

KMRD Beach Fringe Wildlife Habitat Restoration-Shoal Cove Area

What are we proposing to do?

Improve wildlife habitat in older, previously clearcut stands in the beach buffer where dense conifer regeneration (stem exclusion) has eliminated the forage understory and reduced structural diversity. These stands would be thinned using a variety of silvicultural prescriptions per stand to accelerate the development of old-growth habitat components while not increasing the risk of windthrow. Thinning slash would be removed from the site to prevent creating an impediment to wildlife movement. By-products may include small saw timber, firewood, and bulk chips; amounts would vary by stand and designated prescriptions. Removal would be accomplished without the use of new road construction through a barge operated skyline logging system. This harvest system differs from previous A-frame beach harvest in that it offers the potential to achieve partial, full and above the canopy suspension for the removal of by products. Removed stems would be brought to the barge processor and any un-utilizable wood chips would be returned to the stand and scattered.

Specific Stand Objectives include:

- Interrupt the existing stem exclusion and accelerate the transition back to old growth conditions present before harvest.
- Preserve key habitat components such as existing snags (while operating within safety constraints), larger residual trees, “unique” trees, and natural clumped distribution of trees, and interlocking crowns.
- Open portions of stands to allow more light penetration and facilitate regeneration of understory shrubs and forbs.
- Reintroduce biological diversity into stands by promoting more complex stand structure such as large crowned, dominant trees, large future snags, and large down wood.
- Maintain untreated portions of the stands to provide security, snow interception, thermal cover, and a refuge for species sensitive to disturbance.
- Protect and promote western red cedar for species diversity.

Why are we proposing this activity?

Low elevation, coastal old-growth habitat is important to deer and marten during the winter due to snow interception and forage availability. It provides foraging habitat and large denning/nesting trees, snags, and down logs for river otter, bear, and goshawk, and bald eagles. The diverse old-growth understory supports a variety of prey species. Cedar, a valuable habitat component which provides good rain/snow interception within old growth, is being eliminated from sites due to species competition. Alder is also gradually disappearing over time resulting in further loss of habitat diversity. Increased mortality of suppressed and intermediate stand components is decreasing vertical structure diversity and increasing slash in the understory. Although beach buffers are now protected due to their importance to most wildlife species on the Tongass, areas in stem exclusion provide little to no habitat value.

Forest Plan direction for Beach and Estuary Buffers emphasizes wildlife and old growth habitat; restoration of previously harvested areas in the beach buffer is encouraged: maintain

an approximate 1,000-foot-wide beach fringe of mostly unmodified forest to provide important habitats, corridors, and connectivity of habitat for eagles, goshawks, deer, marten, otter, bear, and other wildlife species associated with the maritime-influenced habitat. Maintain an approximate 1,000-foot-wide estuary fringe of mostly undisturbed forest that contributes to maintenance of the ecological integrity of the biologically rich tidal and intertidal estuary zone. Old-growth conifer stands, grasslands, wetlands, and other natural habitats associated with beach and estuary areas above the mean high tide line are managed for near-natural habitat conditions with little evidence of human-induced disturbance (FP pg 4-4).

Wildlife habitat restoration of young-growth conifer stands is encouraged to accelerate development of advanced seral stand structure. Treatments may include thinning of young stands, release, pruning, and fertilization. Areas within the beach and estuary fringe are classified as unsuitable for timber harvest, however, timber harvest that does not count toward the Allowable Sale Quantity could be allowed as products of habitat restoration treatment (FP pg 4-5).

High Priority Stands for Treatment within the beach buffer include stands with a high degree of stem exclusion, low variability (stand structure, species), and relatively wind firm. Additional considerations include stands with large (5+ acres) alder patches and stands with good operational deflection.

What would happen if we did nothing?

Without treatment, stands would continue to provide minimal habitat and take decades to move toward an old growth condition. Impacts include reduced habitat carrying capacity, loss of habitat connectivity, and reduced wildlife numbers.

