Factors Affecting Increases in Biomass Production From Maine Forests

Robert G. Wagner[1], Jeffrey G. Benjamin[1], Aaron R. Weiskittel[1], and Kenneth M. Laustsen[2]

[1]School of Forest Resources, University of Maine

[2]Maine Forest Service

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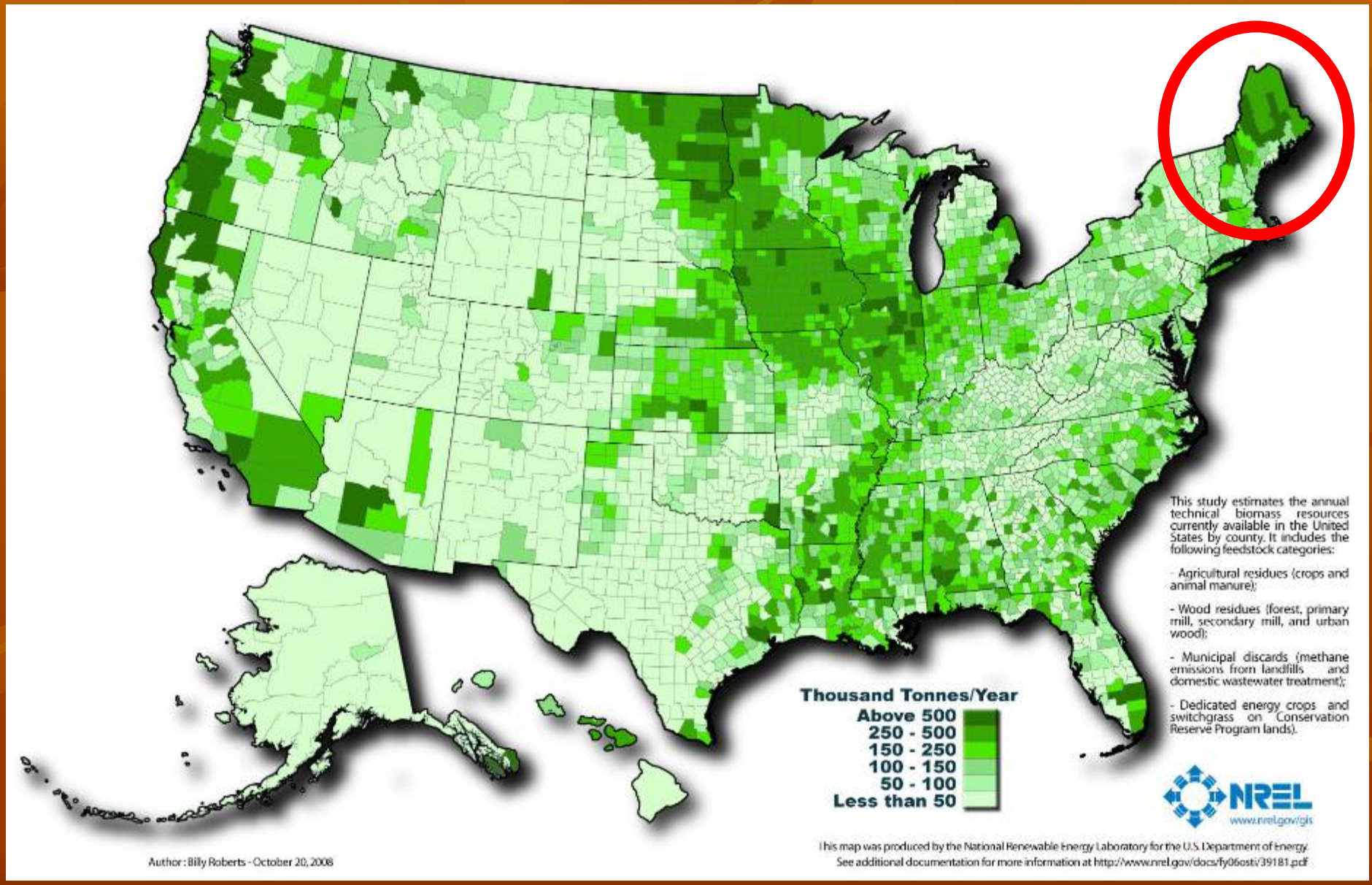
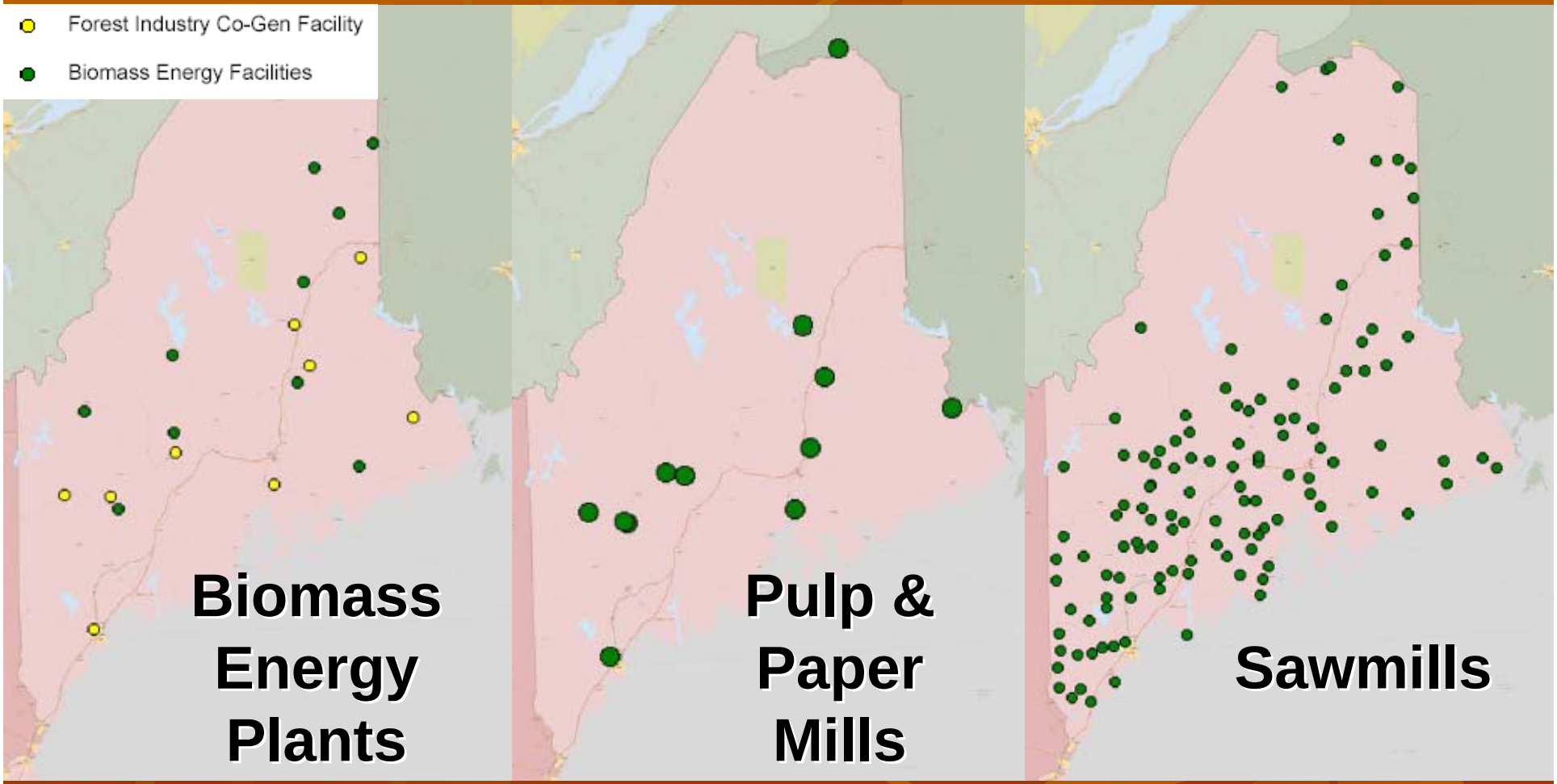
FOREST BIOPRODUCTS RESEARCH INITIATIVE

U.S. Biomass Resource



Maine Wood Processing Facilities



Maine has a diverse forest products industry with a highly integrated processing and transportation system – All poised to immediately handle increased biomass yields if available.

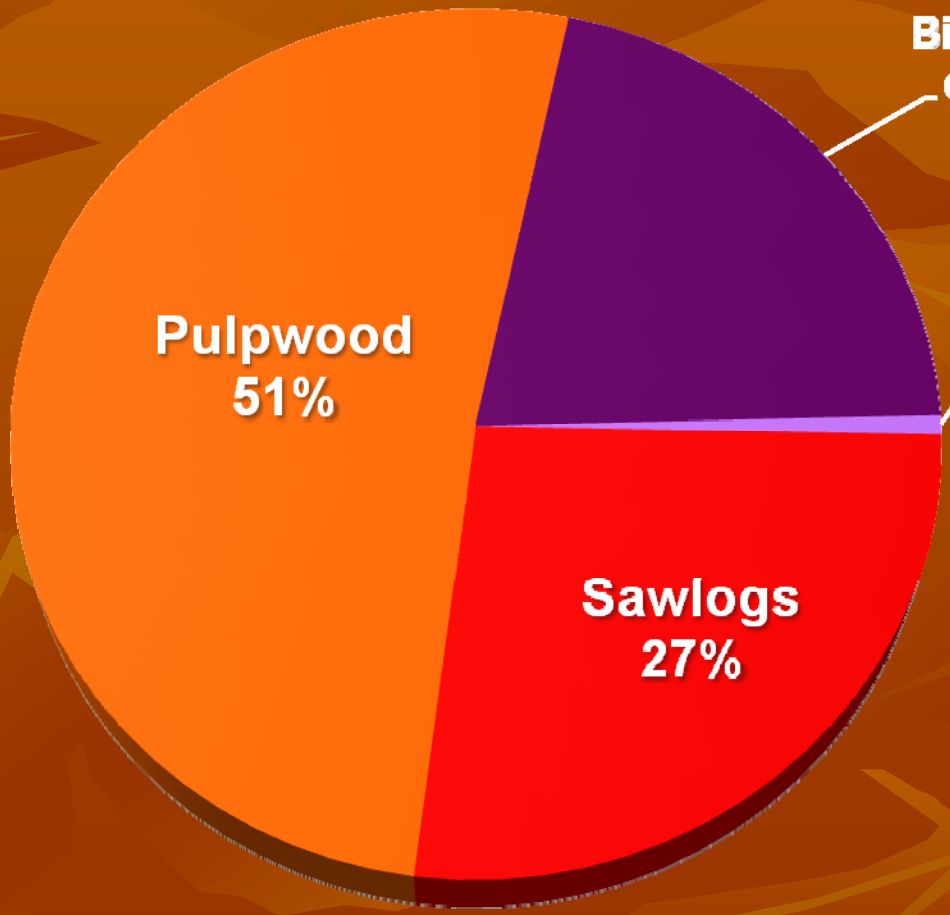
Maine is Already Doing It!

