Ecosystem services and alternative silvicultural approaches in Norwegian forest

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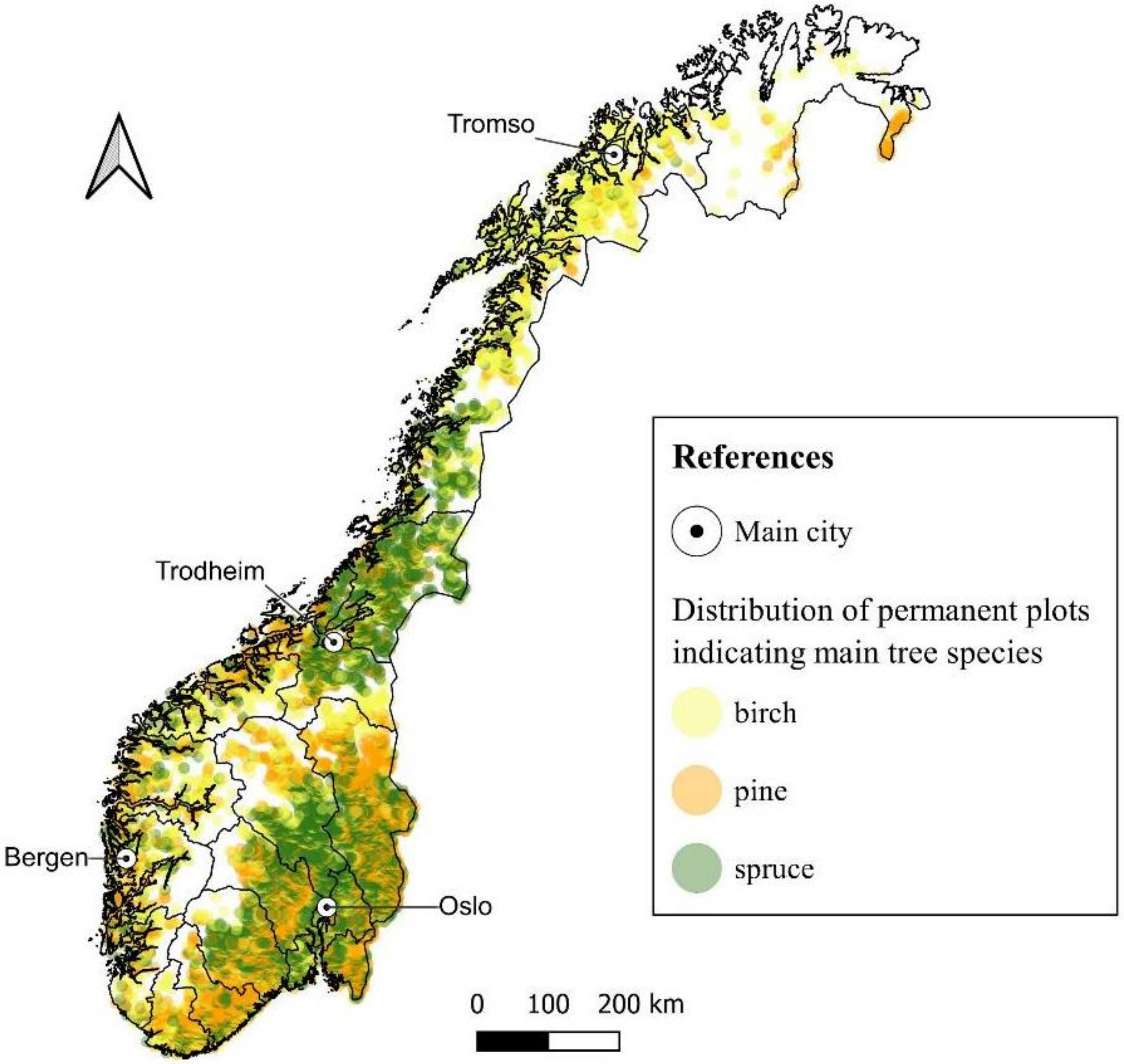
Dominant Tree Species in Norway



Productive forest area:

- 81,167 km^2 (25% of total mainland area)
- 4 % under protected scheme
- Timber harvested (2024) ~ 12 million m^3

