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# Cattle, Grass and Trees

## Combinations, Pitfalls and Opportunities

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# What I'll attempt to cover

- The Qld forest estate and timber industry in a national context
- A brief overview of the Private Native Forest (PNF) resource and its potential
- The link between PNF and grazing
- Look at the impact of trees on beef production; positive and negative interactions
- Discuss a framework for assessing the productivity and economic aspects of both enterprises

# What I won't cover

- The merits or otherwise of the VMA
- The Code of Practice for managing a native forest
- Details of the Carbon Farming initiative (Veg off-sets, bio-fuel etc)

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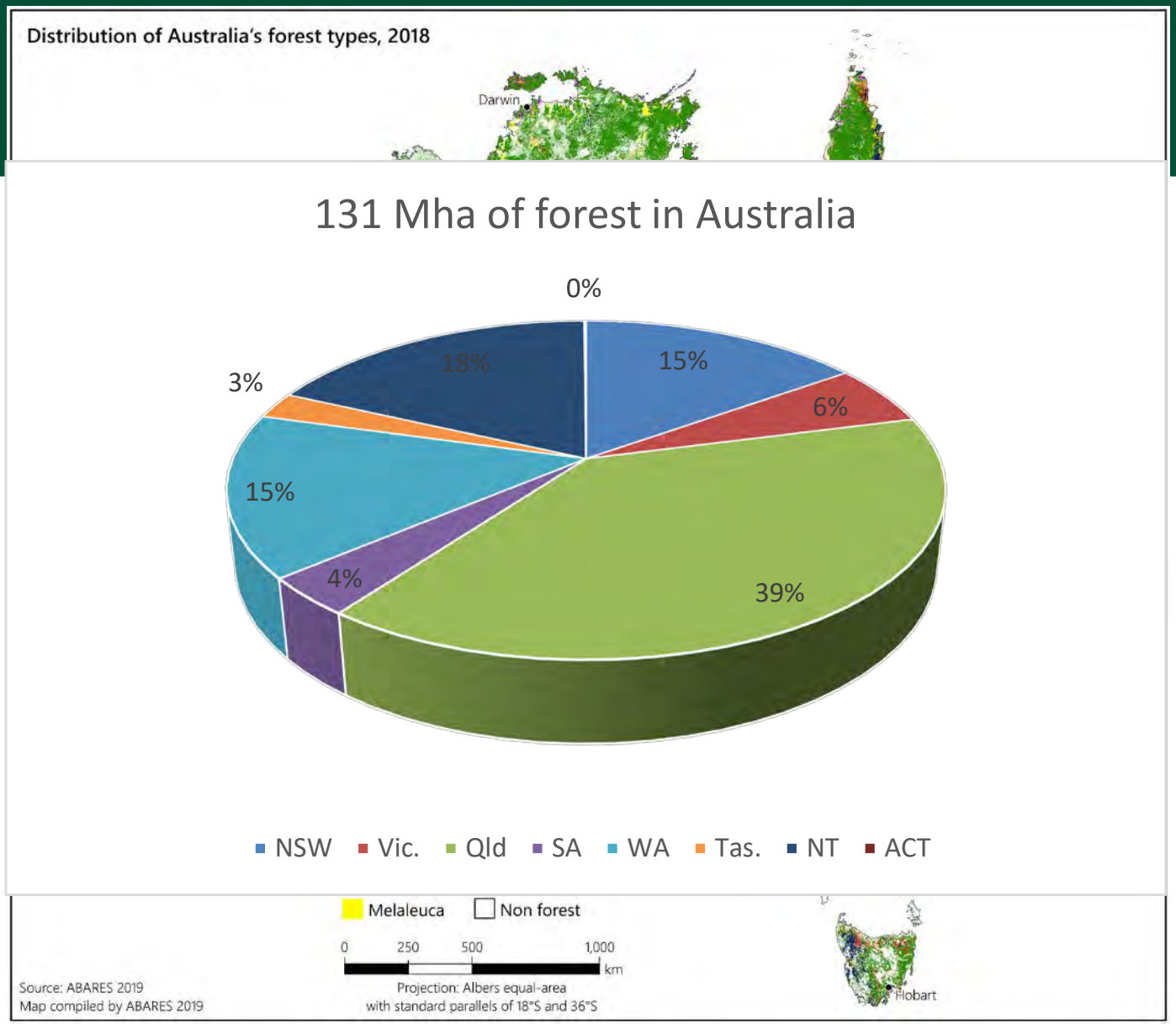

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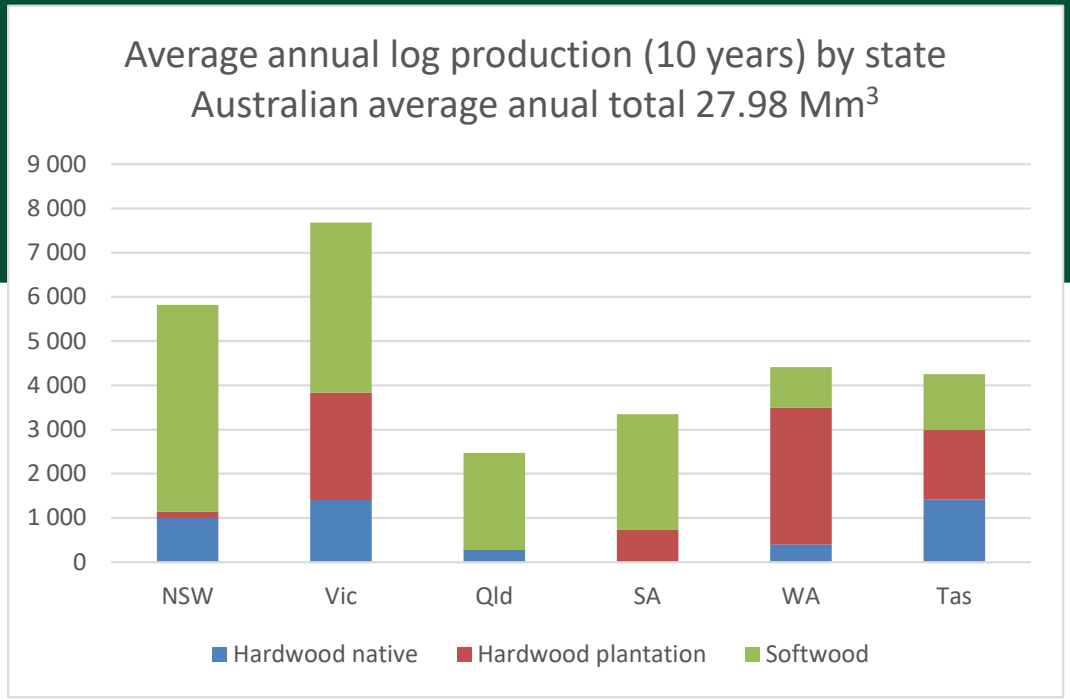


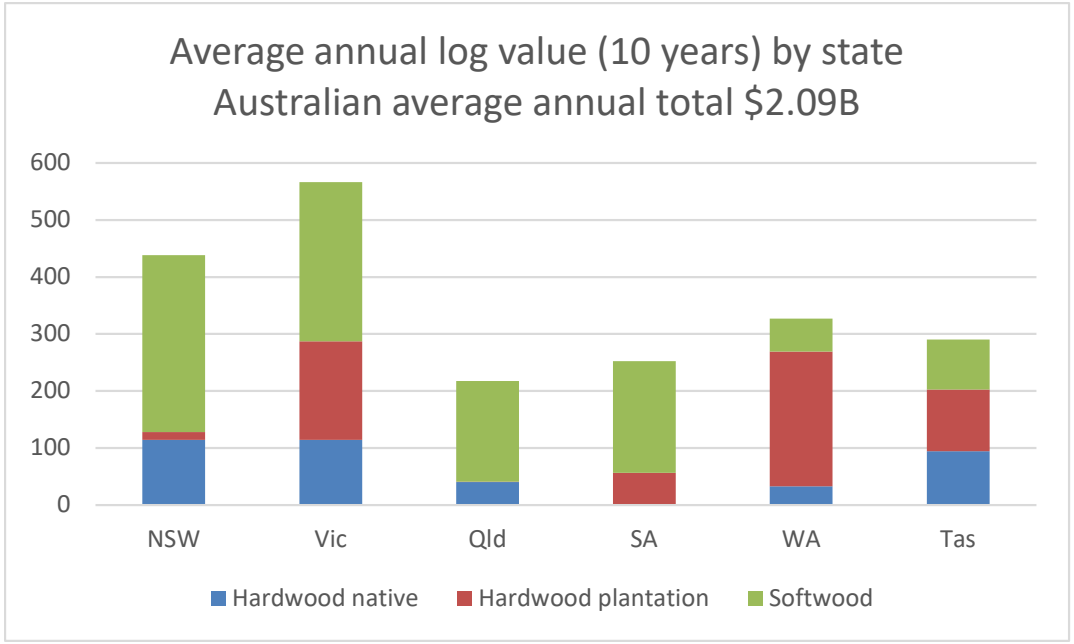

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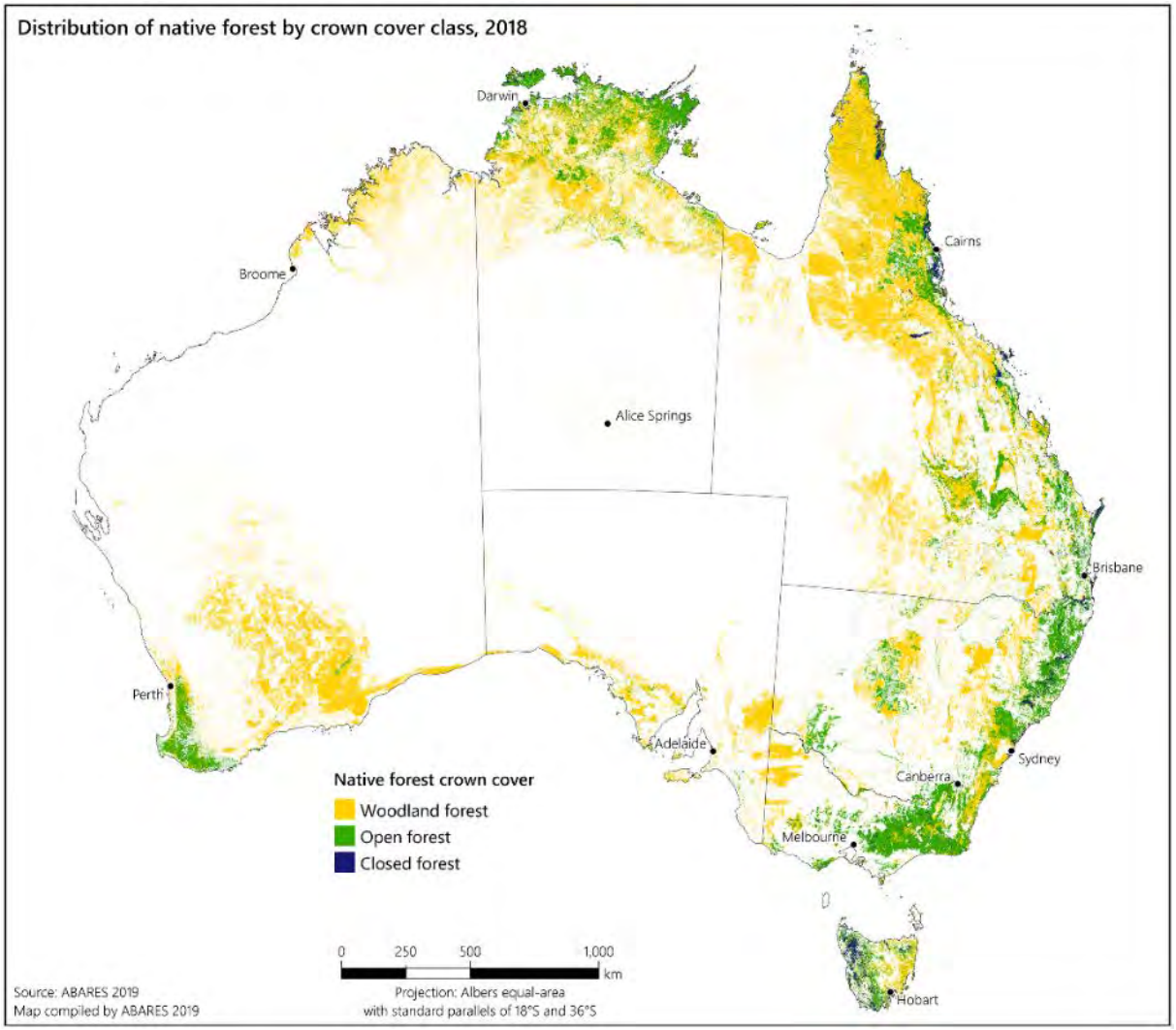
# Why the discrepancy?



