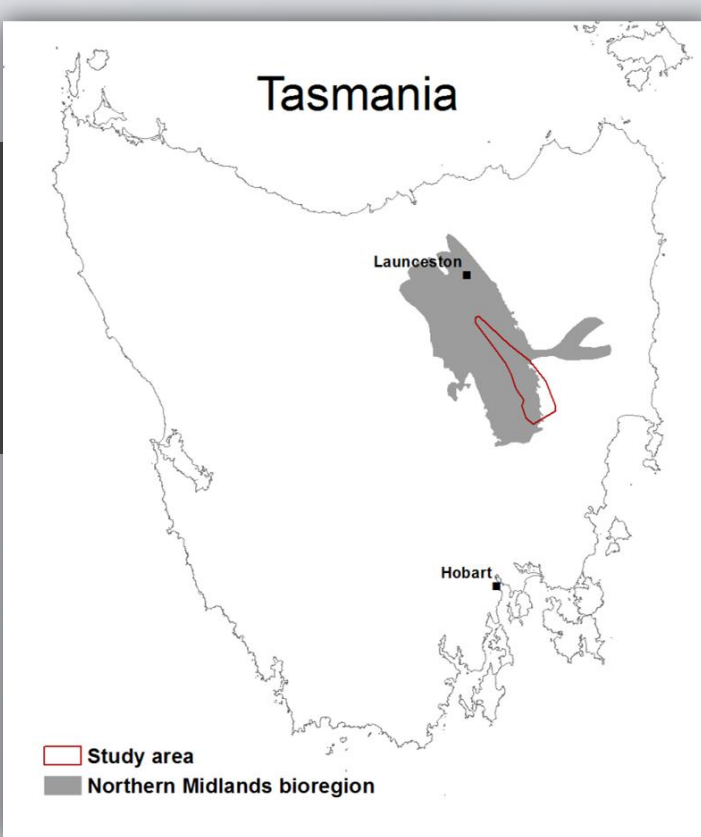


# Land cover change in a Tasmanian rural landscape

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- Key Findings**
- Above ground biomass is down 38% from 1788 levels
  - Replanting 23% of the area would replace the 1940s – 2010s carbon debt

## Background

The Tasmanian Midlands are an interesting case study as the transition from a traditional hunter-gatherer to agricultural economy coincided with the beginning of the Anthropocene (c. 1780). With a climate similar to England and expanses of open grassy woodlands, the region was much favoured for grazing and cropping.

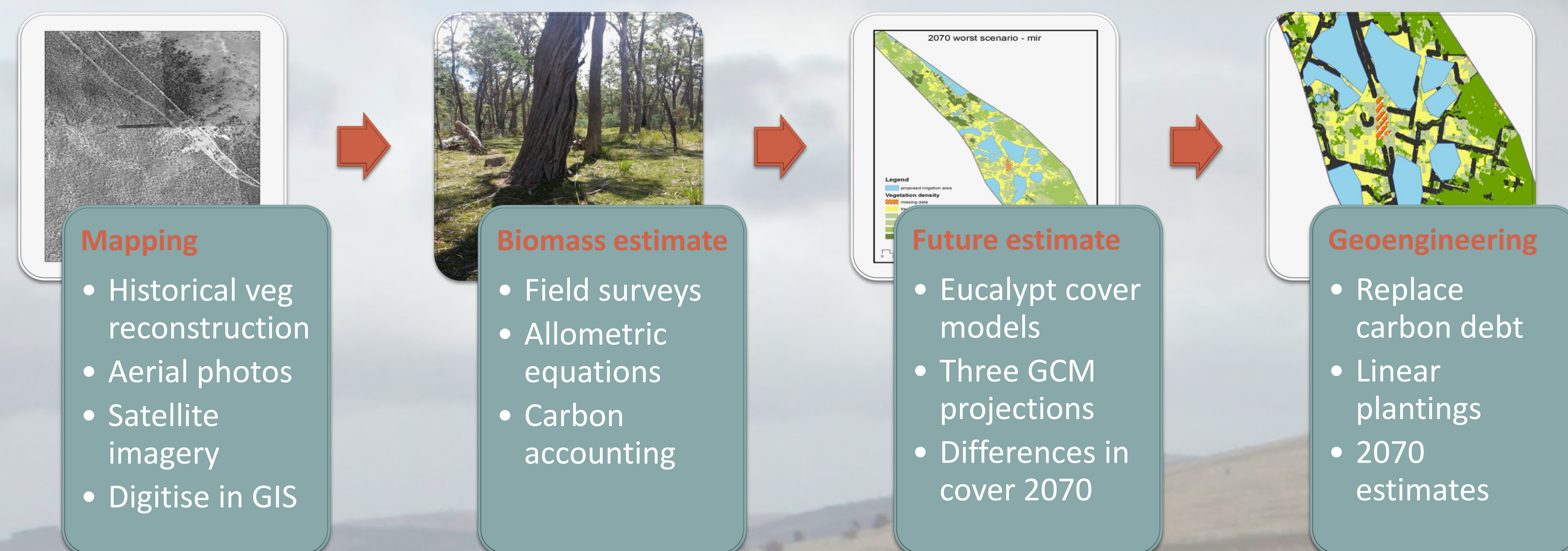
## Landscape change

By the 1820s indigenous land management practices had been eliminated and most of the productive land in the Tasmanian Midlands had been allotted to European settlers. Early settlers were encouraged to clear and develop the land.

