NORTHWEST NATURAL RESOURCE GROUP

MIXED HARDWOOD/CONIFER PRE-COMMERCIAL THIN

Site Summary

Stand type	20 year old mixed hard-wood/conifer
Location	Olympia, WA
Soils	Kapowsin Silt Loam Site Class III Site Index 123 (DF)
Aspect	Flat to westerly
Elevation	130’

Treatment Variables

Design	Two 1.25 - acre treatment sites. Four 1/20th-acre plots per site.
Type of labor	Two chainsaw operators.
Prescriptions	One treatment site was thinned and the 2nd site left unthinned.
Tree species	Douglas-fir, bigleaf maple, red alder, Oregon ash, red Cedar, bitter cherry.

Funding for this project was provided by the USDA’s Western Sustainable Agriculture and Research Education (SARE) program.

SARE Sustainable Agriculture Research & Education

STAND DESCRIPTION (PRE-TREATMENT, 2020)

This stand comprises a Douglas-fir plantation that was established approximately 20 years ago. Although the stand was planted to Douglas-fir, a wide range of other tree species naturalized throughout the area. Red alder is the most common, and occurs both as scattered individuals and in small, dense clumps. In many cases alder has colonized small gaps in the forest where the Douglas-fir did not survive. Bigleaf maple is the second most common tree species, and primarily occurs either as multi-stemmed stump sprouts, or as wildly sprouting, old, decadent trees. Naturally regenerating western red cedar, bigleaf maple also occur throughout the forest. Prior to treatment, stocking densities varied significantly across the forest, ranging from as low as 150 trees-per-acre (TPA) to over 600 TPA, but averaging approximately 400 TPA.

Species per Acre
(All diameter classes)

Site	RA	DF	RC	BM	OA	Total
1	40	133	10	103	18	304
2	39	177	1	37	1	255

HARDWOOD PRE-COMMERCIAL THIN

TREATMENT OBJECTIVE

The primary objective of the thinning treatments was to improve the growth of the most dominant and highest timber quality trees of each species. A secondary objective was to conserve biodiversity by retaining trees of all species present in the stand, including understory conifers and non-timber trees such as cascara and maple.

TREATMENT CONSIDERATIONS

The decision to thin these stands was based on the following considerations:

1. Stand densities were high and competition between trees was beginning to reduce the live crowns. Thinning would ensure continued optimal growth across the stands.

2. The stands were dominated by three species (Douglas-fir, alder, maple). Thinning would release underrepresented species (cherry, cedar, ash) as well as additional conifer species regenerating in the understory, thereby increasing diversity.

3. Thinning would open the canopy, supporting the growth of a more diverse understory layer.

4. There was a small degree of storm damage amongst the trees and thinning would allow the opportunity to remove trees with low timber quality.

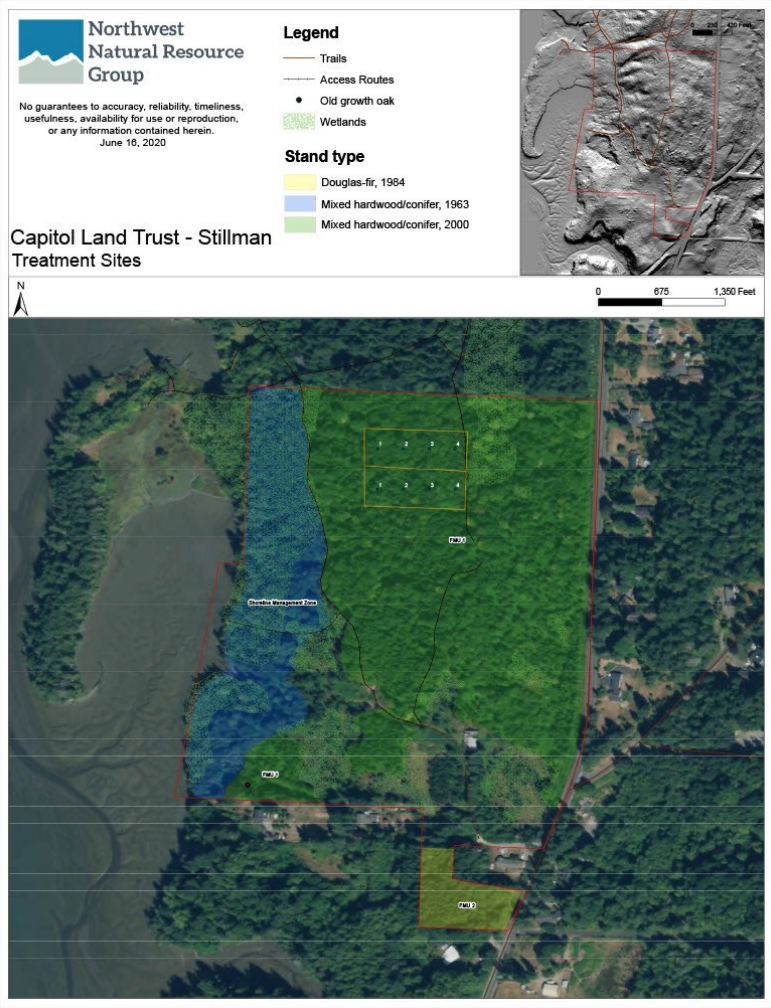
5. Coppicing bigleaf maple stumps were common throughout the stands. Thinning would allow for either their removal, or reduction in stem density.