What are the wildlife benefits?

Retrospective studies of commercial thinning on the Tongass in the mid-1980s (Hanley 2005) showed large benefits to Sitka black-tailed deer (*Odocoileus hemionus*). When the understory biomass and species composition was evaluated on the basis of their food value to black-tailed deer (deer-days use per hectare), the thinnings could supported about five times the number of deer that could be supported by the untreated stands. Total understory biomass in the thinned treatments was about 10 times that in the untreated stands. The shrub component showed the second strongest response to thinning composing 46% of the total understory biomass and averaging more than 12 times that in the untreated stands. Biomass of the herb component (forbs, ferns, and graminoids) composed 11% of the total biomass and was almost three times that of the untreated stands.

Understory plant response to variable density thinning is rapid. Shrubs and forbs increase substantially and the amount of moss decreases (PNW Science Findings April 2009). Reduced conifer density means increased understory cover and diversity, more food and cover for wildlife, and increased wildlife diversity. Total abundance of birds and small mammals is generally higher in thinned than un-thinned stands. Development of understory likely increases food availability. In addition, tree growth within variable density thinned stands increased an average of 26 percent vs non-treated stands (PNW Science Findings April 2009). This creates large denning and nesting structures over a shorter period of time.

What do the stands currently look like?

Eight beach buffer stands in Carroll Inlet were visited between April 13 and April 24, 2009. Although not all folks visited every stand, the group included Steve Seley (Pacific Log and Lumber), Keith Rush (TNC), Boyd Porter (ADF&G biologist), Pat Haley (silviculturalist), Jill Reeck (wildlife biologist), Rob Reeck (forester/planning staff), and Christy Gardner (Sale Administrator). Clarence Clark (DNR), Thomas Hanley (PNW Research Station), Bill Hanson (USFWS), Paul Alaback (Research), and Richard Carstensen (Ecologist) have provided feedback on the project. The KMRD timber crew (Alan Braun, Tad Johnson, Ryan Mulvihill, and Jason Dean) collected stand exam information and ran profiles for us.

Carroll Inlet was selected because it has a lot of existing infrastructure, it has existing contractors and equipment in the area, the terrain is somewhat protected from high winds, and it is relatively close to Ketchikan. The area has an 80 year history of timber harvest activities of varying intensity. Much of the productive old growth has been harvested, both inside and outside of the beach buffer.

Stands ranged from approximately 45 to 65 years old. One stand (75306-110) is much younger than the database indicated. None of the stands appeared to have had any pre-commercial treatments and the stands are indeed in a stem exclusion phase of development, with ongoing natural mortality. Some stands varied greatly in height, stems per acre, and diameter due to changes in site index and aspect. Areas with higher canopy closure and more southerly aspects were relatively snow free, but drainage bottoms and more open areas on northerly aspects contained patches of snow 2-3 feet deep. Random larger trees were measured; spruce and hemlock were between 16-33 inches DBH and roughly 100-132 feet tall, larger alder were approximately 15" DBH. More specific test plot data was collected from stands 75306-72 and 75306-110 (see below). Isolated pockets of dwarf mistletoe were observed in most of the stands. Some stands contain isolated residual trees and snags although many of the snags and down logs are in the latter stages of decay. The understory is generally mossy; blueberry and huckleberry plants were occasionally found, but very little forage existed overall. We found a general lack of cedar regeneration, even though cedar stumps were noted and adjacent uncut areas contained cedar species. Red alder occupied old yarding corridors with little conifer understory, but some salmonberry and devil's club. The alder was nearing the end of its life expectancy, as some have fallen and others were starting to fall apart and die; some alder snags were present. There were few indications of deer use (trails, tracks, droppings, beds) even though portions of the stands had good snow interception. Younger stands and lower productivity areas generally had less snow interception ability, but depending upon topography, also contained more huckleberry and deer use. A few small isolated squirrel caches were found, but cone producing spruce trees are limited in many of the stands. Evidence of windthrow potential varied greatly depending on stand characteristics and aspect. Many of the stands have flatter areas that would be very conducive to ground based harvest machinery.

