Bulkley Valley Research Centre

Habitat Conservation Trust Foundation Grant Report

Restoring Whitebark Pine Ecosystems to Enhance Subalpine Bear Habitat

HCTF PROJECT 6 - 227

2017-18, 1st Year Report of 2nd Five Year Cycle (CAT-18-6-227)

Julia, from the Burns Lake Unit Crew plants whitebark pine seedlings in the Atna Bay wildfire

Prepared by Sybille Haeussler PhD RPF

April 15, 2018

HABITAT CONSERVATION TRUST FOUNDATION

FESBC Forest Enhancement Society of British Columbia

HABITAT CONSERVATION TRUST FOUNDATION

Grant Report *Project #6-227*

Project #_6_-_227__

Project Name: [_Restoring Whitebark Pine Ecosystems to Enhance Subalpine Bear Habitat__]
Name and number must be the same as on the original proposal.

1. Grant Information

Grant Agreement Year: 20_17_ - 20_18_ Conditional Grant Agreement #: CAT- _18-6-227___

Year Status of this Grant: Year _1_ of _5_ Years

Was there an approved Contract Extension for this grant year? Yes __ No _x_

Was there an approved Project Change Request for this grant year? Yes __ No _x_

Project Leader Name and Title: **Dr. Sybille Haeussler**

Name of Organization: **Bulkley Valley Centre for Natural Resources Research & Management**

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Author of Report (*if different than Proponent***):**

Name of Organization:

Contact info:

2. Executive Summary

Whitebark pine (*Pinus albicaulis*) is a wildlife tree whose large oil- and protein-rich seeds (pine nuts) are a important source of nutrition for many wildlife species, including grizzly bears and black bears, birds [especially Clark's Nutcracker (*Nucifraga columbiana*)] and various mammals [especially red squirrels (*Tamiasciurus hudsonicus*] in the subalpine forests of western Canada. The species was listed as endangered under Canada's Species At Risk Act in 2012, and ecosystems containing whitebark pine are blue-listed in British Columbia. In 2010 the Bulkley Valley Research Centre began restoring disturbed whitebark pine ecosystems at their northwest limit in the southern Skeena Region. From 2011-2015 HCTF committed $5000/yr to a successful 5-yr multi-funder project to learn how to restore whitebark pine ecosystems by planting seedlings from blister rust resistant parent trees in areas of high value bear habitat. This 2017-18 Grant Report summarizes the first year of our second 5-year term (2017-2021), whose primary objective was to complete the transition in whitebark pine ecosystem restoration from an experimental/learning stage to a sustainable operational stage.

2017-18 was a huge year for our project because in May and June we successfully planted 6400 whitebark pine seedlings collected locally from putatively rust-resistant parent trees and grown in a local nursery. This was a big step up from the first 5-year cycle (when we planted 100 to 900 seedlings in a year) and marked the first phase of operational scale whitebark pine planting in northern BC. We worked closely with partners Office of the Wet'suwe'ten, BC Parks and BC Wildfire Services to plant 4800 seedlings within recent two wildfires in Morice Lake Provincial Park and Nenikekh/Nanika-Kidprice Provincial Park. This was a logistically challenging operation involving helicopter, boat and seaplane transport of seedlings and planting crews into remote grizzly bear habitat that went off without a hitch. We planted an additional 1600 seedlings at subalpine sites near Smithers with personnel from two forest licensees, Wetzin'Kwa Community Forest Corp and PIR West Fraser Ltd. Total area restored: 7 ha.

Other field activities carried out in 2017-18 included (1) inspection of seedlings for white pine blister rust infection with FLNRORD forest pathologist Alex Woods; (2) 5- to 6-year monitoring and maintenance of the Hudson Bay Mountain and McBride Peak restoration-assisted migration trials (established 2012 and 2013); (3) first-growing season monitoring of the Wetzin'Kwa and PIR-West Fraser plantings; and (4) monitoring and advance preparations for the upcoming 2018 whitebark pine cone crop and seed collection. Total area monitored and maintained: ~31 ha.

Communication and Outreach Activities in 2017-18 included presentations to a Nature Vancouver Camp and the Whitebark Pine Ecosystem Foundation, an article published in the BC Forest Professional Magazine; an interview for an upcoming article, contributions to the Bulkley Valley Perpetual Nature Diary; extension and liaison with northern BC forest professionals, outdoor recreationists, ski resort personnel regarding field activities, and regular updates with whitebark pine specialists in southern BC and the US.

3. Activities (Methods) Completed and 4. Measures of Success Achieved

2017-18 Objectives, Activities and Measures of Success (#)

Objective 1: To successfully restore at least 300 ha of disturbed whitebark pine ecosystems in areas of high value bear habitat in the Skeena Region over 5 year

1.1 Plant 6500 seedlings from Woodmere Nursery: We planted **#6400 seedlings**. At least 100 seedlings died or were culled in the nursery after our 2016 count of 6500 seedlings.

1.2 Stratify and sow remaining seeds collected in 2013. We have delayed the sowing to July 2018 because Dave Kolotelo (seed specialist at BC Tree Seed Centre) did not complete his germination trial until Sept. 2017 with recommendations to sow in July rather than Sept. (details below). **#0 seeds sown**.

1.3 Monitor & maintain existing and new restoration plantings: we monitored and maintained 6 existing and 2 new restoration plantings. Total area monitored & maintained # **31 ha**.

1.4 Motivate and assist partners to establish, monitor & maintain restoration plantings. Forest industry partners planted 1600 seedlings and restored #**1.6 ha**; BC Parks personnel have actively participated in planting, monitoring & maintaining #**5.5 ha** of restoration plantings.

Objective 2: Store 1 million Skeena Region seeds for future whitebark pine plantings

2.1 Monitor conelets: We assessed two locations and received reports from partners on two additional locations in Skeena Region. Total **#4 locations assessed**.

2.2 Mobilize team and partners when good seed year predicted: 2018 is predicted to be a good seed year. We enlisted a strong team of 4 industrial, 4 government agency, 1 First Nation, and 3 not-for-profit and 3 community partners to assist in the 2018 collection (#**15 partners**). Total budget (not yet fully confirmed) are for #**$200,000 in cash & in-kind** for 2018 collection.

2.3 to 2.5. Not scheduled for 2017-18.

Objective 3: Build a sustainable network to maintain & expand whitebark pine restoration projects in the Skeena Region.

3.1 Commitment from government: FLNRORD Skeena-Stikine and Nadina Resource Districts & BC Parks Skeena Region have provided written support for whitebark pine restoration seed collection and plantings in their Districts. Office of the Wet'suwet'en supports whitebark pine restoration in their territories. **#4800 seedlings jointly planted**; **#3 ha planted outside forest licenses.**

3.2 Commitment from forest licensees: BCTS Babine Business area, PIR-West Fraser (Smithers Operations), CanFor (Houston Operations) and Wetzin'Kwa Community Forest (Smithers area) have committed to providing in-kind support for whitebark pine seed collections and to plant whitebark pine on appropriate sites within their forest licenses. **#4 Industry partner organizations (>20 emails,**

phone-calls & face-to-face interactions); #1600 seedlings jointly planted; #1.6 ha planted within forest licenses.

3.3 Other partners: SERNbc, BV Naturalists, BV Backpackers, Whitebark Pine Ecosystem Foundation of Canada have all partnered on projects related to whitebark pine restoration and are committed to participation in seed collection, outreach and other activities. UNBC (NRES institute) is assisting with long-term maintenance & monitoring of research projects. **#4 Community partners; #>10 emails, phonecalls & face-to-face interactions; #2 projects/activities.**

3.4 Assist partners in whitebark pine restoration activities: partners assisted in implementing restoration in 2017-18 included PIR West Fraser, Wetzin'Kwa Community Forest, BC Parks. Partners assisted in planning for future restoration included: CanFor and BCTS. **#4 projects/activities assisted on.**

3.5 Develop a succession plan: not scheduled for 2017/18.

Objective 4: To build awareness, capacity and enthusiasm among natural resource professionals and members of the public in southern Skeena Region.

4.1 Communication and Community Engagement Activities: We engaged with natural resource professionals in Canfor, West Fraser, BCTS, Wetzin'Kwa Community Forest, BC Wildfire Services, BC Parks, FLNRORD (Skeena-Stikine, Nadina), BC Recreation Trails & Sites, SERNbc in 2017-18. Community engagement with Ski Smithers, BV Naturalists, BV Backpackers, BV Paragliders, Smithers Mountain Bike Association was related to recreational use of whitebark pine & grizzly bear habitat. **#See Communication for Measures of Success** (page 21)**.**

5. Results and Discussion

Technical Report attached? Yes __ No _x_

New Planting Projects in 2017-18.