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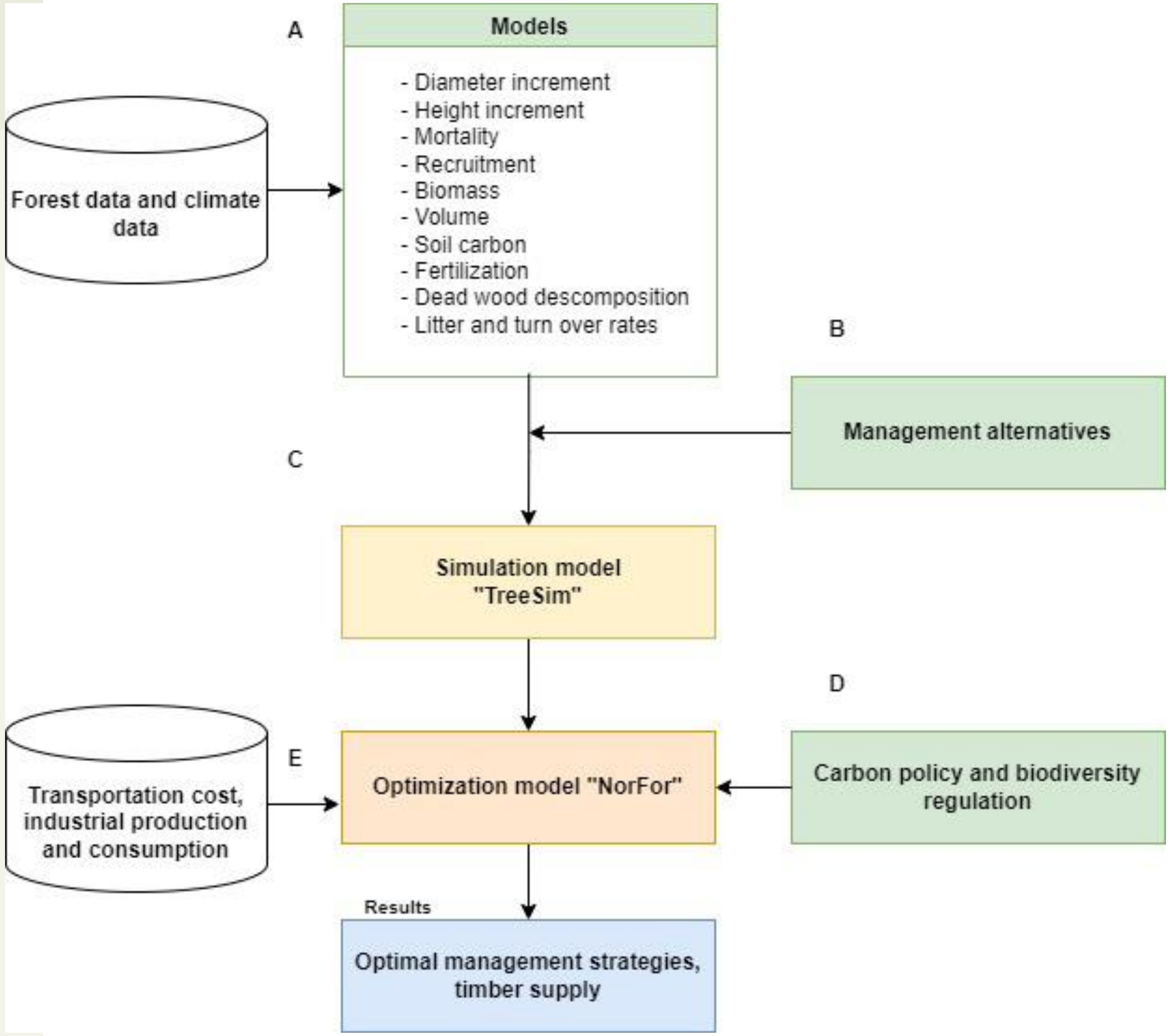
Paper I: policy impacts

Impacts of biodiversity and carbon policies on the management of Norwegian forest and its ecosystem services.

Image source: NIBIO

Base year 2020; 5-year periods; 30 periods total; focus on year 2140 (Period 24)

