Integrating Large-Scale Biomass Harvesting into the US Wood Supply System

Wood Supply Research Institute
Annual Meeting

Dale Greene

March 1, 2011
Panama City, Florida
Study Objectives

☐ Assess the supply and demand of forest biomass feedstocks in key forest regions of the US (Forisk)

☐ Evaluate harvesting and transportation methods and technologies associated with woody biomass (UGA)

☐ How would large scale biomass use impact the US wood supply chain?
Study Regions = FRA Regions

Five regions
- Western
- Lake States
- Appalachian
- Northeast
- South (SE + SC)
Biomass Harvesting Technology (UGA)

- National Online Survey
  - American Loggers Council & WSRI
  - April/May 2010
  - Loggers, procurement foresters, land managers

- Visits to Regional Top Performers
  - Identified by survey, ALC, and WSRI
  - June-August 2010
  - Site visits in woods with contractors
# National Online Survey: Participant’s Role by Region

<table>
<thead>
<tr>
<th>Role</th>
<th>Appalachian</th>
<th>Lake States</th>
<th>Northeastern</th>
<th>South Central</th>
<th>Southeastern</th>
<th>Western</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Manager</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>15</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>Logger</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td>20</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Procurement Forester</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>12</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Wood Dealer</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>8</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total (n=149)</strong></td>
<td><strong>2</strong></td>
<td><strong>18</strong></td>
<td><strong>5</strong></td>
<td><strong>55</strong></td>
<td><strong>55</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

Assistance provided by:
Mills Receiving Forest Biomass

- Pulpmills: 90%
- Forest products facilities: 25%
- Electrical plants: 29%
- Pellet plants: 21%
- Mulching facilities: 22%
Types of Forest Biomass Feedstock

- Clean chips: 14%
- Screened grindings: 15%
- Dirty chips: 67%
- Unscreened grindings: 34%
- Loose slash: 14%
- Roundwood: 33%
Timing of Biomass Harvesting/Collection

- Before conventional harvesting: 7%
- During conventional harvesting: 76%
- After conventional harvesting: 31%
- As a stand alone operation: 21%

Center for Forest Business
The University of Georgia
Average Minimum Tons per Acre

<table>
<thead>
<tr>
<th>Category</th>
<th>Tons per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Managers</td>
<td>13</td>
</tr>
<tr>
<td>Wood Dealers</td>
<td>20</td>
</tr>
<tr>
<td>Procurement Foresters</td>
<td>20</td>
</tr>
<tr>
<td>Harvesting Contractors</td>
<td>22</td>
</tr>
</tbody>
</table>
Average Minimum Tons for a Single Tract

- Forest Managers: 582
- Wood Dealers: 720
- Procurement Foresters: 628
- Harvesting Contractors: 1255
Average Haul Distance

- 31-50 miles: 57%
- 51-70 miles: 24%
- 71-90 miles: 4%
- >90 miles: 4%

<30 miles: 10%
Average Payload

- <20 tons: 1%
- 20-22 tons: 10%
- 23-25 tons: 34%
- 25-28 tons: 47%
- 29-31 tons: 2%
- 32-34 tons: 2%
- >34 tons: 4%

Center for Forest Business
The University of Georgia
Average Turnaround Times at Receiving Mills

- <30 minutes: 34%
- 31-45 minutes: 43%
- 46-60 minutes: 14%
- 60-90 minutes: 5%
- >90 minutes: 5%
Opinions: Current Status of Biomass Markets

- Growing: 40%
- Inconsistent: 38%
- Stable: 11%
- In decline: 4%
- Non-existent: 6%
Opinions:

*Impact of biomass harvesting on future roundwood supply*

- **Increase**: 26%
- **No effect**: 34%
- **Decrease**: 40%
Top Performer Visits & Evaluation

- Survey highlighted key issues (TH article).
- Findings shared with Forisk to assist in their supply/demand analyses.
- We identified some top performers by region through survey, ALC, WSRI, & FRA contacts.
- On-site visits to better understand approach taken and limitations.
- Reports from trips became technology transfer
  - FRA Webinar in August 2010
  - Forest Operations Review article in early 2011
Appalachian Region

- Hardwood is a big opportunity.
- Wood biomass markets are not firmly established.
- Markets & terrain are limiting
- Chippers to process hardwood component & green ton base pay
- Tree length logging + biomass operation averaging 3 loads per was typical
Northeast Region