We successfully planted 6400 locally grown whitebark pine seedlings from putatively blister-rust resistant parent trees located in the Skeena Region in 2017-18. This was a huge accomplishment for our project: the culmination of 6 years of seed collection, development of propagation practices, partnership-building and refinement of planting techniques and logistics.

All seedlings were PSB415 planting stock grown at Woodmere Nursery between February 2015 and May 2017 (2 ½ growing seasons). Seedlings were lifted while actively growing (hot-lift, hot plant) as opposed to being lifted then cold-stored as is usual for spring planting operations. Hot-lifted seedlings must be well ventilated and exposed to daylight (i.e., stored vertically in open dairy crates rather than horizontally in closed cardboard boxes) and planted with 1-2 days of lifting to avoid excessive respiration. Planting took place at four locations in May and June 2017 (Table 1).

Table 1. Description of 2017 whitebark pine operational whitebark pine planting projects.

Location	Coordinates UTM Zone 09U	Site Description	Date	Planting Partner	# Seed-lings	Seed Families	Area (ha)
Reiseter Creek (CP840-1)	622269 E 6095497 N	ESSFmc/01 & /03; elev: 1230 m; aspect SE	May 19, 2017	PIR West Fraser	214 (26 moni-tored)	McK13 (7) SM(137) SW (70)	0.3 ha (2 zones)
Atna Bay wildfire, Morice Lake Park	588900 E 5986843 N	ESSFmk/02 & /03; elev: 1080 m aspect S-SE	May 24, 2017	BC Parks, BC Wildfire Services	3300 (50 moni-tored)	K4 K6 K11 K18 K bulk	1.5 ha (3 zones)
Nanika Falls wildfire, Nenikëkh/Nanika-Kidprice Park	602094 E 5977767 N	ESSFmk/02-/03 elev: 1100 m aspect S-SE	May 30, 2017	BC Parks & BV Naturalists volunteers	1500 (40 moni-tored)	K4 K6 K11 K18	1.66 (2 zones)
Mc Donell Lake Road, Smithers	608982 E 6068688 N	ESSFmc/03 & /02 elev: 1200 m aspect S	June 2, 2017	Wetzin'Kwa Community Forest	1400 (60 moni-tored)	DU1 DU3 HB1 HB3 HB7 HUB1 HUB4 HUB8 HUB11 McK13 SM SW	1.3 ha

(1) Reiseter Creek Planting with West Fraser silviculturists

The first 2017 planting was a small test planting of ~200 seedlings carried out with West Fraser silviculture forester Gary Quanstrom and 4 summer employees, plus one professional planter (Britt White) on May 19, 2017. Purposes of this planting project were (1) to cement our partnership with West Fraser, (2) to familiarize West Fraser silvicultural personnel with whitebark pine ecology and planting requirements; (3) to familiarize ourselves with some of the logistics of industrial planting operations; (4) to prepare for more complex logistics of planting 4800 seedlings in remote wilderness areas; and (5) to establish our first "burn pile scar" planting trial.

The hot lift was carried out by Skeena Forestry Consultants staff (S. Haeussler and A. Coates) on May 18, 2017. Seedlings had abundant weeds and were hand-weeded during the lifting operation. Seedlings were transported by truck to CP840-1, which had been logged in 2015-16 and operationally planted to

Interior spruce, lodgepole pine and subalpine fir in 2016. Piles of logging slash were burned in Oct 2016 and a final operational plant of remaining unplanted areas and burn pile scars was scheduled for spring 2017. We were unable to coordinate with the contract planting crew and Quanstrom made the decision to plant the area with his summer staff (Figure 1). We identified one unplanted south-facing burn pile scar and a south-facing rocky ridge as candidate locations for whitebark pine planting (~ 100 seedlings at each location).

The snow was just melting on May 19 and meltwater was running through the soil. Frost risk was also high and the seedlings were not fully frost-hardened off as they were still growing under a plastic roof at Woodmere Nursery. We considered this to be the earliest possible date for planting.

Within the burn pile scar, we established a monitoring trial of 26 seedlings from three seedlots/families (McKendrick Pass McK13 – all 7 trees available; Smoke Mountain bulk collection (SM; 9 trees); Mount Sweeney bulk collection (SW; 10 trees) (Table 1). The bulk collections were seeds that could not be traced to a parent tree (e.g., fallen on floor, incorrectly labeled, cone on ground beneath putatively blister-rust resistant tree etc). The 26 monitored seedlings were flagged and numbered with a pigtail stake and aluminum tag, then measured for height, basal diameter, condition, colour and pathological factors. An additional ~ 75 seedlings from the SM and SW seedlots were planted in and adjacent to the burn pile scar and the remaining ~100 SM and SW seedlings were planted on an unburned rocky ridge some 400 m to the east of the burn pile scar. The perimeters of both planted areas were GPSed but no seedlings were flagged or measured at the rocky ridge site.

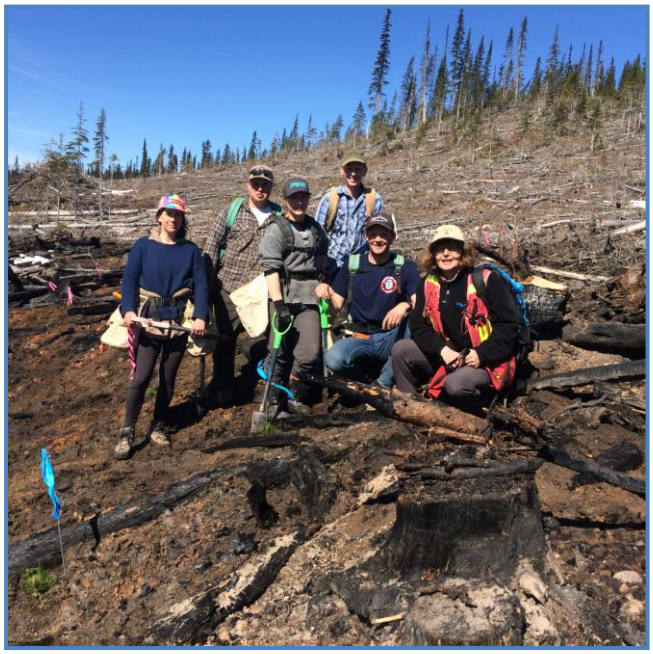


Figure 1. *Treeplanter Britt White (left), four PIR summer students (centre), and project leader Sybille Haeussler (right) planting whitebark pine seedlings in a recent burn pile scar at West Fraser cutblock CP840-1 above Reiseter Creek. The flagged seedling at bottom left is being monitored to determine whether burn pile scars (from fall burning of piled logging debris) provide low competition microsites for whitebark pine comparable to those found in recent wildfires. [G. Quanstrom photo, May 19, 2017].*

(2) Atna Bay Wildfire Planting, Morice Lake Provincial Park with BC Parks and BC Wildfire Services

This was our largest whitebark pine planting operation to date (perhaps the largest single planting ever done to date in BC?), and certainly the most logistically complex. The location was within the 2012 Atna Bay Wildfire above the west arm of Morice Lake. This is a remote area with no road access. Logistical assistance was provided by BC Parks staff (equipped with a parks boat) and Canadian Helicopters.

In November 2016 we flew several candidate areas and cleared a helicopter landing pad slightly below the location of our 2014 Atna Bay plantings (Haeussler 2015). This area is situated adjacent to several burned avalanche tracks that provide high value herbaceous forage and slide alder resting habitat for grizzly bears in the spring and summer. Canadian Helicopters, Canfor and staff at the Nadina Resource District provided assistance in determining when access roads to Morice Lake and the burned slopes above the west shore of the lake became snow-free.

On May 23, 2017 a hot-lift of 3300 whitebark pine seedlings was made at Woodmere Nursery with A. Coates and 6 members of BC Wildfire Service Telkwa Rangers Unit Crew (Figure 2a. The seedlings were trucked to Morice Lake campground on the evening of May 23rd. Six members of the BC Wildfire Service Burns Lake Unit crew (most with treeplanting experience) and three BC Parks employees (Mark Parminter, Scott MacMillan, Marcus Kölnberger) accompanied the project leader to Morice Lake campground. On May 24th Canadian Helicopters pilot Tom Brooks arrived at the campground with 2 forestry technicians (Adrian de Groot, Jen Atkins) and a community volunteer (retired treeplanter & forester, Marie-Lou Lefrancois). Planting crews and seedlings were separately ferried to the planting site and planted on suitable microsites below and above the 2014 plantings.

Approximately 50 seedlings were planted along the Morice Lake shoreline where iconic old growth whitebark pine used to lean out over the water. These trees died from mountain pine beetle and the 2012 fire. They were part of the lowest known population of whitebark pine growing in the wild (764 m elevation) and it seems unlikely that they will persist in the face of climate change, but it was agreed during the November 2016 reconnaissance that it was important to attempt to help restore this iconic tree species to the lake shoreline.