- 15 - 20% of state harvest goes to produce electricity and into wood stoves
- Wood provides over 20 - 25% of the electrical generation in Maine
- Highest proportion of biomass electrical generation in US
- Highest non-hydro renewable electrical generation in US because of wood

Current Harvest in Maine's Forest

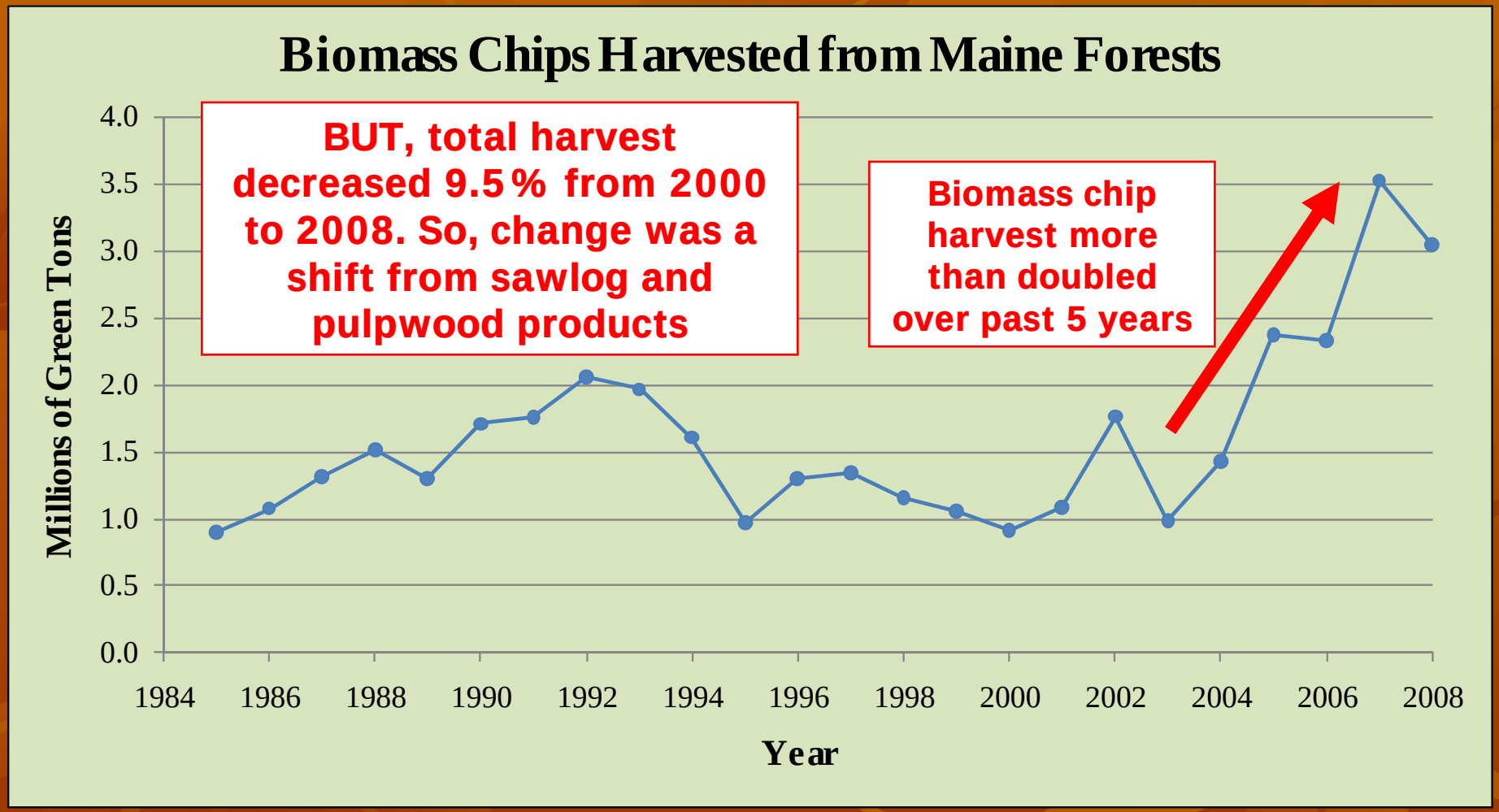
- Forest industry currently harvests **15-17.5 million green tons** of wood annually
- Harvest:Growth are currently in **1:1 balance**
- **It's all biomass!!**

Maine Wood Products Breakdown 2008



Energy Wood: 3.1 million green tons

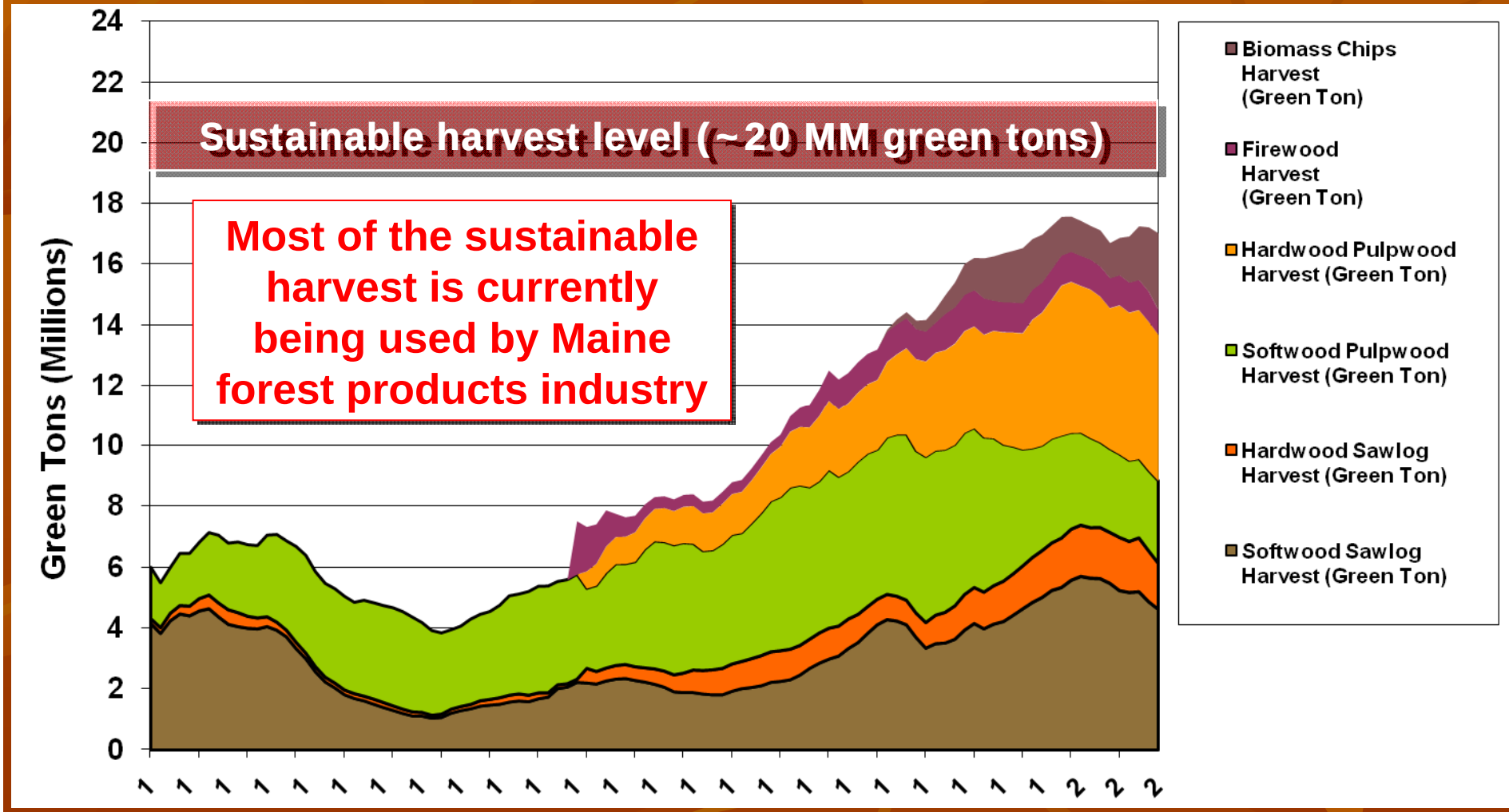
Biomass Harvesting Trend



Recent demand increase due to:

- **Loss of residues from mill shut downs**
- **High oil prices**
- **Renewable energy & climate policy (RGGI, RECs, BCAP)**

Maine Harvest by Product 1904-2008 (green tons, 5-yr trailing average)



