

Abstract:

Title: *Case Study: Growth of Douglas-fir on Cultivated and Non-Cultivated Skid Trails in Coastal Washington and Western Oregon.*

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Our objective was to quantify soil impacts and compare trends of tree survival and growth among the following treatments: logged-only (control, no soil disturbance); non-cultivated skidtrails; and cultivated skidtrails. Skid trail soil disturbance was classed into two categories: 1) A-horizon puddled and mixed with forest floor organic debris, and 2) some A-horizon removed and the rest mixed with B-horizon. Cultivation was accomplished with rock ripping shanks pulled by a caterpillar tractor, yarding was done with a skidder. For eleven clearcuts we report soil bulk density, survival, height and bole volume of Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*) through 18 years on three coastal Washington sites and through 10 years on eight western Oregon Cascade sites. The textures of the Washington coast sites were sandy to fine loamy with 12 to 40% clay content at the 40- to 50-cm soil depth, while the Oregon Cascade sites were characterized as fine to very-fine texture with 30 to 78% clay in the 40- to 50-cm soil depth. Average soil bulk density (0- to 30-cm depth) in ruts of non-cultivated skidtrails exceeded that on adjacent logged-only areas by 40% after eight years in coastal Washington and by 10% (0- to 40-cm depth) in Oregon after 4-5 years. At eighteen years mean seedling survival, height, and bole volume did not differ among non-cultivated, cultivated, and logged-only plots in Washington, where climate is mesic and soils have high organic matter content. At 10 years on the Oregon sites with finer soil textures, one-half the organic matter content, and more xeric climate; trees in skidtrail ruts averaged 13% more survival, but 8% less total height and 26% less volume than those on logged-only plots. Cultivating skidtrails consistently improved growth to equal that on logged only plots at all Oregon Cascade locations. For the last four years the tree height growth was equal on all treatments. Trees on the logged-only portions averaged 4.4 years to attain breast height compared to 4.4 years on cultivated and 5.1 years on non-cultivated skidtrails. Management implications are: 1) growth loss on compacted skid trails, as classed above and for differing soil textures, organic matter content and climate, can be completely ameliorated with cultivation, 2) growth impact data from one soil and climate type should not be extrapolated to other soil and climate types, 3) without cultivation, growth losses occurred during the first two to five years after planting, and 4) following the second or fifth growing season height growth was equal for all treatments.

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