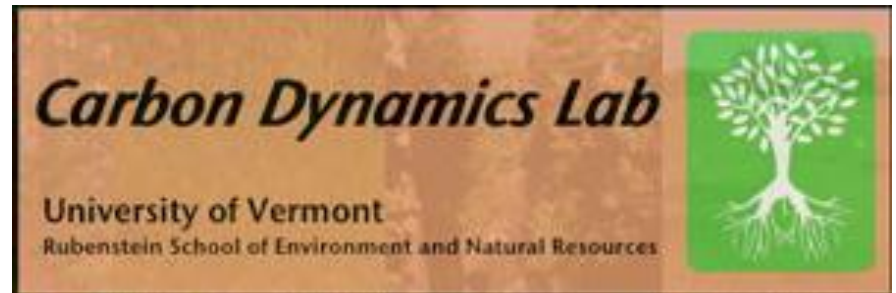




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## **Economics of Biomass Fuel Harvests in the Northeastern Forest**

**Thomas Buchholz, William Keeton,  
Anna Mika and Caitlin Littlefield**

**University of Vermont,  
Rubenstein School of Environment  
and Natural Resources**

**The 3<sup>rd</sup> annual Heating the Northeast with Renewable Biomass  
Conference, April 14-15 2011, Radisson Hotel, Manchester, New Hampshire**

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**WITH RENEWABLE BIOMASS**



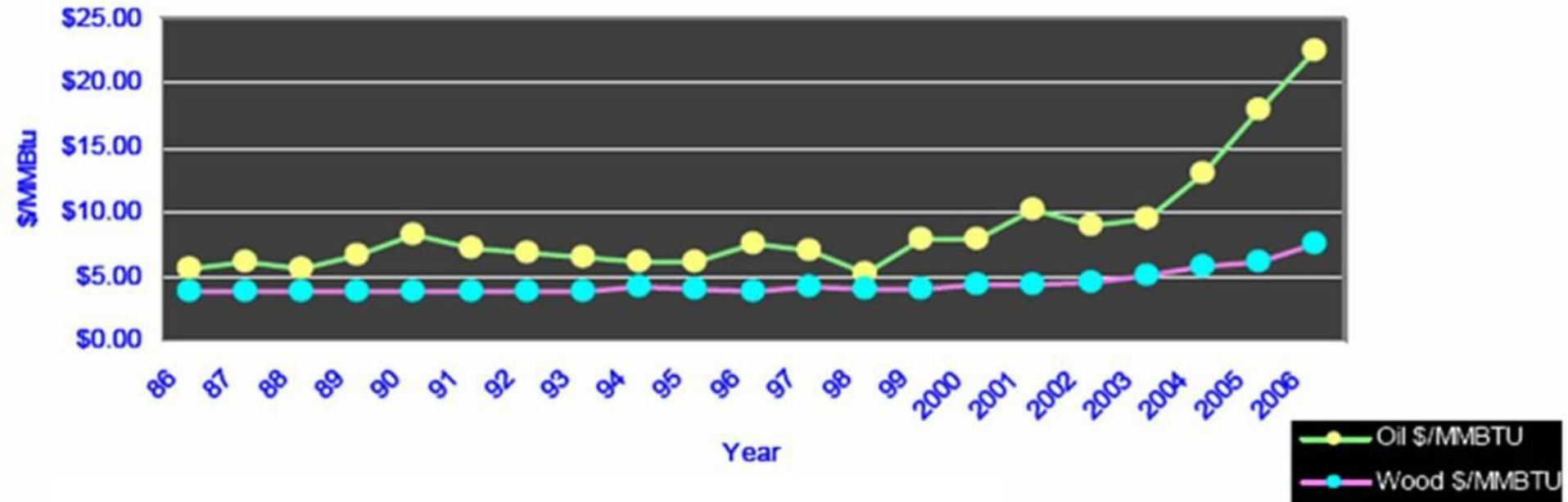
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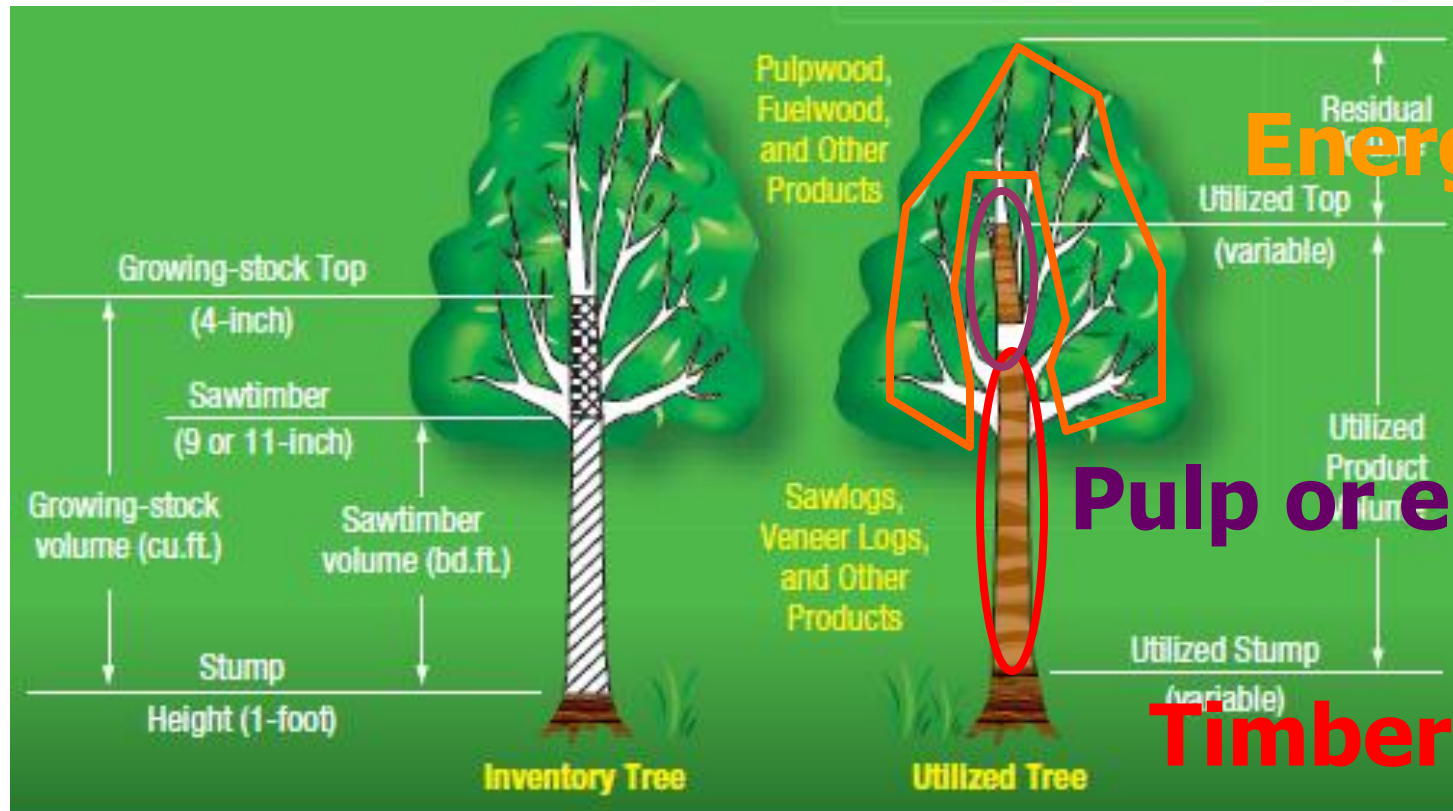
# Biomass price development

