



Limber Pine Monitoring

Craters of the Moon National Monument and Preserve

White Pine Blister Rust and Stand Health

White pine blister rust, an introduced disease which causes mortality in five-needled pine trees, including limber pine (*Pinus flexilis*) is caused by the fungus *Cronartium ribicola*. The disease is widespread and may be considered the most significant disease affecting five-needled pines, resulting in altered stand structure in infected areas. The fungus must use an alternate host, usually currants and gooseberries (*Ribes spp*), to move from an infected tree to one that is healthy. Infection from white pine blister rust can directly kill the tree, while leaving surviving trees more susceptible to attack from mountain pine beetles and mistletoe infections. The limber pine population in Craters of the Moon National Monument and Preserve is susceptible to these threats. Predicted impacts of climate change also threaten the park's limber pine woodlands because drought stress can increase their vulnerability to pests and pathogens.

Limber pine woodlands are a unique and important ecological resource for the park. Widespread infection and mortality from white pine blister rust and pine beetles could be very destructive. Monitoring of limber pine woodlands for white pine blister rust as well as for changes in rates of regeneration and mortality will provide information about the status of the disease in the park and overall stand health, and will support more informed management decision-making.

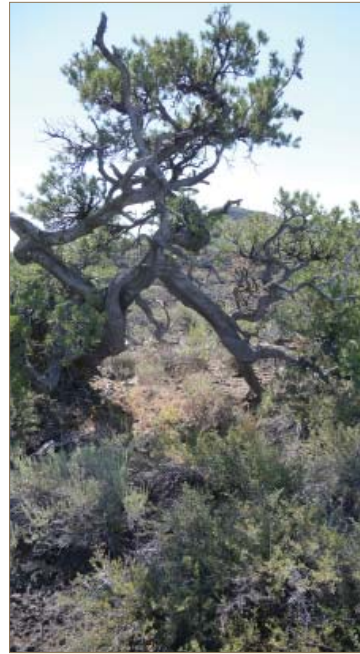
Preliminary Results

In 2013 the Upper Columbia Basin Network (UCBN) installed and sampled 33 plots in Craters of the Moon National Monument and Preserve (CRMO). No incidences of white pine blister rust were found within the sampled plots; although, there is an active blister rust infection in a small stand of limber pine trees in the north end of the monument. Mountain pine beetle attacks were found in 0.4% of live limber pine trees (n=2) and evidence of mountain pine beetle attacks were found in 4 recently dead trees. Dwarf mistletoe infections remain high throughout many limber pine stands in the park, but do not seem to be adversely affecting the pine population. Seventy-three percent of live limber pine trees (n=343) had produced female cones.

A third year of field experience and baseline results indicate that the monitoring effort is moving in a positive direction with a protocol well suited for this park.

Objectives

- Estimate status and trend of *Cronartium ribicola* infection in the park.
- Measure key attributes of stand health, including structure and composition, mortality, and regeneration.



Left: Limber pine in CRMO contribute substantially to the striking landscape in the park and are important to visitors' experiences.

Right: Tree affected by white pine blister rust.

Management Applications

- Provide information about *Cronartium ribicola* distribution in the park.
- Update park management knowledge of limber pine stand health and population dynamics, including impending threats to its long-term persistence, and potential management options.
- Support park resource planning and land health reporting efforts, and inform resource management in the park.