Fuel consumption for harvesting operations in Sweden

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TSG

Lars Eliasson, Skogforsk
John Arlinger, JDA Skog

Previous estimates

From 2006 and 2012

- Based on surveys there the machine owners reported data for specific weeks

Later data

- Case studies for specific machines

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The new study

- Utilizing automatically generated machine data stored in databases
- Continuous data collection
- Separated on site

Challenges

- Data access and confidentiality
- Find machines that report fuel consumption as well as other necessary data
- Accuracy & precision in fuel measurements
- Earlier used variables not always available
  - New are needed

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What is a large…

- Weight
- Engine power
- Load capacity
- Harvester head

Do we include all machines or machines for professional forestry

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Our solution

- Harvesters classified according to harvested tree size
- Forwarders classified according to average load volume

In both cases averages per make and model

Results

- Fuel consumption can be modelled based on machine data
- Machine size affects FC per hour but not necessarily FC per m3

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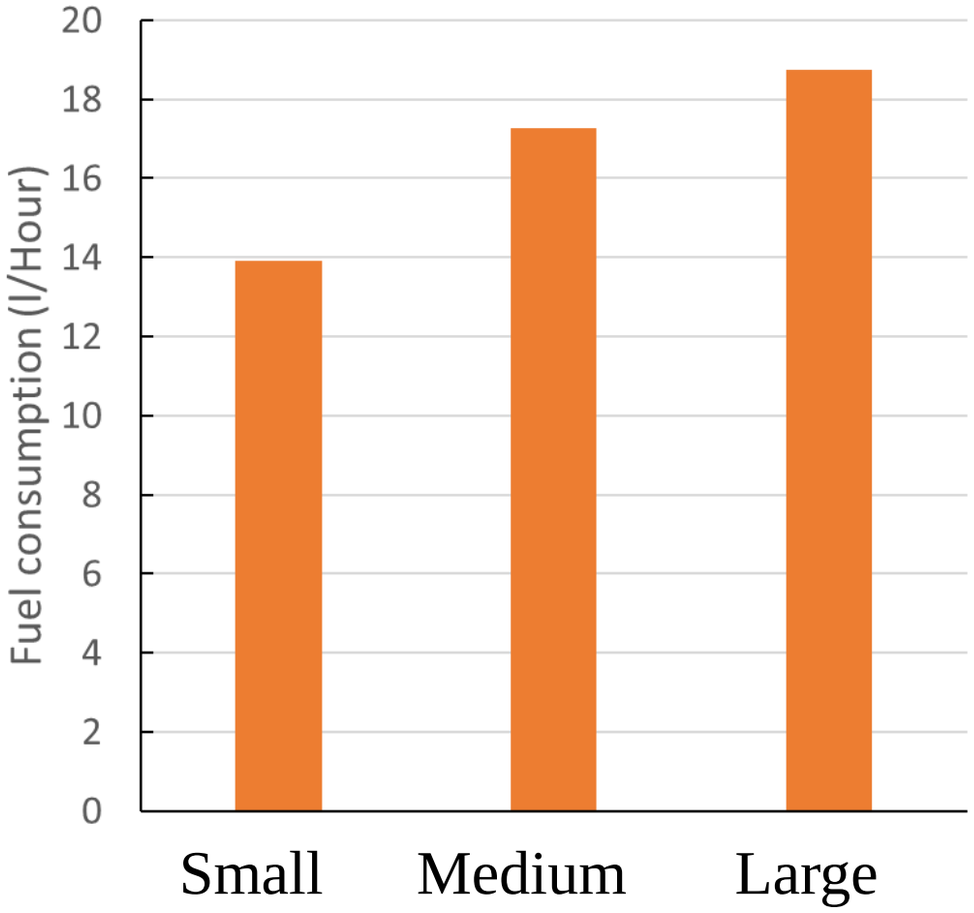
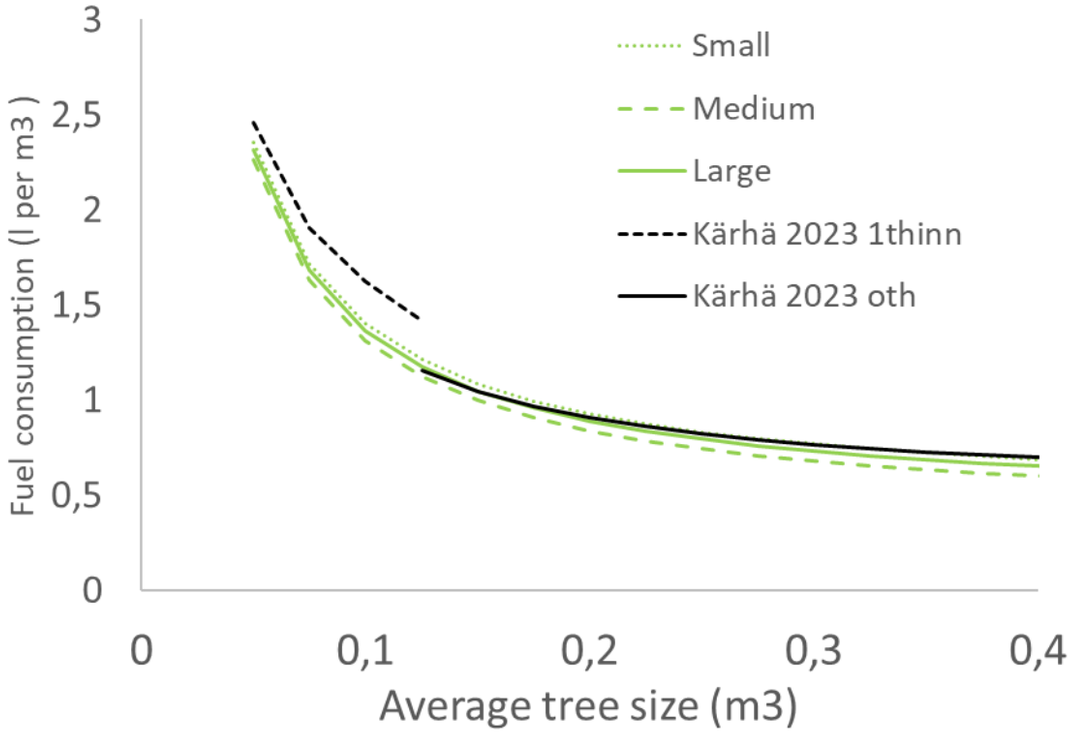
Harvester