Vermont Wood and Oil Energy Price History



Source: Paul Frederickson, VT Dept. of Forests, Parks & Rec.

# Wood products from logging



Energy

Pulp or energy

Timber



- Logging residue includes the unmerchantable tops and small branches.

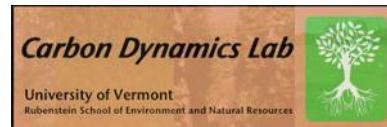
# Forest harvest operations in the NE

- Which stand will be logged?
  - Driven by high-value sawtimber
- How can you lower harvest costs?
  - Cut more volume
  - Additional revenue from pulp and fuelwood (chips, cordwood, etc.)
- What could it mean for biomass harvest if the timber or pulp market is turning sour?
- Sweden: 70 % of forest owner revenue from timber, 30% from pulp, **1% from fuel wood** (Loefstedt 1998)

# Effects of Wood Energy Harvesting on Stand Structure and Carbon Pools in Northern Hardwood Forests

William Keeton, Anna Mika,  
Caitlin Littlefield, and  
Thomas Buchholz

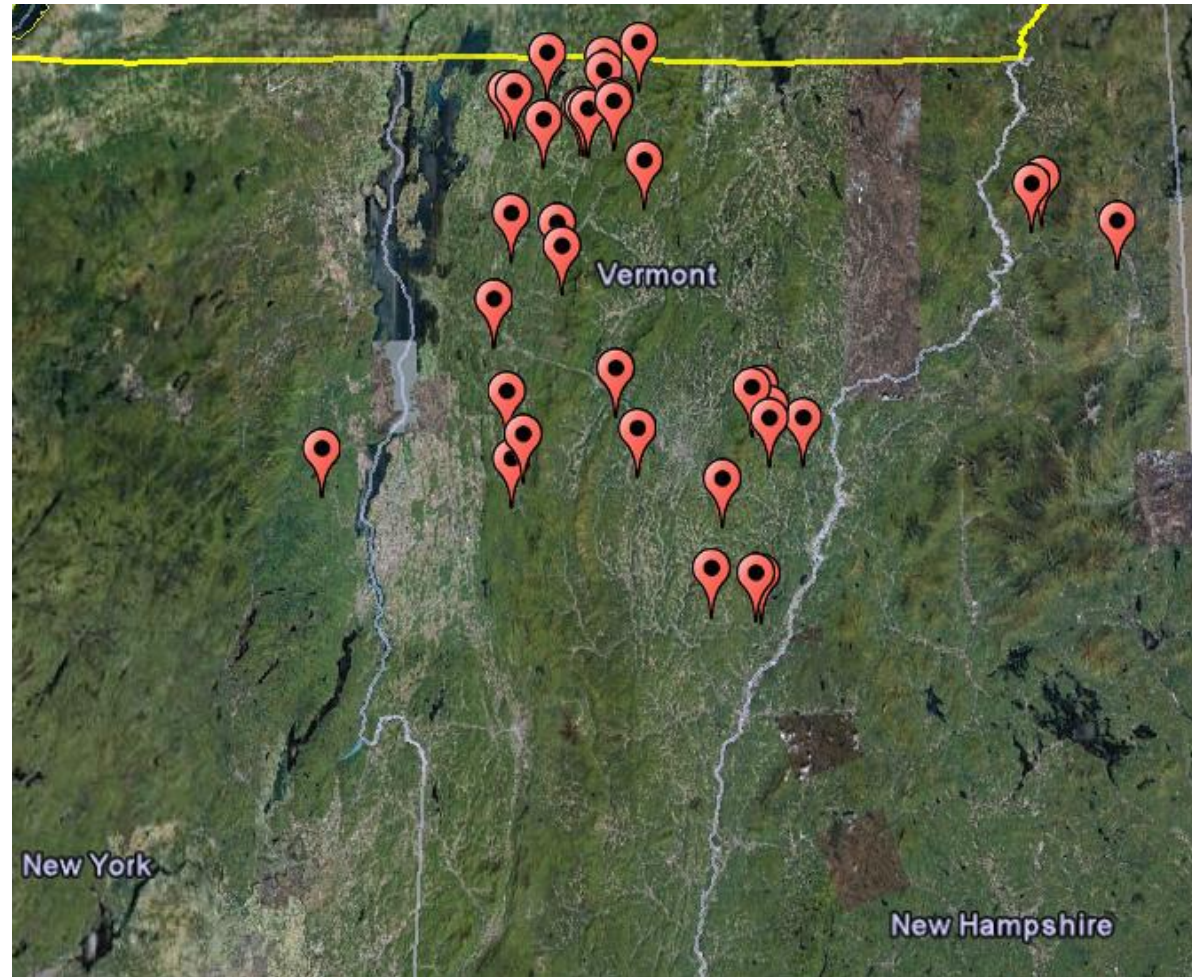
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# Methods

