BENEFICIAL MANAGEMENT PRACTICES FOR LIMBER PINE AND WHITEBARK PINE IN ALBERTA

Value and status of whitebark pine and limber pine

Whitebark pine and limber pine are keystone species of foothills and mountain ecosystems: their loss impairs unique ecological functions including wildlife habitat, erosion control, and headwater stream flow timing. Both species are Endangered in Alberta (*Wildlife Act*). Whitebark pine is listed, and limber pine is being assessed for federal Endangered status listing (*Species At Risk Act*).

An introduced fungus is the main threat to both species in Alberta, infecting 95% of trees in southwest Alberta, and killing 75% of mature trees. Rare, high-value trees with disease resistance are the key to recovery through their seedlings that will survive and reproduce. Slow growth means each mature cone bearing tree can take a century to replace if killed, a serious blow to recovery. Mountain pine beetle, fire suppression, and climate change are also major threats.

Mitigation: first avoid, then minimize, compensate as last resort

The Mitigation Hierarchy is a widely accepted, scientifically credible restoration policy used in Alberta. Avoidance is preferred; if deemed impossible, minimize impacts; if not possible, only then consider compensation for impacts to achieve no net loss of individuals and their habitat quantity and quality. It is difficult or impossible after disturbance to restore functions and capacities of key ecosystem components in a timeframe that can be monitored for success. When proponents become aware of the potential to impact whitebark or limber pine trees or their habitat on provincial Crown land of in a project area, they must contact the Provincial Whitebark and Limber Pine Recovery Team co-chairs (GOA.EndangeredPine@gov.ab.ca) to develop a rationale describing how proposed measures are consistent with the Mitigation Hierarchy.

Beneficial management practices

- ***Avoid**:* Priority is to prevent impacting endangered species by careful planning and design. Recovery team can confirm if a monitoring plot, resistant tree, or restoration project is nearby. Check Open Data for habitat models indicating these species may be in the project area.
- *Baseline data:* Collect data on extent and health of stands and trees in the project area. Retain a professional with experience identifying white pine blister rust to identify rare resistant trees. Contact the Whitebark Pine Ecosystem Foundation of Canada to find regional experts.
- *Mountain pine beetle:* Apply Verbenone and green leaf volatiles to mature and resistant trees early to mid-June if MPB is a local threat; these are only effective at low to moderate beetle population sizes and not during a severe outbreak. Contact regional Forest Health staff.
- *Disease resistant trees:* Submit data on resistant trees to the Recovery Team, contact them for requirements. Collect seed for testing and restoration, and scions for grafting.
- *Collect seed:* Protect high value tree seeds from wildlife by installing wire 1/8” mesh cages from May to August, secured well around cone-bearing branches. Collect cones starting third week September in burlap sacks. Collect, label, and store seed from each tree separately in well

ventilated area. Send seed to Alberta Tree Improvement and Seed Centre, contact Provincial Seed Specialist for documentation and handling instructions.

- *Disease resistance testing:* Send seed from each resistant tree to Dorena Genetic Resource Center Oregon, or Coeur D'Alene Forest Nursery, Idaho for blister rust resistance testing. Proponent will cover costs for phytosanitary inspection, shipping, testing, and follow instructions for seed numbers, packaging, shipping, documentation, and timing. Confirm with Recovery Team first, and submit all data to them.
- *Planting:* Grow 2- or 3-year plug seedlings from selected or tested resistant trees in the same seed zone. Spatially delineate the planting site. Send data and seedling numbers to the Recovery Team, who can provide information on seedlot registration, species-specific seed zones, and seed transfer for whitebark and limber pine.
- *Planting*: Transplanting trees or saplings, and planting seedlings grown from parent trees that are not selected for disease resistance, are **not best practices**. **Plant seedlings from selected or tested resistant trees only**. Replace each disease resistant tree impacted with 200 seedlings. Replace each other mature tree (10+ cm DBH) impacted with 100 seedlings. Replace each immature tree (1.3 cm+ DBH, <10 cm DBH) impacted with 50 seedlings. Replace each seedling impacted with 5 seedlings. Microsite planting and seasonal timing are essential for survival.
- *Grafting*: if a selected or tested resistant tree will be impacted, collect 20 grafts, ideally in winter when dormant or if not possible then during cone collection, and have a nursery graft them onto compatible rootstock to add to the provincial recovery program. Submit data and materials to Recovery Team; contact them in advance for information on graft collection and to confirm rootstock and grafters are available.
- *Interpretive signs*: All-weather signs describing whitebark and limber pine importance and conservation measures on site or a nearby trailhead. Recovery Team has templates available.
- *Recovery team direct project funding:* If avoidance and mitigation options have been thoroughly explored and are not feasible, proponent may financially contribute to priority recovery plan actions including:
    - operational nursery seedling production (takes 3 years, $1.25 to $1.75 per seedling);
    - covering the cost of disease resistance testing (~$1350-1700 CAD per tree, takes 7 years);
    - supporting seedling planting for restoration in areas identified by the recovery team – may require horse packing or helicopter transport of seedlings;
    - covering cost of helicopter access to remote sites for seed collection (2 visits) and monitoring (1 visit);
    - retaining experienced contractors to collect data and cones of putatively disease resistant trees following recovery team protocols.

Contact information

- Provincial Whitebark and Limber Pine Recovery Team co-chairs GOA.EndangeredPine@gov.ab.ca
- Provincial Forest Health Officers Fh.Info@gov.ab.ca
- Alberta Tree Improvement and Seed Centre atisc@gov.ab.ca
- Provincial Seed Specialist Lindsay.Robb@gov.ab.ca
- Whitebark Pine Ecosystem Foundation of Canada http://www.whitebarkpine.ca/
- Alberta whitebark pine recovery plan
- Alberta limber pine recovery plan
- Federal whitebark pine draft recovery strategy
- Restoring whitebark pine ecosystems in the face of climate change