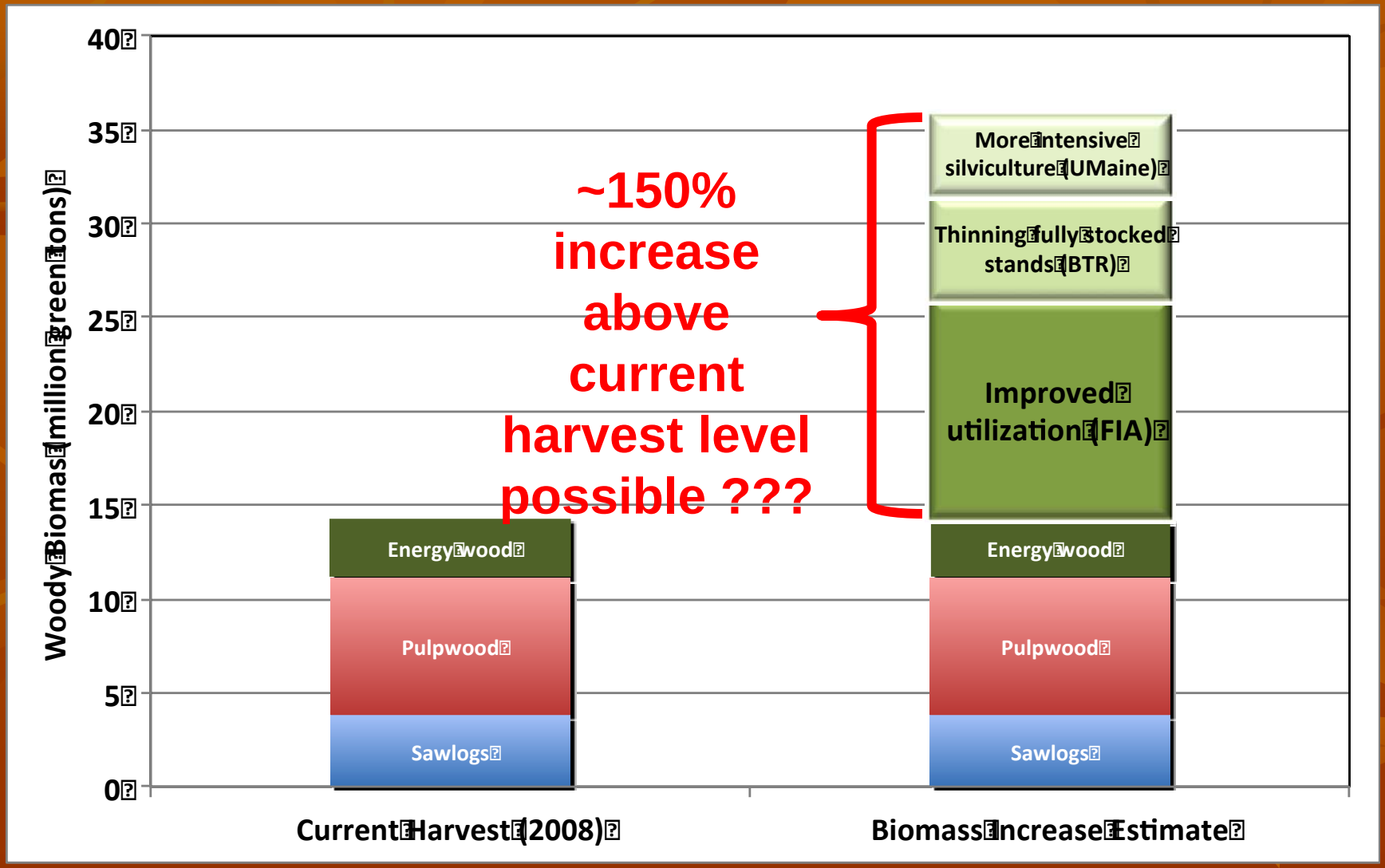
Source: Ken Laustsen, Maine Forest Service

Can we sustainably increase biomass production from Maine's forest?

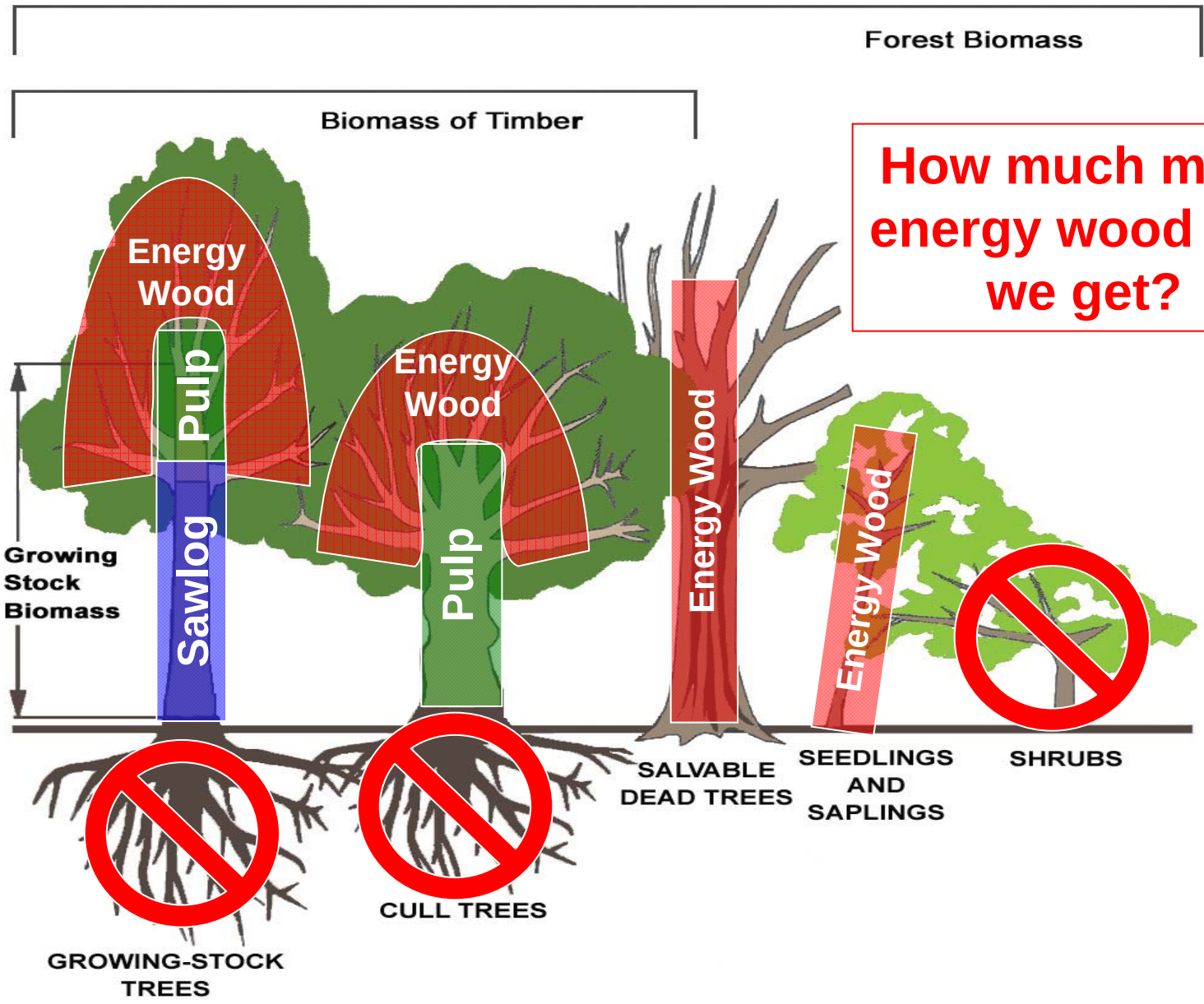
Methods of Increasing Biomass Production

1. Increasing harvest/utilization in stands being harvested
2. Entering stands previously considered as not commercial
3. Intensifying silviculture to increase stand growth and yield (and allowable cut)

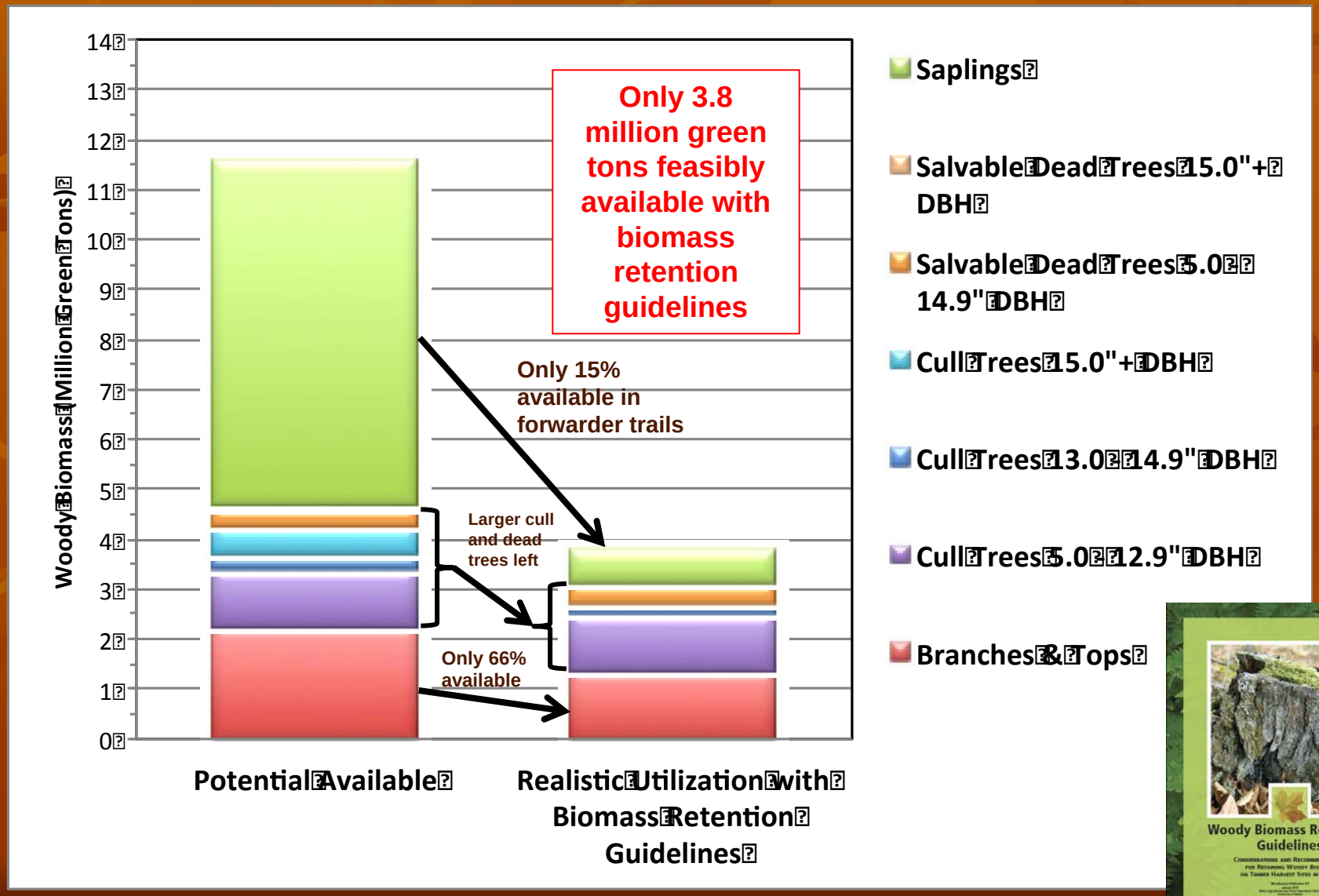
Most Optimistic Biomass Additions to Current Maine Harvest