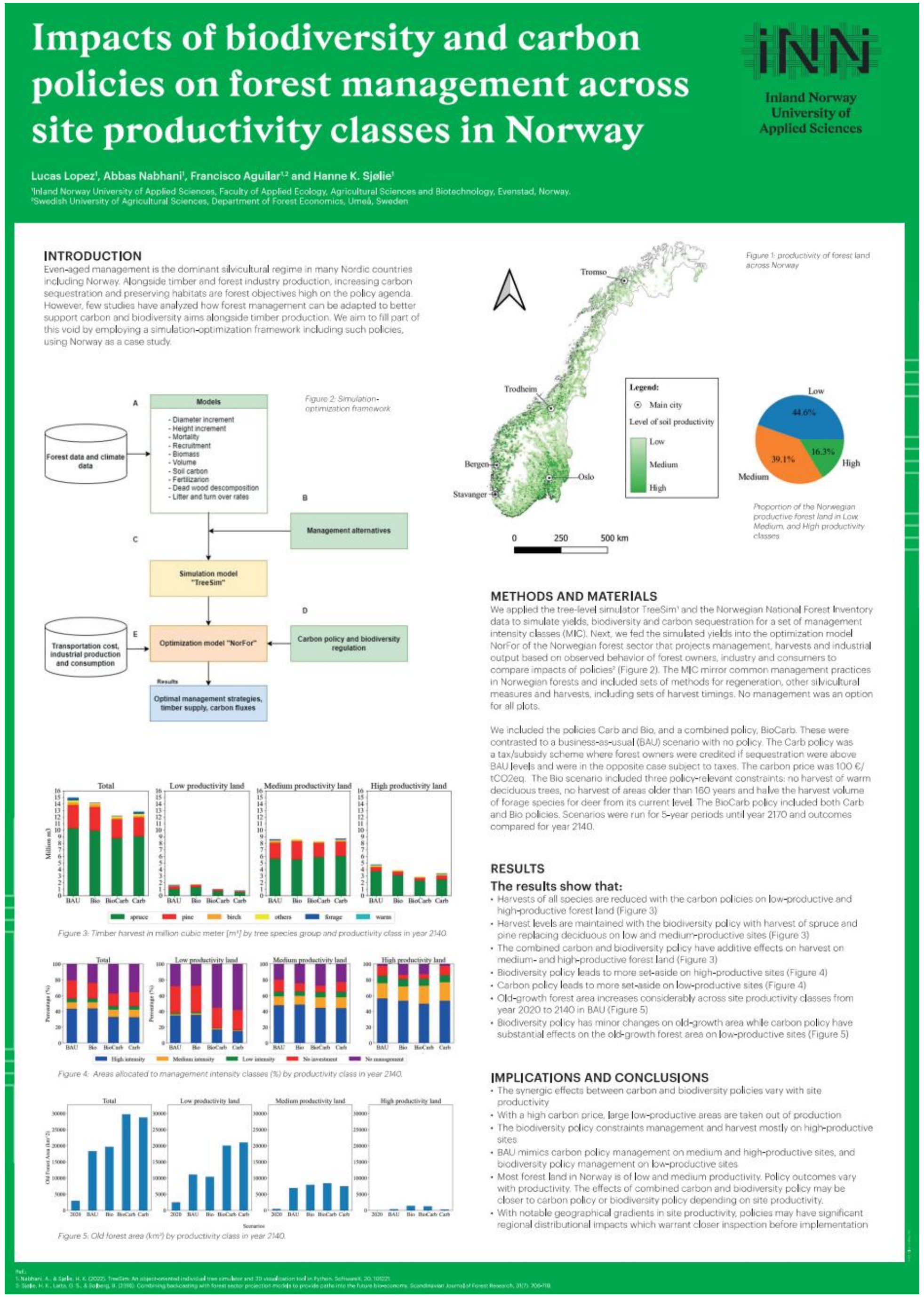


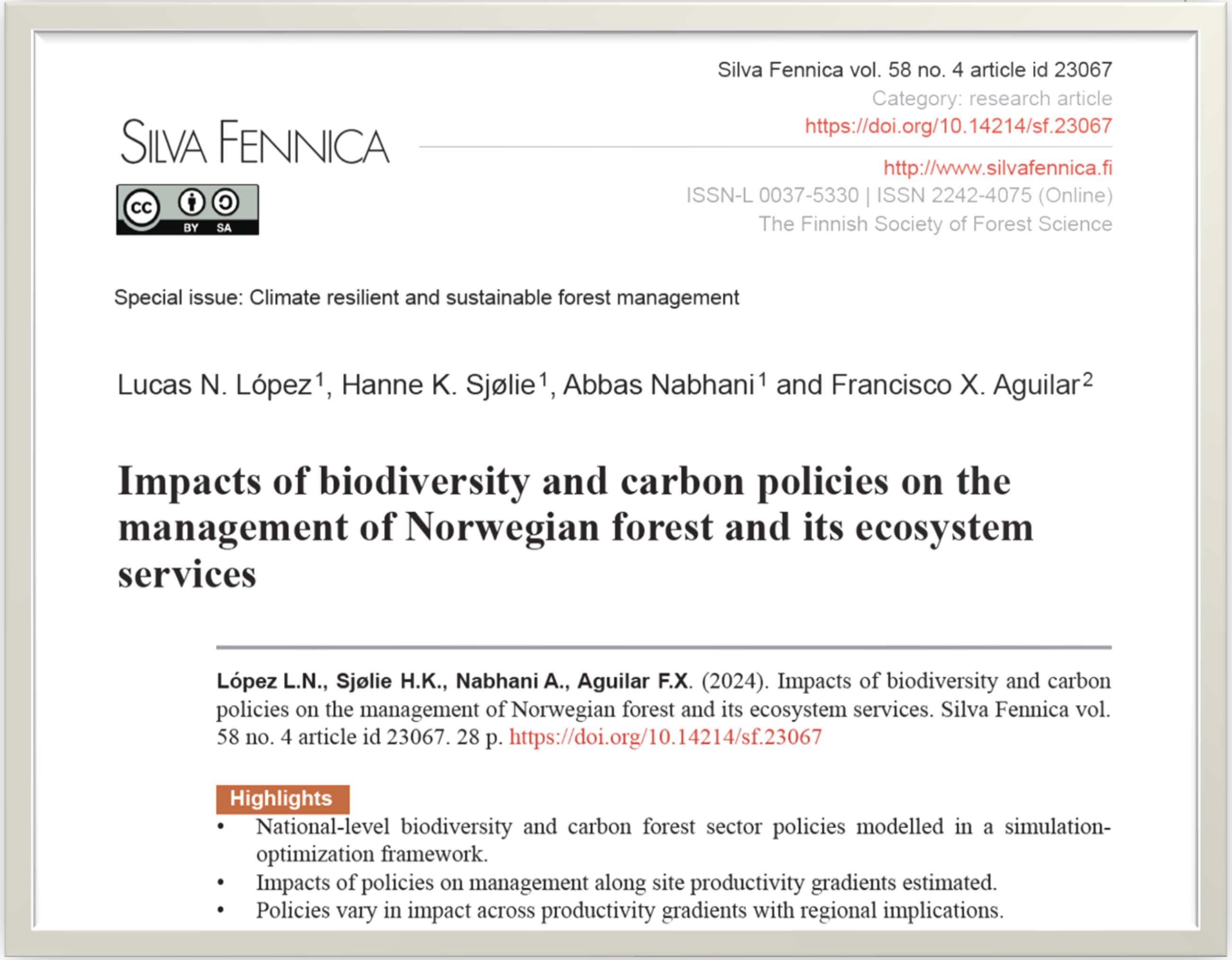
Two policies:

- **Carb:** Carbon pricing (100€ $tCO2^{-1}$)
- **Bio:** Biodiversity regulation (harvest constraints)

Four scenarios:

Business As Usual **(BAU)**, **Bio**, **Carb**, **BioCarb**





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Impacts of biodiversity and carbon policies on the management of Norwegian forest and its ecosystem services

López L.N., Sjølie H.K., Nabhani A., Aguilar F.X. (2024). Impacts of biodiversity and carbon policies on the management of Norwegian forest and its ecosystem services. Silva Fennica vol. 58 no. 4 article id 23067. 28 p. https://doi.org/10.14214/sf.23067

Highlights

- National-level biodiversity and carbon forest sector policies modelled in a simulation-optimization framework.
- Impacts of policies on management along site productivity gradients estimated.
- Policies vary in impact across productivity gradients with regional implications.