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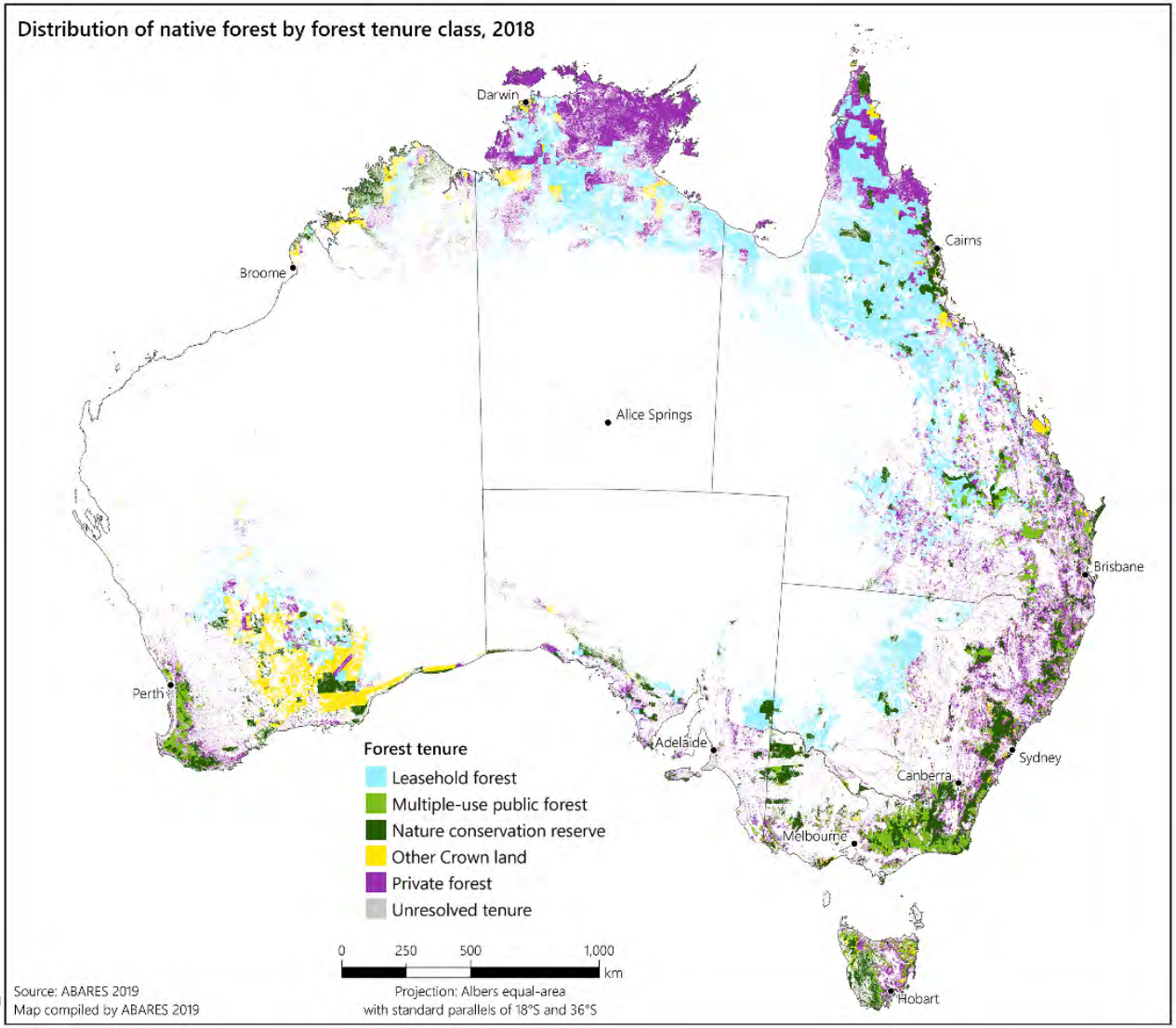

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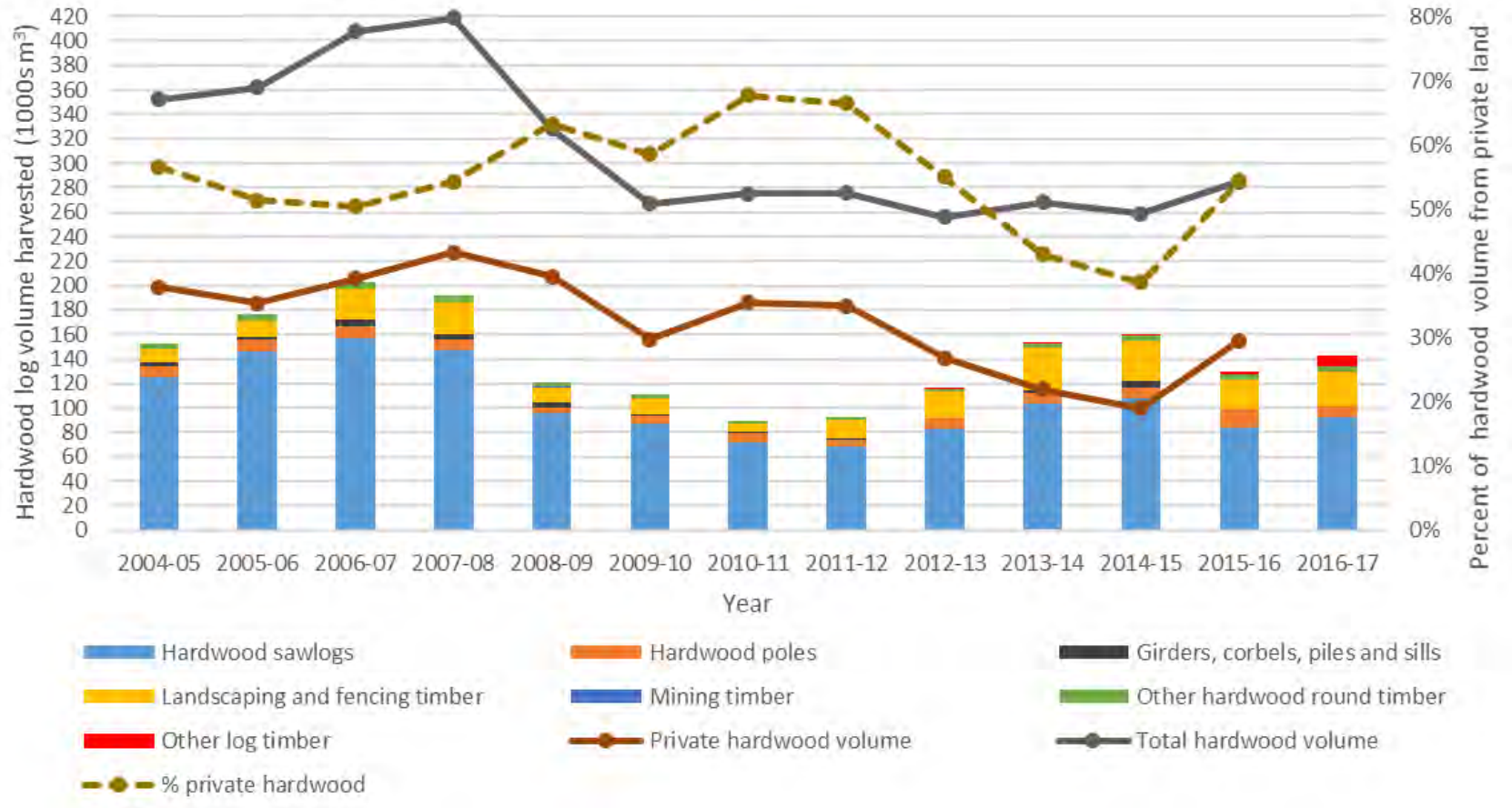
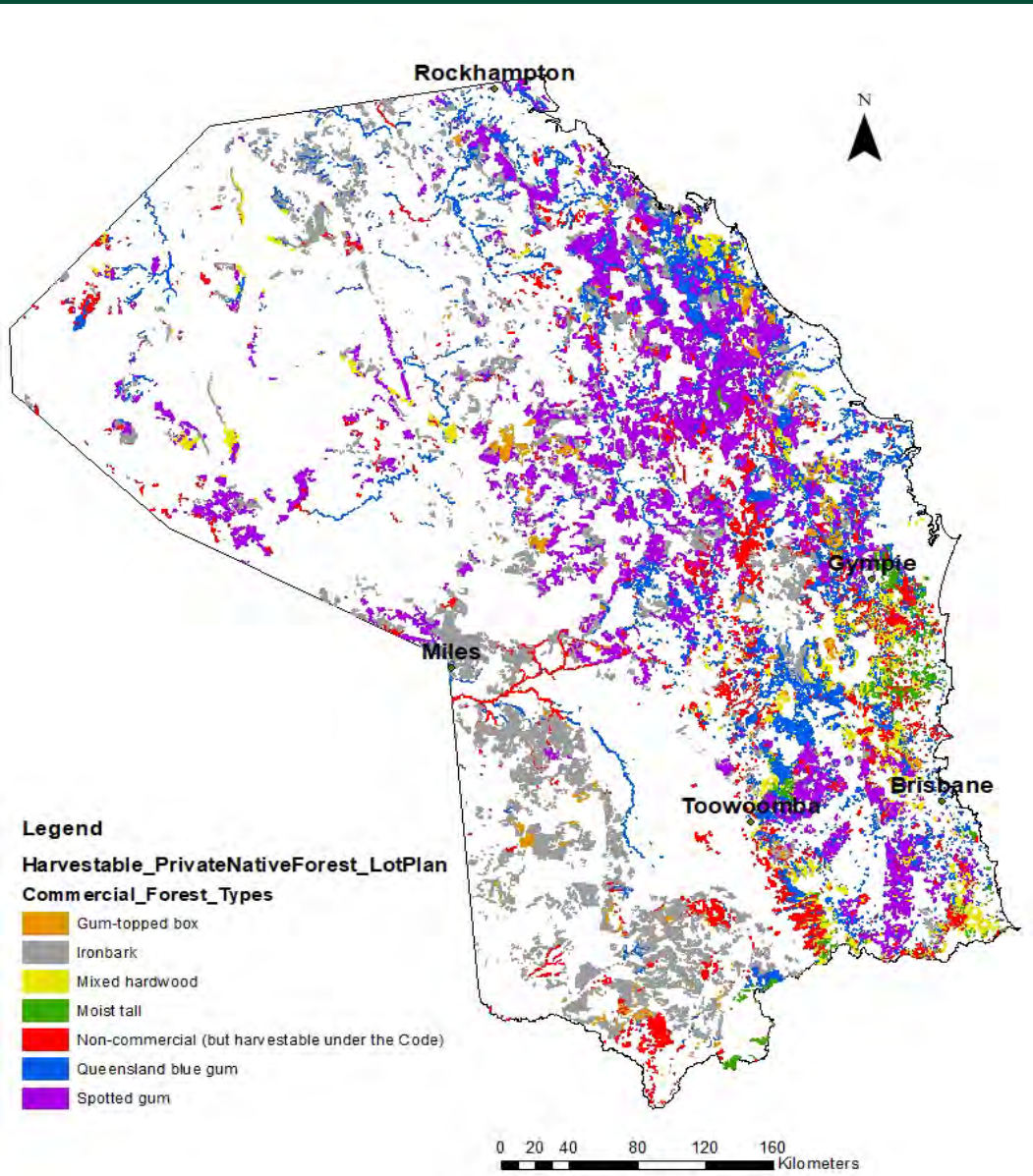
# The Qld Hardwood industry relies heavily on PNF