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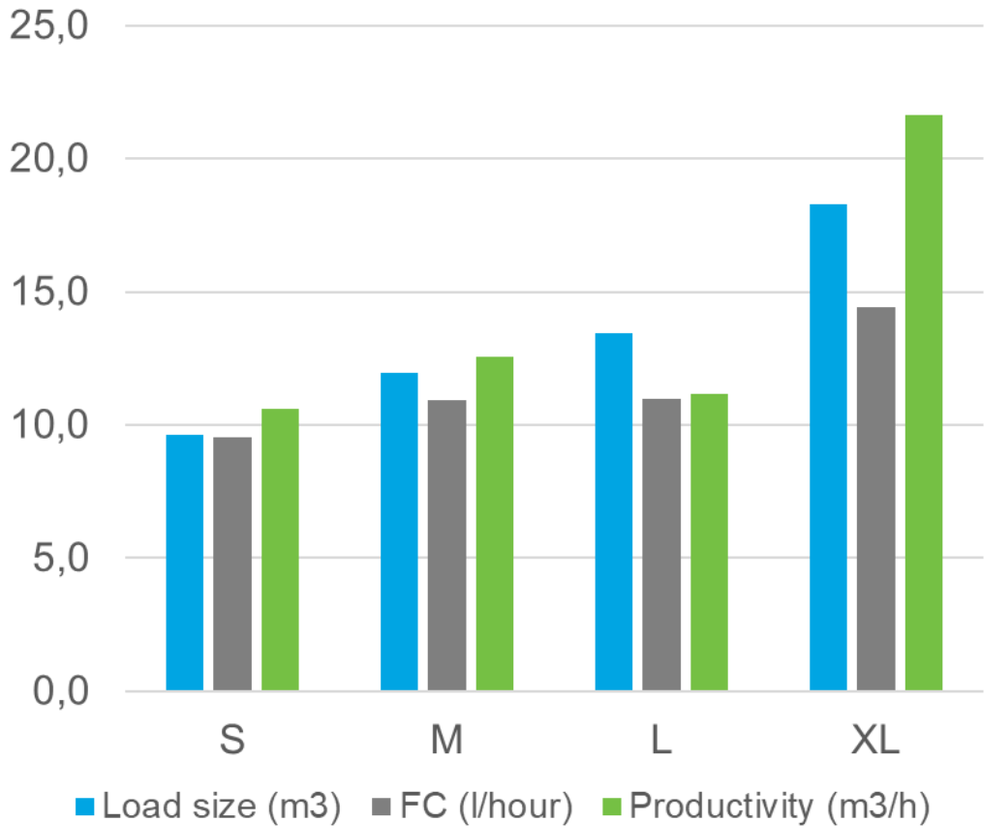
Forwarders



