Faure Island Wildlife Sanctuary

Ecohealth Report 2021

australian wildlife conservancy

Summary

Australian Wildlife Conservancy (AWC) has implemented an Ecological Health Monitoring Program (Ecohealth) across Faure Island (Faure) to measure the changes in the status and trend of conservation assets, and threats to those assets. Metrics from the program are reported in annual Ecohealth Reports and summarised in the annual Scorecard. This is the Ecohealth Report for 2021. Values of metrics derived in this report were based on data collected during surveys carried out between 2019 and 2020. The complete set of metrics and their values are summarised in the accompanying Ecohealth Scorecard.

AWC did not conduct any Ecohealth surveys in 2021. Consequently, this report presents results from surveys conducted in 2019 and 2020. In implementing the Ecohealth program in 2019 and 2020, AWC conducted 315 live trap nights, 30 km of spotlighting transects, 355 track and scat searches and 51 bird surveys. These surveys detected 4 mammal species (all of which were reintroduced species), 18 reptile and 19 bird species.

On Faure, 16 Biodiversity and 4 Threat indicators have been selected to inform AWC's management program. Five survey types (Track Plots, Spotlighting, Scats, Standard Trapping, and Bird Surveys) were conducted with varying frequency from 2014-2020. To date, robust data has been collected for small reptile assemblages (Standard Trapping), population size of Boodies (*Bettongia lesueur*; Spotlighting). Newly developed Track Plot surveys proved effective at detecting cryptic Shark Bay Mouse (*Pseudomys fieldi*) and Shark Bay Bandicoot (*Perameles bougainville*). Recently commenced comprehensive Bird Surveys will continue biennially. New methodologies for surveying reintroduced species are under investigation to better assess population sizes and trajectories.

The results of the 2019 and 2020 surveys show that Faure continues to support well-established populations of all four reintroduced mammals. The population of Boodies on Faure was estimated at over 15,000 individuals in 2019 – broadly similar to estimates from previous years. In 2020, the Shark Bay Bandicoot and Banded Hare-wallaby (*Lagostrophus fasciatus*) were each recorded at 100% of sites, while the Shark Bay Mouse was recorded at 47% of sites.

The populations of most reptile species appear to be stable. One species, the Blinking Broad-blazed Slider (*Lerista connivens*), was not trapped in 2020, whereas it was trapped at one-third or more sites in previous years. Future surveys will reveal whether the failure to record this species in 2020 represents a real decline.

The Bird Surveys, conducted for the first time in October 2020, detected a total of 19 bird species with a site species richness value of 2.8. The majority of species detected were passerines.

Feral herbivores and predators were eradicated from Faure in 2001, and none were detected on the island in 2019 or 2020. There were no wildfires or prescribed burns on Faure in 2021.

Contents

Document citation: Palmer B, Hungerford J, Diete R, Pierson J, Joseph L, Kanowski J (2022) Faure Island Ecohealth Report for 2021. Australian Wildlife Conservancy, Perth, WA.

Introduction

Australian Wildlife Conservancy (AWC) currently owns, manages, or works in partnerships across 31 properties in Australia, covering almost 6.5 million hectares, to implement our mission: *the effective conservation of Australian wildlife and their habitats*. AWC relies on information provided by an integrated program of monitoring and research to measure progress in meeting its mission and to improve conservation outcomes.

AWC's Ecohealth Monitoring Program has been designed to measure and report on the status and trends of species, ecological processes and threats on each of these properties (Kanowski et al. 2018). Data from the monitoring program are used to address the following broad questions relevant to our mission:

- 'are species persisting on a property?',
- 'are habitats being maintained?'
- 'are threats below ecologically-significant thresholds?'

For threatened and iconic species, including reintroduced species, AWC's monitoring program aims to obtain more detailed information related to their conservation management; for example, data on survival, recruitment, condition, distribution and/or population size.

