2013-2014 Annual Progress Report

Whitebark Pine Restoration Program

Pacific Northwest Region

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Ancient WBP near Mt. Adams on the Gifford Pinchot NF.
Photo: J. Nakae

INTRODUCTION

The Whitebark Pine Restoration Strategy for the Pacific Northwest Region (Aubry et al. 2008) laid out a comprehensive 5-year plan to reach the goal of "a network of viable populations of whitebark pine throughout the Pacific Northwest". The key actions prescribed included:

- collect seed for gene conservation and rust resistance screening
- assess stand conditions in priority management units
- develop plans for planting seedlings in priority management units
- continue a rust screening program with emphasis on seed zones in grizzly bear areas
- treat for mountain pine beetle in high risk management units
- develop an approach for planting seedlings in designated wilderness areas
- develop an approach to mitigate the predicted impacts of climate change
- develop a monitoring plan to track accomplishments, success of actions, and provide feedback to improve project procedures and outcomes and disseminate information.

2014 was the sixth year of implementation of the restoration strategy. Little or no restoration work was done on Forest Service lands in 2013 so this report covers both years

MAJOR ACCOMPLISHMENTS FOR CY2014

- Approximately 3000 seedlings planted on 4 forests
- Cones collected from 59 individual trees for gene conservation and rust screening
- ~50 acres stand treated by thinning to reduce competing vegetation, application of verbenone and interpretive sign installation

PROGRAM FUNDING

As in past years Forest Health Protection has provided the bulk of the funding for this work. For 2014 and beyond, the Interagency Special Status/Sensitive Species program has provided funds for stand mapping and surveys. Funding for this year included:

- $13,700K from R6 FHP for thinning/fire protection at Anthony Lakes (carried over from FY2012)
- $16K from R6 ISSSSP for revisiting and assessing "winner trees" from rust screening
- $12K from R6 ISSSSP for surveying WBP occurrence and condition on the Willamette NF
- $32,200K From R6 ISSSSP for surveying WBP occurrence and condition in the North Cascades on the MBS and OKA-WEN NF

Photo: C. Jensen

Caging cones in the 7 Devils area of Hells Canyon. Recent bark beetle activity is evident.
Photo: C. Jensen

CONE COLLECTIONS

2013 was a poor cone crop across the region and almost no cone collections were made. A limited cone collection was made of 6 limber pine trees in Hurricane Canyon on the Wallowa-Whitman NF for gene conservation, however seed yields were insufficient and all seed was sown for rust resistance screening. Cone crops were generally low in many areas in 2014 as well, with the exception of eastern and southern Oregon. Whitebark pine cones were collected for gene conservation from 11 trees in the 7 Devils area of Hells Canyon NRA, which is administered by the Wallowa-Whitman NF. Cones were also collected from 9 individual trees plus 1 bushel of a bulk reforestation lot at Anthony Lakes on the Wallowa-Whitman NF and 39 individual trees in the Green Mountain area on the Fremont-Winema NF for rust resistance screening and reforestation. W.O. Forest Health Protection gene conservation funds carried over from 2010 and 2011 paid for the collections in the 7 Devils and for caging at Anthony Lakes. Forest base funding was used for cone harvest at Anthony Lakes. Overall, 59 single-tree collections were made from trees in three separate locations. Since 2009, cones have been collected from 835 individual trees for gene conservation and rust resistance testing (see table 1).

The Whitebark Pine *ex situ* Gene Conservation Plan for the Pacific Northwest Region designated 22 collection areas in and around Region 6, with a goal of collecting seed from a minimum of 25 individuals within each collection area. A minimum of 700-800 seeds is needed for gene conservation at both the national and regional level. The Region 6 *ex situ* Whitebark Pine Gene Conservation Plan calls for ~500 to be placed in long-term storage at the ARS National Center for Geneplasm Preservation in Ft. Collins, CO, and 300 seed will be stored locally at the Dorena Genetic Resources Center. This local storage will provide a backup for gene conservation and will also be a "working" collection that can be available for small research projects. Prior to 2009 sufficient seed was only available to meet the target in 2 of these areas. With the 2014 seed collection, we have met the target in 20 areas (see table 1).

Table 1: Gene conservation cone collections

Collection Area	Seed Zone	Conservation Areas	# Seedlots >700 seed available pre-2009	# Seedlots collected 2009	# Seedlots collected 2010	# Seedlots collected 2011	# Seedlots collected 2012	# Seedlots collected 2014	Goal met?	# Trees still needed
Olympic mtns.	1	101	10		16				YES	
Okanagan NF	2E	202, 203, 204, 205	2	16	10				YES	
Wenatchee NF	2W	206, 207	12		26				YES	
Wenatchee NF	2W	208	2		23				YES	
Bonaparte mtn.	3	301		19		30			YES	
Kettle Crest	3	302		17		54			YES	
Selkirk mtns.	3	303	1		6	53			YES	
Mt. Rainier-Mt. Adams	4	401, 402, 404, 405	24		4				YES	
Mt. Hood	5	501	18	7	7				YES	
Central OR Cascades	5	502, 503, 504	25	26	7	29	12		YES	
Newberry Crater	5	505	4	26	10	3	16		YES	
Wallowa mtns.	6	601		25		16			YES	
Umatilla NF	6	602, 603	49	5		6		9	YES	
Malheur NF	6	604	7	28		10			YES	
Seven Devils Hills	6	605				14		11	YES	
Central OR Cascades	7	701		23					NO	4
S. OR Cascades	7	703	7	20	11				YES	
Mt. Ashland	7	704							*	
Yamsay Mtn.	8	801		11	8				NO	7
Fremont NF	8	802		20	18	16	19	39	YES	
N. Warner mtns.	8	803		24		7			YES	
S. Warner mtns.	8	804					52		YES	
Pine Forest range NV	8	805					26		YES	
TOTAL				**267**	**146**	**238**	**125**	**59**	**835**	
* Very small population - only 2 mature trees									Total	

SURVEYS

Prior to cone collections, cone surveys were conducted on sites as needed. In addition to cone surveys, an effort was funded by the Interagency Special Status Sensitive Species Program (ISSSSP) to revisit all of the trees that had scored well in rust resistance testing at the Dorena Genetic Resources Center. 92 Trees from 35 different locations were targeted for assessment. Assessments were made on 19 trees, with some alive and healthy, some alive but being attacked by mountain pine beetle, and some (5) unable to be relocated because they were not tagged.

ISSSSP also provided funds for surveying and mapping areas on the MBS, OKA-WEN, and WIL NF's that were thought to be potential WBP habitat, however its presence was unknown. Surveys were done on the Willamette NF in the Three Sisters Wilderness, 40 miles along the Pacific Crest Trail, and the Diamond Peak Wilderness (see Appendix A). Nine sites on the OKA-WEN were visited with ~6300 acres of WBP habitat were surveyed either on-site or with binoculars (see Appendix B). Reports for both of these survey efforts are on file with the local forest. The OKA-WEN also conducted stand exams on 300+ acres in the Summer Blossom area on the Chelan RD.

The Region has over 200 permanent Whitebark pine plots throughout Oregon and Washington managed by the local forest or Forest Health Protection staffs. In 2014 two new plots were added in the Diamond Peak Wilderness located on the Willamette National Forest. In addition to this, 6 plots were re-measured on the Mount Hood National Forest five years post installation. No other permanent plot work was conducted in the region in 2014. In 2013 three plots on Mt Adams were remeasured after a wildfire burned near or through them.

Surveyors David Thompson and Dori Blackburn compare notes as they document the stand below them. Photo: D. Bowden

Aerial Detection Survey

Annually, Forest Health Protection along with Washington Department of Natural Resources and Oregon Department of Forestry fly the entire region to map forest disturbances of the forested lands regardless of ownership. Survey flights are done between July and September and damages notable from aircraft by surveyors are digitally sketch mapped and geo referenced. This provides a systematic annual inventory of damaging agents that are detectable to the surveyors. The annual survey gives a general

idea of long-term trends in damaging agents such as mountain pine beetle. Acres affected and number of trees per polygon are estimated by the observers. Due to the nature of Whitebark pine growing in stands mixed with other species such as lodgepole pine and the lack of an accurate species layer for Whitebark pine, these surveys are rough general trends.

In 2014 Oregon and Washington ADS mapped 4170 acres of mortality in Whitebark pine attributable to mountain pine beetle; this was down from 2013 which had 5891 acres mapped. With this there was an estimated 9049 trees killed in 2014, down from 10,503 trees in 2013. On average it is estimated that within the polygons showing damage from mountain pine beetle to Whitebark pine, about 2.17 trees per acre were mapped. The majority of the detectable damage over 2013 and 2014 has been on the Deschutes National Forest and primarily within the Newberry National Monument. This is also the only area that has shown a noticeable increase in acreage affected. Overall, mountain pine beetle mortality across the region has declined over the past few years. (see table 2)

Table 2: Mountain pine beetle mortality mapped by ADS in 2013 and 2014 in Oregon and Washington.

	Acres Affected		**Est. Trees Killed**		**Average Trees/Acre**	
OWNERSHIP	**2103**	**2014**	**2013**	**2014**	**2013**	**2014**
OR and WA Total	**5891**	**4170**	**10503**	**9049**	**2**	**2**
Forest Service						
Colville	0	8	0	8	0	1
Deschutes	1329	2487	1994	7012	2	3
Fremont	1448	13	5441	13	4	1
Gifford Pinchot	18	9	29	12	2	1
Malheur	714	130	1419	143	2	1
Mount Hood	6	0	3	0	1	0
Okanogan	178	44	117	25	1	1
Olympic	0	0	0	0	0	0
Rogue River	2	0	1	0	1	0
Mt. Baker-Snoqualmie	46	88	62	75	1	1
Umatilla	0	12	0	12	0	1
Umpqua	0	0	0	0	0	0
Wallowa-Whitman	787	885	435	914	1	2
Wenatchee	629	35	518	38	1	1
Williamette	0	0	0	0	0	0
Winema	183	216	80	161	0	1
National Park Service						
Crater Lake	12	0	10	0	1	0
Other						
Oregon BLM	209	113	212	487	1	4
Other	326	91	180	123	1	1

PLANTINGS

Several planting projects were completed in 2014. On the Okanagan-Wenatchee NF, approximately 10 acres were planted with 636 seedlings on Thunder Mountain on the Tonasket RD.

Approximately 1000 seedlings were planted on the Fremont-Winema NF in areas that had experienced heavy mortality from mountain pine beetle.

On the Gifford Pinchot NF, approximately 550 seedlings were planted in the area burned by the Cascade Creek fire in 2012. Approximately 430 seedlings are part of a white pine blister rust resistance field trial with the remainder general restoration planting stock. All trees in the resistance test are tagged and will be followed annually for survival and whitepine blister rust occurrence.

On the Deschutes NF, approximately 400 seedlings from the Dorena Genetic Resources Center were planted in a white pine blister rust resistance field trial and an additional 500 seedlings were planted for restoration.

Seedling planted in a protected microsite next to an old snag.

Photo: M. Horning.

THINNING AND VERBENONE

Funding was received from Region 6 FHP in 2012 for a thinning project at the Anthony Lakes ski area on the Wallowa-Whitman NF. The goal of the project was to remove competing vegetation and ladder fuels from around high-value, mature, cone-producing whitebark pines. A NEPA Categorical Exclusion (CE) was completed and the project was implemented in summer of 2014. Work was performed by a contractor and the treatment area encompassed 49 acres. Slash was lopped and piled. In areas where there was a lot of slash, it will be piled and burned in 2015. Surveys by FHP staff revealed active mountain pine beetle infestations in the general vicinity of the project area so as a precaution, the entire project area was treated with Verbenone. The actual treatment targeted the larger trees and approximately 270 trees had Verbenone applied. The Verbenone that was applied was a new formulation and delivery system called SPLAT® (Specialized Pheromone & Lure Application Technology) developed by ISCA Technologies which comes in a tube and is applied with a caulking gun directly to the tree bole. The area to be treated is on the back side of the ski area so there is high public visibility in both winter by skiers and summer by hikers. Interpretive signs for public education were installed adjacent to the project area at a trailhead for a trail that goes through the project area.

Encroachment by subalpine fir evident before the thinning (left) and cut trees visible after treatment (right).

Photo: D. Komlosi.

OTHER WORK

Pacific Coast WBP Working Group

The Pacific Coast WBP Working Group met in April in Portland. Approximately 35 people met for 2 days of presentations and discussions on the current state of WBP, the issues faced by the species and the needs and future plans for restoration as a catalyst for the revision of the R6 WBP Restoration Strategy. Some of the topics covered included:

- Climate change and the need for restoration
- NEPA planning and documentation
- TES status and the implications of ESA listing
- Restoration in wilderness
- Fire ecology and wildland fire use/planning
- Rust resistance screening
- Seed germination

Speakers and presentation titles are listed below. Presentations are available online at: http://ecoshare.info/projects/whitebark-pine/pacific-coast-whitebark-pine-work-group-wbp-applied-restoration-meeting-presentations/

Diana Tomback – Threats faced by WBP and the need for restoration, especially in the face of climate change.

Kristen Chadwick – Update on the status of WBP in Region 6.

Steve Shelly – WBP in project NEPA planning, and WBP in forest plan revisions.

Mark Skinner – FSM section 2670 and 2680 revisions and implications for project planning

Ted Thomas – Endangered Species Act listing process and the implications of "candidate species" designation, including the need and opportunities for restoration.

Mark Skinner – Implications of ESA listing for USFS restoration work.

Justin Ewer – Minimum Requirements Decision Guide (MRDG) - the who/what/when/where/how/whys.

Connie Mehmel – Report on the Quartz Mountain Wilderness WBP restoration project.

Holly Kearns – The Forest Health Protection WBP restoration program – history, the types of projects funded, what has been accomplished since it started, as well as the proposal process (and how to put together a good one).