TREATMENT PRESCRIPTIONS

In order to study growth rates between a thinned and unthinned stand, one treatment site was thinned and the other left at its original density. Thinning of Treatment Site 1 occurred primarily from below, releasing the most dominant trees with the highest timber quality of each species. Storm damaged trees that were not expected to yield merchantable timber were also removed.

1. 200 – 250 TPA (13’x15’)

2. No Treatment



PCT treatment sites at the north end of the property.

LABOR & OTHER COSTS

Thinning was conducted by two chainsaw operators. Thinning occurred during the dormant season in order to avoid damage to the bark of residual trees, facilitate movement of the operator through understory brush, and to avoid the wasp season.

	Treatment 1 (200—250 TPA)	Treatment 2 (No Thinning)
Labor	2 workers, 14 hours combined	NA
Cost	Flat rate $475/acre ($600 total for 1.25 acres)	NA
Fuel	4.65 gallons+	NA
CO2 Emissions	91.3 lb CO_2++	NA

+(assumption: 0.25 gallons of gas/45 minutes/worker)
++(assumption: 19.64 lbs CO_2/gallon)

PRE-TREATMENT PLOT DATA

(Trees >4.9” DBH)

Treatment	Acres	Avg TPA	Avg DBH	Avg Ht	Avg LCR	Avg % Defect
Treatment 1	1.25	250	10.0”	47.2’	45.6%	11.4%
Treatment 2	1.25	210	8.3”	57.1’	55.6%	4.76%

POST-TREATMENT PLOT DATA

(Trees >4.9” DBH”)

Treatment	Acres	Avg TPA	Avg DBH	Avg Ht	Avg LCR	Avg % Defect
Treatment 1	1.25	260	10.2”	46.4’	37%	8.9%
Treatment 2	1.25	215	8.8”	55.0’	46.1%	2.5%

ANALYSIS

Although all trees were inventoried within each plot, only dominant trees >4.9” DBH tall were included in the analysis in order to focus on competition between canopy trees.

KEY LESSONS LEARNED

- The pre-thinning stand composition was very heterogeneous with trees occurring in clumps at high densities. Thinning allowed the remaining trees to be spaced more evenly, which should eventually result in improved growth across the stand.
- Thinning provided material that was aggregated into wildlife habitat piles and constructed habitat logs that provide important habitat structures otherwise missing in the forest.
- Although the stocking density of the dominant trees did not change much from pre– to post-thinning, the majority of the thinning was focused on removing understory trees that occurred at very high densities and would have eventually begun competing with overstory trees.
- Although thinning was used to reduce the density of overstory hardwoods, it also resulted in a significant increase in naturally regenerating hardwoods, in particular alder, bigleaf maple, and cascara.
- The target density for thinning may not have been low enough to forestall the continued reduction in live crowns, as average live crowns declined by an additional 20% over the two years following thinning.