

Economics of even vs. uneven-aged forestry: the case of Norway spruce

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An economic optimization model is specified to analyze forest management without any restrictions on forest management system. The data on forest growth comes from unique field experiments and is used to estimate a nonlinear matrix transition or size structured model for Norway spruce. The model includes nonlinear density dependent submodels for ingrowth, transition between the size classes and natural mortality. The economic model includes detailed harvesting cost specifications and the optimization problem is solved in its most general dynamic form. In optimal uneven-aged management the level of stand density is shown to be a cause of the density effects on natural regeneration. If the aim is volume maximization, even-aged management with artificial regeneration is superior to uneven-aged management. After adding regeneration and harvesting costs, interest rate and the price difference between saw timber and pulpwood, uneven-aged management becomes superior to even-aged management. In a forest management model with unrestrictive thinnings and natural regeneration the optimal rotation period increases with increases in interest rate, in cost of artificial regeneration and with decreases in timber price. When these parameter changes are high enough, the even-aged management solution always transforms into uneven-aged management.

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