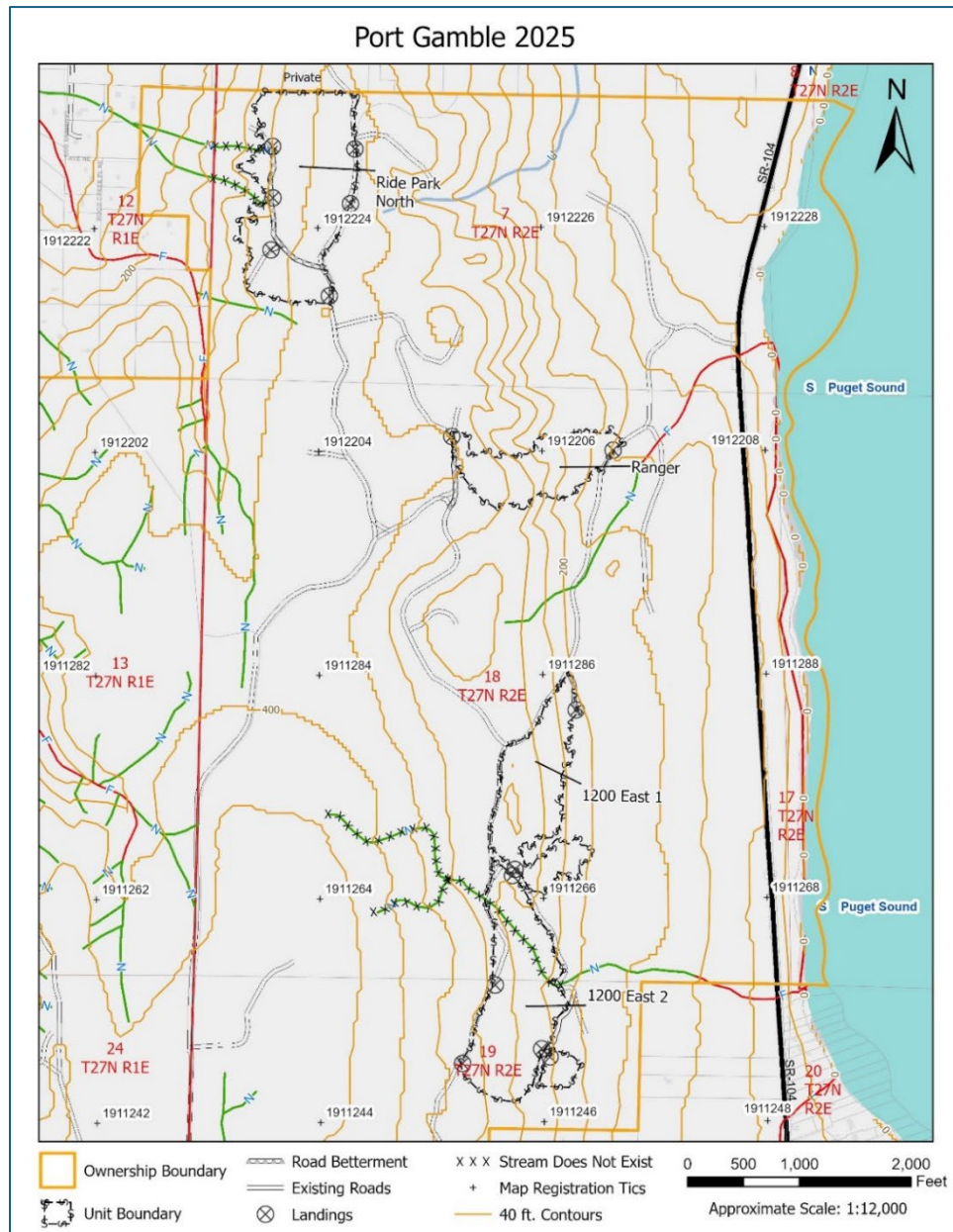


Port Gamble 2025 Stewardship and Restoration Project

Post-treatment Monitoring Report



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Introduction

Approximately 71 acres of a planned 88 acres within a 97 acre project area in Port Gamble Heritage Park received stewardship and restoration treatments (Figure 1) during the summer and fall of 2025 to help create conditions that facilitate tree growth; increase resiliency to insects, diseases, expected climate change, and potential wildfires and; improve habitat quality and ecological function (Ceder and Weber, 2025). Thinning preferentially removed smaller trees, primarily planted Douglas-fir, making more room for remaining larger trees. This will reduce competition between trees, physiological stresses, will allow the remaining trees to grow vigorously¹, increase their resiliency to insects, diseases, wildfires, and expected climate change. Space created in the canopy will allow light to reach the forest floor and encourage the reestablishment and growth of understory vegetation. Healthy, vigorous understory vegetation will improve wildlife habitats, resist invasive species establishment, and create more visually appealing conditions. Removing smaller trees that are becoming unstable and dying will reduce potential risks to park users.

Treatments occurred within four distinct units across the northern part of Port Gamble Heritage Park (Figure 1). These areas were regenerated following harvesting in the 1980s and have seen little, if any, management since that time. Currently these forests are very dense and uniform with little, if any, understory vegetation. Two of the units, which comprise about half of the area, are within the Evergreen Mountain Bike Alliance (EMBA)-maintained and managed mountain bike ride park and Ranger trail corridor. These trails see heavy recreational use. The other treatment areas do not have recreational trails beyond the access roads adjacent to the treatment areas.

This document summarizes conditions following stewardship and restoration treatments in each of the areas including:

- Comparison of the treatment scale and post-treatment conditions with those expected in prescriptions and specifications,
- Comparison of the financial performance compares with expectations, and
- Proximal causes of differences between what was planned and what was achieved.

Data and Information Sources

Data to describe post-treatment forest conditions, areas treated, and financial performance of the 2025 Port Gamble Stewardship and Restoration Project are a mix of field data collected by Kitsap County Parks staff along with information reported by American Forest Management including:

- Overall treatment area boundary of each restoration unit delineated with a resource-grade GPS on a Juniper handheld data collector. These data were used to determine the actual extent of restoration treatment areas.

¹“Vigor” refers to tree growth.