- Well established markets:
  - Electricity plants
  - Pulp mills
  - Small local heating plants

- Tree length logging with tops piled at roadside – loose limbs left on site

- Biomass piece size is large due to weak pulp markets
Northeast Region

- Depending on pulpwood markets biomass represents 1/4 to 1/3 of total harvest volumes

- Markets purchase green material causing contractors to process biomass within 2 weeks

- Chippers are more common than grinders

- Haul distances around 50 miles due to large number of markets
Lake States Region

- Well established markets for biomass
- Primarily CTL contractors deploying logging and grinding crews
- Grinding materials are piled by forwarder – drier and cleaner grindings
- Haul distances average 80 to 200 miles
Lake States Pine
Western Region

- Bone dry ton basis
- Mature markets
- Long hauls require large payloads
- But tight roads are a challenge
- Logging residues and reclaimed biomass from site prep debris piles
West Side

- Larger pieces and more tons per acre
- Waste and residue are abundant 30-50 tons/acre but scattered due to hand felling
- Contractors use shovels to re-pile logging slash
- Stand-alone grinding operations 10+ loads/day
Piling is Key
48-foot trailers, 35 ton payloads (dry)
28-32 foot trailers, paired for highway
Special Trucks for Woods Reload for Highway
South Central Region

- Markets are few and usually at pulp mills
- Contractors are early adopters
- Small chippers (<500 hp) are adequate to meet production goals
- Chipping provides procurement advantage
It’s True – Biomass is Bigger in Texas!
Biomass Bundles – Aspen Power
Southeastern Region

- Pulp mills are a big market
- Pellet plants are a major market in some areas
- Growing demand for clean and/or dry feedstock
- Residues are small in size with relatively low volumes in plantations
- Grinder use in decline
Screened Grindings
Biomass Harvesting Technology

- Pulp mills are major market except in NE
- Electricity and pellet plants – NE, NW, SE
- Green basis everywhere but NW
- Residue piece size related to size & strength of pulp market in region – smallest piece size in Southeast
Biomass Harvesting Technology

- Grinders are less common where clean feedstock desired unless residue is large size and/or forwarders move residue

- Chippers used with green material

- Transportation efficiencies are required – large payloads and ability to handle logging roads
## Regional Operational Comparisons

<table>
<thead>
<tr>
<th>Region</th>
<th>Fuel Use (gal/ton)</th>
<th>Haul Distance (miles)</th>
<th>Truck Payload (tons)</th>
<th>Necessary Biomass Per Site (tons)</th>
<th>Necessary Biomass Per Acre (tons)</th>
<th>Onboard Cost ($/ton)</th>
<th>Haul Cost ($/ton-mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southeast</td>
<td>0.3-0.5</td>
<td>30-50</td>
<td>24-27</td>
<td>500</td>
<td>19</td>
<td>12-16</td>
<td>0.11-0.13</td>
</tr>
<tr>
<td>South Central</td>
<td>0.4-0.6</td>
<td>30-50</td>
<td>26-30</td>
<td>350</td>
<td>17</td>
<td>12-16</td>
<td>0.11-0.13</td>
</tr>
<tr>
<td>West</td>
<td>0.4-0.6</td>
<td>40-60</td>
<td>29-31</td>
<td>500</td>
<td>15</td>
<td>11-16</td>
<td>0.11-0.13</td>
</tr>
<tr>
<td>Lake States</td>
<td>0.3-0.6</td>
<td>60-90+</td>
<td>32-34</td>
<td>460</td>
<td>13</td>
<td>9-14</td>
<td>0.12-0.14</td>
</tr>
<tr>
<td>Appalachian</td>
<td>0.3-0.6</td>
<td>50-90+</td>
<td>26-28</td>
<td>250</td>
<td>25</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Northeast</td>
<td>0.3-0.4</td>
<td>40-60</td>
<td>30-36</td>
<td>300-400</td>
<td>15</td>
<td>11-16</td>
<td>0.11-0.13</td>
</tr>
</tbody>
</table>
Technology Transfer Plans

- EXPO in Arkansas, May 19-21
- Newsletter articles for loggers
- FRA publications
- Survey – Timber Harvesting
- Presentations to groups
  - SC Timber Producers
  - Council on Forest Engineering
Acknowledgements

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Research Teams –

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Questions?

The final in the new Finance/Forestry dual major