

Restoration of Endangered Whitebark Pine (*Pinus albicaulis*) in the Wetzin'Kwa Community Forest and Environs



Wetzin'Kwa 2016 Community Grant

Final Report

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Executive Summary

In 2012, the Bulkley Valley Research Centre (BVRC) and the Wetzin'Kwa Community Forest Corporation (WCFC), working closely with the Office of the Wet'suwet'en, Woodmere Nursery, UNBC, Skeena Region FLNRO and other community partners, began restoration of endangered whitebark pine (*Pinus albicaulis*) ecosystems on the slopes of Hudson Bay Mountain in and adjacent to the Wetzin'Kwa Community Forest. This report summarizes the results of the fifth year of the restoration project, partially funded through a \$2300 Wetzin'Kwa Community Grant. Accomplishments for 2016/17 include:

- (1) **Restoration plantings:** With assistance from WCFC and Chris Howard Treeplanting, 1400 whitebark pine seedlings were planted on the southwest slope of Hudson Bay Mountain in WCFC cutblock CP120-2 (above km1 on the McDonnell Lake Road) on June 2, 2017. This semi-operational planting is the single largest whitebark pine restoration project to date in the Bulkley TSA/Skeena-Stikine Natural Resource District. The seedlings were grown at Woodmere Nursery from seeds collected by BVRC in 2013 from apparently blister rust resistant parent trees located on Hudson Bay Mtn., Telkwa Mtns, McKendrick Pass and in the Sibola Ranges. Sixty seedlings from 6 seed families were staked, numbered and measured for monitoring purposes.

Seedlings planted in 2012 were examined for white pine blister rust and one seedling was found to be infected.

- (2) **Monitoring whitebark pine cone crops:** As predicted, the 2016 whitebark pine cone crop did not warrant picking. We discovered very few 1yr conelets in summer-fall 2016, and, as a result, plans for the next cone collection were deferred. There has not been a sizeable seed crop since 2013.
- (3) **Outreach and Extension:** We participated in 11 outreach activities. Examples include: (1) collaborating with partners to prepare a second 5-year plan for the BVRC's whitebark pine ecosystem restoration program, emphasizing mentoring resource professionals and shifting responsibility for restoration from researchers to operational personnel; (2) A public seminar (Feb 1, 2017) summarizing 10-yr accomplishments and future plans for whitebark pine research and restoration in northwest BC. (3) Liaison with BC Recreation Trails & Sites and Smithers Mountain Bike Association regarding protection of whitebark pine ecosystems on proposed around-the-mountain bike trail on Hudson Bay Mtn.

Accomplishments for 2016/17 mostly met expectations, although there were somewhat fewer seedlings planted than estimated (our proposal estimated 2000 seedlings) due to mortality at the nursery and because 200 seedlings were planted with PIR in the Reiser Creek area as part of the outreach/extension effort.

ACKNOWLEDGEMENTS

We thank the Wetzin'Kwa Community Forest Corporation and Board for continuing support of whitebark pine restoration in the Bulkley Valley through their Community Grant Program. Special thanks to Jay Baker (current) and Bill Golding (former) WCFC Managers for assistance and advice, to former Board member Marie-Lou LeFrancois for advocating tree species diversity and climate change adaptation/assisted migration research, and Dave Louwerse and Derek Hetherington for logistical assistance. The Office of the Wet'suwet'en, especially Mike Ridsdale, David DeWit and Francois Depey, have championed the cultural and ecological significance of Whitebark Pine and raised the profile of this important non-timber tree species within traditional Wet'suwet'en territories.

Joe Wong, Luke Moisey, Wes and other technical staff at Woodmere Nursery, Telkwa grew the seedlings and assisted us in carrying out the "hot lift" on June 1, 2017. Chris Howard and his crew (Arah Maskell, Logan Groves, Johnny Giddings) ably and cheerfully packed, planted and brushed the seedlings at dispersed locations throughout the block. Dave Kolotelo FLNRO, Surrey Tree Seed Centre, John de Gagne FLRNO and SERNbc and Randy Moody WPEF Canada generously lent their technical expertise, while Barb McFee and Laura Guillon at BVRC provided essential administrative support. Additional funding from BC Habitat Conservation Trust Foundation, BC Parks Enhancement Fund, TD Friends of Environment Foundation, and the Forest Enhancement Society was very important.

Feld and nursery assistance in 2016/17 was provided by Andrea Coates, Dave Coates, Adrian de Groot, Jen Atkins and Megan Peloso.

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INTRODUCTION

Whitebark pine (*Pinus albicaulis*) is a western North American stone pine or five-needled soft pine that reaches the northwest limits of its geographic distribution near Smithers, BC. Whitebark pine is considered a keystone species in mountain ecosystems of western North America because of its foundational role in establishing forest cover on harsh, exposed sites, and because its large, nutritious seeds (pine nuts) are very important to subalpine birds (notably Clark's Nutcrackers), rodents (notably red squirrels) and larger mammals (notably grizzly and black bears). The tree is also culturally significant to the Wet'suwet'en and other BC First Nations who recognize its many values and harvested pine nuts for food.

Like other western pines, whitebark pine experienced heavy mortality from mountain pine beetles (*Dendroctonus ponderosae*, MPB), which killed most of the largest, cone-bearing trees in west central BC during outbreaks in the late 1980s and 2000s. Smaller trees at higher elevations historically escaped damage from the beetle, but as the climate warms there is an increasing tendency for high elevation populations to also be attacked. Within the Wetzin`Kwa Community Forest, MPB has slowly spread upslope where it threatens whitebark pine stands below timberline on the southwest slopes of Hudson Bay Mountain. Moreover, whitebark pines of all sizes and ages are steadily dying from an introduced Eurasian disease, the white pine blister rust (caused by *Cronartium ribicola*) that spread across British Columbia over the past century. A third important damaging agent near Smithers is the pine leaf adelgid (*Pineus pinifoliae*) that alternates between whitebark pine and interior spruce, causing heavy foliage loss and weakening already-stressed pines to the point where they either die pre-maturely or fail to produce cones and seeds. Recent wildfires have contributed to losses of mature cone-bearing trees in some areas (e.g., Morice Provincial Park) while a lack of wildfire in other areas has led to gradual loss of whitebark pine through succession to more shade tolerant true fir and hemlock species.

