BOTANIC GARDENS OF SYDNEY

Restoring the adaptive resilience and cultural connectivity of edible rainforest trees

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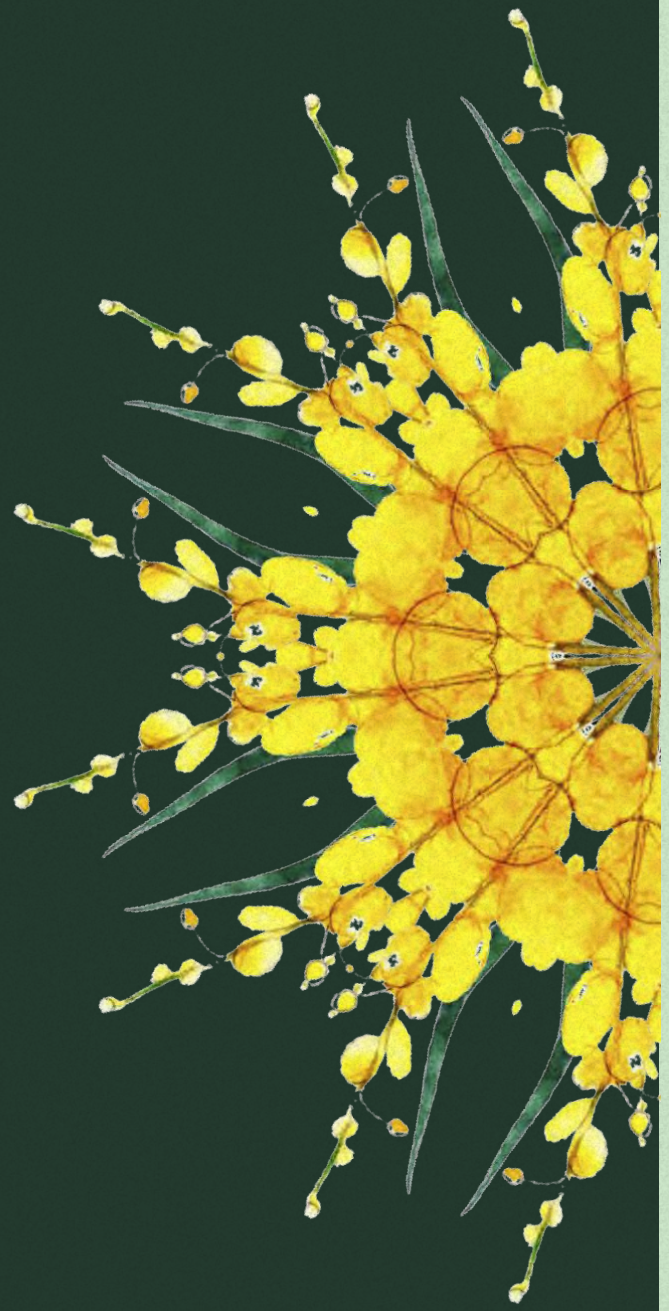
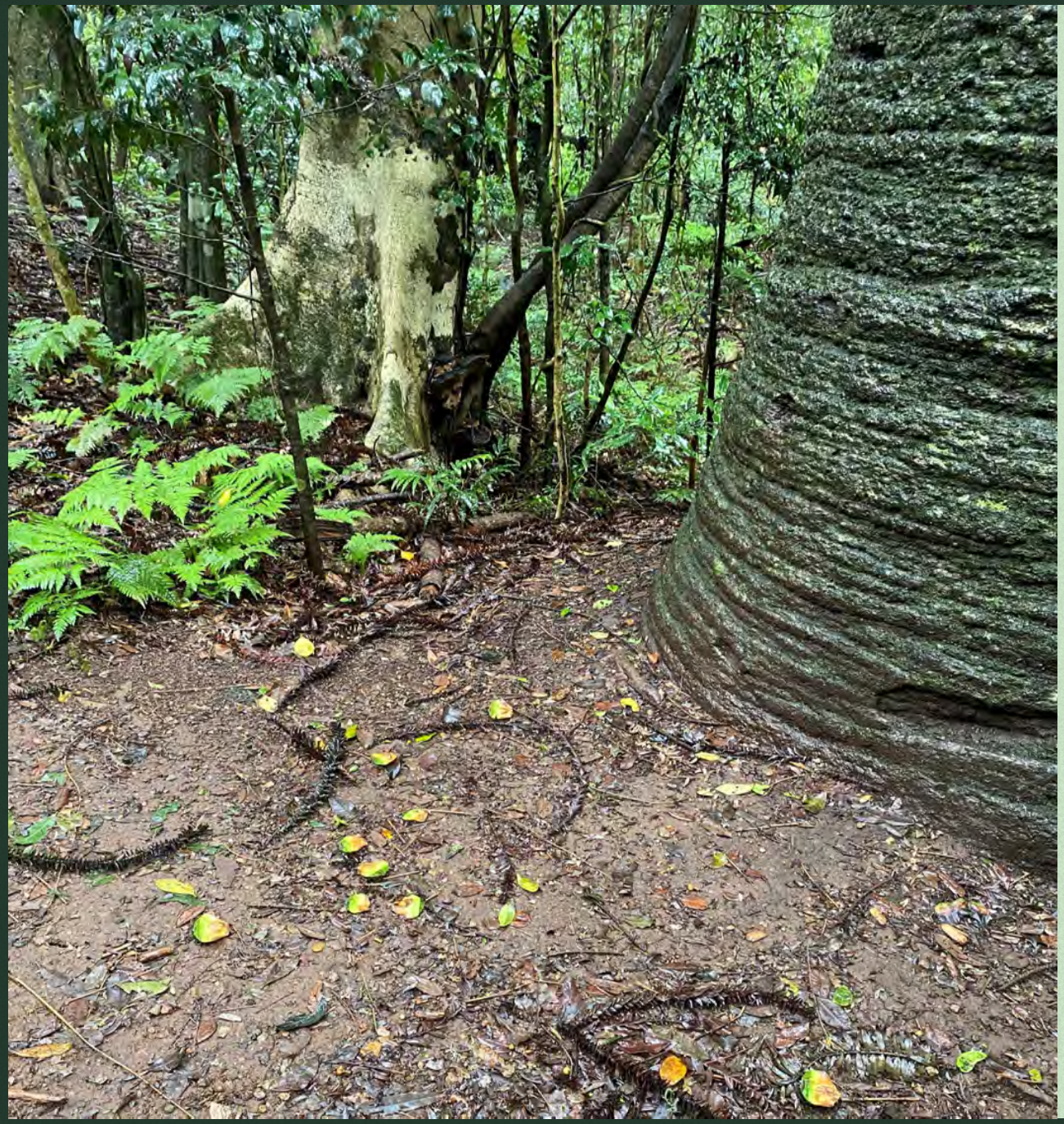


