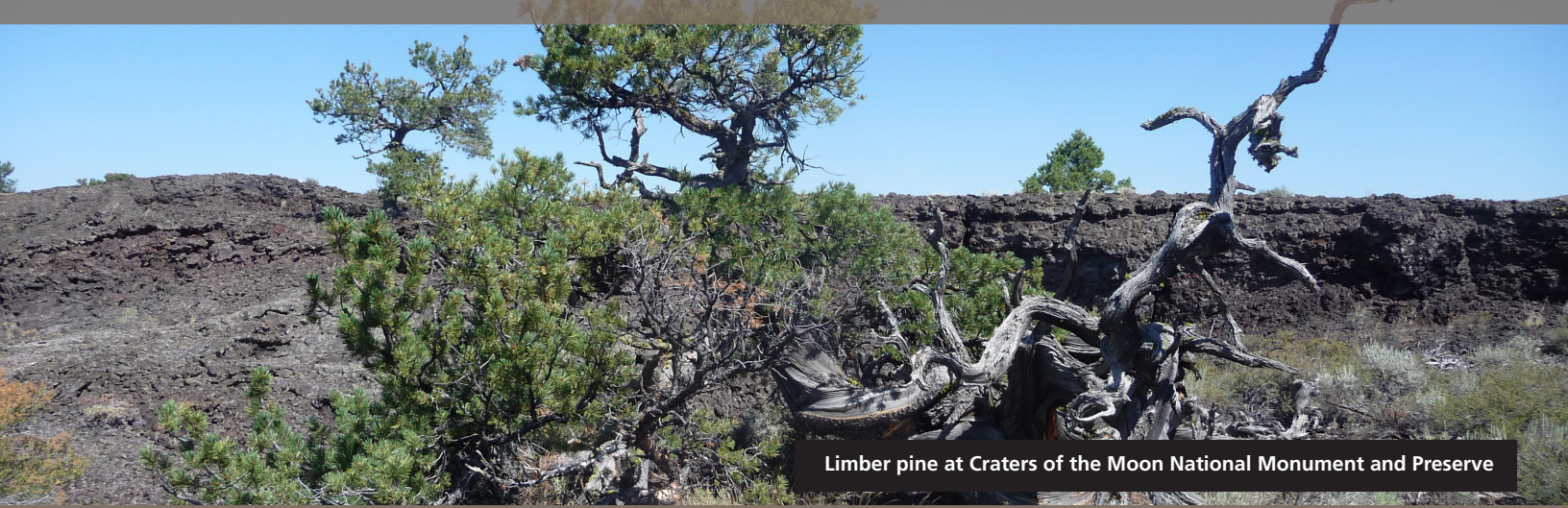




Limber pine and white pine blister rust monitoring

Craters of the Moon National Monument and Preserve



Limber pine at Craters of the Moon National Monument and Preserve

Why is limber pine important?

Five-needle white pines, including limber pine (*Pinus flexilis*), are foundational species in upper subalpine and treeline forests. They create locally stable conditions required by many other species. White pine trees are susceptible to the invasive pathogen white pine blister rust (*Cronartium ribicola*), which has decimated stands throughout the Intermountain West and portions of the Pacific West. Invasive pathogens as well as other stressors, including climate-change induced drought, threaten the stability of this species. In western North America there is often only one or two foundational tree species, and if one is lost, it will likely lead to a cascade of secondary losses and shifts in biological diversity. Limber pine is a high priority resource at Craters of the Moon National Monument and Preserve (CRMO) and monitoring in this park is being closely coordinated with high-elevation whitebark pine (*Pinus albicaulis*) and foxtail pine (*Pinus balfouriana*) monitoring in the Klamath and Sierra Nevada Networks, which includes the use of a common protocol.



Biological technicians setting up plots for limber pine monitoring at CRMO

Why do we monitor limber pine?

- To detect changes in the ecological condition of the limber pine community
- To quantify limber pine forest dynamics (e.g., species composition and structure, birth, dead and growth rates, cone production, incidence of infection and severity of tree damage by white pine blister rust, pine beetles and dwarf mistletoe)

How do we use the monitoring data?

- To initiate effective management intervention
- To contribute to the broader regional assessment of the status and trend of white pine species across western North America

What have we found?

Plots monitored at CRMO in 2014 contained a total of 403 live limber pine trees, 32 dead limber pine trees, and 100 other live conifer trees. No incidences of white pine blister rust were found; although, an active white pine blister rust infection occurs in the north end of the monument. Mountain pine beetle attacks were found in two limber pine trees, and Dwarf mistletoe was found in about 163 live limber pine trees. Although pathogen and insect infestations at CRMO are currently not high, declining trends in some populations observed in white pine populations in the Cascade and Rocky Mountain ranges, coupled with the identification of beginning infestations of blister rust and mountain pine beetle in the park, is cause for significant concern about the future status of these valuable communities. CRMO has a unique limber pine population, as it is occurs on the lower elevation periphery of the species' range.



White pine blister rust (*Cronartium ribicola* A. Dietr.)



Dwarf mistletoe (*Arceuthobium* spp.)