In 2012, whitebark pine was listed as endangered under Canada's federal Species At Risk Act (SARA) due to cumulative effects of white pine blister rust, mountain pine beetle, changes in wildfire regimes, climate change and other factors (COSEWIC 2010). Provincial agencies and land tenure holders are now called upon to protect existing whitebark pine trees and to undertake restoration of damaged whitebark pine ecosystems. Landscape level tree species selection benchmarks for the Bulkley Timber Supply Area recommend planting up to 1% whitebark pine on suitable sites in ESSF subzones over the next 5 years with a long term goal of 5% of total planting on dry ESSF sites (Table 6 in Mah and Astridge 2014).

The Bulkley Valley Research Centre began research on endangered whitebark pine ecosystems in 2007 (www.bvcentre.ca/whitebark/research) and in 2011 initiated a program of seed collections, nursery seedling production, and whitebark pine restoration and assisted migration plantings in recent wildfires, beetle-killed forests and alpine/parkland areas (www.bvcentre.ca/whitebark/restoration). Our partnership with the Wetzin`Kwa Community Forest Corporation began in 2012 with the establishment of an assisted migration planting trial at low (1100 m), medium (1300 m) and high (1600 m) elevations using 373 seedlings grown at UNBC in Prince George from seeds collected in central and southern BC, Alberta and Washington. Subsequent plantings have used locally collected seeds and locally-grown

seedlings from apparently blister rust parent trees. This report summarizes our accomplishments for the period July 2016 to June 15, 2017.

2016/17 OBJECTIVES

Goal: To ensure that the Wetzin'Kwa Community Forest does its part to restore healthy whitebark pine ecosystems in the Bulkley Valley

2016/17 Objectives:

- 1) Plant ~2000 whitebark pine seedlings in Wetzin'Kwa Community Forest in spring 2017
- 2) Monitor status of 2017 whitebark pine cone crop
- 3) Take part in community outreach and extension activities related to whitebark pine

ACTIVITIES AND METHODS

(1) Restoration Plantings

- **July-August 2016:** Communication initiated with Dave Louwerse (Silvicon) re: access to CP120-2, a 2015-16 high elevation cutblock located on the southwest slopes of Hudson Bay Mtn (turn-off at km 1 on the McDonnell Lake (7000) Road. Sybille Haeussler and Dave Coates (volunteer), completed a reconnaissance of the cutblock to identify and GPS suitable planting locations for whitebark pine seedlings on August .
- **Feb 2017:** GIS files showing suitable whitebark pine planting areas in and adjacent to CP120-2 circulated to Dave Louwerse & Jay Baker.
- **May 2017:** Planning for whitebark pine planting in and adjacent to CP120-2 discussed with Dave Louwerse, Derek Hetherington (Silvicon) and Chris Howard (treeplanting contractor).
- **May 2017:** Whitebark pine seedlings counted, flagged and hand-weeded, and seedling lift carried out at Woodmere Nursery.
- **June 2, 2017:** 1500 seedlings planted at 8 dispersed locations within CP 120-2 by Chris Howard and crew (Arah Maskell, Logan Groves, Johnny Giddings – latter 2 pictured in cover photo. Competing woody vegetation (mostly *Abies lasiocarpa* natural regeneration) was removed by manual-clipping. Sybille Haeussler and Adrian de Groot supervised and GPSed the planting polygons and planted, measured and GPSed 60 monitoring trees from 6 seed families.
- **June 3-14, 2017:** GIS files and maps of 2017 whitebark pine polygons prepared. 2017 monitoring data entered and analysed.
- **June 15, 2017:** Alex Woods (FLNRO Forest pathologist) inspected 180 live seedlings at 2012 Low and Medium Elevation Restoration Sites for white pine blister rust (*Cronartium ribicola*). 2012 High

elevation site was not inspected due to snow; Transitional elevation site (2014 planting) was not inspected because seedlings were too young.

(2) Monitoring 2017 whitebark pine cone crop

- **October 2016:** Mature whitebark pine trees on Hudson Bay Mtn (ski resort area and Miller Creek hiking trail) climbed and examined for evidence of 1-yr old conelets.
- **Nov 2016-March 2017:** Whitebark pine trees on Hudson Bay Mtn, Babine Mtns, McKendrick Pass and Morice Lake examined during ski trips and other fieldwork for evidence of 1-yr old conelets.
- **Winter 2016/17:** Other local whitebark pine enthusiasts queried regarding observations of first-year conelets. Sybille prepared plan for 2017 collaborative cone monitoring.

(3) Outreach and Education

- **July 2016 – June 2017** BVRC whitebark pine project leaders Sybille Haeussler engaged in a wide variety of whitebark pine education and outreach activities throughout the year with partner organizations, professionals, industry representatives and the public. These activities are summarized in Results.

RESULTS AND DISCUSSION

(1) Whitebark Pine Restoration Plantings

The total number of live seedlings lifted at Woodmere Nursery for planting in the Smithers area was 1600 from 6 provenances (locations) and 14 seed families (Table 1). The seedlings were PSB415 stock sown in Feb 2015 that had completed 2 full growing seasons in the nursery and were partially through their 3rd growing season (height growth not yet complete, needles elongated but not fully hardened off) at the time of planting (Fig. 1). This was lower than the 2000 seedlings estimated from our 2015 count of 2111 seedlings, indicating a mortality rate of ~24% at the nursery over 2 years.



Figure 1. Jen Atkins and Megan Peloso showing off the first successfully grown Hudson Bay Mountain whitebark pine seedlings prior to the lift at Woodmere Nursery, Telkwa.

Two hundred seedlings from 3 provenances were hot lifted on May 18, 2017 for planting on May 19, 2017 at West Fraser PIR's high elevation CP 840-1 near Reiser Creek (Appendix II). These trees were given to PIR to kickstart their participation in whitebark pine restoration in the Bulkley TSA; for education/outreach purposes (4 summer employees participated in the planting effort); and because our August 2016 reconnaissance indicated that there insufficient suitable microsite area (dry, sunny ESSFmc/02 and /03 site series) in CP 120-2 to plant the all of the trees at the desired wide spacing (for details see mid-term report: Haeussler 2017).