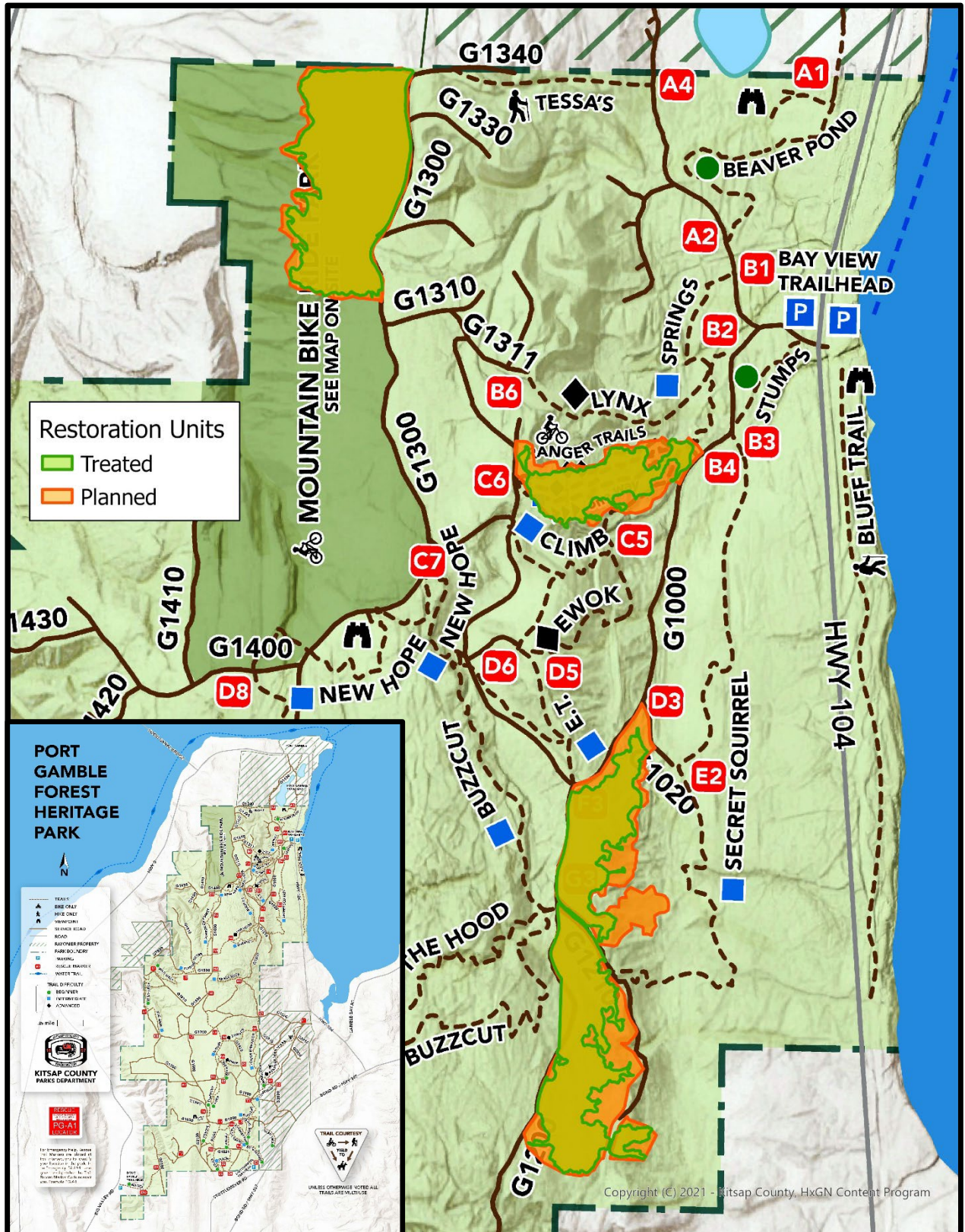


Figure 0-1: Location of the planned Port Gamble 2025 Stewardship and Restoration Project units within Port Gamble Heritage Park (orange/orange outline) and the areas that were treated during the project (green/green outline).

- Forest inventory data collected as close as possible to the reported location of each pre-treatment forest inventory plot. These data were used to describe post-treatment forest conditions and make comparisons with pre-treatment conditions. Data were processed and summarized using the USDA Forest Service’s Forest Vegetation Simulator² (FVS) and purpose-built scripts for the R statistical software³. Because exact plot locations could not be found⁴ and a different basal area factor was used for sample tree selection, this is not a true re-measurement and the samples are not statistically comparable with pre-treatment forest inventory data. However, these data do provide a good comparison between pre-treatment conditions with post-treatment conditions to examine compliance with prescription specifications.
- Operational costs, removed log tonnage, and log sales revenues were reported by American Forest Management during and at the conclusion of this project. These data are used to summarize the financial performance of the project.

Treated Acreage

Approximately 71 acres of the planned 88 net⁵ acres were treated (Table 1) during the 2025 Port Gamble Stewardship and Restoration Project. Restoration boundaries were designed and located with the intent of maximizing the potential restoration footprint of this project, which included some limited steep, or otherwise inoperable, areas as well as non-forested areas, like roadbeds. During planning it was assumed that approximately 10% of each unit would be inoperable with the net area of 88 acres used to calculate potential project removal volumes that were then used to calculate expected financial performance.

Table 1: Gross acreage, planned net acreage, and treated net acreage for units in the 2025 Port Gamble Stewardship and Restoration Project.

Unit	Gross Acres	Planned Net Acres	Treated Net Acres	Deviation Acres
Ride Park North	35	32	31	-1
Ranger	14	13	9	-4
1200 East 1	20	18	12	-6
1200 East 2	28	25	19	-6
Total	97	88	71	-17

Post-treatment monitoring data showed treated net acreage of each unit being between 1 and 6 acres (3-33%) less than the planned net acreage (Table 1). Altogether, the treated net acreage was

² The Forest Vegetation Simulator is publicly available online at: <https://www.fs.usda.gov/managing-land/forest-management/fvs> (Last accessed May 29, 2025)

³ R is publicly available, open-source statistical software available online at: <https://www.r-project.org/> (Last accessed March 13, 2026)

⁴ All inventory plot locations were marked during pre-treatment inventory. However, these were often disturbed during treatment and could not be precisely re-located.

