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Dirk Hartog Island National Park Ecological Restoration Project – fauna reconstruction

Animal Science

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Context

The Dirk Hartog Island National Park Ecological Restoration Project (DHINPERP) aims to restore the ecological condition of Western Australia's largest island to that seen by Dirk Hartog when he landed on the island in 1616. The establishment of populations of 12 mammal species and one bird species on Dirk Hartog Island (DHI) over a 12 year period is a key part of this project. Of these species, four are listed as Endangered and six as Vulnerable under the national *Environment Protection and Biodiversity Conservation Act 1999*, and their successful re-establishment will contribute towards improving the conservation status of these species. The translocation of 13 native species to an island 633 kmš in size, makes it the largest fauna reconstruction project in Australia and one of the largest in the world. To allow this to proceed, sheep, feral goats and feral cats have been removed and the eradication of feral cats represents the largest eradication program achieved globally. Genetic information on source populations has been and will be used to inform founder selection and genetic monitoring of released animals will inform ongoing management practices. Translocations of Shark Bay bandicoots (*Perameles bougainville*) and dibblers (*Parantechinus apicalis*) are planned for spring 2019.

The aim of Stage Two of the DHINPERP is to re-establish up to 10 terrestrial native mammal species on DHI and establish up to two native mammal species that may have previously occurred there, along with healthy vegetation and ecosystem processes to sustain the islands biodiversity.

Aims

- Identify the most suitable source populations to act as founders for new populations on DHI, using the criteria set out in the *Dirk Hartog Island National Park Ecological Restoration Strategic Plan*.
- Establish new populations of 12 mammal species and one birds species on DHI, using the species selection criteria set out in the Strategic Plan.
- Confirm that the translocations are successful and that all new populations on DHI are healthy and self-sustaining, using criteria set out in the Strategic Plan and approved Translocation Proposals.
- Promote scientific research associated with the translocations, monitoring and establishment of fauna, and publish scientific findings.

Progress

- The first full-scale translocation of banded and rufous hare-wallabies was successfully implemented with 90 and 50 individuals of each species released respectively. Animals were transferred by helicopter rather than boat, reducing transit time by 90% (30 mins compared with 5 hours). There were no known mortalities of adult hare-wallabies, although a rufous hare-wallaby pouch young died after being abandoned after release.
- Survivorship and movement were determined using VHF-transmitters collars fitted to nine individuals of each species and home-range size assessed as well for an additional three GPS-collared individuals of each species.
- When hare-wallabies were examined when trapped or having radio-collars removed, there was evidence of breeding (11 pouch young, lactating teats) and most individuals maintained the condition they were in when released on DHI. Some post-capture weight loss was observed but it was much lower than in 2017.
- A trial to assess the rate of degradation of DNA on banded hare-wallaby faecal pellets was undertaken in collaboration with Australian Wildlife Conservancy at Mt Gibson and Faure Island. Results suggest that faecal DNA represents a sound method of monitoring populations for this species (and rufous hare-wallaby) and a trial survey will be run to develop a robust monitoring methodology.
- A population genomic survey of mainland, island and translocated populations of rufous hare-wallaby was undertaken to assess genetic diversity, inbreeding and genetic divergence of Shark Bay island populations. Analysis showed the Shark Bay island populations are divergent to the mainland and have lower diversity.

Bernier and Dorre Island populations are differentiated but mixing source populations is expected to exhibit an increase of genetic diversity.
- Thirteen dibblers were taken from Whitlock (8) and Escape (5) Islands in Jurien Bay in November 2018 and transferred into a captive breeding program at Perth Zoo. Two of these dibblers died and a further five animals were captured in January and February 2019.
- Nine 40 x 40m exclosure fences were erected for monitoring the restoration of ecosystem processes as a result of the fauna reintroductions. These will be monitored for the duration of the project using remote sensing and regular soil and vegetation surveys.
- A population genomic survey was undertaken of boodie populations from Shark Bay and Barrow islands and indicated significant differentiation between all three islands. Mixing Bernier and Dorre island founders for DHI is expected to increase genetic diversity.
- Genomic analysis of dibblers and banded hare-wallabies commenced and samples have been collated for dibbler and is underway for banded hare-wallabies.
- Population genetics of the Shark Bay mouse was commenced, using samples from Bernier, Northwest and Faure islands in collaboration with Australian Wildlife Conservancy. DNA extractions have been completed and samples have been sent for genomic analysis.
- Preliminary population viability models of banded hare-wallabies, Shark Bay bandicoots and dibblers developed in collaboration with The University of Western Australia and University of Sydney have been completed.
- The monitoring of small vertebrates on DHI was undertaken in conjunction with the Global Gypsies.
- A Wildlife Population Health residency has been established with Murdoch University and the resident will commence in July 2019.

Management implications

- Establishing large and viable populations of banded and rufous hare-wallabies (and the other species) on DHI will significantly reduce their risk of extinction and may lead to an improvement in conservation status for several threatened species.
- Hare-wallabies (and the other translocated species) undoubtably play a role in maintaining and improving ecosystem function, through grazing, browsing and endozoochory. There may be potential for the browsers and grazers that are established on DHI to control some of the weed species on the island.
- The presence of medium-sized mammals on DHI will ultimately lead to increased likelihood of interactions with the general public, especially with vehicles. Signs encouraging road users to drive slowly during hours of darkness were erected in 2018. However, the first road-kill rufous hare-wallaby was picked up in May 2019 north of the signed area, indicating more signs and better public information may be required to avoid these interactions.

Future directions

- Translocations of Shark Bay bandicoots and dibblers are planned for spring 2019, as well as a potential supplementation of rufous hare-wallabies.
- Monitoring of hare-wallabies will incorporate radio-tracking (including the use of drones) and cameras as well as other techniques that will continue to be trialled to refine an effective monitoring protocol for these species (e.g. faecal DNA).
- Planning has commenced for the order of future translocations to DHI with the development of a structured decision-making approach.
- Population genomic analyses on dibblers, boodies, banded hare-wallabies and Shark Bay mouse will be progressed. Novel microsatellite markers for faecal DNA analysis will be developed and validated for rufous hare-wallaby.
- Population viability models of banded hare-wallabies, Shark Bay bandicoots and dibblers developed in collaboration with The University of Western Australia and University of Sydney will be finalised.