This left ~1400 seedlings for planting in WCFC's CP 120-2. These seedlings were lifted on June 1, 2017 and planted on June 2, 2017. All of the seedlings were planted within 10 small polygons within or adjacent to the boundaries of CP120-2 (Fig 2), including some trees planted beneath MPB snags (Fig 2). The total area planted was 1.3 ha and planting density was slightly over 1000 stems per hectare, which

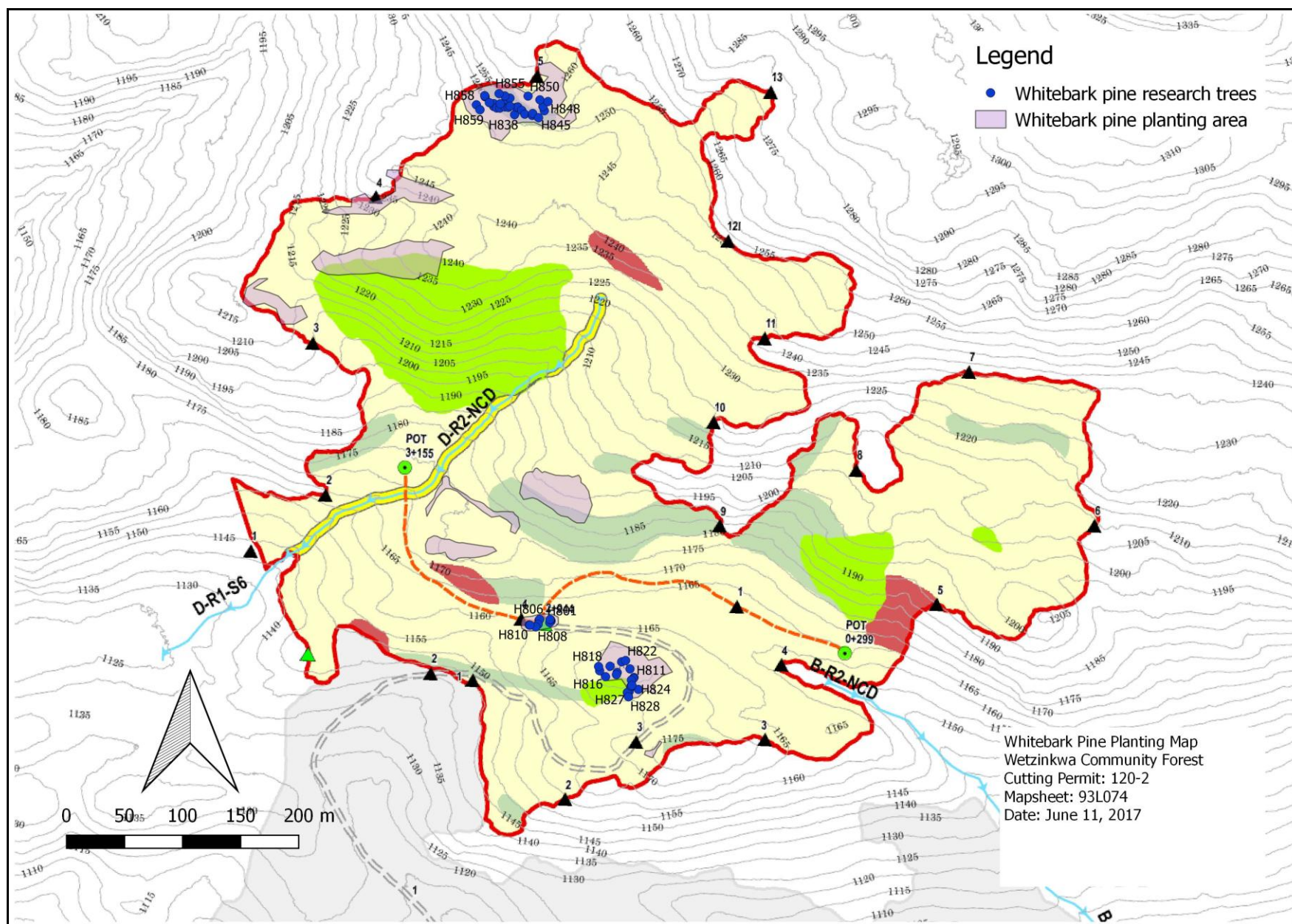


Figure 2. Map of Wetzinkwa Community Forest CP 120-2 logged in 2015/16, showing location of (a) 10 whitebark pine planting areas (pink-grey polygons) on dry knolls and in burn piles, and (b) monitoring trees (blue dots) at lower and upper elevations.

was considerably denser than anticipated based on the density of our 2011-2014 experimental plantations. We encouraged the planters to adopt a cluster-planting approach with seedlings planted in groups of 2-4 with 0.6 – 1 m spacing within-groups and 5 -7 m spacing between-groups. This distribution mimics the clustered distribution of whitebark pine resulting from seed caching by Clark's Nutcracker.

Table 1. Whitebark pine seed families planted near Smithers area in May-June 2017 with mean seedling size and vigour determined from a sample of monitoring trees per provenance.

Seed Family	Provenance	# seedlings		PIR Monitoring Trees				WCF monitoring trees			
		PIR CP840-1	WCF CP120-2	#	ht (cm)	diam (cm)	vigor	#	ht (cm)	diam (cm)	vigor
HB1	Hudson Bay Mtn resort area		130					10	11	0.6	fair/ good
HB3			42								
HB7			18								
DU1	Hudson Bay Mtn above Duthie Mine		155				10	15	0.6	good	
DU3			216								
DU5			93								
HUB1	Telkwa Mtns above Hunter Basin		126				10	14	0.7	good	
HUB4			6								
HUB8			218								
HUB11			17								
McK13	McKendrick Pass	7	49	7	11	0.6	good	10	18	0.6	good
SM	Smoke Mtn	137	117	9	18	0.6	good	10	18	0.7	good
SW	Mt Sweeney	70	196	10	10	0.5	fair	10	13	0.6	f/g
Total		214	1383	26	13	0.6	good	60	15	0.6	good

Twenty six monitoring trees were planted at PIR's CP 840-1 and 60 monitoring trees were planted at Wetzin'Kwa Community Forest CP 120-2 (Table 1; Appendix III). Monitoring trees were marked with a pigtail stake with a numbered tag. The location was GPSed and the provenance, height, basal diameter, vigour and some information about the planting microsites was recorded (Appendix I). At CP840-1 all of the monitoring trees were planted in a row in middle of the deeply incinerated soil from a slashpile burned in Fall 2016 (Fig. 2,) at 1235 m elevation. At CP 120-2, 10 of the monitoring trees were planted in deeply incinerated soil in a recent burn pile (Fig. 4). Half of the trees (including those in burn piles) were planted at the lower end of the cutblock adjacent to the main landing/parking area so that they will be readily accessible for demonstration purposes (1170 m elevation). The remaining thirty trees were planted at the uppermost elevation of the cutblock (1255 m elevation).