Richard Sniezko – WBP rust screening activities and results in Region 6.

Lee Riley (presented by Richard Sniezko) – Tests and results from WBP seed stratification/germination trials.

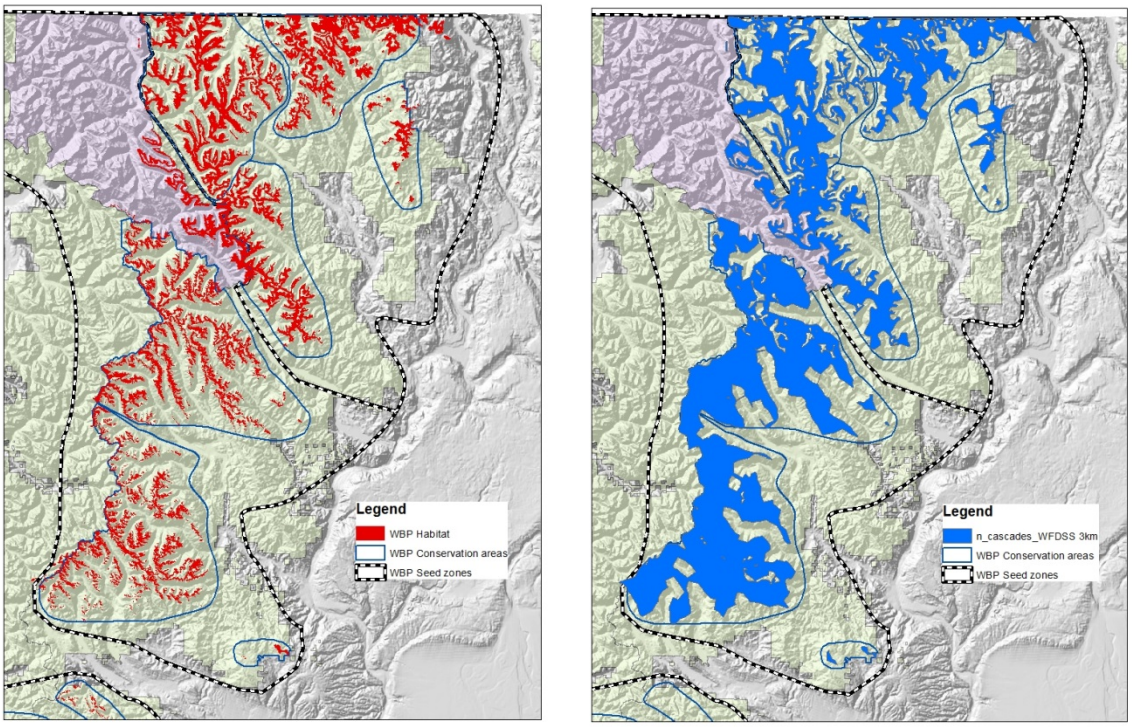
Andy Bower – Update on WBP restoration in Region 6, including the current status of seed collections, and potential funding sources for restoration projects.

In addition to the presentations listed above, two panel discussions were held, the first covered developing formats/templates for Biological Evaluations for NEPA project planning, and the second focused fire, including fire ecology and WBP, how can WBP be incorporated into pre-attack incident planning? how do we protect WBP during suppression activities as well as fire use to benefit WBP habitat?

The meeting concluded with a round-robin sharing of the status of WBP on each forest within the region, including work that has already been done, work that is needed, lessons learned, and what each forest sees as its priorities in the next 5-year planning cycle of the WBP restoration program.

Fire pre-attack planning

To aid in planning during wildfire suppression in high elevation areas, maps were developed for inclusion in WFDSS that show the extent of WBP on each of the forests in R6. These maps were developed from the regional WBP distribution shapefile and were saved on the T: drive as shapefiles so they are accessible to all personnel who may need them during pre-attack planning. These files can be found and accessed or downloaded here: T:\FS\NFS\Olympic\Program\Genetics\WBP\GIS\Data\ShapeFiles\WFDSS



Maps showing modelled WBP habitat (left) and WBP polygons for use in WFDSS (right)

Quartz Mountain (Pasayten Wilderness) Restoration Planting

Wildfires in 2002 burned approximately 11,000 acres in the Pasayten Wilderness on the Okanagan-Wenatchee NF, including 600 acres dominated by whitebark pine. Surveys in 2012 in the Quartz Mountain area found no natural regeneration of whitebark pine and a 4 acre area was identified for restoration work to plant whitebark pine seedlings. During 2013 planning was initiated for this project including a Minimum Requirement decision analysis and the preparation of an Environmental Assessment. Planting seedlings in a designated wilderness is unprecedented and a conflict arose between the Natural Resources (NR) Program direction to proceed with restoration in wilderness to preclude the species being listed under the endangered species act, and the Wilderness Act and the Forest Service Wilderness Program direction for minimal intervention and that restoration take place outside of wilderness areas first. Authority to approve this project rests on the Chief of the Forest Service and was delegated to the Regional Forester. After briefing of the Regional Forester and staff by both the NR and Wilderness staffs, (see Appendix C for briefing paper) the Regional Forester did not authorize this project. The NR and Wilderness programs are actively engaged in working together to find a mutually agreeable way to move forward with whitebark pine restoration in wilderness where appropriate. This will involve implementing the Evaluation Framework for Proposed Ecological Restoration in Wilderness developed by the Aldo Leopold Wilderness Research Institute.

A trail sign stands amongst the whitebark pines at the Mission Ridge ski area. Photo: A. Bower

APPENDIX A

Willamette NF Whitebark Pine Inventory Report: 2014

Prepared by: Jenny Lippert, Chris Wagner, Alice Smith and Molly Juillerat

The ISSSSP program helped fund an inventory effort on the Willamette National Forest in the summer of 2014 because whitebark pine had never been surveyed or mapped on the Forest. We were interested in distribution (were the trees in high probability habitat?), health of populations and whether there were any cones on trees because no cone collection has occurred on the Willamette NF. Richard Sniezko provided us with collection tubes for needles so teams also collected for this genetic study.

Three teams conducted inventory for whitebark pine in three wilderness areas in the summer of 2014.

The northern team composed of Chris Wagner, Mike Hicks and Mark Leis conducted inventories along the spine of the PCT and along strategic trails leading into the **Mt. Jefferson Wilderness.**

The adjacent maps show the modelled habitat in pink in map 2 and identified habitat in purple in map 3.


Photo 4. Ridge and knob showing massive die off and regeneration

The main observation we had was that there is very strong and healthy Whitebark pine regeneration. There were many areas that appear to have had a mass die off in the past but there appeared to be an equal growth of young trees approximately 2-10 years old. There were some strange looking trees that almost completely died in the past but had a few branches that survived and were growing healthy with no or very little sign of blister rust. We encountered only 2 trees with all yellowing needles and turning brown.


Photo 6


Photo 7


Photo 8

There was only one tree observed with active large spore blistering.

We also looked for signs of mountain pine beetle. We didn't see any signs in the live trees such as bored holes. The only thing we found was one tree on Park Butte ridge that was already dead, and the bark fallen off (see photos 6,7 & 8). Only one or two trees were observed with cones during surveys along the PCT.

The second Wilderness surveyed was the northern part of **Three Sister's Wilderness**. Alice Smith, Erick Larkin and Krista Farris were the surveyors. They hiked in to the Sister Spring area on the Obsidian Trailhead, off of highway 242. Whitebark pine was growing as low as 5800 feet in the lava flow that intercepts the trail. Mature trees at that elevation were barely alive and most of the 30 trees they saw were saplings. At Arrowhead Lake, most of the mature trees were

dead or dying but there were lots of trees in the 3-5" DBH that appeared healthy, and seedlings and saplings were prevalent. Blister rust was seen in this area. There was very little evidence of cone production.

The following day they hiked up toward Little Brother to 7500 feet. Here the stand is almost entirely composed of whitebark pine. Once again, most of the larger trees were dead, but there were quite a few cone producing "young adults" and lots of seedlings and saplings. Approximately 75% of the trees were alive. Evidence of both mountain pine beetle and blister rust were present.

Trends that we noted are:

1. It appeared that a wave of blister rust and mountain pine beetle had killed mature trees about 10-15 years ago and that the population is recovering. Although we saw evidence of both pests they appeared minor.

2. There is more cone production and purer stand at higher elevations.

3. Mountain hemlock is encroaching heavily at lower elevations (6000-7000 feet) in areas that had been non-forested. This could potentially change the fire regime in this area, which would further impact whitebark pine.

The third area surveyed was in **Diamond Peak Wilderness** and a few sites outside. Forest Health Protection staff led by Beth Willhite joined Molly Juillerat, Ryan Murdoff and the Botany survey crew for a backpack trip into Diamond Peak Wilderness to inventory and set up two monitoring transects using the regional protocol. There was evidence of blister rust on trees but many were still surviving (see picture below). They found a similar pattern here; many seedlings below the older diseased trees. No cones were documented during the survey.

Whitebark pine was confirmed on two other sites where it had been reported in the past: Fuji Mountain and Sawtooth Ridge, both outside of Wilderness.

APPENDIX B

Surveying the Gaps: Inventory of previously undocumented whitebark pine (*Pinus albicaulis* Engelm.) stands on the Methow Valley Ranger District

Fall colors paint a rocky opening in a whitebark pine stand on Old Baldy Mountain.

David Bowden
Okanogan-Wenatchee National Forest
October, 2014

Introduction:
Whitebark pine is a federal candidate species, currently listed as Endangered in Canada, whose decline from white pine blister rust, mountain pine beetle outbreaks, and unnatural fire regimes as well as its vulnerability to global climate change, puts it at risk for listing. Decline has been observed through much of its range since the 1980s (Shoal and Aubry 2004). Whitebark pine occurs in the subalpine and parkland zones of the northern Pacific Northwest Ecoregion, where it is most abundant along the Cascade Crest (USDA 2008). However, there is a lack of basic knowledge about presence, extent, and health in many areas of the North Cascades Ecoregion. This project focused on filling data gaps, addressing populations or potential habitat that had not been adequately surveyed or documented in the past.

The Methow Valley Ranger District possesses approximately 106,000 acres of suitable habitat for whitebark pine. Habitat within wilderness accounts for 76,000 of these acres. Our portion of this study focused entirely on "front-country" whitebark pine habitat. Many of our front-country whitebark pine populations occupy areas affected by management and recreational activities such as grazing, snowmobiling and dispersed camping, but have not been properly documented and evaluated as required.

Whitebark seedlings struggle to regain a foothold in an old log-deck helispot on top of Granite Mountain.

Objectives:
This study sought to assess and document the presence, condition, and health of whitebark stands in the lesser-known portions of the Methow Valley Ranger District. Data was collected on overall distribution, abundance, mortality, pathogen presence, infection severity, and discernable population trends. Beyond simply documenting stand conditions, this project sought to bring to light any management needs, concerns or opportunities to contribute to the greater effort of whitebark pine conservation.

Surveyors David Thompson and Dori Blackburn compare notes as they document the stand below them.

Methods:
Survey sites were determined during pre-field analysis, using any available existing data. Site probability models have been developed both locally and regionally to identify sites in which whitebark pine is most likely to occur. These models generally focus on areas between 6500 and 7500 feet in elevation, and on southerly aspects. These are the parameters used in this project to identify "ideal" habitat, with the recognition that actual suitable habitat on the district can range from 5000 to 8000 feet in elevation on any aspect. Habitat was modelled on GIS and sites were chosen based on three main criteria:

- Lack of data: Sites containing suitable habitat, but for which little to no data existed on the presence or condition of whitebark pine stands, were given a preference.
- Public use or active management: Sites containing suitable habitat which were likely to be affected by public use or Forest Service management activities were also given a preference.
- Fringe sites: Sites that contained marginal amounts of suitable habitat but, because of their geographic position or topographic features could contain undocumented populations of whitebark pine were given some preference.

These criteria resulted in a list of sixteen sites, during preliminary planning. Further analysis of existing data, and consultation with local experts narrowed the list down to thirteen sites, with priority given to six of those.

The protocol for this project was developed by combining regional TES protocols with those developed by regional geneticists specifically for analyzing whitebark pine stand conditions and

cone crops. It was a flexible protocol, based on the conditions found at a given site, consisting of four levels of data collection:

- Presence – general documentation: This level of data collection tiered to regional TES protocols by determining the presence or absence of whitebark pine at a site, mapping its overall distribution, determining overall abundance and noting associated species. In addition, a whitebark pine belt transect cover sheet would be filled out, noting levels of blister rust infection and stand structure. This level of documentation would be carried out for every whitebark pine population located.
- Cone crop documentation: Data on cone crops would only be collected if a suitable number of cones were found in the stand to warrant collection. In order for this to be the case, the stand would need to contain ten or more trees with thirty or more second-year cones per tree. In this case, a Region 6 Cone Crop Survey form would be filled out, following regional protocol.
- Stand structure mapping: Data would be collected on overall cover and proportional species abundance across the documented portions of the population, and expressed in map form. This level of documentation would not be required in cases where whitebark pines are found only in small patches or where the complexity of the distribution of whitebark pines across the landscape make this process impractical.

  Table 1: Cover class and whitebark proportion classes used to characterize population elements. For example, a pure whitebark stand with an overall cover of 30% would be classified C6.

