The University Of Queensland
AUSTRALIA

Threatened Species Recovery Hub

National Environmental Science Programme

Australian plant translocations: an overview

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Translocation

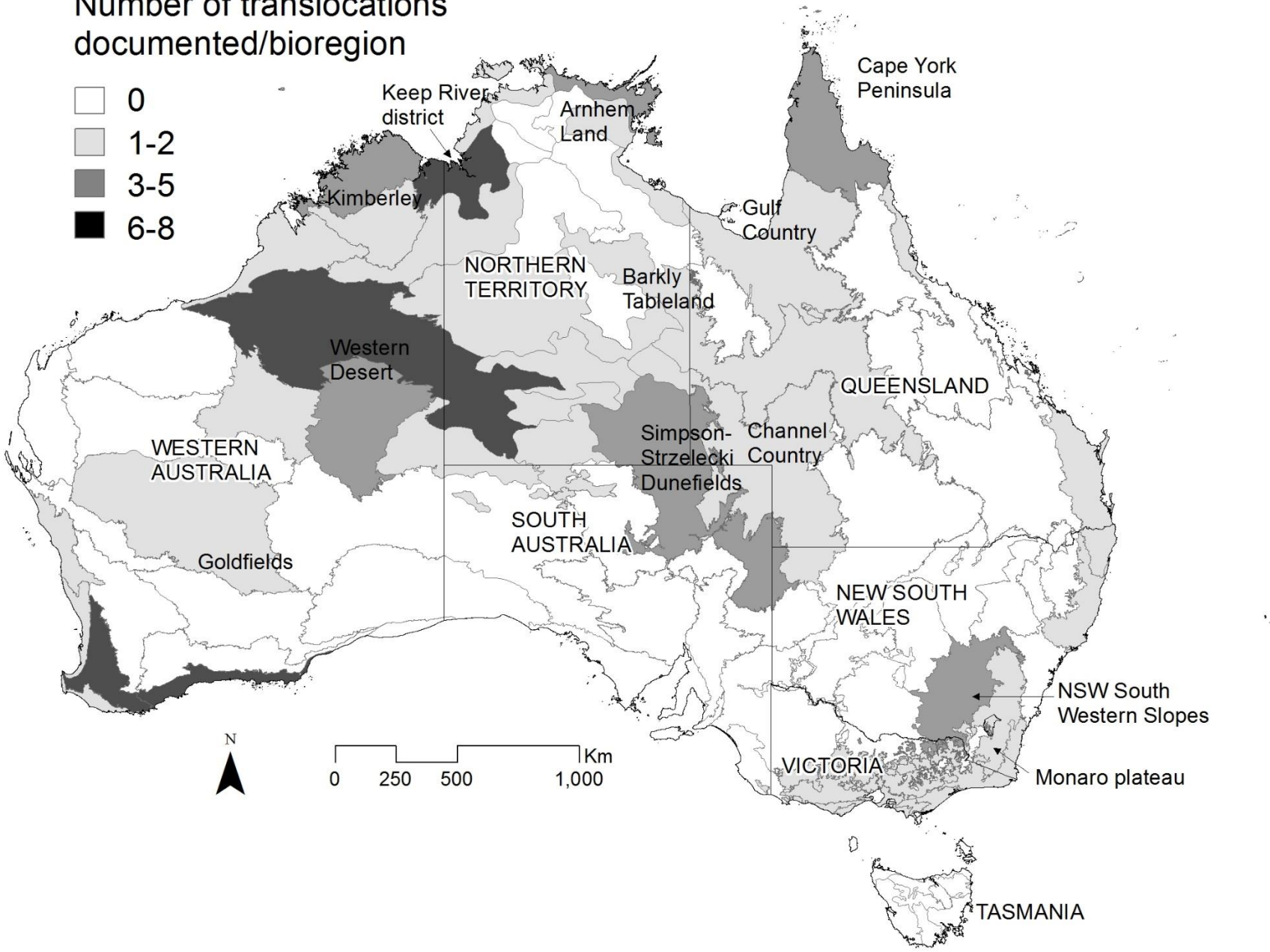
The **intentional** transfer of plants or regenerative plant material from an ex situ collection or natural population to a new location.