From a wildlife standpoint, two types of stands are present: older or higher productivity stands were essentially one story with weak intermediate trees occupying roughly the same canopy level as the dominant and co-dominant trees. These stands facilitate goshawk flight patterns and could be enhanced through gaps and thinning to provide habitat for prey species,

deer forage, marten denning and resting sites, small mammals, and shrub dwelling birds. Goshawks use all layers while hunting, but forage more often in the ground-shrub layer of the forest than in the shrub-canopy, tree canopy, and aerial zones. Therefore, understory structural characteristics that promote an abundance and availability of ground and low-shrub dwelling species, together with the availability of appropriate perches above this layer, are likely essential for goshawk foraging success (USFWS Queen Charlotte Goshawk Status Review, 2007 pg. 35). Weak intermediates are at higher risk of windthrow, which may limit the location of low retention gaps and how much of the stand is removed under gap prescriptions. The variable density thinning prescriptions would increase the amount of light reaching the ground, increase understory forage, and provide habitat for many prey species. Variable density thinning has also been shown to substantially increase growth on remaining trees (PNW Science findings #112, April 2009) which would favor development of large nest trees for bald eagle, goshawk, and woodpeckers, and large den sites for bear, and red squirrels. Vertical diversity in these stands can only be achieved through future conifer regeneration. Two storied stands could be present within 1-2 decades, but multi-storied stands may take decades to achieve since no vertical diversity currently exists.

The second type of stand was generally younger or on less productive sites. These stands have stronger intermediates with more crown so have potential for creating multi-story stands. Intermediate trees are generally more windfirm, creating more flexibility in the location and number of low density retention gaps and the opportunity to regenerate additional forage. Smaller diameter trees are experiencing high mortality with numerous dead stems present in the understory. These stands are less suitable for goshawks, but provide more vertical structure. Thinning would benefit multiple wildlife species similar to those described above and would also provide habitat in the future for species occupying taller shrub and mid-story canopy layers.

What treatment prescriptions are we proposing to restore wildlife habitat?

Prescriptions are designed to restore wildlife habitat and focus on special habitat structural components (niches) such as larger diameter residual trees, naturally clumped trees with interlocking crowns, forked or twin trees, trees with large lateral branches, scarred or damaged trees that will provide habitat for cavity nesters. Due to its very limited presence, all cedars and cedar regeneration will be retained and enhanced when encountered to help ensure continued presence on site. Individual trees that are not significantly contributing to the desired condition now or in the future will be removed to enable sunlight reaching the forest floor.

Four Major Prescriptions would be used within of each stand. The percentage of each prescription type will vary from stand to stand based upon existing stand condition, surrounding stand conditions, and the ability of the harvest system.

1. High Retention Variable Spaced Thinning
2. Low Retention Gaps
3. No Treatment (Skips)
4. Individual tree selection from the edges of the No Treatments.

1. High retention variable spaced thinning - The high retention thinning was designed to maintain a post harvest canopy closure of 55 to 70 percent for both wildlife objectives and to lessen future windthrow. Cedar and Sitka spruce trees, trees with unique wildlife features (e.g. forks, crooks, dead tops, decayed, etc.), dominant trees, and trees with large crown ratios and/or branches were preferentially selected as leave trees with no spacing guideline. Tight clumps of 2 to 10 trees were selected where available to achieve the desired canopy closure and to maintain interconnected canopies. Additional trees (filler trees) were left between clumps to maintain connectivity. High retention thinning areas will be used to connect Gaps and No Treatment areas.