Cover – All Species	Code	Proportion of Overstory – Whitebark	Code
<1%	A	<1%	1
1-15%	B	1-15%	2
15.1-35%	C	15.1-35%	3
35.1-50%	D	35.1-50%	4
50.1-80%	E	50.1-80%	5
>80%	F	>80%	6

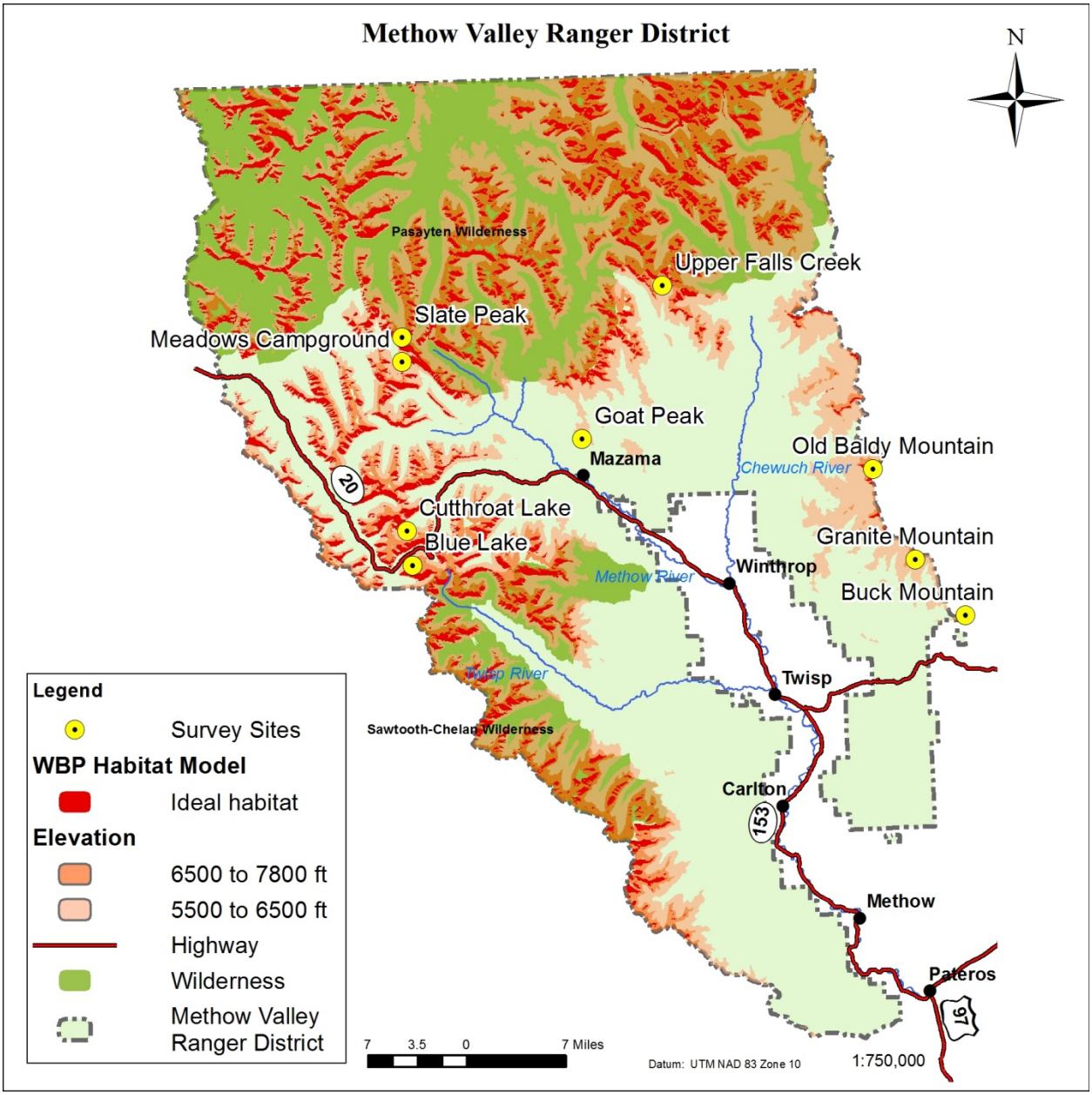
- Whitebark Pine Belt Transect: If a stand was large enough, and particularly if there was evidence of blister rust resistance, a transect would be installed and recorded, following regional protocol. This step would be optional – left to the surveyors discretion.

Pre-field work consisted of mapping the areas to be surveyed, determining the most effective approach, and using aerial imagery to identify any particular areas of interest. Weather and unforeseen factors largely dictated the logistics of which sites were visited, and in what order.

Four Forest Service employees and one contractor worked on the project between July and October, 2014. Some sites were accessible by vehicle, but most required hiking access on or off

trail. Data was collected via GPS, camera, and field data forms. Accessible stands that fell within surveyors travel routes were documented, at a minimum, on belt transect cover sheets. The typical approach taken during surveys was to hike to a peak or dominant ridgeline and use binoculars to survey areas that would not be visited on foot. Typically stand mapping was performed from these vantage points as well. Stands surveyed by binocular could only be documented at a very basic level. Areas of particular interest, containing stands with at least 50% whitebark pine, were documented via whitebark pine belt transect, following regional protocol. Transects were not monumented using tree tags.

Figure 1: Map of the Methow Valley Ranger District showing habitat distribution and locations of survey areas.



Results:

Between the months of July and October, 2014, surveyors visited nine sites, conducting pedestrian surveys of approximately 1,300 acres of whitebark pine habitat, and binocular surveys on an approximate additional 5,200 acres. These surveys documented whitebark pine populations occupying approximately 4,900 acres. The sites visited were: Upper Falls Creek, Slate Peak, Meadows Campground, Cutthroat Lake, Blue Lake, Goat Peak, Buck Mountain, Granite Mountain, and Old Baldy Mountain.

Upper Falls Creek (Barney Fire):
This area contains one of the more diverse and fascinating ecosystems on the Methow Valley Ranger District. The upper reaches of Falls Creek contain a stringer of rich fens, which were the subject of a four year ISSSSP-funded study from 2009 to 2012, assessing the effects of grazing in these sensitive wetlands. Another ISSSSP funded study, conducted by Rick Dewey in 2013, analyzed these fens as well. The fens are home to many rare and uncommon species, including the R6 Sensitive Carex gynocrates. Whitebark pine also occurs along the periphery of these fens, as it is known to occasionally do at mid-to-high elevations. While whitebark had been documented near the fens, up until 2012 nothing was known about whitebark populations on slopes and peaks around the headwaters of Falls Creek.

Before 2012, upper Falls Creek was in an active grazing pasture. It has since been fenced off and removed as pasture; however, the fence is frequently damaged by falling trees and cows are known to get into the area still. The Falls Creek trail is a lesser-known but nevertheless popular trail primarily used by hikers and horsemen. The trail follows Falls Creek north up the west fork, reaches the summit of Burch Mountain at the head of the west fork, then loops southward along the Eightmile Ridge and reconnects with the main trail near the trailhead.

In 2012, the misnamed Barney Fire burned 45 acres on the ridgeline between the east and west fork of upper Falls Creek, about one mile to the west of the actual Mount Barney. At that time, resource advisors - including this author - visited the fire and noted the presence of large stands of whitebark pine. By the time resource advisors arrived, many whitebark pines had been cut down in order to clear helispots, hand-line, and drop points. Much of the cutting may have been necessary, but some certainly could have been avoided or mitigated had natural resources staff responded more quickly. The damage done illustrated a need for a proactive approach to whitebark awareness in fire suppression activities, such as including recommendations in the Wildland Fire Decision Support System. On a local level, this incident demonstrated a need for better and more thorough data regarding whitebark stands on the district, in order to allow resource specialists to respond more rapidly to concerns during fires or other incidents.

2014 surveys revisited the Barney Fire with the intent of documenting stand conditions inside and outside the burn, and any natural regeneration that may be occurring. A whitebark pine belt transect was installed just inside the northern fire perimeter, on the ridgeline. From this

ridgeline, the surrounding mountain slopes were surveyed via binocular. After leaving the Barney Fire area, surveyors proceeded north, up the west fork of Falls Creek to its headwaters. After camping for the night, surveyors proceeded west onto the Eightmile ridgeline, just south of Burch Mountain, and worked southward surveying along the ridgeline, then returning to the trailhead.

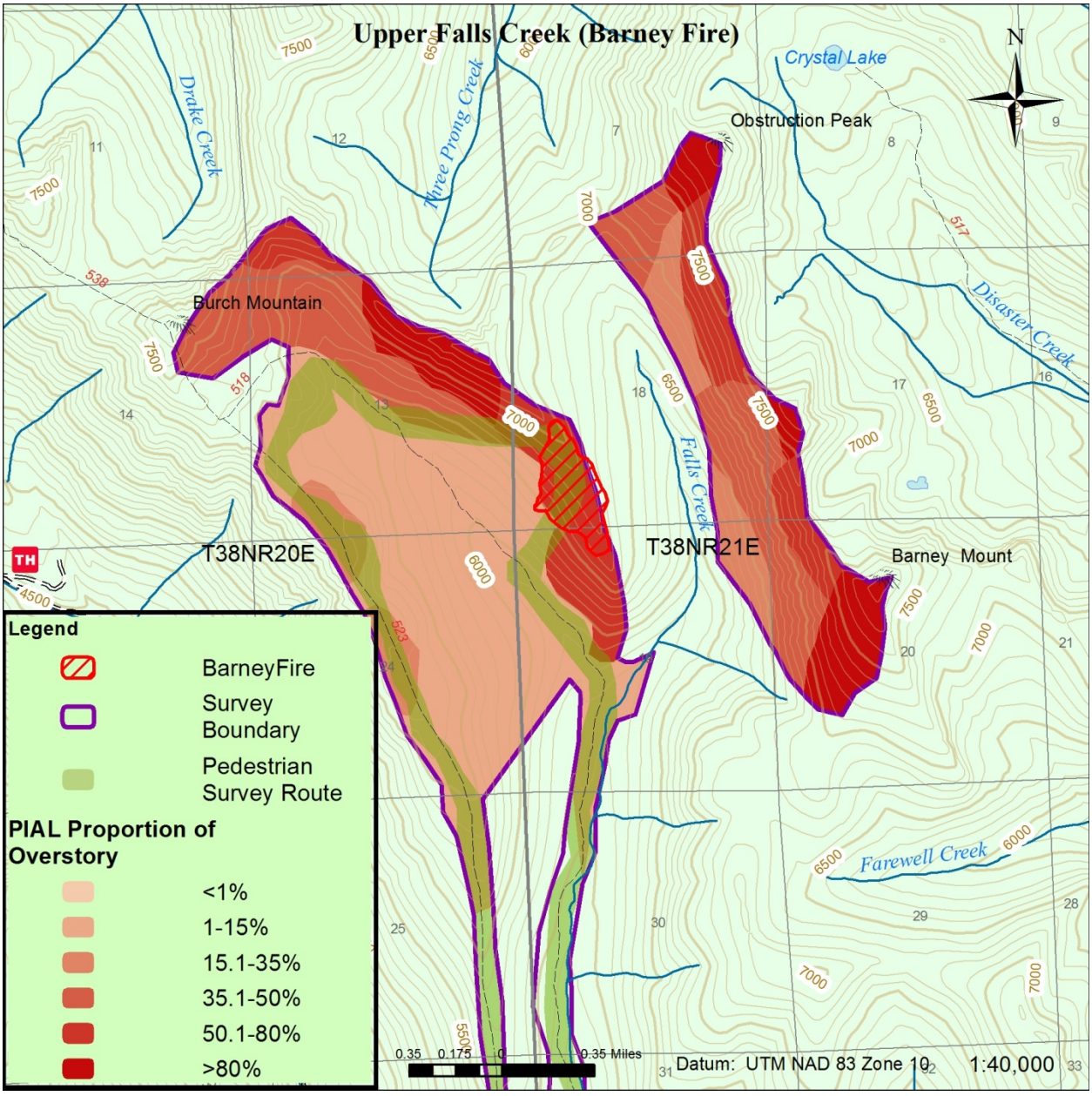
Looking east toward the 2012 Barney Fire. A fen used as a helispot during the fire can be seen in the drainage bottom.

Surveyors began seeing whitebark pine as low as 5500 feet in elevation, along the trail just north of the east-west fork in the creek, on a small ridge that feeds into the larger ridge where the Barney Fire occurred. whitebark pine trees in this habitat were tall and thin, likely due to competition with lodgepole pine and Engelmann Spruce, which they were intermixed with. Whitebark pine regeneration was noted to be relatively high in this area. White pine blister rust was found actively sporulating on many trees throughout this area. The trees were sparsely, but regularly dotted throughout the forest from this point until surveyors began to climb the main ridgeline, at around 6200-6300 ft in elevation on a southwest aspect. As noted before, in the lower elevations whitebark pines were found more commonly around fens or wetlands, which are interspersed along the length of upper Falls Creek.

Before proceeding northeast, up the slope toward the Barney Fire, surveyors stopped at the fen that had been used as a helispot and noted the progress of rehabilitation work, as well as conducted binocular surveys of the opposing (northeast) face of the canyon. Rehabilitation work

was noted to be more or less achieving the desired effect. The opposing slope was noted to contain whitebark intermixed with Engelmann spruce, lodgepole pine, and subalpine larch. The whitebark pine appeared to comprise about 10% of the total tree cover on this slope. Many very large, healthy looking trees were noted.

Figure 2: Map of Upper Falls Creek survey area and survey results



From the valley bottom, surveyors proceeded northeast up the slope of the middle ridge toward the Barney Fire. At about 6400 feet in elevation, near the base of the fire, whitebark began to be the dominant tree in the overstory, with subalpine fir and englemann spruce giving way. The fire itself was of mixed severity. Some portions burned extremely hot, and in these areas all trees and understory vegetation are still completely gone. However, in the portions that burned less

severely, large robust whitebark pines are charred but living, and even young saplings have survived.

