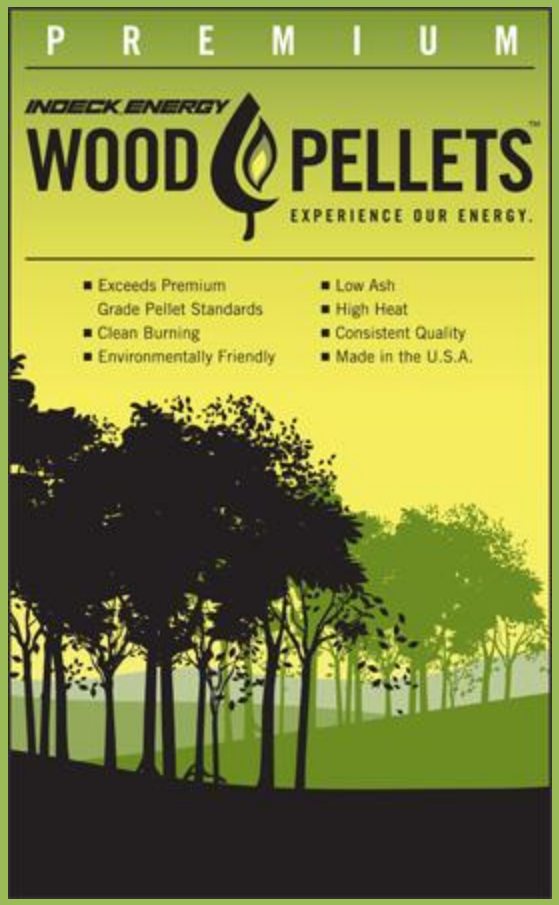



# Forest Biomass Procurement and Processing Strategies

April 25th, 2013

Eric Maki
President
Midwest Forest Products Company
Hayward, WI

Wood Procurement Manager
Indeck Ladysmith Biofuel Center
Ladysmith, WI

# Forest Products Industry Value Wisconsin and Minnesota

| Industry Output | Employee Compensation | # of Jobs |
|---|---|---|
| WI $14.9 BILLION | $3.6 BILLION | 99,318 |
| MN $ 7.8 BILLION | $1.4 BILLION | 67,300 |