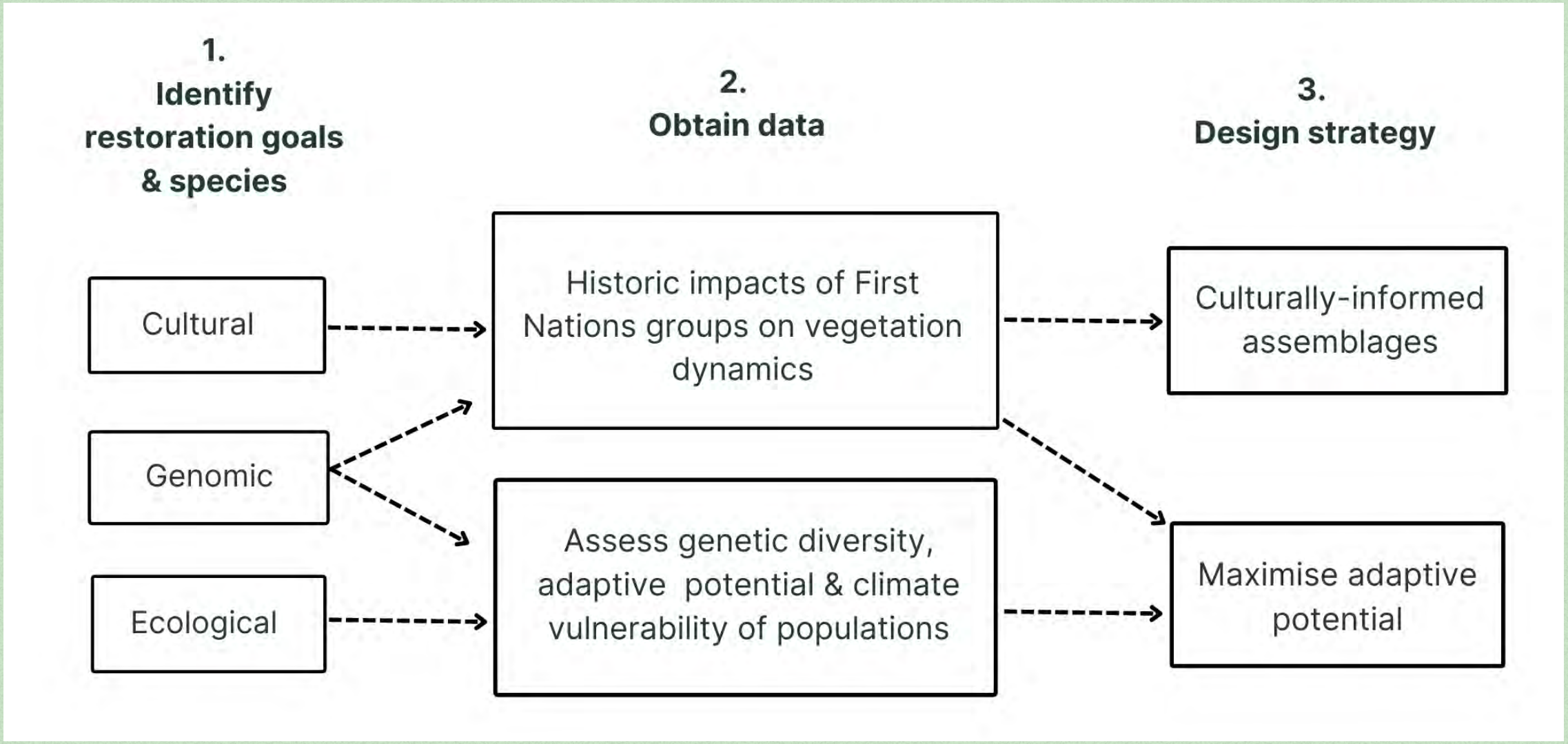


Restoration challenges

Key challenges:

1. Integrate the knowledge, preferred management methods and inclusion of Indigenous and non - Indigenous peoples.
2. Identify an achievable and desirable reference state.

Biocultural restoration approach supported by genomic tools.


1.
Identify
restoration goals
& species
2.
Obtain data
3.
Design strategy
Cultural
Genomic
Ecological
Historic impacts of First Nations groups on vegetation dynamics
Assess genetic diversity, adaptive potential & climate vulnerability of populations
Culturally-informed assemblages
Maximise adaptive potential

