Economic and Ecological Effects of Forest Practices and Harvesting Constraints on Wisconsin’s Forest Resources and Economy

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The Guild provides training, policy analysis, and research to support practicing foresters and allied professionals and to engage a broader community in the challenges of forest conservation and management.
Primary Questions

1. What is the scope of selected timber harvesting restrictions in Wisconsin, and the potential for the restrictions to shift forest harvesting from summer to winter months?

2. What are the economic consequences of the timber harvesting restrictions identified in question 1?

3. What are the ecological consequences of the timber harvesting restrictions identified in question 1?
Method Used to Address These Questions

- Reviewed existing scientific literature
- Held stakeholder listening sessions
- Mapped affected areas
- Analyzed harvest cases studies
- Conducted surveys of foresters and timber professionals
- Model economic effects
- Assessed ecological impacts
Project Partners

Bureau of Business and Economic Research

Labovitz School of Business and Economics
University of Minnesota Duluth
Driven to Discover

Applied Ecological Services, Inc.
Forms of Forest Management Constraints

Constraints occur in many forms and come from several sources:

1. Mandatory requirements which carry the force of law, such as regulations

2. Quasi-mandatory requirements such as those requirements imposed as a term of contract or by professional organizations as part of third-party certification or professional accreditation

3. Voluntary guidelines that are recommended but not required

4. Independent judgments made by foresters, timber professionals, or forest landowners.
Listening sessions

- May 5th, 2015, Rockbridge Sawmill, Richland Center
- May 7th, 2015, GLTPA Office, Rhinelander
Constraints Highlighted by Lit Review and Listening Sessions

• Prevent or control forest pests or diseases
  o Oak wilt and Annosum rot root
• Invasive Plants
• Threatened Species
  o Wood turtle, goshawk, other forest-nesting birds
• Forest Productivity
• Water Quality
• Biomass
Other issues

• Hunting / Outdoor Recreation
• Size of forestland holdings
• Distance to roads
• Forest certification
• Weather
• Crop-off
• Owner attitudes toward harvest
Constraints Highlighted by Lit Review and Listening Sessions

• Prevent or control forest pests or diseases
  o Oak wilt and Annosum rot root

• Invasive Plants

• Threatened Species
  o Wood turtle, goshawk, other forest-nesting birds

• Forest Productivity

• Water Quality

• Biomass
Case Studies

- 170 timber sale records from 23 counties
- Large and small private and public land owners
- Most sales listed months of allowable or prohibited operation
- Specific reason for timing constraints often not explicitly described
- Reasons for seasonal prohibitions varied greatly
Case Study Results

• 95% of harvests had a seasonal constraint
• Average timber sales allowed 6.5 months of operation
  • Particular months of allowable operation varied greatly by sale
• 94% did not allow spring logging
• 35% of sales required frozen ground
• 10% did not allow winter harvests
Case Study Results

- Pulp prices were significantly higher ($49 to $37) when July was included in the operable months.
- Sawtimber prices were significantly higher ($290 to $257 per MBF) for sales that were restricted to frozen ground conditions.
- Sale descriptions often did not specify why seasonal constraints were applied and rarely identified where multiple constraints overlapped each other.
Timber Professional survey

• Estimated response rate of 12% (55 of 445)
• Respondents from 27 of 72 WI counties
• 77% identified as independent logging operators
• 23% identified as a mill or primary wood user purchasing stumpage
Forester survey

- Response rate of 65% (245 of 377)
- 54 of 72 WI counties
- 60% identified as public agency foresters
- 26% identified as consulting foresters working primarily with family forest landowners
- 12% work for a mill, logger, or industrial forest landowner
Percent of timber harvests foresters apply a constraint to during a typical year.