# Mill Closures – Lake States (Since 2005)

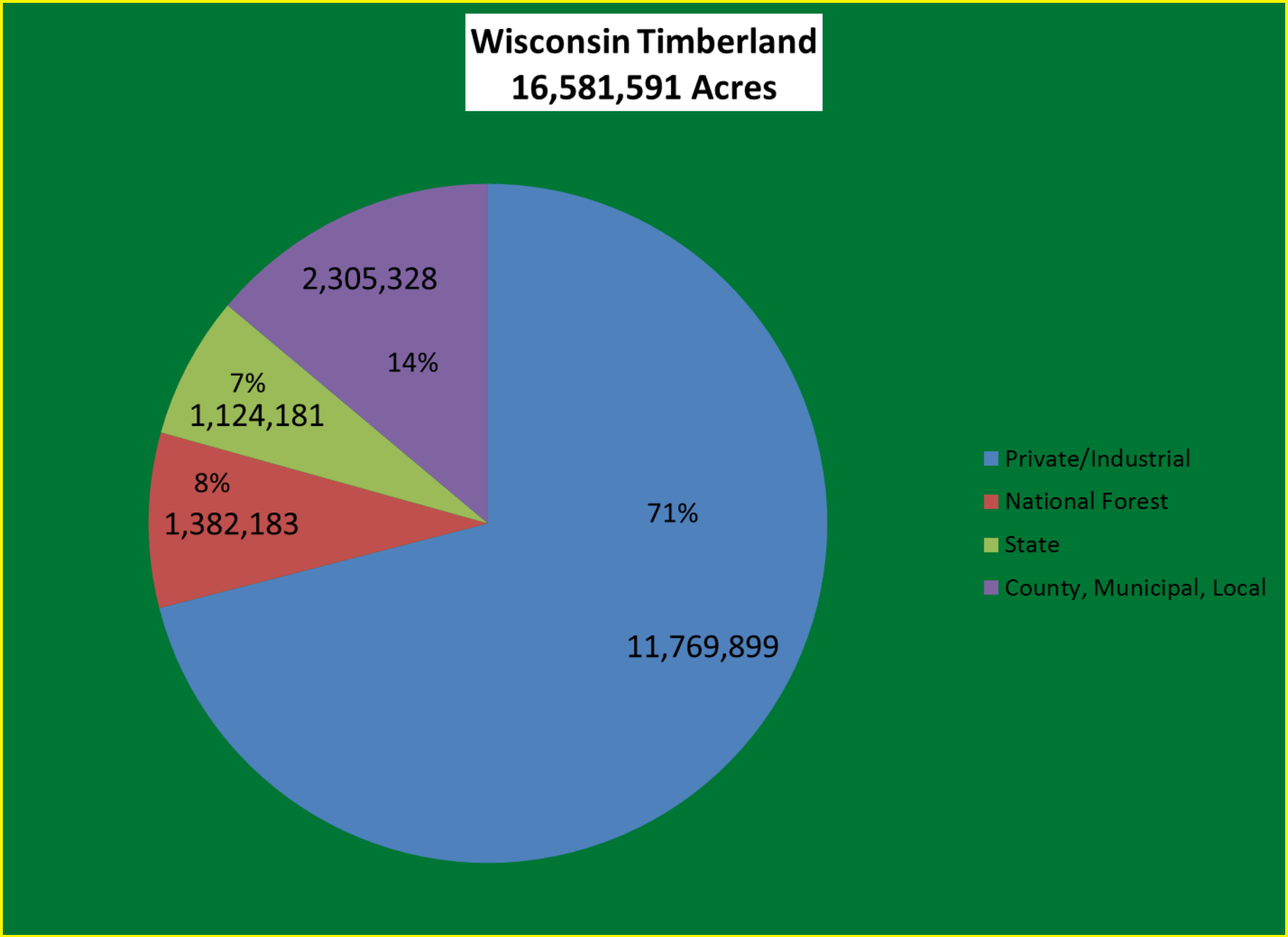
| | |
|---|---|
| • Verso Paper, Sartell, MN | 160,000cords |
| • Georgia Pacific, Duluth, MN | 90,000 |
| • Ainsworth, Bemidji, MN | 325,000 |
| • Ainsworth, Grand Rapids, MN | 325,000 |
| • Ainsworth, Cook, MN | 325,000 |
| • Truss-Joist McMillan, Deerwood, MN | 125,000 |
| • Wausau Papers, Brokaw, WI | 157,000 |
| • New Page Corp, Niagara, WI | 150,000 |
| • Domtar, Port Edwards, WI | 150,000 |
| • Georgia Pacific, Gaylord, MI | 174,000 |
| • Menasha, Otsego, MI | 109,000 |
| • Sappi, Muskegon, MI | 217,000 |
| • Smurfit Stone Container, Ont. MI | 150,000 |
| • TOTAL | 2,457,000 cords |