The technicians GPSed the perimeter of the planting areas and flagged, tagged and measured 50 monitoring seedlings, 10 each from 4 Kidprice Lake seed families and 10 from the Kidprice bulk collection (Table 1).

Planting conditions were perfect and everyone had a magnificent day (Figure 2b-d). Snow had left the site ~1 week prior and soil moisture was at field capacity. The seedlings had spent several days cold-hardening outdoors at the nursery and it rained the day after planting. This activity was very meaningful for the firefighters because many of them had helped to contain the Atna Bay wildfire and it felt like coming full circle to participate in its ecological restoration. Some time was spent on whitebark pine and grizzly bear extension activities at the nursery and campground to provide context for the project. The firefighters were extremely well prepared and equipped to deal with complex logistics and wilderness safety issues including helicopter access and truly a pleasure to work with.

Figure 2. *Atna Bay whitebark pine planting operation (a) Telkwa Rangers Unit Crew and technician Andrea Coates at Woodmere Nursery after the lift; (b) Burns Lake Unit crew member Dalia coordinating the helicopter sling; (c) Burns Lake Unit Crew member planting the Atna Bay wildfire; (d) happy crew (3 members of Burns Lake Unit crew, 2 BC Parks rangers, technician Adrian de Groot) enjoying the view from the helipad after a full day of planting.* (S. Haeussler photos, May 23-24, 2017)

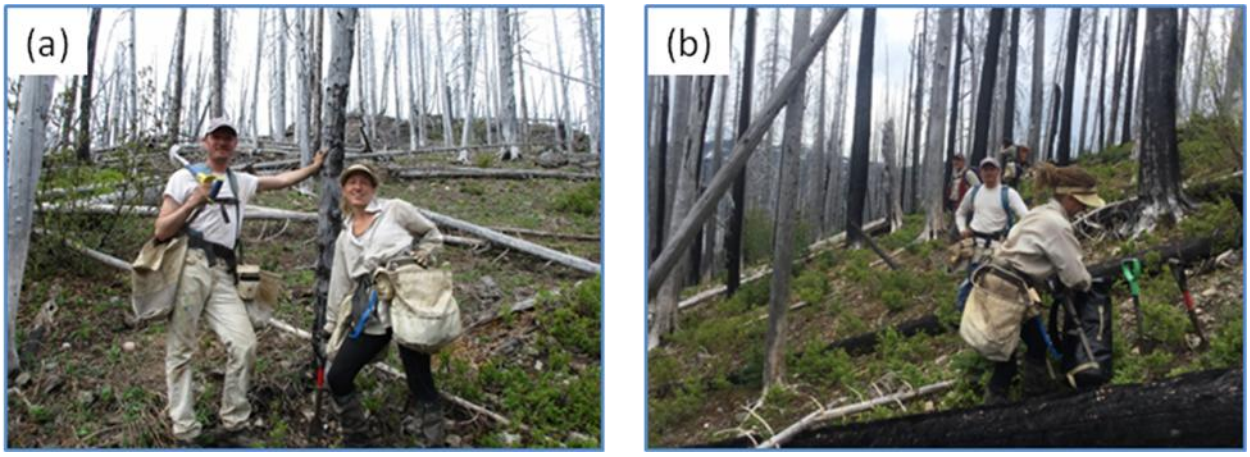
(3) Nanika Wildfire Planting, Nenikekh/Nanika-Kidprice Provincial Park with BC Parks and Community Volunteers

Planting of 1500 whitebark pine seedlings in the 2004 Nanika wildfire at Kidprice Lake (Figure 3) was scheduled to take place May 30th with assistance from BC Wildfire Services, but they were called to the first of many 2017 wildfires and a group consisting of 1 professional and one retired (volunteer) treeplanter, 3 forestry technicians and 4 volunteers (mainly from BV Naturalists) was pulled together to carry out the lift at Woodmere Nursery on May 29th and to plant the trees the following day. Access was via an Alpine Air seaplane. The seedlings were planted directly above Nanika Falls around and above the location planted in 2014. We have viewed many grizzly bears near Nanika Falls over the years – there is a sockeye salmon spawning pool at the base of the falls, the wildfire now has abundant black huckleberry and bears are known to climb juvenile whitebark pine trees to harvest cones nearby.

We flagged and measured 40 whitebark pine monitoring trees, 10 each from four seed families (Table 1).

The nursery had neglected to water the seedlings the evening prior to the lift and the seedlings were limp and desiccated when we arrived at the nursery on the morning of May 29th. We watered them and most appeared to rehydrate well (only a few had to be discarded), but it will be of interest to monitor whether this stress immediately prior to lifting and planting will reduce field survival. We have experienced more desiccation-related mortality at Nanika Falls than at Atna Bay in our 2014 planting trial, and competing vegetation is more advanced at this location. We don't know whether desiccation is a common occurrence at the nursery – when not extreme, it helps to condition the seedlings so that they are better able to withstand drought in the field. Generally speaking the Woodmere Nursery seedlings have proven to be sturdy and well adapted to field conditions with survival rates ~90% after the 2014 plantings at all but one site.

Figure 3. Tree planting in the Nanika Falls wildfire. (a) former treeplanter Nick Thomas (volunteer) and professional treeplanter Arah Maskell; (b) planting crew and technicians working in the wildfire.



4) McDonell Lake Road Planting with Wetzin'Kwa Community Forest Corporation

Our final planting took place in the Wetzin'Kwa Community Forest on the south side of Hudson Bay Mountain near Smithers (CP 120-2)(Figure 4). This was a high elevation operational cutblock that had been logged in 2015-2016 and was scheduled to be operationally planted in June by Chris Howard Treeplanting. Seedlings were lifted at Woodmere Nursery on June 1, with 3 technicians –they were weeded and well-watered in advance of the lift. Planting took place on June 2, 2017 under cool cloudy conditions with soil moisture at field capacity. The Wetzin'Kwa Community forest supplied a small crew consisting of Chris Howard and Arah Maskell as planters and two labourers to transport the seedlings and clip competing vegetation. Sybille Haeussler and Adrian de Groot were responsible for mapping and seedling monitoring.

The whitebark pine seedlings were established at 10 scattered locations in the cutblock to take advantage of dry, sunny low-competition microsites, including two burn pile scars. One group of seedlings were planted beneath unlogged mountain pine beetle-killed trees in a dry rocky wildlife tree patch. Sixty monitoring seedlings (representing 10 seed families and 2 bulk seedlots) were flagged and measured at three locations to contrast lower (1170 m) and upper (1250 m) elevations and burn pile scar vs. unburned planting spots (both at the lower elevation). Each planting zone was well-ribboned to avoid overplanting when the commercial trees were planted several weeks later. Because Chris Howard was responsible for both plantings he was able to minimize overplanting but indicated that this required considerably more supervision than usual.

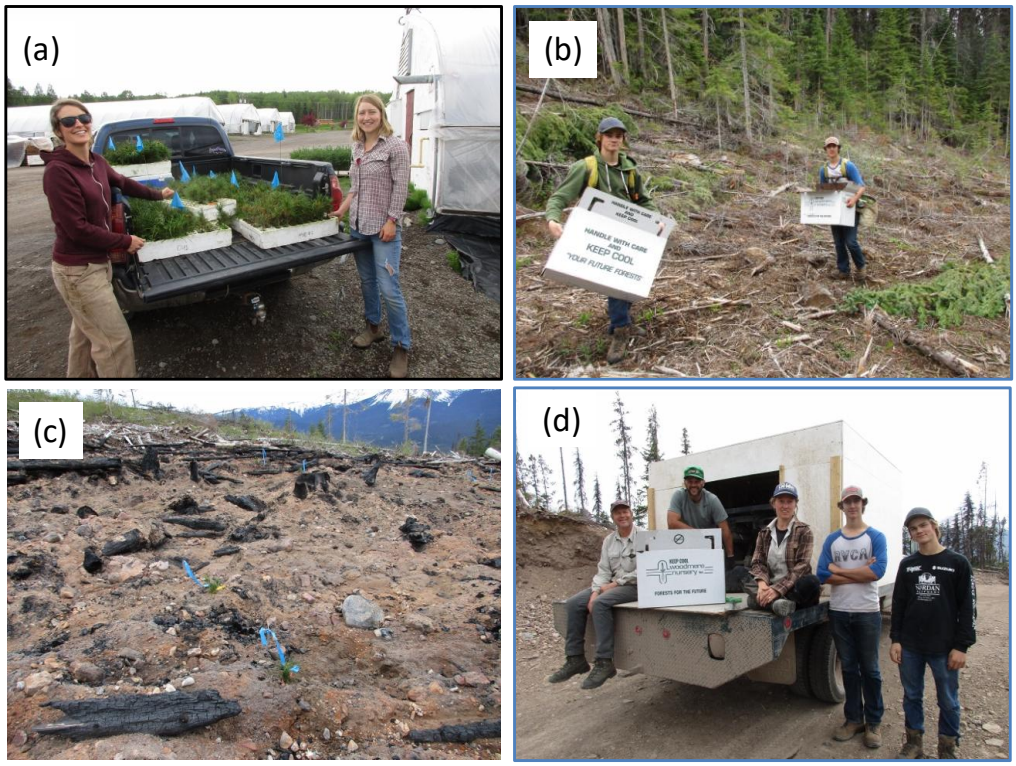


Figure 4. *Planting above McDonell Lake Rd. on the south side of Hudson Bay Mountain in the Wetzin'Kwa Community Forest. (a) Jen Atkins and Megan Peloso assisting with the seedling lift at Woodmere Nursery; (b)high school students Johnny Giddings and Logan Groves hauling seedlings to the top of the cutblock; (c) monitoring trees flagged in a burn pile scar; (d) the planting crew: Adrian de Groot, Chris Howard, Arah Maskell, Logan Groves and Johnny Giddings.* (S. Haeussler photos, June 1-2, 2017).