# PNF at a glance

- Produces high quality wood products.
- Multi-species and multi-aged.
- Moderate to low productivity.
- Generally not managed or poorly managed.
- Very resilient. Natural regeneration.
- Responds to silvicultural treatment (five fold increase in productivity).



# High Grading – a form of forest abuse

- Only removing quality stems (about 10 - 20 sph)
- Leaving defective or suppressed trees (600 sph)
- Damage to some retained trees (from both harvest operation and post harvest fire – 40 sph)
- Harvest interval of > 30 years
- Unfortunately this is the industry norm

# Silvicultural thinning – a bit of forest lovin'

## Only keep high quality trees

- Good crown, not suppressed
- Long log
- No defect
- Removal of suppressed trees

## Allow adequate room to grow

- Larger trees (30 cm +) 10 – 15 m apart
- Smaller trees (10 – 20) 5 – 7m
- Range of size classes

# Response to thinning

- Typical overstocked unmanaged forest
- >1000 stems/ha individual trees grow at 1 to 3 mm/yr
- Commercial volume grows at 0.2m³/ha/yr

# Response to thinning

- Salvage harvest only removes commercial trees that need to come out
- Non-commercial trees felled to waste
- 150 stems/ha

# Response to thinning

- 6 years later
- Healthy crowns
- Individual trees growing at > 1 cm/yr
- Commercial volume increasing at 1.5 $m^3$/ha/yr
- Good ground cover

# Response to thinning

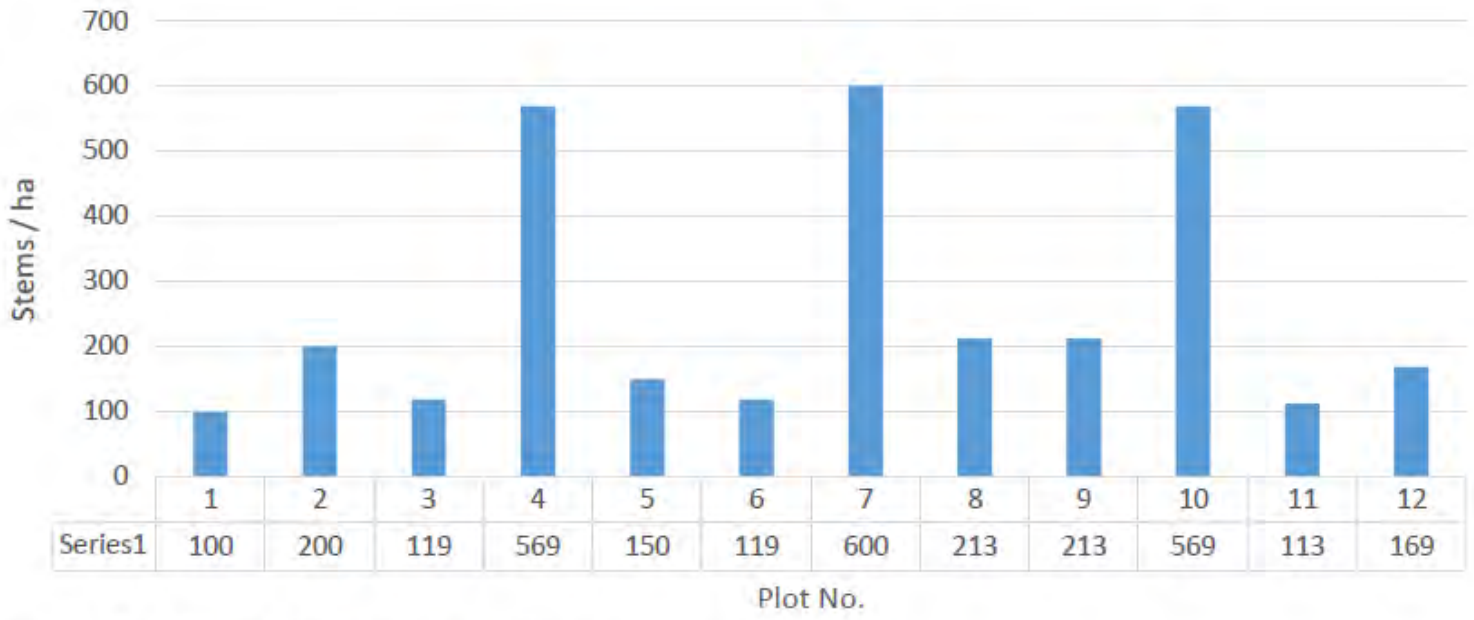



**Figure 3**. Esk Growth Experiment Stems / Ha / Plot

# Response to thinning

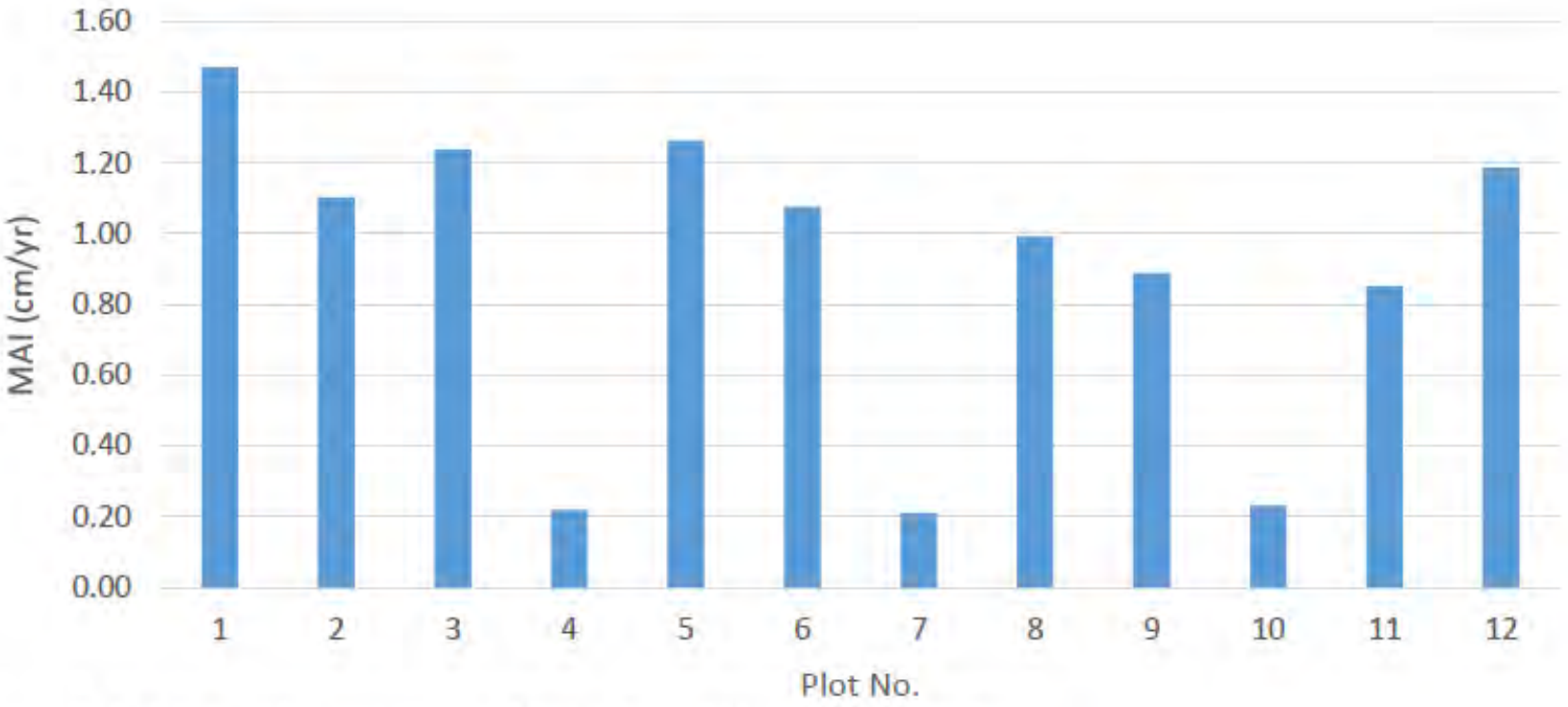



**Figure 5.** Esk Growth Experiment Mean Annual Increment (MAI)

# 3 broad PNF situations

1. Advanced growth regrowth/remnant stands; usually mapped as remnant (category B)

2. Young regrowth stands following clearing or heavy harvesting; either category X (PMAV) or mapped as HVR or Reef regrowth.

