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Managing Carbon Sequestration and Storage in Northern Hardwood Forests

Carbon has an important role in sustainable forest management, contributing to functions that maintain site productivity, nutrient cycling, and soil physical properties. Forest management practices can alter ecosystem carbon allocation as well as the amount of total site carbon. Management for productive sites, long-lived species, full stocking, larger diameter classes, and dead wood components will generally store greater amounts of carbon. Adaptive forest management effects on carbon dynamics have not been extensively studied in the Lake States. We initiated a carbon sequestration study to address these topics using the experimental framework of the Managed Old-growth Silvicultural Study (MOSS) being conducted currently in northern Wisconsin. MOSS is an extensive study investigating economic and ecological effects of traditional and adaptive forest management practices at operational scales. Silvicultural treatments aimed at restoring structural and compositional complexity in second-growth forests were applied in 2007-2008 across three replicated sites covering approximately 1,450 acres. MOSS treatments used in the carbon sequestration study include shelterwood, large gap thinning, small gap thinning, and passively managed controls. Coarse woody debris (CWD; i.e., larger-diameter standing and downed dead wood) has been added on half the area of active MOSS treatments. We are modeling carbon stored in forest overstory, saplings, and CWD based on measurements previously taken for the MOSS, and in fine woody debris measured during 2010. We are determining the carbon content of tree seedlings, shrubs, herbaceous vegetation, autumn litterfall, forest floor, and soils (0-30, and 30-70 cm depths). Laboratory analyses for carbon and nitrogen are in progress. The study will be repeated periodically in the future to determine how carbon pools change over time. The carbon sequestration study will help identify management practices that maintain or increase site carbon, and will also have important policy implications for carbon accounting and the use of woody biomass in energy production.

Challenges of Managing for Early Successional Forests and Associated Species



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