Lessons for Operational Planting of Whitebark Pine

1) Hot-lifting is logistically unrealistic. We have had excellent success with hot-lifted seedlings planted in late spring when fully flushed. This is not practical for operational tree planting because of the additional cost and sensitivity to delays. Cold storage of spring planted seedlings and summer planting of high elevation sites with seedlings that have completed their growth for the year is being tested elsewhere in BC and is expected to become the norm. We expect that survival will be lower, at least

until nursery and planting regimes are as well established for whitebark pine as for commercial tree species.

2) Coordinating whitebark pine planting with industrial tree planting can be complex. Ideally whitebark pine seedlings would be planted at the same time as other species, either using mixed bag planting or assigning one planter to appropriate drier zones within the cutblock (to be paid at a higher rate). To maximize seed crops we would like whitebark pines to be cluster-planted at low densities on low competition microsites. Tree planters have great difficulty planting at wide spacing (it is slower –thus costly, and conflicts with their usual routine). Most planters have little or no experience with cluster planting. Planting densities (typically ~1000 stems/hectare) were much higher than desired (300 -500 stems/hectare) and tree planters have difficulty selecting the best low-competition planting spots, when the microsites were not flagged in advance. It isn't possible to provide adequate supervision. This means that we are unlikely to meet our target of 300 ha of habitat restored. But higher densities might be desirable to allow for considerable blister rust mortality.

3) It may be more feasible to plant whitebark pine separately from other species, but risks of overplanting are high. If whitebark pine is planted close to faster-growing commercial tree species it will be out-competed and is unlikely to survive or to produce a large crown with many seeds. Reserving some burn pile scars for whitebark pine may be an attractive solution because they are easily delineated and often require fill-planting a year after the industrial tree plant (e.g., when burning is delayed due to poor weather). We think burn pile scars may also provide the best possibility for relatively competition-free microsites on deeper, more productive soils where whitebark pine may grow to a larger size and more quickly produce seeds than on the dry, rocky, exposed sites where it is most often found.

4) Inadequate weeding of the seedlings in the nursery has been an issue because 2 ½ year-old whitebark pine seedlings accumulate many more weeds than one-year old commercial tree seedlings. These are manually removed in the nursery, but often regrow from root and rhizome fragments remaining in the seedling plug. This is particularly an issue within Provincial Parks where the introduction of invasive non-native nursery weeds (domestic grasses, hawkweeds, chickweed, dandelion, etc.) can threaten the ecological integrity of otherwise pristine wilderness areas. It is somewhat less of a concern in industrial forestry operations where invasive plant species are already plentiful along road right-of-ways and in landings.

Monitoring of Existing 2012 and 2014 plantings

1) White pine blister rust In June 2017, Alex Woods, FLNRORD Skeena Region Forest Pathologist accompanied Sybille Haeussler for an inspection of the seedlings at the low elevation (WL) and mid-elevation (WM) whitebark pine restoration trials established on Hudson Bay Mountain in 2012. The purpose of the inspections was to determine whether any of the seedlings (in their 6th growing season) had become infected with white pine blister rust, caused by the fungal pathogen *Cronartium ribicola*. Alex trained Sybille to better detect developing cankers on young seedlings.

Alex found one infected seedling at the mid-elevation WM site (Figure 5) and no infected seedlings at the low elevation WL site. This is intriguing because WL has abundant *Ribes lacustre*, the obligate

alternate host for *Cronartium ribicola*, in minor gullies surrounding the planted area, whereas no *Ribes* species have been observed at WM.

Figure 5. *White pine blister rust canker caused by* Cronartium ribicola *on main stem of an otherwise healthy whitebark pine at the mid-elevation site on Hudson Bay Mtn. Faded needles surrounding the canker are diagnostic* along with swelling and orange spores –visible in early summer. *(S. Haeussler photo, June 15, 2017).*

I subsequently inspected the seedlings at the high elevation WH and transitional WT sites on Hudson Bay Mtn and found no additional blister rust cankers. At the McBride Peak restoration trial site, one seedling with a confirmed blister rust canker and 4 seedlings with stem swellings that may prove to be blister rust cankers were recorded. This site has moderately abundant *Ribes* and widespread blister rust infection on naturally occurring whitebark pine trees at the tree line. Note that these 2012 and 2013 plantings were non-local genotypes (Tables 2-3 below) not necessarily from seeds collected from putatively blister rust parent trees. So far, none of the putatively blister rust resistant seedlings planted in 2014 have developed blister rust cankers –however cankers typically don't become visible until pine trees are at least 6 years old.

2) End of Growing Season Assessments and Maintenance of Whitebark Pine Assisted Migration and Provenance Trials on Hudson Bay Mountain and McBride Peak.

Whitebark pine seedlings planted at the low-, mid- and high elevation sites (WL, WM, WH) in and adjacent to the Wetzin'Kwa Community Forest on Hudson Bay Mountain in June-July 2012 completed their 6th growing season in the field in September 2017 and their 10th growing season since sowing at UNBC in 2007. Seedlings planted at the subalpine (McBS) and alpine (McBA) sites in the McBride Community Forest at McBride Peak in July 2013 completed their 5th growing season in the field in September 2017, and their 10th growing season since sowing at UNBC. Seedling height, basal diameter, vigour, foliage colour and damage agents were assessed for each tagged and numbered seedlings

(Hudson Bay Mtn. 276 seedlings, assessed Sept 5-8, 2017; McBride Peak 269 seedlings, assessed Sept 19, 2017).

Both climate change adaptation trials include seedlings from 5 provenances ranging in latitude from northern Washington State to Mt. Sidney Williams north of Fort St. James, BC (the northern limit of whitebark pine) (Table 2). Seedlings in each provenance were planted into four different soil types in the greenhouse in a factorial experiment: PS= Perkins Peak (Coast Mountains) subalpine soil , from a site with native whitebark pine; PA = Perkins Peak (Coast Mountains) alpine soil, from a treeless site without native whitebark pine; MS = McBride Peak (Interior Mountains) subalpine soil with native pines, MA = McBride Peak (Interior Mountains) treeless alpine soil. The purpose of the greenhouse study was to determine how mycorrhizal colonization and seedling growth varied among the four soil types and interacted with provenance. The working hypothesis was that assisted migration of conifer seedlings to higher elevations as an adaptation to climate change may be limited by the absence of compatible mycorrhizal fungi. The purpose of the assisted migration field trial was to determine how the various provenances responded to climatic conditions at various elevations near the northern limit of whitebark pine and whether residual effects from the soils and mycorrhizal colonization in the greenhouse influenced field performance.

Preliminary results from the trial were presented at the September 2017 Whitebark Pine Ecosystem Foundation workshop in Jasper, Alberta (see Communication and Outreach) and are summarized here. The complete trial will be written up as a scientific journal article with Hugues Massicotte and Linda Tackaberry of UNBC, hopefully by 2019.

Table 2. Location and planting information for 2012 and 2014 Wetzin'Kwa trials.