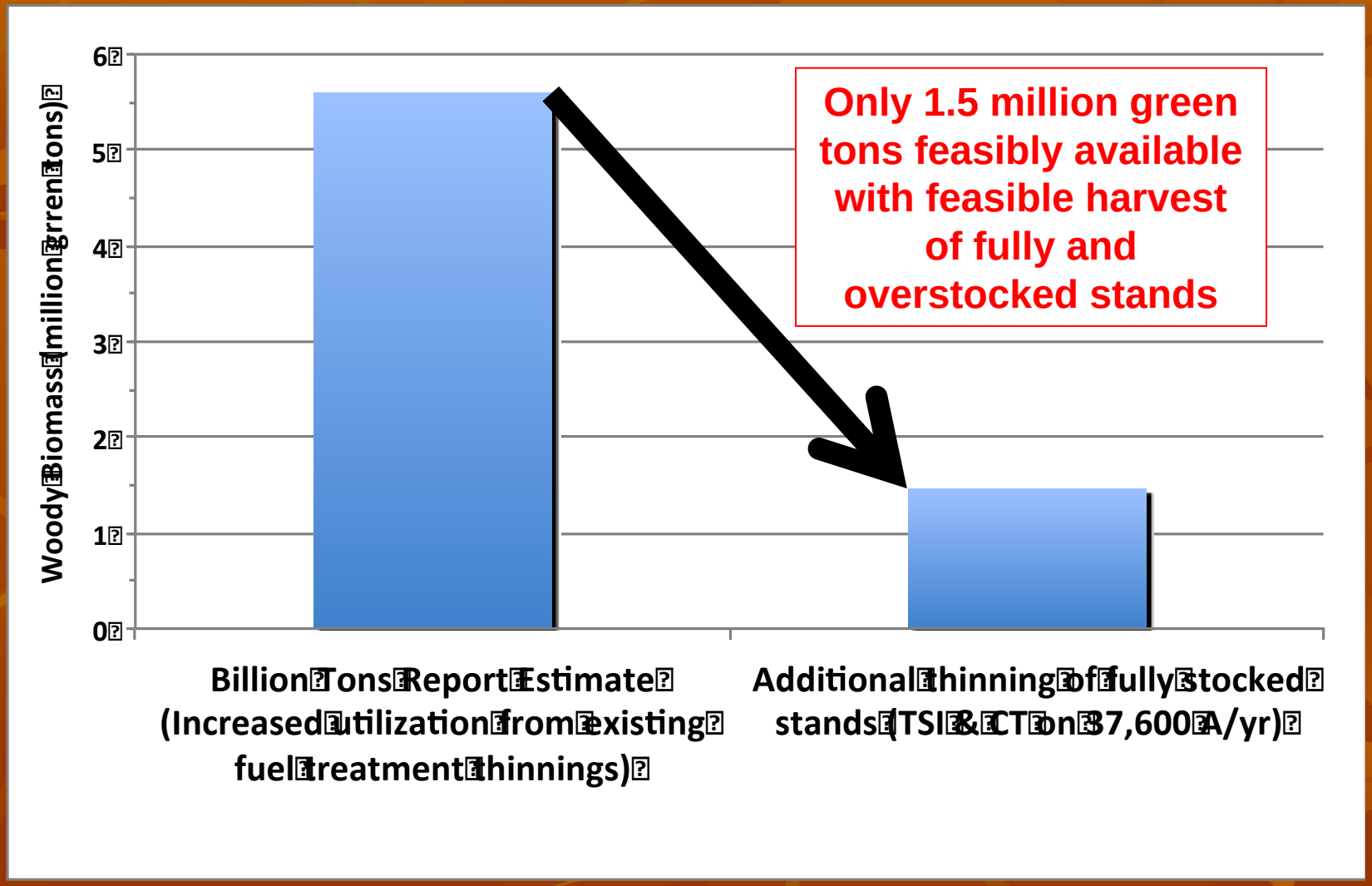
Sources of Biomass for Increased Utilization



Reduction in Harvest / Utilization from Current Harvests

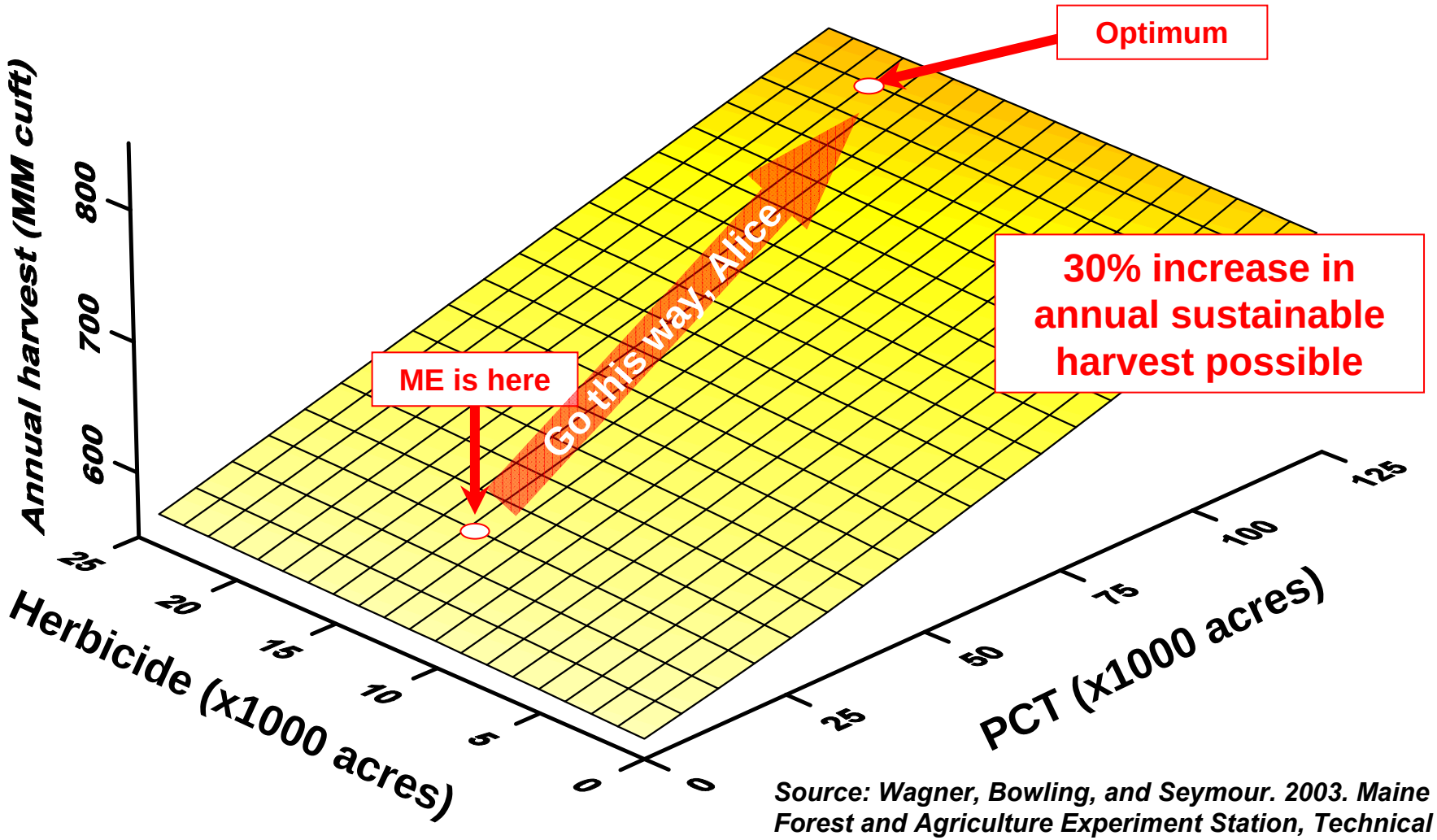


Reduction in Billion Tons Report Estimate of Additional Biomass Available From Overstocked Stands



Source: Ken Laustsen, Maine Forest Service

Increasing Maine's Annual Sustainable Harvest Level



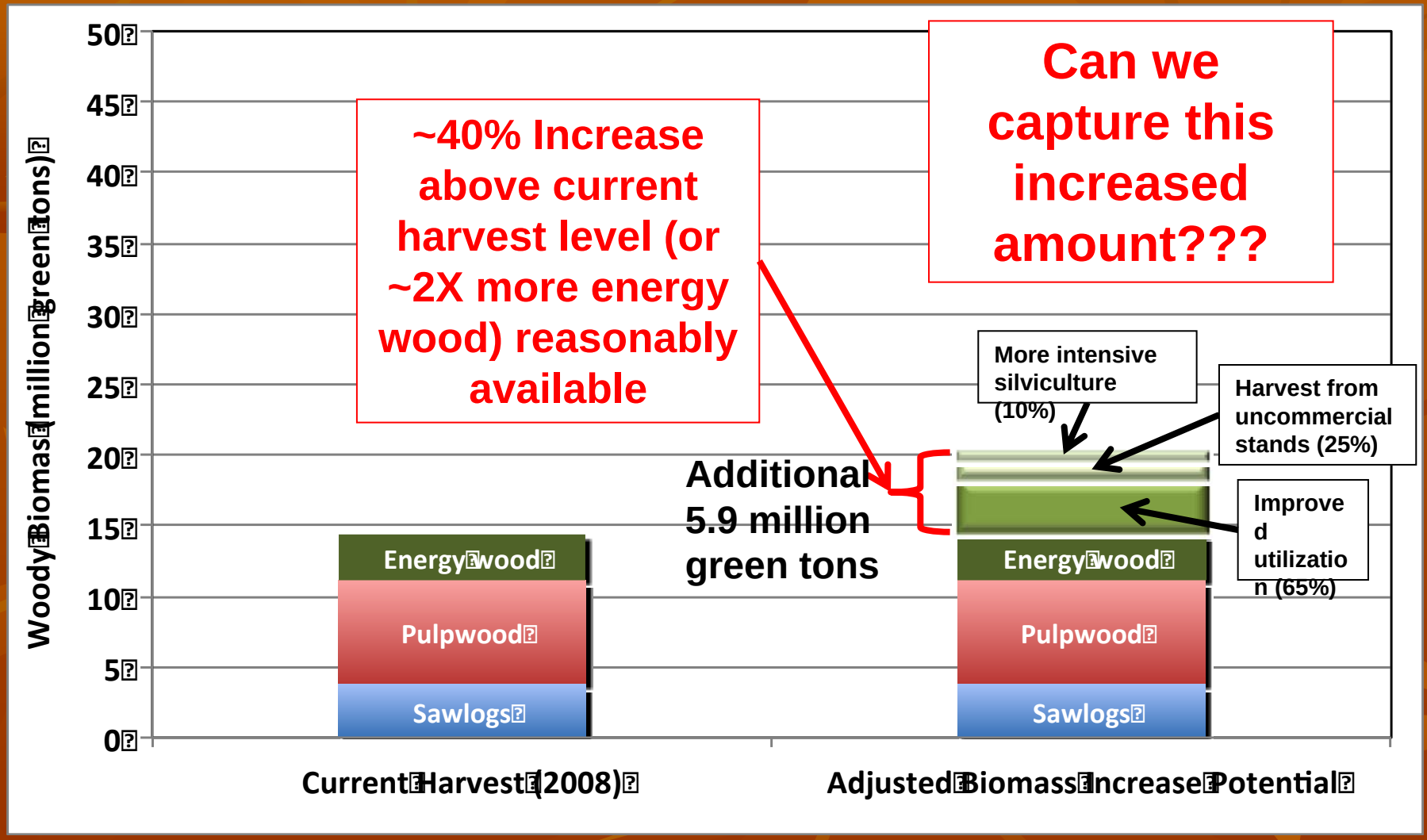
Source: Wagner, Bowling, and Seymour. 2003. Maine Forest and Agriculture Experiment Station, Technical Bulletin 186. 105 p.

