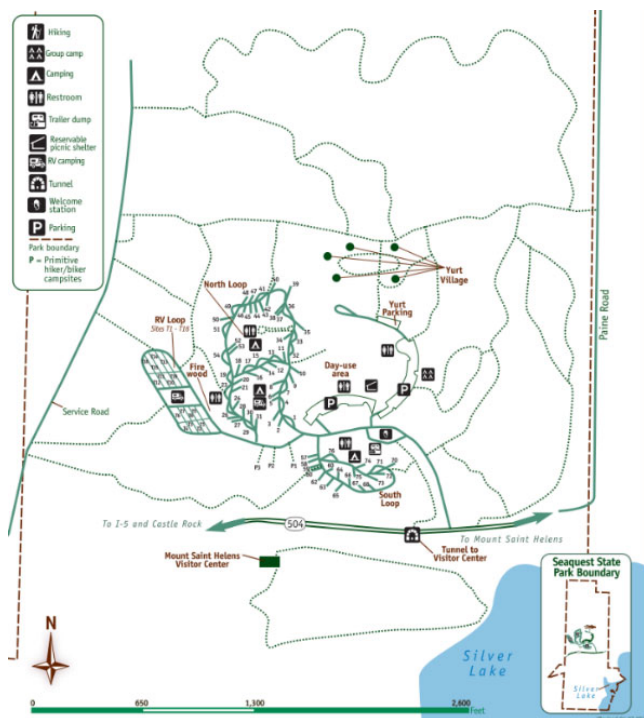


SEAQUEST STATE PARK SILVICULTURAL TREATMENTS



Sequest State Park is a 475-acre property in the Washington State Park system containing a visitors' center for Mt. St. Helens National Volcanic Monument, a campground, and an established trail system. Goals for the forested portion of the park include improving forest health through reduction in stocking, diversifying species composition, and accelerating the development of old growth characteristics. Previous reconnaissance and evaluations of stand conditions include the Rare Plant and Vegetation Survey of Sequest State Park (Smith and Morrison, 2006), the Forest Health Assessment and Management Plan for Sequest State Park (Ettl, G.J., Emmons, D., and N. Reep. 2009) and the addendum to the plan (Sequest State Park Forest Health Plan Addendum: Silvicultural Prescriptions for Stands 33, 33B, and 35 (Fischer, Raynham and Ettl, 2011). These reports indicated that thinning stands 33, 33A, 33B and 35 (Figure 2) covering an area of approximately 54.8 acres, would create future stand conditions that are conducive to attaining the stated goals. Stand 32 was excluded from treatment as it is primarily a riparian area.

Pre-treatment data collection included: 1) **graphical analysis** to determine percent of area in existing gaps (Table 1 and Fig. 2), 2) the establishment and measurement of systematically located **fixed-radius plots** to determine current and projected stand volumes, and 3) **coarse-level mapping** of salient features within the stands (Fig. 2). The prescribed treatment was based on the coarse-level surveys conducted in early 2013 and proposed thinning these stands with a variable density thinning technique known as "thinning with skips and gaps".

Skips (no entry areas) of approximately 0.5 acres in size, protect areas with desired features (in these stands, primarily concentrations of coarse woody debris). **Gaps** (openings) promote development of less common tree species, forest understories, and development of tree crowns. The mean gap size was 0.088 acres (35 feet in radius), but ranged from 20 to 40 feet in radius. **Thinning** the general matrix between the skips and gaps promotes forest health and development of tree crowns. This area was thinned from below to approximately 130 trees per acre in stand 33, 33A, and 35 (average spacing 18 feet). Dominant and codominant trees with large crown ratios (>30%) were favored for retention. Non-Douglas-fir species (primarily western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), bigleaf maple (*Acer macrophylla*), and red alder (*Alnus rubra*) were not cut. Non-Douglas-fir tree species greater than 9" DBH in the matrix were given an area equivalent to double spacing (36 feet) except if located in a previously marked skip, gap or no-thin area. The prescription also included recommendations for underplanting and treating invasive plants, as well as opportunities for future interpretive features.