GPS Label	Site	Location	Elev. (m)	BEC unit	Seedlings Planted	Stock Type	Provenances (Table 3)	Planting Date
WL	Wetzin'Kwa Low elevation	Duthie West trailhead	1033	SBSmc2	94	4-yr-old, extra-large plug, UNBC	JU, MP, SW, TA, TW	June 8, 2012
WM	Wetzin'Kwa Mid elevation	adjacent to Paydirt Mountain Bike Trail	1340	ESSFmc	93	4-yr-old, extra-large plug, UNBC	JU, MP, SW, TA, TW	June 22, 2012
WH	Wetzin'Kwa High elevation	Hudson Bay Mtn Prairie at climate station	1650	BAFA	89	4-yr-old, extra-large plug, UNBC	JU, MP, SW, TA, TW	July 17, 2012 (caches July 2011)
McBS	McBride Peak subalpine	McBride Peak parking lot	1828	ESSFmm	138	5-yr-old, extra-large plug, UNBC	JU, MP, SW, TA, TW	July 4, 2013
McBA	McBride Peak alpine	Halfway to forestry lookout	1925	IMA	131	5-yr-old, extra-large plug, UNBC	JU, MP, SW, TA, TW	July 5, 2013

Table 3. Whitebark pine provenances included in the 2012 Hudson Bay Mtn (Wetzin'Kwa Community Forest and 2013 McBride Peak climate change adaptation/assisted migration trials.

Abbrev.	Site Description	Latitude	Longitude	Elev. (m)	Planted at Hudson Bay Mtn : (# seedlings)	Planted at McBride Peak (# seedlings)
JU	Junior Peak near Entiat, Washington	47.99005 -120.40527	-120.40527	2438	WL (20) WM (19) WH (21)	McBS (28) McBA (27)
MP	Blackwell Peak in Manning Park , BC	49.1	-120.76	~2000	WL (20) WM (19) WH (19)	McBS (31) McBA (29)
SW	Mt. Sidney Williams, north of Fort. St. James, BC	54.88415	-125.37427	1490	WL (16) WM (16) WH (14sl, 165sd)[†]	McBS (21) McBA (20)
TA	Table Mtn, W of Pincher Creek, AB	49.36641	-114.25193	2204	WL (18) WM (18) WH (16)	McBS (26) McBA (28)
TW	Heckman Pass, Tweedsmuir Park, BC	52.53990	-125.81197	1541	WL (20) WM (21) WH (19)	McBS (30) McBA (26)

Unexpectedly, Hudson Bay Mountain seedlings grown in alpine soils, either Interior (MA) or Coastal (PA) had significantly greater diameter growth in the greenhouse and retained this advantage after 6 years in the field (Figure 6, 1st and 2nd panels). Diameter growth in the field was not, however, significantly affected by soil type (Figure 6, 3rd panel). We believe the enhanced growth was due to the higher content of humified organic matter (which would increase both water holding capacity and cation exchange capacity) in the alpine soils relative to forest soils. Mycorrhizal development in the greenhouse on seedlings grown in alpine soils was excellent and it appears that whitebark pine may share mycorrhizal fungi with many alpine dwarf shrubs, including ericaceous (heather) species and dwarf willows. Assisted migration above the treeline is therefore not expected to be inhibited by lack of compatible mycorrhizal fungi.

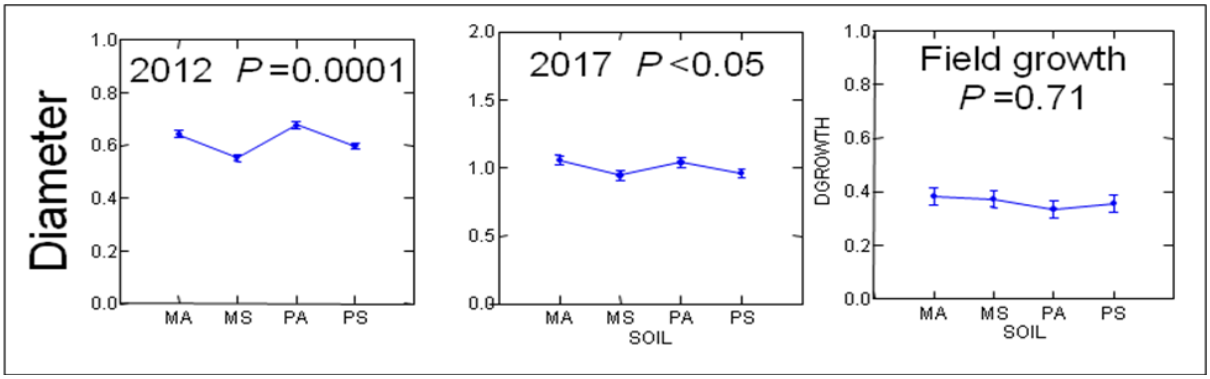


Figure 6. *Effect of soil type on seedling basal diameter (cm) in the greenhouse (2012 panel) and field (2017 and Field growth panel). M = McBride Peak (Interior); P = Perkins Peak (Coast Mtns), A = alpine soil, S = subalpine soil.*

At the Hudson Bay Mountain site there was no effect of provenance on field survival, height, diameter and vigour after 10 growing seasons from seed and 6 growing seasons in the field. All provenances performed well with survival ≥80% (Figure 7a). We were unable to detect a significant relationship between the latitude, longitude or absolute elevation of the provenance (seed collecting location) on seedling performance. There was, however, a weak positive relationship between diameter and height growth in the field and the elevation of the provenance relative to the elevation of timberline at that location (Figure 7b, negative numbers are below mean treeline, positive numbers are above treeline). This relationship suggests that seedlings from parent trees located above the average treeline elevation at their respective sites may be slightly better adapted for assisted migration at or beyond the northern limit of whitebark pine than seedlings from parent trees growing in a more benign environment below treeline.

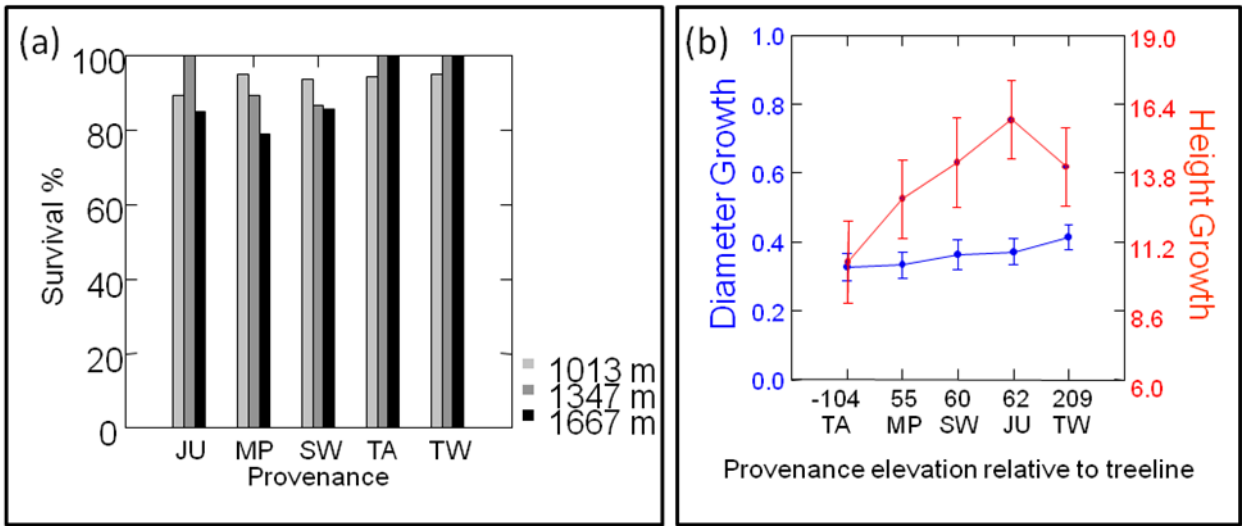


Figure 7. *Performance of whitebark seedlings by provenance (see Table 3) at the Hudson Bay Mountain trial site. (a) shows survival of each provenance by elevation; (b) shows that there is positive relationship between the elevation of the provenance relative to treeline and seedling diameter (blue) and height (red) growth after 6 years in the field.*

At Hudson Bay Mountain, seedling survival was highest and seedling damage was lowest at the mid-elevation site (Figure 8a; 1347 m elev.), which is located in the mid-range of whitebark pine's elevational distribution in the Smithers area (upper ESSFmc). Six-year height growth was highest at the low elevation site (Figure 8b, 1013 m elevation), near the lowest elevation of naturally established whitebark pine in the Smithers area. Six-year diameter growth was more than twice as high at the high elevation alpine site (Figure 8c, 1667 m elevation), located slightly above the highest elevation that whitebark pine trees occur naturally in the Smithers area, as at the mid and low elevation sites. Again, the high water holding and cation exchange capacity of humified alpine soils with well developed Ah horizons may have contributed to the excellent diameter growth (subalpine forest soils lack Ah horizons), but it also appears that whitebark pine develop into shorter, sturdier trees in the wind-exposed, high light environment of the alpine than in more sheltered forest environments where they face light competition from other plants and must allocate more resources to height growth.

