

The Scotia Plantation: Implications for Multiaged and Even-aged Silviculture

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Abstract

The Scotia Plantation was established in 1982 on the large alluvial flat south of Scotia and adjacent to the Eel River. Seedlings, from local “woods run” seed sources, were planted on a 3.1 x 3.1 m (10 x 10 ft) grid. Site quality was very high, with site index averaging greater than 45 m (50 yr base). In 1997, the area was divided into blocks and a series of thinning treatments were randomly assigned to these blocks. Thinning treatments included alternate row, diagonal row, every-third row, a double-alternate row, and a low density treatment. Plots were established and measured in the winter of 2002 to 2003 and remeasured in 2007 after 5 growing seasons.

Stump sprout development following thinning treatments was very sensitive to available light resources. In the most heavily thinned treatment, the largest understory sprouts were up to 12.8 m (42 ft) in height and 12.7 cm (5 in) at dbh in only 10 years. However, at low light intensities many sprout clumps were completely dead. For example, in 2007 after 5 years, clump survival was only 9 percent in the third row treatment, but 100 percent in the low density treatment (O'Hara and Berrill 2010). Implications for multiaged silvicultural strategies suggest that treatments that create stump sprouts may not be sufficient by themselves for regenerating a new age class; additionally, light levels must also be sufficient to allow these sprouts to grow and survive. Our results suggest a light level of 40 percent of full sunlight is needed to sustain sprout height growth approaching 1 m/yr and light levels of 10 percent of full sunlight is needed for sprout survival. These sprout development results are published in more detail in O'Hara et al. (2007) and mortality patterns in O'Hara and Berrill (2010).

Volume increment for the Scotia Plantation was comparable to the fastest growing conifer plantations in the world. Periodic annual increment (PAI) ranged from 42.9 to 72.6 m³/ha/yr (613 to 1082 ft³/ac/yr) depending on treatment (*table 1*). Mean annual increment (MAI) ranged from 15.4 to 40.0 m³/ha/yr (220 to 570 ft³/ac/yr); MAI was considerably lower than PAI suggesting MAI was far from culmination and that these values underestimate potential productivity for the Scotia Plantation. These results are comparable to the greatest production from other conifer and broadleaf plantations around the world and demonstrate the enormous production potential of coast redwood.

Key words: *Sequoia sempervirens*, thinning, plantation management, forest production, coppice, sprout development

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Table 1—Volume production of four thinning treatments and one control from the Scotia Plantation through age 21 and 25 years. Values are means from 2 to 3 plots per treatment.

Treatment	MAI (21 yrs) (m³/ha/yr)	MAI (25 yrs) (m³/ha/yr)	PAI (2003-06) (m³/ha/yr)
Low density	10.3	15.4	42.9
Diagonal row	21.6	28.6	65.2
Alternate row	18.3	25.1	60.8
3rd row	21.2	23.8	65.7
Control	33.2	40.0	75.6

References

- O'Hara, K.L.; Stancioiu, P.T.; Spencer, M.A. 2007. **Understory stump sprout development under variable canopy density and leaf area in coast redwood.** Forest Ecology and Management 244: 76-85.
- O'Hara, K.L.; Berrill, J.-P. 2010. **Dynamics of coast redwood sprout clump development in variable light environments.** Journal of Forest Research 15: 131-139.