⁵ Net area is the area remaining in the unit after inoperable (e.g. excessively steep, leave area) or non-forested areas (e.g. roads) are removed from a unit.

approximately 17 acres (19%) less than planned. Factors that reduced restoration treatment area included terrain limitations, species composition variability, and limiting damage to developed trails. The limitations type and scale of impacts varied by unit. The Ride Park North unit had the smallest deviation from planned acreage with only a small amount of area, primarily along the western side of the unit, untreated. This unit has relatively gentle topography until the slopes become steeper on the western and southern sides of the unit providing few operability limitations. The Ranger unit had the largest percentage deviation from planned acreage – a 33% reduction. This unit is relatively steep with four developed mountain bike trails through the unit. Minimizing damage to trails and excessively steep terrain, which the restoration contractor was not comfortable operating on, limited the area that was treated. Reductions in treated area on the 1200 East units were driven by a combination of excessively steep terrain and diverse species compositions. Areas along the east side of the units have relatively steep draws where the contractor was not comfortable working down into many of these areas. These units also had a larger proportion of western hemlock, western redcedar, and red alder, in the southern part of the southern unit, areas that had received thinning sometime in the past. Species compositions and prior thinning left areas that had insufficient take trees to make operating in those areas worthwhile.

Reductions in net treatment area reduced potential removal volumes, which, in turn, impacted the financial performance of this project.

Post-Treatment Forest Conditions

Tree removals in restoration treatments decreased the number of trees per acre (TPA) and basal area per acre (BA, sq. ft./ac) in the units and increased average tree size (QMD, inches) (Figure 2). Average conditions in each unit are close to, or fall within the range of, conditions expected from the treatment prescriptions (Ceder 2025). However, ranges of conditions were often wider than expected. At several plots both basal area and trees per acre were lower than the minimum expected values. Several plots were located in or near skid trails, which resulted in lower TPA and BA values. Other plots were located in or near areas with many required leave trees, such as western hemlock, western redcedar, and/or red alder, which resulted in higher TPA and BA because fewer trees could be removed. These differences were expected because monitoring data were collected across all inventory plot locations to capture the range of conditions created by the restoration treatments, but prescription ranges were specified for areas outside skid trails, gaps (areas where all trees were cut), and skips (areas where few or no trees were cut).

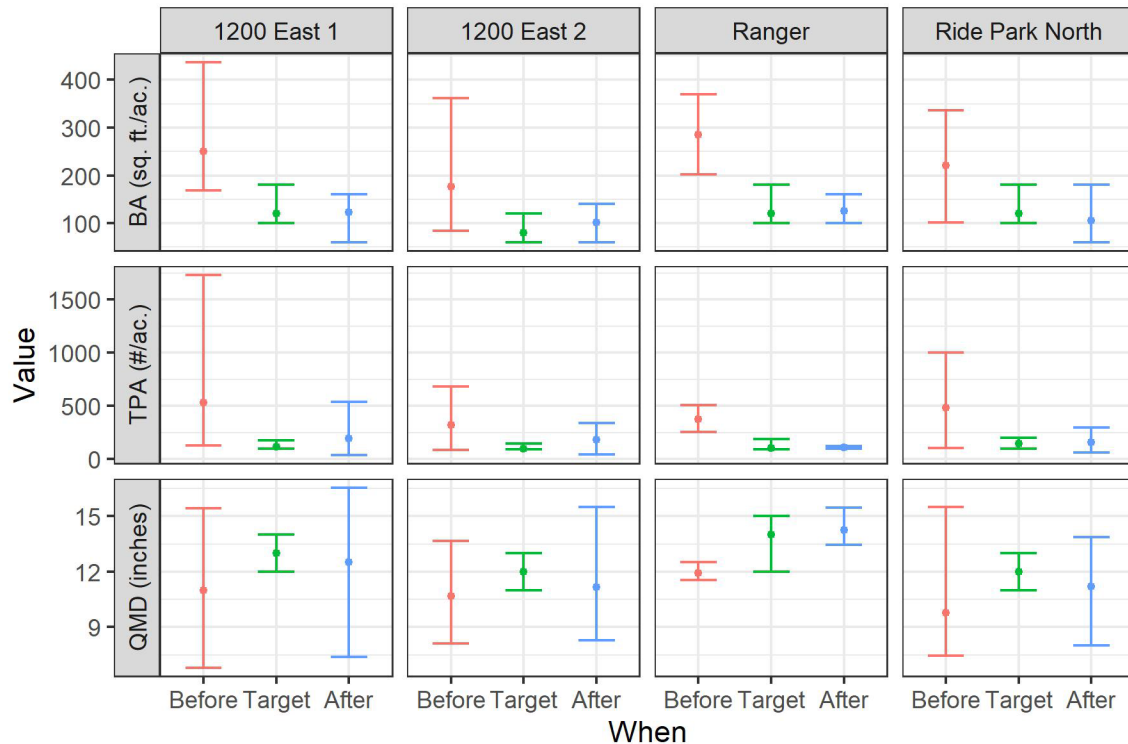


Figure 0-1: Comparisons of stand metrics before restoration treatments (red), restoration treatment targets (green), and after restoration treatments. Bars cover the range of metrics across all inventory and monitoring plots throughout the treated area or the expected range from treatment prescriptions. Dots are the mean values.

Restoration treatments reduced competition levels within treatment units (Figure 3), providing opportunities for the remaining trees to increase their growth and allowing light to reach the forest floor. Increasing the space between trees reduced the inter-tree competition levels from very high and high to moderate and low. At lower competition levels, there is room between tree crowns which will give space for branches to grow into and increase the amount of food (carbohydrates) the trees can produce for themselves. Extra food will allow trees to increase in vigor and size. Increased vigor will help trees fight insects and diseases as trees growth begins to increase. However, it may take some time – several years – before growth is seen at breast height (4.5 feet above the ground) because the tree stem will get larger closer to the tree’s crown first before there enough food is produced to allow additional growth closer to the ground.

Reduced competition levels frees up growing space that understory vegetation can take advantage of. Extant understory vegetation in the project area sustained some damage from restoration treatment operations. With the increased light reaching the forest floor the vegetation is expected to recover quickly and reestablish in areas that were initially lacking vegetation cover.