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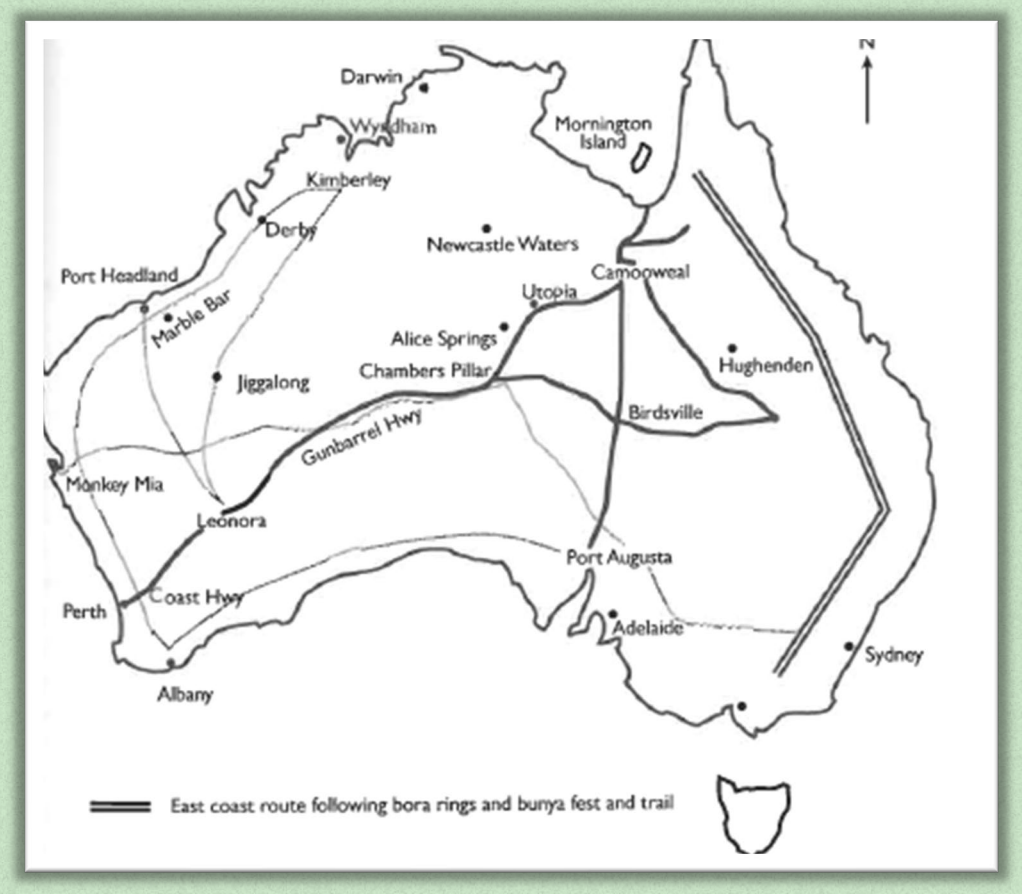
Yellow walnut (Beilschmiedia bancroftii)

- ✓ Signal 1 = low Fst & absence of IBD
- ✘ Signal 2 = admixture between sites
- ✓ Signal 3 = genomic outliers within sites
- ✓ Signal 4 = haplotype LDD

Niemeyera prunifera

- ✘ Signal 1 = low Fst & absence of IBD
- ✘ Signal 2 = admixture between sites