- 37 Sites in VT, NH, and NY
- Paired reference and harvested at each location
- Harvested within last three years
- Site matching criteria





# Economics of biomass cuts

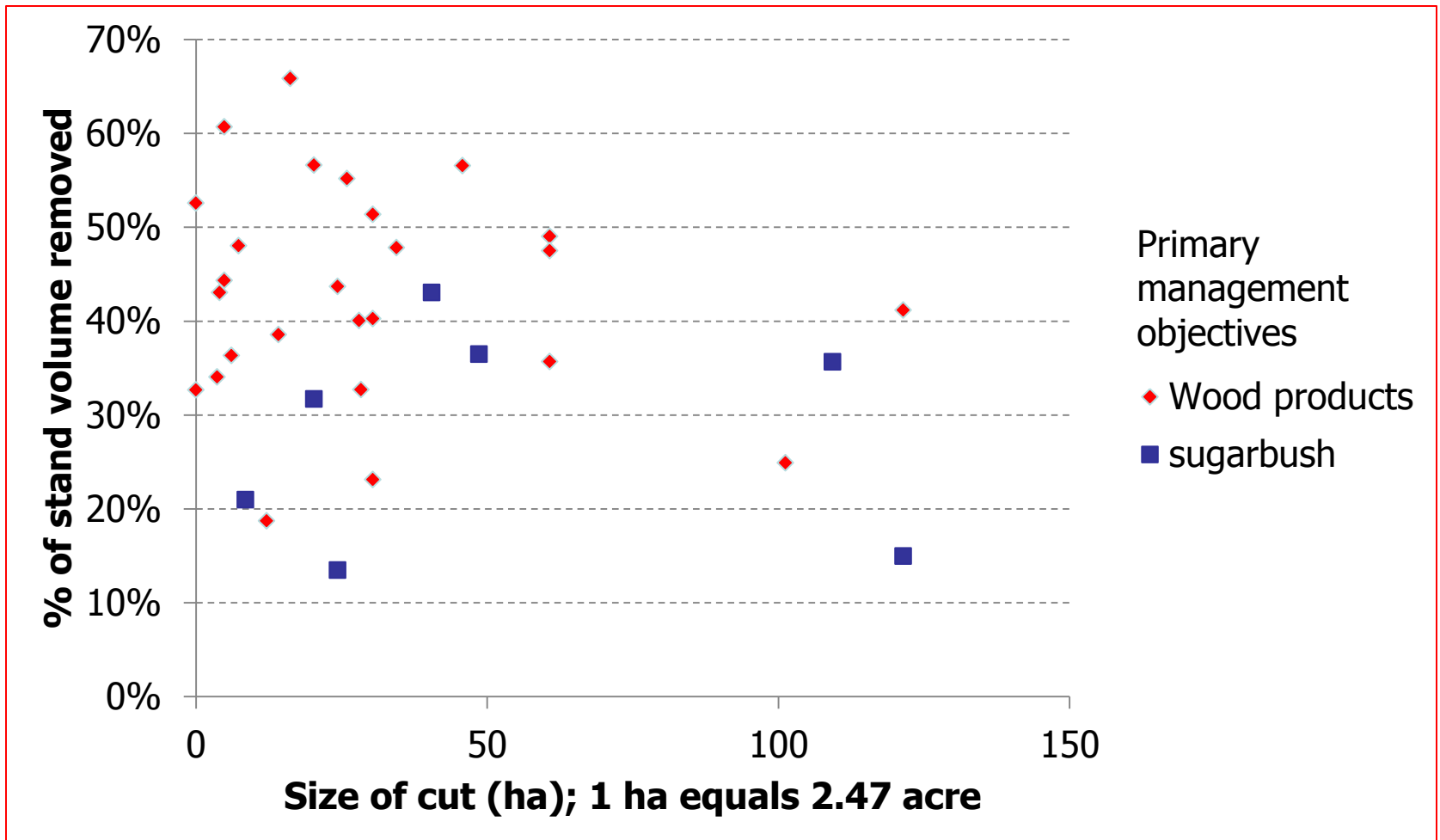
## Goals:

- What is the economic driver for biomass harvests?

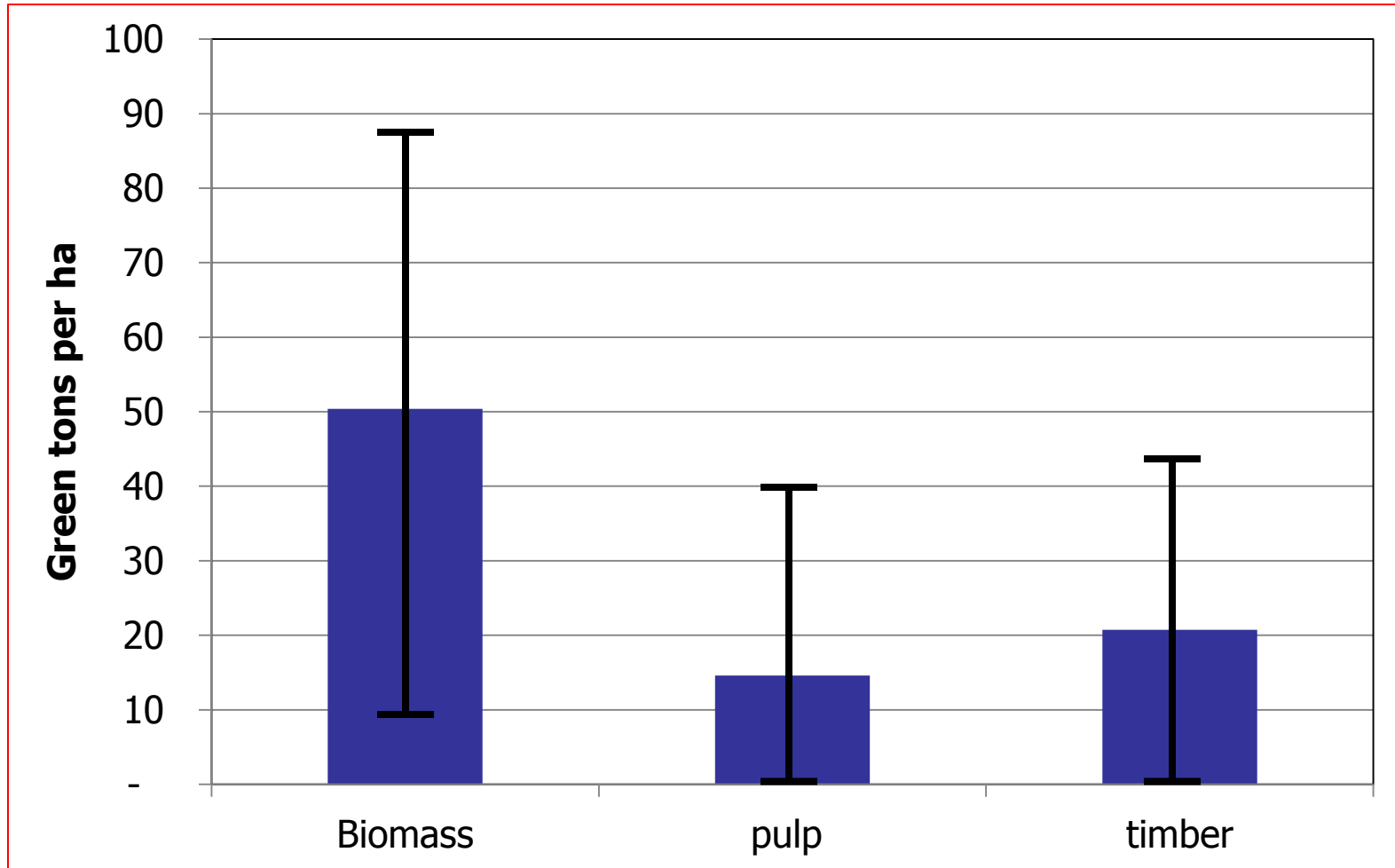
## Methods:

- Informal data collection on quantity and type wood removal
- 380 \$/mbf at mill gate for timber
- 35 \$/green ton at plant gate for pulp
- 30 \$/green ton at plant gate for biomass and firewood
- Stumpage prices: 33% of mill price to land owner for timber;  
1 \$/green ton for pulp/firewood/biomass
- Fixed costs per unit of harvesting equipment delivery
- Machine rates from literature
- Machine productivity adjusted by harvest intensity (green tons/acre)
- Transport costs of 50 \$/mbf (timber) and 8 \$/green ton (all other)

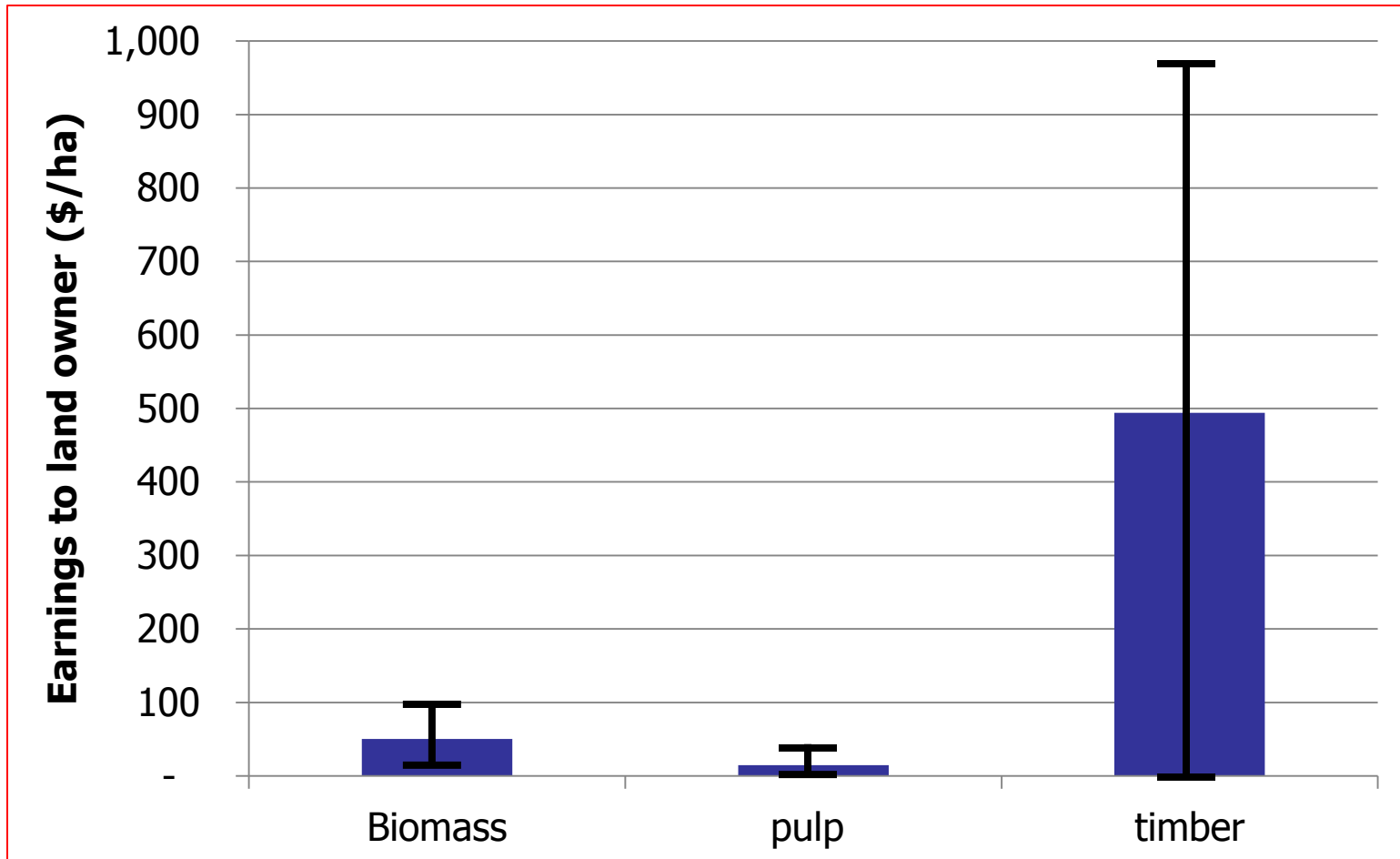
# Intensity and size of cuts



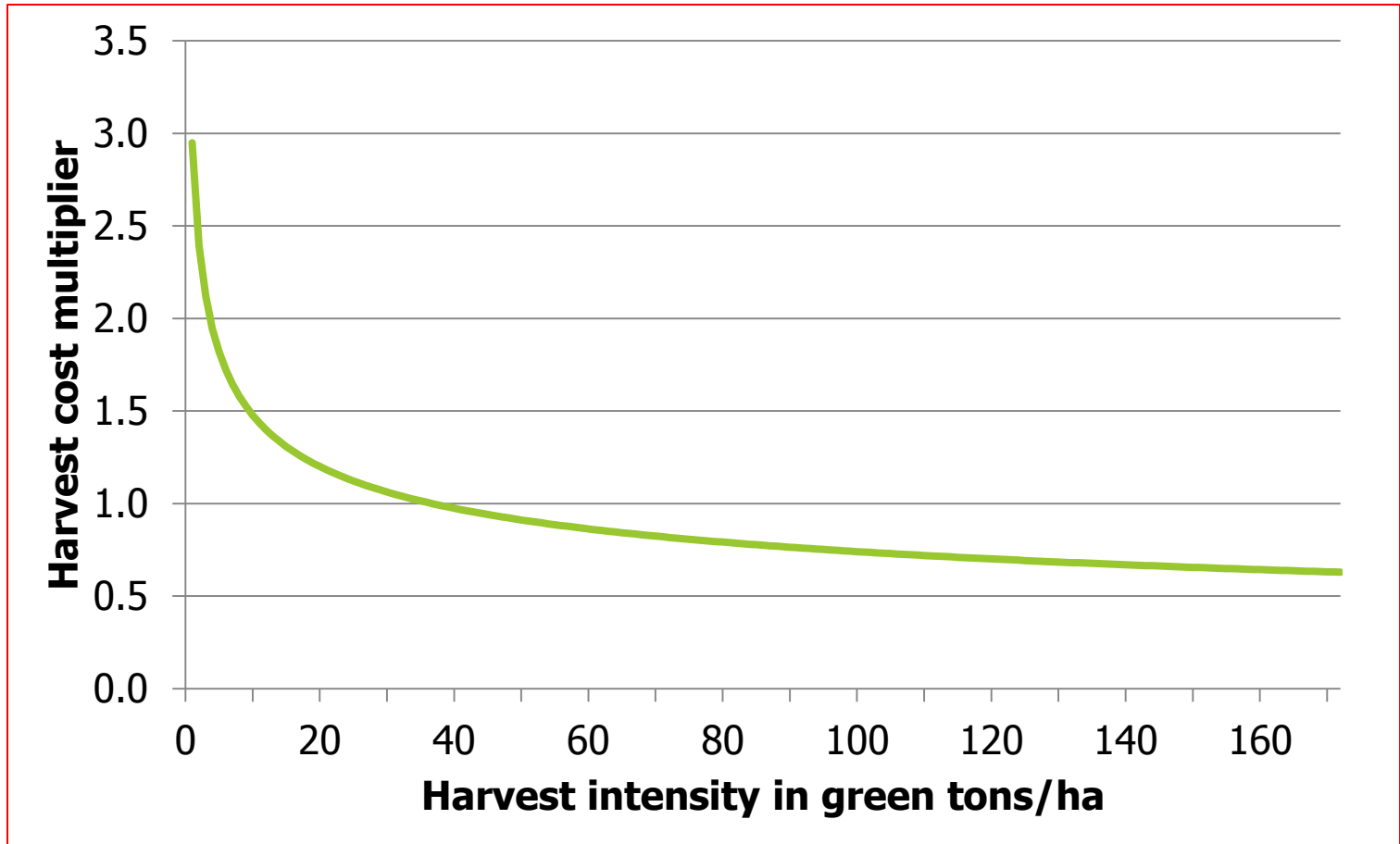
# Quantities of wood products



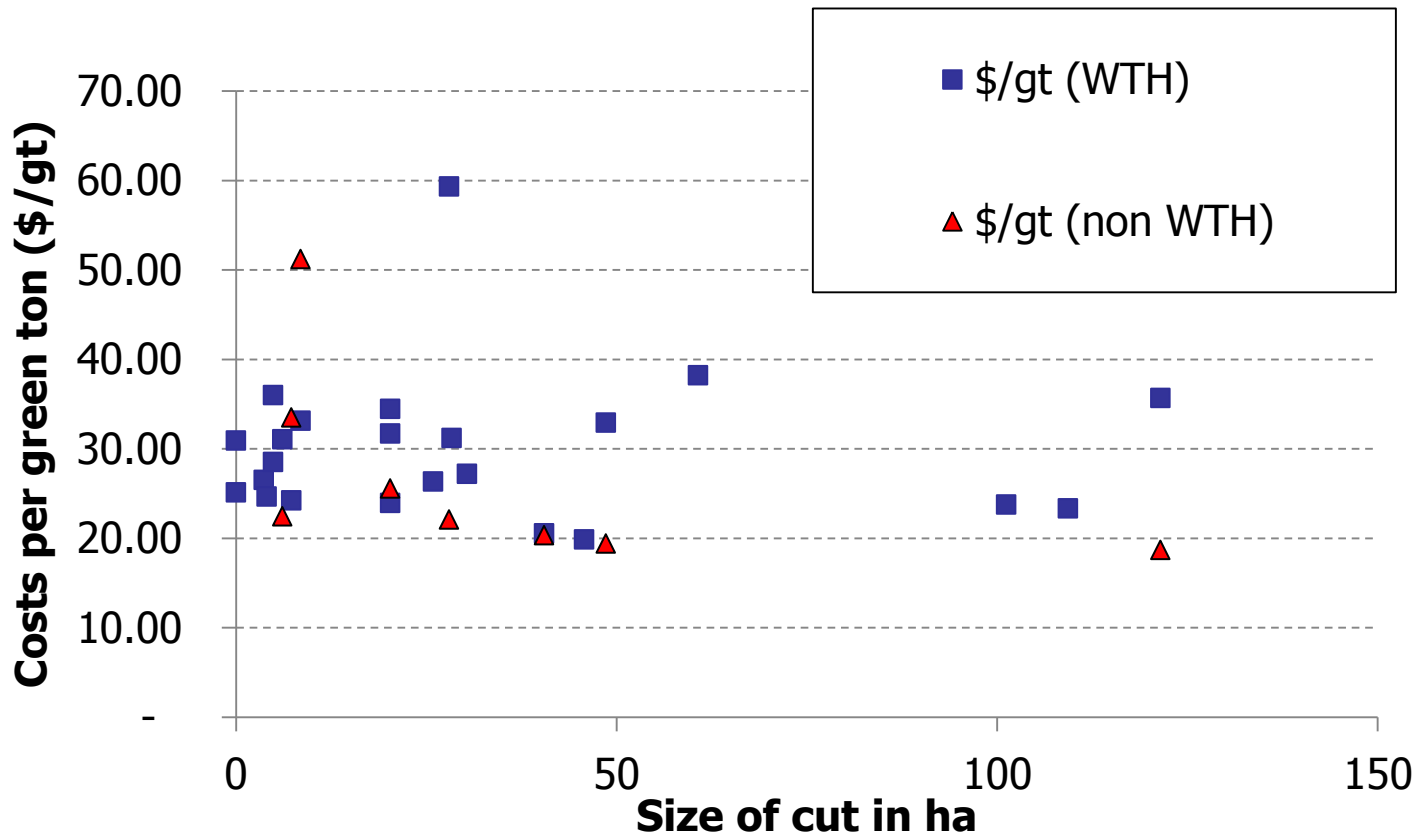
# (Short-term) Profits to the land owner