The structure of the Ecohealth Program is as follows. AWC's Monitoring and Evaluation framework provides guidance on the development of the Ecohealth Monitoring Plans for each property managed by AWC: these plans describe the conservation values and assets of each property, the threats to these assets, and the monitoring program that will be used to track their status and trend, and to evaluate outcomes. Annual survey plans and schedules are developed to implement these plans. The outcomes of these surveys are presented in annual Ecohealth Reports and summary Ecohealth Scorecards.

This document is the second in a series of annual Ecohealth Reports for Faure Island (referred to here as Faure). The companion Ecohealth Scorecard presents the indicators and their metrics in a summary format.

Faure Island Wildlife Sanctuary

Faure is located in the eastern gulf of Shark Bay, between the Peron Peninsula and the mainland of Western Australia (Carnarvon Bioregion) and is 4,554 ha in extent (Figure 1). Faure is within the traditional lands of the Malgana people. Following European colonisation, the island was run as a pastoral lease. AWC has owned the pastoral lease since 2000 (Wilson 2008). At the time of acquisition, there were 3,400 sheep (*Ovis aries*) and over 2,000 goats (*Capra hircus*) on the island. All livestock have since been removed from the island, and feral cats (*Felis catus*) eradicated (Algar et al. 2010). House mice (*Mus musculus*) were present on the island at acquisition but have not been recorded since 2009 (Kabat et al. 2012). Foxes (*Vulpes vulpes*) and rabbits (*Oryctolagus cuniculus*) were not historically, and are not now, present on the island.

The island's coastline features cliffs, mangrove-lined lagoons, mudflats, and sand dunes covered in beach spinifex (*Spinifex longifolius*), while the interior consists of undulating sandy plains and dunes with a mosaic of Acacia shrubland and interdunal 'birridas' (seasonally flooded, saline clay pans) fringed by salt-tolerant samphire and saltbush (Keighery and Muir 2008; Figure 2). These systems support 1 extant mammal, 36 reptile, 127 bird, and >142 plant species, including 15 threatened fauna and 3 threatened flora species, in addition to 4 reintroduced mammal species. The mudflats and mangroves on Faure are important foraging areas for shorebirds, particularly trans-equatorial species that migrate from their breeding habitat in the Arctic to the southern hemisphere for the Austral summer.

AWC has successfully established populations of four threatened mammals: Shark Bay Bandicoots (formerly known as Western Barred Bandicoots, *Perameles bougainville*), Boodies (*Bettongia lesueur*), Banded Hare-wallabies (*Lagostrophus fasciatus*) and Shark Bay Mice (*Pseudomys fieldi*; now synonymised with Gould's Mouse *P. gouldii*: Roycroft et al. 2021). Surveys have included sub-fossil and extant fauna inventories to identify historic assemblages (Aplin et al. 2008; Baynes 2008; Dell and Cherriman 2008; Schmitz and Richards 2008), followed by monitoring of select wildlife indicators and threatening processes, and ongoing monitoring of the reintroduced mammal populations.