- Introduction
- Reintroduction
- Reinforcement/augmentation
- Assisted migration

An increasingly common management response and rapidly-expanding field of conservation biology

…but also an ancient practice

- >50 species recorded as being deliberately translocated: 20 trees and shrubs, 13 tuberous spp., 9 non-tuberous herbs, 7 grasses.
- Important food species and plant materials
- >17 with ceremonial or cultural importance – translocation occurred as part of specific ceremony
- Mostly introductions and reinforcements, often with *in situ* nurture of plants and habitats
- 10 post-contact – mostly to maintain connection to important sites/patches of country


Number of translocations documented/bioregion
0
1-2
3-5
6-8
Keep River district
Arnhem Land
Cape York Peninsula
Kimberley
Gulf Country
NORTHERN TERRITORY
Barkly Tableland
Western Desert
QUEENSLAND
Simpson-Strzelecki Dunefields
Channel Country
WESTERN AUSTRALIA
SOUTH AUSTRALIA
Goldfields
NEW SOUTH WALES
NSW South Western Slopes
VICTORIA
Monaro plateau
TASMANIA
N
0 250 500 1,000 Km

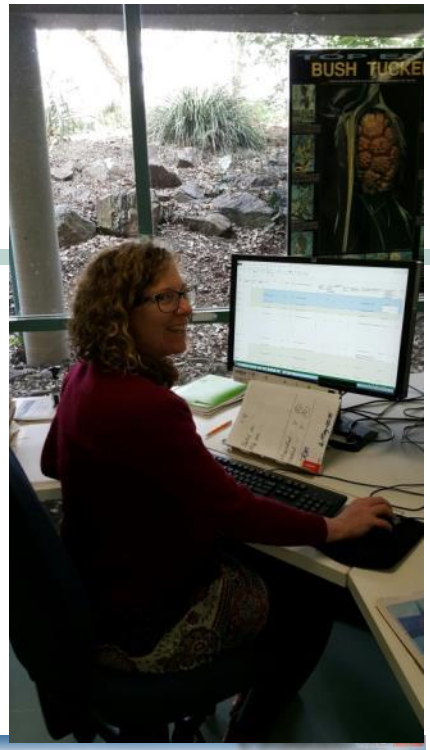
Extent and implications

- Many undocumented translocations – 20,000 vascular flora species known to have been directly used in Australia
- Emerging use of molecular and genomic techniques
- Goals and practice of Aboriginal translocations broadly similar to present-day translocations
- Relevance to assisted migration debates
- Challenge conceptions of “natural” species distributions