Surveyors installed a belt transect at the northern interior edge of the fire, on the crest of the ridgeline. The transect was placed in a mixed severity portion of the burn. Data collected from this transect seems to indicate several noteworthy processes taking place in the stand. Of the dead trees enountered, the majority had been killed by fire; however, most of the remaining mortalities had been caused by mountain pine beetle within the past two years. This indicates that the fire weakened these trees, allowing the beetles to finish them off. Blister rust was found actively sporulating throughout this area, and infection seemed ubiquitous throughout the stand. Blister rust could not be named as the cause of any mortality along the transect, but this could simply be due to the fire covering up the evidence of blister rust mortality. Rust infection rates along the transect accurately reflected overall infection rates in the greater area surveyed. One in seven trees showed active sporulation or cankering, while the remaining all had evidence of previous infection and cankering. It should be noted that this transect was not monumented with metal tags. A small rock cairn was built, GPS coordinates were taken, and transect pictures were taken.

From the middle ridgeline, surveyors were able to look east with binoculars at the east slope of the east fork of Falls Creek proceeding up towards Barney Mountain and Obstruction Peak. Large stands of whitebark were noted along the entire hillside, from approximately mid-slope to the top of the ridgeline. A particularly large and seemingly pure stand was noted just southwest of the peak of Barney Mountain. Stand compositions and whitebark abundance were estimated based on binocular survey, and mapped.

Leaving the Barney fire, surveyors made their way northwest, cross slop and down toward the headwaters of the west fork of Falls Creek. En route they encountered and documented robust and nearly pure populations of whitebark pine growing along the eastern slopes of the ridge, above 6500 feet. Proceeding down into the valley, surveyors camped in a large meadow at the headwaters of Falls Creek. The drainage bottom was heavily populated with decadent spruce, laden their entire heights with mats of horsehair lichen. This creates extremely hazardous fire fuel conditions. Whitebark pine certainly occurs, in patches, throughout the upper portion of the drainage bottom, but the dominant species by far was spruce. From this location, surveyors

worked westward to the top of the ridgeline dividing the Eightmile Creek and Falls Creek drainages.

Surveying southward along the Eightmile ridgeline, surveyors were able to not only document their immediate surroundings, but also perform binocular surveys. This ridgeline is extremely rocky, and harbors some of the largest and most extreme specimens of whitebark pine this author has seen (an example is shown at the beginning of this section). One specimen in particular set the local District record - so far - for whitebark pine dbh at 81cm. Unfortunately, these stands, like those across the drainage, are severely infected with white pine blister rust. Mountain pine beetle attacks seem less severe here, possibly due to lower stand density and purity. Many dead giant whitebark can be found along this ridgeline and many more look like they will follow soon. Recruitment of young trees does seem to be occuring, but there is a distinct lack of middle-aged trees.

Whitebark pine extends surprisingly far down this ridgeline to the south. As the overstory shifts from firs to lodgepole, the whitebark pine and Englemann spruce stay consistent. Finally even the spruce peters out and is replaced by Douglas-fir, and yet whitebark pine can still be found occasionally, disguising itself as a lodgepole. Finally, at about 5500 feet in elevation, no more whitebark can be found on this ridgeline.

Approximately one month after surveys were conducted in the Upper Falls Creek area, a fire started on the southwest flanks of Barney Mountain. This fire proceeded to consume more than 8000 acres, including the entirety of the area walked by surveyors for this

project. Some large whitebark stands, such as the one observed southwest of Barney Mountain's summit, escaped the fire, while others may have survived simply due to low fire intensity. A burn severity map reveals, though, that large swaths of the area burned incredibly hot and fast - likely due to the decadent spruce that was observed during surveys. As could be anticipated, the Barney Fire area, where the transect was installed, burned very lightly, and the fire did not proceed much further north up the ridge beyond it.

Slate Peak

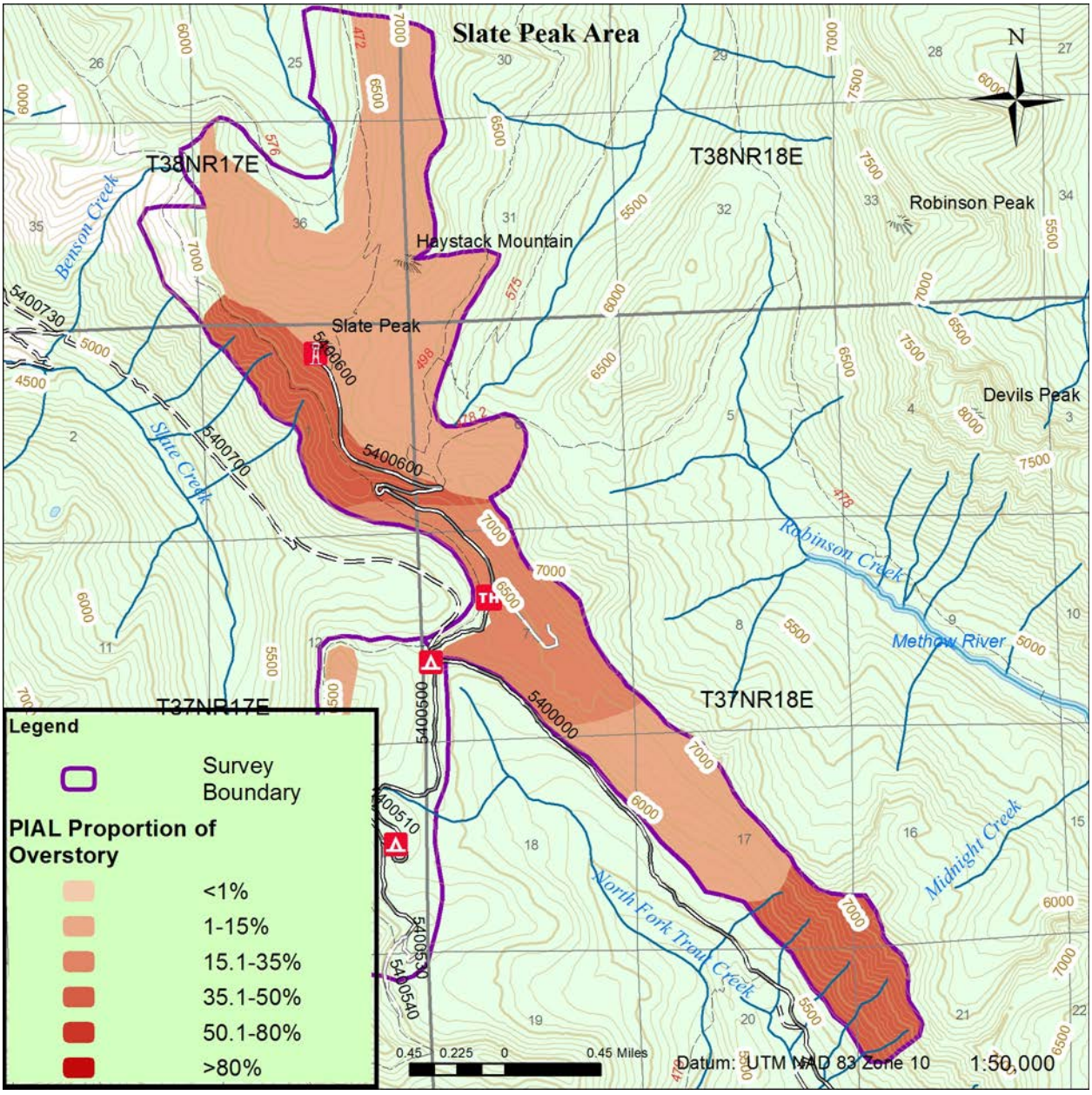
At 7440 feet in elevation, Slate Peak is the highest point in Washington State that is accessible by car. This, along with two nearby Pacific Crest Trail trailheads, a campground, and general grandiose beauty makes it an incredibly popular, and busy place.

Right: View from Slate Peak looking southeast toward Harts Pass.

This area receives heavy use by backpackers, stock outfitters, campers, snowmobilers, and backcountry skiers. The Forest Service has been forced to develop increasingly large areas as parking lots and stock camps in order to facilitate these uses and manage their impacts to the environment. Whitebark pine, historically, has been known to occur in the areas surrounding Slate Peak, but few details as to its extent and stand structure were known. Cone surveys were performed in the area in 2008 and 2009, so some data existed, but it was mostly north of the peak, in the wilderness.

Surveys were conducted by walking portions of the Pacific Crest Trail, Slate Ridge, and the Harts Pass (54) Road. Binocular surveys were performed from Slate Peak, and Slate Ridge. Whitebark pine presence throughout the area ranges from 1-2% to as much as 45-50% of the overall overstory. Blister rust was found to be present in all portions of the area visited on foot, however no active cankering was found. Other tree species occuring in the area are subalpine fir, subalpine larch, lodgepole pine, and Englemann spruce. The area was mapped, with zones divided by apparent changes in overstory composition. For each zone, the proportions of each species in the overstory were recorded

Figure 3: Map of Slate Peak survey area and survey results.

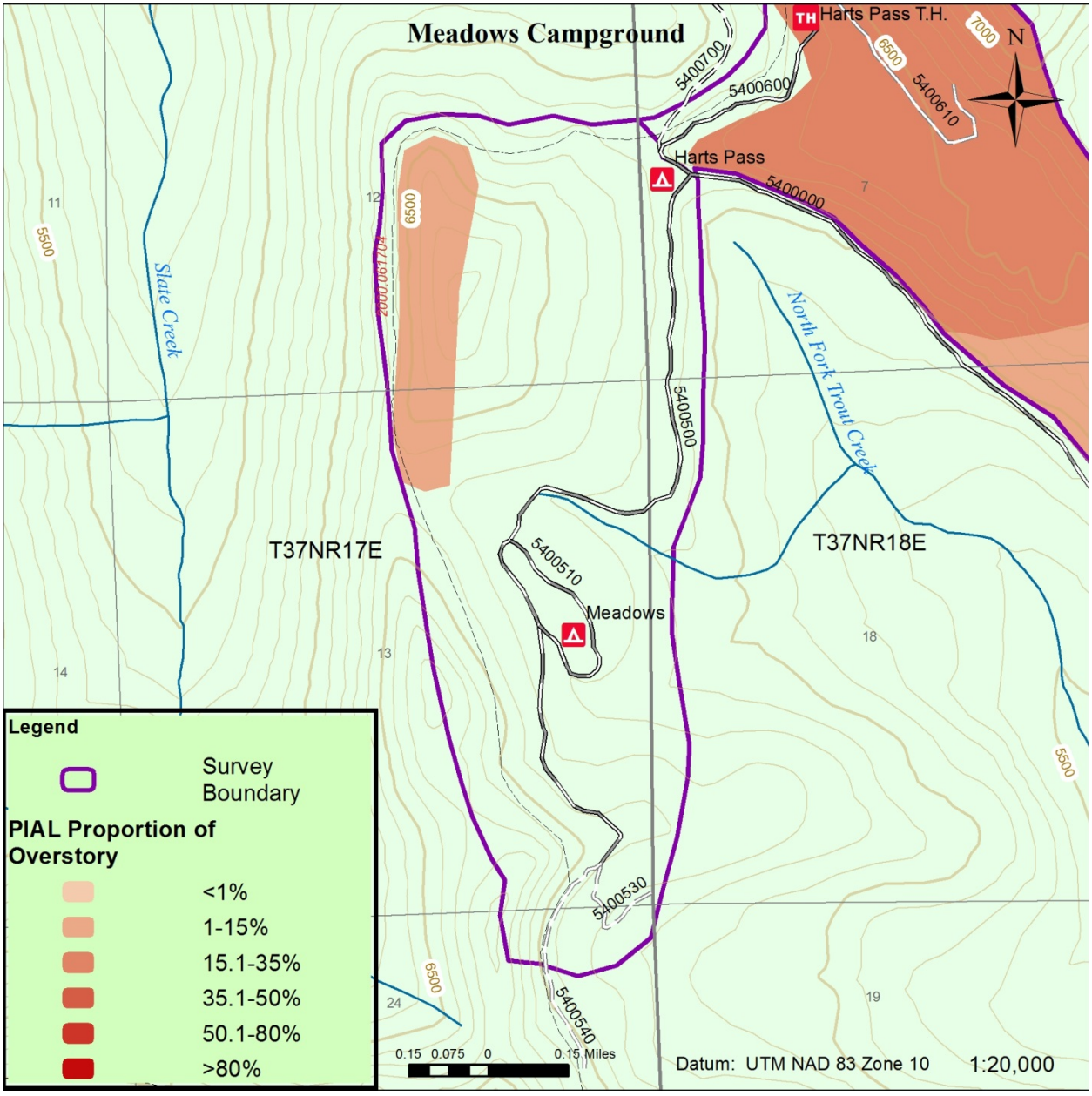


Meadows Campground

This area is in close proximity toSlate Peak and Harts Pass recreational areas. It is a popular campground and snowmobile park, as well as an access point for the Pacific Crest Trail. Due to high visitation rates, and concern over the impacts of snowmobiling activities on young whitebark, this area was identified as a survey need.

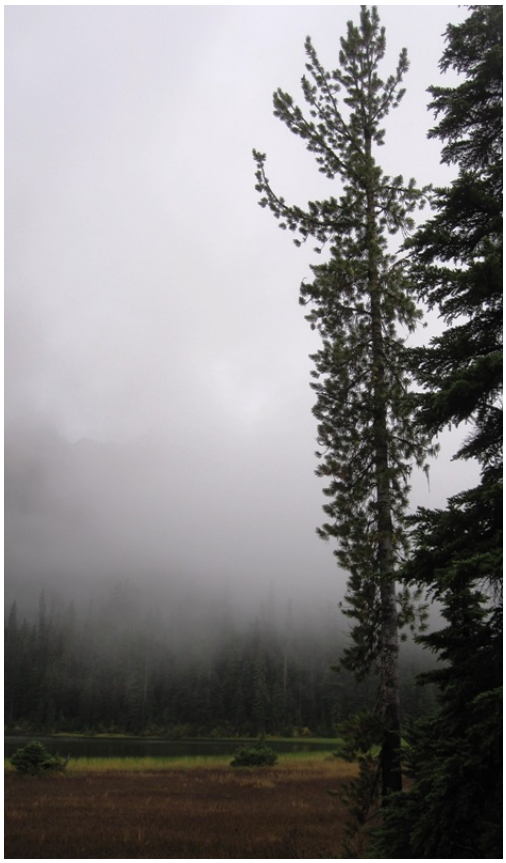
Surveys were conducted in this area by walking the immediate and surrounding areas around the campground, as well as the portion of the Pacific Crest Trail occuring nearby. Surveys did not locate any whitebark pine at or near the campground; however, an area to the northwest of the campground, near the Pacific Crest Trail, was identified as containing a small contingent of whitebark pine.