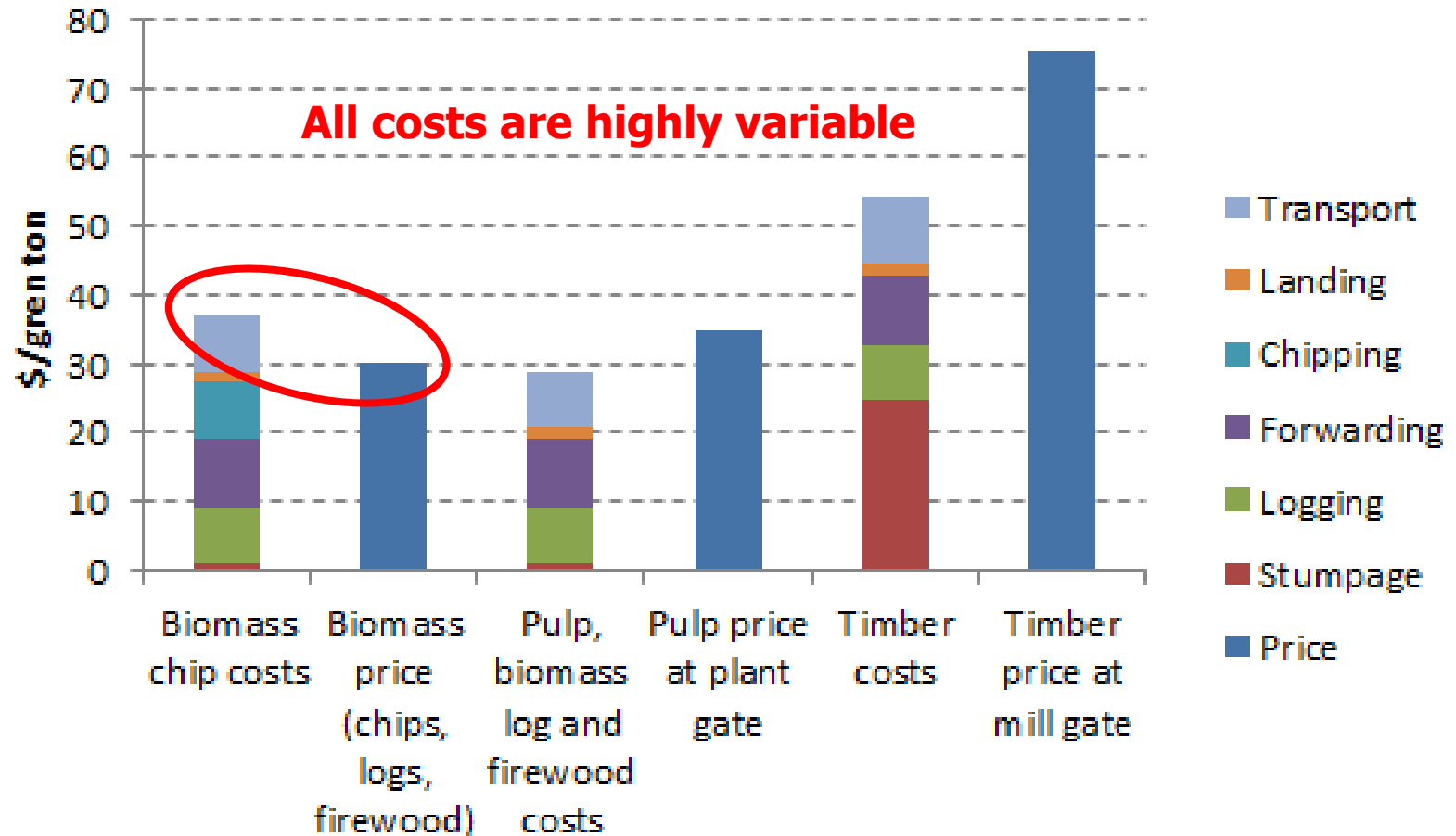
# Logging costs – economies of scale: Harvest intensity