Restoration treatments left approximately half of the pulp logs onsite and created snags⁶ to begin rebuilding the dead wood stocks and improve wildlife habitats in the project area. Treatments increased the amount of downed wood from nearly none to an estimated 1,963 tons of pulp logs across the restoration area as several piles per acre scattered through each unit. 1-3 snags per acre

⁶ Snags are standing dead trees.

were created by cutting trees as high as the contractor could reach with his machine. While these snags and logs are typically small-diameter they provide the substrate for fungi and insects that would be food for birds and small mammals. Piles of logs also provide roosting, nesting, and denning opportunities for birds, small mammals, reptiles, and amphibians. As the forest matures overtime, it is expected that some of the larger trees facilitated by the restoration project will eventually die, producing large snags of a diameter suitable for cavity nesting.

Pictures representative of forest conditions within each treatment unit are available in Appendix B.

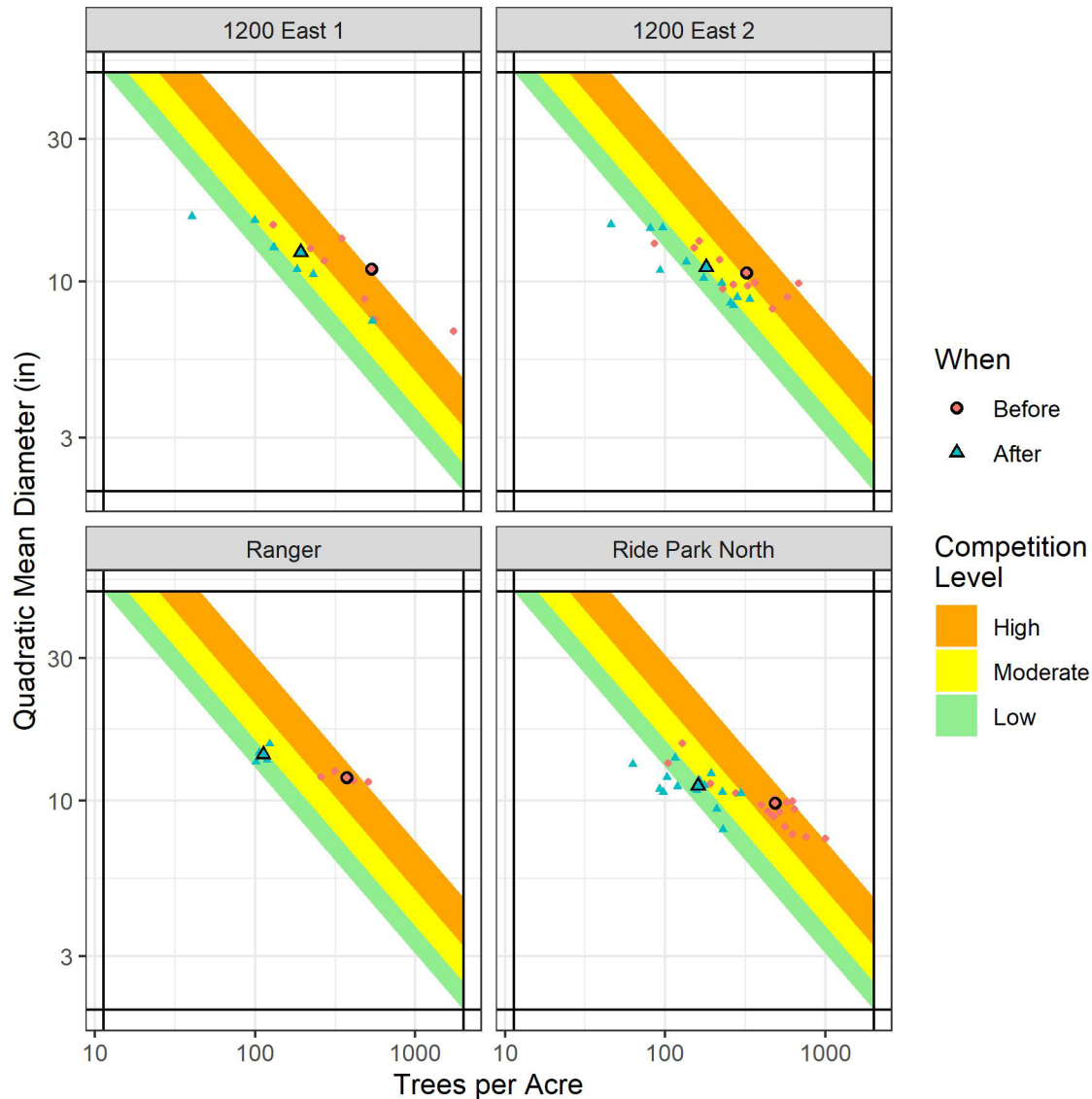


Figure 0-2: Density management diagrams showing competition levels of each plot within individual restoration units both before (red markers) and after (blue markers) restoration treatments. Small points represent individual plots. Large points represent average conditions.

Financial Performance

Overall financial performance of this project was, effectively, breakeven (Table 3) because removal tonnage was lower and the pulp log proportion higher than expected. While operability limits reduced the treatment area by approximately 20%, removals were only 3% lower than expected. However, the removals included 65% sawlogs and 35% pulp logs rather than the 83%/17% split that was expected based on removals from similar recent restoration projects at Port Gamble. This increase in pulp percentage caused the actual revenues from the project to be approximately \$54,355 (15%) lower than expected.

Lower removal volumes resulted in decreased gross removal costs. Actual harvesting and hauling costs were consistent with expectations on a per-ton basis except for hauling to C&C Timber in Kingston, WA. This was the result of a special pulp log sort, logs destined for fish habitat enhancement projects, which were purchased at the landing with C&C Timber paying the hauling costs. This reduced the per-ton hauling on pulp logs sold to C&C Timber resulting in gross removal cost that was approximately \$23,303 (8%) lower than expected.

Taken together the decreased revenues and decreased costs resulted in net revenue from removals that was approximately \$22,052 (45%) less than expected. This decrease was primarily driven by the increased proportion of pulp logs that were removed. Removed sawlogs had a net revenue of \$19.50/ton (\$24.50/ton for logs shipped to Interfor) while removed pulp logs had a net loss of \$31.50/ton for logs shipped to Port Townsend Paper (40% of the removed pulp logs) and \$13.48/ton for logs shipped to C&C Timber (60% of the removed pulp logs). The increased percentage of pulp logs reduced net revenue for logs removed with the log prices realized for this project.