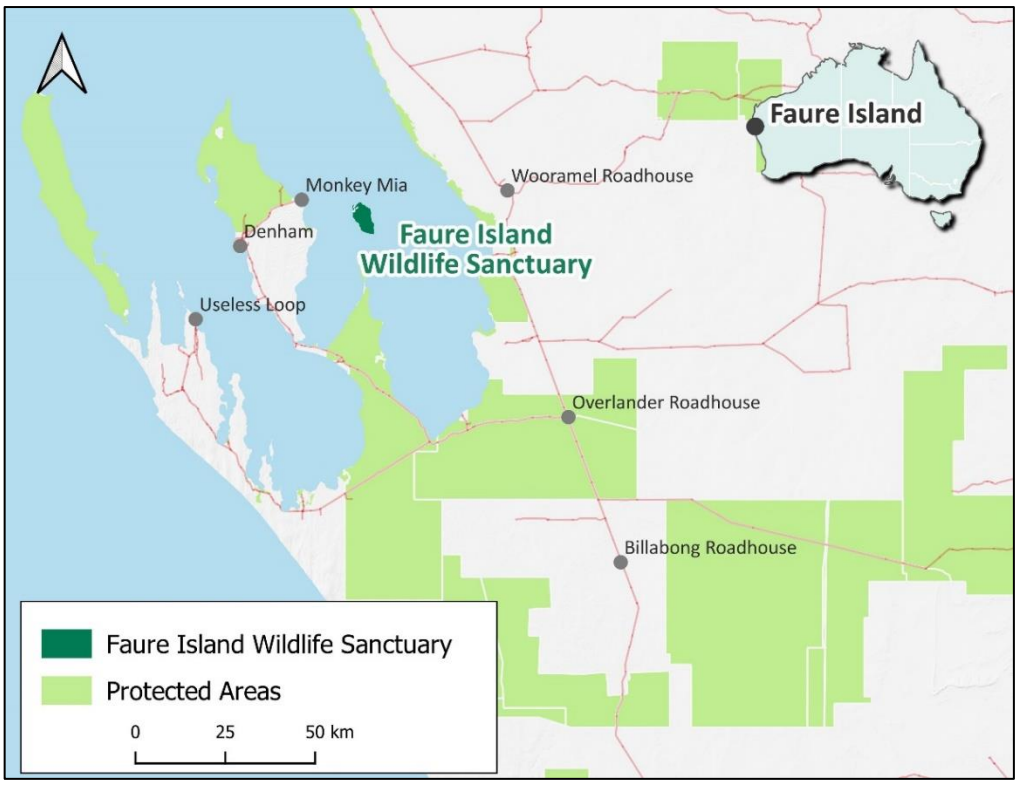

Figure 1. Location and regional context of Faure Island Wildlife Sanctuary. Inset indicates location within Australia.