# How much wood is available for industry?

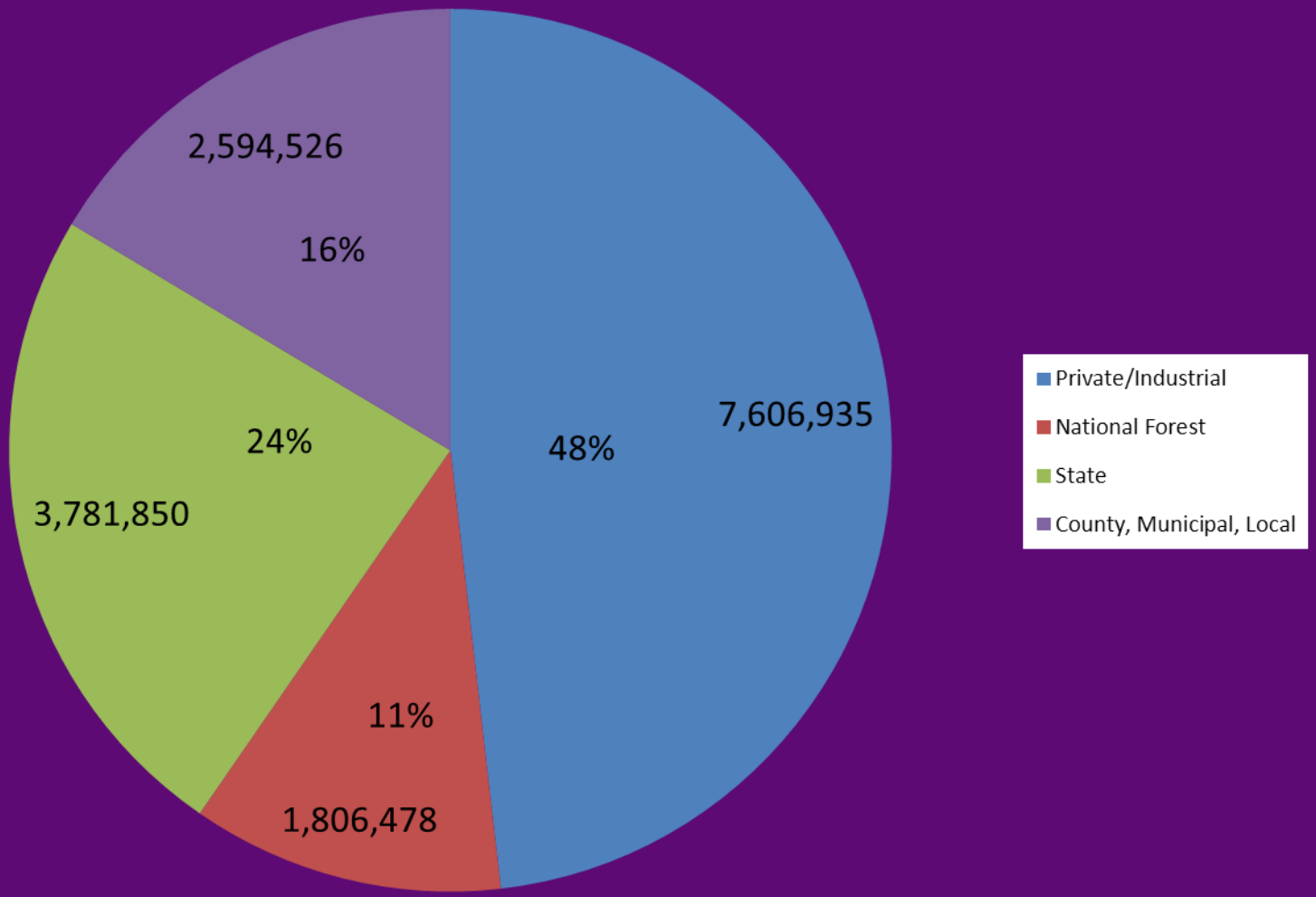
## In the Lakes States, (MN, WI, & MI) quite a bit…

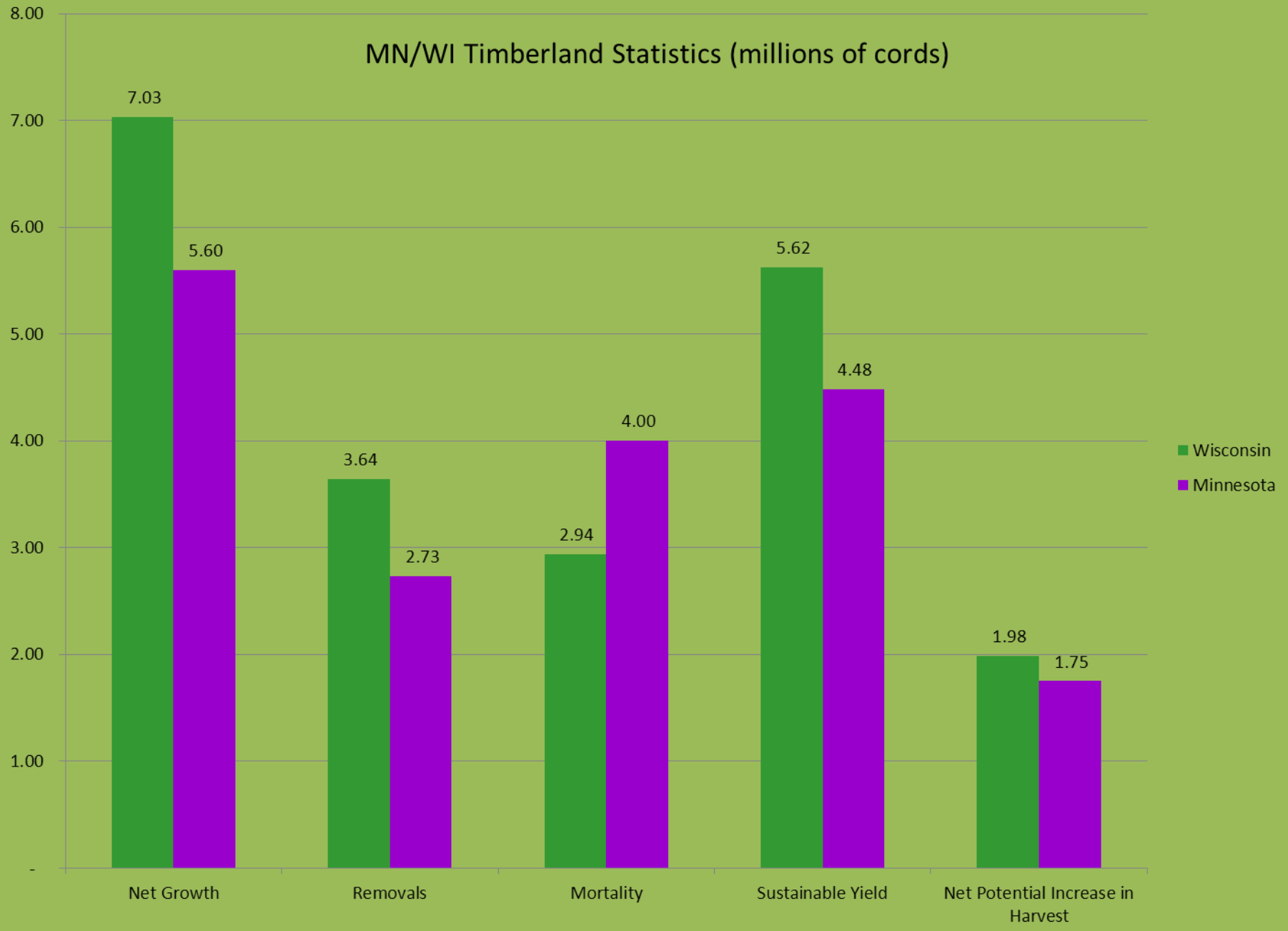
Wisconsin Growing Stock:  301.88 million cords
Minnesota Growing Stock: 221.53 million cords

