

FIVE-NEEDLE PINES

TRANSBOUNDARY CONSERVATION INITIATIVE

Background

Of the nine five-needle pine species found in western North America, only limber pine (*Pinus flexilis*) and whitebark pine (*Pinus albicaulis*) have wide distributions in the Crown of the Continent ecosystem (CCE). They are keystone species in the native ecosystem providing ecosystem services such as snowpack retention and life cycle food and habitat niches for birds, squirrels and bears. They also have cultural and aesthetic value.

Whitebark pine, a foundation and keystone species of upper subalpine and treeline forest communities, is widely represented throughout the CCE, growing at the highest elevations and on the harshest sites. Limber pine forms small to large stands after fire or other disturbance, and occurs from the lower forest boundary to the highest elevations. It also grows as a dominant species in climax stands on harsh sites or alongside whitebark pine in subalpine and treeline communities. Both pines produce large, wingless seeds, which are important food for wildlife, including grizzly and black bears as well as birds and small mammals, and have a rich culture of traditional uses by indigenous peoples. Both pines depend on Clark's nutcrackers for seed dispersal and are unable to reproduce without this bird, which extracts seeds from the cones and plants them in the ground.

Whitebark and limber pines are declining rapidly as a consequence of anthropogenic disturbances. The main agent of decline is the introduced fungal pathogen *Cronartium ribicola*, which causes the virulent disease white pine blister rust in five-needle white pines. The CCE has the highest infection and mortality rates from this pathogen across the range of both pines, with stands often suffering over 90% mortality and infection. Blister rust impacts trees of all ages, resulting in top-kill, branch dieback, mortality and predisposition to attack by other agents, including mountain bark beetles (*Dendroctonus ponderosae*). They are also susceptible to direct human impacts, including mining operations, recreational development and harvesting. Whitebark and limber pines are also impacted by fire exclusion which often favors shade-tolerant competitors. Climate change exacerbates the impact of other stressors, shifting pine distributions, altering local hydrology, and leading to mortality of the most valuable large, old pines.

Without these two species and the communities that they anchor, carrying capacity for wildlife declines, high and low elevation forests are more geographically restricted and homogeneous, and multiple ecosystem services are diminished. Despite the grim situation, there are lots of reasons for optimism about the prospect of these important ecosystems.

What is being done?

In Canada, limber pine has been designated as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), but has not yet been assigned status under the federal Species at Risk Act (SARA). Whitebark pine has been designated as endangered by COSEWIC and has endangered status under SARA. A federal recovery strategy is underway, led by Environment and Climate Change Canada. Both limber and whitebark pines are listed as *endangered* under *Alberta Wildlife Act* and recovery strategies have been approved. In the US, whitebark pine is a candidate for listing under the Endangered Species Act. It was ruled as "warranted but precluded" in 2011, and a final status review is expected in 2019.

There is considerable active research underway on ecology, genetics and restoration. Recent studies show 80% or higher infection rates for both whitebark and limber pines in the Crown. Infection levels have increased twice as fast in limber versus whitebark over the last decade. Restoration strategies include planting of rust resistant seedlings from 'plus' trees (trees showing apparent or confirmed disease resistance) and experiments with fungal inoculations to improve seedling vigor. Vulnerability, adaptation and restoration strategies for the Crown have been compiled for

whitebark pine by the Crown Conservation Initiative:

http://crownmanagers.org/storage/CC_Gap_Analysis_Report_Public_FINAL_v2.pdf.

In March 2014 the Crown Roundtable sponsored a stakeholder workshop in Missoula, MT on the theme, [‘Taking Action on Climate Change Adaptation: A Workshop to Develop Shared Strategies for a Shared Landscape’](#). The workshop was organized by the CMP, the Crown Conservation Initiative and The Wilderness Society and was held at the same location and immediately following the CMP’s Annual Forum [‘Managing for Climate Change in the Crown of the Continent Ecosystem’](#) ([scroll down](#)). Five-Needle pines were amongst the short-list of priorities identified for action following these meetings.

How did you go about deciding what to do?

In March 2016 the Crown Managers Forum held a workshop at its Annual Forum in Fernie, BC on the theme, [‘We Need the Needles: Coordinating Action to Conserve Five-Needle Pine Forests in the Crown of the Continent’](#). This workshop was the fourth in a series of workshops organized by the Crown Adaptation Partnership (CAP), and was co-sponsored by the Whitebark Pine Ecosystem Foundation (US) and the Whitebark Pine Ecosystem Foundation of Canada.

Eighty-seven people participated in the workshop, representing 43 different federal, provincial, state, municipal, Tribal and First Nation governments, as well as conservation organizations, universities, industry and communities.

The workshop opened with a tribal/First Nations panel discussing the ecological and cultural significance of Five-Needle Pines. The objectives of the workshop were to:

- Deliver best available science and data products on the climate adaptation strategies and tactics necessary to maintain five-needle pine in the CCE in an era of rapid climate change;
- Discuss existing challenges and/or barriers that may be impeding five-needle pine restoration, and develop recommendations to address these issues;
- Catalyze a formal CCE-wide working group whose purpose is to promote the long-term viability of five-needle pines in the CCE by sharing information, leveraging capacity and resources, and promoting five-needle pine protection and restoration; and
- Initiate a process to develop a CCE-wide five-needle pine restoration strategy that identifies and prioritizes the type, amount and location of restoration activities, protection measures and monitoring that are necessary to restore five-needle pine in the CCE.

