating actions may be appropriate.

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