3. Regrowth encroaching onto category X (non-remnant)

# Advanced growth regrowth/remnant stands

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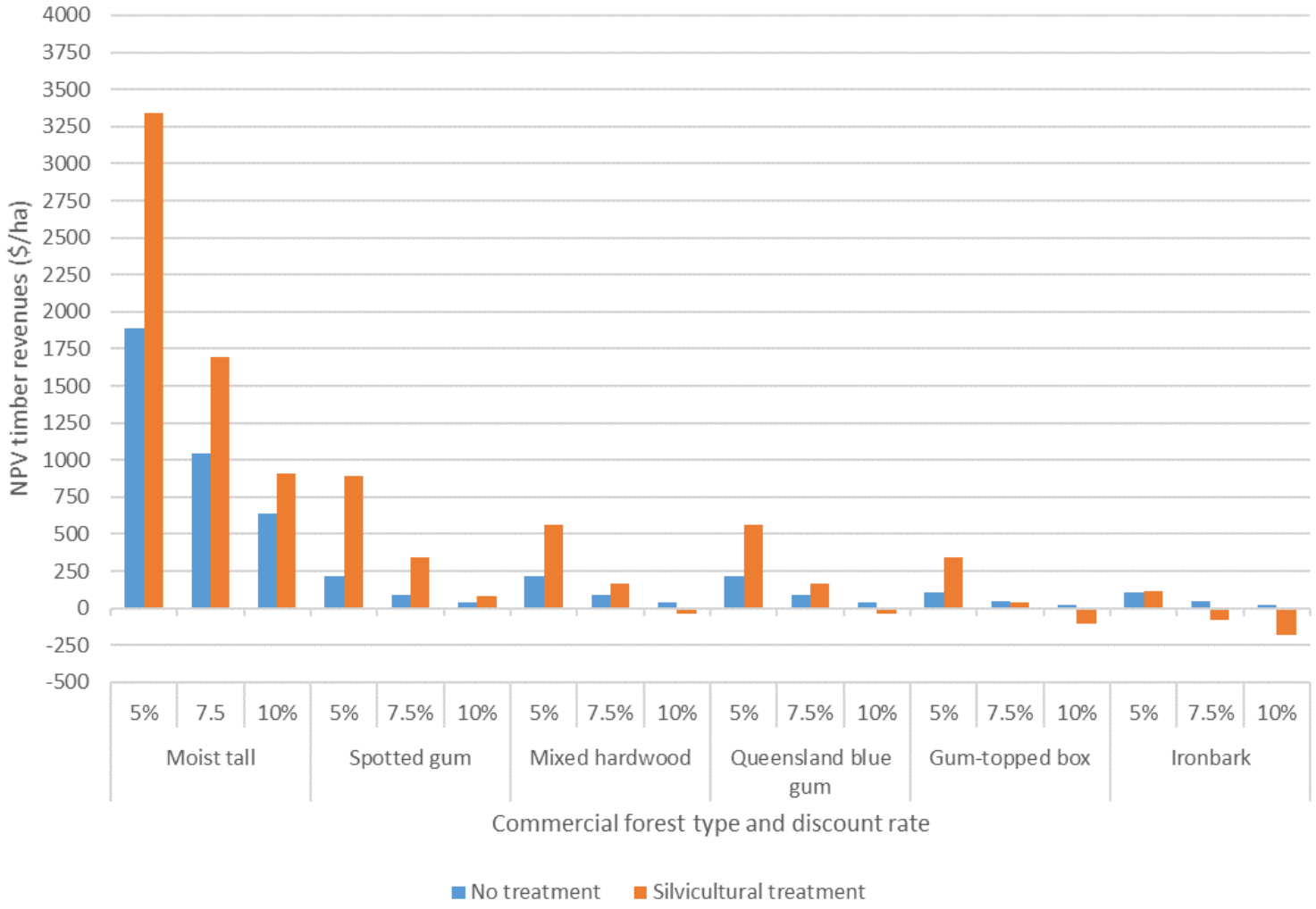
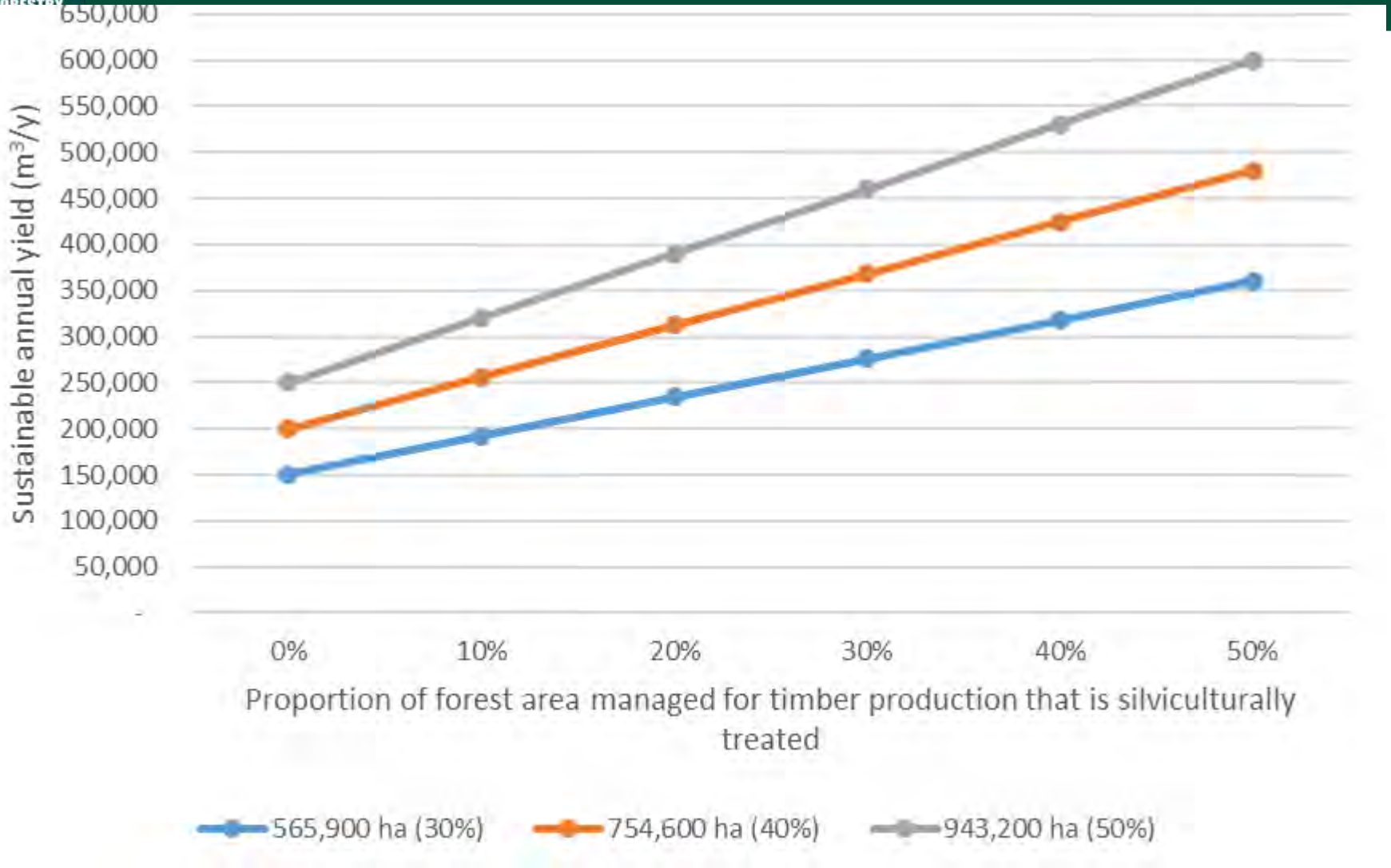
# Young regrowth stands


Regrowth encroaching onto category X

# Silvicultural investment pays for most forest types up to discount rates of 7.5%



# Industry potential

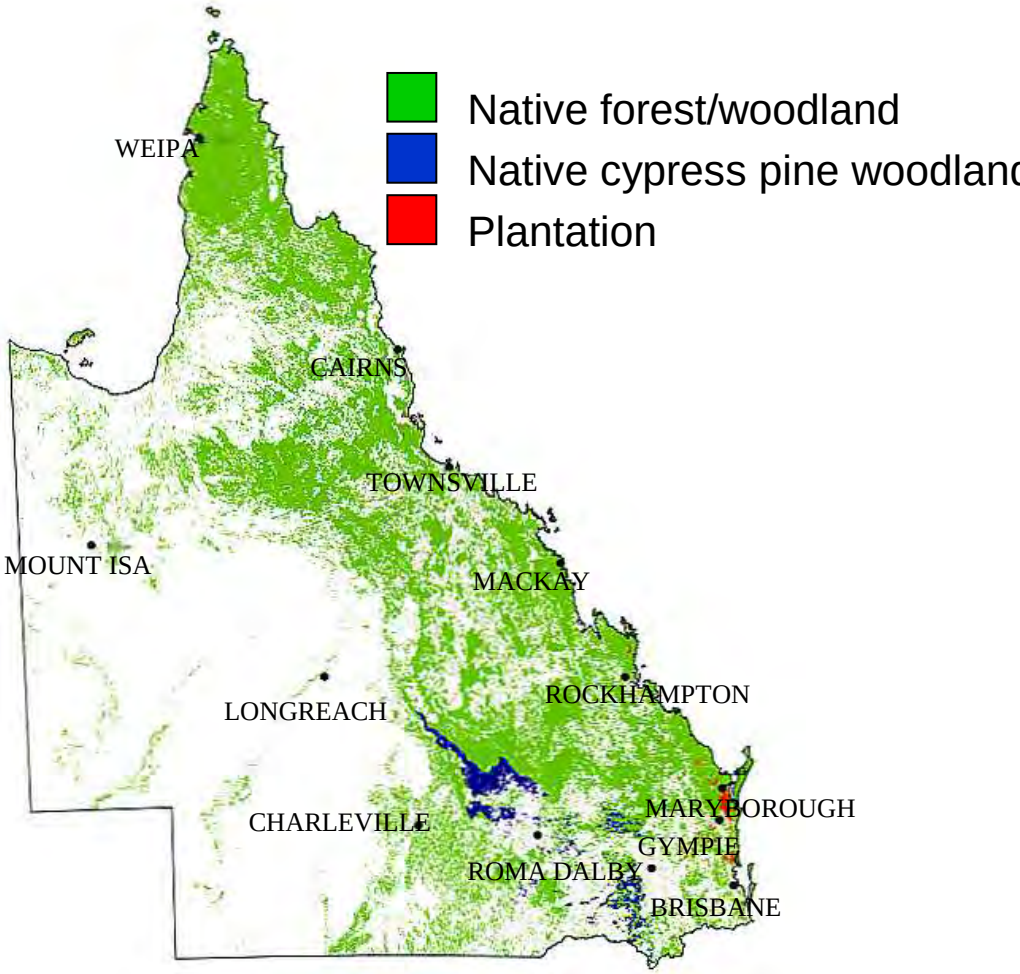


# What are the impediments?

- The PNF resource is generally owned by graziers not foresters.
- Annual income from cattle; irregular (>15 years) income from timber.
- Graziers will often discount future earnings; avoid investments with long payback periods.
- Sovereign risk; don't trust Governments not to change the rules.
- Lack of understanding of PNF;
    - forest products and their value,
    - forest productivity and potential,
    - silvicultural management regimes.

