

**ADAPTATION OF PRACTICAL SILVICULTURE IN A CHANGING WORLD –  
FEASIBILITY AND EFFECTS ON FOREST PRODUCTION AND ECONOMY  
FOR SOME FOREST MANAGEMENT SYSTEMS IN A BOREAL MOUNTAIN  
FOREST**

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We investigated four forest management systems, clear cutting, mountain forest selective cutting, group system and single tree selection system in two Norway spruce mountain forest stands. The sites are located 50 km southeast of Stjørdal in central Norway 600 m a.s.l., which is about 100 m below the alpine tree line in this region. The background for this experiment was that the forest owner wanted to examine alternatives to clear cutting with silvicultural methods where some trees were left in the stand to protect the regeneration against frost, to maintain the biodiversity and for recreational reasons in these kinds of areas in mountain forest. In twenty 400 m<sup>2</sup> systematically sampled plots we assessed vegetation type, regeneration, diameter of trees > 2.5 cm dbh, tree heights, annual growth from increment cores, tree quality, old stumps and wind throws. In addition, time studies of the four harvesting methods were performed close to each other in the area. Following mean values were estimated in the two stands before cutting: Area 7 hectares, volume 170 m<sup>3</sup> ha<sup>-1</sup>, mean diameter 23 cm, mean height 18 m, stems 550 ha<sup>-1</sup>, seedlings 150 ha<sup>-1</sup>, productivity 3 m<sup>3</sup> ha<sup>-1</sup> yr<sup>-1</sup>. The diameter distribution of the two stands was almost similar to a J-shaped curve, but a larger amount of trees in some medium and large diameter classes were observed. Annual increment indicated growth reactions 3 years after harvesting. However, most of the 230 m<sup>3</sup> harvested trees were medium and large sized. The operational costs were estimated according to time studies of the harvesting and extraction of 580 trees. Analyses of net present value, where bare land value and all future revenues and expenses were estimated and discounted backwards to the harvesting year, indicates less profitability in mature stands for group selection and selection system than clear cutting and mountain forest selective cutting. If a more uneven-aged forest is the goal in mature stands, a transition period with a careful mountain forest selective cutting is probably required as the first step, and then a selection system or group selection as the next harvesting.