

# Productivity and Financial Viability of Natural Disturbance-Based Management in the Acadian Forest

*Michael R. Saunders, Project Leader*



## Co-PIs:

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## Graduate Students:

*Actively searching for M.S. student*

## Goals:

1. Quantify wood yield and financial performance of two gap-based silvicultural systems
2. Determine the productivity and economic tradeoffs of traditional silvicultural systems vs. those based on natural disturbance regimes (i.e., ecological forestry)

## Funding Organization:

[Northern States Research Cooperative](#)

## Related Publications:

Saunders, M.R., and Wagner, R.G.  
2005. Ten-year results of the Forest Ecosystem Research Program (FERP) – successes and challenges. *In*: Peterson, C.E., and Maguire, D.A., eds. Balancing ecosystem values: innovative experiments for sustainable forestry. Gen. Tech. Rep. PNW-GTR-635. U.S.D.A. Forest Service, Pacific Northwest Research Station, Portland, OR.

## Statement of Problem:

Within recent years, there has been a broad paradigm shift in forest management from an emphasis on production forestry towards an emphasis on ecological forestry. With this shift, much effort has been made to develop “disturbance-based” or “close-to-nature” silvicultural systems that are intended to maintain health and viability of forest ecosystems, to maintain or improve local and regional biodiversity, to protect and enhance ecological processes within the forest, and to increase other ecological services associated with the forest. However, maintenance of sustainable yield or economic viability with these silvicultural systems is almost never mentioned or is merely assumed to occur. This lack of a comprehensive economic and production analysis of these systems has been major roadblock to their application more broadly in the Northern Forest and elsewhere.

We intend to address this gap in our knowledge by using data collected from one of the oldest ecological forestry experiments, the Acadian Forest Ecosystem Research Program (AFERP), located on the Penobscot Experimental Forest in central Maine. AFERP tests two versions of a gap-based silvicultural system that mimics the 1% annual disturbance rate common to the Northern Forest. AFERP has undergone an entire cutting cycle and has over 10 years of longitudinal, individual-tree data. Existing growth patterns will be summarized and used to project the growth and economic returns for an entire 100-year rotation of each treatment with a calibrated version of the Northeast Variant of the Forest Vegetation Simulator (FVS-NE). Comparisons will be made among the two gap-based treatments, a simulated single-tree selection, and a simulated shelterwood treatment – two time-tested silvicultural treatments commonly applied in the Northern Forest. Specifically, we postulate that (1) growth and financial returns from gap-based silvicultural systems are between those achieved by uniform shelterwood and single-tree selection systems, and (2) growth and yield of stands using gap-based silvicultural systems can be accurately determined using FVS-NE, through decomposing stands into “gap-cohorts”, creating separate tree lists for each, and projecting each gap-cohort separately.

## Current Activities:

We are actively searching for a M.S. student to begin this work. Data collection for the project is largely done, with the exception of ancillary data for calibration of regeneration models within FVS-NE. A link to the M.S. announcement can be found [here](#).