Table 1. Intensity of skips and gaps within the stands.

Stand	Existing		#	Add'l		%	#	Total		Matrix	Select
	Total Acres	Gap Acres		Gap Acres	Gap Acres			Skip Acres	Skip Area	Thin Acres	Thin Acres
33	34.3	0.5	16	1.4	1.9	5.5	7	3.6	10	18.6	7.7
33B	16.1	0.6	9	0.8	1.4	8.6	3	1.6	10	0	13.4
35	37.3*	1.7	12	1.1	2.8	7.5	5	2.6	6.9	13.9	12.9

Figure 2. Salient features were mapped. Features included snags, accumulations of CWD, less represented tree species, existing gaps (including root rot pockets), wildlife use, and microsites that would help maintain diversity within the stand.

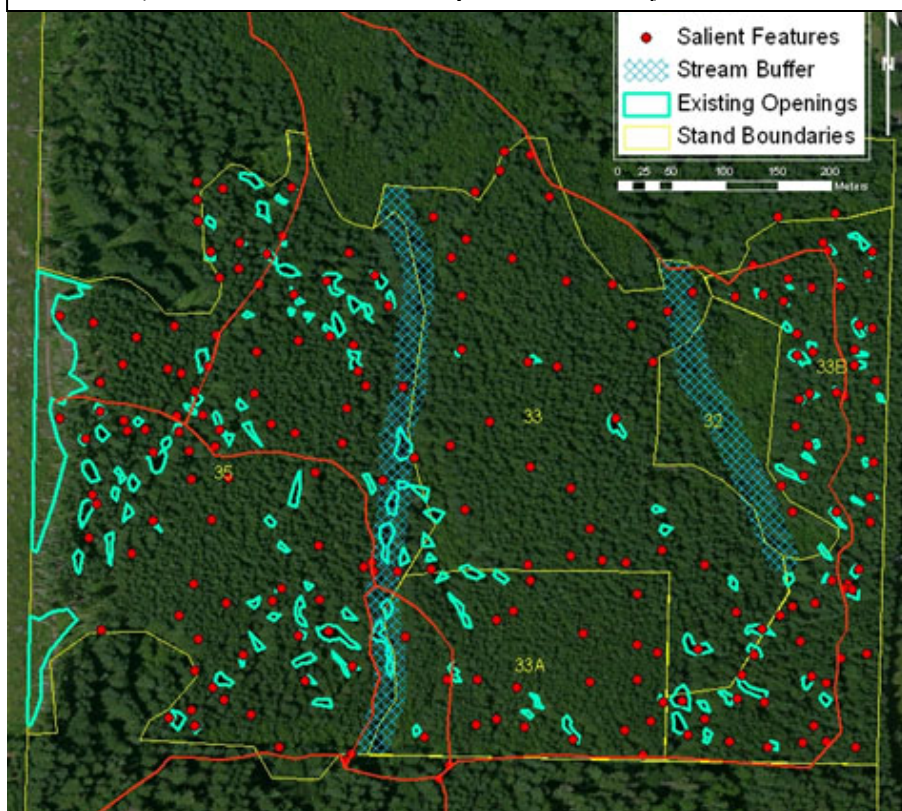
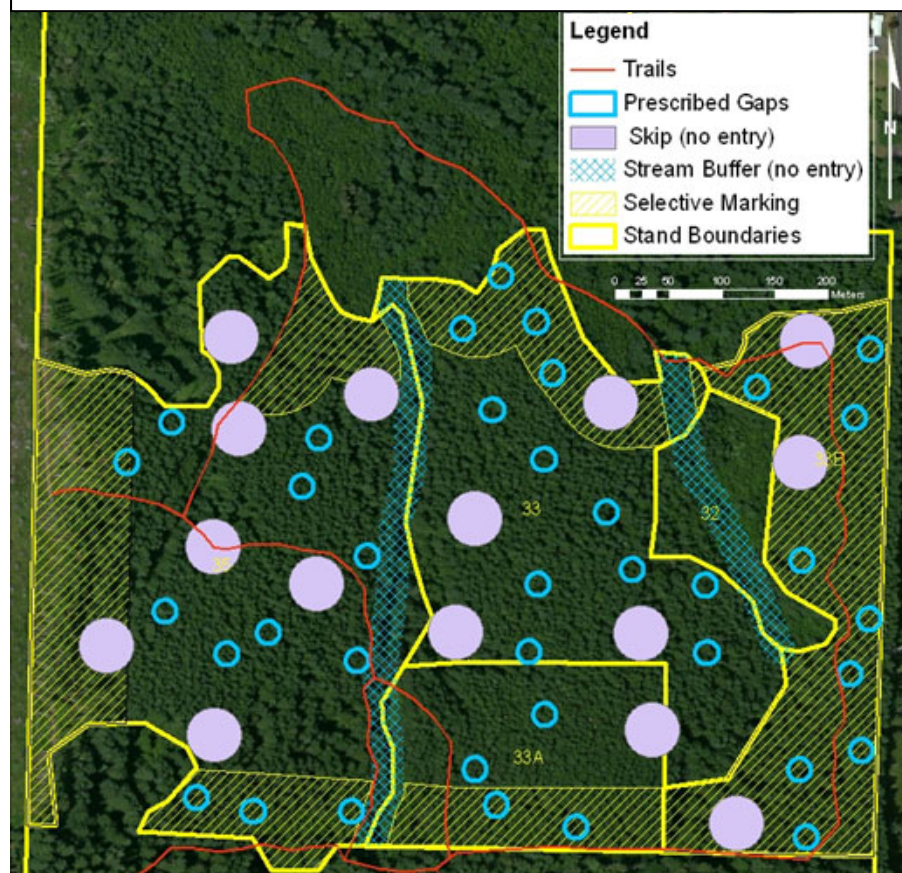