Losses on pulp logs were reduced by keeping approximately 50% of the pulp logs onsite to help improve wildlife habitats. Leaving more, or all, pulp logs on site would have done little to reduce costs because all the equipment would have been onsite and working. The harvester, which is most of the logging cost, would still cut same number of trees to meet prescription specifications. The forwarder, which moves logs from the woods to the roadsides, and log loader, which loads the logs onto trucks, would see limited reductions in operating times and limited reductions in costs. Leaving all pulp wood onsite could have undesirable ecological impacts with more downed wood coverage possibly limiting the areas where understory vegetation could recover. Excessive downed wood could provide brood material for Douglas-fir beetles which could allow the beetle population to become larger than can be expected or tolerated by a healthy forest, resulting in attacks on retained trees in the treatment areas. Removing half the pulp seemed to be a good balance between minimizing costs and meeting restoration objectives.

Non-staff project costs, including forest inventory, road maintenance costs, and project administration contractor fees were approximately \$5,814 (17%) less than expected. Reductions in non-staff project costs were driven by a decrease in the commission for our restoration project administration contractor and lower road maintenance costs. Lower gross revenues from removed logs, the basis for their charges, reduced the commission charged by our contractor for their log marketing, contractor management, and oversight services. Roads in the project area required less maintenance work than expected because work happened primarily during dry months. After

accounting for non-staff project costs net revenues were approximately \$16,438 (97%) lower than expected with a final net revenue of \$450 for this project.

Table 0-1: Project expected financial performance (from Ceder 2025) and actual financial performance.

Restoration Removals Net Revenue						
Log Sort (Destination)	Log Price (\$/ton)		Tons		Gross Revenue	
	Expected	Actual	Expected	Actual	Expected	Actual
Sawlogs ⁷ (Manke ⁸)	\$80.00	\$80.00	4,100	2,695	\$328,000	\$213,411
Sawlogs (Interfor ⁹)		\$85.00		406		\$34,490
Pulp ¹⁰ (PT Paper ¹¹)	\$31.00	\$29.00	425	689	\$13,175	\$19,980
Pulp (C&C Timber ¹²)	\$31.00	\$32.00	425	1,004	\$13,175	\$32,114
<i>Gross Revenue</i>			4,950	4,794	\$354,350	\$299,995
Cost Type	Cost Rate (\$/ton)		Tons		Gross Cost	
	Expected	Actual	Expected	Actual	Expected	Actual
Harvesting	\$41.50	\$41.50	4,950	4,794	\$205,425	\$195,862
Hauling (Manke)	\$19.00	\$19.00	4,100	2,695	\$77,900	\$51,204
Hauling (Interfor)		\$19.00		406		\$7,710
Hauling (PT Paper)	\$19.00	\$19.00	425	689	\$8,075	\$13,090
Hauling (C&C Timber)	\$8.50	\$3.98	425	1,004	\$3,613	\$3,844
<i>Gross Cost</i>			4,950	4,794	\$295,013	\$271,710
Removals Net					\$50,337	\$28,285
Non-staff Project Costs						
Cost Type					Expected	Actual
Forest Inventory					\$2,250	\$2,250
AFM commission (5.7% of gross revenue)					\$20,198	\$17,385
Road maintenance					\$11,200	\$8,700
Contract hold-back ¹³						-\$500
<i>Total</i>					\$33,649	\$27,835
Project Net Revenue					\$16,688	\$450

⁷ Sawlogs are logs with a small-end diameter of at least 5” in diameter with sufficient quality, straight and lacking large knots from limbs, to make dimensional lumber.

⁸ Manke Lumber Company located in Tacoma, WA.

⁹ Interfor USA Inc., Port Angeles Division located in Port Angeles, WA.

¹⁰ Pulp logs are logs that are too small (2-5” small end diameter) or poor quality to make dimensional lumber. These logs are used to make paper, firewood, or other uses.

¹¹ Port Townsend Paper chipping facility located in Port Angeles, WA.

¹² C&C Timber located in Kingston, WA.

¹³ Amount held back as penalty to the contractor for harvesting a small area of unowned trees outside the treatment area

Next Steps

Forest stewardship and restoration is a long-term process with cycles of assessing, planning, managing, and monitoring to ensure that forests continue to develop on expected trajectories and keep meeting the needs, wants, and goals of the County and community. Post-treatment monitoring is just the first step of a process that will take decades, or more, to get these forests to a mature condition. KC parks will continue to monitor these restoration areas on 5-to-10-year intervals to ensure that forests are developing as expected and to discover any issues that may need to be addressed in an adaptive management context. Future monitoring would include, but would not be limited to:

- Forest inventory data collection to monitor tree growth, mortality, and establishment.
- Understory vegetation surveys to monitor understory growth, establishment, and composition.
- Invasive species surveys to monitor the establishment of any invasive species in the restoration area.
- Bird and wildlife monitoring to evaluate what species are utilizing the restoration area.

Following monitoring, data would be assessed to determine what, if any, deviations had occurred since the last monitoring and what responses may be needed:

- Is the understory vegetation developing as expected? If not, what actions may be needed to meet desired conditions?
- Have invasive species started to colonize parts of the restoration area? If so, how should the invasives be addressed?
- Are understory trees establishing that will grow to become a second age class and canopy layer? If not, what treatments may be needed to meet desired objectives?
- Is the restoration area providing, or on a trajectory towards providing, suitable wildlife habitat?

All these questions, and likely more, would be asked and answered during and following each monitoring cycle to guide future forest stewardship and restoration.

Summary

The Port Gamble 2025 Stewardship and Restoration Project created the expected forest conditions following the restoration treatments, but it fell short on achieved restoration area. Net revenue was lower than the projected financial performance, but the project did breakeven.

Forest densities were reduced, creating space between trees that will allow room for the retained trees to grow larger. Space between trees will also allow more light to reach the forest floor and allow remaining understory vegetation to grow vigorously and foster reestablishment where understory is lacking because of heavy canopy shade prior to treatment. Logs were left onsite and

snags were created to begin replenishing standing dead and downed wood stocks to improve wildlife habitats.

Operability limitations and a larger than expected amount of pulp logs reduced achieved treatment area and financial performance to effectively breakeven. Overall, this project achieved restoration objectives with no additional or unexpected cost to Kitsap County.