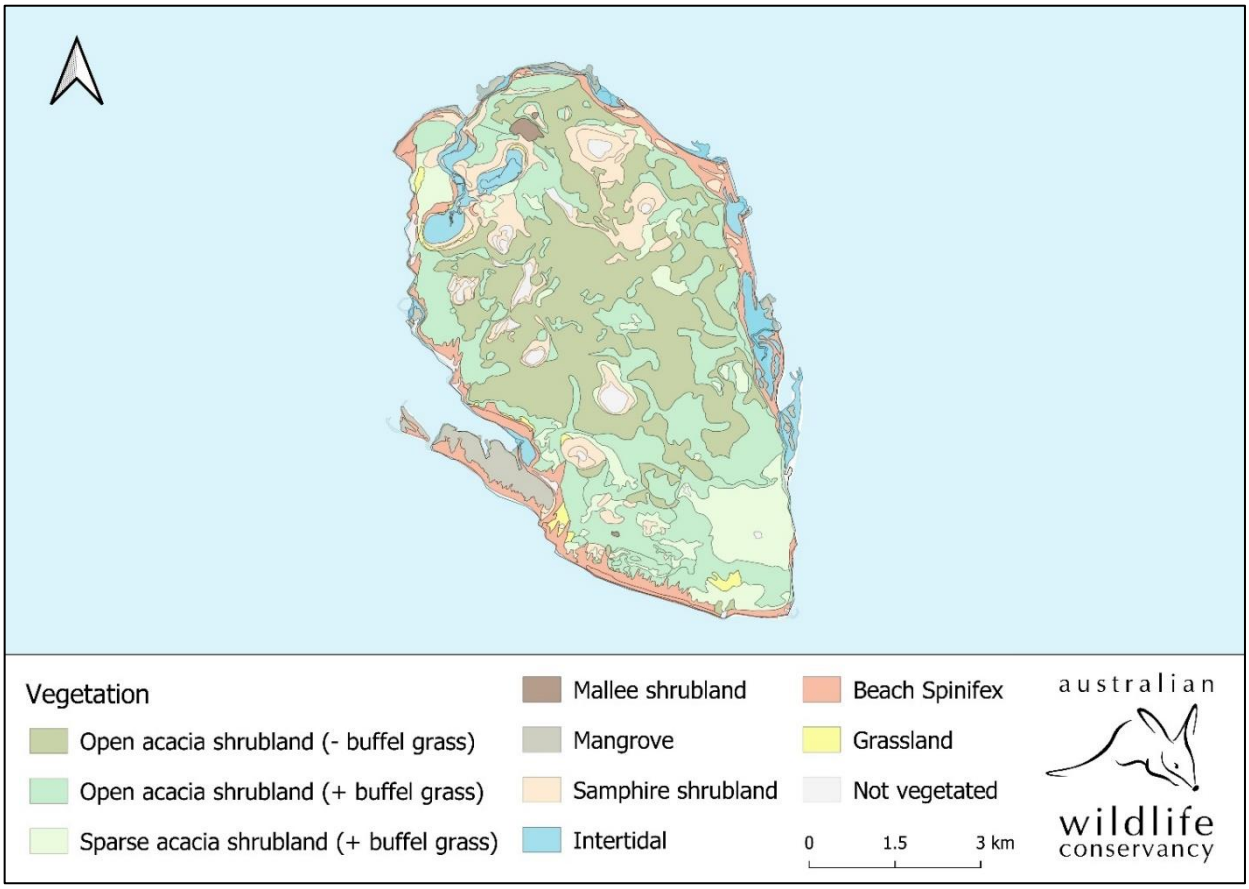

Figure 2. Extent and distribution of broad vegetation types of Faure.

Climate and weather summary

Faure has a semi-arid to arid climate, with mild winters and hot dry summers (Figure 3 and Figure 4). Slightly more rain is usually received in winter compared to other seasons but there can be inter-annual variation, with cyclones that can bring substantial rainfall at other times of the year.

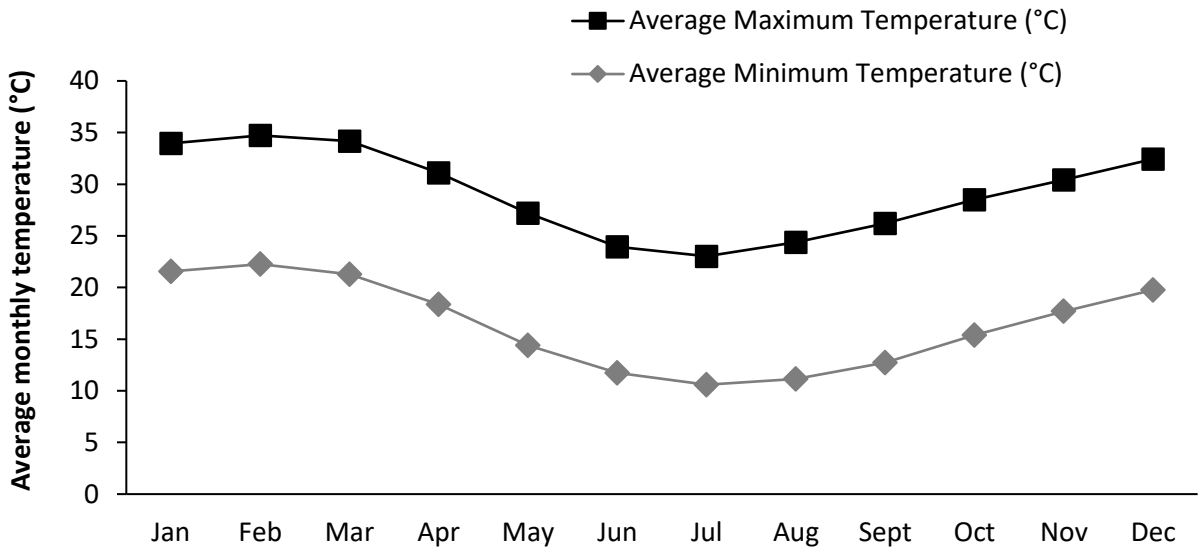

Figure 3. Mean minimum and mean maximum monthly temperature at Shark Bay Airport Monitoring Station (2001-2021; BOM Station No. 006105)**.** Source: BOM Climate Data Online.