Paper II: wildlife impact

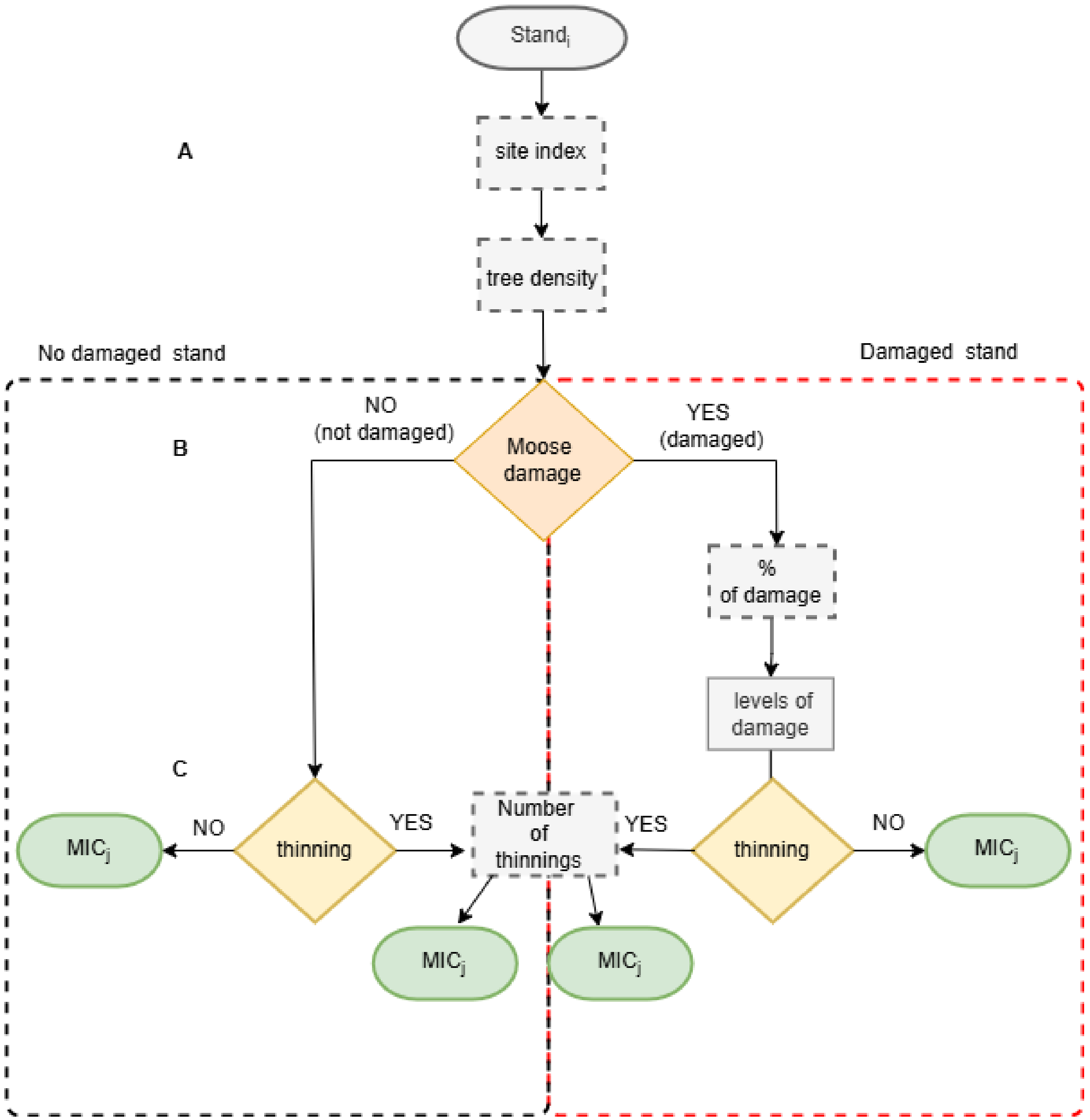
Consequences of moose browsing on timber production and management

(ongoing manuscript)

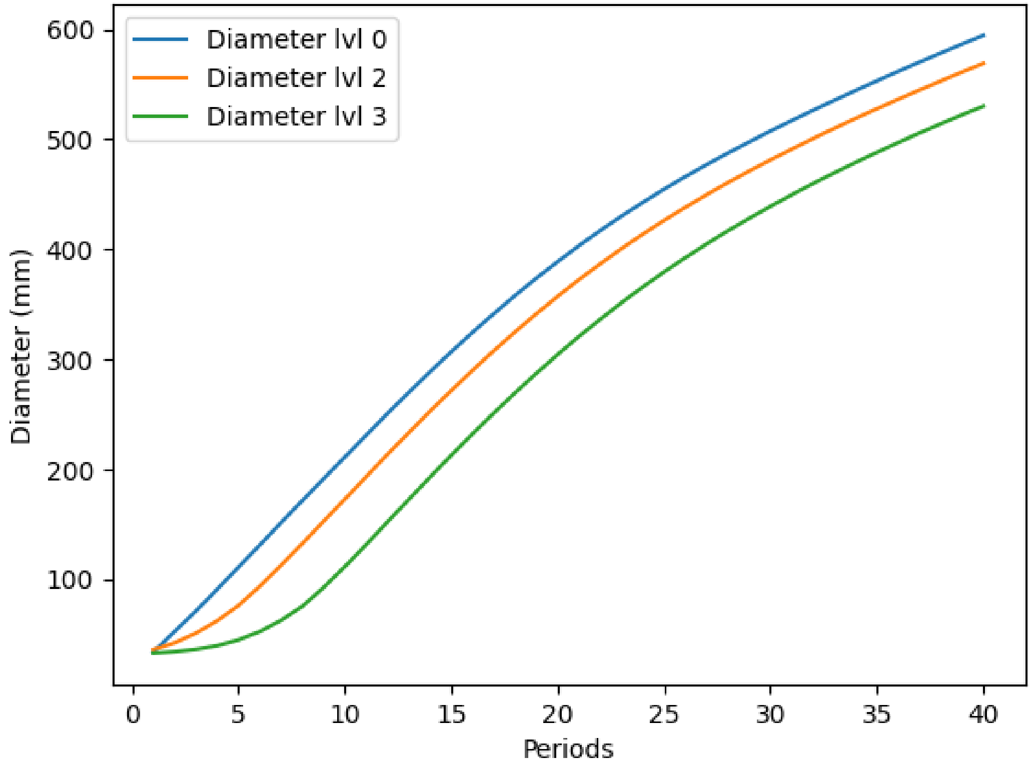
Objectives of our study

- Estimate damage functions for pine based on pine and moose densities.
- Simulate long-term consequences of browsing on growth and yield.
- Indicate changes in optimal management and consequences on timber production and economic surplus.