- ✘ Signal 3 = genomic outliers within sites
- ✓ Signal 4 = haplotype LDD

Fahey *et al.* 2022. Genomic Screening to Identify Food Trees Potentially Dispersed by Precolonial Indigenous Peoples. *Genes. 13(3), 476.*



Dale Kerwin (2011) Aboriginal Dreaming paths and Trading Routes

In-situ vegetation management

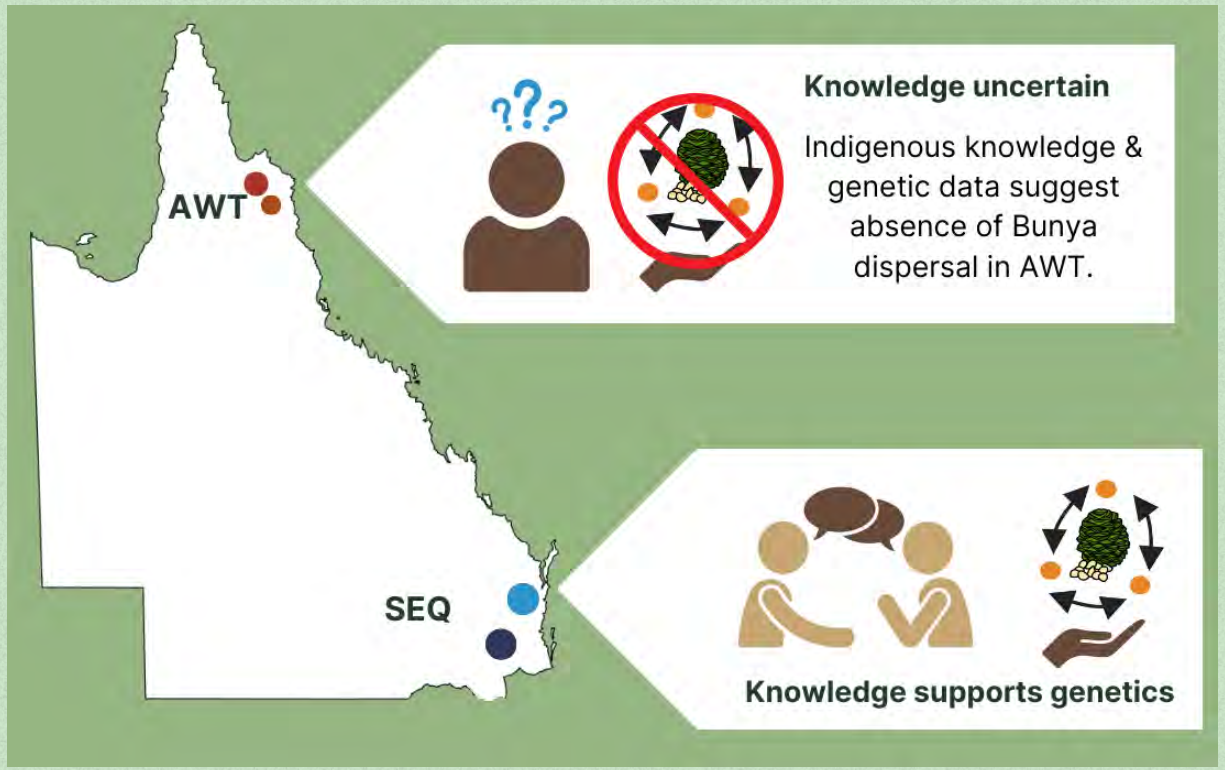
- Burning
- Hunting herbivores
- Plant processing
- Propagation