NO difference in FC/m3 beetween machine sizes if:

- wood concentration (m^3/ha)
- driven distance per m^3

is the same

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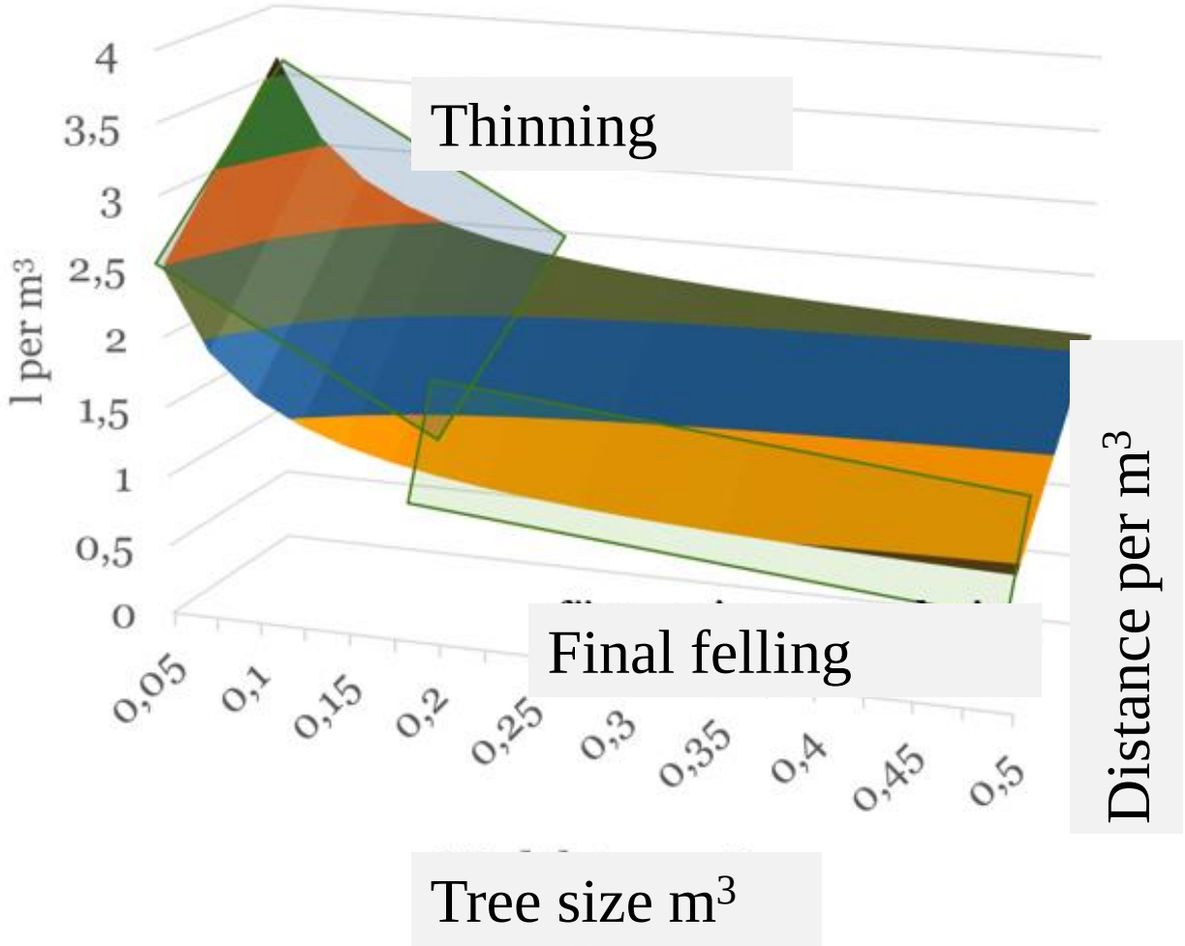
Fuel consumption per harvesting team