The workshop intentionally linked:

- Best available science and data on distribution, status, trends and stressor impacts;
- Strategies and tactics necessary to restore and maintain five-needle pine in the CCE in an era of rapid climate change;
- Jurisdictional challenges and opportunities; and
- Break-out groups and plenary discussion on desired outcomes and strategies for the transboundary Crown.

What outcome do you want to achieve?

To protect and restore functional whitebark and limber pine ecosystems by fostering transboundary collaboration and coordination to transfer sound scientific knowledge, leverage funding opportunities, and optimize restoration and conservation efforts within the Crown of the Continent Ecosystem.

What are your strategies for getting there?

- Catalyze a formal “High-Five” Crown-Wide Working Group;
- Develop a Mitigation Strategy and Best Management Practices to Avoid Degradation or Loss of Five-Needle Pine;
- Launch a Crown-Wide Inventory and Monitoring Database for Five-Needle Pines;
- Draft (and Implement) a Crown-Wide Recovery Strategy for Five-Needle Pines;
- Develop Recommendations for 5-Needle Pine Restoration in Highly Protected Areas;
- Develop Recommendations to Guide Pro-Active Fire Management in Five-Needle Pine Forests; and
- Develop a Multi-Faceted Communications Strategy to Raise Awareness and Support for Five-Needle Pine Restoration and Conservation.

What has been done?

In May 2016 follow-up activities culminating from the Annual Forum workshop are summarized in a final workshop report: including an initial Implementation Strategy detailing the ‘Why, What, When and Who’ for each of the seven identified strategies: <http://crownmanagers.org/storage/5NP%20Workshop%20Report%20FINAL.pdf>

A suite of science and data products have been produced in support of the Five Needle Pine Conservation Priority:

- Five Needle Pine Data Management Plan: <https://www.sciencebase.gov/catalog/item/584eddefe4b0260a373818db>
- Five Needle Pine Database Scoping Document and Presentation: <https://www.sciencebase.gov/catalog/item/5807d47be4b0841e59e3a508>
- Probability of occupancy model for Limber pine in the Crown of the Continent: <https://www.sciencebase.gov/catalog/item/57bf65f5e4b0f2f0ceb75be7>
- Probability of occupancy model for Whitebark pine in the Crown of the Continent: <https://www.sciencebase.gov/catalog/item/57bf6572e4b0f2f0ceb75be0>

In September 2016 an inaugural meeting of the Crown of the Continent High Five (Hi5) Working Group was held in Whitefish, MT, representing fulfillment of the first charge of the implementation strategy, “Catalyze a formal, ‘High Five’ Crown-wide Working Group”. A leadership team with US and Canadian Co-Chairs was struck. There was exceptional participation in the workshop, with 55 attendees representing over thirty different jurisdictions/entities. A [workshop summary](#) detailing the discussions that took place was produced. A draft charter was developed and committed to by participating stakeholders, additional implementation ideas were generated and new volunteers identified. Hi5 Working Group sub-committees with designated leads were formally struck to make progress on each of the strategies identified (see Contacts on following page).

Subsequently, the Hi-5 Working Group has formalized the Charter and sub-committees are making progress on workplan priorities. A notable mitigation strategy milestone is the December 2016 development of a draft species management and mitigation plan for whitebark pine by Teck Resources Ltd., which is conducting coal-mining operations in the BC portion of the Crown.

What's next?

In 2017 the High Five Working Group and respective sub committees will be working to achieve the milestones agreed to in Whitefish. The 2017 annual meeting of the Crown High Five Working Group is scheduled for November 6-7 in Missoula, Montana. For more information, contact Regan Nelson, regan.nelson@crownsconservation.net.

Collaboration (who is involved)?

Federal, provincial and state agencies, invasive species and other partnerships, consultants, Tribes and First Nations, universities and key researchers, forest companies and NGOs including The Wilderness Society, the Crown Conservation Initiative and American Forests.

Links to a few key websites:Research:

Rocky Mountain Research Station:

<https://www.fs.fed.us/rmrs/people/rkeane>

<https://www.fs.fed.us/research/people/profile.php?alias=mmahalovich> University of

Colorado: <https://clas.ucdenver.edu/directory/faculty-staff/diana-f-tomback> Five-Needle Pine societies:

Whitebark Pine Ecosystem Foundation: <http://whitebarkfound.org/>

Whitebark Pine Ecosystem Foundation of Canada: <http://www.whitebarkpine.ca/>

Newsletters:

Nutcracker Notes: http://whitebarkfound.org/?page_id=408

Publications:

- Alberta Limber Pine Recovery Plan: <http://open.alberta.ca/dataset/45ceb67a-7b44-4beb-a5a4-2b72a9b2e118/resource/05362a91-7f67-4af3-b8ea-e8e40f91a5dc/download/2014-SAR-LimberPine-RecoveryPlan-Sep2014.pdf>
- Alberta Whitebark Pine Recovery Plan: <http://aep.alberta.ca/fish-wildlife/species-at-risk/species-at-risk-publications-web-resources/plants/documents/SAR-WhitebarkPineRecoveryPlan-Jan-2014.pdf>
- University of Montana: http://scholarworks.umt.edu/forest_pubs/16
- Natural Resource Council: http://www.whitebarkpine.ca/uploads/4/4/1/8/4418310/smith_et_al_2013_changes_in_blister_rust_infection_and_mortality_in_whitebark_pine_over_time.pdf

Contacts:

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