Increased Silvicultural Investment on Extensively Managed Forest

- **Invest in highest productivity sites (top quartile of sites, SI_{50} 76 - 99) = 455,936 acres**
- **Double annual yields on those acres from 0.37 to 0.74 cords/A/yr through more intensive silviculture (vegetation management and PCT)**
- **Could produce an additional 169,608 cords per year or <u>0.61 million green tons per year</u> in additional merchantable wood and**

Source: Ken Laustsen, Maine Forest Service

Sustainable Biomass Additions to Current Maine Harvest



Constraints to Increased Utilization

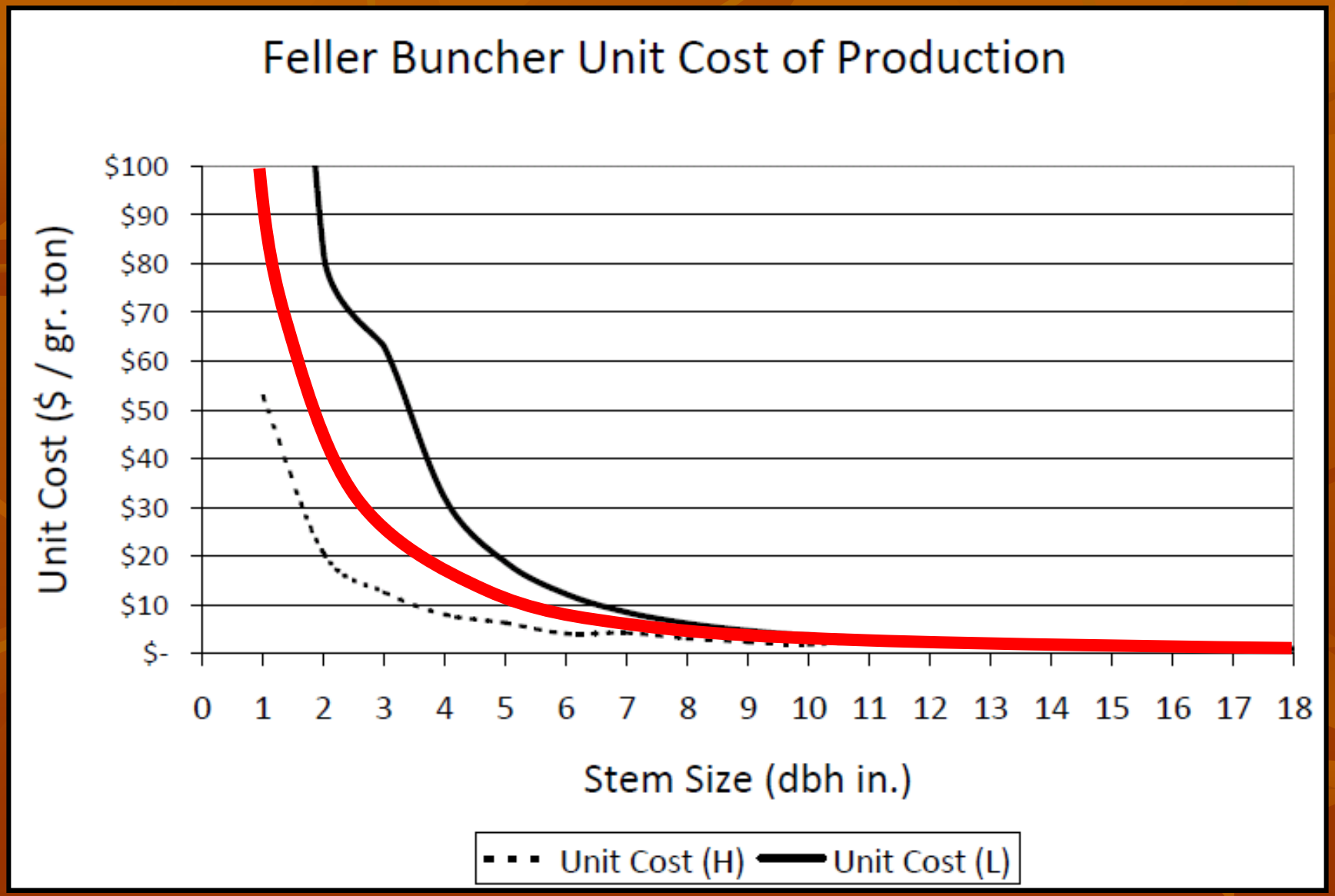
Biomass Recovery Technology Currently Based on a Sawlog & Pulpwood Technology

Photo credit: Jeff Benjamin

Photo source: www.ces.ncsu.edu/forestry/biomass/pubs/WB011.pdf

Photo credit: Jeff Benjamin

Physical & Financial Limitations



Source: Benjamin, 2010, UMaine

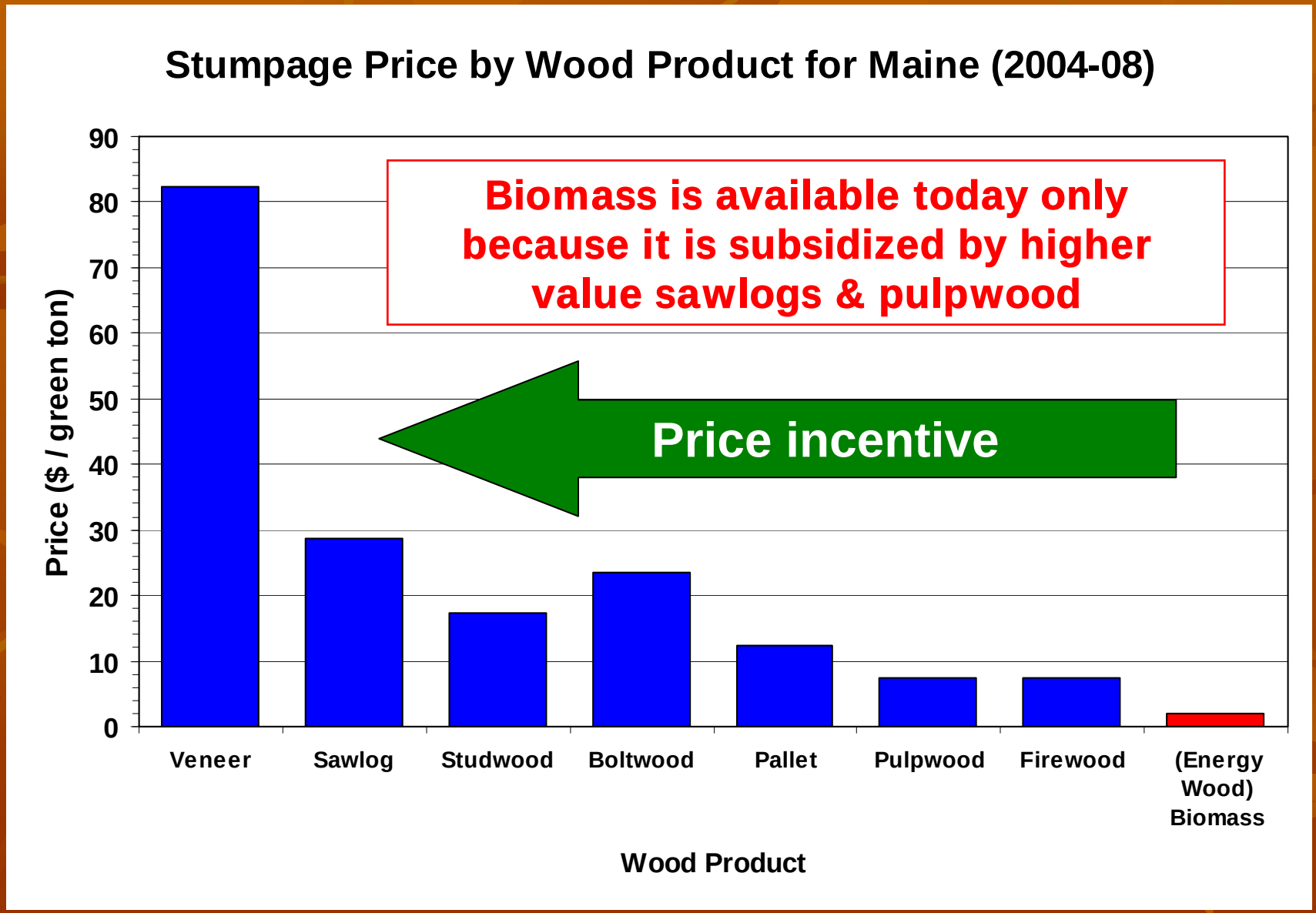
New Technology

- Can contractors afford to own and operate specially designed equipment?