# Grazed woodland in Qld

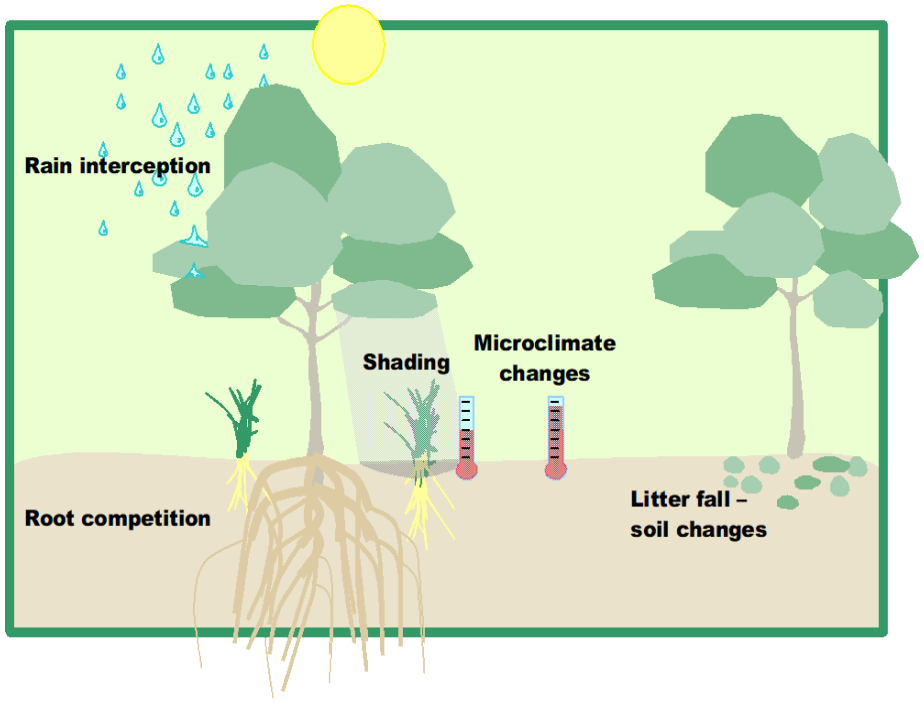
- Qld 173 Mha
- 112 Mha (65%) used for grazing
- 50 Mha Remnant Forest
- For most beef producers in Qld, managing their land and businesses means managing the mix of **cattle, grass and trees**.



# Impacts of trees on grass

## Positive impacts of trees

- Trees impact on nutrient and hydrological cycles
- Some production benefits; often different suite of grasses grow in association with trees
- Provide shade and shelter
- Ecological benefits of trees
- At low densities trees may enhance cattle production

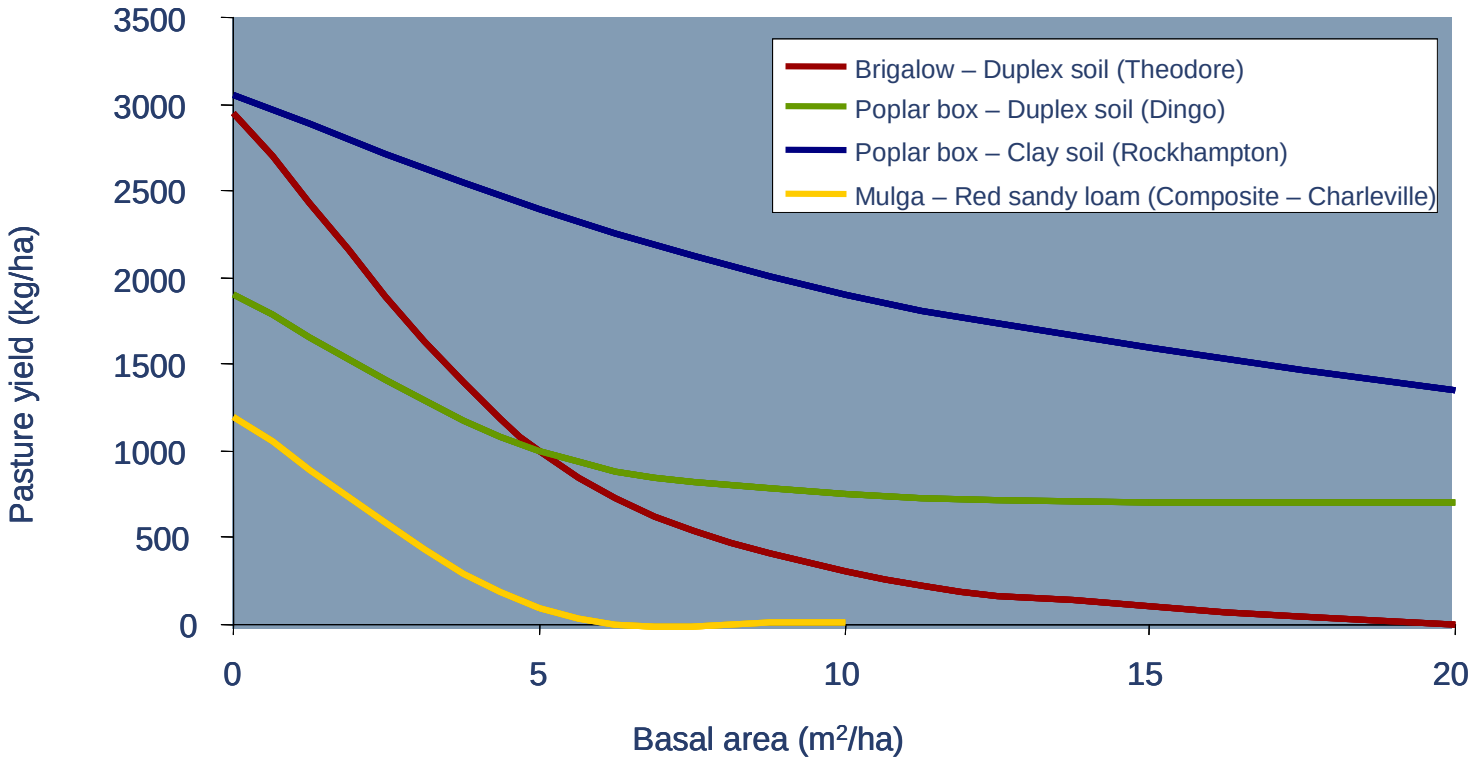





Source: EDGE*network* Grazing Land Management

# …. Once tree density increases …

- Net competitive effect (mostly for moisture) takes over
- Reduced grass production
- Reduced carrying capacity






Source: EDGE*network* Grazing Land Management

# Silvo-pastoralism can be a bit tricky

- Need to account for changing tree value (timber product) over time

- Need to be able to track changes in tree density over time and assess the impact on grass growth and cattle carrying capacity.

- Need to asses the economics of investment in two enterprises that generate income at different time scales

# Looking at the impacts of three management scenarios

- High grading – log it and flog it
- Good management – harvesting and thinning to improve the forest
- Clear for grazing – hate them trees