1 cord = 128 cubic feet (a log pile 4’ high x 4’ wide x 8’ long)
(approximately 2 tons)
What is sustainable harvest?  80% of net growth.


Wisconsin Timberland
16,581,591 Acres
2,305,328
14%
7%
1,124,181
8%
1,382,183
71%
11,769,899
Private/Industrial
National Forest
State
County, Municipal, Local

# Minnesota Timberland
# 15,789,789 Acres




MN/WI Timberland Statistics (millions of cords)
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
-
7.03
5.60
3.64
2.73
2.94
4.00
5.62
4.48
1.98
1.75
Net Growth
Removals
Mortality
Sustainable Yield
Net Potential Increase in Harvest
Wisconsin
Minnesota

What kind of wood does a pellet mill need?

- Any kind, as long as it is made of wood…

Is species important?

- Not necessarily, but density is!

Species density categories:

- High Density: Ash, birch, cherry, elm, hickory, ironwood, maple, oak.
- Medium Density: Aspen
- Low Density: Basswood
- Softwood: Spruce, pine, fir, hemlock, tamarack
  Cedar is not desirable

How much wood does a pellet mill need?
Let's pick a hypothetical number of 75,000 cords per year.

What does it take to produce this amount of wood?
One  2-person logging crew (mechanized) can produce 60 cords per day.
300 cords per week x 46 production weeks = 13,800 cords per year.
So, in simple terms, 5 1/2 full-time logging crews could supply this pellet mill.

But that's not how it works…
Loggers have diversified customer bases, and produce different types of Products:
Sawlogs
Bolts
Pulpwood
Fuelwood
Biomass

