

Roll of Canopy Gaps and Functions in a Northern Hardwood Ecosystem



“Ecology and Silviculture of Northern Lake States Forests”

A research work unit of the USDA Forest Service North Central Research Station

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Study Briefing

Established 1995, Nicolet National Forest, Wisconsin

Purpose: Today, forest managers in the Lake States struggle with the challenge of returning diversity to these hardwood forests, now mostly even-aged as a result of intensive logging around the turn of the century. These forests lack the age and both species and structural diversity of pre-settlement hardwood forests.

Management guides have been developed that prescribe the creation of canopy gaps to bring the second-growth forests under uneven-aged management. These guides suggest creating small gaps, resulting in forests dominated by sugar maple. But very little is really known about the ecological response to such gaps. How big should gaps in a forest be, and will the effect vary by size and extent of gaps? What role do larger gaps play in maintaining biodiversity in these ecosystems? How do the costs and impacts of creating gaps in the canopy compare with the costs and impacts of present management guides? We need to understand the role of canopy gaps in managing our present Lake States northern hardwood forests to an appropriate condition to meet landowners goals whether it is to manage for high quality timber or restore old-growth characteristics.

Study Design:

The experiment uses a randomized block design, consisting of four blocks and six gap treatment sizes (control or no cutting, 20, 30, 60, 100, and 150 ft diameter), replicated three times. The residual stand was thinned to about 85 ft²/ac basal area. Block size was 40-60 acres. Study was installed in 1995.



Sugar maple seedlings in a 30 foot gap.

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Yellow birch seedlings in
a 60 foot gap.



Red raspberry dominating a
150 foot gap.

Research History:

Pre-Harvest (1994) and Post-Harvest (1995, 1997, 2000) measurements were taken.

Publications:

Strong, TF, Zasada, JC, and Wiese, AH. 1998. The effects of canopy gap size on the microclimate and understory vegetation in a northern hardwood forest. In: Third International Conference on Forest Vegetation Management: Popular Summaries, 1998, Aug. 24-28. Ste. Sault Marie, Canada. Ontario Forest Research Information Paper No. 141. 323-325

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Nauertz, EA, Buckley, DS, Teclaw, RM, Strong, TF, and Zasada, JC. 1998. Effects of silvicultural treatments and forest structure on temperature at various levels in northern hardwood forests. In: Proceedings of the North American Forest Ecology Workshop; June 24-26, 1997. Raleigh, NC. 253-256.

Potter, BE, Strong, TF. 2002. Comparison of simulated stem temperatures and observed air temperatures with observed stem growth in forest openings. In: Proc. Of the 25th Conf. on Agricultural and Forest Meteorology. Norfolk, VA. May 20-24, 2002. 107-108.

A ten-year remeasurement is planned. Cumulative data is being analyzed for publication.

Investigators:

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