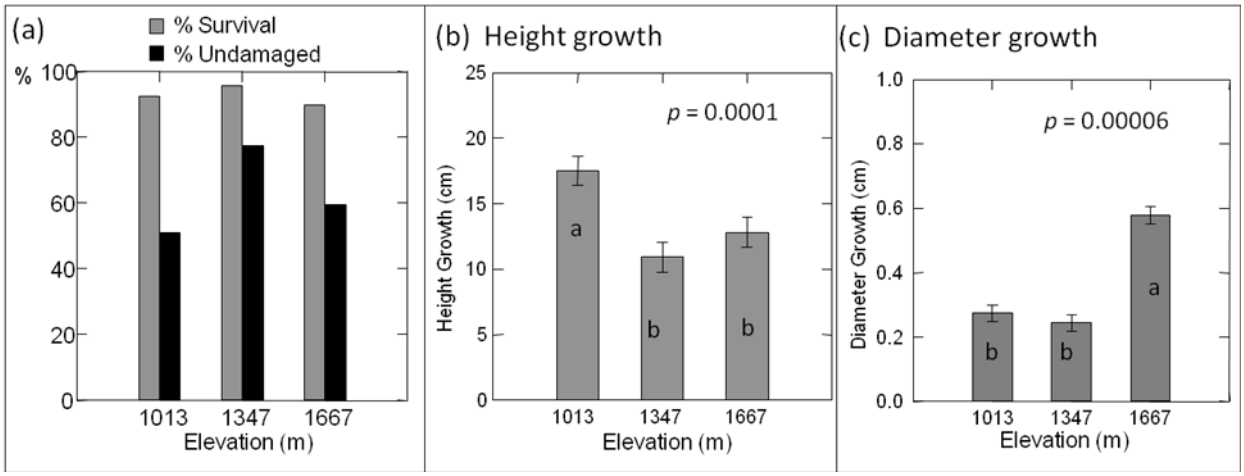


Figure 8. *Comparison of 6-year whitebark pine seedling performance at low, medium and high elevations on Hudson Bay Mountain. (a) seedling percent survival and percent of undamaged seedlings at the three elevations; (b) height growth (2012 – 2017) at the three elevations; (c) basal diameter growth (2012 – 2017) at the three elevations. Bars with the same lower case letter are not significantly different. Error bars indicate standard* errors across sites. No statistical analysis was possible for % survival and % undamaged as they are unreplicated.

Overall, the growth of whitebark pine seedlings is exceptionally slow compared to other northern BC tree species. Total height growth over 6 years in the field was in the range of 10 – 20 cm while total diameter growth was just 0.2 – 0.6 cm. These are sturdy trees but it will take them a long time to become mature and seed-bearing. We expect that the trees planted in the alpine will suffer heavy damage once they grow tall enough to extend above the snow pack. There is little evidence at Hudson Bay Mountain that the climate has warmed enough in the alpine to produce tall, seedbearing trees, but at McBride Peak there appears to be a more gradual gradient of whitebark pine trees invading the alpine.

Our early results confirm field observations that whitebark pine is a morphologically plastic species and that all elevations within and above its current range provide some advantages and disadvantages for successful growth. From the perspective of assisted migration, these early results suggest that putting all eggs all in the same basket (i.e., planting all trees above the current midpoint of the species' local elevational range) could be risky. It may be advisable to restore sites across a relatively wide range of elevations. This is the approach we have taken with our 2017 operational plantings.

Monitoring New (2017) Restoration Site

Monitoring trees at the two road-accessible 2017 plantings were assessed in September 2017. The seedlings planted at Atna Bay and Nanika Falls will not be assessed until Sept 2018 when we can complete 5th growing season assessments of the 2014 plantings at the same time.

We measured height, basal diameter and assessed vigour, foliage colour, damage and competing vegetation of the 26 monitoring trees in the burn scar at Reiseter Creek (PIR CP 840-1) 60 monitoring trees at the McDonell Lake Road site (Wetzin'Kwa Community Forest Corp, CP120-2). We also briefly

examined the seedlings planted on the rocky ridge at Reiseter Creek (not flagged or previously measured).

Survival was 92% at Reiseter Creek and 100% above McDonell Lake Road. It was evident from their foliage that a few of the Reiseter Creek seedlings had suffered mild frost damage from being planted early (mid-May) before their 2017 foliage was fully hardened (Figure 9a) , whereas the McDonell Lake Road seedlings were in excellent condition due to being planted later (June 2). We also observed minor heat damage on a seedling planted in a burn pile scar next to a blackened log.

At Reiseter Creek many of the seedlings planted in the burn pile scar were surrounded by a prolific and growth of greenhouse weeds, mostly chickweed (Figure 9b), but also some grasses, dandelion and hawkweed. There was no significant growth of greenhouse weeds on the rocky ridge at Reiseter Creek nor among seedlings planted at McDonell Lake Road, even among those planted in burn pile scars. These results suggest two things: (1) careful hand-weeding at the nursery can be effective in removing greenhouse weeds; (2) burn pile scars are particularly prone to invasion by greenhouse weeds. I hypothesize that the soil nutrients in the burn pile scars are available in inorganic form and that the destruction of soil biota in the intense burns is particularly advantageous for weedy plants that don't require mycorrhizae for successful establishment (Bardgett et al. 2005). All nursery weeds associated with planted seedling plugs were removed.

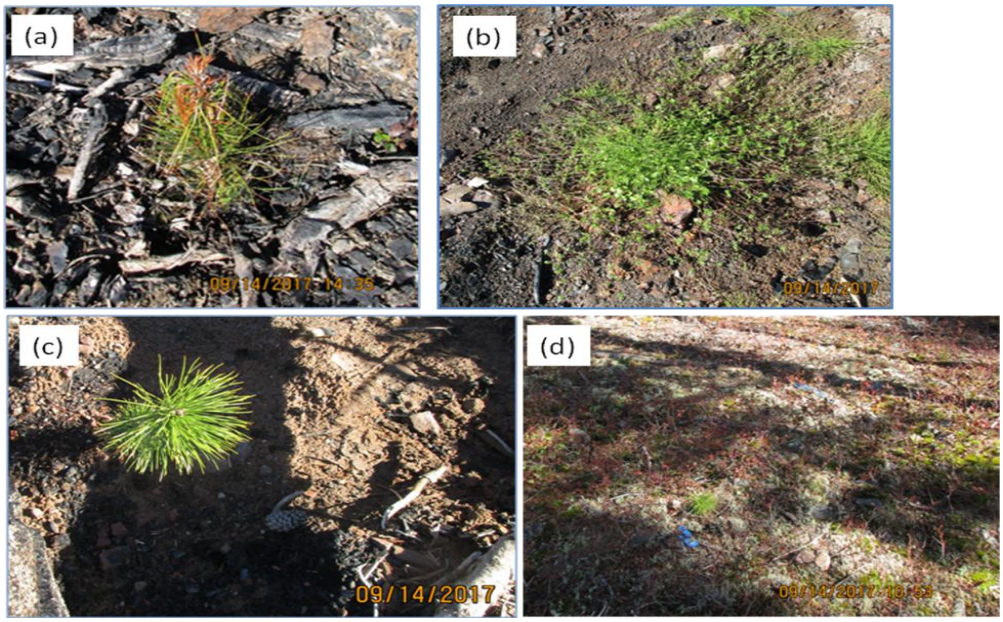


Figure 9. *2017 whitebark pine seedlings at Reiseter Creek and McDonell Lake Road the end of their first growing season. (a) minor frost damage on seedlings planted too early (May 19); (b) luxuriant growth of chickweed surrounding a seedling planted in a burn pile scar; (c) foliar nutrition of seedlings planted in burn pile scars is good; (d) seedling planted in the understory of MPB-killed pines in a wildlife tree patch.*

Monitoring of the Upcoming 2018 Whitebark Pine Cone Crop

We examined mature whitebark pine trees on Hudson Bay Mountain and McKendrick Pass in September 2017 and found significant numbers of 1-year old conelets (Figure 10), suggesting (potentially) a better 2018 cone crop than at any time since 2007 at those locations. WPEF members based in southeastern BC are also expecting a good 2018 cone crop (Adrian Leslie, pers. comm. Sept. 2017). However, mature trees examined at McBride Peak had few conelets. Based on the two Skeena Region records, we spent the fall and winter of 2017-18 planning and fundraising for a cone collection in the Skeena Region.

We prepared an e-brochure encouraging citizen scientists, outdoor enthusiasts and resource professionals to report their observations on the upcoming 2018 whitebark pine cone crop. The brochure was widely circulated to project partners and potential partners across northwest BC and was posted on several websites (e.g. http://www.bvnaturalists.ca/wp-content/uploads/2017/09/Help-monitor-Whitebark-Pine-cone-crops-across-northern-BC.pdf), however no response was received from members of the public. Two natural resource professionals responded with email reports of whitebark pine tree sightings and mature cones but no reports of 1-yr old conelets.

We are not certain whether this is an indication that the 2018 cone crop will not be as good as initially projected or whether the job of monitoring whitebark pine conelets is too technical for non-specialists.