Drawing from: [Moose Illustration - loosen-studio]



Forest Moose Simulator



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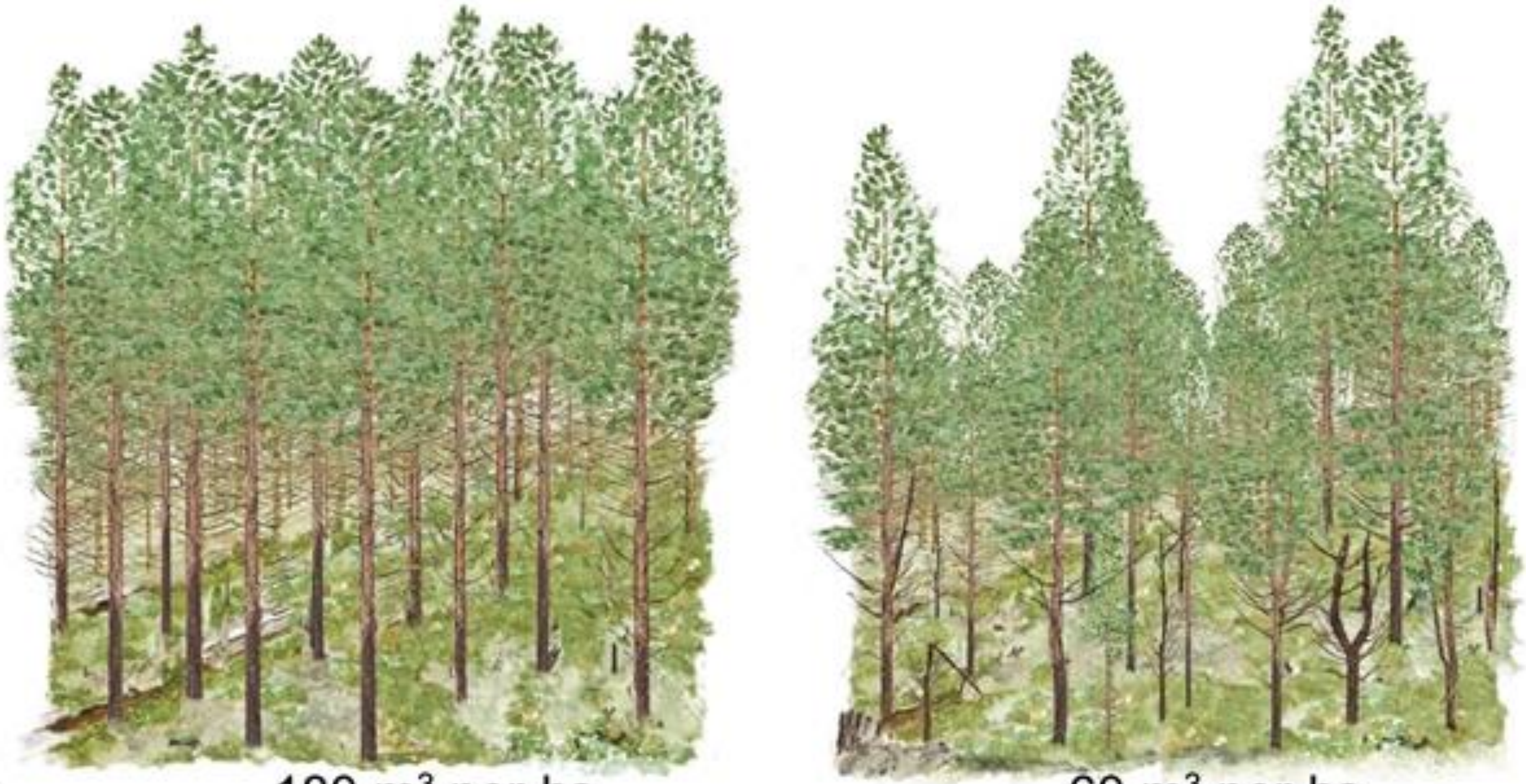
Skog till nytta för alla

Permanenta skador på bestånd

(Permanent damage to the stand)



