A digger’s gotta dig: assessing the impacts of reintroducing digging mammals in Australia

Bryony Palmer, Richard Hobbs, Leonie Valentine
Why translocation? Australia’s digging mammals are in trouble...

- 315 species of terrestrial mammal
- 30 species now extinct
- Distribution of 91 species declined by > 50%
- ~70% digging marsupials threatened or endangered
Australia’s digging mammals include:

- Rodents
- Echidna
- Bettongs
- Wombats

[Images of Rodents, Echidna, Bettongs, and Wombats]
Digging mammals are ecosystem engineers

Abundance ➔ Plant responses ➔ Germination rate ➔ Litter decomposition

Species composition ➔ Germination rate ➔ Soil biota

Compaction ➔ Soil properties ➔ Moisture

Soil properties ➔ Nutrient content ➔ Other fauna

Soil biota ➔ Fungi ➔ Bacteria ➔ Invertebrates
“...species’ responses may be different under the ecological conditions of the destination area due, for example, to a change of predators or parasites or a different level of competition, or to interactions with other species already present...”

Annex 6.3.2: Ecological consequences of translocation

“Where a translocation purpose is to restore an ecological function, monitoring should include a focus on detecting and measuring the return of this function.”

Annex 8: Ecological monitoring
Aims of the review

• Why were the translocations conducted?

• Were the ecosystem engineering roles of the focal species considered in the planning process?

• Has any monitoring or research been conducted?

• What are the results?
Published and grey literature search

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<tr>
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<tbody>
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You searched for: TOPIC: (translocat * OR reintroduc* OR re-introduc* AND mammal*)
There have been >200 translocations in Australia

Translocations
- Past
- Planned
Translocations through time

Number of translocations

- 1920: 0
- 1930: 0
- 1940: 0
- 1950: 0
- 1960: 0
- 1970: 10
- 1980: 20
- 1990: 50
- 2000: 60
- 2010: 40
- Planned: 30

Palmer, unpublished data
Digging mammal translocations have been relatively successful*

* Success = population persistence for > 5 years and still persisting in October 2018

Palmer, unpublished data
Reintroductions for restoration of functions are on the rise

Past translocations (n = 205)

- Conservation
- Research/education
- Population management
- Unknown
- Development
- Restoration - functions

Planned translocations (n = 37)

- Conservation
- Restoration - functions
- Restoration - species
- Research/education
- Unknown
- Population management

Palmer, unpublished data
Monitoring/research has been limited

- Majority = once-off research projects
- Long-term monitoring very rare

Palmer, unpublished data
Most planned translocations are intending to conduct monitoring

Successful past translocations

Monitoring intended for planned translocations

Palmer, unpublished data
All properties that digging mammals influence have been researched/monitored to some degree.

- Abundance
- Species composition
- Germination rate
- Litter decomposition
- Soil biota
  - Fungi
  - Bacteria
  - Invertebrates
- Compaction
- Moisture
- Nutrient content
- Other fauna

Palmer, unpublished data
There have been no negative impacts reported

Palmer, unpublished data
Major findings

• ~250 translocations

• Reintroductions to restore ecosystem functions are increasing

• Very few translocations have been monitored for ecosystem function restoration

• The results of that monitoring are promising but not yet conclusive as to whether reintroducing digging mammals restores ecosystems
To move forward we need to:

• Define what we mean by “restoration”

• Investigate how reintroduced species interact with novel ecosystem elements

• Establish, and commit to, long-term ecological monitoring from the beginning of a translocation

• Include sections for success criteria and monitoring plans related to restoring functions in planning documents
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