Figure 4: Map of Meadows Campground survey area and survey results.



Cutthroat Lake

This area is a popular hiking and mountain biking destination along the Highway 20 corridor, near Washington Pass. The lake occurs at the head of a broad glacial valley. Hikers can link into the Pacific Crest Trail from this point, by continuing on the established trail to the northwest. This location has been identified as an area of concern due to the impacts of high amounts of foot and bicycle traffic off of established trails. It is currently one of several areas that have received funding to undergo restoration activities to mitigate or rehabilitate these impacts. Little was known about whitebark pine stands in this area, though pre-field analyses indicated that the slopes surrounding the lake would be suitable habitat.



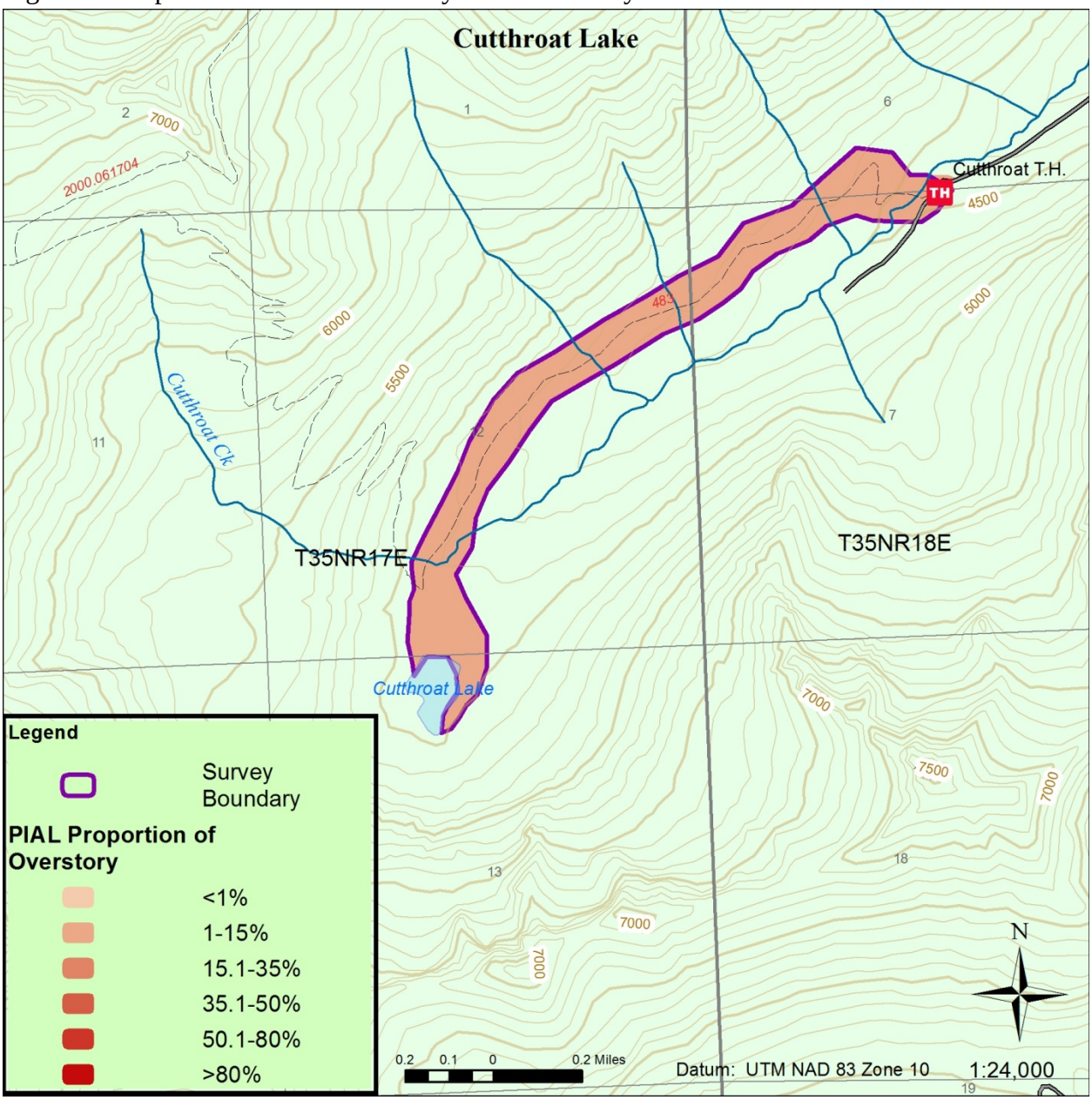
Surveys were performed at this location by walking the trail from the trailhead to the lake, then following the user-made trails near and around the lake. Originally, surveys were intended to consist of binocular surveys and walking the trail toward the Pacific Crest Trail, however weather and logistics conspired to limit the extent and efficacy of this survey.

Left: Whitebark pine supports a popular perch on a user-made trail overlooking Cutthroat Lake.

However constrained in scope, the results of this survey were surprising and more than a little intriguing. Whitebark pine was found to be growing at the trailhead, at 4,450 feet in elevation. From here, proceeding southwest along the trail, a few whitebark pine individuals were seen sporadically for a quarter mile or so before becoming a regular site every fifty feet or so, at an elevation of 4,600 feet. The lake itself occurs at just below 5000 feet, but has an ample supply of relatively healthy, if a bit spindly, whitebark pine in its vicinity. The total proportion of whitebark in the overstory is never much more than 5-10%, but it is ubiquitous throughout the area surveyed. Blister rust is

present in this population. Flagging is abundant in the population, though no active blister rust cankers were observed. No alternate hosts for blister rust were found in the area. Another very interesting aspect of this area is that Western white pine is present in the highest concentrations of any location this author has documented on the Methow Valley Ranger District, accounting for up to 10% of the overstory in portions of the surveyed area. Growth form of whitebark individuals in this area is typically tall with a narrow crown, as seen above.

Figure 5: Map of Cutthroat Lake survey area and survey results.

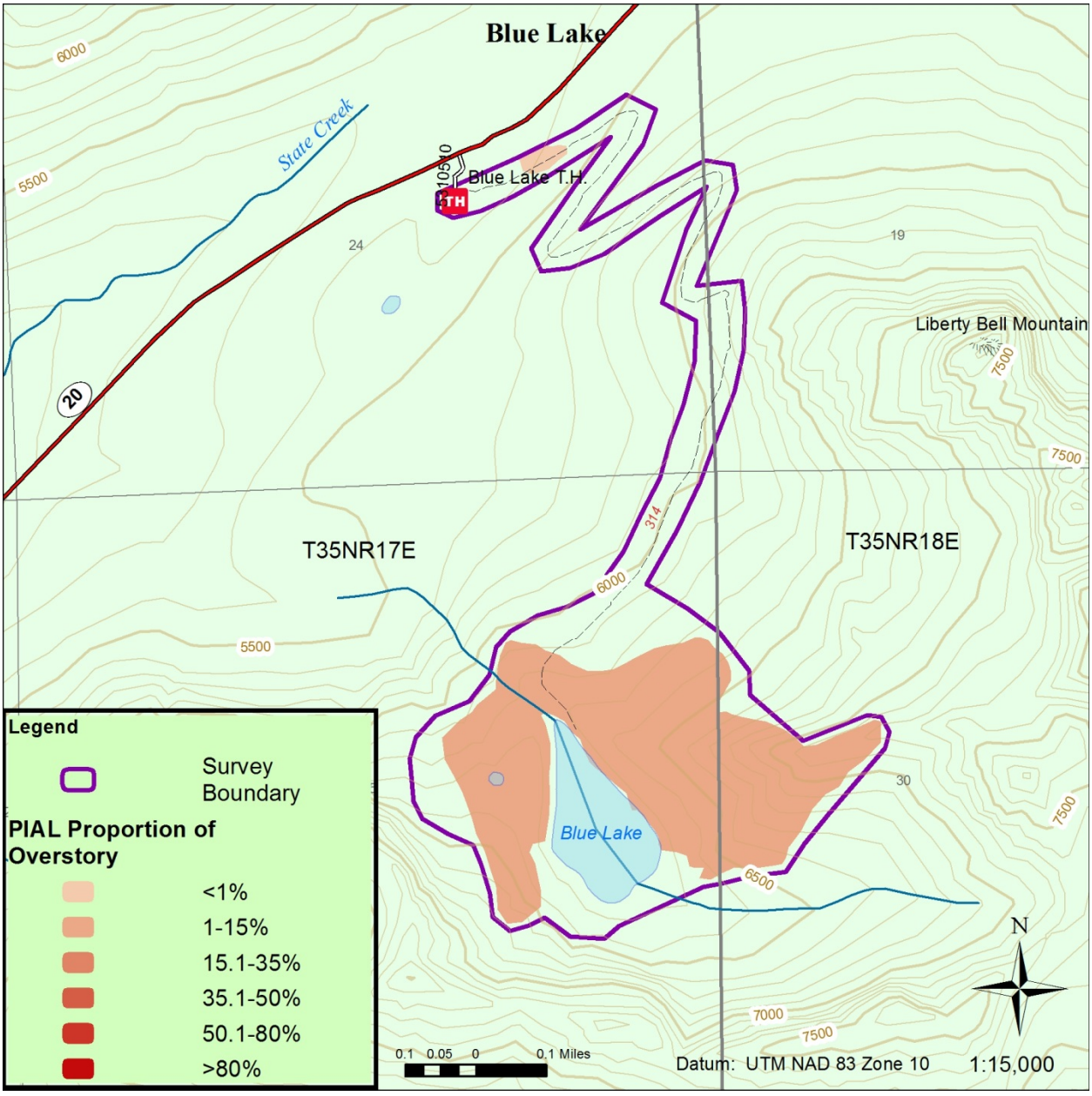


Blue Lake

This area receives more pedestrian traffic than nearly any other trail system in the North Cascades. Just during the Summer of 2014, visitation rates exceeded 10,000 persons at this site. For casual visitors, it is a pleasant and relatively short hike up into a glacial cirque containing a small but beautiful mountain lake surrounded on three sides by towering headwalls sparsely populated by larch, spruce, subalpine fir, and whitebark pine. For climbers, it is an access route to some of the most enjoyable and widely recognized climbing routes in the area, the Early Winters Spires. Concern has been raised, however, over the impacts that visitors unwittingly incur on the environment around the lake when they choose to leave the established trail system. A tangled network of user-made trails has emerged over the years, baring large amounts of soil and contributing to erosion. These trails are now the subject of proposed restoration activities. Whitebark pine was known, anecdotally, to occur in the area, but had not been documented in any official capacity. It was deemed important to gain an understanding of the prevalence, distribution, and condition of whitebark pine in the area.

Whitebark pine was located near the trailhead, adjacent to a small wetland that occurs just south of the trail, near a dispersed camping area approximately 100 meters east of the trailhead. Only a couple of whitebark occur here, with none found in the surrounding forest which is dominated by Englemann spruce, mountain hemlock, and ??? fir. No more whitebark pine was seen along the trail until nearly reaching the lake. As a hiker makes the final approach to the outlet of Blue Lake, whitebark pines can be seen in the surrounding forest. Surveys of the area found that, while whitebark pine is scattered sporadically throughout the cirque containing Blue Lake, there is nothing that could be considered a stand of whitebark in the area.

Figure 6: Map of Blue Lake survey area and survey results



Overall, throughout the Blue Lake cirque and surrounding area, whitebark pine comprises about 1 to 2 % of the overall overstory. The majority of individuals located near the lake were large older trees in the range of 15 to 25 inches dbh. Some younger recruitment of whitebark pine was noted near the lake as well, but these accounted for less than 20% of the individuals located. east of the lake, a ridge proceeds east toward the ridgeline containing the Early Winters Spires. Whitebark located on this ridge, and its north face were of a more evenly mixed age and dbh range. Many saplings and young trees were seen, as well as older trees like those seen near the lake. It was noted as unusual that the younger whitebark pines on this ridgeline and north slope grow sub-dominantly in clusters with Englemann spruce, mountain hemlock, or subalpine fir.

This seems to be the reverse of the common understanding that whitebark pine will colonize and provide nurse habitat for other tree species.

The presence of blister rust was evident in the area. Flagging was noted in all age classes, though primarily in very young or mature trees. Recently-active blister rust cankers were located on a young tree northwest of the lake. Many middle-aged trees seemed to be in good health, showing much less sign of blister rust. Dead branches and twisted boles indicate a tough existence, but large standing dead whitebark pines were not abundant in the area.

Right: A young whitebark pine growing inside the dripline of a large mountain hemlock. Below: Spore casings remaining on a young whitebark pine near the lake.

Goat Peak

This site is a very popular day hike destination, though the remoteness of the trailhead results in lower visitation rates than sites such as Blue Lake and Cutthroat Lake. This mountain's summit houses the Goat Peak lookout, one of two remaining staffed lookouts on the district. This site is of interest, not just because of the potential for recreational and management impacts. Geographically, Goat Peak is located on the very southern edge of a somewhat disconnected central range of habitat on the district (refer to Figure 9).

Surveyors accessed the site from the Goat Peak Trailhead, and began to see whitebark pines scattered occasionally along the ridgeline within a quarter of a mile. After a half mile, the trail enters an opening on a wide bench north of Goat Peak. While this area is predominantly populated by Douglas-fir and lodgepole pine, whitebark pine is found commonly along the edges of openings and in clumps inside the opening. Many whitebark pines in this area were showing signs of rust infection, such as flagging or dead limbs. Many more have already succumbed and are left as standing dead.