Figure 3. Mapping of prescribed 'skips' and 'gaps' within the stands helped those monitoring compliance relocate them even if inappropriate cutting had taken place.



Location of skips and gaps

Based on the mapping data (Fig.2), skips were located to protect groups of desirable stand features that would be disturbed by the logging process. They were distributed within each stand to facilitate access to the trees to be harvested and to protect a variety of feature types. They were marked with a perimeter of pink 'flashers' that will be easily visible to equipment operators. Individual protected features (large stumps, and alternative tree species) were also flagged in pink.

Prescribed gaps retained existing tree alternate species (*Alnus rubra*, *Acer macrophylla*, *Thuja plicata*, and *Tsuga heterophylla*) and large shrubs such as vine maple (*Acer circinatum*), hazel (*Corylus cornuta*), Saskatoon (*Amelanchier alnifolia*) or elderberry (*Sambucus racemosa*). Smaller gaps were located primarily to release one or more individual trees of alternate species and consisted of cutting just 1-12 Douglas-fir trees. Fewer gaps were prescribed for stand 35 (5% of area) due to the stand's western exposure. Close to roads, where risk of invasive species and illegal entry is greater, gap sizes were kept small. Gaps were marked by painting the center cut tree with the radius of the gap in blue tracer paint (i.e. "G 30" denoted a gap radius of 30 feet).

In addition to skips and gaps, the prescription included several areas that included skips and gaps, but were not systematically thinned (Fig. 3). These areas included:

- 1) a 300-foot buffer on the western side of stand 35 which faces prevailing winds,
- 2) a 200-ft buffer along portions of the northern and southern edges of stands 33, 33A and 35 where the stands either include wet areas, border hardwood strips, or are already clumpy and variable in nature,
- 3) all of stand 33B in which the trees are already larger and more widely spaced.

More information: Brodie, Leslie C.; Harrington, Constance A. 2020. [Guide to variable-density thinning using skips and gaps](#). Gen. Tech. Rep. PNW-GTR-989. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 37 p.
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