Effects of canopy openings on adjacent forest matrix
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Abstract – Do canopy gaps affect matrix?
Objective #1: Conduct a decadal review of disturbance-based silviculture effects in terms of forest growth and regeneration

Objective #2: Determine if responses in canopy opening gaps differ from those in adjacent forest matrix.

Introduction – Lack of “disturbance-based” silviculture knowledge and research

Premise: Forest species adapt to natural disturbance regimes that occur in their ecosystem

Conclusion: Silviculture producing patterns within limits of natural variability maintain ecosystem processes and biodiversity

Problem: “Disturbance-based” systems relatively recent and effects not well understood

Materials and Methods – Acadian Forest Ecosystem Research Program (AFERP)

Site: Penobscot Experimental Forest, Bradley, Maine.

Design: Complete randomized block

9 experimental units (8.7 to 11.3 ha)

Data used:

Overstory and saplings: Species, DBH, Condition

Regeneration: Species and Density

Importance Values (IV)

Discussion / Conclusion – Gaps affect adjacent matrix. More research needed.

Treatments:

- Gaps impact adjacent forest matrix
- Largest effect is on sapling recruitment
- Favored compositional goal species, but also competitors
- Low power, but observations consistent with knowledge of species responses in Acadian forest
- Evidence sufficient for further investigation

Practical Implications:

- Disturbance-based systems differ from traditional silviculture
- Implementation varies over time/space, which changes proportion of forest matrix affected by gaps
- These studies valuable for development and calibration of growth models
- Understanding canopy openings = better design and implementation of disturbance-based systems

References


Legend

RA Boundary
1997 Gap
2007 Expansion
Skid Trail
Sampled Grid point
Grid point

Change in Importance Values ([Rel. Freq + Rel. Dom. + Rel. Dens.] / 3)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Overstory</th>
<th>Sapling</th>
<th>Seedling</th>
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<td>Edge Gap</td>
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<td>Small Gap</td>
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<td>Aspen</td>
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<td>White Pine</td>
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<td>Fir</td>
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<td>Hemlock</td>
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<td>Large Gap</td>
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Δ IV: 0 – 5 = 0      5 – 10 = +      10 – 20 = ++      >20 = +++

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