Unburned portions of the block had abundant false azalea (*Menziesia ferruginea*) and subalpine fir advanced regeneration. To provide a low competition environment, the planters were instructed to avoid the false azalea and we clipped any subalpine fir seedlings growing within 2 meter of the seedling (Fig. 3).



Figure 3. Logan Groves and Johnny Giddings clipping advanced regeneration of subalpine fir near whitebark pine seedlings planted beneath MPB-killed lodgepole pines.



Figure 4. Staked, numbered and measured whitebark pine monitoring trees planted in the centre (blue ribbon, foreground) and at the edge (blue ribbon, background) of a deeply incinerated autumn 2016 burn pile adjacent to the parking area in CP120-2 to determine if these competition-free environments are favourable growing sites for whitebark pine.

Are Burn Piles Suitable Planting Sites for Whitebark Pine? Approximately half of the 200 PIR seedlings were planted in the burn pile while the remainder were planted in minimally disturbed soil on a rocky knoll. At CP 120-2 we planted approximately 30 seedlings in 2 burn piles. We had several reasons for testing the suitability of deeply incinerated burn pile soils as a microsite for whitebark pine: First, we want to determine whether this microsite will provide the seedlings with a competition-free microsite to aid successful establishment without stand tending. Our monitoring data from the Gosnell, Atna Bay and Nanika Falls wildfires (Haeussler 2016) indicates that recent wildfires provide optimal growing conditions for whitebark pine seedlings. But severely incinerated burn pile soils could simply be too harsh. For example, they may be deficient in nutrients and mycorrhizal fungi, may contain toxic residues, may be too hydrophobic, or may provide insufficient shade. If burn pile planting is successful, it will be very easy to instruct forestry personnel on where to plant their whitebark pine and the seedlings will be easy to locate for operational monitoring without flagging and staking. Moreover, whitebark pine could often be planted independently from the operational planting of commercial tree species, for example when slash piles is delayed after operational planting, or by reserving a few burn piles in each high elevation block as unplanted area that could be reforested with whitebark pine whenever stock becomes available.

Incidence of White Pine Blister Rust (*Cronartium ribicola*) on 2012 Restoration Plantings

Alex Woods (FLNRO Skeena Region Forest Pathologist) and Sybille Haeussler inspected all live trees on the 2012 Low Elevation and 2012 Mid Elevation Restoration Plantings on Hudson Bay Mountain for signs of white pine blister rust. Of 180 seedlings inspected we found one seedling at the Mid Elevation site with a blister rust canker (Figure 5). There was no *Ribes* growing nearby.

We also inspected 4 naturally regenerated whitebark pine seedlings and saplings at this site for evidence of blister rust cankers and found no active cankers. One of the naturally regenerated seedlings (pictured in Fig 2 of Haeussler 2015) was, however, completely dead earlier from blister rust damage and related small mammal chewing. The planted seedling immediately adjacent to the dead tree has no signs of white pine blister rust –not surprising considering blister rust moves from Pine to Ribes to Pine rather than directly from Pine to Pine.

At the low elevation site, Ribes continues to resprout despite regular brushing and is abundant in nearby gullies. We have not yet observed any white pine blister rust damage at this site, perhaps because there are no whitebark pine trees nearby and the nearby Ribes are not infected. We have not inspected the Ribes for evidence of *Cronartium ribicola* infection – this has to be done in late July or August.

The high elevation 2012 seedlings can be inspected for blister rust in mid-late summer 2017. The 2014 and 2017 seedlings are unlikely to show signs of blister rust infection for several more years.



Figure 5. Active blister rust canker caused by Cronartium ribicola on whitebark pine seedling on June 15, 2017. The canker is on the main stem and will probably kill the otherwise healthy tree within a few years.

(2) Monitoring 2017 Cone Crop

Whitebark pine cones take two years to mature. One-year old immature conelets (Fig. 5) can be observed in the late summer, fall and winter in the year prior to a cone crop. If conelets are observed on outer branches, especially in the middle and lower portions of the tree crown this is indicative of a good cone crop the following year—although it doesn't guarantee a good crop as bad weather or insects could damage or delay maturation of cones in the 2nd year. Usually, good cone crops (known as mast years) are a region-wide phenomenon, but there may be local

We examined open-grown small trees on Hudson Bay Mountain near timberline in October and while skiing during the winter months. We also examined trees at several locations in the Babine Mountains and McKendrick Pass while hiking in fall and while snowshoeing in winter, and during a helicopter field trip to Morice Lake in November 2016. We did not observe any conelets during any of these investigations either in the lower crown ground access or upper crown (climbing up trees). We concluded that 2017 is unlikely to have sufficient cones to warrant cone collection.

While preparing our 5-year plan we decided to crowd-source the monitoring of the 2018 cone crop among our many partners and collaborators and regional hiking groups by distributing a brochure in August 2017 by email and Facebook. The brochure will request that resource workers and outdoors enthusiasts working or recreating in whitebark pine stay alert for signs of 1-yr conelets and submit photos and geographic coordinates to an email address or cell phone number. An early draft of the brochure graphics is shown below (Figure 6).