- 55 to 70% post harvest canopy closure

- 35 to 85% of the area

- Moderate to moderately high snow interception ability

- Fair hiding cover and screening from predators

- Moderate crown connectivity

- Moderate density of snags and down wood

- Understory re-initiation area

- Horizontal tree diversity initiated by developing small groves and some inter grove connectivity with filler trees.

- Desired tree species (cedar, spruce) promoted/maintained

- Unique tree components promoted/protected

- Larger crown ratios and branch size promoted

2. Low retention Gaps (Gaps with reserve trees) – The low retention gap was designed to significantly increase the amount of light reaching the forest floor and to promote large open crown trees. Approximately 20 trees per acre will be left in each designated gap area. As in the High Retention thinning areas, leave trees were chosen to favor Cedar and Sitka spruce, trees with unique wildlife features, and trees with large crown ratios and/or branches. Gaps were targeted for portions of the stand with quality (e.g. huckleberry, bunchberry) forage potential, areas with little present variability, areas that were windfirm, areas dominated by western hemlock, or areas necessary for or near yarding corridors, etc.

- 10 to 25% canopy closure

- 15 to 35% of the area

- ¼ to 2 acres in size

- Open crown trees of all ages developed over time

- Strong shrub/forb component re-initiated

- Hiding cover developed over time

3. No Treatment – (Skips) The no treatment prescription was designed to maintain existing high canopy closure for snow/rain interception and thermal cover, wildlife travel corridors, security escape routes from predators, and to maintain existing snags. The no treatment prescription may also be used in wet areas that are dominated by salmonberry and devils club, wind prone areas, severe slopes with unstable soils, inoperable areas, etc.

- Greater than 75% canopy closure

- 15 to 35% of the area

- High snow/rain interception

- Good hiding cover and screening from predators

High crown connectivity maintained for squirrels
High density of snags and down wood for cavity nesters, marten, small mammals

4. Individual Tree Selection - Similar to High Retention, but would selectively remove individual trees to promote development of unique habitat characteristics (e.g. forage near a deer bed), release individual Sitka spruce and cedar trees on the edges of no treatments areas, release conifers being suppressed by alder in riparian areas, or to maintain windfirm edges.

How much Fuelwood/Biomass would be generated and what size are the trees?

The following summarized data was collected from test prescription plots on stands 75306-72 and 75306-110. Both stands were in the beach fringe within the stem exclusion structural stage. The stands can be stratified into blocks of high and low productivity and whether they contain remnant older trees. The data was collected on biased quarter acre plots that best represented the dominant stratifications.

Using averaged plot data for each prescription type, an example biomass yield was calculated for combined stands; mid-range prescription amounts were used as follows:

25% of the area in low retention gaps (including cable corridors)

50% of the area in high density thinning

25% of the area in no treatment areas

Combined Stand = 70 acres

323 trees/acre Averaged Potential Gap Harvest x (25% of 70 acres) = 5653 trees from Gaps
250 trees/acre Average High Retention thinning x (50% of 70 acres) = 8750 trees from Thin
TOTAL TREES COMBINED STANDS **14,403 Trees**

4022 cubic feet/acre Averaged Gaps x (25% of 70 acres) = 70,385 cubic feet from Gaps
2005 cubic feet/acre Average High Retention x (50% of 70 acres) = 70,184 cubic feet Thin
TOTAL CUBIC FEET COMBINED STANDS **140,569 Cubic Feet**