- Models of FC per m3 explain 84% of the variation
- Issues with covariation between tree size, driven distance, harvested volume and machine size



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Fuel consumption per harvesting team

Average fuel consumption in Sweden were

- 1,69 liter per m^3 in 2020
- 1,76 liter per m^3 in 2021
  - ➢ 5% increase

Final felling teams

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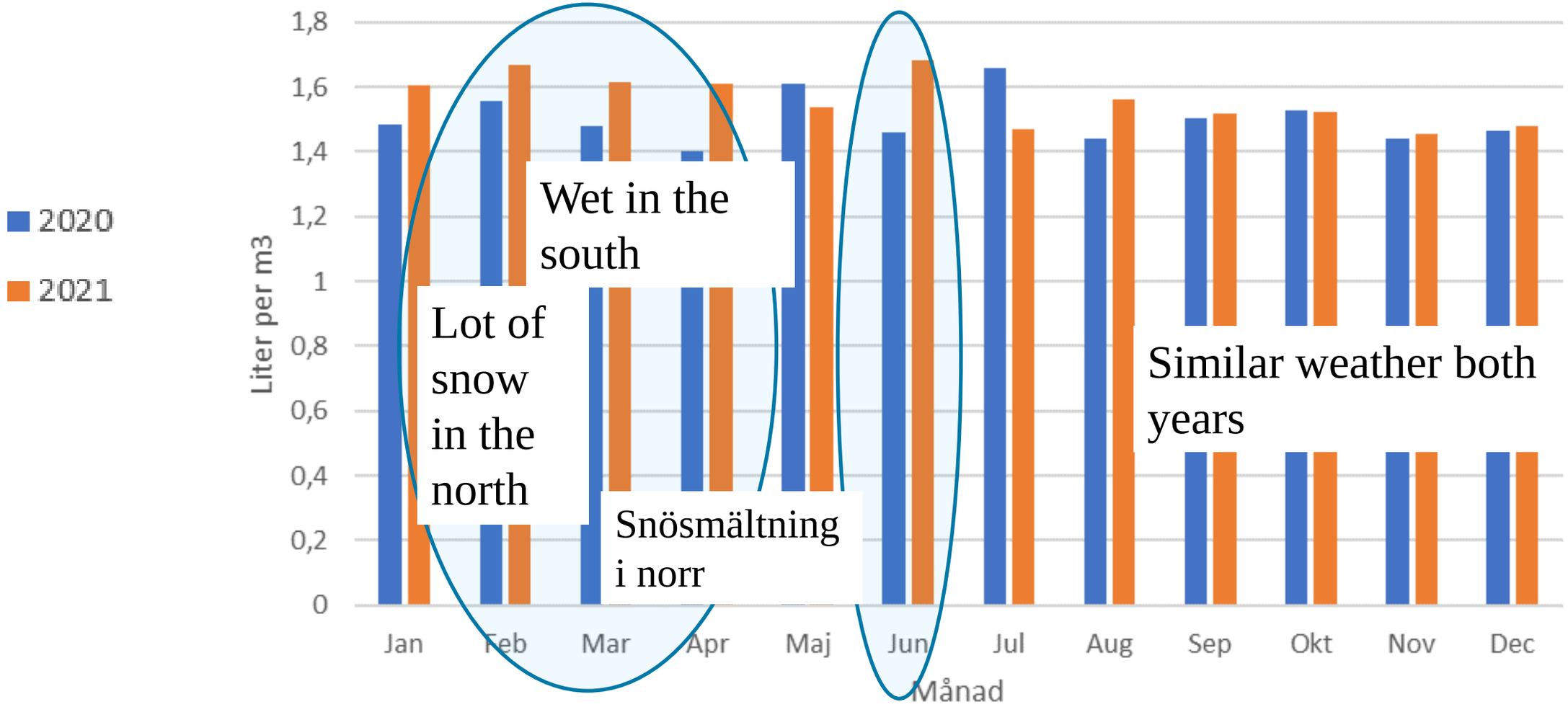
Some theories



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Machine data

Provides new opportunities to analyze fuel consumption

- Weather
- Geographical differences
- Differences in site conditions
- ….

And can be used as a benchmark when training operators

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Lars Eliasson
lars.eliasson@skogforsk.se

skogforsk