Continuing a long but poorly-documented history: Modern translocations

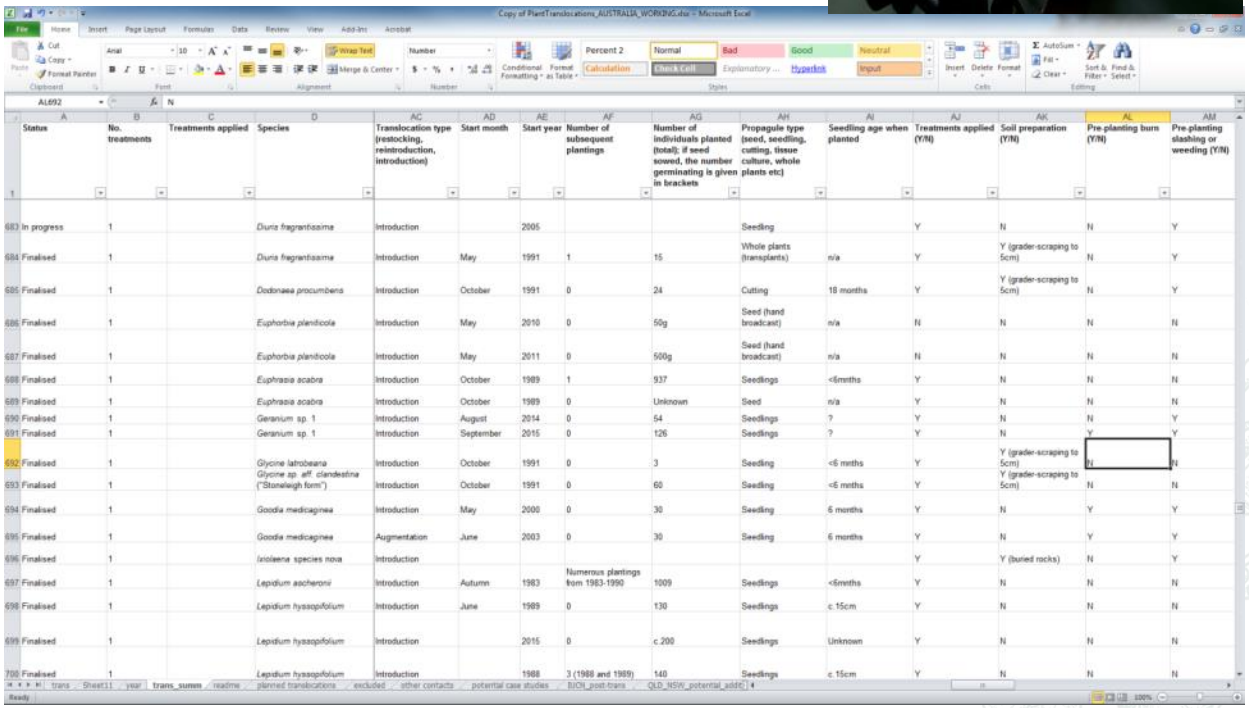
- Increasing importance and prevalence of translocations, including for development mitigation
- High-risk, labour-intensive
- Low rate of publishing - no picture of what has been done or where, or how successful it has been

NESP Project, 2016-2019



- Literature review
- Interviews (face-to-face, phone, email) with >150 practitioners

→ Australian Plant Translocation Database



	Status	No. treatments	Treatments applied	Species	Translocation type (restocking, reintroduction, introduction)	Start month	Start year	Number of subsequent plantings	Number of individuals planted (total); if seed sowed, the number germinating is given in brackets	Propagule type (seed, seedling, cutting, tissue culture, whole plants etc)	Seedling age when planted	Treatments applied (Y/N)	Soil preparation (Y/N)	Pre-planting burn (Y/N)	Pre-planting slashing or weeding (Y/N)
683	In progress	1		*Diuris fragrantissima*	Introduction		2005			Seedling		Y	N	N	Y
684	Finalised	1		*Diuris fragrantissima*	Introduction	May	1991	1	15	Whole plants (transplants)	n/a	Y	Y (grader-scraping to 5cm)	N	Y
685	Finalised	1		*Dodonaea procumbens*	Introduction	October	1991	0	24	Cutting	18 months	Y	Y (grader-scraping to 5cm)	N	Y
686	Finalised	1		*Euphorbia planticola*	Introduction	May	2010	0	50g	Seed (hand broadcast)	n/a	N	N	N	N
