The Forest Resource and Sustained Yield Management

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Logger Viability Symposium
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Presentation Plan

- Define forest resources and sustained yield management (reference: silviculture)
- Reflect on current patterns of timber harvesting in New York (and a bit beyond) and effects on yields and forest systems
- A positive way forward (silvicultural, of course)

Forest Resources – Defined

Perspective #1
Measurable value (harvested outputs, or YIELDS)

The five renewable (and measurable / harvestable) resources:
- Wood
- Water
- Wildlife
- Recreation
- Range

Perspective #2
Forest ecosystem function and processes
- Energy capture and storage
- Water movement, quality and availability
- Nutrient cycling
- Soil stability and development
- Ecosystem resistance and resilience (normal functioning, biodiversity including wildlife)
- Regeneration and succession

System and Outputs (Yields)
Sustained Yield / Sustainability

Sustained Yield defined as:
harvest rates that are equal to or less than what is produced (producible) over a period

Sustain Yield depends in the long-term on:
a normal, functioning system (especially regeneration and ecological succession)

There are basically two approaches to harvest yield

1 – With Silviculture
   - Crown thinning in northern hardwoods
   - Diameter-limit cutting in northern hardwoods

2 – Without Silviculture

Why is silviculture sustainable?

ANS: investment into the system / controlled levels of harvest

Why is silviculture sustainable?

Two core forest management / silvicultural systems to produce sustained yields

Even-aged:
- Trees in a stand (community) are generally one age
- Methods: release, thinning, shelterwood, clearcutting

Uneven-aged:
- Three or more balanced age classes of trees
- Methods: single-tree, group
Yield control – even-aged systems

- AREA-WIDE CONTROL
- CONSIDER – 200-acre forest
  - (shown with 10-acre square stands)
- Stands grown for 100 years (rotation)
- Regeneration harvests – 10% of forest every 10 years
  - Tending select rest?
  - Volume control
- If system is maintained, can work across this forest in perpetuity
  - KEY: regeneration, tending

Yield control – uneven-aged systems

- AREA-WIDE CONTROL
- CONSIDER – 20-acre stand
  - (shown with 1/10 acre squares)
- Individual trees grown for 100 years (rotation)
- Regeneration harvests – 10% of each stand every 10 years
  - Tending the rest – yes!
  - Volume control
- If system is maintained, can work across this stand in perpetuity
  - KEY: regeneration, period of recovery

Why is silviculture supposed to work?

- A systems approach, with constant attention to both
  - Regeneration and Tending
  - CONTROL: timing, arrangement and species mix of trees
- Intensity of cut
  - Area control
  - Volume control

- Diameter limit/high grading. Why not sustainable?
It is a FACT that silviculture is used to guide only about 20% of timber harvests.

For documenting sources, see: Fajvan 1998; Nyland 2000; Pell 2000; Munsell et al. 2008

System and Outputs – Being Broken?

“The proof is in the pudding”

Sustainable

NOT Sustainable

1 – With Silviculture

2 – Without Silviculture

Crown thinning in northern hardwoods

Diameter-limit cutting in northern hardwoods

“The proof is in the pudding”

Summary

- Yield and systems – classically linked
- Silviculture recognized as the sustainable way of harvesting (yield) and protecting forest system
- Silviculture not commonly practiced

The Forest

Yield and residual state of forest
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Growth rate / removal ratio (GRR)

Growth Rate (G) = standing volume Time 1 – Time 2

Removal (R) = harvested volume over period Time 1 to Time 2

GRR = G / R

In general ...

If GRR ≥ 1, then we may have harvested sustainably

If GRR < 1 then we have over harvested and are likely not sustainable
Forest land ownership

A more realistic set of GRRs for NY: 1.1-1.5

North Region Growth & Removals (Private Timberlands)

<table>
<thead>
<tr>
<th>Hdwds</th>
<th>Inventory (billion cubic feet)</th>
<th>Removals (billion cubic feet)</th>
<th>% of Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>39.0</td>
<td>0.53</td>
<td>1.4%</td>
</tr>
<tr>
<td>2010</td>
<td>39.1</td>
<td>0.53</td>
<td>1.3%</td>
</tr>
<tr>
<td>2012</td>
<td>39.1</td>
<td>0.48</td>
<td>1.2%</td>
</tr>
<tr>
<td>2014</td>
<td>38.7</td>
<td>0.42</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Annual Change (0.1%) (3.6%) GRR=0.88

Evidence that the resources is being overcut / degraded

National Growth/Harvest Ratio (All Species – Private Timberlands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Inventory (billion cubic feet)</th>
<th>Removals (billion cubic feet)</th>
<th>% of Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>393.6</td>
<td>10.45</td>
<td>2.7</td>
</tr>
<tr>
<td>2010</td>
<td>401.2</td>
<td>10.25</td>
<td>2.6</td>
</tr>
<tr>
<td>2012</td>
<td>409.5</td>
<td>10.22</td>
<td>2.5</td>
</tr>
<tr>
<td>2014</td>
<td>418.0</td>
<td>10.11</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Annual Change 1.0% (0.6%) GRR = 1.4

Not all acreage available for harvest
The "System" and Outputs – Being Broken?

Yield → The "System" → Yield

Regeneration – not good ...

Regeneration of timber species in New York.

New forest on the way – not good ...

Summary

- Despite little silviculture – the State’s forest appear in good shape … but maybe not
- Possibly more realistic GRRs indicate a more precarious forest
- Regeneration and new forest – NOT good

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"Low Input" silviculture

- Commonly practiced
- Tending and regeneration done together in even-aged stands
- Practical, yet "seat-of-the-pants"
- Sustainable?
Edgy silviculture (continued)

- Operational Parameters
  - Operable cut
    - ~1,000 bf ft / acre
    - ~ 5-10 cords
  - REGEN: Harvesting “large” trees in groups / patches, often with advance regeneration
  - TEND: improvement cutting, free thinning to below C-line stocking

Harvest big trees (associated with advance regen)

Protect and release advanced regeneration

Tend the rest of the stand …

… focusing on removing undesirables

And you get, multi-aged stands …
Summary

- Silviculture can be complex and costly, or low in intensity and less costly (yet still silviculture, with many of the attendant benefits!)

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Summary -- Review

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- Silviculture recognized as the sustainable way of harvesting (yield) and protecting forest systems
- Silviculture not commonly practiced
- Despite little silviculture – the State’s forest appear in good shape … but maybe not
  - Possibly more realistic GRRs indicate a more precarious forest
  - Regeneration and new forest – NOT good
- Silviculture is the way to system sustainability and sustained yield
  - KEY: regeneration
  - KEY: manage maturing growth stock (tending)
- Silviculture can be complex and costly, or low in intensity and less costly (yet still silviculture, with many of the attendant benefits!)

Thank you ... any questions?

And now to Rene’ ...