Figure 10. *One mature2-year old cone (foreground) and numerous smaller 1-yr old conelets (rear) are visible near branch tips on this Hudson Bay Mountain whitebark pine tree in Sept. 2017. Unless they fail to mature, these conelets should produce (in 2018) the largest cone crop at this location since annual monitoring began in 2007.*

6. Communications/Outreach Results

a. Project Outreach Activities

Activities undertaken this Grant Year

(a) As part of the transition to operational restoration, n article was prepared for and published in the Nov./Dec. 2017 issue of the BC Forest Professional newsmagazine (attached) describing how forest professionals can (and should) incorporate whitebark pine restoration into their forestry practice. Positive feedback on the article was received from several foresters.

(b) Two slide presentations on the project were given at (a) Nature Vancouver field camp held in Smithers, BC in July 2017; (b) WPEF annual workshop held in Jasper, Alberta, Sept. 2017.

(c) Discussions on whitebark pine restoration were held with forest industry personnel and other forest professionals at the Northern Silviculture Committee Winter workshop in Prince George in Jan. 2018.

(d) An e-brochure encouraging citizen scientists and nature resource professionals to record and report observations of the upcoming whitebark pine cone crop was widely circulated on Facebook, by email and on the BVRC and Bulkley Valley Naturalists websites (described above).

(e) updates were made to the BV Research Centre whitebark pine website, including a new section entitled “Get Involved” (www.bvcentre.ca/whitebark/getinvolved).

(f) Discussions were held with members of the public, WPEF members and Hudson Bay Mountain Ski Resort personnel regarding a visually prominent whitebark pine rust screening trial established by MFLNRORD forest genetics personnel in the middle of a ski run on Hudson Bay Mountain.

(g) Widespread email and telephone outreach with existing and new project partners was done in conjunction with preparing funding proposals for the upcoming 2018 seed collection. New partnerships were established with Canfor and West Fraser and we received verbal and written indications of support from BCTS Babine business area and the Nadina and Bulkley-Stikine Resource Districts. We also continued our outreach and communications with ecosystem biologists and restoration ecologists in the Omineca Region and SERNbc.

(h) Phone call and email discussions were held with BC Recreation Trails and Sites BC personnel and HCTF Communications coordinator Shannon West regarding a whitebark pine-wildlife interactions information sign to be installed at the Piper Down mountain bike trailhead adjacent to the Hudson Bay Mountain ski resort. This is the most publicly accessible whitebark pine population in northern BC. A suitable location within the Recreation reserve was selected for the sign. Work on the sign was delayed until 2018/19 due to everyone being too busy to complete the work in 2017/18.

(i) A short description on whitebark pine-wildlife interactions was prepared and published (to accompany a painting by a local artist not connected to this project) in the Bulkley Valley Naturalists Perpetual Nature Diary, published in Dec. 2017. The Nature Diary project was extremely successful

(some 700 copies have been sold) and a show of the artwork was held at the Smithers Art Gallery in January 2018.

b. Communicating About HCTF

Activities specific to communicating about HCTF undertaken this Grant Year

1) Funding support from HCTF (and FESBC) was verbally and visually acknowledged in the slide presentations to Nature Vancouver and WPEF.
2) Funding support from HCTF (and FESBC) is prominently displayed on the Bulkley Valley Research Centre's whitebark pine website (www.bvcentre.ca/whitebark/collaborators)
3) HCTF and FESBC support was repeatedly acknowledged in discussions with project partners and resource professionals during discussions of how to operationalize whitebark pine restoration.
4) Discussions held with Shannon West regarding information signage acknowledging HCTF and FESBC to be posted at Hudson Bay Mtn at the boundary between Mountain Bike recreation reserve and ski resort. Project has been deferred to 2018/19.
5) I even managed to slip a reference to HCTF and FESBC as agencies that support whitebark pine restoration into the article in BC Forest Professional (attached) ☺.

Articles/Media Coverage on this project attached? **Yes** **x** **No**

Please list attached articles:

BC Forest Professional Nov/Dec 2017: "Incorporating Whitebark Pine Recovery into your Forestry Practice." Pp. 14-15.

c. Communicating About Your Project

We often post a brief account of HCTF projects on our website *for the lay public audience. Please summarize what your project is about and what you accomplished this year (maximum 250 words):*

The Bulkley Valley Research Centre has been leading the restoration of endangered whitebark pine ecosystems in the Skeena Region and northern BC since 2011. Annual funding from HCTF, and more recently from FESBC, has been essential to our success. Whitebark pine, listed as endangered under Canada's Species at Risk Act, is a very important source of food for many of BC's mountain wildlife species, most notably the grizzly bear. In 2017-18 our project planted over 6400 whitebark pine seedlings grown from locally-collected seeds in two high elevation wildfires located within high value grizzly bear habitat and two recently logged high elevation cutblocks. We are working hard to make whitebark pine restoration a part of normal resource management operations in northern BC and are preparing for a large seed collection in 2018 that will give resource professionals access to high quality seeds for future plantings.

7. Literature Cited in this Report

Bardgett, R.D., Bowman, W.D., Kaufmann, R., and Schmidt, S.K. 2005. A temporal approach to linking aboveground and belowground ecology. Trends Ecol. Evol. 20(11): 634–641.

Haeussler, S. 2015. Restoring whitebark pine ecosystems to enhance subalpine bear habitat. HCTF Project File 6-227, 4th Annual Report: April 2014 – March 2015. Prepared for BC Habitat Conservation Trust Foundation, Victoria, BC. 19 p. http://bvcentre.ca/files/research_reports/HCTF_6-227_BVRC_Whitebark_pine_Grant_Report_2014-15.pdf

8. Photographic Record

We often include engaging photos of HCTF projects on our website. While we appreciate photos embedded in your report, we need jpeg photo files (about 5 MB) attached separately.

Please ensure you attach photos jpegs and list the photo titles here: NA

9. Financial Report

Please fill in all project expenditures in the appropriate section below. For comparison, refer to the budget in your approved proposal.

APPROVED HCTF BUDGET = **$7,000**

A. Labour Costs

Human Resources: Wages & Salaries

Position	Total Days on Project	# of HCTF Person Days	Rate/Day	Total HCTF Amount

Subcontractors/Consultants

Contractor	Total Days on Project	# of HCTF Person Days	Rate/Day	Total HCTF Amount
Skeena Forestry Consultants-S. Haeussler Project Manager	30	9	$307.50	$2767.50
Skeena Forestry Consultants-field & nursery technicians (37.50/hr+1/2GST)	2.73	2.46114	$328.00	$807.25
Skeena Forestry Consultants-field & nursery technicians (daily rate $300+1/2GST)	17.75	3.5	$307.50	$1076.25
Skeena Forestry Consultants –data entry & website updates	1.5	1.5	$246.00	$369.00
Experienced treeplanters	21.5	3	$410.00	$1230.00
Total =	52	19.46114		$6250.00

Other

Description	Total Cost	Total HCTF Amount
Resource Managers (all in-kind, rate assumed to be $410/day)	$1537.50	0
Junior field assistants (all in-kind, rate assumed to be $205/day)	$615.00	0
		0

SUBTOTAL LABOUR COSTS =	**$**

B. Site/Project Costs

	Description	Total HCTF Amount
Travel		0
Capital Expenditures / Equipment Purchase		0
Site Supplies & Materials		0
Rentals (equipment, vehicle, helicopter)		0
Work & Safety Supplies		0
Repairs & Maintenance		0
Other		0

SUBTOTAL SITE/PROJECT COSTS =	**$0**

C. Overhead/Administration

	Description	Total HCTF Amount
Office space, utilities etc.		0
Office supplies		0
Printing/photocopying		0
Administration fee	12%	$750
Sub-contractor admin fee (if not included in labour cost)		0
Other		0

SUBTOTAL OVERHEAD/ADMIN COSTS =	**$750**

Explain how you calculated the Administration Fees

BVRC charges 12% administration fee ($6250 + 12% = $6250 + $750 = $7000)

Capital Expenditures and purchases over $1,000

Item Description	Serial Number	$$ Value	Location Stored	Contact
		$0		

D. HCTF Expenditure Summary

Please insert the Subtotals from above:

$7000	Total HCTF Amount
Labour Costs	$6250.00
Project/Site Costs	
Overhead Costs	$750
Total Amount from HCTF:	$7000

Additional Comments on Project Costs:

Explain any significant variances or differences from the approved proposal budget (e.g., unspent funds, approved budget changes).

Minor differences only. GST was charged at 5% in proposal, but BVRC has since reduced this to 2.5%.

