



HARDWOOD

PRE-COMMERCIAL THIN #1

Site Summary

- Stand type** 20 year old red alder, naturally regenerated
- Location** Bucoda, WA
- Soils** Centralia Silt Loam
Site Class II
Site Index 135 (DF)
Site Index 80 (RA)
- Aspect** Flat to easterly
- Elevation** 400'

Treatment Variables

- Design** Three 1.0 - 1.5-acre treatment sites. Four 1/20th-acre plots per acre.
- Type of labor** Individual chainsaw operator
- Other species** Bigleaf maple, cascara, bitter cherry, grand fir, western redcedar, Douglas-fir.

STAND DESCRIPTION (PRE-TREATMENT, 2020)

These stands naturally regenerated following clearcut harvesting approximately 20 years ago. The sites were not replanted and consequently red alder, and a wide diversity of other hardwoods and conifers, quickly colonized the area. Prior to treatment, stocking was heterogeneous and highly variable, ranging from 280 – 1,000 TPA, including all species and ages of trees. Cascara was the second most common hardwood, and maple primarily occurred as multi-stemmed stumps. Nearly 90% of the trees had diameters less than 4.5" DBH, and the live crown ratio of most of the dominant and co-dominant alder had receded to approximately 40%. Conifer regeneration was occurring throughout the understory, but was sparse and clumpy, with grand fir the most common species. A dense understory shrub layer was present beneath the porous hardwood canopy, with Himalayan blackberry dominant in many places, and salmonberry and sword fern comprising the bulk of the native species.

Species Per Acre								
Site	RA	CA	BM	DF	GF	CH	OT	All
1	530	210		15		15		770
2	370	150		105			55	680
3	185	123	123	13	103		10	555

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



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, bitter cherry, and maple.

TREATMENT CONSIDERATIONS

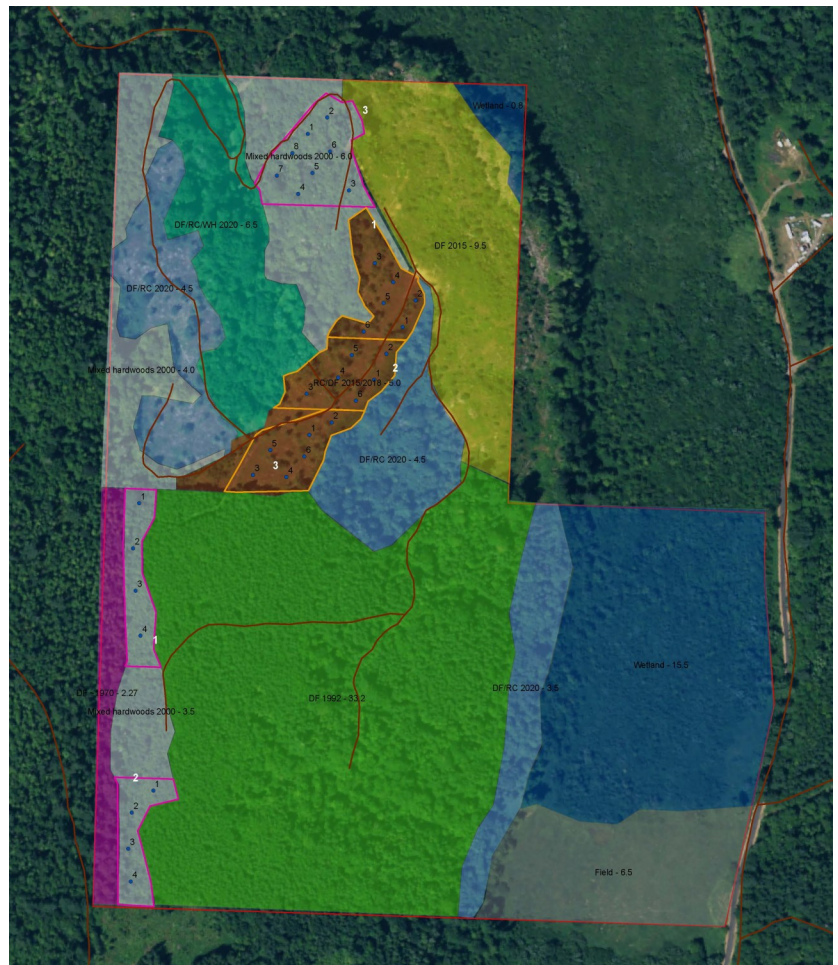
The decision to thin these stands was based on the following considerations:

