RESIDUAL STAND DAMAGE FROM THINNING

YOUNG STAND THINNING & DIVERSITY STUDY

CASCADE CENTER *for* ECOSYSTEM MANAGEMENT

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ECOSYSTEM RESEARCH

EDUCATION

ADAPTIVE MANAGEMENT

background

Plantations established in western Oregon and Washington over the last 50 years often lack the broader range of habitat features found in older forests, or in young stands resulting from natural disturbances. These missing features include large live trees, large dead wood in the form of snags and logs, vertical and horizontal variation in tree canopies, and a significant component of broadleaf trees. Many feel commercial thinning and other forest practices in plantations can help restore these features. The *Young Stand Thinning and Diversity Study*, a collaborative effort of scientists and managers from the Willamette National Forest, Oregon State University, and the Pacific Northwest Research Station, is designed to evaluate the effectiveness of alternative thinning, underplanting, and snag creation practices.

Wounding of reserve trees is often a by-product of thinning operations. These wounds are potential means of entry for organisms causing decay and pitch rings. Forest managers are concerned that log defects associated with wounds may greatly reduce the economic benefits expected from thinning. In addition, tree scarring from logging leaves a negative visual impression. The objective in this component of the *Young Stand Thinning and Diversity Study* was to investigate residual stand damage in relation to various logging systems and thinning treatments.

study

Data for this study were collected on commercially thinned young stands on the Willamette National Forest in western Oregon. Species composition was dominated by Douglas-fir with scattered western hemlock and individuals or clumps of bigleaf maple. Trees were 30 to 50 years old and 10 to 12 inches in diameter at breast height. Slopes were relatively gentle, generally less than 20% for ground-based logging systems units and steeper in skyline thinning units. Ground-based systems included small tractor skidding and mechanized (cut-to-length) harvesting systems. For yarding, a small yarder (e.g. Koller 501) was used. Three different residual stand densities were prescribed: (1) heavy thinning (50 to 55 trees per acre [tpa]); (2) light thinning (110 to 120 tpa); and (3) light thinning with gaps (about 20% of the stand consists of 0.5 acre openings). Thinning left healthy dominant and codominant trees.

results

Scarring was the most typical damage to leave trees, accounting for 90% of the total damage in most cases. Frequency of scars was highest for the smallest scar size class (less than 24 square inches), and greatly decreased with increased scar sizes. Scarring by ground-based systems was more severe; scars were larger, and gouge and root damages were more prevalent than in skyline units. Ground-based

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systems also created more severe root damage by repeated passes of equipment and dragged logs. Figures **1** and **2** depict scarring locations from different timber harvesting systems. Damaged trees were highly concentrated near skid trails or skyline corridors. In the cut-to-length system the harvester caused more wounding (70% of total scars) to leave trees than did the forwarder (30% of total scars), but forwarder scars were larger and sustained severe gouging.

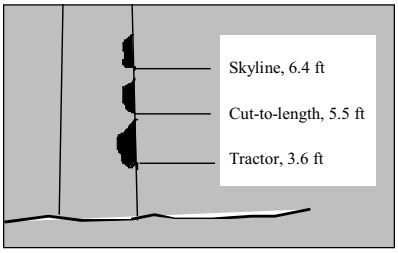


Figure 1. *Scar height from ground level for three harvesting systems.*

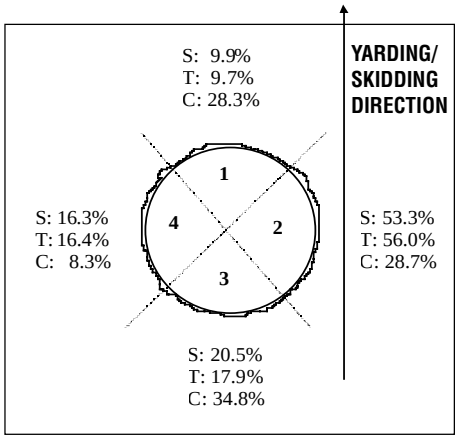
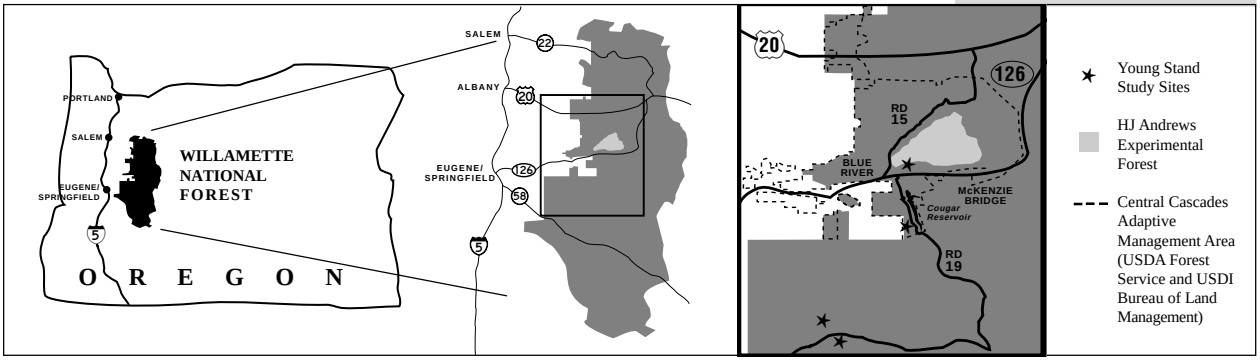


Figure 2. *Scar location by quadrant for three logging systems, averaged for all sites.*
S: skyline
T: tractor
C: cut-to-length

LOGGING SYSTEM (SALE)	THINNING TREATMENT	LOGGING SEASON	DAMAGE LEVELS (%) BASED ON THE MINIMUM SIZE OF SCARS			
			NO LIMIT	>24IN^2	>72IN^2	>144IN^2
skyline	heavy	winter	18.8	8.3	2.6	1.5
(Walk Thin)	light	summer	13.5	5.9	3.8	1.6
	LTw/gaps	summer	20.2	14.6	8.0	5.6
tractor	heavy	summer	25.4	18.7	10.0	4.5
(Mill Thin)	light	summer	18.4	9.8	3.9	3.9
	LTw/gaps	summer	9.2	6.6	4.6	3.6
tractor	heavy	summer	7.5	3.3	1.9	1.4
(Tap Thin)	light	spr/summer	20.2	14.6	8.4	5.1
cut-to-length	heavy	winter	34.2	19.2	6.8	4.1
(Flat Thin)	light	winter	41.3	14.3	4.7	2.3
	LTw/gaps	summer	31.9	22.2	10.4	6.9

Figure 3. *Logging damage levels listed by the minimum size of scars considered as damage.*

Damage can be effectively reduced by well-prepared thinning plans and careful logging. For example, yarding corridors can be located to minimize wounding of additional trees in *future* harvest operations, and leave trees adjacent to yarding corridors can be wrapped to prevent damage.



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