140,569 Cubic Feet x 0.025 tons/cubic foot (hemlock) = **3514 TONS OF BIOMASS**

Stand 306-72 North of Gnat Cove		Approx. 75 years old (High Productivity)	
Site Index	120-140		
	STAND	SITKA SPRUCE	W. HEMLOCK
Total TPA	208	8	200
Total BA	340 (180-260)	20	320
Total CU FT/AC	6881	580	6301
HIGH RETENTION THINNING		LOW RETENTION GAP	
Potential Harvest	2493 CU FT/ACRE	Potential Harvest	4809 CU FT/ACRE
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	0	4	0
6	0	6	0
8	20	8	20
10	32	10	32
12	32	12	40
14	16	14	20
16	12	16	28
18	4	18	20
20	8	20	8
22		22	4
24		24	8
26		26	4
Total Cut TPA	124	Total Cut TPA	184
Cut Basal Area	100	Cut Basal Area	240
HIGH RETENTION THINNING LEAVE TREES			
WESTERN HEMLOCK		SITKA SPRUCE	
Post Harvest Volume	3808 CU FT/ACRE	Post Harvest Volume	580 CU FT/ACRE
Total Leave TPA	76	Total Leave TPA	8
Approx Leave BA	220	Approx Leave BA	20
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	0	4	
6	0	6	
8	0	8	
10	0	10	
12	8	12	
14	4	14	
16	16	16	
18	16	18	4
20		20	
22	4	22	
24	12	24	
26	4	26	4
28		28	
30	12	30	

Stand 306-72 North of Gnat Cove		Approx. 75 years old (Low Productivity)	
Site Index	80-100		
	STAND	SITKA SPRUCE	W. HEMLOCK
Total TPA	428	4	424
Total BA	340 (180-260)	5	235
Total CU FT/AC	2249	112	2137
HIGH RETENTION THINNING		LOW RETENTION GAP	
Potential Harvest	1093 CU FT/ACRE	Potential Harvest	1761 CU FT/ACRE
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	116	4	116
6	100	6	100
8	84	8	88
10	56	10	68
12	8	12	36
14		14	
16		16	
18		18	
20		20	
22		22	
24		24	
26		26	
Total Cut TPA	364	Total Cut TPA	408
Cut Basal Area	240	Cut Basal Area	315
HIGH RETENTION THINNING LEAVE TREES			
WESTERN HEMLOCK		SITKA SPRUCE	
Post Harvest Volume	1158 CU FT/ACRE	Post Harvest Volume	0 CU FT/ACRE
Total Leave TPA	64	Total Leave TPA	0
Approx Leave BA	100	Approx Leave BA	0
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	0	4	
6	0	6	
8	4	8	
10	12	10	
12	28	12	
14	12	14	
16	4	16	
18	4	18	
20		20	
22		22	
24		24	
26		26	
28		28	
30		30	

Stand 306-110 Spit Point		Approximately 60 years old (Remnants)	
Site Index	100		
	STAND	SITKA SPRUCE	W. HEMLOCK
Total TPA	336	0	336
Total BA	240 (200-340)	0	240
Total CU FT/AC	6797	0	6797
HIGH RETENTION THINNING		LOW RETENTION GAP	
Potential Harvest	1523 CU FT/ACRE	Potential Harvest	4401 CU FT/ACRE
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	36	4	36
6	52	6	52
8	56	8	68
10	40	10	48
12	32	12	44
14	16	14	16
16		16	16
18		18	12
20		20	4
22		22	12
24		24	
26		26	
Total Cut TPA	232	Total Cut TPA	316
Cut Basal Area	120	Cut Basal Area	204
HIGH RETENTION THINNING LEAVE TREES			
WESTERN HEMLOCK		SITKA SPRUCE	
Post Harvest Volume	5274 CU FT/ACRE	Post Harvest Volume	0 CU FT/ACRE
Total Leave TPA	104	Total Leave TPA	0
Approx Leave BA	120	Approx Leave BA	0
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	0	4	
6	0	6	
8	8	8	
10	8	10	
12	12	12	
14	12	14	
16	16	16	
18	12	18	
20	4	20	
22	12	22	
24	12	24	
26	4	26	
28		28	
30	4	30	