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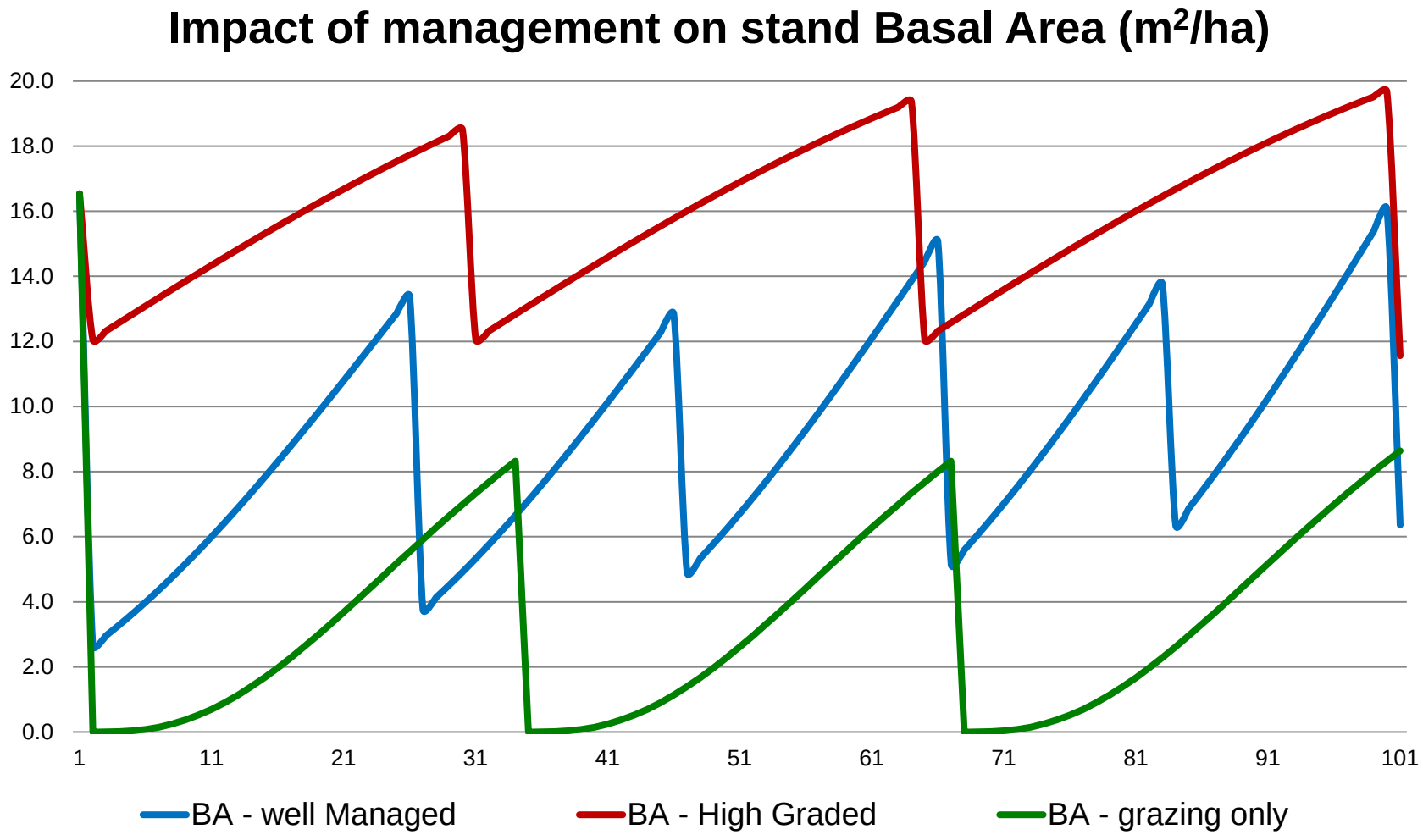
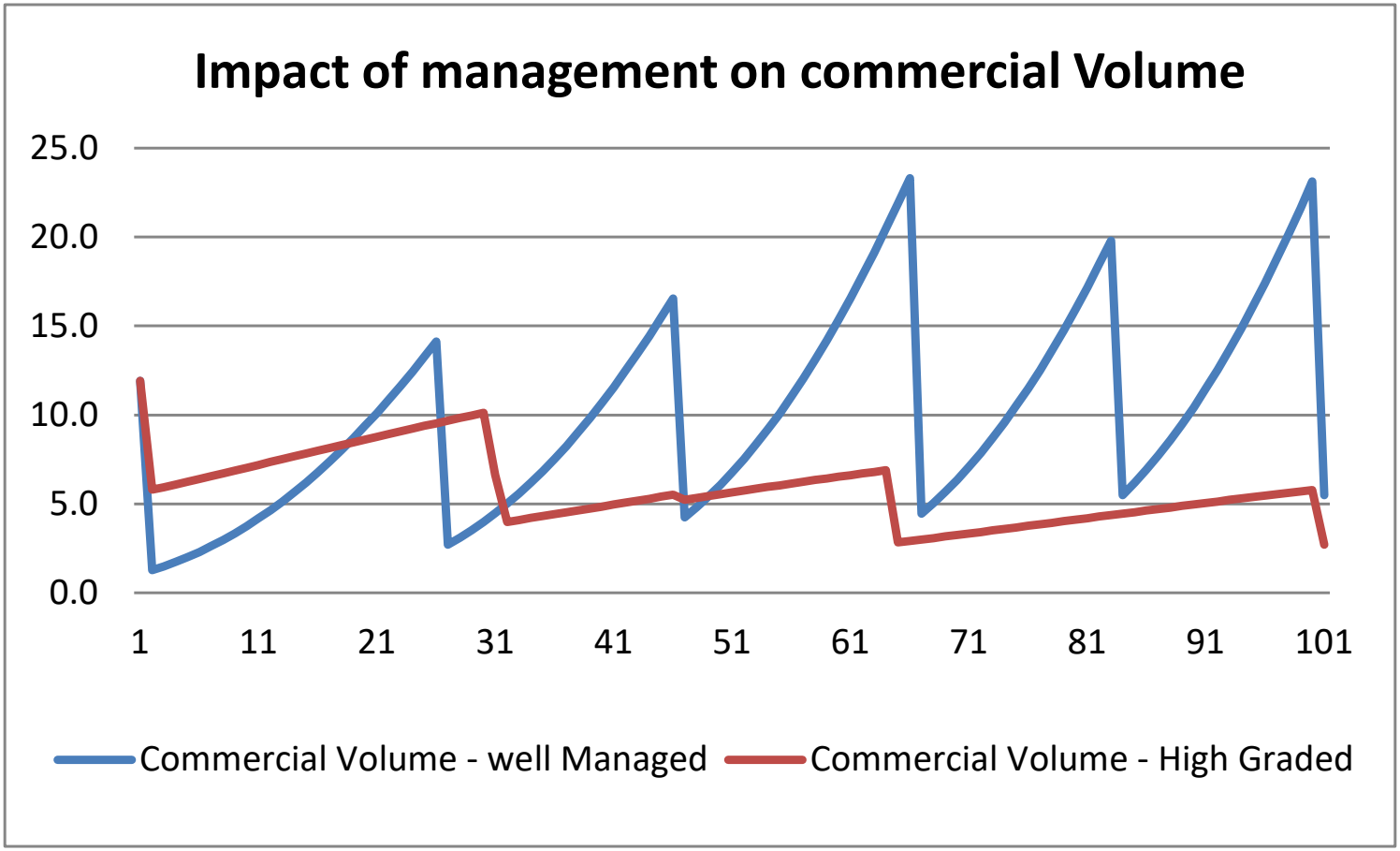
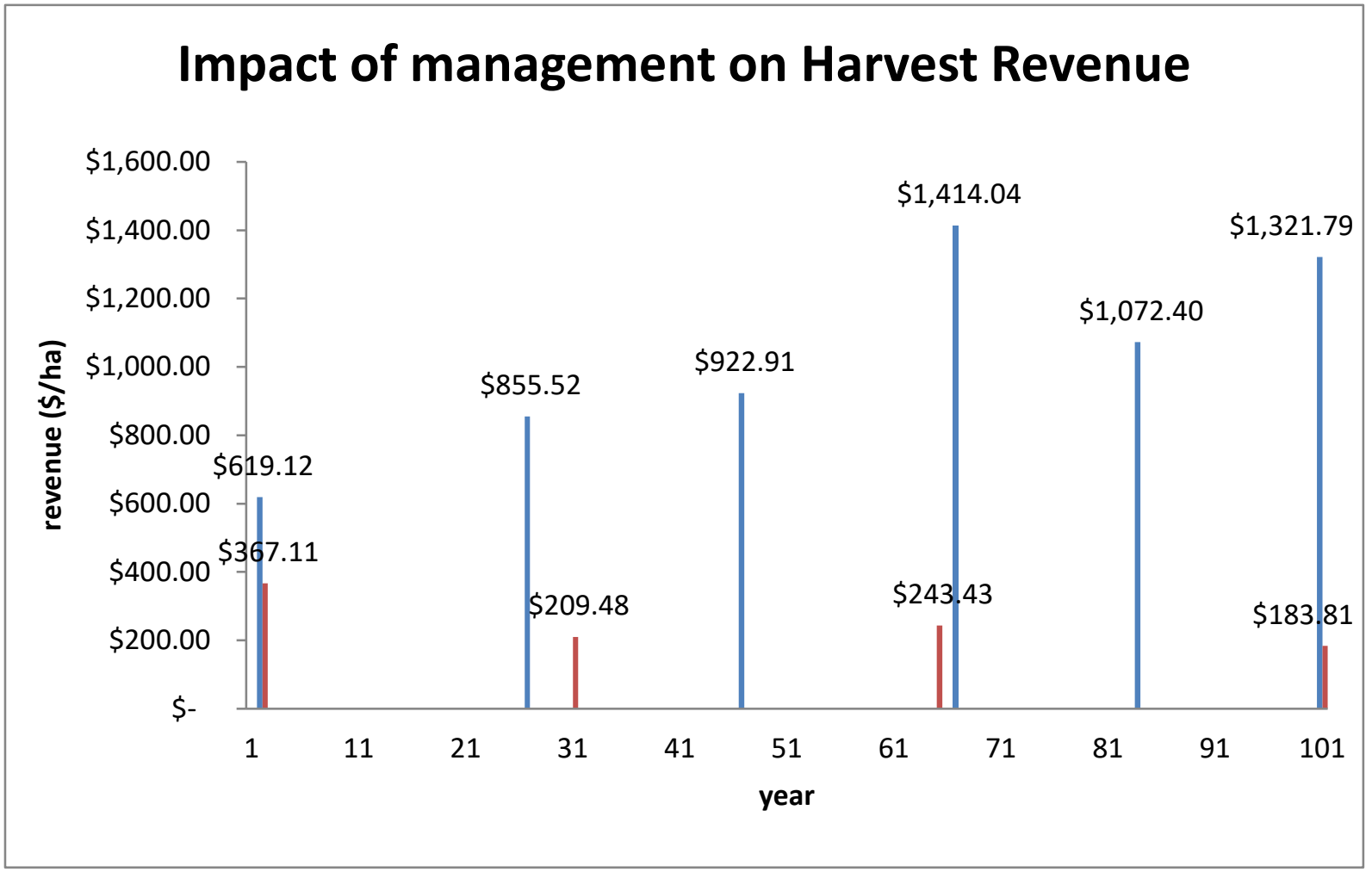
- Trees in the managed forest average 0.54 cm/yr DBH increase
- Trees in the high graded forest average 0.1 cm/yr DBH increase







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## Reducing tree density will improve timber production ….

…. it will also increase grass production and cattle carrying capacity.

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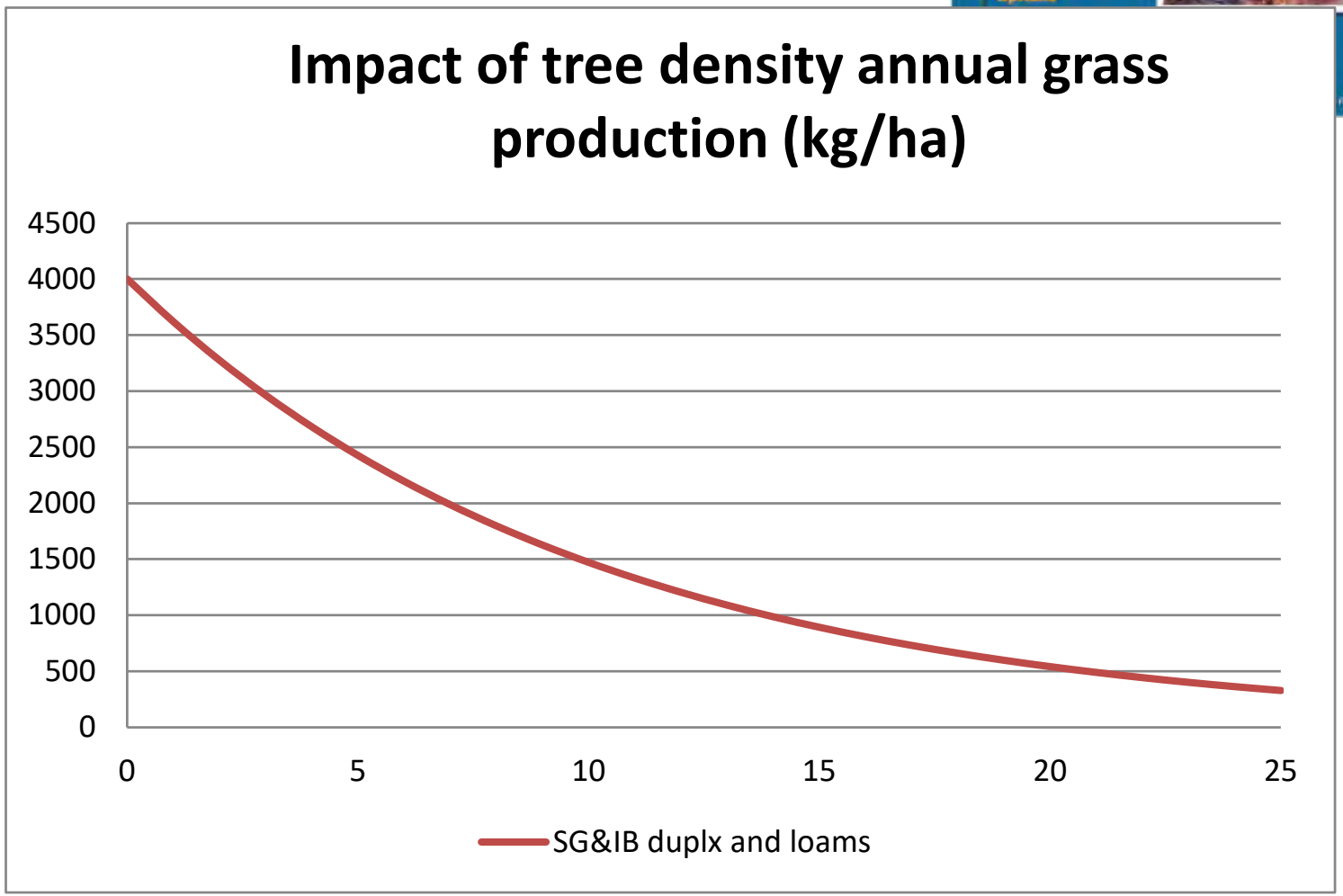
# Linking timber production with grazing through changes in BA