Rainfall in 2021 (284 mm) was above the preceding long-term average (197 mm), largely as a result of abnormally high rainfall in February (Figure 5).

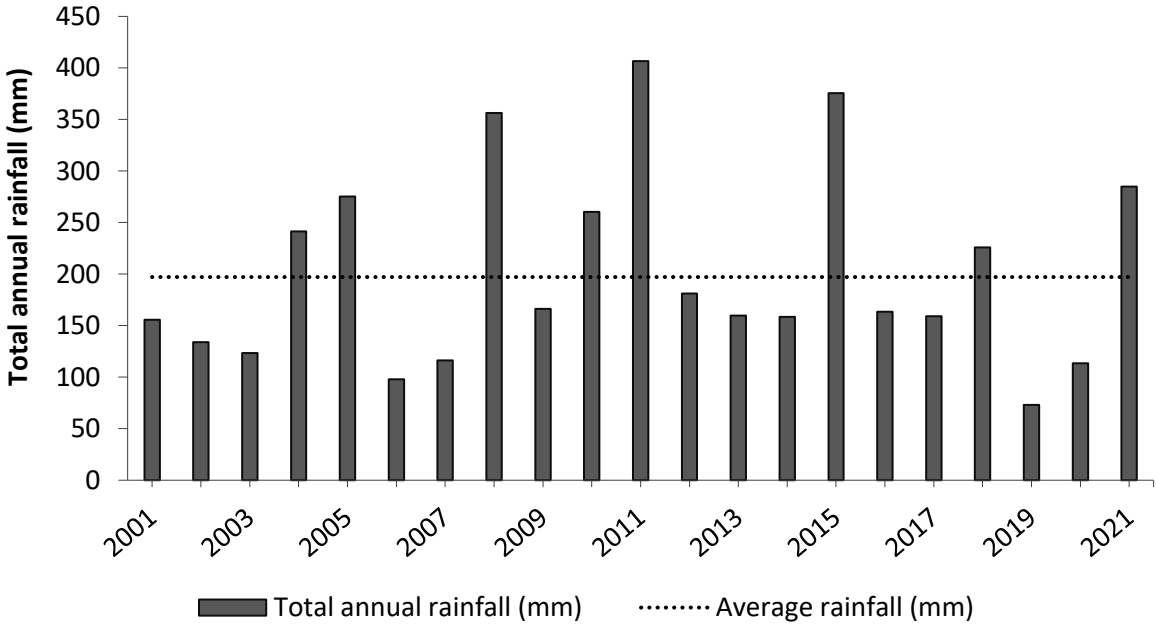

Figure 4. Total annual rainfall at Shark Bay Airport Monitoring Station (2001-2021; BOM Station 006105). Source: BOM Climate Data Online. Dashed line = mean annual rainfall.

