BRITISH COLUMBIA | Ministry of Forests

Forest Health Bulletin

Will the pine survive?

How to retain endangered whitebark pine in harvest operations.

Whitebark pine (*Pinus albicaulis*) is widely distributed in the high-elevation forests of central and southern British Columbia. Its nutrient-rich seeds are an important historical food source for indigenous people and wildlife. At the highest elevations of tree growth, these trees help stabilize steep slopes and regulate snowmelt.

An introduced fungal pathogen causing the disease known as white pine blister rust is decimating populations of whitebark pine throughout most of its range. Combined with mountain pine beetle, shifting fire regimes, widespread successional replacement, and climate change – whitebark pine's future is uncertain.

Whitebark pine is the first tree in western Canada to become federally listed as endangered under the **Species at Risk Act**. It's also classified as endangered by the International Union for Conservation of Nature and designated as a species of special concern (blue-list) in BC.

This long-lived tree is often found in forests suitable for harvesting. A study recently examined five historical harvests – all variable retention prescriptions. We analyzed survivorship and growth of retained whitebark pine. We found a strong increase in survivorship with greater tree crown length accompanied by decreasing tree height. Thus, the probability of post-harvest mortality was higher for taller trees with shorter crowns and lower for shorter trees with long crowns. Trees with blister rust cankers had less than 50% chance of survival post-harvest. In examining the importance of neighbor trees, a survivorship probability greater than 50% required a minimum of 7.5 retained neighbor trees within tree height radial distance. For trees that did not survive, we found the vast majority of downed stems oriented in a north-easterly direction from root collar to crown indicating the significant influence of wind from southwesterly directions.

BASED ON OUR FINDINGS, WE RECOMMEND:

Pre-Harvest

- Ensure whitebark pine are accurately classified in surveys and inventories.
- Use Forest Stewardship Plans (FSPs), forest landscape-level planning, wildlife tree reserves, and Old Growth Management Areas as tools to retain.

During Harvest

- Retain healthy trees and avoid damage.
- Retain a minimum of eight neighbour trees (neighbours are counted within a radius that equals the target tree's height).
- Retain trees with greater vertical crown lengths as measured along the stem from ground to tip of crown.
- Retain trees of average height. The tallest trees are more prone to wind tipping.
- Orient retention patches according to predominant wind direction.

Post-Harvest

- Remove logging slash from beneath retention. Surface fires can readily scorch and kill retained trees.
- Promote regeneration. Based on Provincial stocking standards, whitebark pine is classified as an acceptable or preferred species in many biogeoclimatic units.
- Carefully site seedlings. Although whitebark pine are hardy trees, they are slow-growing and compete poorly with brush and other tree species.

For more information:

Harvest Retention Survivorship of Endangered Whitebark Pine Trees; Forests 2021, 12(6), 654

Michael Murray, Ph.D., P.Ag, has been the Regional Forest Pathologist in the Kootenay-Boundary Region since 2008.

Provincial Bark Beetle Response

While we are still grappling with the aftermath of the unprecedented mountain pine beetle outbreak, recent trends show widespread and concerning surges in bark beetle populations for spruce beetle, Douglas-fir beetle, and western balsam bark beetle. As naturally occurring forest disturbances, bark beetle outbreaks can result in increased ecosystem diversity and resilience, but they can also have far-reaching impacts for forest values such as carbon sequestration, recreation, fish and wildlife, watershed management, range, landscape values and aesthetics, cultural heritage, and old growth forest ecosystems.

As the Director of Provincial Bark Beetle Response, I want to take a proactive and energetic approach to a renewed bark beetle response.

At the end of 2022, the provincial bark beetle response strategy is composed of three goals: tools, outreach and education, and investment. In 2022 and into 2023, the immediate focus must involve the review and development of forest health tools within the forest health program (Goal 1). This goal is to provide accurate, useful, and science-based data collection, analysis, monitoring, and management tools for access and use within government programs as well as for use by external clients (industry, consultants, First Nations, public). Further into 2023, the strategy will shift to an increased focus on education and outreach (Goal 2). The Annual Bark Beetle Summits will continue, and a social media strategy is already recently underway. Finally, within the next 3-5 years, strategic investment in healthy forests (Goal 3) must include data-based risk and susceptibility modeling incorporating climate change, increased public forest health monitoring and reporting, silvicultural rehabilitation programs, policy support for rapid treatment of early bark beetle infestations, and research into knowledge gaps. I am looking forward to learning the best ways to support and advocate for your important work on forest health in BC, so please reach out with information, challenges, and solutions: *Jeanne.Robert@gov.bc.ca*.