1. The alternative to thinning was to clear the site and start over, which would incur a cost and lose 20 years of growth.
2. Dominant and co-dominant trees averaged nearly 6" DBH and retained >40% live crowns. At current growth rates, 8-10 years of additional growth should yield merchantable trees averaging 10" - 12" DBH.
3. Dominant trees have clear boles to at least 26', which is sufficient to produce a merchantable log.
4. Although continued height growth may be marginal, releasing the crowns of the dominant and co-dominant trees should maintain or improve diameter growth.
5. Cost-share assistance was available through the USDA's Environmental Quality Incentives Program (EQIP), thereby removing any financial disincentive to pre-commercial thinning.

TREATMENT PRESCRIPTIONS

In order to study growth rates of trees at varying densities, the stands were thinned to the following three densities. Thinning occurred primarily from below, releasing the most dominant trees with the highest timber quality of each species.

1. 180-220 TPA (14'-16')
2. 240-280 TPA (12'-14')
3. 300-400 TPA (11'-12')



PCT Treatment Sites Outlined in Pink.

HARDWOOD PRE-COMMERCIAL THIN

LABOR & OTHER COSTS

Thinning was conducted by an individual 50-year-old chainsaw operator. 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. Labor costs cited below have been averaged across each treatment site

	Treatment 1 (180—200 TPA) Per acre	Treatment 2 (240—280 TPA) Per acre	Treatment 3 (300—340 TPA) Per acre
Labor	1 worker, 8 hours	1 worker, 8 hours	1 worker, 8 hours
Cost	\$45/hr \$360/acre	\$45/hr \$360/acre	\$45/hr \$360/acre
Fuel	2.65 gallons ⁺	2.65 gallons ⁺	2.65 gallons ⁺
CO2 Emissions	52 lb CO ₂ ⁺⁺	52 lb CO ₂ ⁺⁺	52 lb CO ₂ ⁺⁺

⁺(assumption: 0.25 gallons of gas/45 minutes/worker)

⁺⁺(assumption: 19.64 lbs CO₂/gallon)

PRE-TREATMENT PLOT DATA

(Trees >30')

Treatment	Acres	Avg TPA	Avg DBH	Avg Ht	Avg LCR	Avg % Defect
Treatment 1	1	392	5.8	46	29	9
Treatment 2	1	456	5.6	46	33	8
Treatment 3	2	613	4.8	44	33	4