References

Ceder, Kevin. 2025. Port Gamble 2025 Stewardship and Restoration Project: Project Plan and Report. Kitsap County Parks Department, Kitsap County, Port Orchard, WA.

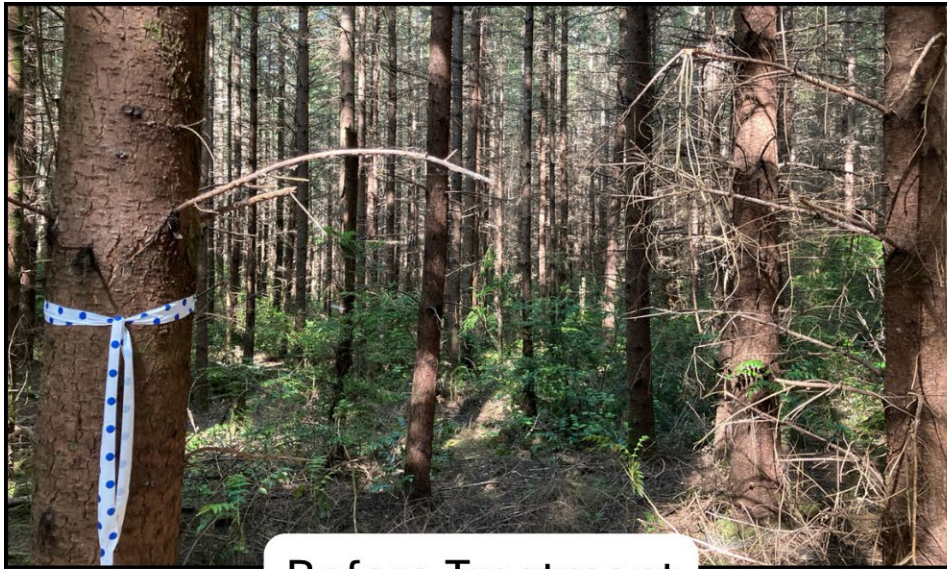
Ceder, Kevin and Irene Weber. 2025. Forest stewardship and restoration policy. Kitsap County Parks Department, Kitsap County, Port Orchard, WA.

Appendix A – Stand Table Summaries

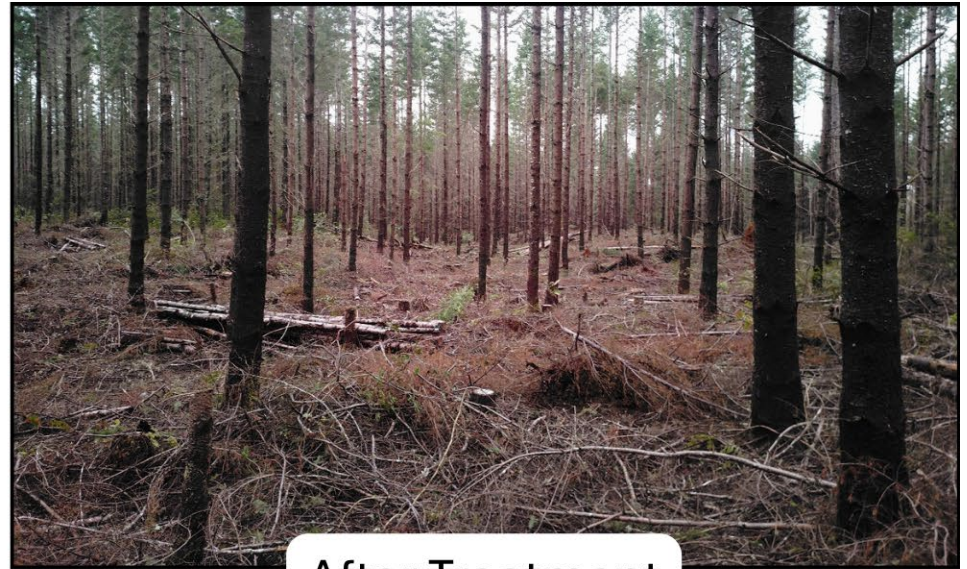
Table 1: Stand table summary representing the average forest conditions before and after treatment along with prescription specification targets for each restoration unit. TPA is the average number of trees per acre. QMD is the average quadratic mean diameter of trees. BA is the average amount of basal area (cross sectional area of all trees) per acre. Ranges are presented in parentheses.

Unit		TPA	QMD (in)	BA (ft ² /ac)	SDI
Ride Park North	Before	488 (105-1,011)	9.8 (7.4-15.5)	223 (101-336)	419 (165-623)
	Target	150 (100-200)	12.0 (11.0-13.0)	120 (100-180)	200 (117-305)
	After	170 (63-296)	11.0 (8.0-13.9)	113 (60-220)	198 (98-378)
Ranger	Before	373 (258-509)	11.9 (11.5-12.5)	286 (202-370)	490 (344-640)
	Target	105 (90-180)	14.0 (12.0-15.0)	120 (100-180)	180 (121-345)
	After	112 (101-123)	14.2 (13.4-15.4)	125 (100-160)	199 (163-247)
1200 East 1	Before	543 (129-1,731)	11.0 (6.8-15.4)	250 (168-437)	458 (259-933)
	Target	120 (100-180)	13.0 (12.0-14.0)	120 (100-180)	183 (134-309)
	After	192 (40-536)	12.5 (7.4-16.5)	123 (60-160)	213 (90-330)
1200 East 2	Before	322 (85-683)	10.7 (8.1-13.7)	177 (83-631)	321 (136-666)
	Target	100 (90-150)	12.0 (11.0-13.0)	80 (60-120)	134 (105-228)
	After	181 (46-337)	11.2 (8.3-15.5)	102 (60-140)	183 (92-271)

