

LIMBER PINE CONSERVATION STRATEGY: RECOMMENDATIONS FOR ROCKY MOUNTAIN NATIONAL PARK

Christy M. Cleaver^{1,2,3}, Anna W. Schoettle³, Kelly S. Burns⁴, and J. Jeff Connor⁵

ABSTRACT

Limber pine (*Pinus flexilis*), designated by Rocky Mountain National Park (RMNP) as a Species of Management Concern, is a keystone species that maintains ecosystem structure, function, and biodiversity in the park. In RMNP, limber pine is declining due to the interacting effects of recent severe droughts and the climate-exacerbated mountain pine beetle (*Dendroctonus ponderosae*) outbreak, and is imminently threatened by the invasion of the non-native pathogen (*Cronartium ribicola*) that causes the lethal disease white pine blister rust (WPBR) in five-needle white pines. Loss of limber pine will likely lead to cascading ecological impacts and loss of biodiversity in RMNP and surrounding area if impacts are not mitigated. This strategy is the outcome of collaboration between RMNP, Rocky Mountain Research Station (RMRS) and Forest Health Protection (FHP). It addresses the unique situation of limber pine in RMNP and the Southern Rockies. It recommends proactive conservation actions specific to the Southern Rockies based on knowledge from the RMNP/RMRS/FHP program and other research that provides site-based information before ecosystem impairment by WPBR. It focuses on timing specific monitoring efforts and interventions to sustain healthy limber pine populations and ecosystems during invasion and naturalization of WPBR and thereby putting limber pine on a trajectory that does not lead to ecosystem impairment in the future.

In: Ramsey, A. & P. Palacios (Comps). Proceedings of the 63rd Annual Western International Forest Disease Work Conference; 2015 Sept. 21-15; Newport, OR. ¹USDA Forest Service, Forest Health Protection (FHP), Region 1, Coeur d'Alene, Idaho. ²Colorado State University, Fort Collins, Colorado. ³USDA Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado. ⁴USDA Forest Service, FHP, Region 2, Golden, Colorado. ⁵USDI National Park Service, Rocky Mountain National Park (retired), Estes Park, Colorado.

The objectives of the Limber Pine Conservation Strategy are to: (1) conserve genetic diversity and populations of limber pine throughout the park, (2) provide science-based recommendations appropriate for the park and wilderness within the park to sustain healthy high-elevation ecosystems, and (3) develop the park's continued role in the Southern Rocky Mountains to preserve the genetic integrity of native flora and fauna (Schoettle *et al.* in press).

RMNP is in a unique and enviable position in western North America as it is proactively focusing on this threatened species while the ecosystems are still in "healthy" (pre-WPBR caused mortality of reproductive trees) condition, thus enabling informed management to avoid and mitigate ecological impacts before they are expressed. The Conservation Strategy recommends continued and expanded application of the current proactive management approach as it offers the best opportunity to prepare the landscape for greater resilience before WPBR-caused impacts develop and to sustain populations as WPBR spreads (Schoettle *et al.* in press). The major focal areas for management activities are: promote *ex situ* and *in situ* conservation; increase population size and sustain genetic diversity; maintain durability of qualitative WPBR resistance; discover, develop, and deploy local quantitative WPBR resistant sources; and monitor pines and rust.

In spring of 2015, five monitoring plots in riparian areas at high risk for WPBR were installed for early detection and mitigation of WPBR. As a result, the recommended monitoring networks in the park are complete and include the (1) *Forest Health Monitoring Network* comprised of the ten forest health plots in the limber pine research areas established in 2013 and the three forest health plots established by USFS Forest Health Protection in

2006, (2) Early Detection Monitoring Network with the five riparian monitoring areas for early detection and mitigation of WPBR, and (3) WPBR Virulence Monitoring Network comprised of the 28 individual trees determined to have *Cr4* complete resistance to WPBR for monitoring virulence in the rust. Assessment protocols for the monitoring networks will be compiled in a guide and submitted to the park. This guide and the Conservation Strategy can be applied to other lands in the Southern Rockies as well as elsewhere.

REFERENCES

Schoettle, A.W., Cleaver, C.M., Burns, K.S., and Connor, J.J.. *In press*. Limber Pine Conservation Strategy for the Greater Rocky Mountain National Park Area. USDA For. Serv. Gen. Tech. Rep. RMRS-GTR-xxx.