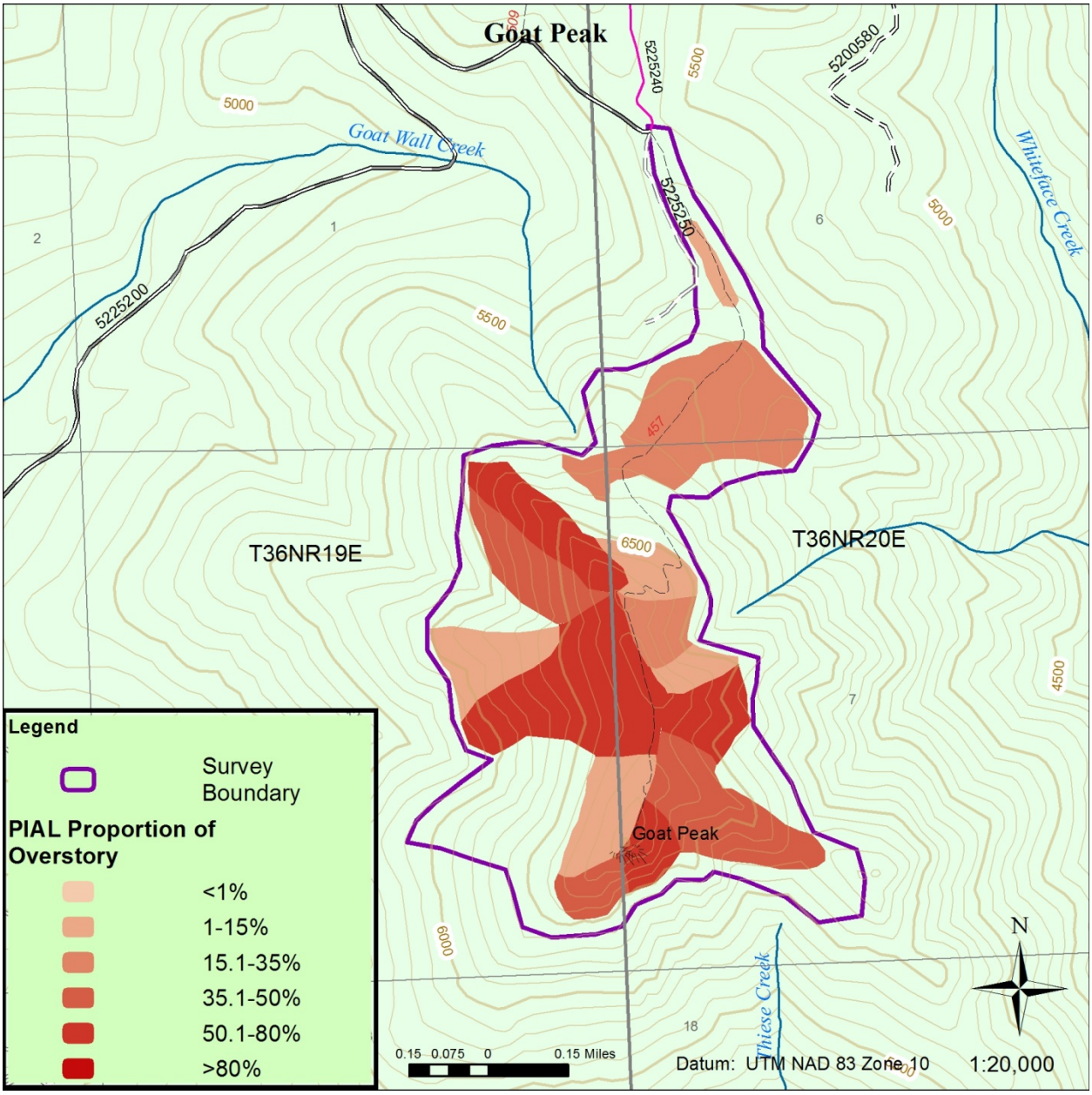
Many standing dead whitebark pine occur in and around a large clearing along the trail north of Goat Peak.

Leaving the opening, the trail progresses up the steep north face, which is forested primarily by subalpine fir, lodgepole pine, and subalpine larch. Whitebark pine on this face is scarce until one nears the top of the ridgeline. A fairly pure stand was located on the southwest side of the middle portion of the main ridge north of the peak, and a belt transect was installed here. One active canker was located, while every other whitebark pine, including saplings, along the transect had at least one inactive canker. Little evidence of mountain pine beetle attack or infestation was found along the transect. Overall the stand at this location appeared wind-torn and decadent. Subalpine fir and lodgepole pine appear to be colonizing the site.

Figure 7: Belt transect location on Goat Peak.

Figure 8: View of the Goat Peak lookout from the main ridge, near the belt transect.

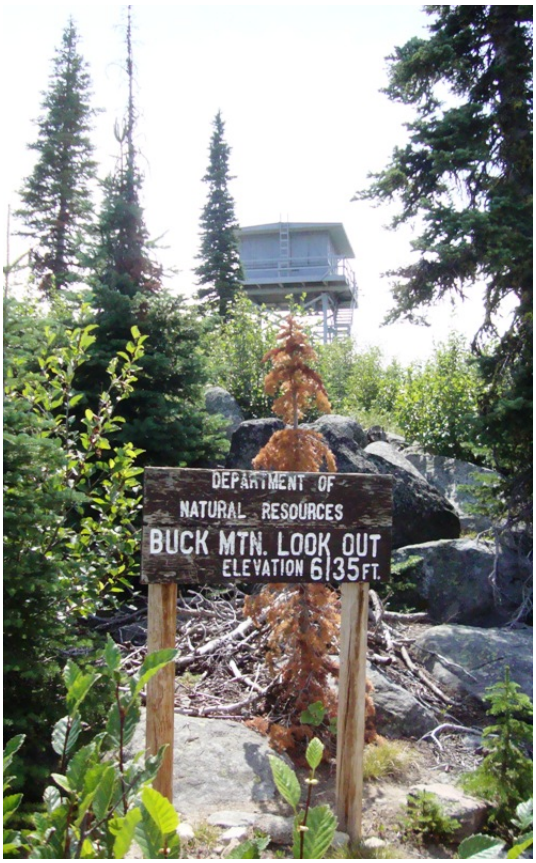
Figure 9: Map of Goat Peak survey area and survey results.



Whitebark pines off of the main ridge appear to be fairing better than those directly on top. As shown in the map above, whitebark pines were more prevalent on the southern aspects, with the exception of the far ridgeline running northwest off the peak. The largest and healthiest appearing individuals seen during these surveys were actually on this northeast ridgeline. Whitebark pines near the lookout were typically small, growing sparsely and spread out. The habitat near the lookout is very rocky and cliffy. From the peak and dominant ridgelines, surveyors were able to conduct binocular surveys.

Buck Mountain

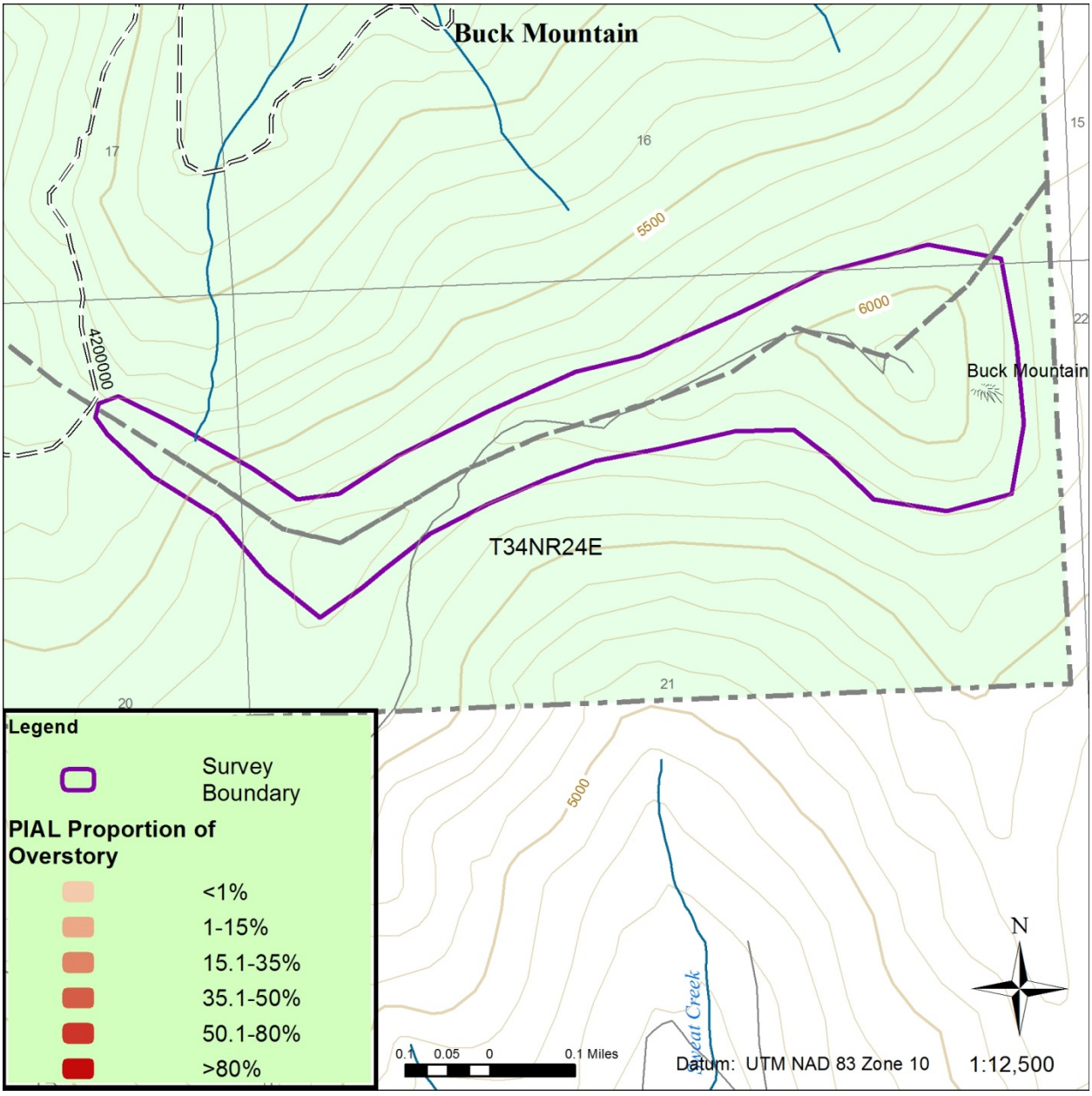
This area was identified as marginal, but possibly suitable habitat. One of the intentions of this study was to identify our furthest outlying whitebark pine populations or individuals, as they would potentially be at the most risk in the face of climate change and wildfire. This site occurs on the very edge of the Methow Valley Ranger District, bordering up on the Washington Department of Natural Resources land. Habitat models did not show this area as being suitable habitat; however, prefield analysis showed this to be the southern tip of a chain of peaks and ridges that contained large areas of suitable habitat and contiguous marginal habitat. For this reason, Buck Mountain was kept as a potential survey site that could easily be surveyed by one person in one day.



Surveys were performed in this area by foot access from the FS 4200 road northeast of Loup Loup summit. The surveyor accessed and walked the ridgeline eastward to the summit of Buck Mountain, and then proceeded to survey the southern aspect below the summit. No whitebark pine was located at the site.

Lodgepole pines stand watch on Buck Mountain as the 2014 Carlton Complex smolders in the distance.

Figure 10: Map of Buck Mountain survey area and survey results



Granite Mountain

This mountain occurs on the southern end of a string of mountains and ridges on the eastern border of the Methow Valley Ranger District. It is the southernmost area identified by habitat models as containing high quality habitat for whitebark pine. This study gave priority to sites on the fringes of known habitat, as those areas may be at the most risk from threats such as wildfire and climate change. Indeed, this mountain seems to have already had its fair share of one, if not both of those threats. In 2006, the Tripod Fire swept over this mountain, killing nearly everything in its path. As the second largest wildfire in Washington state history, it left a mark that will be seen for centuries to come. Having never seen the mountain up close before, surveyors weren't sure what to expect. Only two records of whitebark in the area existed, and they both pre-dated the fire.

Surveys of this mountain took place over two days. On the first day, surveys began at the base of the southwest ridgeline, where it meets the 4235-100 road. Surveyors hiked north onto the ridgeline and followed it, curving northeast toward the summit. Near the road, the burn severity is low, and upon accessing the top of the ridge, a small patch of young whitebark pine was quickly located. As surveyors proceeded north from this patch, however, they entered the higher severity portion of the burn. From this point, near 6000 feet elevation to approximately 6600 feet, the only whitebark pine located was tucked away in cracks and crevices in large rock formations, where it had survived the fire. These survivors ranged in age from very young to middle-age, not exceeding 10" dbh. Little-to-no evidence of blister rust was seen in these sparse patches of

whitebark pine. Lodgepole pine regeneration was abundant throughout much of the burned area along this ridge, while whitebark pine regeneration was extremely limited.

When surveyors reached approximately 6600 feet in elevation on the ridgeline, whitebark pine began to become more abundant, and they were able to use binoculars to assess stands on the southern face of the mountain. These stands, such as the one seen in the picture at the beginning of this section, were in mixed-severity portions of the burn, and the amount of standing dead individuals was extremely high. Little to no flagging was observed, but trees appeared contorted and spindly with relatively poor crown vigor.

Looking northeast, toward a false summit on Granite Mountain. The surviving trees mingle with the dead.

