

Effects of intensity of forest regeneration measures on some ecosystem services in a nationwide Swedish field experiment

Effects on important ecosystem services (total and species-wise biomass production, distributed on tree fractions), of three regimes with different intensities of forest regeneration measures after clear-cutting were evaluated 24-27 years after initiation of a field experiment at 14 sites across Sweden. The three treatments, designated high (HI), normal (NI) and low (LI) respectively consisted of: mechanical site preparation and planting of large seedlings at 2 x 2 m spacing, with supplemental planting and pre-commercial thinning (PCT) when deemed necessary; standard local practices; and natural regeneration with no site preparation, artificial regeneration or PCT.

Over all, significantly more total biomass was found in the HI (53.6 ton ha⁻¹) and NI (40.8 ton ha⁻¹) treatments compared to the LI (23.5 ton ha⁻¹) treatment. For stem biomass, significant differences were found only between the HI and LI (37.0 and 16.5 ton ha⁻¹, respectively) treatments, and the same result was also found for living branches; HI (8.2 ton ha⁻¹) and LI (5.3 ton ha⁻¹). For foliage, the two managed treatments had significantly higher values, 7.5 ton ha⁻¹ (HI) and 6.3 ton ha⁻¹ (NI) compared to 3.0 ton ha⁻¹ for the LI treatment. Also for dead branches the highest value was found in the HI treatment (3.3 ton ha⁻¹), significantly higher compared to the LI treatment (0.7 ton ha⁻¹).

In addition to effects on biomass production and allocation, the regeneration intensity also influenced stand structure and composition. Hence, regeneration intensity may affect biodiversity, ecosystem functions and social values in a number of different ways.