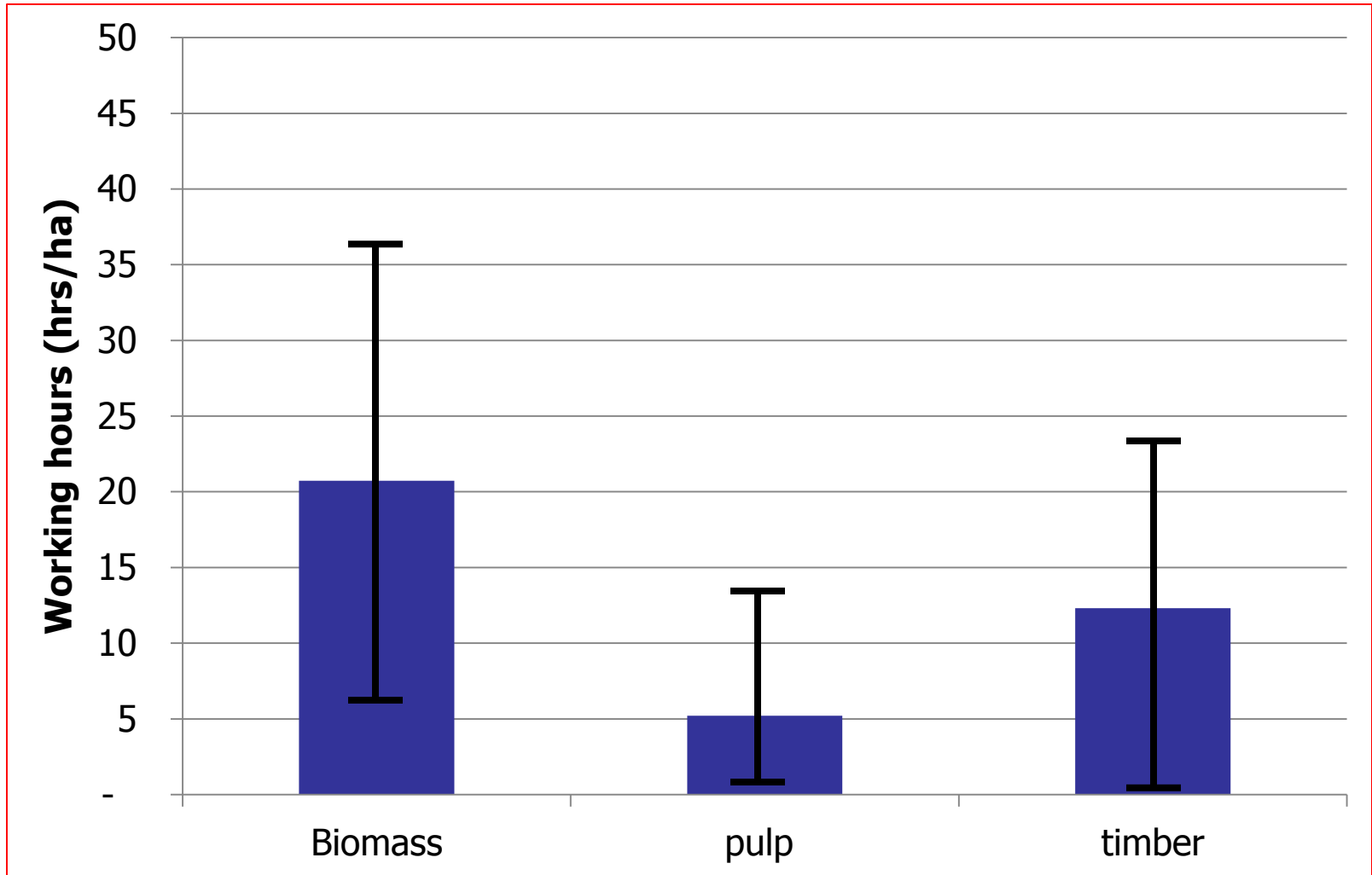
# Logging costs – economies of scale: Harvest size