Appendix B – Before and After Conditions Photos



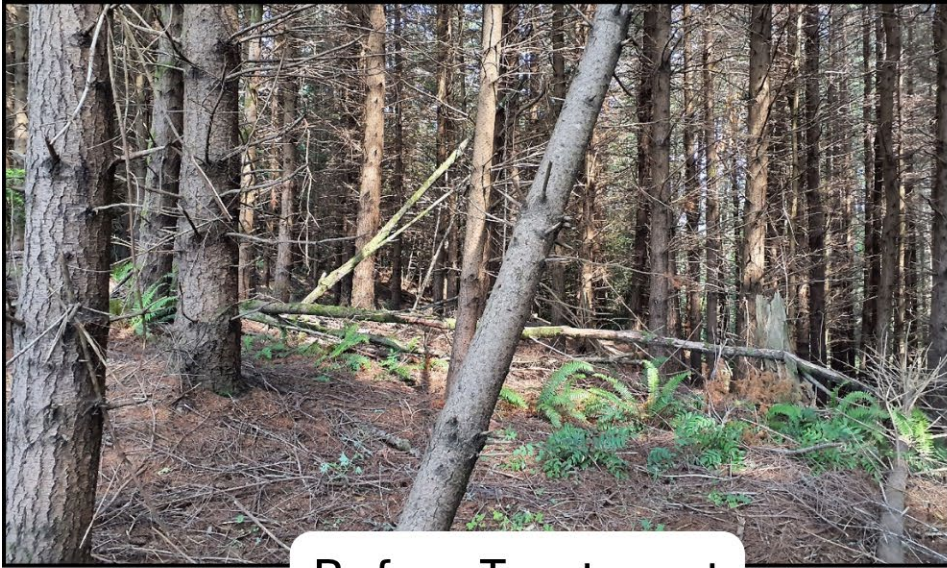
Before Treatment



After Treatment



Figure Appendix B-1: Examples of conditions before and after treatment in the Ride Park North unit. Photos were taken at approximately the same place and approximately the same direction.



Before Treatment



After Treatment

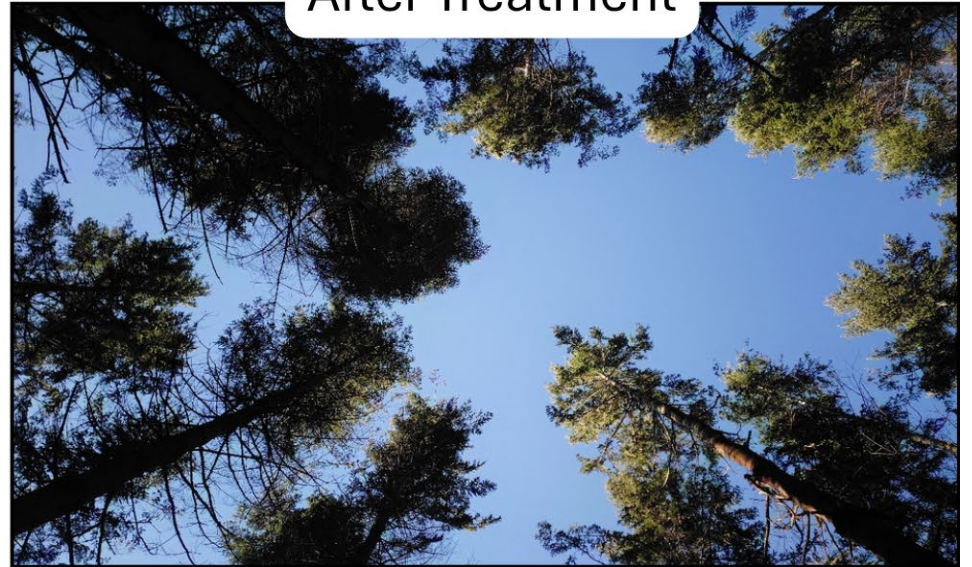
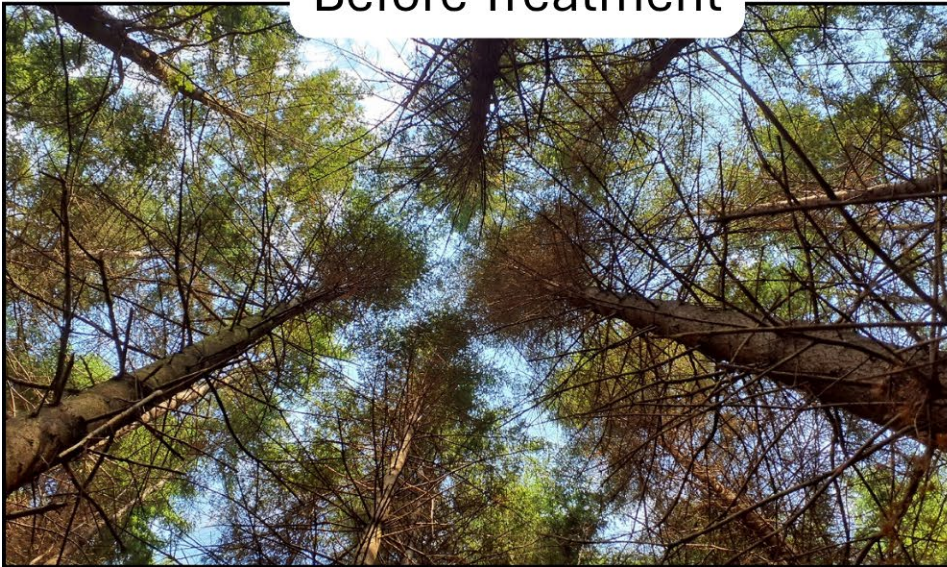
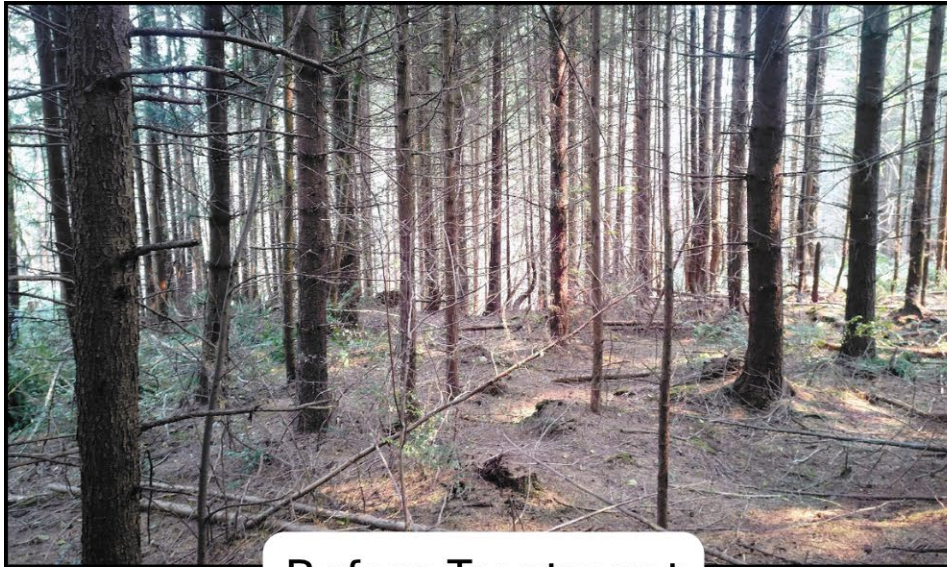
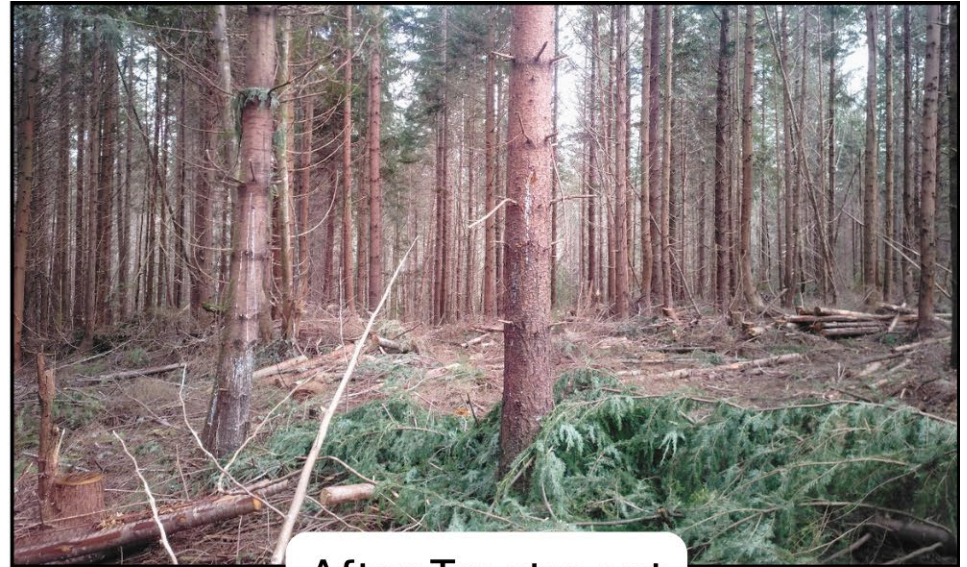