John Deere 1490D Slash Bundler

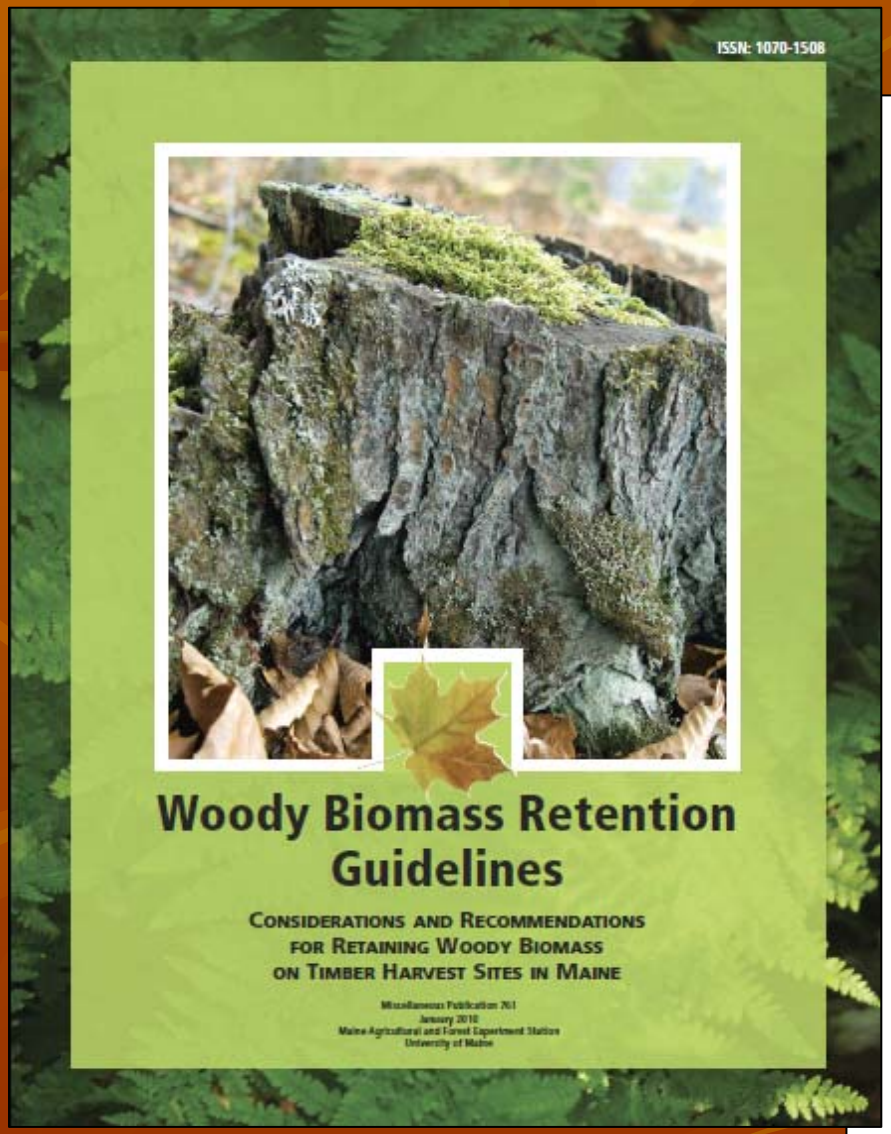
$600,000

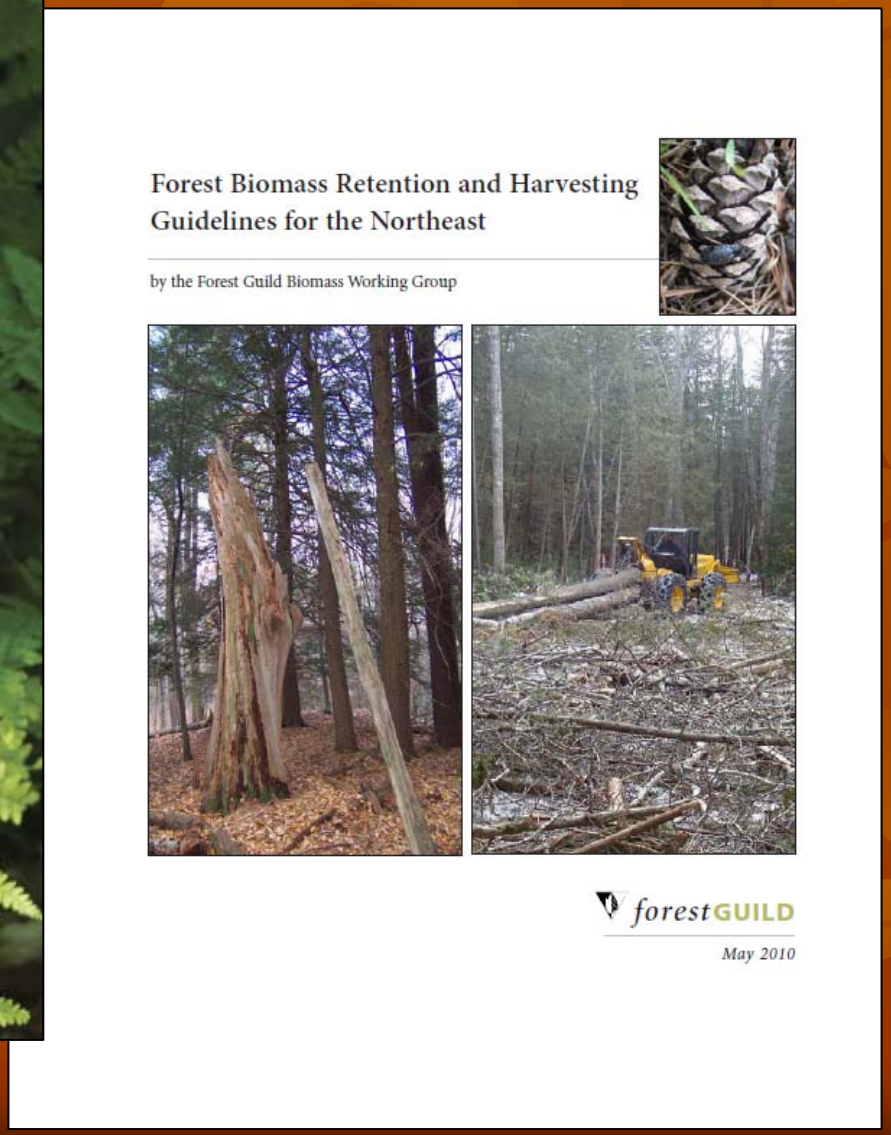
Landowner / Logger Incentive to Produce Biomass

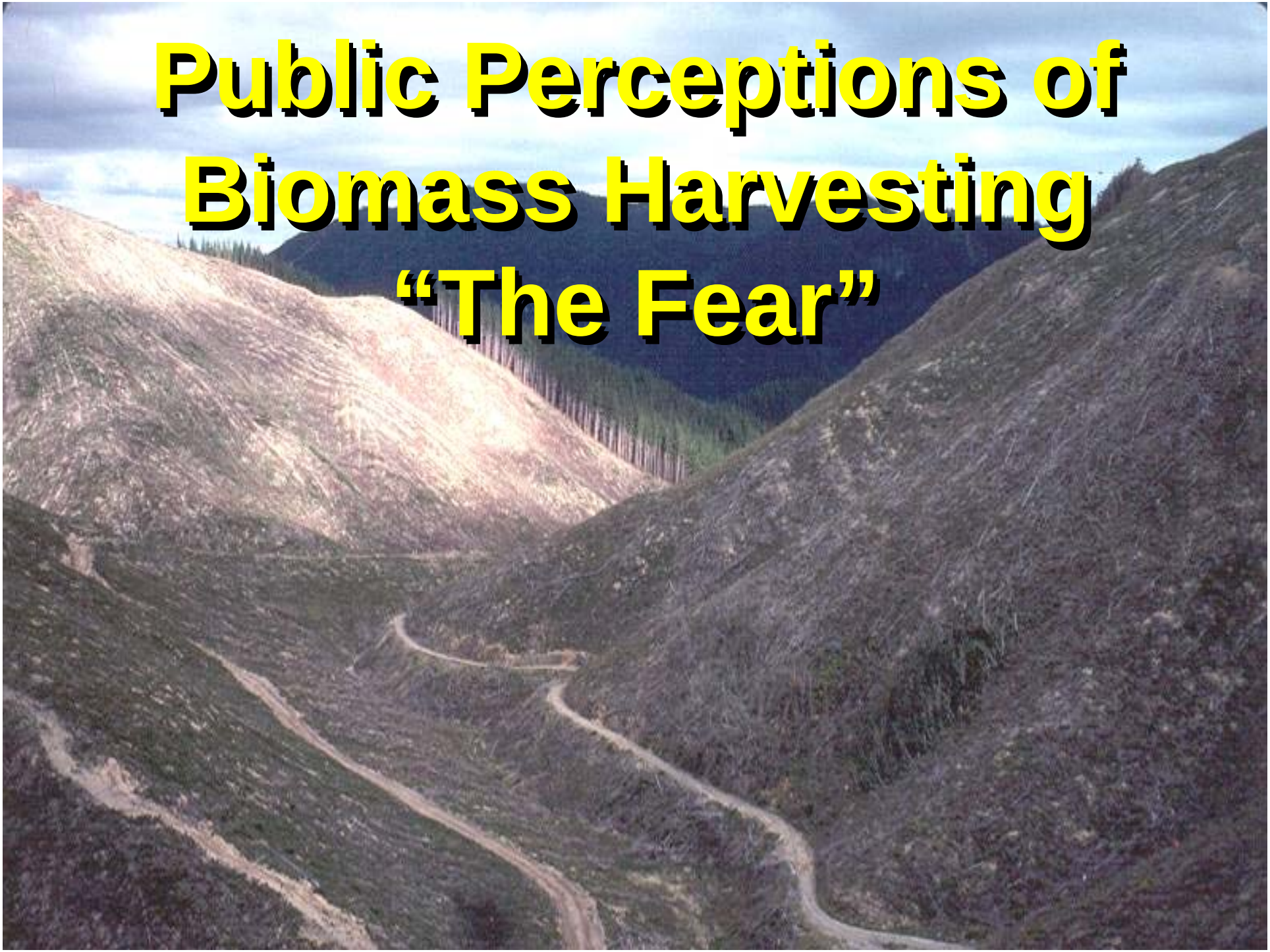


Source: Maine Forest Service Stumpage Price Reports

Biomass Retention Guidelines






Public Perceptions of
Biomass Harvesting
"The Fear"

Biomass Harvesting "The Reality"