687	Finalised	1		*Euphorbia planticola*	Introduction	May	2011	0	500g	Seed (hand broadcast)	n/a	N	N	N	N
688	Finalised	1		*Euphrasia acabra*	Introduction	October	1989	1	937	Seedlings	<6mnths	Y	N	N	N
689	Finalised	1		*Euphrasia acabra*	Introduction	October	1989	0	Unknown	Seed	n/a	Y	N	N	N
690	Finalised	1		*Geranium sp. 1*	Introduction	August	2014	0	64	Seedlings	?	Y	N	N	Y
691	Finalised	1		*Geranium sp. 1*	Introduction	September	2015	0	126	Seedlings	?	Y	N	Y	Y
692	Finalised	1		*Glycine latrobeana*	Introduction	October	1991	0	3	Seedling	<6 mths	Y	Y (grader-scraping to 5cm)	N	N
693	Finalised	1		*Glycine sp. aff. clandestina* ("Stoneleigh form")	Introduction	October	1991	0	60	Seedling	<6 mths	Y	Y (grader-scraping to 5cm)	N	N
694	Finalised	1		*Goodia medicaginea*	Introduction	May	2000	0	30	Seedling	6 months	Y	N	Y	Y
695	Finalised	1		*Goodia medicaginea*	Augmentation	June	2003	0	30	Seedling	6 months	Y	N	Y	Y
696	Finalised	1		*Isoleena species nova*	Introduction							Y	Y (buried rocks)	N	Y
697	Finalised	1		*Lepidium ascheroni*	Introduction	Autumn	1983	Numerous plantings from 1983-1990	1009	Seedlings	<6mnths	Y	N	N	N
698	Finalised	1		*Lepidium hyssopifolium*	Introduction	June	1989	0	130	Seedlings	c. 15cm	Y	N	N	N
699	Finalised	1		*Lepidium hyssopifolium*	Introduction		2015	0	c.200	Seedlings	Unknown	Y	N	N	N
700	Finalised	1		*Lepidium hyssopifolium*	Introduction		1988	3 (1988 and 1989)	140	Seedlings	c. 15cm	Y	N	N	N