- Population growth or decline (Ne)
- Elevated diversity
- Selection pressures

Source: Australian Museum

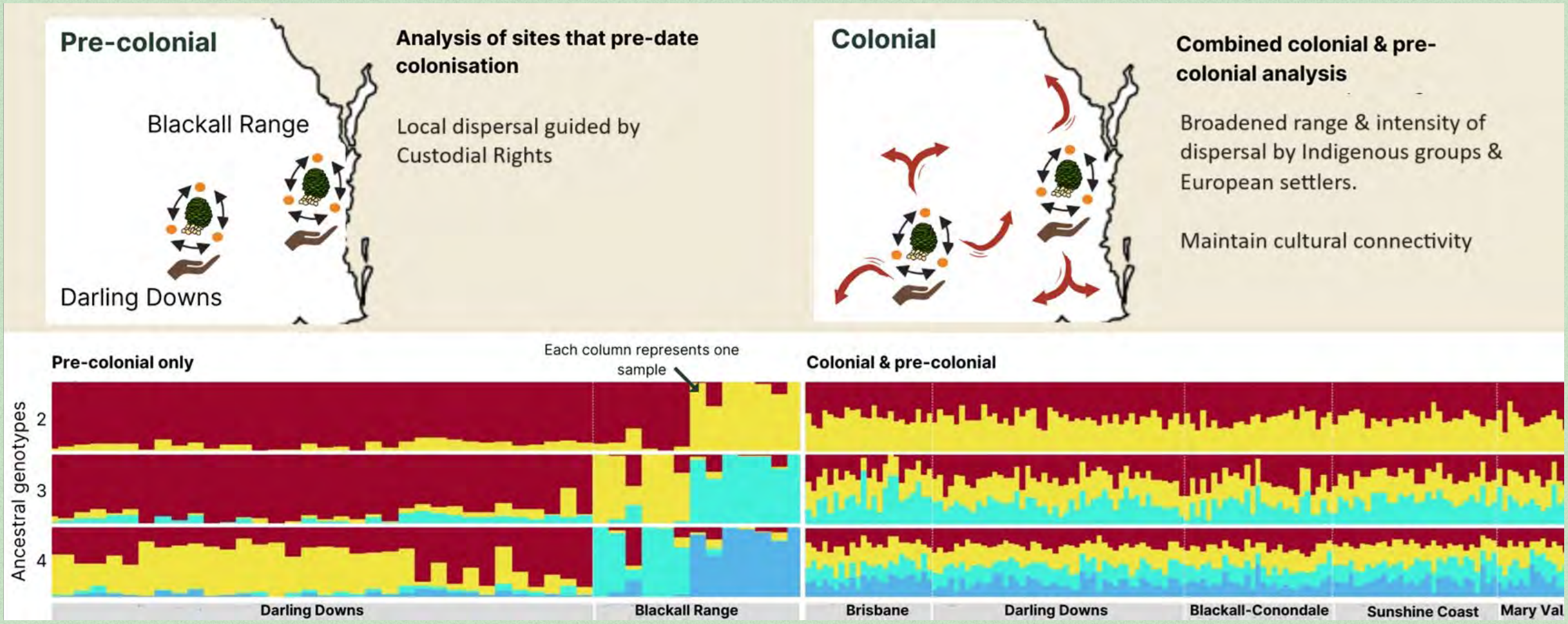
Source: Tuechler et al. 2014

Araucaria bidwillii (Bunya Pine, Bonyi Bonyi)