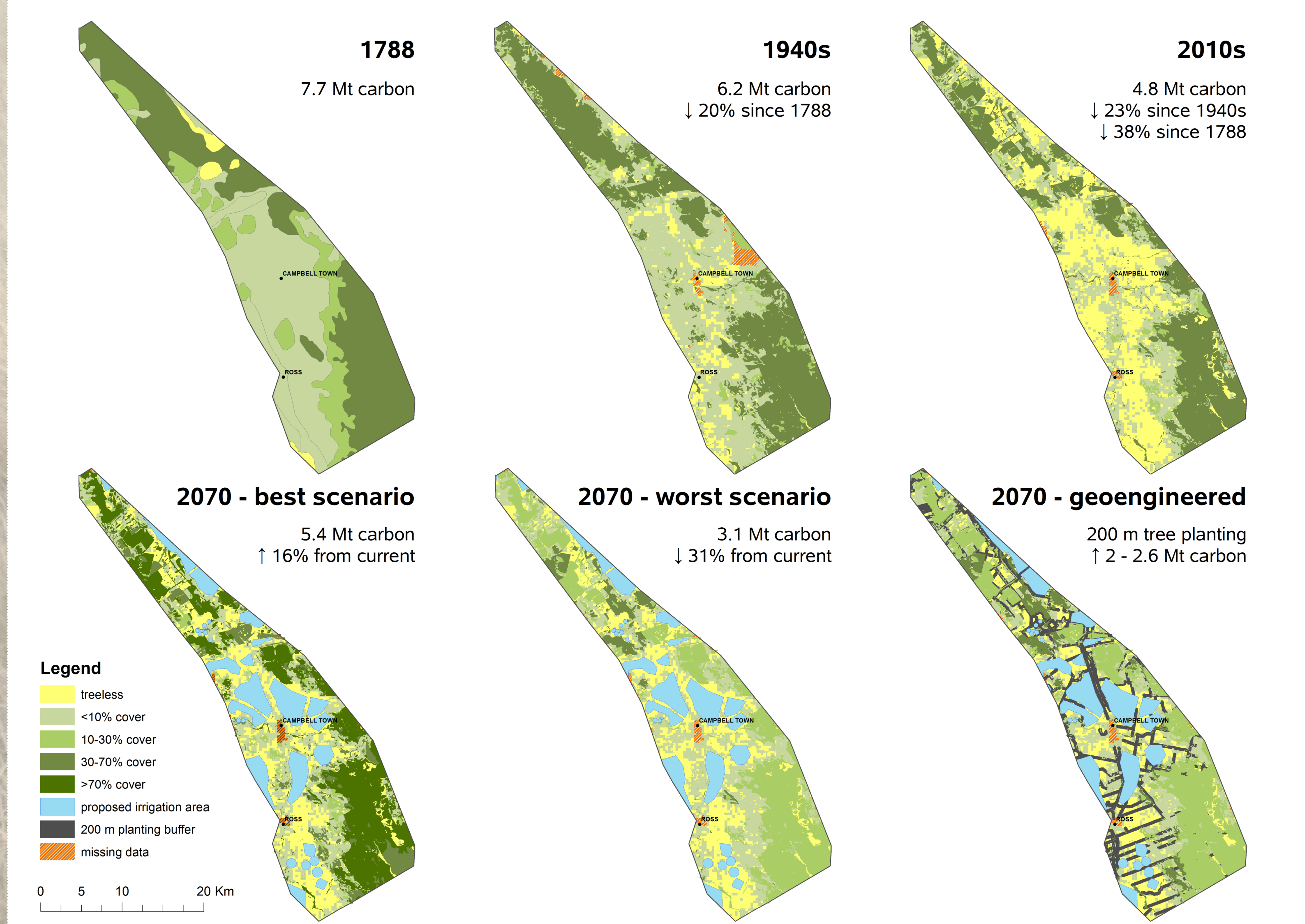
There have been a number of periods of agricultural development in the region, all of which have involved the deliberate removal or unexplained dieback of mature trees. The region is again at a point of change, facing alteration for a major irrigation program and the uncertainties of future climate change.

- Aims**
- to document the changes to canopy cover and carbon since 1788
  - three general circulation models (GCMs) (high emissions scenario) used to estimate tree cover in 2070

## Research steps



## Tree cover change 1788 – 2070



## Canopy cover

- Treeless area
  - 1788 = 2.4%
  - 1940s = 9.2%
  - 2010s = 22%
- Area of open forest (30% – 70% cover)  
Reasonably static
- Area of open-woodland (<10% cover)
  - 1788 to 1940s = ~41%
  - 2010s = 28%

## Carbon loss

- Total carbon loss = ~3 Mt since European arrival
- Total carbon decreased from 7.7 Mt to 4.8 Mt.
- Average carbon per hectare
  - 1788 = 120 t ha<sup>-1</sup>
  - 1940s = 96 t ha<sup>-1</sup>
  - 2010s = 74 t ha<sup>-1</sup>
- Additional loss of tree cover in future from planned irrigation areas: 10,280 ha (16% of area).
- Massive variability in future carbon estimates depending on general circulation model. Total carbon estimates between 3.1 Mt – 5.4 Mt.



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## Restoring the debt

- Re-forestation to replace the carbon debt from 1788 to 2010s requires linear plantings more than 200 m wide along every road, property boundary and river.
- This is 11,990 hectares, or approximately 19% of the region, planted at extremely high density, the value derived from a mature forest with 30 – 70% canopy cover (177 t ha<sup>-1</sup>).
- A more realistic carbon value for restoration plantings (78 t ha<sup>-1</sup>) requires planting more than 300 m wide, just to replace the debt accrued from the 1940s to 2010s (23% of study area).