= 1001 translocations of 376 taxa

- 110 of these include multiple treatments (e.g. propagule type, herbivore exclosure, microhabitat, watering, weeding, fertilising)
- 214 with no available data on survival; 46 in ground <12 months; 17 solely experimental
- 724 with performance data (507 conservation, 218 mitigation)

Timeline of translocations

Where and why?

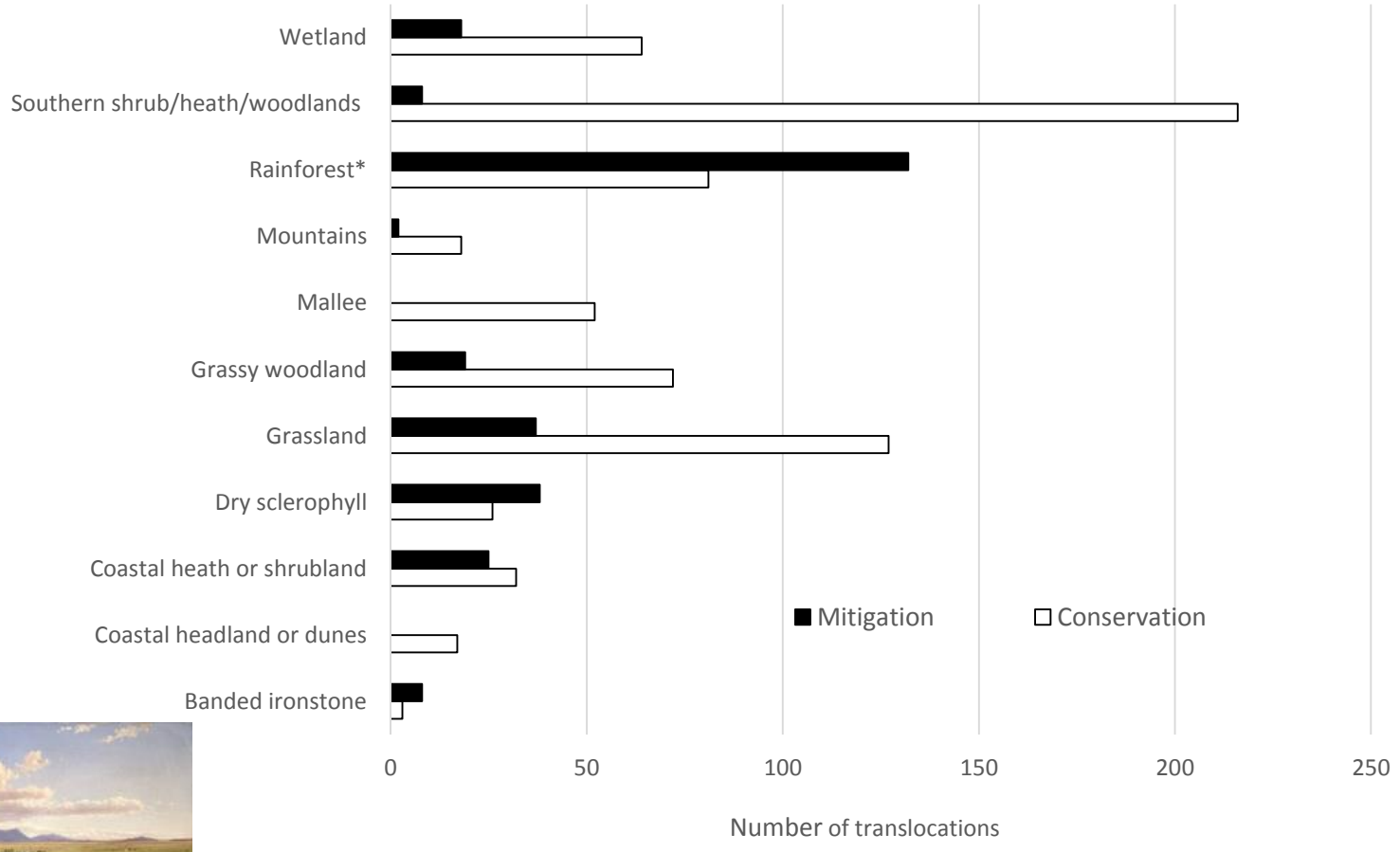








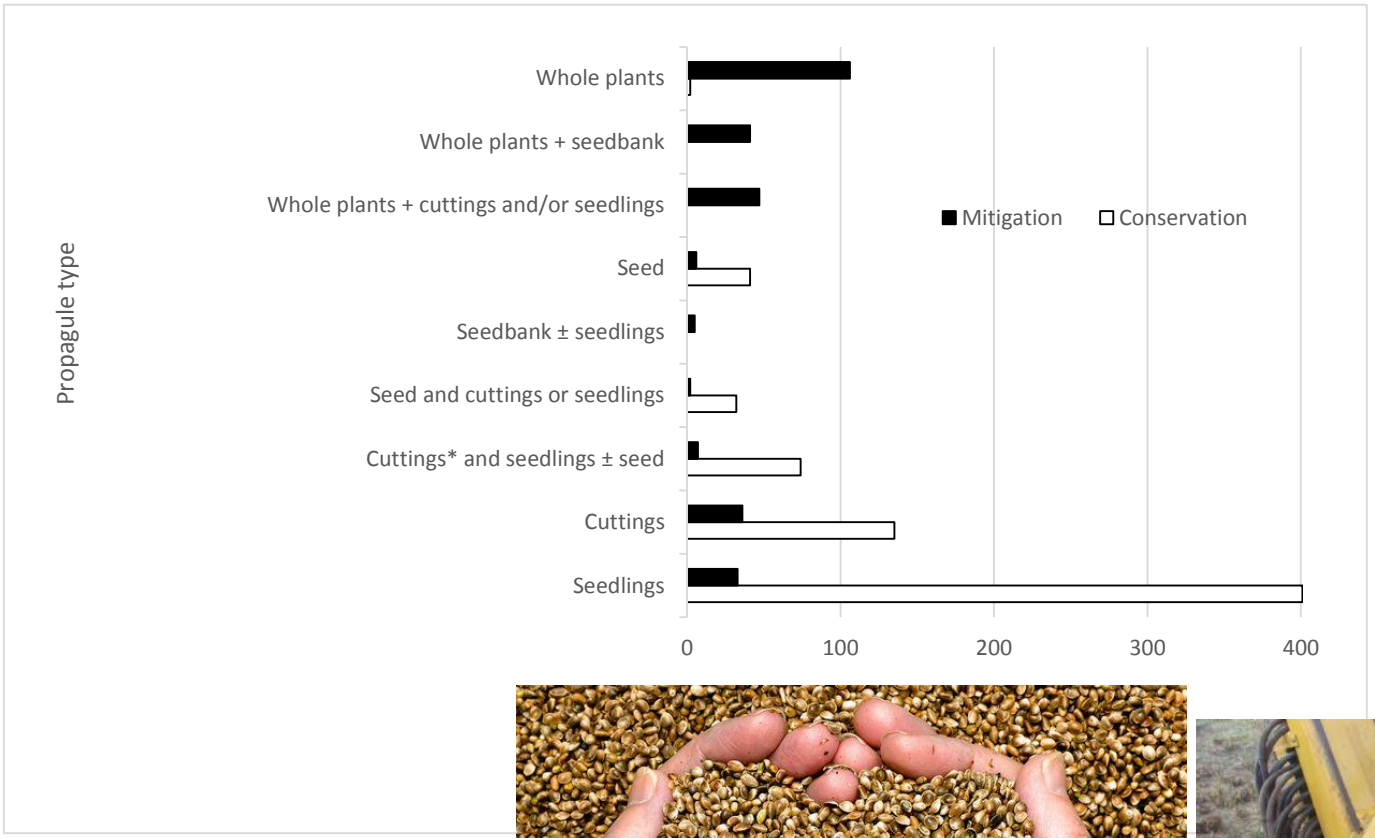

Broad habitat types

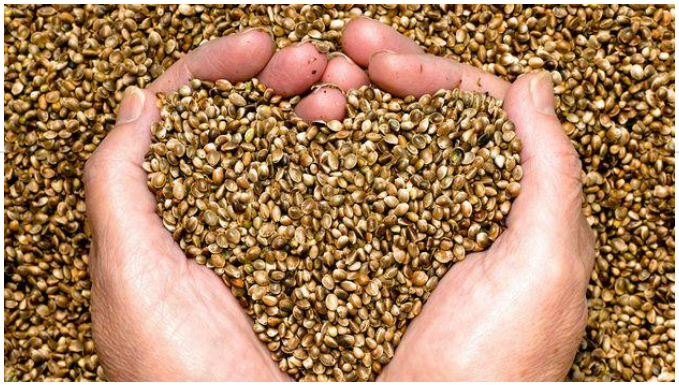


Types and practice

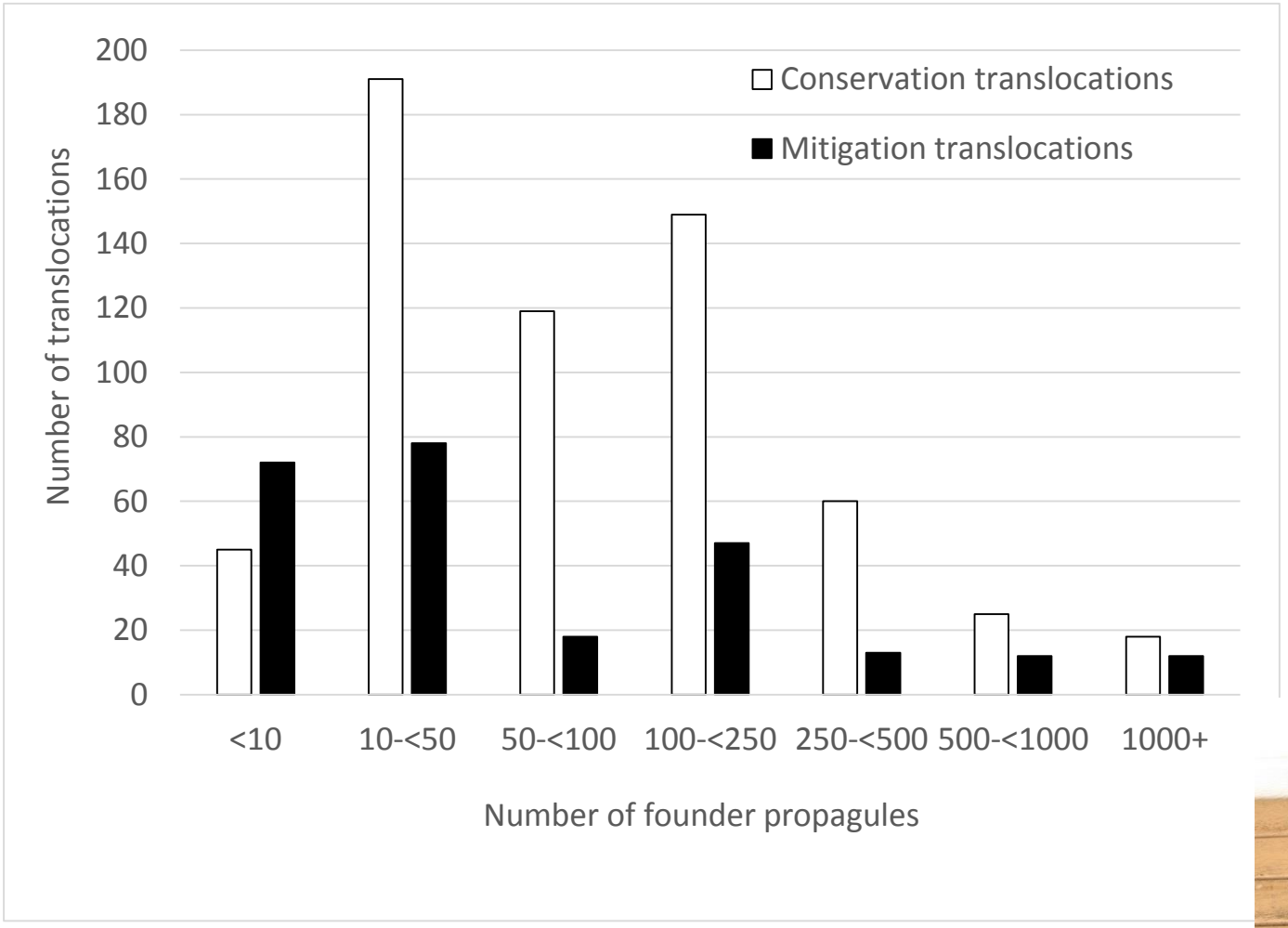
- Type of translocation
  - 80% introductions
  - 17% reinforcements
  - 3% reintroductions
  - 2 assisted migrations
- Most plants not going far (<10 km); ¼ with follow-up plantings
- Watering, weeding and grazing protection; >600 still monitored

Propagule type





Number of propagules used



Evaluating performance (n=724)

- 19% no plants surviving
- 23% <10 plants surviving
- 21% fewer plants surviving than is considered necessary to establish self-sustaining populations

= 62% of translocations (59% of conservation; 70% of mitigation)