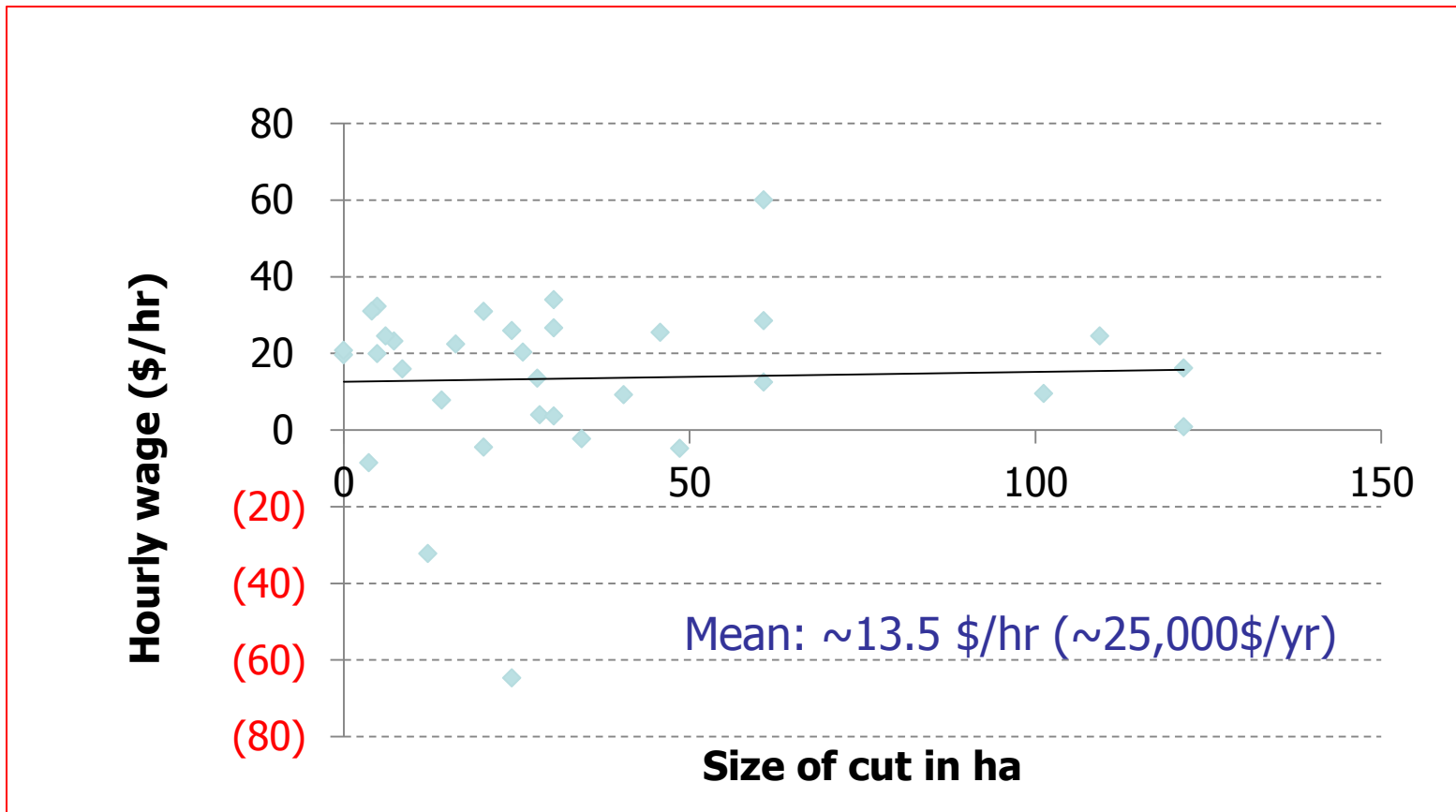
# Wood products: costs and price



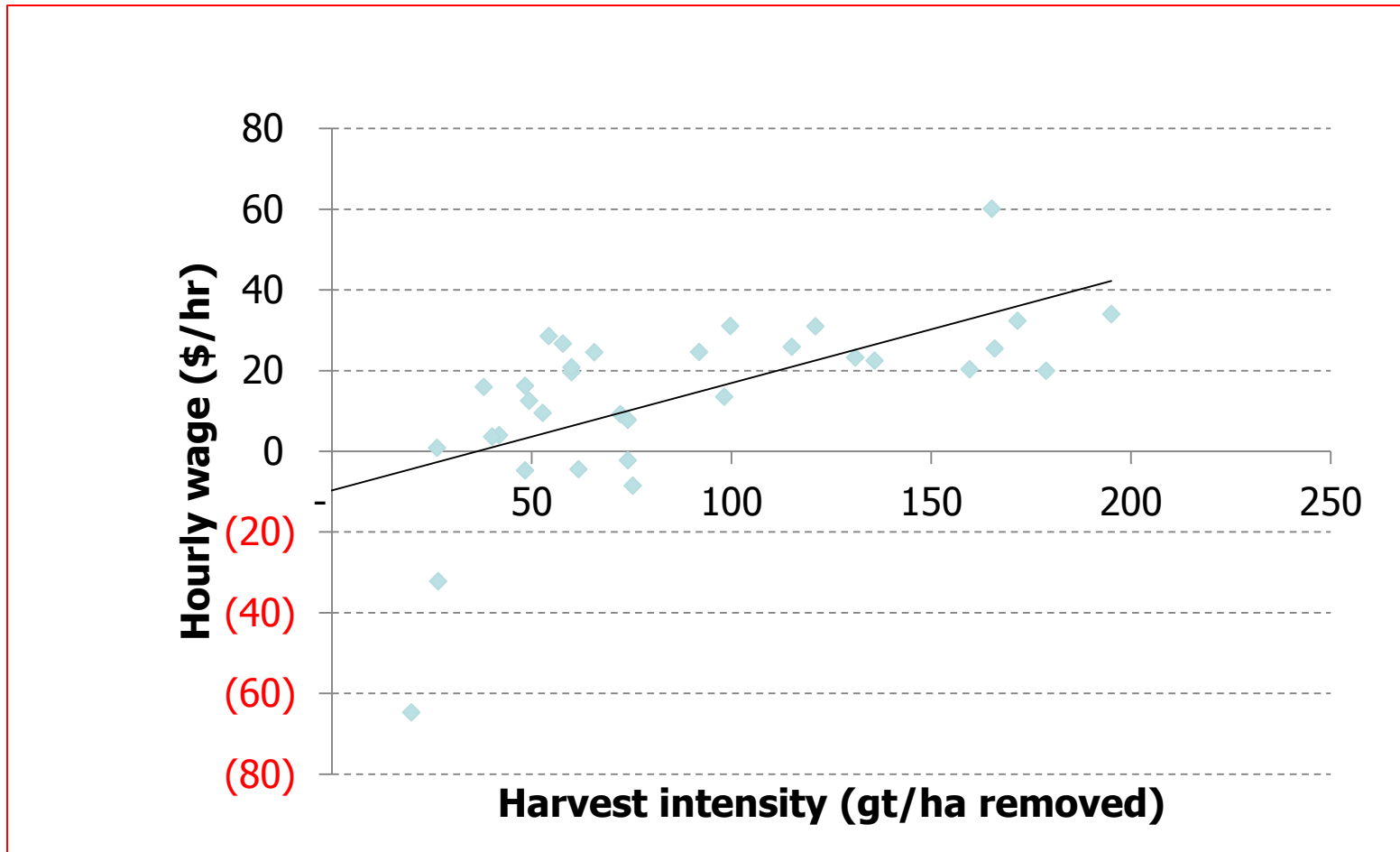
# Earnings to the logger



# Economies of scale – Earnings to the logger (2)



# Economies of scale - Earnings to the logger

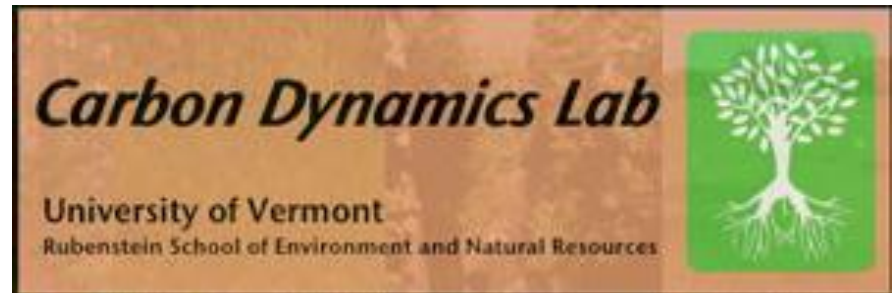


# Conclusions

- High variability in logging economics
- Economics of biomass cuts heavily depend on other wood products
- Stumpage prices do not reflect the full picture of logging operations
- Biomass harvests significantly increase income to logger
- Pressure to intensify operation rather than increase size of cut
- Innovative logging contracts
- Next steps: identify costs of reducing environmental impacts, etc.



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Thank you for your attention!

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**Carbon Dynamics Lab:**  
<http://www.uvm.edu/~cdl>

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