180 m^3 per ha

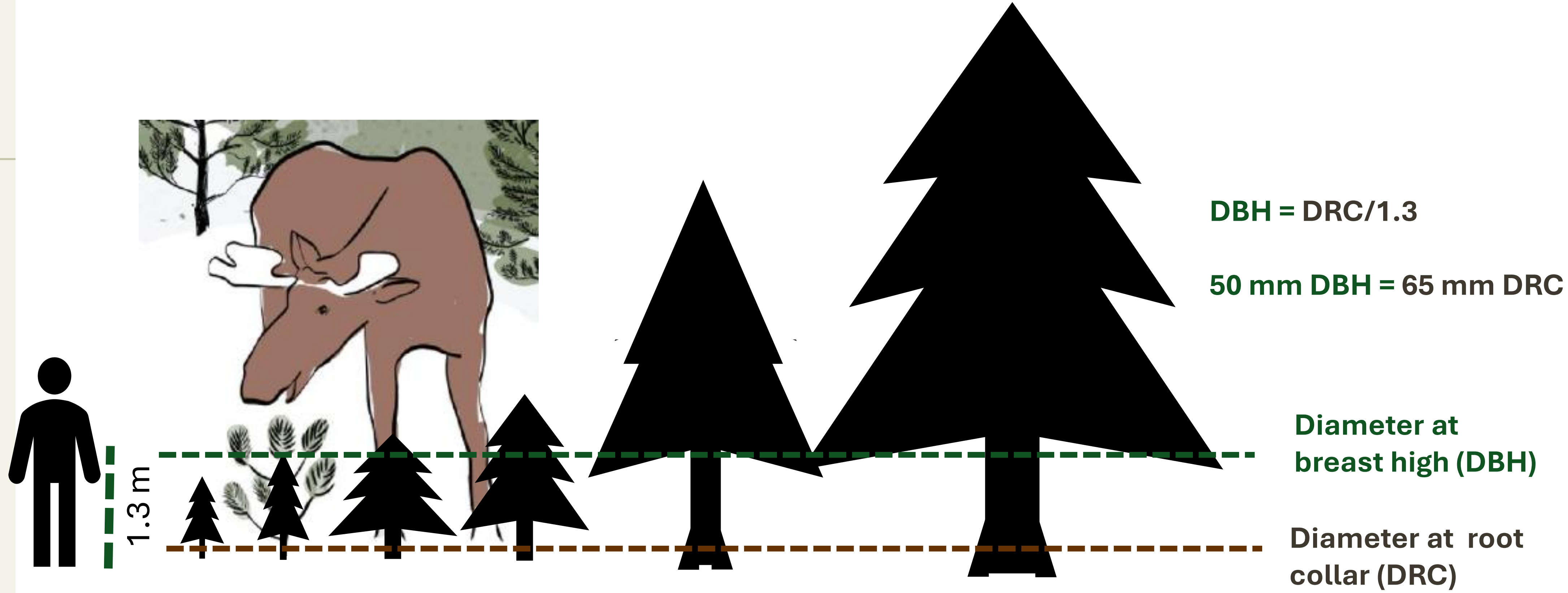
60 m^3 per ha

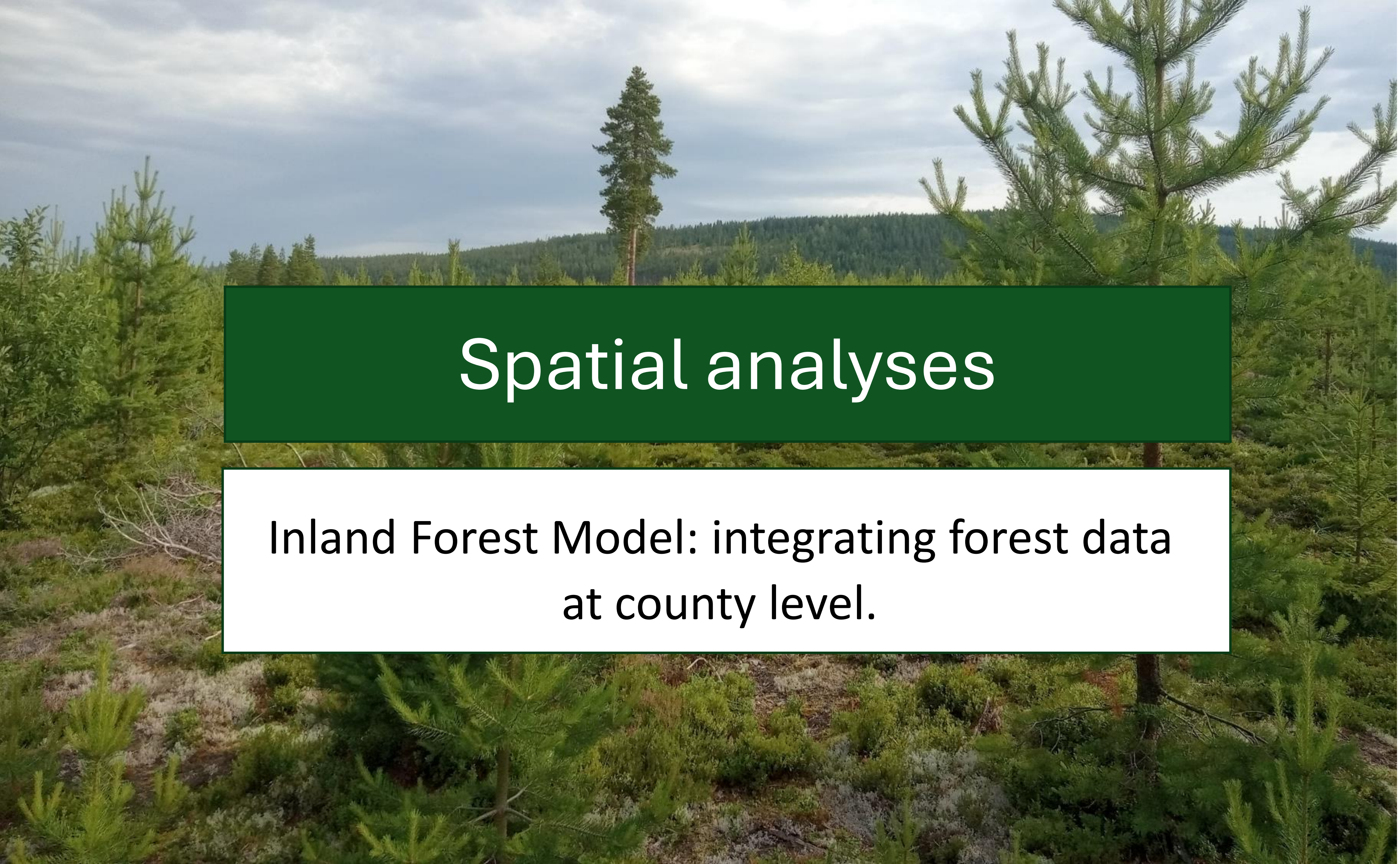
SKOGSSTYRELSEN

Illustration: Bo Persson

Challenges with current Models

- Equations based on National Forest Inventory (NFI) data, which includes only trees with a DBH ≥ 50 mm (5 cm) and total height ≥ 4m.