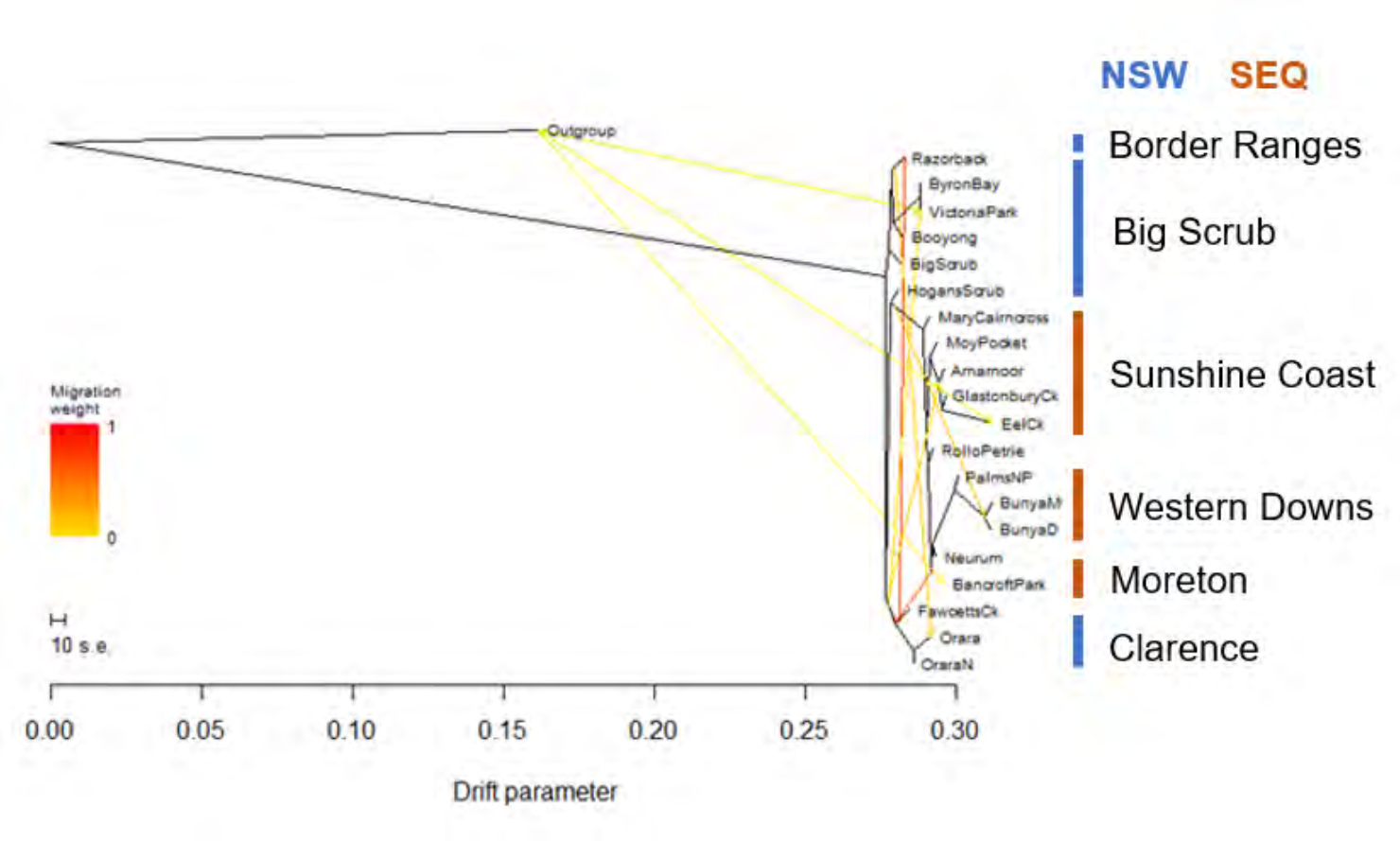


Source: Cooke et al. 2024

SEQ

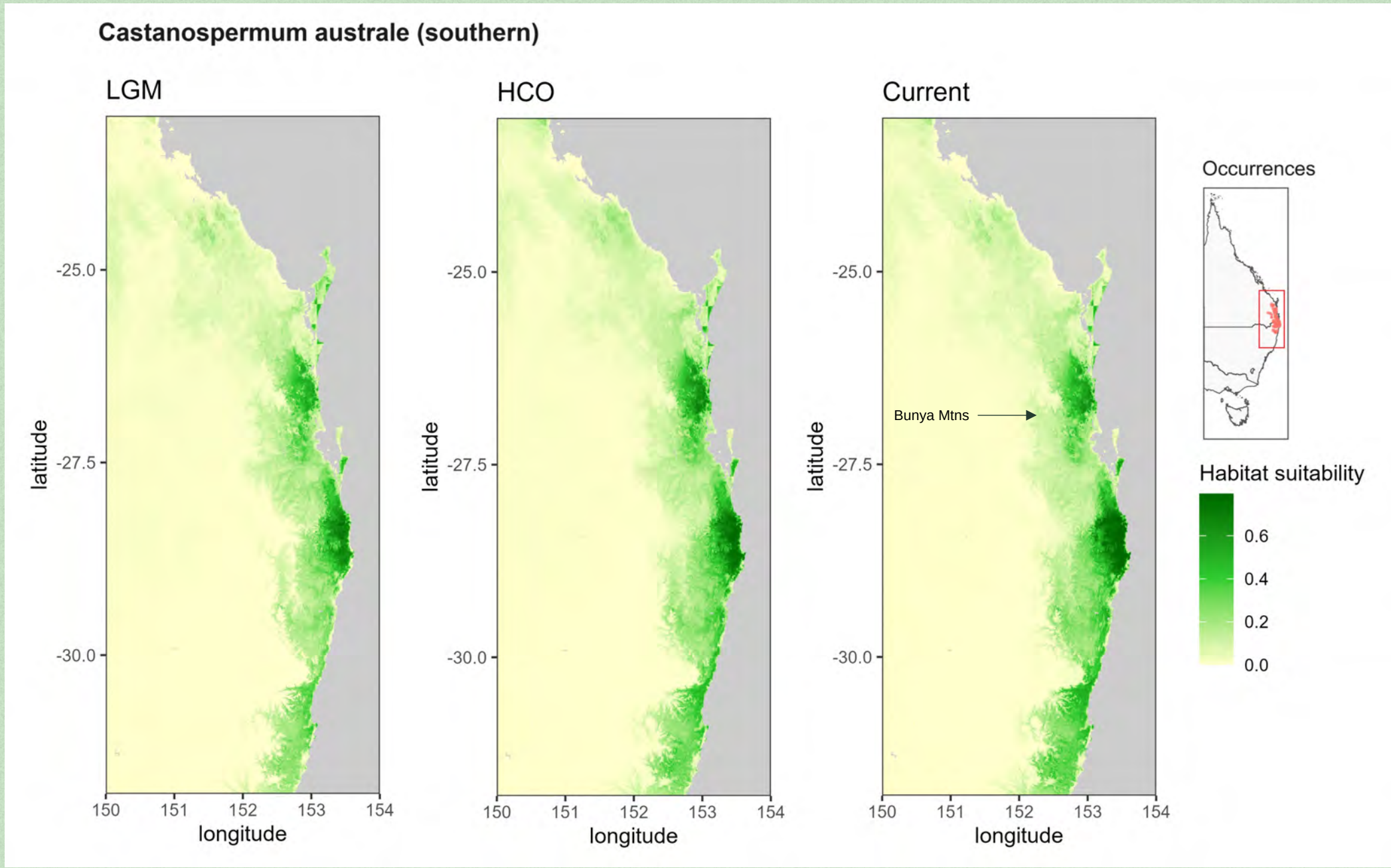

Pre-colonial
Blackall Range
Darling Downs
Analysis of sites that pre-date colonisation
Local dispersal guided by Custodial Rights
Colonial
Combined colonial & pre-colonial analysis
Broadened range & intensity of dispersal by Indigenous groups & European settlers.
Maintain cultural connectivity
Pre-colonial only
Each column represents one sample
Colonial & pre-colonial
Ancestral genotypes
2
3
4
Darling Downs
Blackall Range
Brisbane
Darling Downs
Blackall-Conondale
Sunshine Coast
Mary Val