E. Other Funding Partners

Name of Organization	In-Kind Type (Goods or Services	In-Kind Amount	Cash Confirmed	Total
FESBC – $10, 000 award to SERNbc (minus fee)		$0	$9054.06	$9054.06
TD-Friends of Environment Foundation		$0	$5000.00	$5000.00
Wetzin'Kwa Community Forest Corporation	Labour/truck/planting/maps supplies	$2000	$5000.00	$7000.00
BC Parks	Labour/truck/boat& trailer	$3306	$0	$3306.00
BC Wildfire Services	Labour/ trucks	$6303.75	$0	$6303.75
FLNRO Skeena Stikine Resource District	Pathology service	$410	$0	$410.00
BV Naturalists & other community volunteers	Volunteers	$2716.25	$0	$2716.25
Bulkley Valley Research Centre	Labour, Supplies + carry-over funds	$2000	$700	$2700.00
Summit Treeplanting & Camps	Planting bags & shovels	$500	$0	$300
PIR-West Fraser Ltd., Smithers	Planters,trucks, supplies, maps	$2321.88	$0	$2321.88
Backwoods Contracting	Silvitarp	$50	$0	$50
TOTAL All Funding Partners =		**$19,607.88**	**$19,754.06**	**$36,840.06**

TOTAL PROJECT COSTS

Total Partners Amount	Total HCTF Amount	Total Project Amount
$36840.06	*$7000*	$43,840.06

Additional Comments on Partner Funding:

Explain any significant variances or differences from the partner funding identified in your proposal. Define how you have monetized the in-kind estimate for the budget.

We received less cash funding from partners than requested (SERNbc could not come up with in-house cash, and there was an unexpected admin fee from their FESBC proposal). Also I decided not to include some of the Wetzin'Kwa funds (their fiscal year runs from July to June). Our in-kind was close to predicted values, considering we scaled back the project slightly (no germination of a new round of seeds) and a there were slightly fewer trees to plant than projected. In general we met the goals for this year's project, except that we will be doing further updates to the website in the remainder of Wetzin'Kwa's fiscal year as well as additional analysis of the McBride dataset.

For in-kind I have used the rates listed in the labour section (replacement cost if we had to hire someone to do the same job) and added estimated rental/purchase costs for vehicles and supplies.

F. Final Invoice

Please ensure your final invoice is attached to this report and that it reconciles with this financial report.

Certified that the project has been satisfactorily completed and this report is an accurate reflection of project activities and expenditures per the HCTF Grant Agreement.

APRIL 15, 2018

SYBILLE HAEUSSLER

Project Proponent Signature | Date | Print Name

APPENDIX A: ARTICLE PUBLISHED IN BC FOREST PROFESSIONAL

10. Submit your Grant Report

- *Save this report using the Project # and grant year in the filename. Example:* ***1-123 Grant Report 2015-16***
- ***Final payment is contingent on HCTF receiving, reviewing and accepting the final invoice and this Grant Report****.*

Please send your Grant report and final invoice with an email to: reporting@hctf.ca

Incorporating Whitebark Pine Recovery into Your Forestry Practice

All photos by Sybille Hæussler, PhD, RPF, except where noted

In 2012, whitebark pine *(Pinus albicaulis)* became the first western tree to be declared endangered under Canada's *Species at Risk Act* (SARA). We typically think of an endangered species as something rare, concentrated in a few, specialized habitats. This five-needled pine is widespread across central and southern BC, numbering in the millions of individuals but, sadly, most trees and seedlings are in poor and declining condition. If you are a BC forest professional whose work is not restricted to Vancouver Island or the outer Coast, chances are that your work encompasses current or future whitebark pine habitat and you have an opportunity — shall we say, a professional responsibility — to find ways of incorporating whitebark pine recovery into your forestry practice.

As forest professionals we know far more about trees (especially conifers) and how to care for them than the average endangered species biologist who, let's face it, has difficulty thinking of anything green as more than food or shelter for animals. When it comes to trees we are the experts. We love trees, and it's time for all of us to extend that love to a scruffy, scrappy, little multi-stemmed tree whose twisted wood will never end up as pine paneling in your rec room but which plays an oversized role in sustaining healthy high elevation forest and timberline ecosystems across western North America.

For the past decade, a small band of dedicated whitebark pine enthusiasts in public and private practice across BC and Alberta has been building expertise in whitebark pine silviculture and restoration, exchanging and adapting information with our colleagues across the border in the western United States through the Whitebark Pine Ecosystem Foundation[1] and its Canadian offshoot[2]. The time has come to shift these efforts from research to operational forest practice and we need forest professionals across BC to step up and play their part.

Observe, record, and report. Learn to identify whitebark pine reliably from a distance as well as close-up and ensure that your coworkers and contractors can do the same. Large holes in the distribution map still occur, notably on the mid-Coast, across the Fraser Plateau and at the species' northern limits. Novel occurrences can be reported to BC's Conservation Data Centre (online) or to a ministry ecosystems biologist in your region. Finer-scaled information is needed to improve inventory maps and day-to-day forest management. Identifying healthy young stands that can be thinned to remove competing tree species is a top restoration priority. Also, whitebark pine seedlings can often be found at the base of beetle-killed lodgepole pines and require protection during salvage and restoration operations.

Help collect cones. The biggest limitation to whitebark pine recovery efforts is a shortage of registered seeds gathered from trees showing resistance to infection by the deadly whitebark bark pine blister rust fungus (*Cronartium ribicola*). Whitebark pine cone collection is expensive and good crops are intermittent. Foresters can participate by monitoring and reporting on upcoming cone crops and by contributing in-kind or financial support to helicopter surveys and access, cone cage construction, tree climbing, cone caging, cone collection, cone and seed processing, storage, and registration, including providing professional advice to novice cone collectors. Now is the time to consider how you can help out, as 2018 may be a good year for whitebark pine cone in at least some regions.

Update strategic and forest stewardship plans to include whitebark pine. Although whitebark pine is not a commercial tree species, it often grows in and among units of merchantable forest and, like woodland caribou, spotted owls, or other species at risk, must be factored into forest planning. Landscape scale species composition benchmarks were established in 2014 for several central BC timber supply areas

ABOVE: *Restoration trial on Hudson Bay Mountain near Smithers, BC.*
LEFT: *Whitebark pine stand at Eagle Pass near Smithers, BC.*

Pacific Inland Resources (West Fraser) crew plants whitebark pine seedlings near Smithers. FROM LEFT TO RIGHT: *Britt White, planter and graphic designer; Zach Tjader, TFT; Tiana Hooker, UNBC forestry student; Tara Dzenis, TFT; Bradley Wickson, UNBC forestry student.*

that include targets of one to five per cent whitebark pine in appropriate Engelmann Spruce-Subalpine Fir ecosystems. In the Bulkley TSA, for example, at least one forest licensee has prepared amendments to its forest stewardship plan to meet that commitment.

Protect, release and plant whitebark pine in harvest and silviculture operations. Silvicultural best practices guidelines are currently in development for whitebark pine. Forest licensees and community forests at several locations across BC are moving forward with projects that incorporate whitebark pine into current and future high elevation planting or stand tending programs. Ensuring that mature whitebark pine trees, saplings and seedlings are protected during road construction, harvest, silvicultural and wildfire management activities is an important first step that begins with accurate pre-harvest mapping and appropriate prescription development.

Participate as a proponent or partner in restoration projects. Forest professionals have many opportunities to become involved in whitebark pine enhancement or restoration in areas damaged by wildfire or mountain pine beetle, either as a project leader or by partnering with local groups, agencies, and First Nations. The BC Forest Enhancement Society and Habitat Conservation Trust Foundation are just two examples of the many agencies that can be approached for funding.

Speak up for whitebark pine recovery at meetings and with coworkers and employers. Whether you are a senior forest manager or just starting your forestry career there are opportunities in your workplace or at professional gatherings to advocate for better whitebark pine management. Why not include a whitebark pine tour stop on your next field trip or sponsor an employee to attend the next Whitebark Pine Ecosystem Foundation science workshop. Discuss with colleagues how they are incorporating whitebark pine into their management prescriptions.

For more information on whitebark pine ecosystem recovery and how to participate in your region, please contact Sybille Haeussler[3] PhD, RPF, or another member of the Whitebark Pine Ecosystem Foundation of Canada[4]. If you work in the Flathead-Crowsnest Pass area, you can take part through the Crown of the Continent Ecosystem High Five Working Group[5].

Sybille Haeussler PhD, RPF, has co-led the Bulkley Valley Research Centre's whitebark pine research and restoration program (www.bvcentre.ca/whitebark) since 2007. She is a self-employed forest ecologist and University of Northern British Columbia adjunct professor based in Smithers, BC.

References

1. www.whitebarkfound.org
2. www.whitebarkpine.ca
3. Sybille.Haeussler@unbc.ca
4. http://whitebarkfound.org/contact
5. http://crownmanagers.org/cce-high-five-working-group