- Water quality
- Winter harvest of aspen
- Soil/hydrological disturbance
- Recreation
- Rare species/wildlife
- Pests
- Oak wilt
- Invasive species
- Cultural or archaeological
- Biomass harvesting guidelines
- Annosum root rot
- Access/transportation

Percent of respondents

- 100%
- ≤99%
- ≤75%
- ≤50%
- ≤25%
- ≤10%
- Rarely/Never
Magnitude of impact timber professionals perceive harvest constraints to have on their operations in a typical year

- Negligible effect on our operation
- Minor effect on our operation
- Moderate effect on our operation
- Major effect on our operation

**Recreation Use Constraints**

**Wisconsin Biomass Harvesting Guidelines**

**Forest Health Protection**

**Protecting Soil Productivity**

**Water Quality Best Management Practices**

**Invasive Species Best Practices**

**Threatened and Endangered Species Protection**
Factors Affecting Stumpage Price According to Foresters Surveyed

<table>
<thead>
<tr>
<th>Factor</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health of Wisconsin timber markets</td>
<td>4.6</td>
</tr>
<tr>
<td>Proximity of timber sale to mills</td>
<td>4.3</td>
</tr>
<tr>
<td>Species of timber for sale</td>
<td>4.2</td>
</tr>
<tr>
<td>Competition between loggers</td>
<td>4.1</td>
</tr>
<tr>
<td>Timber quality</td>
<td>4.1</td>
</tr>
<tr>
<td>Size of the timber sale</td>
<td>4.0</td>
</tr>
<tr>
<td>Health of the United States’ economy</td>
<td>3.9</td>
</tr>
<tr>
<td>Seasonal timber harvesting restrictions imposed</td>
<td>3.8</td>
</tr>
<tr>
<td>Government regulations</td>
<td>3.5</td>
</tr>
<tr>
<td>Silvicultural prescription (i.e. thinning, clearcut, etc.)</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Average rating scale was developed using 1 = not important, 2 = of little importance, 3 = moderately important, 4 = important, 5 = very important
Survey Patterns

Water quality and soil disturbance practices were rated as the most costly but also the most effective and most widely supported.
Survey Patterns

T&E among least frequently applied but identified as a restriction with too much cost for the benefit by respondents.
Survey Patterns

Foresters and timber professionals indicated professional judgment based on available science was the most important reason they applied constraints.
Assessment of Economic Effects

• IMPLAN (IMpact analysis for PLANning)
• Model of how the economy is tied together
• Modeled statewide and regional data
• Forest based businesses and landowners classified in a diversity of industries
• Focused market shock on logging sector
  ◦ Estimated expanding logging season by one month would increase production between 5-10% based on harvest case study data
## Economic Effects Summary

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Employment</th>
<th>Labor Income</th>
<th>Value Added</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>193 to 386</td>
<td>$7.5 to $15</td>
<td>$8.3 to $17</td>
<td>$16 to $32</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>102 to 204</td>
<td>$2.6 to $5.2</td>
<td>$4.1 to $8.3</td>
<td>$7.1 to $14</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>64 to 127</td>
<td>$2.7 to $5.4</td>
<td>$4.7 to $9.5</td>
<td>$8.3 to $17</td>
</tr>
<tr>
<td>Total Effect</td>
<td>358 to 717</td>
<td>$13 to $26</td>
<td>$17 to $34</td>
<td>$32 to $63</td>
</tr>
</tbody>
</table>

• Compare to $23 billion direct output of the entire WI forest industry

• Forest resources protected by constraints are difficult to measure but potentially total in the billions of dollars
Assessment of Ecological Effects

The ecological effects of forest management constraints were evaluated in four categories:

1. Forest structure, composition and productivity
2. Wildlife habitat
3. Biodiversity
4. Water quality
Economic Effects Summary

Forest
- Northern goshawk
- Red-shouldered hawk
- Spruce grouse
- Acadian flycatcher
- Worm-eating warbler
- Kentucky warbler
- Cerulean warbler
- Hooded warbler
- Yellow-throated warbler
- Kirtland's warbler
- Northern blue
- American marten
- Wood turtle
- Queensnake
- Ornate box turtle
- Bell's vireo
- Slender glass lizard
- Karner blue
- Western ribbonsnake
- Eastern ribbonsnake

