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Coast Redwood Regeneration Survival and Growth in Mendocino County, California

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ABSTRACT

Three stands of second-growth redwood forest were clearcut, and the logging slash in two of the units was broadcast burned following logging. Three types of redwood seedlings (plug, plug-one, and 2-year bareroot) were planted following logging and burning. Seedling survival rates were high, and there were no significant differences between survival and growth of stock types after 9 years. The native redwood sprouts were substantially larger than the planted seedlings, in both height and diameter, which could affect future growth of some seedlings. The status and dimensions of seedlings and native regeneration were periodically checked. The burned units were fully occupied by a dense, tall growth of brush within a few years, and the brush became re-established after a successful initial herbicide treatment.

Keywords: Seedling, sprout, broadcast burn, vegetation control, *Sequoia sempervirens*

Coast redwood (*Sequoia sempervirens*) is a species highly valued for wood quality, rot resistance, and fast growth. Redwood stumps sprout prolifically and redwood can readily reproduce by seed (Neal 1967, Boe 1975). Once cut at the base, a very high percentage of redwoods will sprout from the stump or base of the former tree (Barrette 1966, Lindquist 1989). Jackson Demonstration State Forest (JDSF) is located near the Pacific coast in central Mendocino County, California. In the Hare Creek watershed on JDSF, Lindquist (1989) determined that 93 percent of cut redwoods sprouted and that a total of 1,740 sprouts were established per acre.

In the redwood forest of western Mendocino County, redwood seedlings have been routinely planted in harvest areas since the early 1970s. During the 1960s, harvested areas were both planted and aerially seeded, but the majority of the second-growth timber harvesting conducted in this area was selective, so there was little need for planting. Large areas that had been harvested to remove residual old-growth trees were either planted or seeded during the 1960s. From 1930 to 1960, most harvest areas were left to regenerate naturally.

This study was initiated in part to test the hypothesis that larger seedlings would grow better than the plugs that were most commonly planted locally. Bareroot seedlings and plug-one seedlings may have been planted successfully at the time this study was initiated, but they were not produced locally on the Mendocino Coast or commonly planted on JDSF. We examined seedling survival and growth, natural redwood regeneration, and stocking by competing species of hardwood and brush.

Materials and Methods

The Caspar Creek watershed is located in JDSF. The watershed is forested by second- and third-growth redwood/Douglas-fir

(*Pseudotsuga menziesii*) forest. The second-growth forest developed naturally following clearcutting of the old-growth forest in the late 1800s. The harvested units are located approximately 6 miles from the coast at an elevation between 400 and 1,000 ft (Figure 1).

Between May 1989 and May 1990, three stands of second-growth were clearcut (Units J, K, and L), using both cable skyline and tractor yarding. Unit J had a south- to southeast-facing aspect, whereas Units K and L had a primarily north- to northwest-facing aspect. Table 1 shows preharvest stand conditions for the three units.

The number of redwood trees in the three logging units was similar, but the available preharvest data included only stems larger than 12 in. dbh. It is quite common for stands of this type to contain many additional smaller stems with a variable spatial distribution. No information is available concerning the spatial distribution of stems in the stands, which ultimately affects the distribution of redwood sprouts.

Units J and L were yarded primarily by a skyline cable yarding system. Approximately 40 percent of Unit K was tractor yarded because of gentler upper slopes; the remainder was skyline yarded. Units J and L were broadcast burned in the fall of 1990. By the time broadcast burning occurred, most redwood stumps had already sprouted and grown for one season. Unit J had a burn that was relatively hot, which was attributed primarily to aspect. The burn in Unit L was most complete near the upper slopes of the unit, becoming less effective lower on the slope, where fall shade and fuel moisture levels remained high. Unit K was not burned.

Three types of redwood seedlings were planted along parallel transect lines approximately 200 ft in length, with the lines spaced 10 ft apart, in each of the three logging units. The transects were laid out in groups of three and oriented in the cardinal direction that placed lines as close as possible to directly up- and down-slope (either north-south or east-west). Each transect was planted with a

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