Overstocked SPG

Thinned SPG (5 $m^2$/ha)

Grows on average **500kg/ha**

Safe UR 25%

**125 kg/ha** available forage

AE needs
3,650 kg / yr

**Carrying Capacity**
**29 ha : AE**

Grows on average **2,500 kg/ha**

Safe UR 25%

**625 kg/ha** Available forage

AE needs
3,650 kg / yr

**Carrying Capacity**
**5.8 ha : AE**

Overstocked SPG

SPG harvest ready (14 $m^2$/ha)

Grows on average **500kg/ha**

Safe UR 25%

**125 kg/ha** available forage

AE needs 3,650 kg / yr

**Carrying Capacity 29 ha : AE**

Grows on average **1,000 kg/ha**

Safe UR 25%

**250 kg/ha** Available forage

AE needs 3,650 kg / yr

**Carrying Capacity 14.6 ha : AE**

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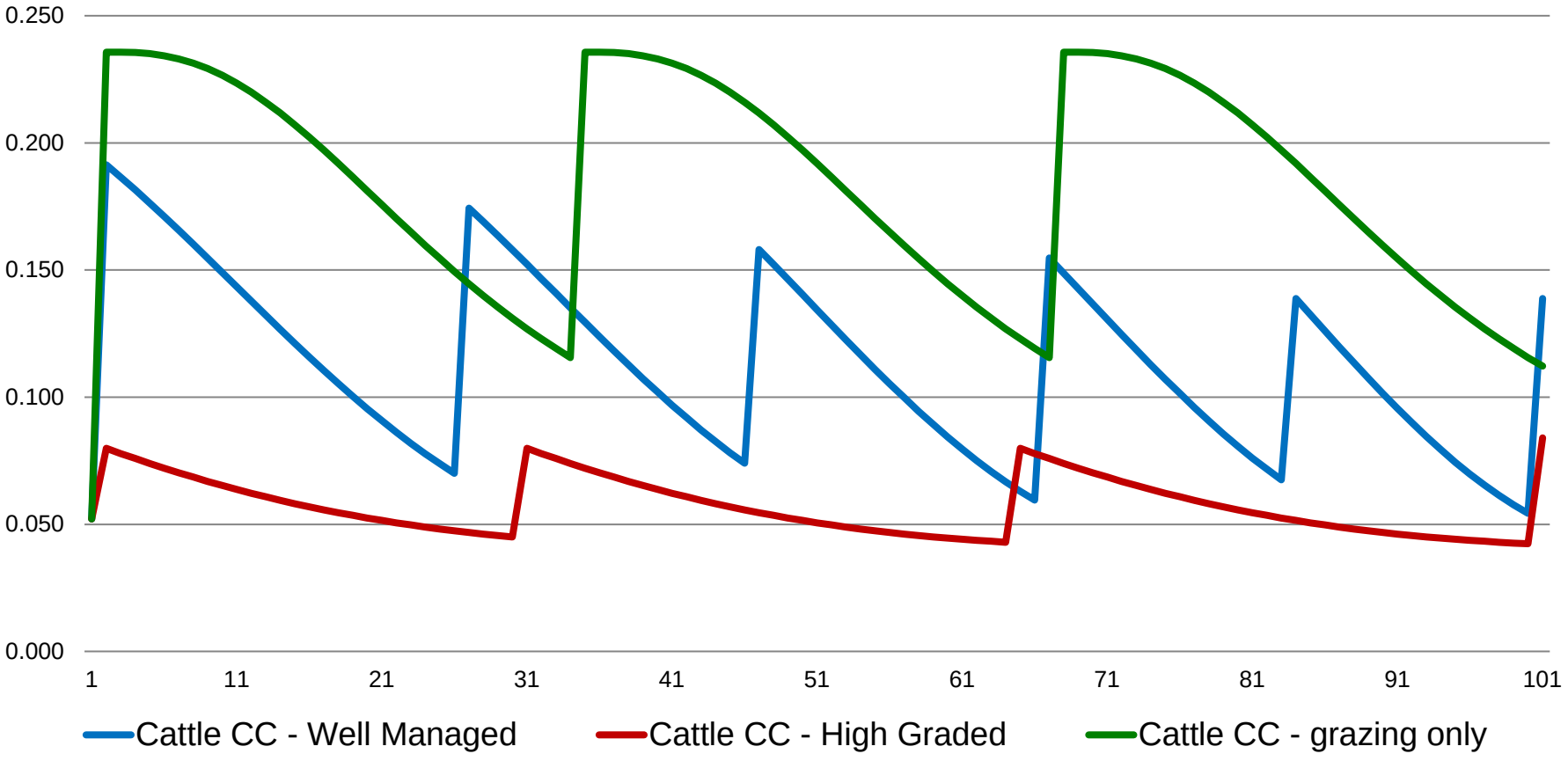
# Impact of management on Cattle Carrying Capacity (AE/ha)



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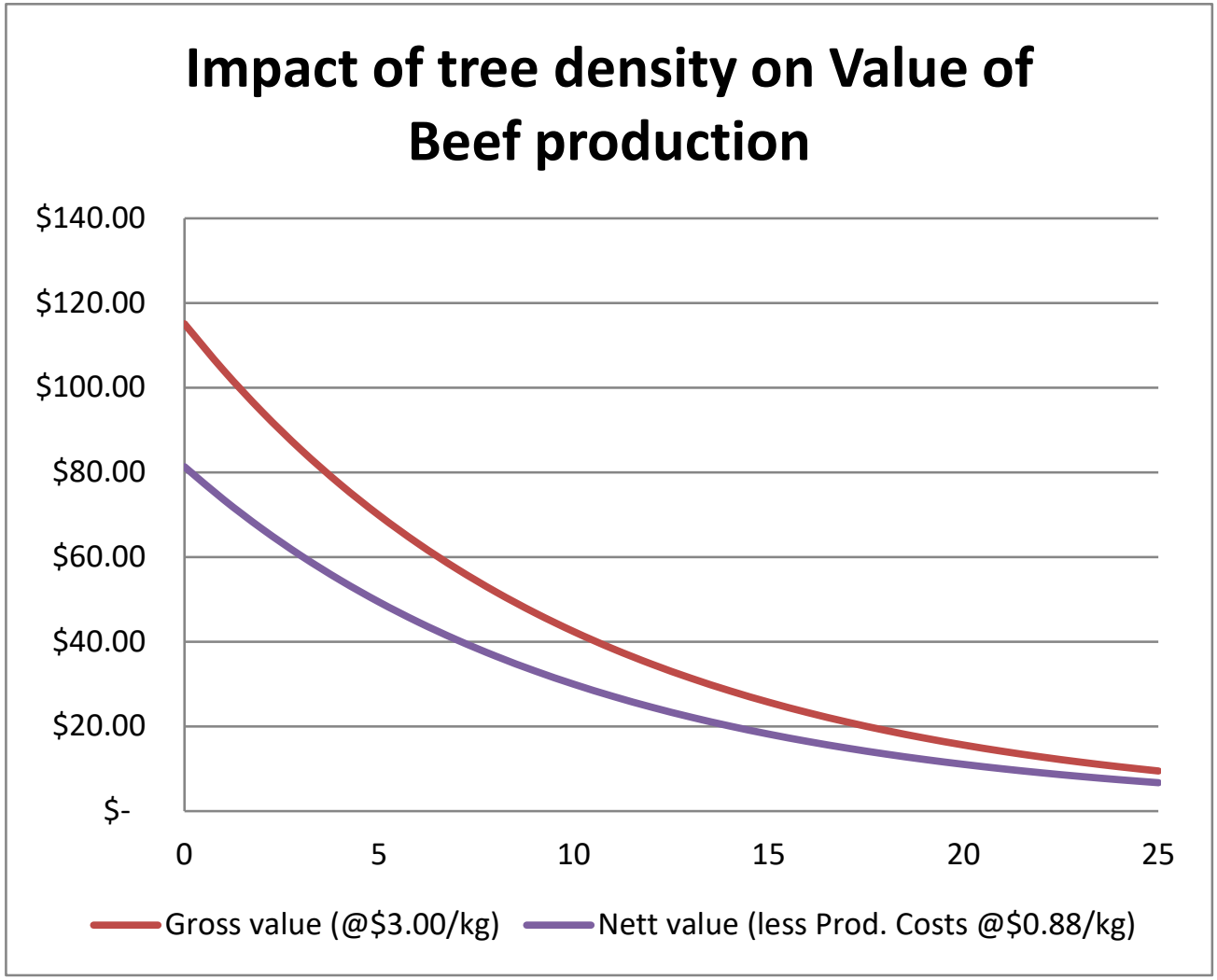