Aquatic
- Slippershell mussel
- Ellipse
- Rainbow shell
- Starhead topminnow
- Longear sunfish
- Striped shiner
- Redfin shiner
- Shoal chub
- Pugnose shiner
- Ozark minnow
- Gilt darter
- Slender madtom

Grassland

Wetland

Legend:
- Birds
- Reptiles
- Insects
- Bivalves
- Mammals
- Fish
## Economic Effects Summary

### Effect of Winter Harvest on Wildlife Habitat Indicator Species

<table>
<thead>
<tr>
<th>SGCN Indicator Species</th>
<th>Forest Type</th>
<th>Short Term Effects</th>
<th>Long Term Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Effect</td>
<td>Rationale</td>
</tr>
<tr>
<td>Sharp-tailed grouse</td>
<td>AB</td>
<td>-</td>
<td>Could eliminate or degrade winter food and cover in riparian habitat</td>
</tr>
<tr>
<td>Brown thrasher</td>
<td>OH, P</td>
<td>NP</td>
<td>Species not present during winter harvest</td>
</tr>
<tr>
<td>Red-headed woodpecker</td>
<td>OH</td>
<td>-</td>
<td>Potential to disturb wintering territories and food stores</td>
</tr>
<tr>
<td>Olive-sided flycatcher</td>
<td>LF</td>
<td>NP</td>
<td>Species not present during winter harvest</td>
</tr>
<tr>
<td>Least flycatcher</td>
<td>HW</td>
<td>NP</td>
<td>Species not present during winter harvest</td>
</tr>
<tr>
<td>Veery</td>
<td>LF, HW</td>
<td>NP</td>
<td>Species not present during winter harvest</td>
</tr>
<tr>
<td>Wood thrush</td>
<td>HW</td>
<td>NP</td>
<td>Species not present during winter harvest</td>
</tr>
<tr>
<td>Black-throated blue warbler</td>
<td>HW</td>
<td>NP</td>
<td>Species not present during winter harvest</td>
</tr>
<tr>
<td>Connecticut warbler</td>
<td>P</td>
<td>NP</td>
<td>Species not present during winter harvest</td>
</tr>
<tr>
<td>Red crossbill</td>
<td>P</td>
<td>-</td>
<td>Species sometimes breeds in winter depending on cone crop</td>
</tr>
<tr>
<td>Eastern red bat</td>
<td>HW, OH</td>
<td>NP</td>
<td>Migrates south for winter therefore not present during harvest</td>
</tr>
<tr>
<td>Northern flying squirrel</td>
<td>HW, P</td>
<td>-</td>
<td>Potential to disturb shelter trees and foraging habitat in vulnerable season</td>
</tr>
<tr>
<td>Woodland vole</td>
<td>HW</td>
<td>-</td>
<td>Active year round. Potential for direct take or, more likely, disturbance of habitat. Breeding may overlap</td>
</tr>
<tr>
<td>Woodland jumping mouse</td>
<td>HW</td>
<td>0</td>
<td>Hibernate and not active during winter harvest. (Hibernacula usually in well drained soils and therefore)</td>
</tr>
</tbody>
</table>
Environmental Effects Summary

• Forest management constraints are expected to have positive repercussions on forest composition, structure and productivity particularly over the long term.

• There is limited research on the efficacy of the forest management constraints, with the notable exception of water quality BMPs.
Conclusions

Some of the forest management constraints with the largest impacts are not directly related to or controlled by existing regulations or policies. Some of these factors (including the length of frozen ground conditions) may even become more limiting, not less limiting, in the future.

Overall our study confirms the widely held view that timber professionals are shouldering a disproportionately large portion of the costs of forest management constraints.

It may be possible to adjust forest management constraints so that they better balance positive and negative impacts; however, any adjustments must be based on sound science.
Thank you to all the individuals and organizations who provided data and helped make this study possible.