From this point, surveyors proceeded to the false-summit southwest of the main summit, and documented the whitebark pine in that area. Trees around the false summit fared better than those on the slope, in part due to large rock outcroppings that provided shelter. Individuals growing in the cracks of those rocks are larger and more robust than those pictured above. Many trees have tops, but the surveyors felt this was more likely due to climate than infection. From this point, surveyors worked southeast, skirting the southern face of the slope and proceeding a short distance down the southeastern ridgeline before cutting back southwest and downhill into the drainage to the road, to end the first day of surveys.

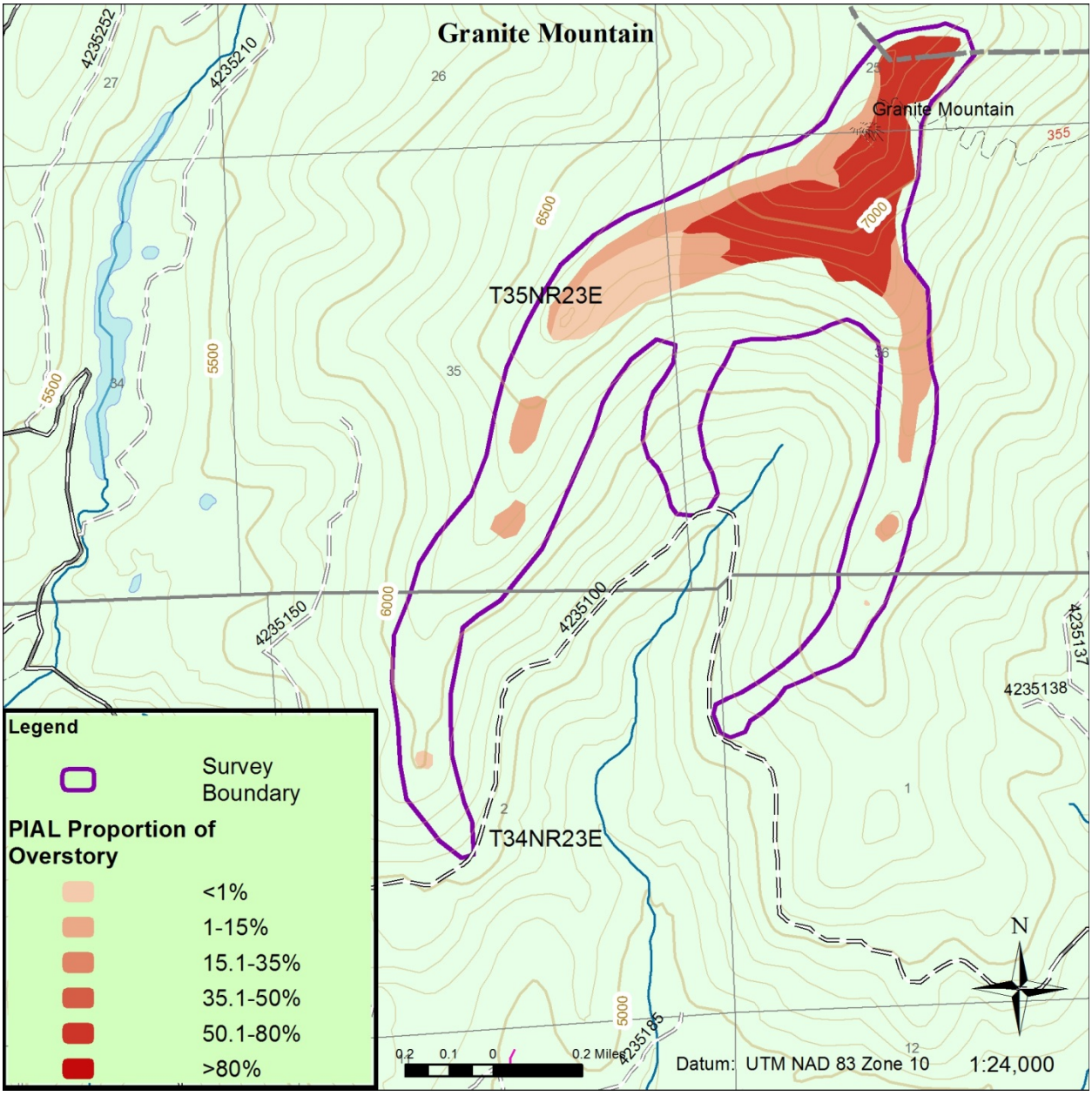
The second day of surveys began at the tip of the southeastern ridgeline, where it intersects the 4235-100 road. Surveyors worked northward up this ridgeline, and soon began to find small isolated patches of whitebark pine. Like the other ridge, large trees could be located in and around rock outcroppings, but open areas were mostly burned over. At approximately 6300 feet in elevation and proceeding up to the summit of the mountain, this southeastern ridgeline seems

to have been spared the brunt of the burn, and there is a large stand of whitebark pine here that wraps up onto the ridgeline running northeast. This "island" of survival was a sight for sore surveyor eyes.

Right: Survivors in an unburned "island" on the upper southeast flanks of Granite Mountain near the summit.

This stand of whitebark pine showed little evidence of blister rust infection, though some inactive cankers were located. More evident were patterns of woodpecker exploration in the bark of many individuals, creating horizontal bars stacked upon each other up the trunk. This was seen as evidence of insect attack, though not necessarily mountain pine beetle. Some active as well as second and third year pitch tubes were found in these trees as well, though infestation rates were low. Three individuals were located that may have been killed by infestation. The range of ages present in this portion of the stand ran the full range from seedling to old-growth. From this point, surveyors proceeded back down the ridge, to the road.

Figure 11: Map of Granite Mountain survey area and survey results.



Old Baldy Mountain

A goshawk hunts among the whitebark pines near the summit of Old Baldy Mountain.

This site occurs on the eastern edge of the Methow Valley Ranger District, toward the southern end of a series of ridges and peaks that support large populations of whitebark pine. Little was known about whitebark pine on Old Baldy Mountain, mainly because of the difficulty of access. The mountain is very steep and rocky, with the northern half consisting of a cirque with vertical headwalls hundreds of feet high. Like Granite Mountain, this area burned in the 2006 Tripod fire. This site was identified as a place of interest because of the lack of quality information, and the likelihood of there being large healthy populations that could produce cone crops for genetic testing or planting.

Surveyors accessed this area from the Forest Service 37 road at Baldy Pass. During the ascent, surveyors located an old trail that is marked by blazed trees and rock cairns. It was discovered that this trail leads to the summit, which formerly held a lookout. Rather than following this trail all the way to the summit; however, surveyors traversed the eastern side of the mountain and accessed the dominant ridgeline south of the peak. From this ridgeline, surveyors made their way to the peak, then traveled the western ridge and work around the eastern edge of the large cirque. Once surveyors reached the bottom of the cirque, they traversed back to their origin, at Baldy Pass.

Figure 12: Looking north toward Baldy Pass from approximately 7400 feet in elevation.

Whitebark pine was located almost immediately upon leaving the road from the pass, mixed with lodgepole pine and some subalpine fir. In fact, whitebark was seen from the vehicle, on the opposite side of the road where it meets the southern slope of Mount McCay. It occurs sporadically on the north face of Old Baldy. Subalpine fir becomes more prevalent, replacing lodgepole pine, up to an elevation of 7100 feet, at which point the canopy begins to open up and whitebark pine becomes much more dominant in the overstory. This face of the mountain burned with mixed severity in 2006. There are many dead standing trees, though most of them seem to have been killed by the fire. Some evidence of insect attack was seen in trees in this area, and many surviving trees had dead or dying limbs. Very little sign of blister rust was evident on whitebark pine trees at this point on the mountain.

The eastern slopes of Old Baldy were burned more severely than the northeastern ridge; however, they are also much more rocky. Large rock outcroppings and boulder fields provided refuge for many patches of whitebark pine along this slope. Overall tree species composition on these slopes is a fairly even mix of lodgepole pine, Engelmann spruce, and whitebark pine, spread out sporadically and sheltered in rock formations. Individual whitebark pine trees encountered along this traverse of the east face seemed healthy overall. Some flagging was found, though its cause was not clear. Little to no direct evidence of blister rust or mountain pine beetle attack were found in these trees.

Arriving at the southeast face, and subsequently accessing the southern ridgeline, surveyors noted a dramatic increase in whitebark pine. Stands along this southern ridge and extending onto the southeast face are comprised predominantly

(>80%) of whitebark pine, with high cover and crown vigor. West of the southern ridgeline, however, large swaths of forest were burned with high severity in the 2006 Tripod Fire. The portions that remain, at higher elevations, are healthy vigorous stands. In general, the crest of the mountain, running west from the peak, contains very large, healthy, nearly pure stands of whitebark pine. Very little evidence of blister rust or mountain pine beetle activity was seen in these populations.

Figure 13: Map of survey boundary and survey results at Old Baldy Mountain.

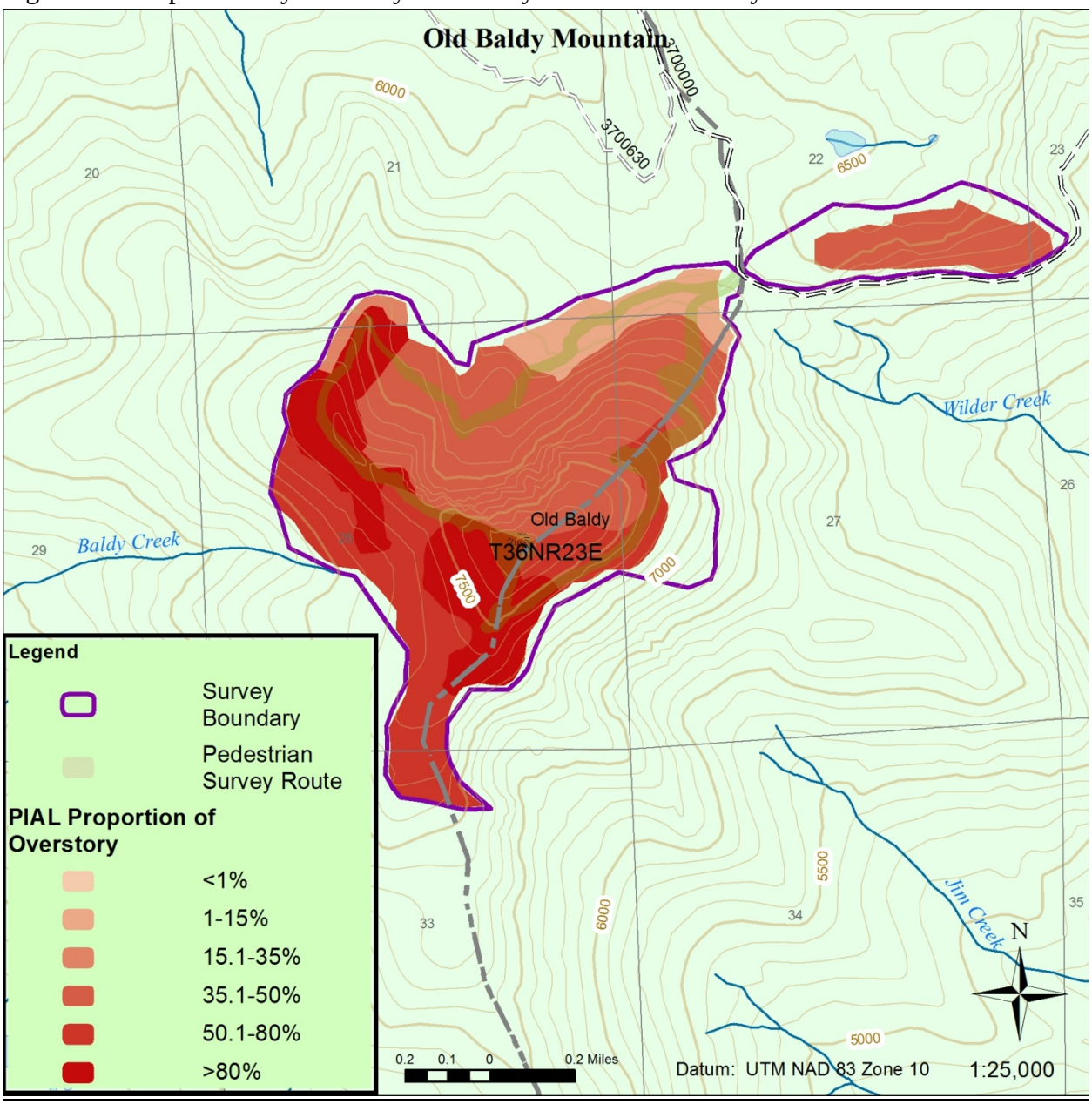


Figure 14: View, from the summit of Old Baldy, of whitebark stands on the south ridge.

Figure 15: A view of whitebark stands on the crest of the mountain running west from the summit of Old Baldy.

A user-trail was noted running the length of the southern ridge. A hunter encountered during surveys informed surveyors that many hunters and recreationalists access the mountain from the south, up that ridge. He also stated that snowmobilers access the southwest slopes of the mountain and recreate in the meadows adjacent to the whitebark pine stands. As surveyors proceeded to circumnavigate the cirque, working north and west around it, snowmobile route markers were observed.

Working around to the west side of the large cirque, surveyors continued to see large vigorous whitebark pines in occasional unburned patches. After dropping down into the bowl, and skirting the base of the boulder and scree fields, surveyors noticed that whitebark pines became much less prevalent. Interestingly, in this area, many more whitebark pine seedlings and saplings were observed than mature trees. From this point, surveyors returned to their origin.

Discussion:
These surveys have inspired questions, thoughts, concerns, and recommendations too numerous to be listed here. Here are the big ones.

<u>How to symbolize and characterize whitebark pine stands in a geodatabase (NRIS)?</u>
Whitebark pine populations are widely variable in distribution and density. Where does one draw the line between

<u>Distribution and habitat of whitebark pines at Cutthroat Lake</u>
Nowhere else on the Methow Valley Ranger District has whitebark pine been found growing at such a low elevation, in such abundance, and comingled with such a high diversity of other tree species. What are the processes or climactic factors that allow these conditions? What is the significance of the presence and relative abundance of Western white pine in this area?

