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Abstract

Lessons on long-term structural Stability after selection cutting in uneven-aged and even-aged northern hardwood stands †

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Abstract: Selection cutting is defined as a tool for uneven-aged silviculture. Our study used several long-term data sets to investigate the structural stability in stands treated with different kinds of partial cutting. The management goal was to create and maintain a stable all-aged diameter-distribution like the one described by Eyre and Zillgitt (1953) and Arbogast (1957). We analyzed data from stands at Argonne Experimental Forest (WI), Dukes Experimental Forest (MI), Cuyler Hill State Forest (NY), Secord Hill State Forest (NY), and Anna Huntington Wildlife Forest (NY). The stands differed in their initial age structure. Those at Dukes and NY were uneven-aged and treated with single-tree selection system. Stands at Argonne were even-aged second-growth treated with selection-like cuttings. We determined changes through time in number of trees across 2.5-cm diameter classes, shifts in the shape and scale of the three-parameter Weibull function used to describe the diameter distributions, and dynamics of associated stand attributes. Long-term results differed dramatically. Findings showed that single-tree selection cutting created and sustained stable diameter distributions and uniformity of conditions through consecutive entries in uneven-aged stands. By contrast, these characteristics varied through time in the second-growth stands that had been treated with selection-like cuttings. Analysis also showed that the Weibull shape and scale parameters for stands under selection system migrated towards those of the recommended target diameter distribution in the uneven-aged stands. These parameters diverged from the target with repeated use of selection-like cuttings in the second-growth even-aged stands.

Keywords: Diameter distribution; second-growth; structural attributes; long-term changes; three-parameter Weibull

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