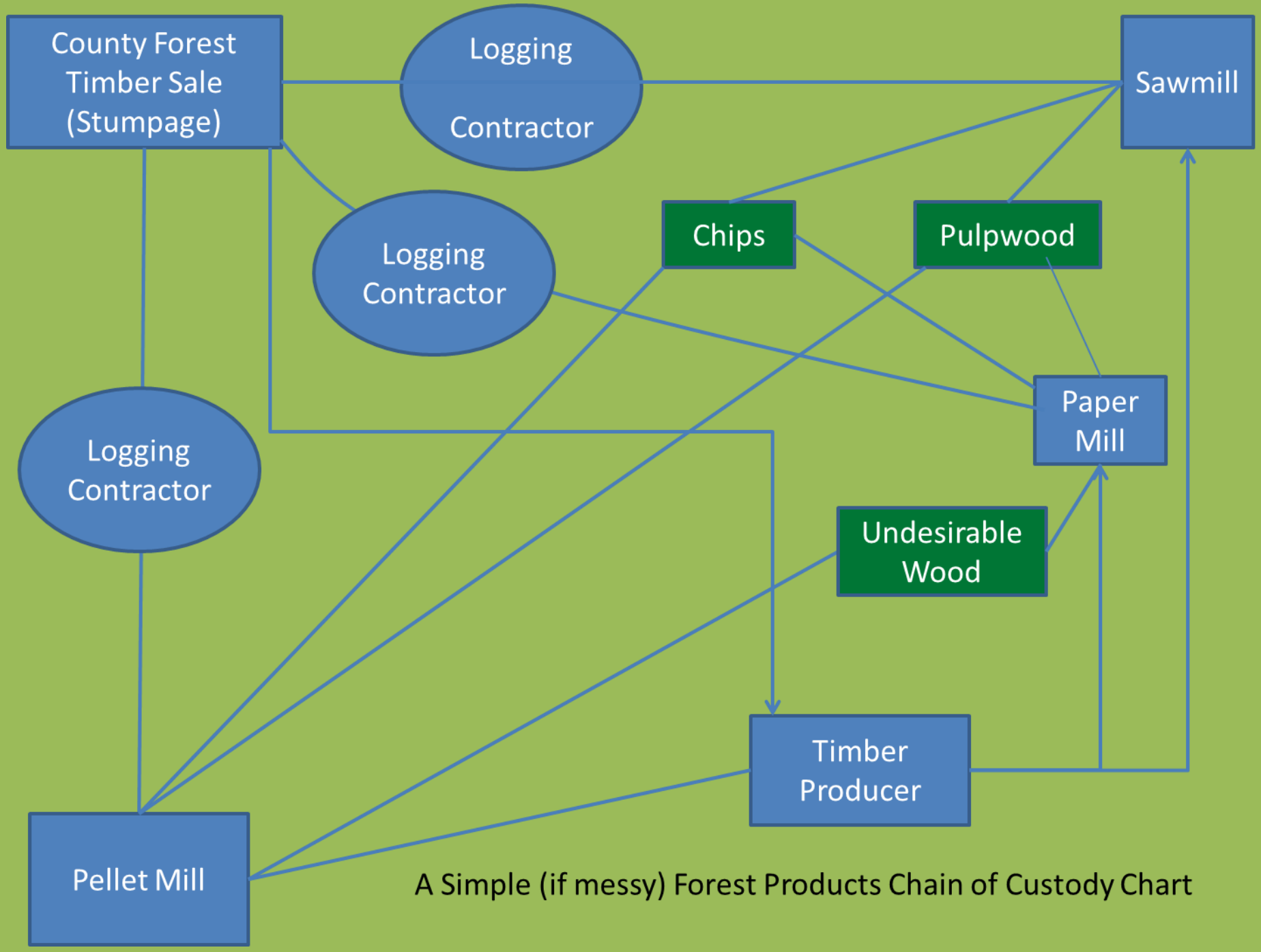
Since you can't buy 100% of a logger's production, you must increase your customer base.  (5 1/2 logging crews might turn into 50 logging crews)

Roundwood supply is supplemented by sawmill residue (chips and sawdust.)
Densities are separated based on wood species.

Let's say  half of your feedstock is roundwood, and half is residue.
You will need to buy about 37,500 cords of wood, and 75,000 tons of residue.