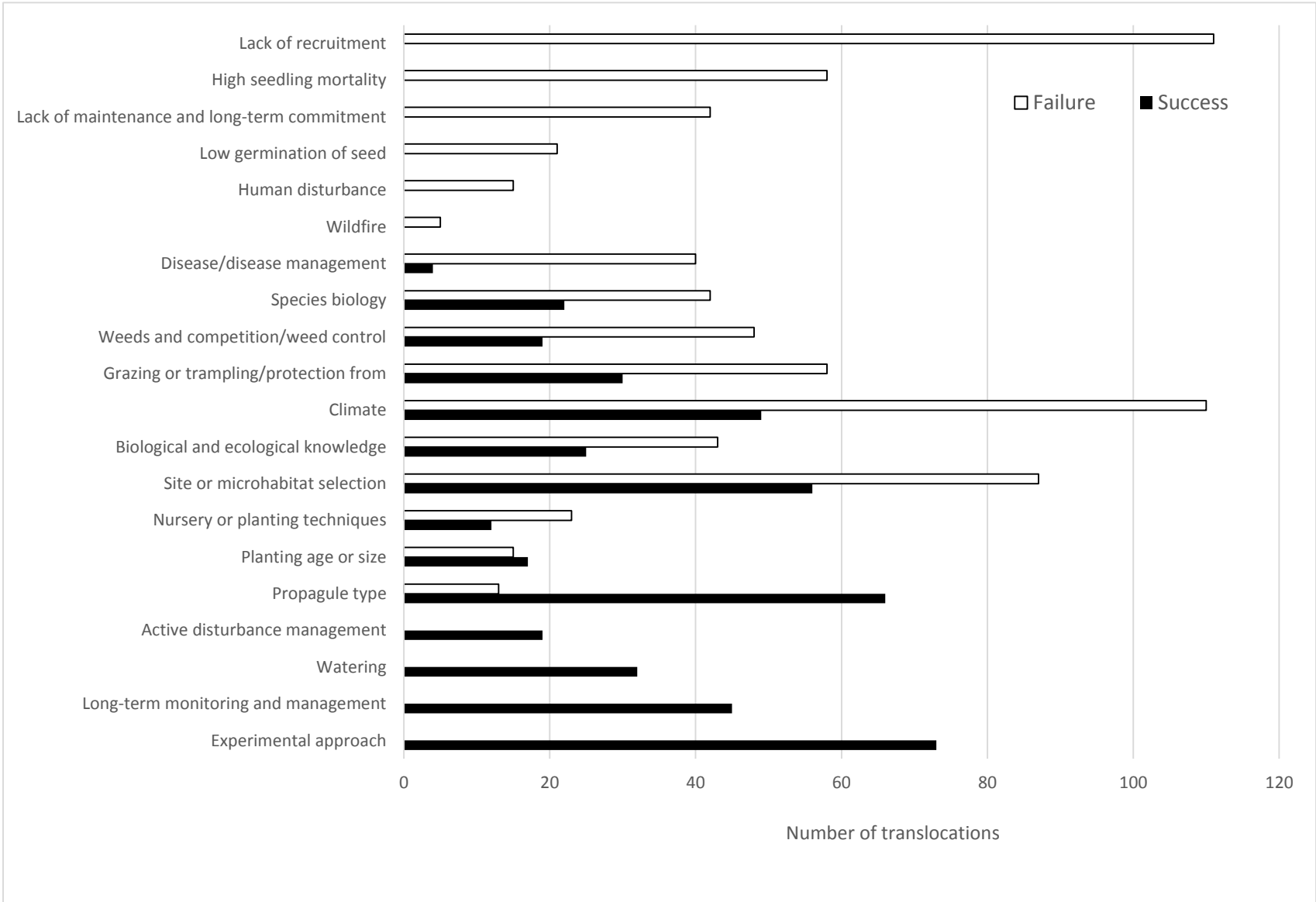
- Total of 274 with ≥ 50 plants surviving
  - 2/3 no recruitment
  - many too soon
- 93 (13%) with ≥ 50 plants

AND some recruitment

Evaluating performance (GLMM)

- Translocation performance (number surviving and recruitment) highly variable between plant lifeforms, habitats, propagule type and type of translocations.
- But species more variable than all of these
- Number of propagules had largest effect size – using at least 500 founder individuals increased chances of creating viable population.

Factors driving translocation performance (practitioner responses)



Synthesis

- Sufficient founder propagules
- Difficult to predict translocation performance – importance of inherent traits of spp.
- Importance of long-term commitment and monitoring
- Second-generation recruitment major factor inhibiting success
- Translocation remains largely experimental – caution esp. for mitigation + value of well-documented experimental approaches

Further reading

- Silcock (2018) Aboriginal translocations: the intentional propagation and dispersal or plants in Aboriginal Australia, *J. Ethnobiology* 38:390-405
- Silcock et al. in prep. 'Threatened plant translocation in Australia: a review'
- Commander et al. (eds) (2018) Guidelines for the Translocation of Threatened Plants in Australia (3rd edition)

Acknowledgements:

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