- Biomass harvesting will force unsustainable logging is a #1 concern of the public and those in mill towns (Marciano et al. 2009)
- 47% of small woodland owners are either somewhat or very unfamiliar with biomass harvesting (Leahy 2010)
- 25% of the small woodland owners who want to harvest are concerned about biomass harvesting (Leahy 2010)

Constraints to More TSI & Thinning in Overstocked Small-Dimension Stands

Overstocked Stand Needing TSI and Thinning

Overstocked mixedwood stands

- Over 1.1 million acres available above current harvest of “fully stocked” and “overstocked” lands
- Could feasibly thin or TSI an additional 37,600 acres per year

- Gain an additional 1.5 million green tons of biomass per year
- Improve the growth, composition, and financial value of future forest

Overstocked softwood stands

TSI Harvesters for Small Diameter Stems

Tigercat 822 with a low tail swing for “strip” thinning

Constraints to More Intensive Silviculture

Maine Forestland Ownership Changes

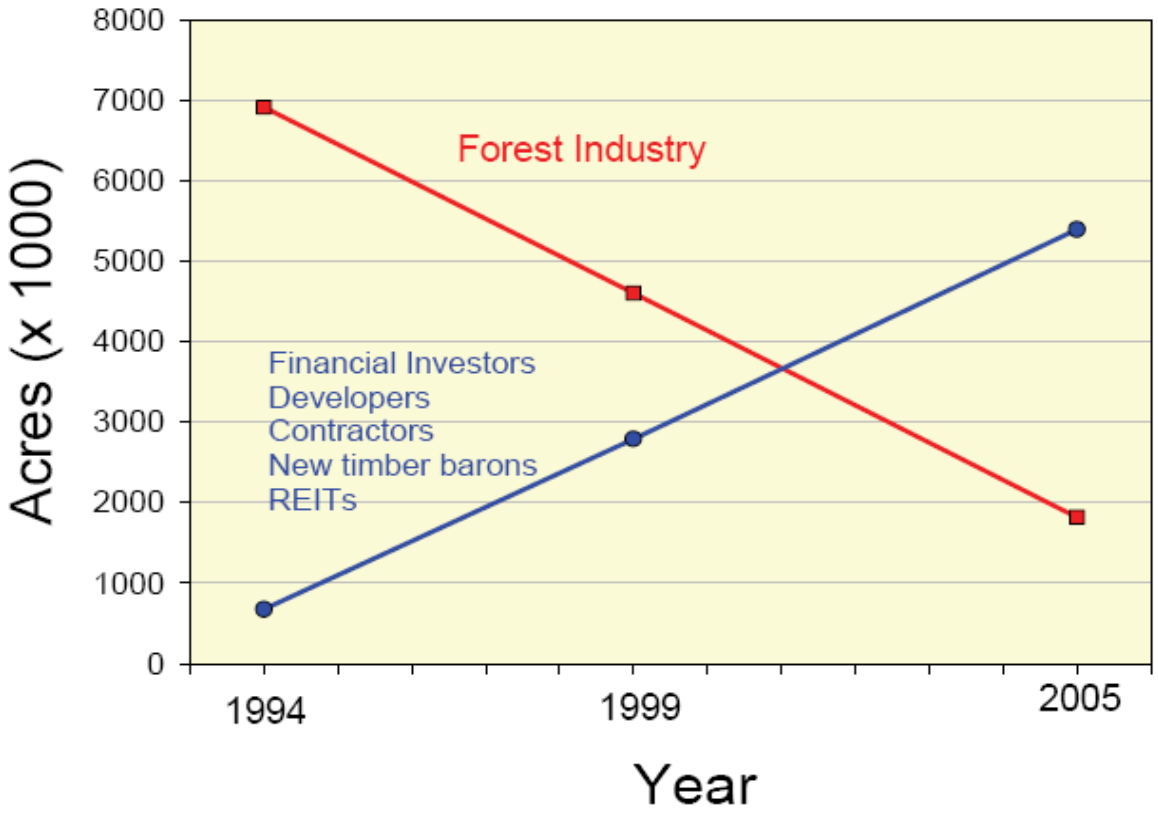
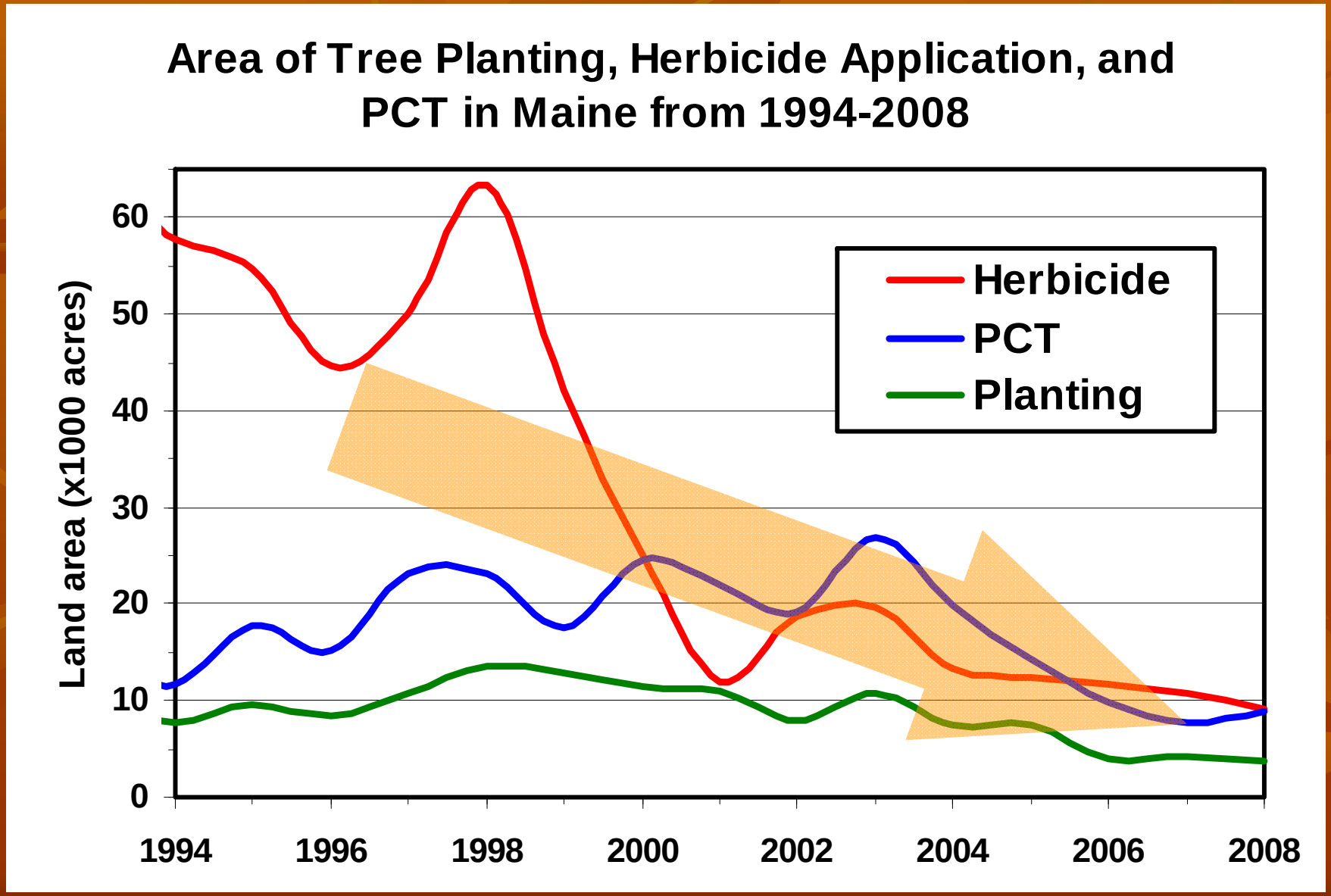


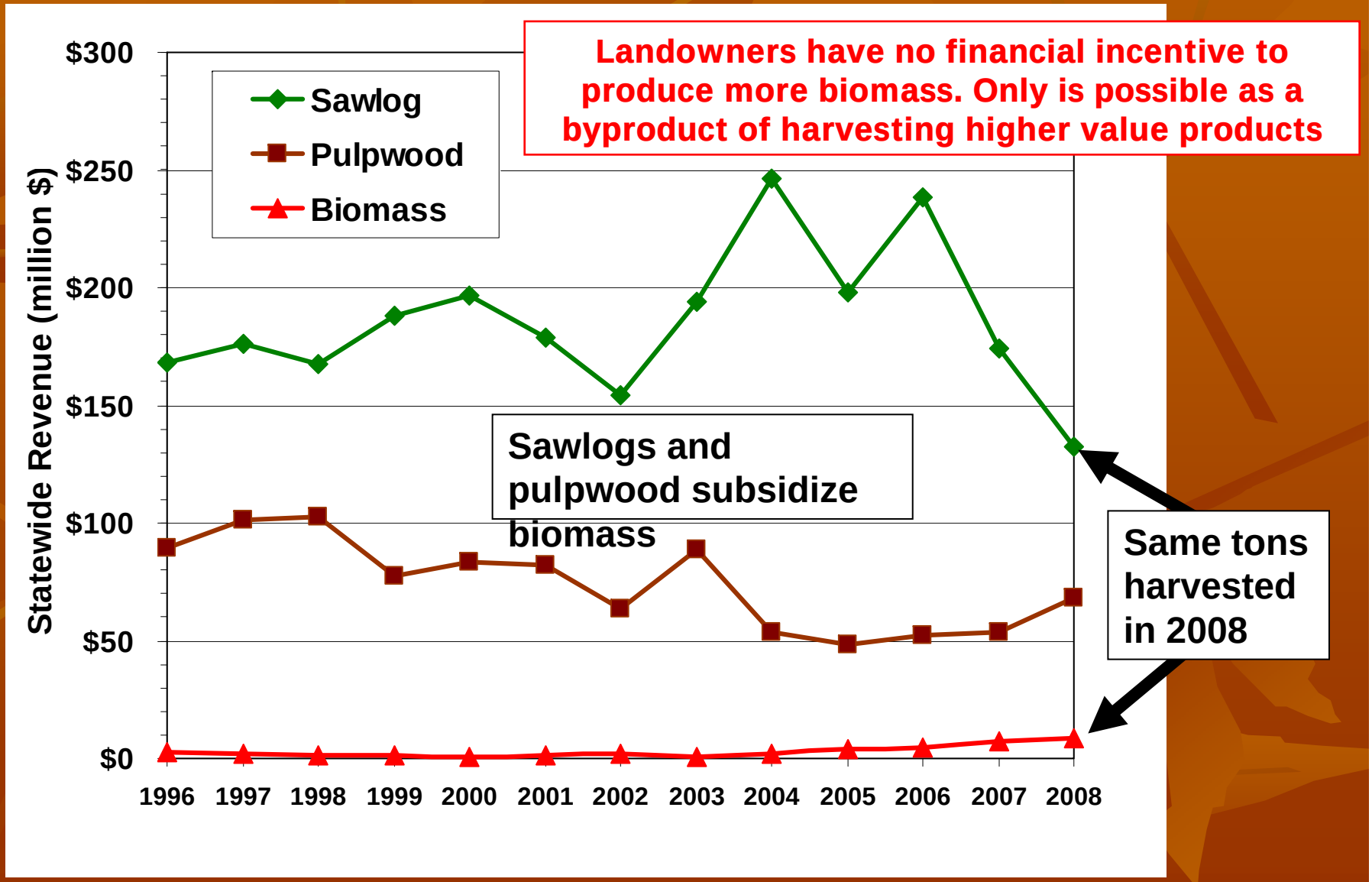
Figure 6. The number of acres owned by Industry (red) and by various newer forest owner types combined (blue) in Maine between 1994 and 2005.