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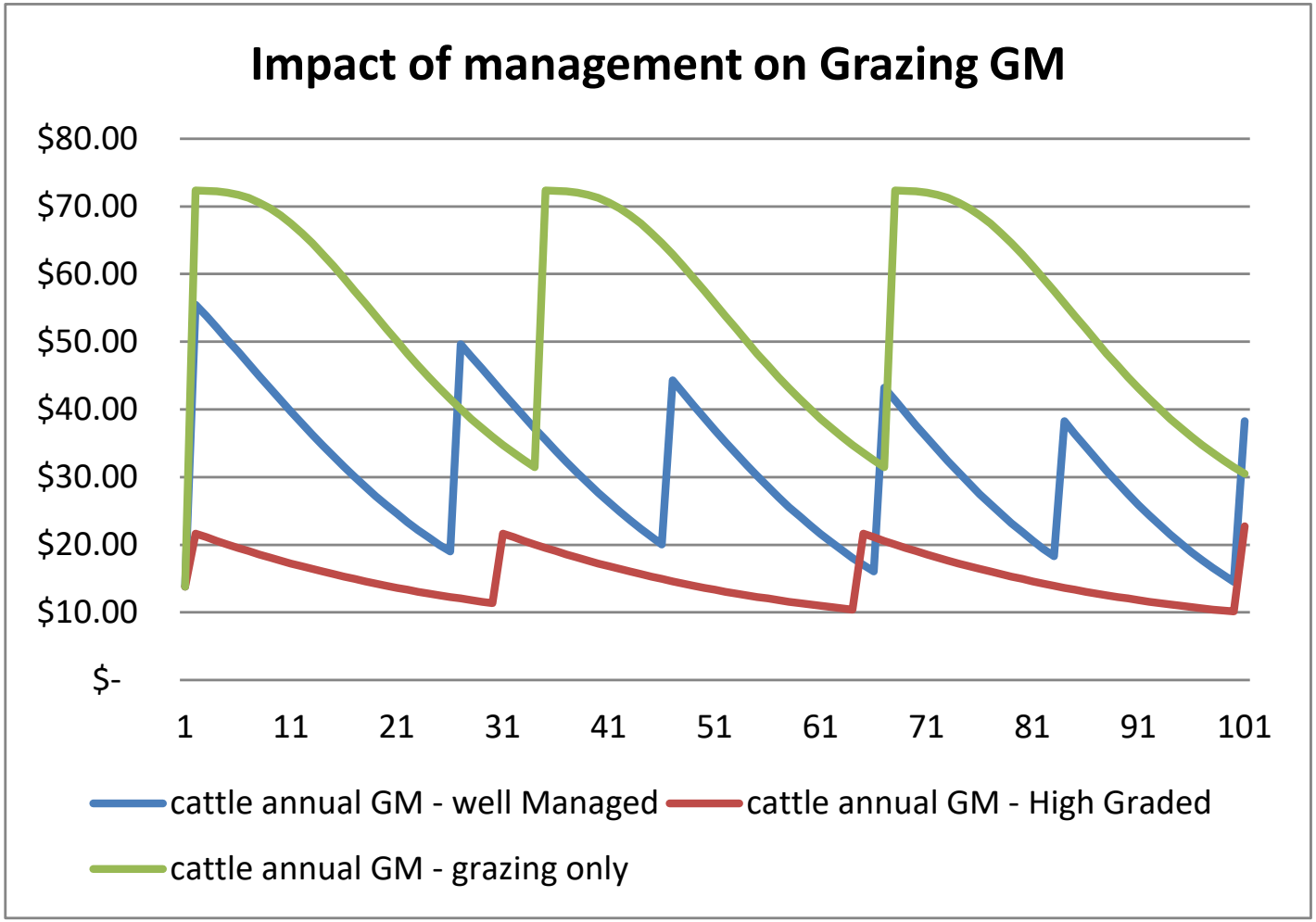
Annual liveweight gain = 120 kg/head
Liveweight value = $3.00 /kg
Cost of production = $0.88/kg



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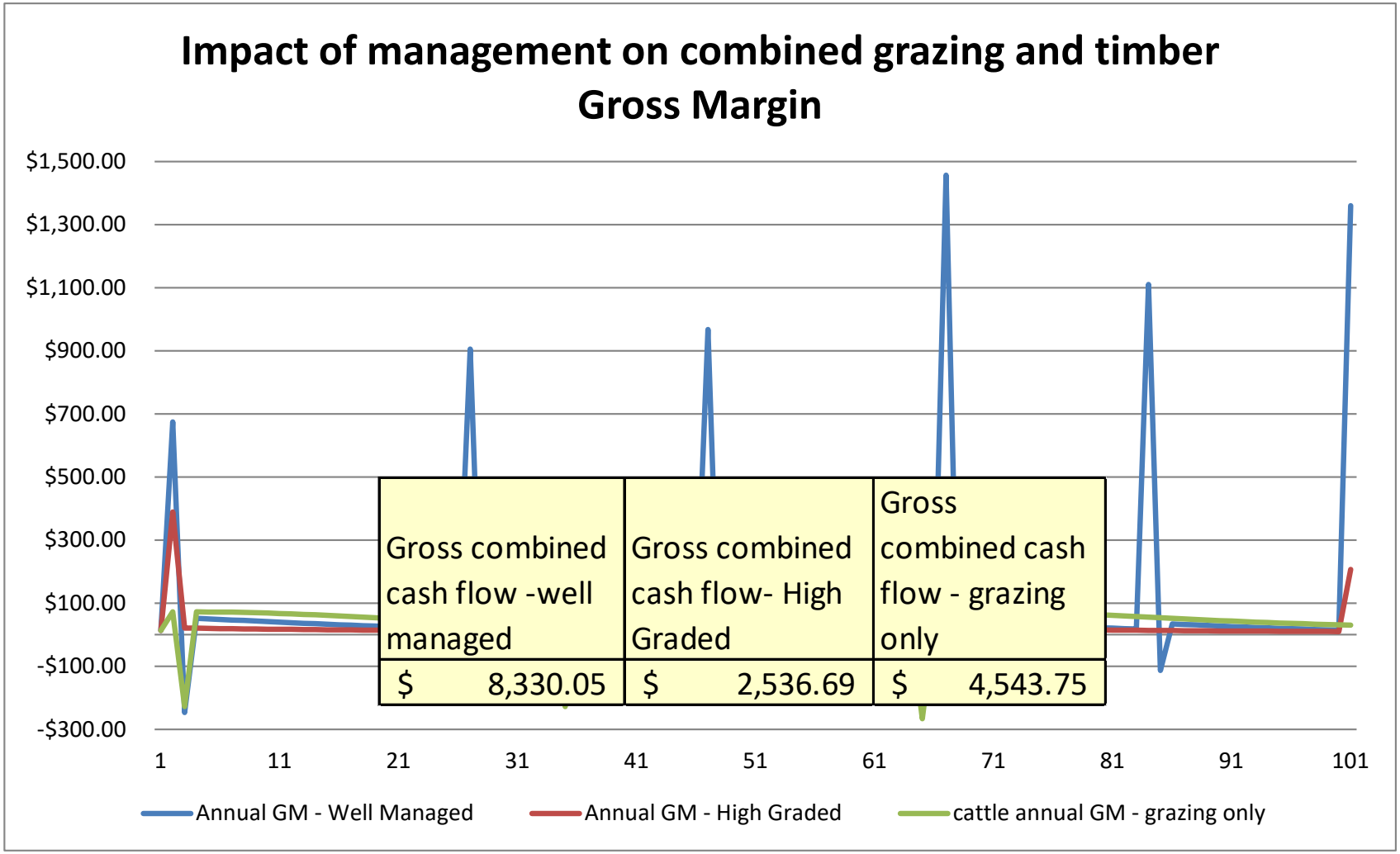
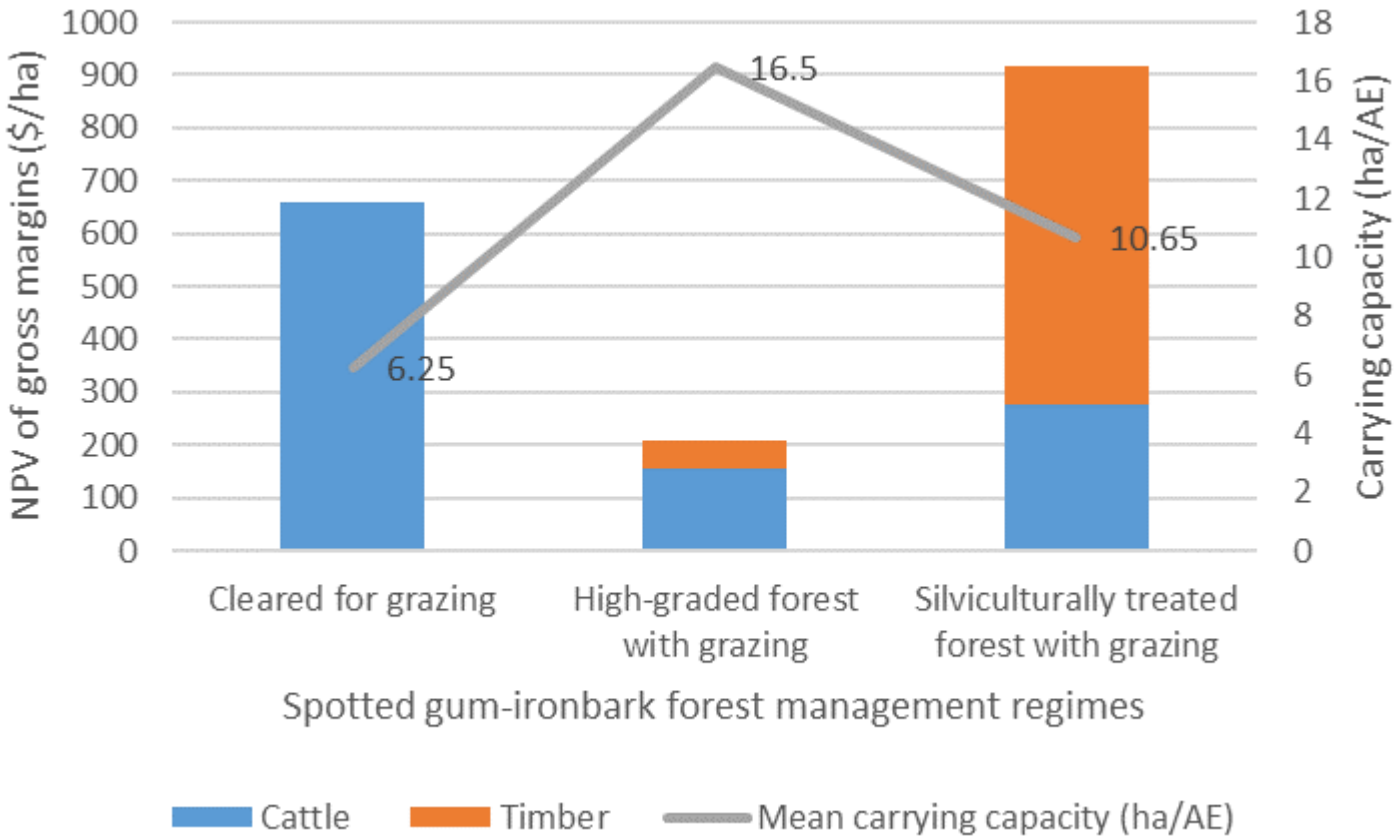


# Combining silviculture with grazing



# Limitations and assumptions

- Not considering land value and capital invested in land or livestock.
- Not accounting for land condition (assuming all good grazing land condition).
- Not accounting for difficulties in managing livestock (in particular adjusting livestock numbers to match C.C.) and impacts on herd structure (require more complex herd modelling).
- We have limited forest growth models (but working on it).
- Not accounting for the change in the relative value of grazing and timber.
- Need to consider risks (climatic and sovereign).

# Conclusions

- Qld has a lot of forest.
- Most of it is unproductive or tied up in leasehold land.
- The hardwood timber industry will increasingly rely on the PNF estate
- The PNF has considerable productive potential, despite a history of poor management and lack of silvicultural investment.
- The main impediments to landholders investing in PNF silviculture include: -
  - sovereign risk (harvest security)
  - lack of understanding of or interest in forestry.
  - long term nature of forestry (discounting future earnings).
- In many situations timber and grazing can combine to provide alternative income streams.

# Thank you

any questions?