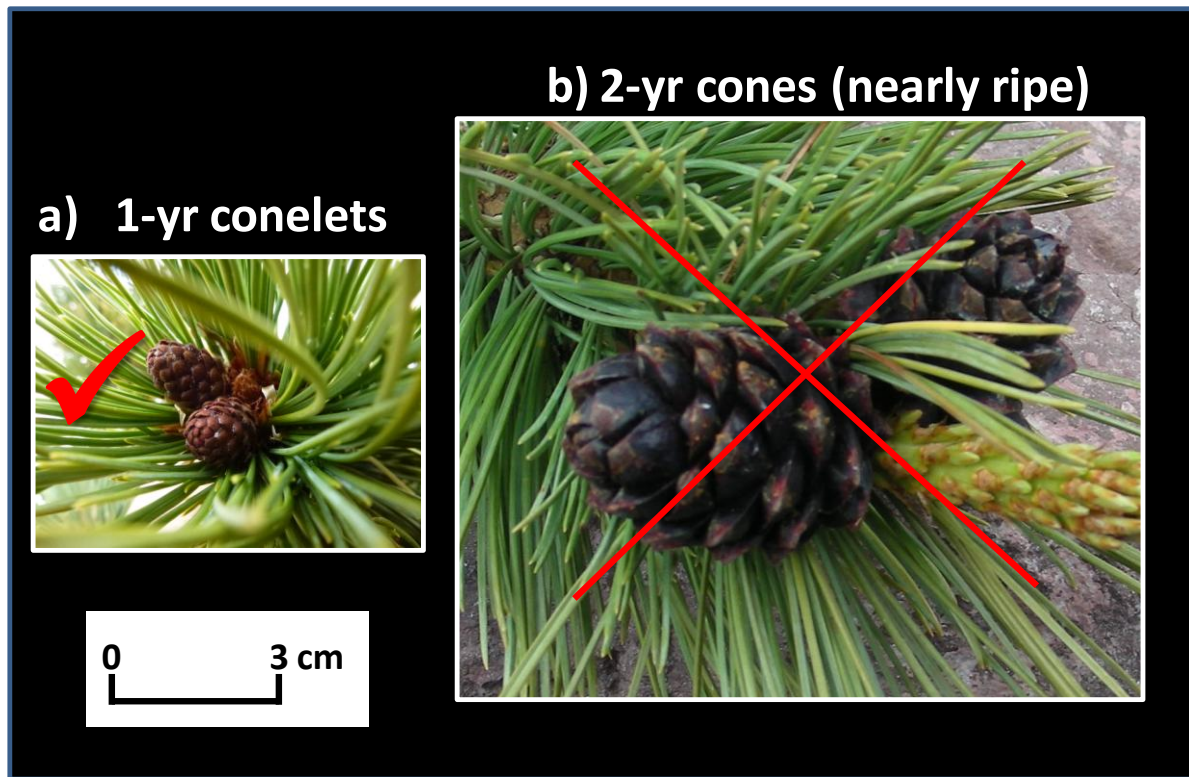


Figure 6. Draft of graphic showing the difference between one-year old whitebark pine conelets (~2 cm long with thin scales) and nearly ripe 2-yr old old cones (> 5cm long with thick scales). Collaborators will be asked to photograph and report on the incidence of 1-yr conelets only in order to assist in prediction of next year's cone crop.

(3) Outreach and Education

The following professional and public engagement activities were completed in 2016/17. These activities were mostly completed with volunteer labour or were funded by other sources. A \$300 contribution by WCFC to these outreach efforts is gratefully acknowledged:

- a) Whitebark pine restoration article in Smithers Interior News July 13, 2017.
- b) 5-yr strategic plan for BVRC's whitebark pine restoration program, including 5 proposals for submission to funders (BC HCTF, TD-Friends of Environment Foundation, BC Forest Enhancement Society (with SERNbc), Environment and Climate Change Canada Environmental Damages Fund, Environment Canada Stewardship Fund for Species at Risk (with WPEF-Canada). Reached out to a wide variety of partners and potential collaborators and solicited comments on draft proposals
- c) Interview with Emily Bulmer for forthcoming article in Northword Magazine.
- d) Oral presentation on whitebark pine restoration achievements and challenges in the southern Skeena Region at the BC Parks and Protected Areas forum in Victoria (Dec. 7, 2016).
- e) Public presentation on the Bulkley Valley Research Centre's whitebark pine research and restoration programme since 2007 at the BVRC winter seminar series (Feb 1, 2017).
- f) Collaborated with BV Naturalists to include information on whitebark pine and Clark's Nutcracker in Perpetual Nature Calendar for the Bulkley Valley (contributed text to accompany solicited artwork).
- g) Collaborated with Gary Quanstrom and West Fraser's summer student crew to plant 200 whitebark pine trees at a high elevation cutblock in the Reiser Creek drainage (CP840-1 >1200 m elevation). The forestry students learned about whitebark pine ecology, silviculture and restoration challenges and assisted in planting and GPSing the planted trees (May 2017).
- h) Collaborated with BC Parks & BC Wildfire Service (Telkwa & Burns Lake Unit Crews) to lift and plant 3300 whitebark pine seedlings in Morice Lake Provincial Park. The firefighters learned about whitebark pine ecology and restoration challenges while actively involved in the restoration work (May 2017).
- i) Consulted with Joanne Williams, BC Recreation Trails and Sites regarding whitebark pine protection and interpretive information on Hudson Bay Mountain. The Piper Down trailhead and Crater Lake trail improvement project (with proposed information on whitebark pine ecosystems) has been shelved for the time being. BC Recreation Trails & Sites is collaborating instead with Smithers Mountain Bike Association on the "round-the-mountain" trail project. Have made initial contact with SMBA project leader (Leanne Helkenberg) regarding whitebark pine protection during trail routing and construction and to discuss the possibility of including interpretive signage along this trail (June 2017).
- j) Provided assistance to WPEF-Canada colleagues (Don Pigott, Randy Moody) on development of best management practices document for whitebark pine (Dec 2016- Jan 2017).
- k) Provided BC Conservation Data Centre with geographic coordinates of whitebark pine populations and restoration trial sites in northwest BC for species & ecosystems at risk monitoring (March 2017).

Our proposal included \$500 for website posting (to be paid for by TD-Friends of Environment Grant). We decided to delay the website updates after June 2017 so that we could include all of the exciting new information on the 2017 plantings (too busy to do that during the planting season).