Jeanne Robert, Ph.D., RPBio, FIT, was the Regional Forest Entomologist in the Omineca and Northeast Region from 2016 – 2021, prior to assuming her position as Director, Provincial Bark Beetle Response with the Office of the Chief Forester.

Changes within the Forest Health Team:

Philip Batista, PhD, first joined the ministry in 2019 as a spruce beetle researcher working under Jeanne Robert and in 2021 became the Regional Entomologist for the Omineca and Northeast Region. Philip started in entomology while working on his PhD in Biology from the University of Alberta. After graduating he joined the TRIA-net initiative in 2014 as a postdoctoral fellow at the University of Alberta where he worked on resolving the range-wide population structure of mountain pine beetle. In 2015, he moved to Prince George to work at UNBC on a postdoctoral fellowship within TRIA-net with Dr. Dezene Huber in the Ecosystem Science and Management Program. His work during this time focused on looking at the functional genetic variation and changes in metabolomic profiles of overwintering mountain pine beetle. His work on bark beetles continued to spruce beetle, which was undergoing an outbreak in the region, resolving the population structure of spruce beetle and metabolic tree response to spruce beetle attack.

Calvin Jensen, M.Sc., RPF, became the Regional Forest Pathologist for the Thompson Okanagan in 2021. He is based in Kamloops on the traditional territory of the Tk'emlúps te Secwépemc. Calvin began his forestry career as a tree improvement research assistant at the University of Alberta, worked in wetland and caribou conservation for Ducks Unlimited Canada and Environment and Climate Change Canada, and later in silviculture for Alberta-Pacific Forest Industries. He pursued a Master of Forestry at the University of Alberta to gain experience in forest pathology with a focus on white pine blister rust, though he will always have a soft spot for dwarf mistletoes. Calvin has been hard at work going through records of previous trials and experiments to better understand the research that has been conducted in the past, as well as increasing his familiarity with the region and its forest health agents.

Celia Boone, Ph.D., P.Ag., joined the Forest Health team as the Regional Forest Entomologist in the Skeena Region where she looks forward to embracing all that northwestern B.C. has to offer. Celia's official science career commenced with a B.Sc. and M.Sc. in Plant Protection/Pest Management from the Nova Scotia Agricultural College/Dalhousie University. Lured by the glamour and acclaim of research, she pursued her Ph.D. in Entomology at the University of Wisconsin-Madison studying bark beetle ecology in western Montana and the southern interior of B.C. Celia's adventures in the realm of bark beetles continued with my first post-doc with the Tria Project based in Prince George, B.C. (UNBC) focusing on the population genetics of the mountain pine beetle system throughout western North America. A second post-doc took her to Brussels, Belgium (Université Libre de Bruxelles), to develop a federal detection and mitigation program for a forest invasive alien species that was native to North America. Celia had a brief stint as a consulting Lead Scientist/Entomologist briefly in Northern California before returning to Nova Scotia as the Provincial Forest Entomologist in March 2017.

David Rusch, M.Sc., RPF, has returned to the west coast as the Regional Forest Pathologist, replacing Stefan Zeglen, who moved on to lead the Forest Health Team as the Forest Health Officer. David spent 14 years working for the ministry in Alexis Creek and Williams Lake in roles that included both the Regional Forest Entomologist and Regional Forest Pathologist. David Started his career as a self-employed root disease surveyor on the Island back in the 1990's. David brings extensive experience working with root disease, dwarf mistletoes, foliage diseases, and stem rusts. He is excited to learn more about coastal disease problems such as Swiss Needle Cast and Yellow Cedar Decline, and to make new acquaintances on the coast.