Stand 306-110 Spit Point		Approximately 60 years old (No Remants)	
Site Index	100		
	STAND	SITKA SPRUCE	W. HEMLOCK
Total TPA	404	8	396
Total BA	240 (200-340)	12	228
Total CU FT/AC	6276	332	5944
HIGH RETENTION THINNING		LOW RETENTION GAP	
Potential Harvest	2912 CU FT/ACRE	Potential Harvest	5116 CU FT/ACRE
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	16	4	16
6	56	6	56
8	60	8	72
10	56	10	60
12	64	12	76
14	4	14	44
16	16	16	36
18	4	18	24
20	4	20	
22		22	
24		24	
Total Cut TPA	280	Total Cut TPA	384
Cut Basal Area	120	Cut Basal Area	228
Total TPA	404	8	396
Total BA	240 (200-340)	12	228
Total CU FT/AC	6276	332	5944
HIGH RETENTION THINNING - LEAVE TREES			
WESTERN HEMLOCK		SITKA SPRUCE	
Post Harvest Volume	3032 CU FT/ACRE	Post Harvest Volume	332 CU FT/ACRE
Total Leave TPA	116	Total Leave TPA	8
Approx Leave BA	108	Approx Leave BA	12
Diameter Class	Trees per Acre	Diameter Class	Trees per Acre
4	0	4	
6	0	6	
8	12	8	
10	12	10	
12	40	12	
14	20	14	
16	36	16	
18		18	8
20	4	20	
22		22	
24		24	
26	4	26	

Harvest Design features

Barge mounted Skyline Yarder with locking, motorized, slack pulling carriage with 200 ft side reach

100% Skyline

Ground base Harvester or Processor with Swing Yarder

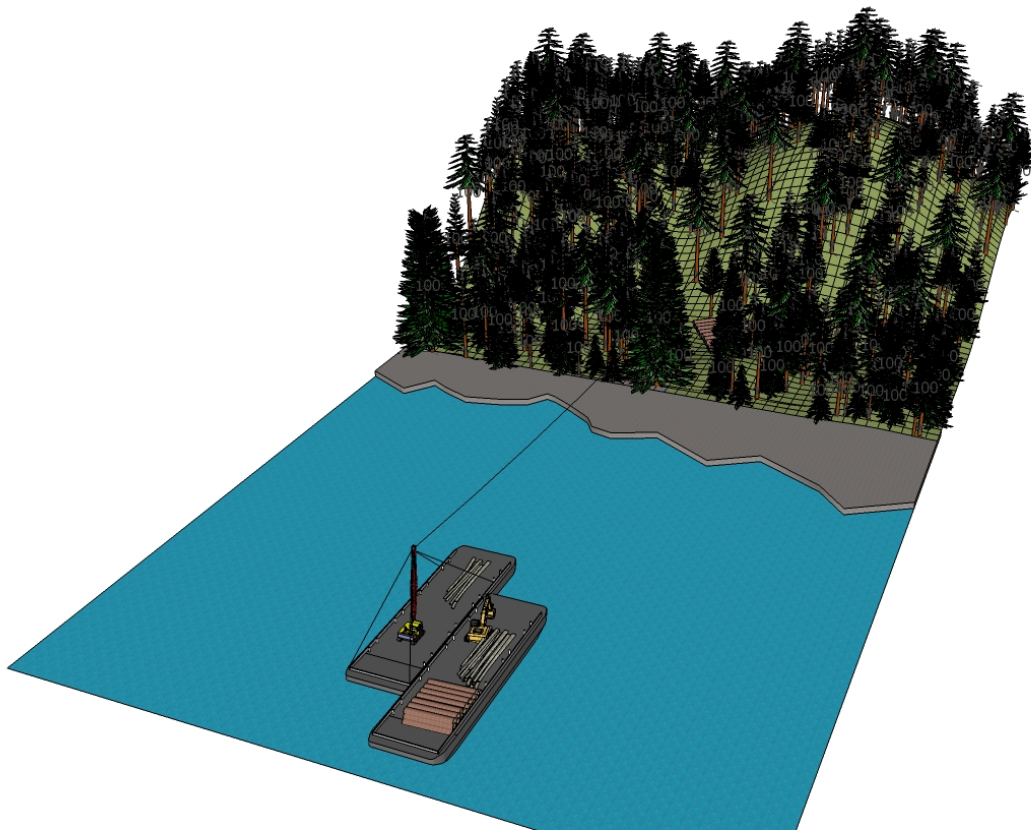
Ground base harvester or Processor with Direct Barge Loading