BUDGET

Table 2. Project Budget

Category/Activity	Projected WCG	Actual WCG	Other Cash (source)	In-kind (source)	Total
Human Resources					
Project Mgmt: S. Haeussler (Skeena Forestry Consultants = SFC)	\$400	\$300	\$500 (HCTF)	\$400 (BVRC)*	\$1200
Coordinating seedlings & planting (SFC):	\$600	\$400	\$800 (HCTF)	\$0	\$1200
Planting trees	\$0	\$0	\$0	est \$2000 (WCFC to Chris Howard Tree planting & Silvicon)	\$2000
Assessing blister rust on 2012 trials	NA	\$0	\$0	\$400 (FLNRO-Alex Woods)	\$400
Assessing local cone crop SFC	\$200	\$41.44	\$0	\$238.56 (BVRC, BV Nat, BV Backpackers)	\$280
Communications & outreach	\$300	\$300	\$600	\$1000	\$1900
Data entry & website assistance	\$300	\$100	\$300 (TD-FEF)	\$0	\$400
Website posting	\$0	\$0	\$0	\$0	\$0
Writing final report & extension article	\$200	\$200	\$200 (TD-FEF)	\$400 (BVRC)*	\$800
Total HR	\$2000	\$1341.44	\$2400	\$4438.56	\$8180
planting supplies & equip	\$0	\$0	\$200 (TD-FEF)	\$600(WCFC & Summit)	\$800
nursery & misc supplies	\$0	\$0	\$150 (TD-FEF)	\$700	\$850
nursery seedlings†	\$0	\$658.56	\$0	\$0	\$658.56
Total Materials	\$0	\$658.56	\$350	\$1300	\$ 2308.56
Other Expenditures					
Use of personal vehicle	\$0	\$0	\$0	\$200 (BVRC*)	\$200
Admin Fee (15%)	\$300	\$300	\$0	\$0	\$300
Total Other Expend.	\$300	\$300	\$0	\$200	\$500
Total Costs and Expenditures					
	\$2300	\$2300	\$2750	\$5938.56	\$10,988.56

*BVRC in-kind labour & expenditures refers to volunteer labour and use of personal vehicle by the project leader.

†1372 seedlings x \$0.48/seedling = \$658.56

The cost to Wetzin'Kwa Community Grant Program for this year's project was on budget (\$2300) but we allocated the funds slightly differently from our proposal estimate. Most significantly, we charged the Wetzin'Kwa grant \$658.56 for 1372 seedlings paid to Woodmere Nursery. We spent less time on

website updates than anticipated (opting to defer the website updates to after the planting season was over in order to include all of the new information about this year's plantings), but instead completed a half-day assessing white pine blister rust infection on 2012 restoration plantings with the assistance of FLNO pathologist Alex Woods, at no charge to the project. Labour costs were offset by Whitebark Pine Ecosystem Restoration grants from HCTF and TD-Friends of Environment. The total budget for the project was ~\$250 higher than in our 2016-17 grant proposal (\$10,988.56 vs. \$10,727.50) with slightly lower Other Cash contributions and a slightly higher In-kind Contributions than estimated.



Figure 6. Happy whitebark pine planting crew finishes the job. Adrian de Groot, Chris Howard, Arah Maskell, Logan Groves, Johnny Giddings, June 2, 2016.

SUMMARY AND CONCLUSIONS

- The Wetzin'Kwa Whitebark Pine Restoration project is proceeding successfully and on budget.
- The first semi-operational planting of 1300 whitebark pine seedlings (locally grown from seeds collected from local blister-rust free parent trees) in the Wetzin'Kwa Community Forest was successfully completed on June 2, 2017 together with Chris Howard Treeplanting. Total area 1.3 hectares at a density of 1000 stems per hectare.
- 2012-2014 restoration trials were not measured this fiscal year but two of four trial sites were carefully inspected for white pine blister rust infection together with Skeena Region forest pathologist Alex Woods (FLRNRO). He found 1 infected tree out of 180 trees inspected. These seedlings (10-yr old trees: 4 yrs in UNBC nursery; 6th growing season in the field) were not derived from blister rust-resistant parent trees. This result suggests that the rate of blister rust infection on Hudson Bay Mountain is relatively slow despite both host plants (whitebark pine & wild currants/gooseberries) being naturally abundant on the mountain slopes.
- We initiated a small operational trial in the cutblock on Hudson Bay Mtn (CP120-2) and a PIR cutblock at Reiserer Ck (CP840-1) to determine if severely incinerated burn piles are a good growing microsite for whitebark pine. If successful, this could provide a operationally convenient alternative to planting in wildfires.
- There has not been a collectible crop of whitebark pine cones in the region since 2013. We continue to monitor cone crops and will begin a crowd-sourcing project in 2017 to monitor the upcoming 2018 cone crop.
- We continued to pursue a wide range of communications and outreach activities to engage our partners, resource professionals and the public in whitebark pine ecosystem-related activities with a minor contribution (\$300) from the Wetzin'Kwa Community Grant Program. Updating the www.bvcentre.ca/whitebark website was delayed until later in 2017 to include all of the 2017 planting projects.