<u>Big beautiful healthy stands on Old Baldy Mountain</u>
Despite stress from fire, and possibly some climax decadence, the stands on the southern flanks of Old Baldy Mountain are singularly impressive. White pine blister rust and/or mountain pine beetle signs are few and far between in these stands. On average, the trees are large and the crowns are vigorous. This population is not isolated from its nearby neighbors, as there is contiguous suitable habitat to the north, west, and south, connecting it to other known populations – some of which are clearly infected with blister rust or have been attacked by mountain pine beetles. **This stand is highly recommended for cone collection.**

<u>Upper Falls Creek Fire</u>
This area burned a mere month after it was surveyed. Data collected can be used to compare and monitor pre-post fire conditions. A transect was installed inside the perimeter of a 2012 fire, which then re-burned this year. Revisiting the area could yield useful information about burn intensity in whitebark pine stands. Also, this area has potential for replanting and/or monitoring of regeneration.

<u>Replanting Granite Mountain</u>
A large swath of the southwest shoulder of Granite Mountain burned so severly that no whitebark pine has naturally regenerated. Lodgepole pine has begun to regenerate naturally in this area. It is this author's opinion that the site would be suitable for whitebark pine planting.

Future Sites to Visit

Beaver Mountain – this mountain is northwest of Buck mountain and southeast of Granite Mountain. If whitebark pine occurs here, it would be on the southernmost tip of the string of mountains and ridges upon which Granite and Old Baldy occur.

Pearrygin and Tripod Peaks – FIA plots have located whitebark pine on these mountains, west of Starvation Mountain. This is the only data on the species at these locations. These areas have burned in the Tripod fire and again recently in the Carlton Complex. Fire suppression activities may have impacted whitebark individuals in that area.

McLeod and Setting Sun Mountains – These mountains north of Goat Peak likely have large whitebark pine populations, with some potential to be impacted by snowmobiling.

Conclusions:

Acknowledgements:

Methow Valley Ranger District: Special thanks to Kelly Baraibar, District Botanist, for doing research and supporting this project in every way. Thanks to Therese Ohlson for providing detailed background information and assisting in pre-field planning. Thanks to David Thompson as well as Sherrie Farmer, Nathaniel Redetzke, and Dori Blackburn for their great field work; Bruce Akker for sharing his data; Gary Reed for GIS help.

APPENDIX C

Briefing Paper

Pacific Northwest Region – *Regional Office*

Program perspective on the proposed Whitebark Pine (WBP) planting in the Pasayten Wilderness on the Okanogan-Wenatchee National Forest.

Background: A proposal is pending to plant 3.9 acres of WBP seedlings within the 628 burned acres of WBP habitat (within the larger 2002 Quartz Mountain fire perimeter). Authority to approve this project rests with the Regional Forester after receiving a delegation of authority from the Chief in 2013. Forest Supervisor Mike Balboni is waiting for the Regional Forester's decision. NEPA has been completed, public comments both for and in opposition to the project have been received. A Minimum Requirements Decision process to determine whether it is appropriate to proceed with the project in Wilderness was completed in 2012. Small-scale vegetation restoration in wilderness does occur in response to direct human-caused impact. Examples include campsite re-vegetation, or restoration of WBP where it was cut down by an outfitter.

Current Situation: The R.O. program staffs recognize the importance of WBP on the landscape, the need to protect and maintain this candidate species, and the likely eventuality of active restoration in some wilderness areas. The District Ranger and Natural Resources program support this project, however the Wilderness program has concerns about whether this project is appropriate in wilderness *at this time*.

Key points:

- Climate change, introduced blister rust, and the effects of decades of fire suppression are human-caused impacts to wilderness.
- The area proposed for restoration is one of the few areas in the PNW that is projected to retain a snow dominated climate favorable to WBP due to its elevation and location.
- WBP is an Endangered Species Act (ESA) candidate species and a keystone species within the ecosystem.
- Managing wilderness to preserve wilderness character requires a balance between managing for 'natural' elements (freedom from the effects of civilization) and 'untrammeled' elements (allowing the forces of nature to play out in an unhindered fashion.)
- Forest Service Wilderness Policy provides the following direction:
    - FSM 2320—Introduction. "Manage wilderness to ensure that human influence does not impede the free play of natural forces or interfere with natural successions in the ecosystem."
    - FSM 2320.2—Objectives. 2. "Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces."
    - FSM 2323.5—Management of Forest Cover. "Manage forest cover to retain the primeval character of the environment and to allow natural ecological processes to operate freely."
    - FSM 2323.54—Reforestation. "Allow reforestation only if a loss of the wilderness resource has occurred, due to human influence, and there is no reasonable expectation of natural reforestation."
    - FSM 2323.32—Policy. 4. "Manage wilderness to protect known populations of Federally listed threatened or endangered species where necessary for their perpetuation and aid in their recovery in areas of previous habitation. When alternative areas outside of wilderness offer equal or better protection, take actions to recover threatened or endangered species outside of wilderness areas first."

for the greatest good

- In general, regional and national wilderness program staff believe the following actions are appropriate in wilderness: *natural fire process, natural regeneration, monitoring, education;* the following actions may be appropriate, subject to a minimum requirements analysis: *verbenone and carbaryl applications, seed and cone collection, pruning, protecting WBP from fire,* and the last suite of actions*: planting seedlings, establishing seed orchards, thinning, creating nutcracker openings, and prescribed fire for WBP* are indicated as generally not appropriate in wilderness.
- Based on the direction in the November 2011 letter signed by the R6 NR and RLM directors, the Natural Resources Program Staff in genetics, silviculture, botany, and wildlife favor a different mix of wilderness activities subject to a minimum requirements analysis, which includes planting seedlings. This letter was the basis for the initiation of this project.
- In order for the planting to occur this fall prior to snowfall, May 27 is roughly the last date for publishing the 'notice of availability to comment'. The seedlings are too large to hold over for yet another year, so they would have to be outplanted outside of wilderness. National Forest funding would be lost, and it would take another 3 years to grow seedlings to a sufficient size for the project.
- This would be a precedent-setting action at a national scale. Other USFS regions who have WBP habitat (Regions 1, 4, and 5) and adjacent agency management (NPS) have chosen not to plant in wilderness areas, and instead are using wilderness areas for monitoring to better understand the manipulation outside wilderness. (Only half of WBP habitat is in wilderness in these areas, so opportunities to restore and recover the species elsewhere are much greater.)
- We need to work in R6 wilderness to preclude ESA listing (per Ted Thomas, USFWS). A large majority of the whitebark pine habitat in Oregon and Washington is in wilderness (see Attachment 2). Across all lands (USFS, NPS, BLM, Indian Tribes, and other), nearly 90% is in wilderness. On USFS lands only, wilderness habitat is nearly 73%, leaving only 27% of the total FS habitat in areas that do not have wilderness management restrictions. On an individual forest basis, the situation is even more evident. For example, nearly 57% of all whitebark pine habitat on USFS lands in R6 is on the Okanagan-Wenatchee NF, with 75% of that land is in wilderness and an additional 23% in roadless areas, leaving only 2% that is not in reserved status. (A total of 25% of the habitat is not impacted by wilderness restrictions.) This land base is not sufficient for restoration that would put the species on a course for recovery and obviate Endangered Species Act listing.
- Within the R6 WBP restoration strategy (currently being updated), there is a need identified for multiple small plantings in wilderness to effectively protect and retain the species. Does approving this initial specific activity open the door to additional planting?
- Is this action the *minimum necessary* at this time?
    - Relative abundance of WBP per the R6 Terrestrial Restoration and Conservation Strategy for the greater area of Quartz Mtn in the Pasayten River-Similkameen River Watershed is 2.91 and in the adjacent Ashnola Watershed it is 3.47 ("anything over 2 is quite significant, and anything over 3 is extraordinary").
    - There are WBP on ridges 2 and 4 miles from the proposed planting site, according to the response to comments on the EA. There may not be cone-bearing trees at these locations, and in any event, no regeneration at the project site has occurred in the last ten years.
    - As recently as 2012, two WBP plantings totaling ~2900 seedlings took place on the Oka-Wen but were not close enough to eventually provide a future seed source for natural regeneration of Quartz Mtn. (See Attach. 1)
- The overarching idea of wilderness includes restraint and acknowledgment of our action bias. It may ultimately be the correct decision to plant WBP in selected wilderness locations, but questions still remain about whether the current proposed action is the best avenue for preserving wilderness character at this time.
- There are examples of restoration in wilderness to redress anthropogenic damage. For example, see the St. Mary's wilderness aquatic restoration project (using helicopters to drop 140 tons of limestone sand into 6 locations in the St. Mary's watershed to de-acidify streams degraded by acid rain), in which the deciding official declared "St. Mary's has served as a natural area for scientific study, but acidification of the stream demonstrates that humans have already disrupted or intervened in its natural processes, even though unintentionally". The project was approved to restore outstanding values, and one of its activities includes "Allowing indigenous aquatic

species to recolonize naturally, or reintroduced to their historic distribution if natural recolonization does not occur". The situation with whitebark pine in general and the Quartz Mountain project in particular may be analogous.

- In the year of the 50th Anniversary of the Wilderness Act, agency choices may receive additional scrutiny. While there is support from some constituents, there are other members of the public in opposition to this proposal. There is a possibility of litigation if the project proceeds and objections cannot be resolved. There is also the enhanced probability of ESA listing if we do not do everything possible to restore and recover the species, since the vast bulk of WBP in the US is managed by the USFS. This is a difficult and nuanced decision.

Options:

- Work with the Aldo Leopold Wilderness Research Institute staff and Dr. Cara Nelson (University of Montana) to use this as a national test case for the multidisciplinary interagency wilderness restoration assessment protocol currently in development. The window for this process is August 15- October 15, 2014. This will be too late to plant the current crop of seedlings.
- Proceed with project implementation for this field season
- Do both of the above.

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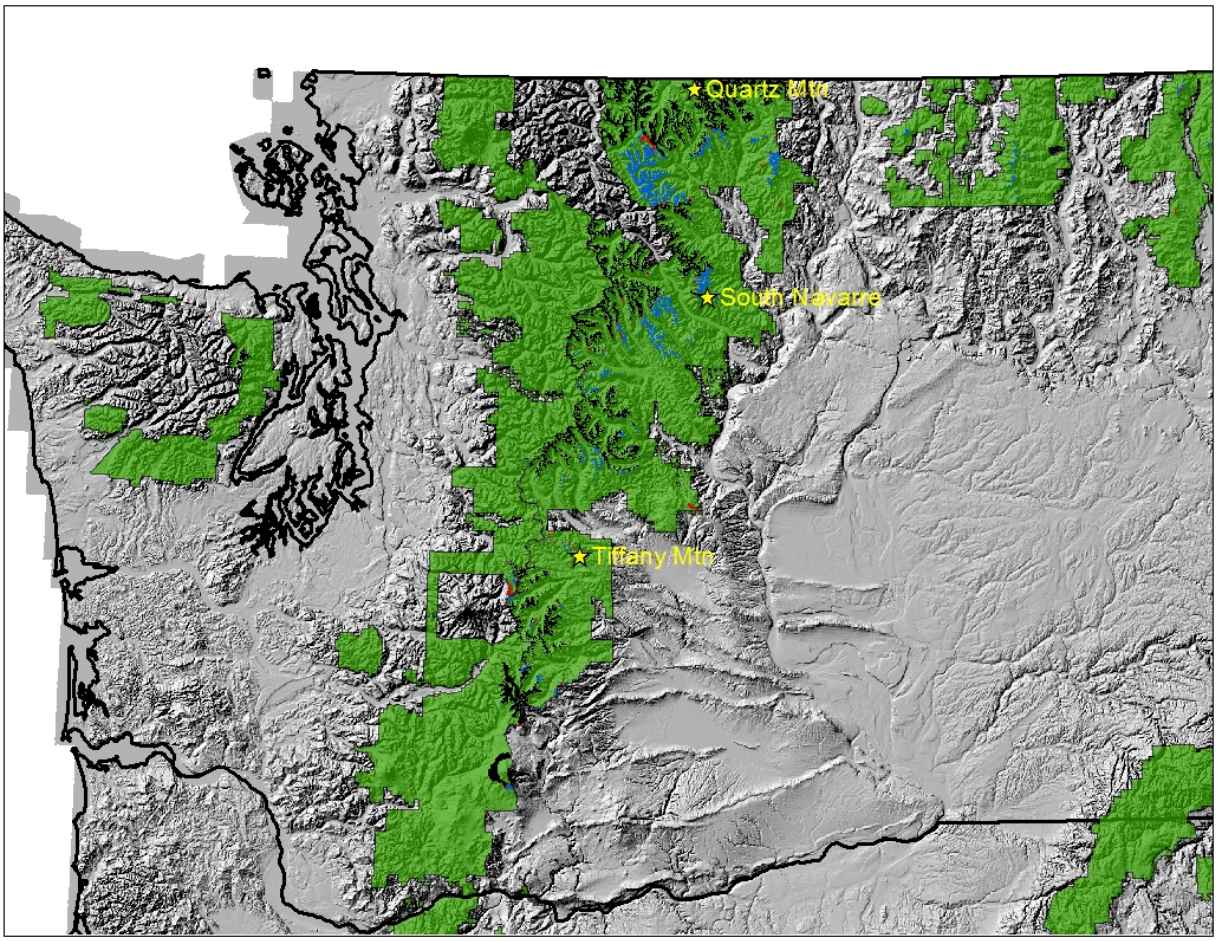
Attachment 1.
Location of the 2 areas planted in 2012 relative to the Quartz Mountain project.



Attachment 2.

Distribution of whitebark pine in PNW Wilderness