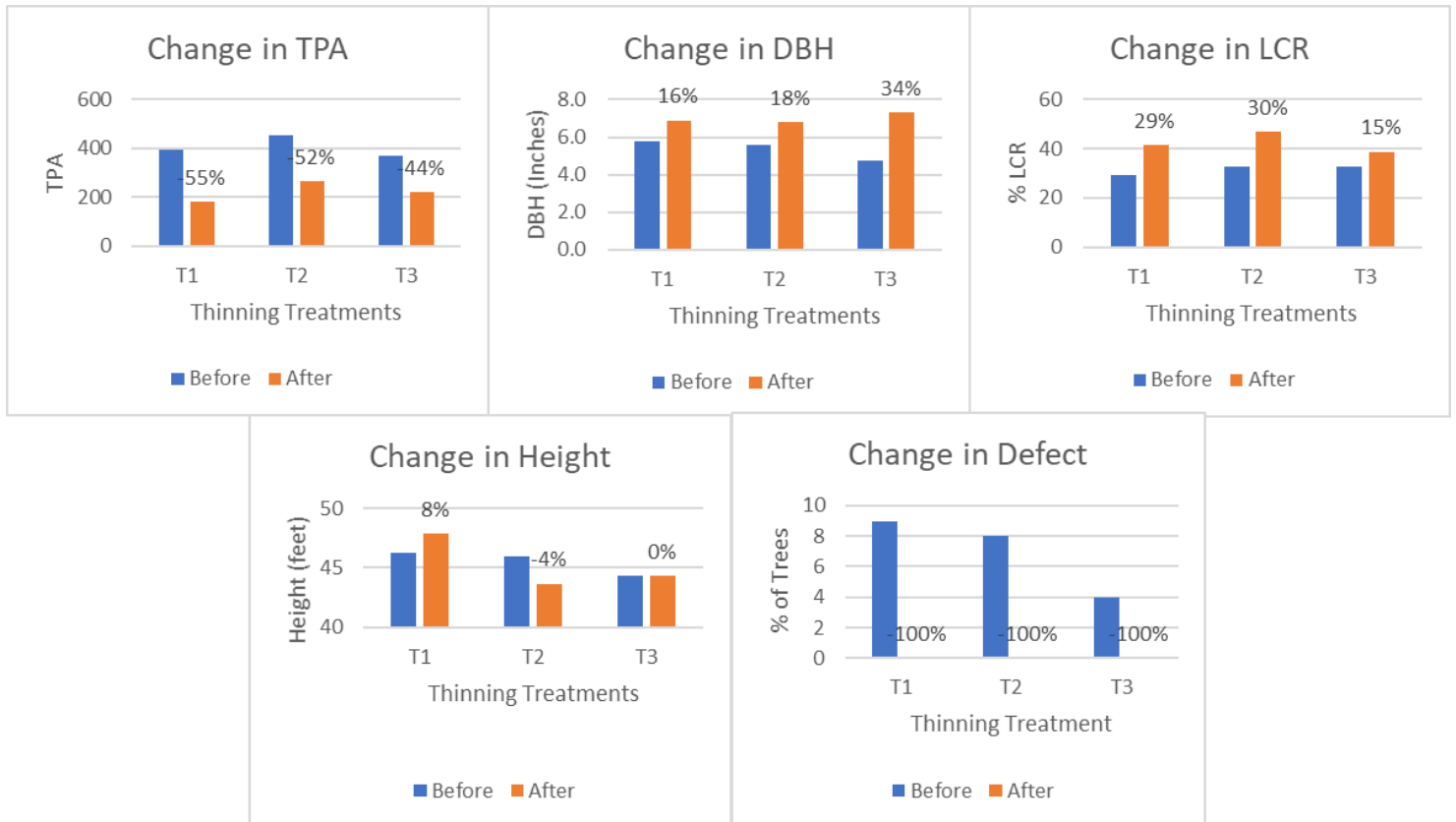
POST-TREATMENT PLOT DATA

(Trees >30')

Treatment	Acres	Avg TPA	Avg DBH	Avg Ht	Avg LCR	Avg % Defect
Treatment 1	1	180	6.9	48	41	0
Treatment 2	1	264	6.9	44	47	0
Treatment 3	2	347	7.3	44	39	0

ANALYSIS

Although all trees were inventoried within each plot, only dominant trees >30' tall were included in the analysis in order to focus on competition within the canopy. Given the high degree of heterogeneity across the three treatment sites, plots with similar post-thinning stocking densities were compared to one another across all treatment sites vs. a treatment site to treatment site comparison.



KEY LESSONS LEARNED

- At 20 years of age, the stand still retained sufficient trees (>180 TA) with >40% live crowns to justify releasing.
- Given the heterogeneous stocking density of the stands, achieving an even distribution and spacing of trees during thinning was difficult. Trees tended to occur in clumps with small canopy gaps in between clumps. Therefore, clumps were often left at a higher density if gaps occurred to the south providing sunlight.
- It took a 50-year-old operator approximately eight person-hours to cut an acre of trees and lop-and-scatter the cut material. The operator was able to operate a saw and conduct manual labor for approximately six hours/day. A smaller and lighter weight saw (e.g. Stihl 170 w/14" bar) was preferred over a heavier saw (e.g. Husqvarna 550 w/20" bar).
- Trees that are 15' - 20' shorter than the dominant and codominant trees are unlikely to exert an adversely competitive influence on dominant trees and can be retained if they are sufficiently shade tolerant and add diversity to the stand. Species include: grand fir, western hemlock, western red cedar, and bigleaf maple.