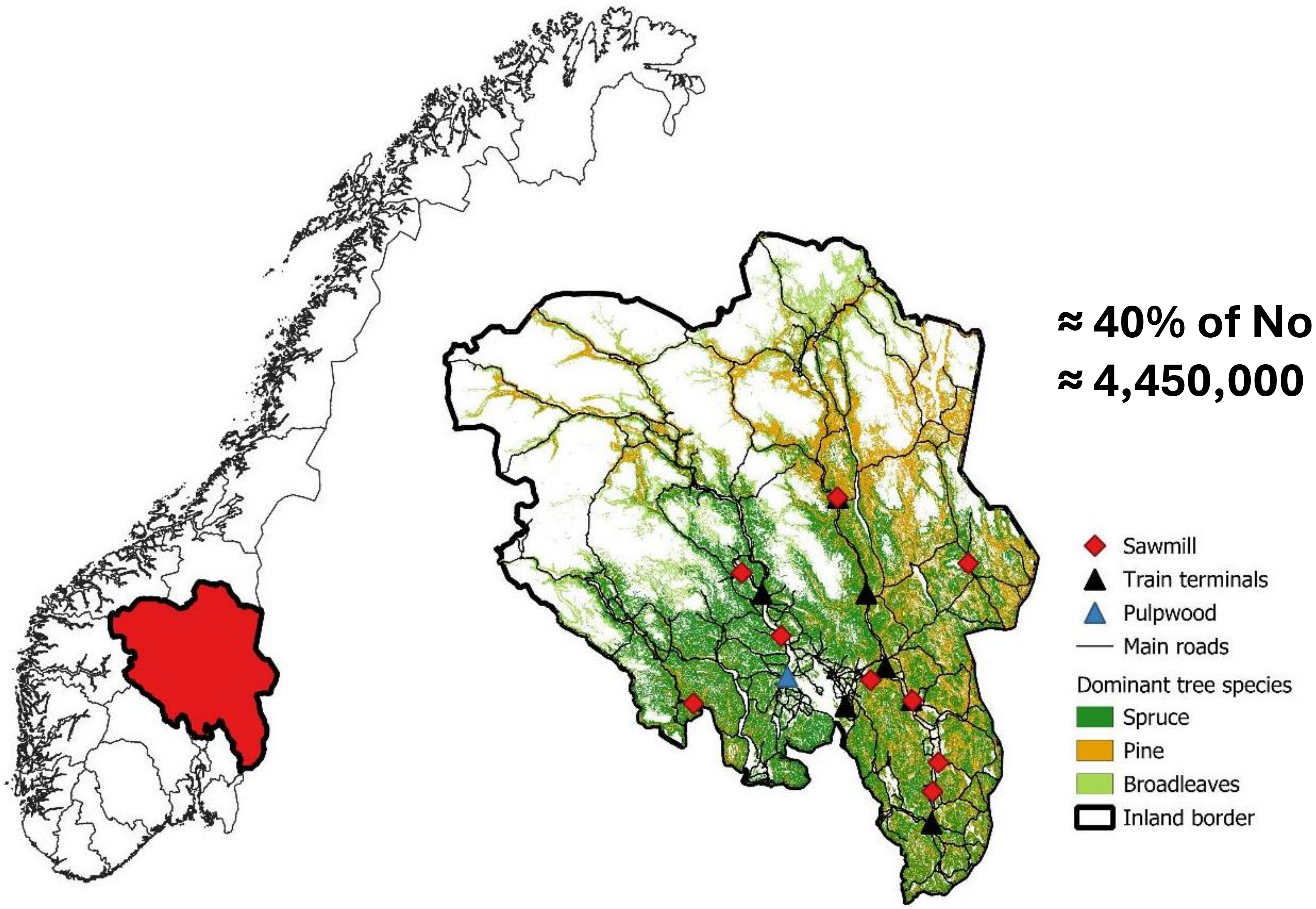
Spatial analyses

Inland Forest Model: integrating forest data at county level.

Selection cutting in mixed forests on sloped areas

Clearcutting practices in sloped pine forest

Forest Industry Infrastructure and Dominant Tree Species Distribution in Inland



≈ 40% of Norway's total timber harvest.

≈ 4,450,000 million m^3 (2023)

(SSB: https://www.ssb.no/en/statbank/table/11551/tableViewLayout1/ [26 Nov. 2024])