Source: *Hagan, J.M., L.C. Irland, and A.A. Whitman. 2005. Changing timberland ownership in the Northern Forest and implications for biodiversity. Manomet Center for Conservation Sciences, Report # MCCS-FCP- 2005-1, Brunswick, Maine, 25 pp.*

Decline in Silvicultural Investments



Maine Stumpage Revenues on Wood Products (1996-2008)



Source: Maine Forest Service, Stumpage Price and Wood Processor Reports

Maine Partial Cutting

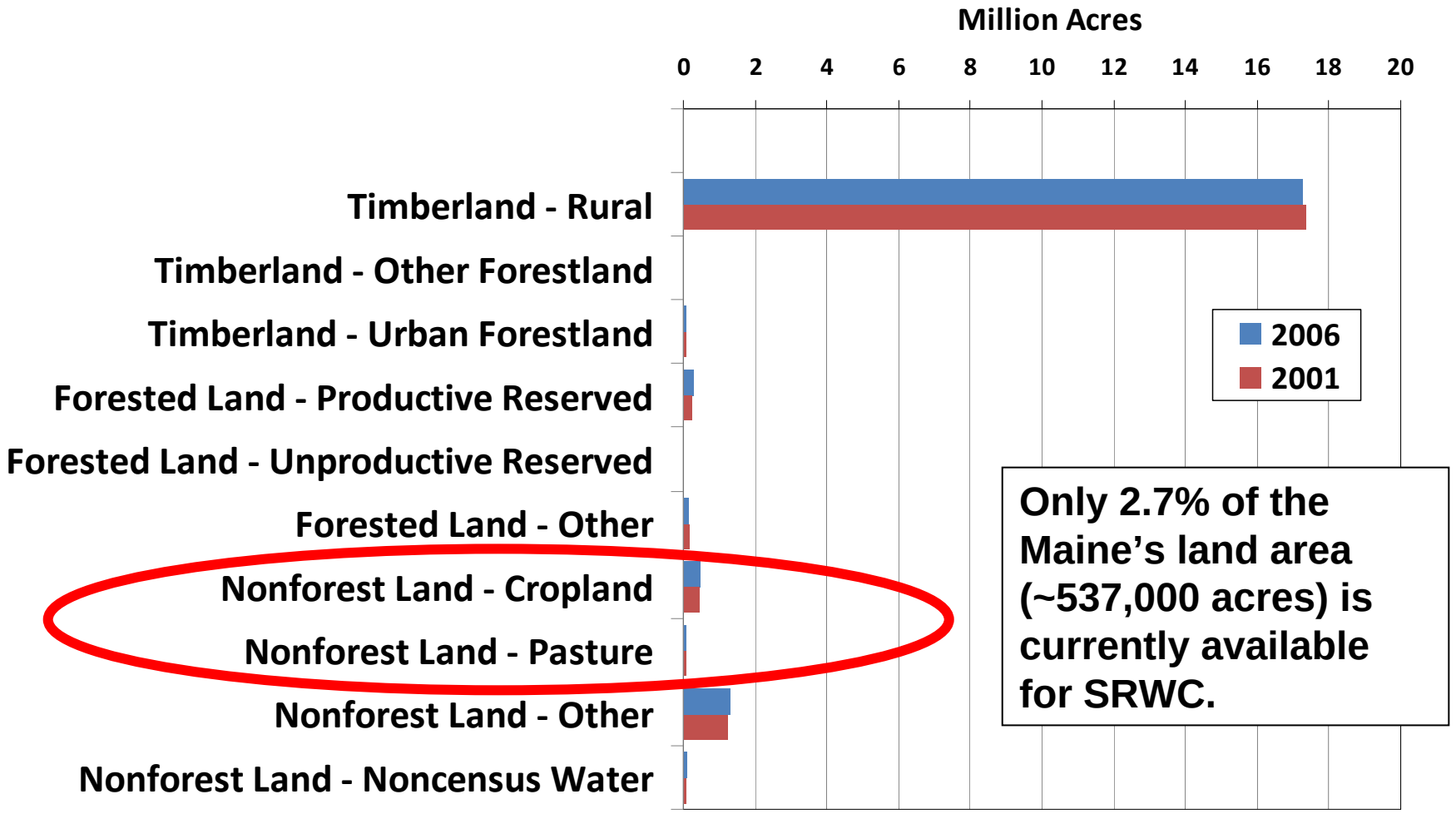
Short-Rotation Woody Crops for the NE

Hybrid poplar

Willow

- Available markets?
- Relatively stable prices?
- Government subsidies?
- Bad memories from 1970s?
- Amount of suitable land?

Short-Rotation Woody Crop Opportunities in Maine?

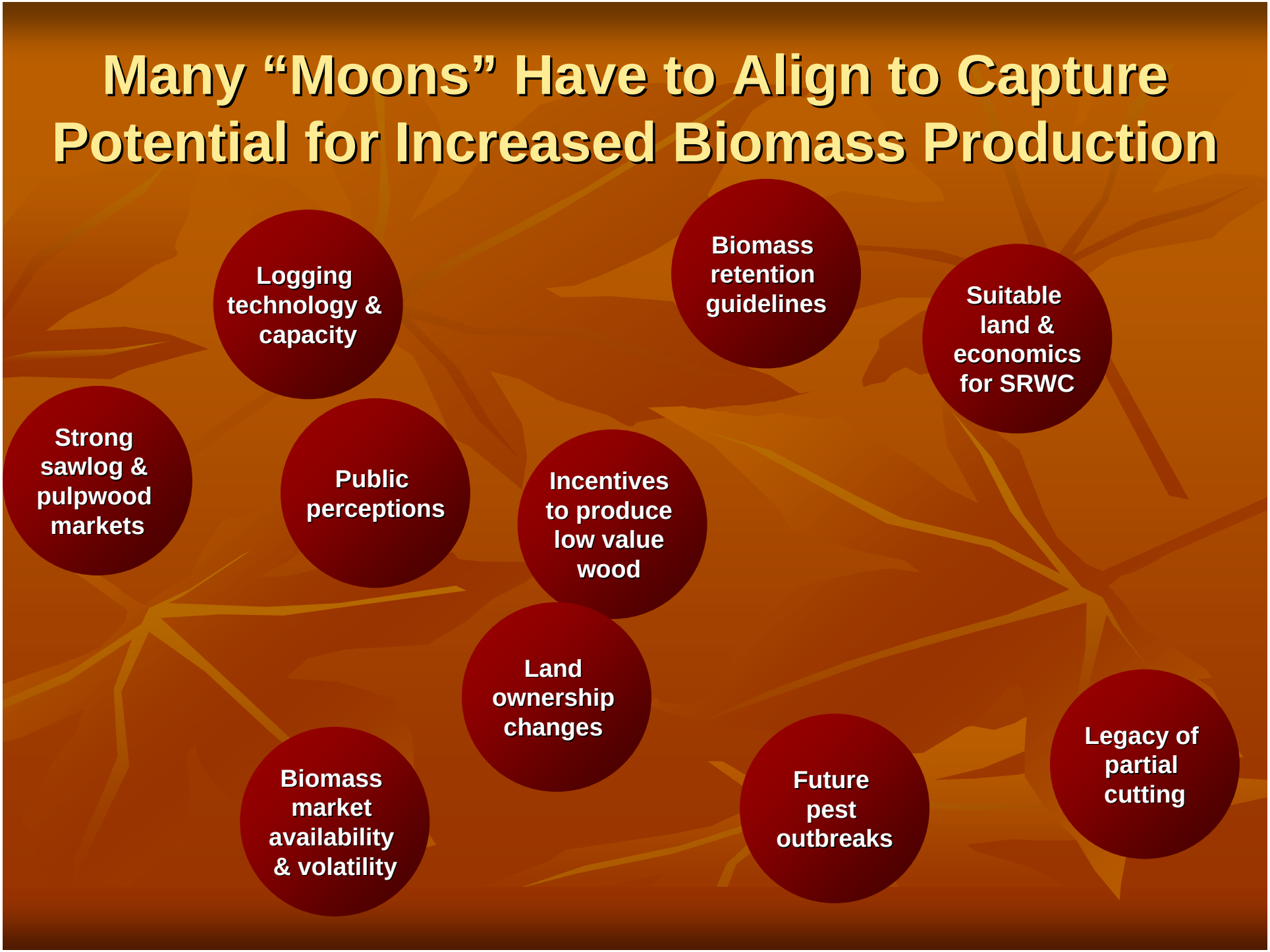


Source: Aaron R. Weiskittel and David Timmons. 2010. Evaluation of short rotation woody crops and perennial grasses in Maine

Conclusion

- **Energy wood (biomass) will continue to be an important byproduct from Maine's naturally regenerated and extensively managed forest – *Can't all be sold as sawlogs or pulpwood***
- **Current biomass harvests and any future increases in biomass will depend upon having a strong building and paper products industry**
- **Maine has the potential to sustainably double its energy wood production, BUT many significant and complex constraints**

Many “Moons” Have to Align to Capture Potential for Increased Biomass Production



These “Moons” Have to Align to Capture Potential for Increased Biomass Production

IT’S NOT EASY BEING OPTIMISTIC!