Figure Appendix B-2: Examples of conditions before and after treatment in the Ranger unit. Photos were taken at approximately the same place and approximately the same direction.



Before Treatment



After Treatment

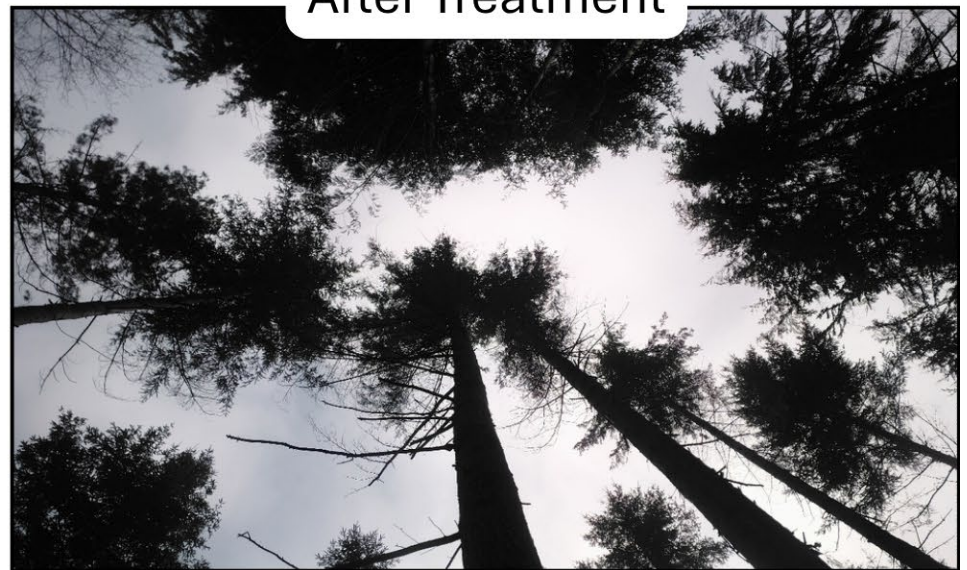
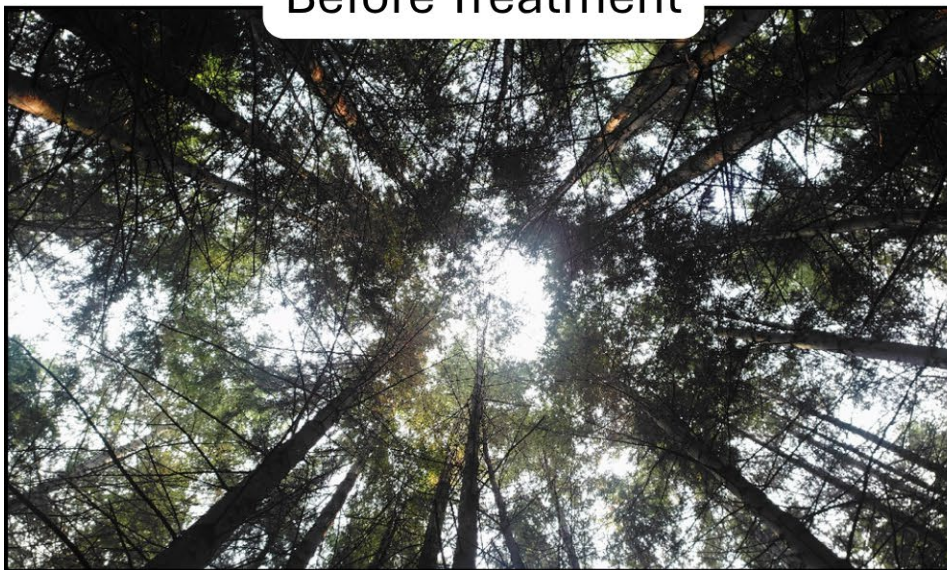


Figure Appendix-3: Examples of conditions before and after treatment in the 1200 East 1 unit. Photos were taken at approximately the same place and approximately the same direction.

No before and after treatment photos were taken in the 1200 East 2 unit.