Castanospermum australe (Black Bean, bugam)



Expansion from Big Scrub to SEQ mirrors shared ancestry of Bundjalung, Githabul and Yugambeh.

Long-distance dispersal to Bunya Mtns


Castanospermum australe (southern)
LGM
HCO
Current
latitude
longitude
-25.0
-27.5
-30.0
150
151
152
153
154
Bunya Mtns
Occurrences
Habitat suitability
0.6
0.4
0.2
0.0

Conclusions

- Contrasting signatures of translocation in Bunya and Black Bean
  - kinship, cultural identity and spiritual worldviews guide Indigenous ecological management.

- Understanding historic Indigenous influences on vegetation dynamics improves ecological models and restoration strategies.

- Some species appear more dependent on dispersal vectors than specific habitat requirements.

- Genomic data can inform translocation strategies.

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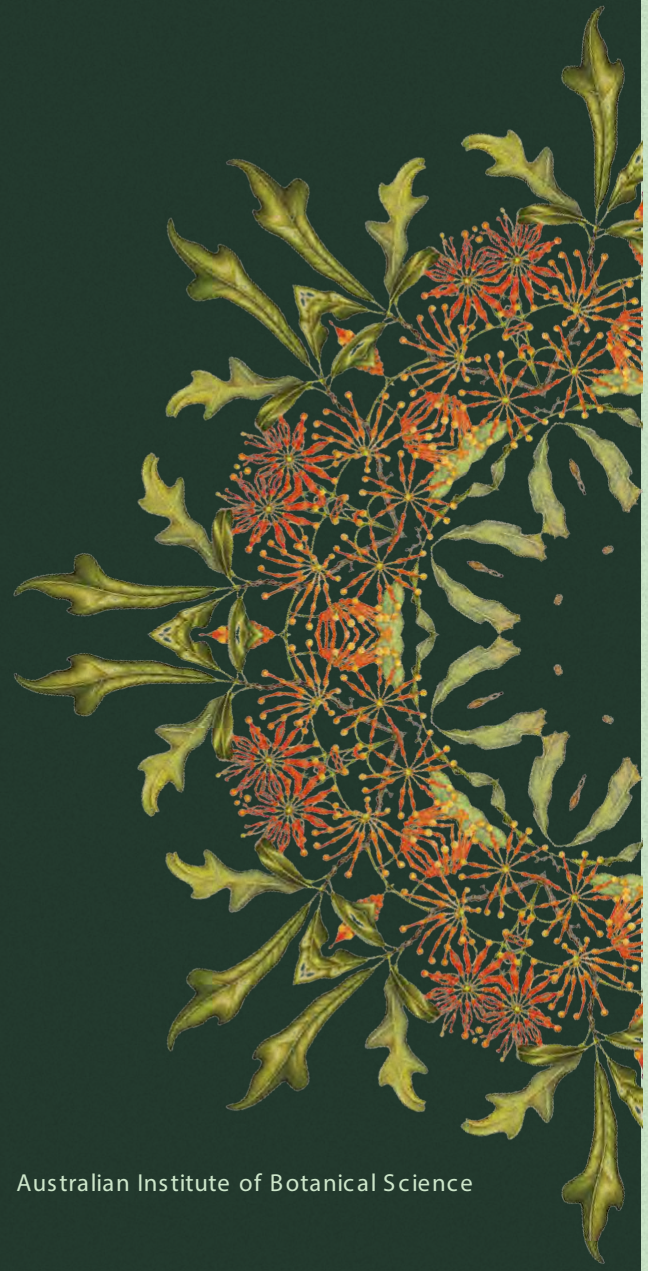
Thank You

botanicgardens.org.au



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