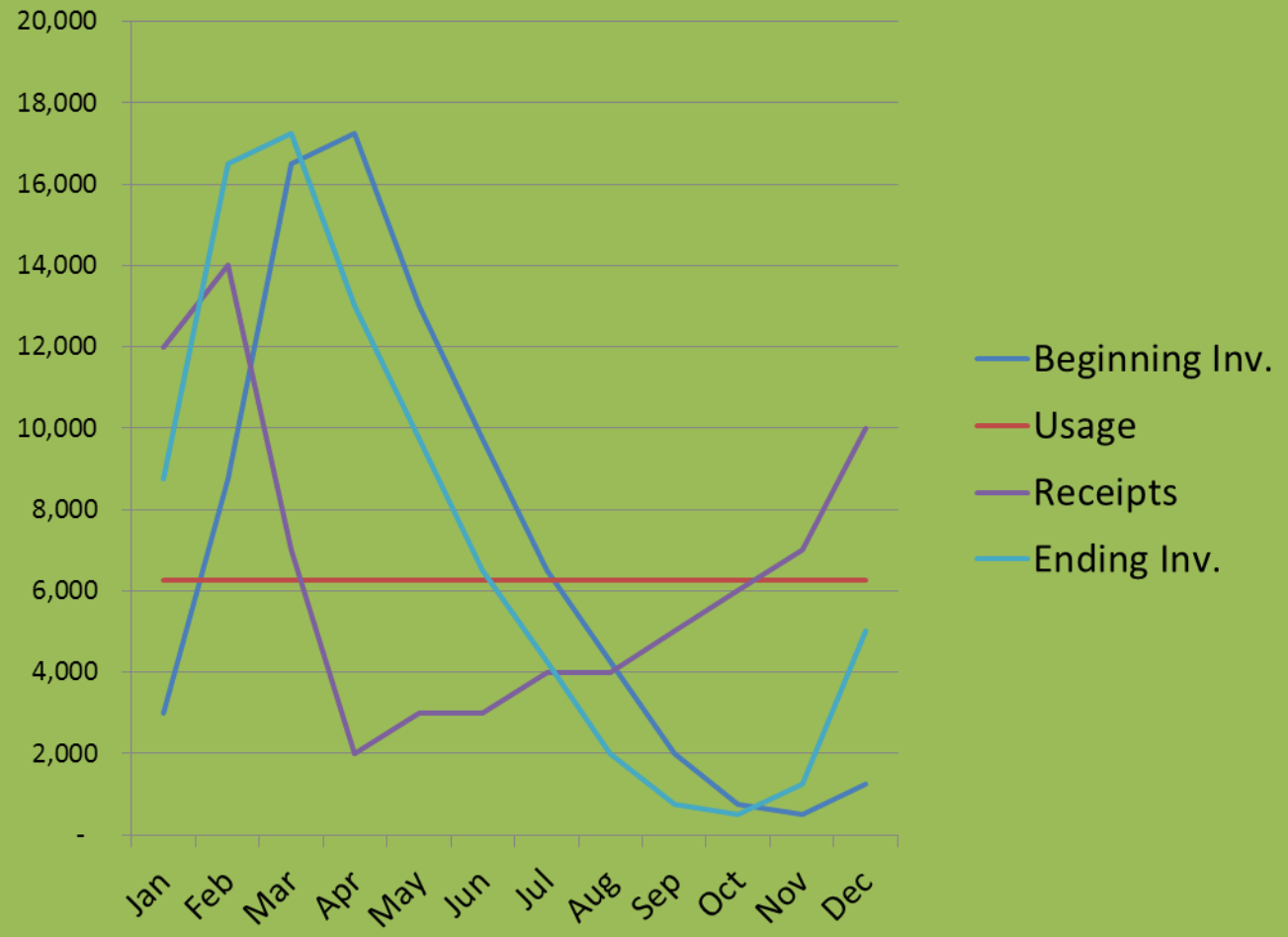
Your supplier base may be comprised of 60 different entities –
Timber Producers (Loggers)
Sawmills
Secondary Manufacturers (Cabinet Factory)
Paper Mill
Industrial Landowner

- Quarterly contracts
- Weekly payments




A Simple (if messy) Forest Products Chain of Custody Chart

# Basic line graph for annual roundwood procurement



# Example of a Receipts, Usage and Inventory Chart

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beginning Inv. | 3,000 | 8,750 | 16,500 | 17,250 | 13,000 | 9,750 | 6,500 | 4,250 | 2,000 | 750 | 500 | 1,250 | |
| Usage | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 6,250 | 75,000 |
| Receipts | 12,000 | 14,000 | 7,000 | 2,000 | 3,000 | 3,000 | 4,000 | 4,000 | 5,000 | 6,000 | 7,000 | 10,000 | 77,000 |
| Ending Inv. | 8,750 | 16,500 | 17,250 | 13,000 | 9,750 | 6,500 | 4,250 | 2,000 | 750 | 500 | 1,250 | 5,000 | |

A typical logging job in the north woods
in January… Or April, it’s hard to tell the difference.


Photo courtesy of Ponsse, Oyj.


Photo courtesy of Ponsse, Oyj.

Photo courtesy of John Deere & Company

Photo courtesy of John Deere & Company


Top-loading Chips at a Sawmill

# Self-unloading Chip Van


Chip Dump

# Indeck Ladysmith's 70' automated scale

# Raw Material

Loading the Deck with Roundwood.

View of Debarker Outfeed From Chipper.

# Face of Chipper

Feedstock

Eric Maki
Midwest Forest Products Company
Indeck Ladysmith, LLC
(715)634-8955
www.midwestforestproducts.com
www.indeckpellets.com

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