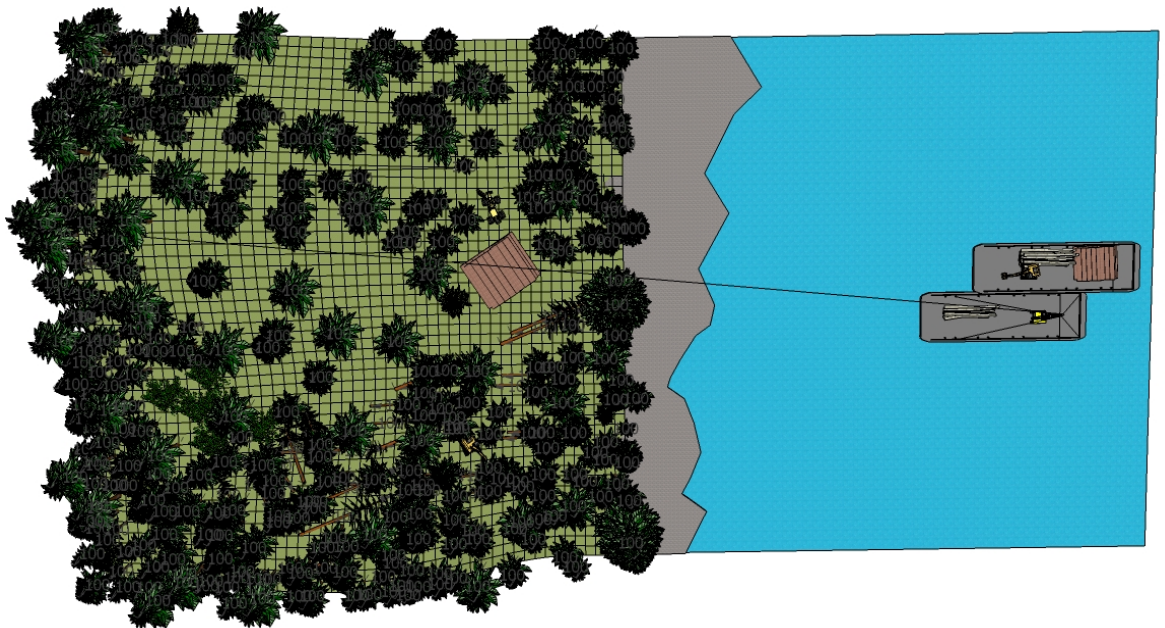
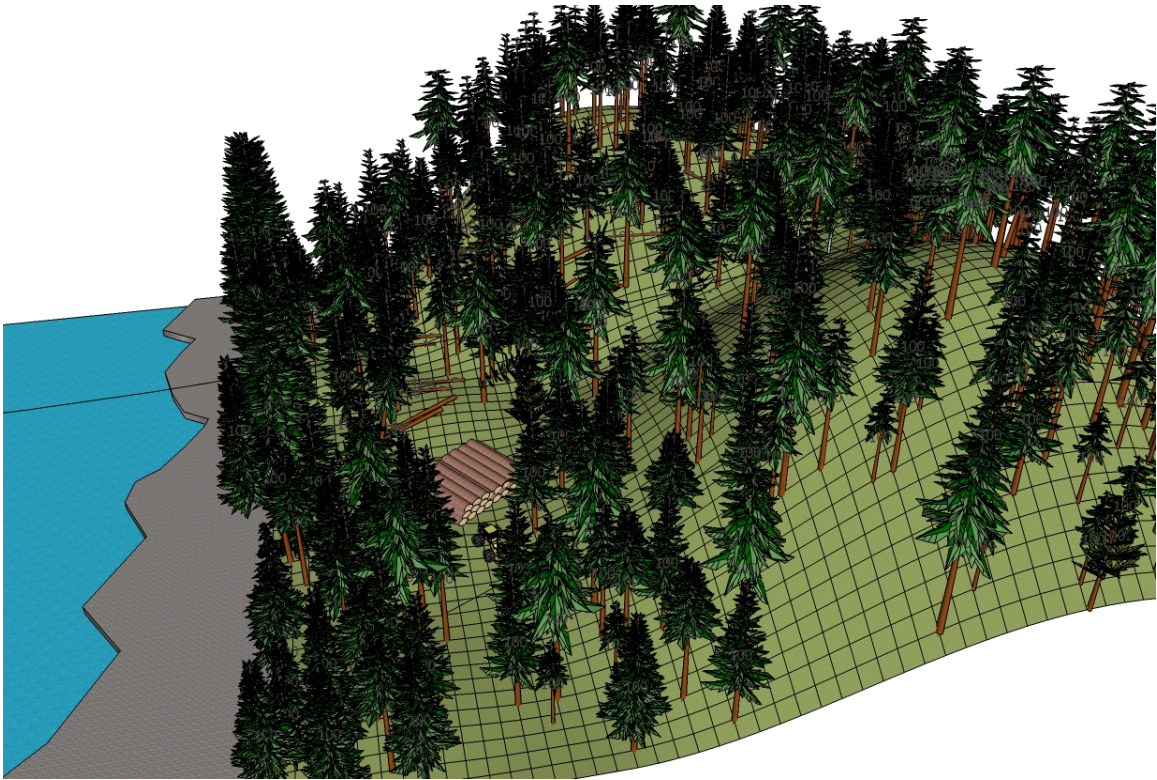
Narrow Corridors 15 to 25 feet