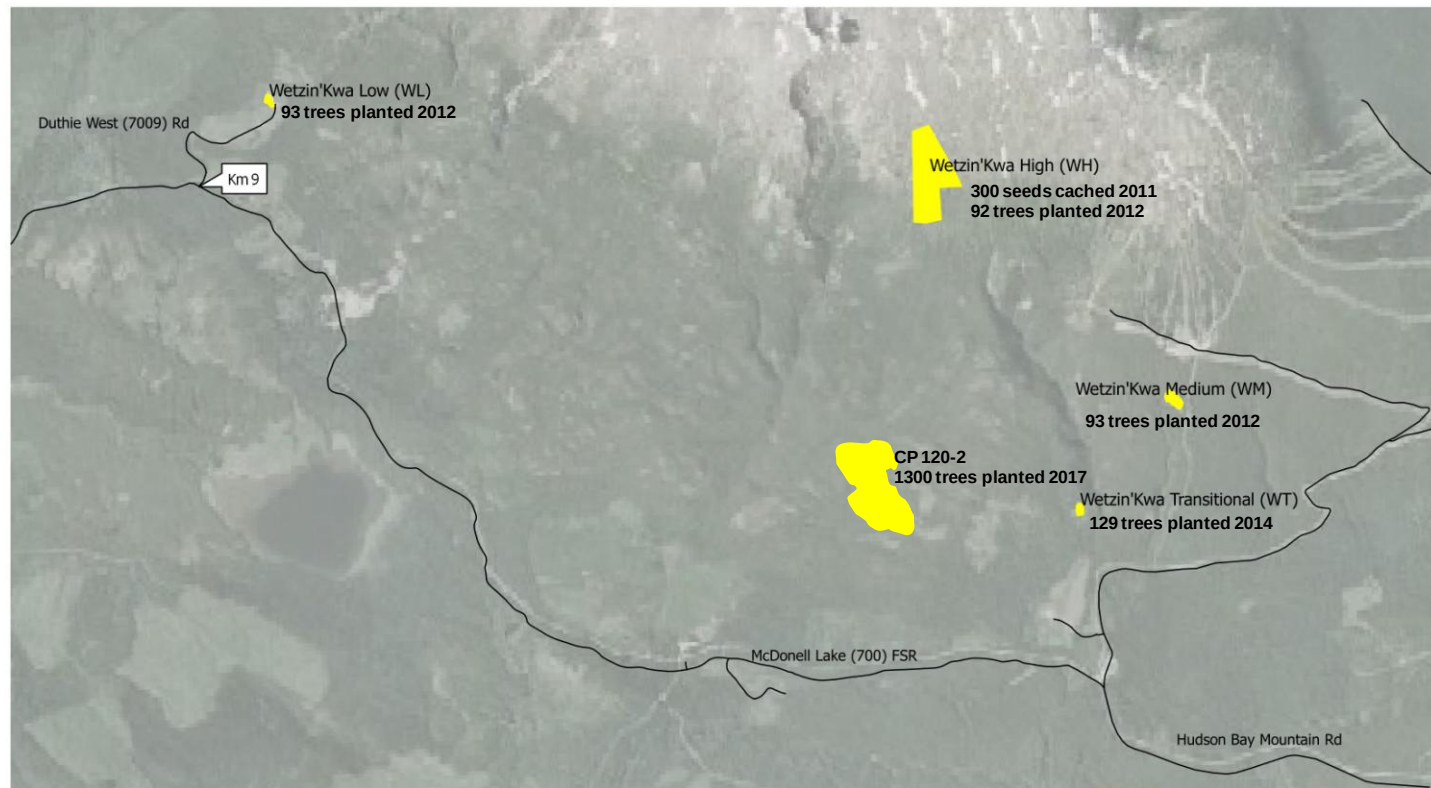
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APPENDICES

Appendix I. Overview map showing all whitebark pine restoration plantings on Hudson Bay Mountain, 2011 – 2017.

Wetzin'Kwa Community Forest Whitebark Pine Restoration Sites



Legend

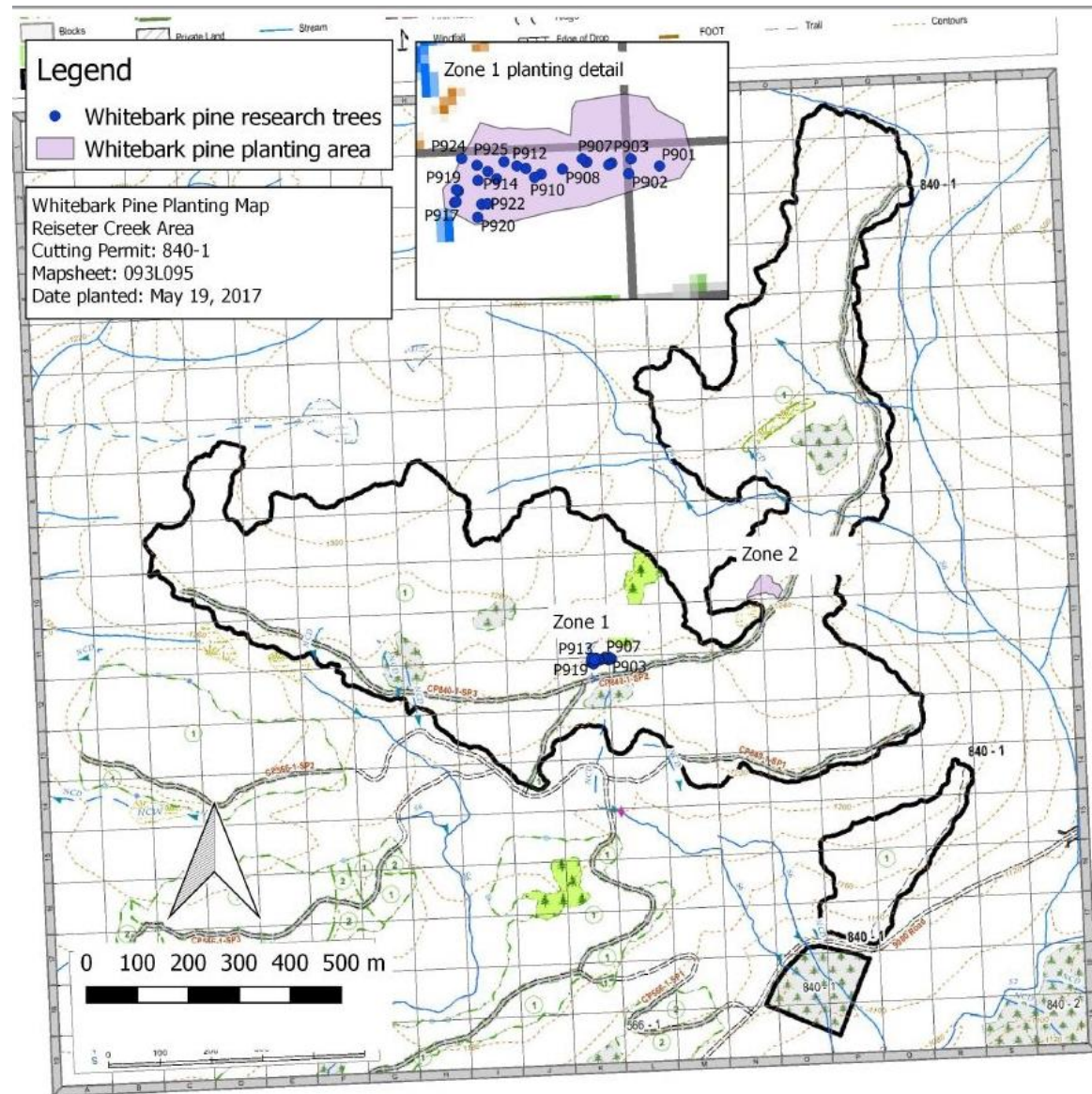
- Planting Site
- Roads

0 0.5 1 1.5 2 2.5 3 Km



Data Source: Bulkley Valley Research Centre
 Satellite Image: Google Earth [2006]
 NAD 83 UTM Zone 9N

Appendix II. Map of PIR (West Fraser) CP 840-1 at km 13.8 on the 9000 Rd (Reiseter Creek/Harold Price) showing planted polygons (lilac) and monitoring trees (blue dots). Total planted area 0.3 ha.