PLOT

National Forest Inventory

$250m^2$

Ground: measure of forest attributes

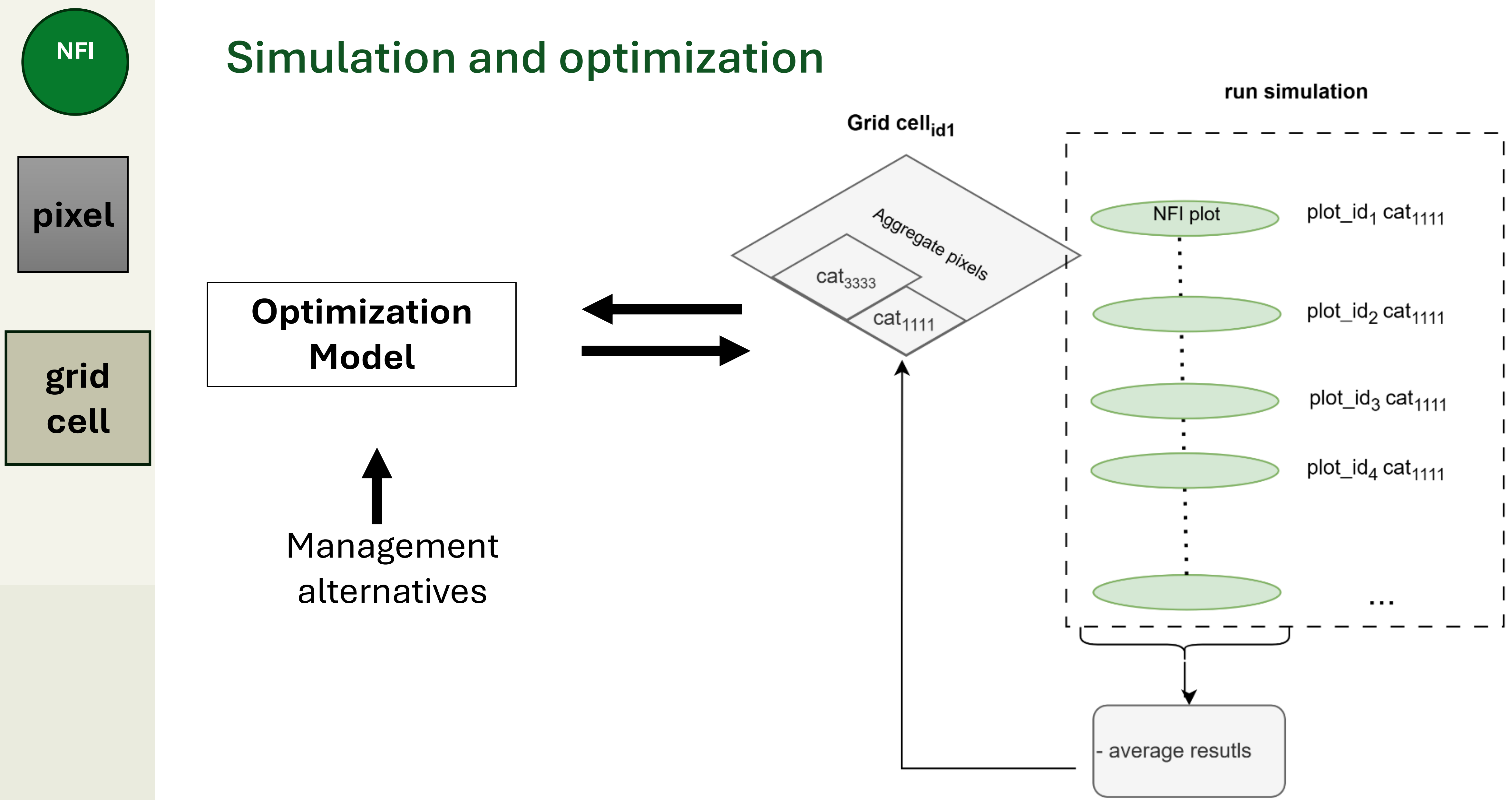
PIXEL

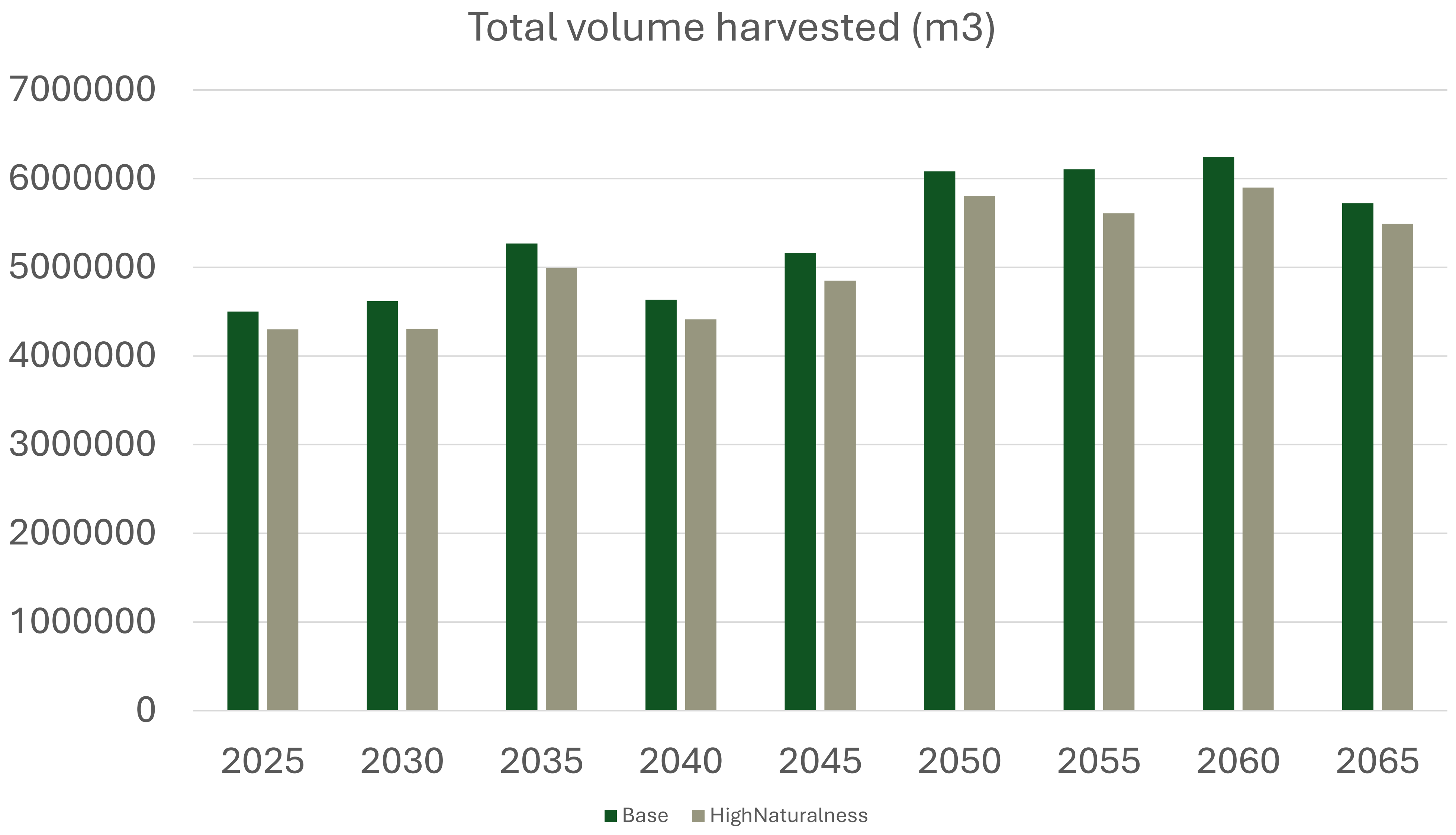
Raster SR16

$256m^2$ resolution

Digital map: Wall-to-wall modeled forest attributes

Simulation and optimization





Preliminary results: 5-10% reduction of harvest volumes

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