Tail hold Lift Trees

Intermediate supports

Minimum disturbance to trees lining the beach





Alternatives to what we are proposing.

One alternative would be to apply the above prescriptions without removal of materials. This has been done in the past and has limited benefits due to slash accumulation. A combination of thinning and girdling has provided better results, but is still not ideal as girdled trees will fall over time. Another alternative would be to incorporate ground based forwarding of products to extraction corridors and points on the more gentle ground where skyline deflection may be difficult to achieve. This would require additional equipment but could be more cost effective overall.

Economics

- Harvest Cost
- Other Cost
- Other Values

Stewardship

- Guided by Forest Service Statement of Objective of desired stand structure percentage and prescription marking guide
- Requires a detailed corridor by corridor harvest method and prescription plan
- Prescription location may be limited by logging system capability

Several Factors were identified that are important to any action.

- Steep unstable slopes or other fragile soil conditions
- Eagle nests
- Archaeological sites
- Fish habitat and other streams
- Skyline deflection
- Consideration of wind throw potential

Challenges

- NEPA – CE, EA or EIS which one do we need to use?
- State Permits and Interagency Coordination
- Stand variability and complexity require complex prescriptions to obtain desired restoration results. Needs field verification of each stand.
- FS marking crews or contractor locate prescription treatment areas
- Funding sources
- Contracting – uncertain timing of funding and contracting deadlines; who inspects or administers contract (unique from PCT or standard timber sale)
- Untried in Alaska – would be new industry
- Need for new and/or different equipment and skilled operators
- Need to develop market utilization of product
- Long-term supply and demand

Monitoring

- Effectiveness of treatments
- Browse species response
- Regeneration of forage species and alder

Damage to residual leave trees

Chip depth accumulation on the forest floor and decomposition rate

Harvest system efficiency and appropriateness for treatments of this kind

Future stand wind firmness and severity of blowdown