Appendix III. Whitebark pine monitoring tree data from (a) Wetzin'Kwa Community Forest CP120-2 and (b) West Fraser-PIR CP840-1.

(a) Wetzin'Kwa Community Forest CP 120-2 (Low elevation monitoring trees) – see map in Figure 2.

Site	Date	Measured by	Tree No	UTM Coordinates	Elevation	Family	Ht (cm)	Diam(mm)	Vigour	Substrate	Comments
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H801	9 U 608982 6068688	1176	HB3	11	6	G	deeply burned MS	burn pile just W of landing/parking area
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H802	9 U 608981 6068687	1172	SM	15	6	G	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H803	9 U 608981 6068689	1171	McK13	21	6	E	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H804	9 U 608981 6068689	1171	HUB1	15	6	G	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H805	9 U 608971 6068688	1168	SW	17	7	G	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H806	9 U 608972 6068689	1168	HUB4	11	8	G	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H807	9 U 608971 6068685	1168	McK13	20	6	G	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H808	9 U 608969 6068682	1167	SM	27	7	E	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H809	9 U 608963 6068684	1165	SW	12	5	F	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H810	9 U 608964 6068684	1165	HB3	15	7	G	deeply burned MS	
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H811	9 U 609055 6068643	1180	HUB4	16	7	G		moved to knoll just S of parking area
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H812	9 U 609055 6068642	1180	DU3	18	7	E		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H813	9 U 609053 6068640	1178	McK13	17	5	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H814	9 U 609041 6068646	1179	SM	20	9	E		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H815	9 U 609040 6068644	1180	DU1	12	5	F		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H816	9 U 609031 6068642	1181	McK13	22	7	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H817	9 U 609025 6068647	1179	SM	18	7	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H818	9 U 609024 6068651	1177	HB1	7	5	P		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H819			HUB11	10	6	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H820	9 U 609034 6068651	1179	DU3	16	6	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H821	9 U 609044 6068656	1179	HB1	11	6	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H822	9 U 609047 6068657	1178	McK13	22	5	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H823	9 U 609051 6068650	1180	SM	14	6	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H824	9 U 609059 6068633	1178	HUB1	11	7	F		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H825	9 U 609053 6068634	1177	SW	15	7	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H826	9 U 609052 6068630	1176	HUB1	18	6	E		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H827	9 U 609050 6068630	1177	HUB8	17	7	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H828	9 U 609051 6068626	1174	McK13	18	6	G		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H829	9 U 609053 6068635	1176	HUB11	8	6	F		
Wetz CP120-2	2-Jun-2017	Adrian de Groot	H830	9 U 609054 6068636	1175	SW	9	6	F		

(a) continued: Wetzin'Kwa Community Forest CP 120-2 (high elevation monitoring trees) – see map in Figure 2.

Site	Date	Measured by	Tree No	UTM Coordinates	Elevation	Family	Ht (cm)	Diam(mm)	Vigour	Substrate	Comments
Wetz CP120-2	2-Jun-2017	S. Haeussler	H831	9 U 608914 6069126	1249	McK13	16	6	G		moved to uppermost (northernmost) polygon
Wetz CP120-2	2-Jun-2017	S. Haeussler	H832	9 U 608914 6069129	1250	SW	12	7	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H833	9 U 608916 6069125	1250	HUB8	16	6	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H834	9 U 608919 6069125	1249	SM	15	7	G		~damage to leader
Wetz CP120-2	2-Jun-2017	S. Haeussler	H835	9 U 608923 6069126	1249	DU1	15	5	FG		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H836	9 U 608924 6069133	1249	HB3	14	7	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H837	9 U 608926 6069126	1251	McK13	19	5	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H838	9 U 608932 6069120	1250	SW	12	5	F		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H839	9 U 608933 6069126	1252	DU5	13	6	G		some red needles
Wetz CP120-2	2-Jun-2017	S. Haeussler	H840	9 U 608934 6069127	1251	SM	18	8	E		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H841	9 U 608938 6069124	1250	McK13	17	7	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H842	9 U 608941 6069121	1251	HB1	7	4	FP		red tips on needles
Wetz CP120-2	2-Jun-2017	S. Haeussler	H843	9 U 608947 6069120	1250	DU5	9	6	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H844	9 U 608947 6069122	1251	SW	12	6	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H845	9 U 608953 6069118	1249	SW	17	6	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H846	9 U 608957 6069124	1252	DU3	16	7	G		dead side branch
Wetz CP120-2	2-Jun-2017	S. Haeussler	H847	9 U 608956 6069128	1252	HB3	11	7	F		good caliper but scruffy
Wetz CP120-2	2-Jun-2017	S. Haeussler	H848	9 U 608960 6069132	1254	SW	10	7	F		good caliper but scruffy
Wetz CP120-2	2-Jun-2017	S. Haeussler	H849	9 U 608953 6069134	1255	DU5	16	6	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H850	9 U 608943 6069136	1255	SM	17	7	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H851	9 U 608927 6069134	1254	SM	14	7	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H852	9 U 608923 6069136	1255	HB7	11	7	FG		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H853	9 U 608928 6069127	1251	SM	18	6	F		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H854	9 U 608919 6069129	1252	HB7	11	4	F		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H855	9 U 608918 6069137	1256	DU1	15	6	G		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H856	9 U 608906 6069134	1253	HB3	9	6	F		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H857	9 U 608905 6069135	1252	DU1	15	6	F		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H858	9 U 608899 6069127	1249	HUB8	13	6	F		
Wetz CP120-2	2-Jun-2017	S. Haeussler	H859	9 U 608902 6069123	1249	SW	14	5	F		dead leader, stubby 2016 needles
Wetz CP120-2	2-Jun-2017	S. Haeussler	H860	9 U 608910 6069129	1251	McK13	12	6	F		sparse needles; start of lammas growth?