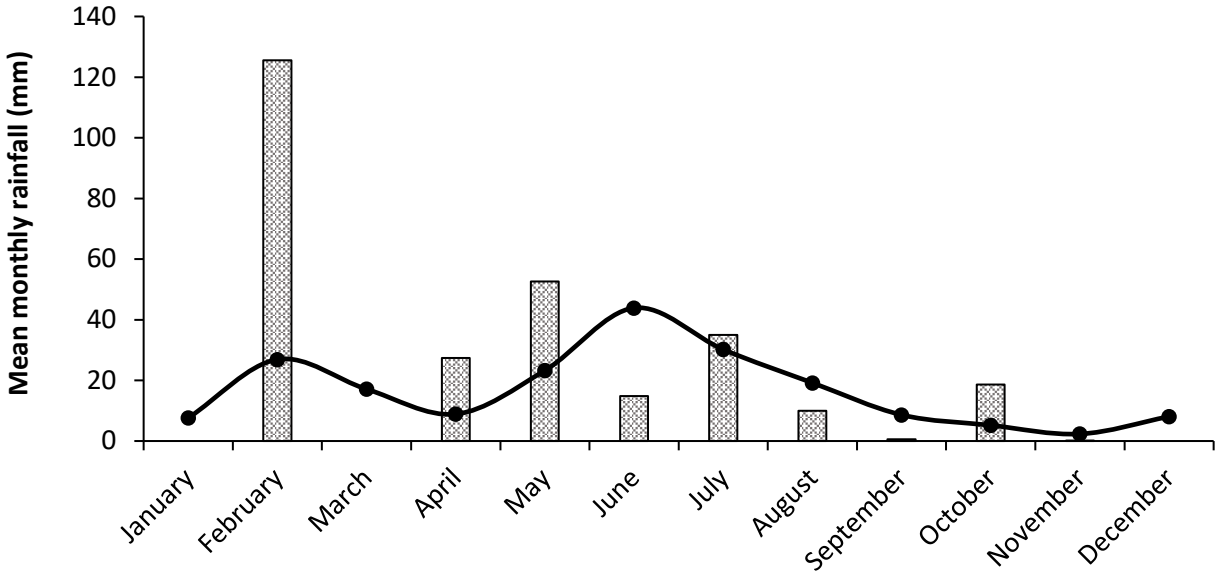

Figure 5. Mean monthly rainfall at Shark Bay Airport Monitoring Station (2001-2021; BOM Station 006105; line) compared to total monthly rainfall in 2021 (columns). Source: BOM Climate Data Online**.**

Methods

Monitoring and evaluation framework

Faure's Ecohealth Monitoring Program has been designed to measure and report on the status and trends of selected biodiversity and threat indicators on the property, using metrics derived from data collected through a series of purpose-designed surveys. Where possible, outcomes will be evaluated against performance criteria relevant to each species, guild or assemblage.

Reintroduced, threatened and iconic species

The Ecohealth program is focused on species of high conservation value, including reintroduced species (where present), and key threatened and 'iconic' species (e.g., regional endemics, species with high public profile and other species of conservation importance because of the role they play in an ecosystem, etc).

Monitoring programs for reintroduced species in the establishment phase (i.e., within 5-10 years of establishment) are typically set out in a *Translocation Proposal*, along with success criteria to evaluate outcomes around survival, recruitment, population size, etc.

AWC will develop *Population Management Plans* to underpin management of long-established populations of reintroduced species, to ensure early detection of any serious issues that arise, and to trigger timely responses. These plans will specify a monitoring and evaluation program (e.g., Berry et al. 2021).

AWC will aim to develop *Conservation Plans* for the remaining (extant) threatened and iconic species, with similar objectives to Population Management Plans. These plans will specify metrics to monitor outcomes for target species against nominated performance criteria.

Vertebrate assemblages and surveillance species

AWC's mission involves the conservation of all wildlife, not only threatened or reintroduced species. For this reason, AWC's monitoring program extends to surveillance monitoring of faunal assemblages (mammals, birds, reptiles, frogs). The monitoring program aims to address questions relevant to the conservation of assemblages.

At the most basic level, the program seeks to establish whether all species that are known to occur on the property are persisting on the property (i.e., 'are all species present?').

With increasing information, the monitoring program can address more detailed questions relating to conservation of assemblages, such as 'have species maintained their distributions or abundance?' However,

the boom/bust conditions of most Australian environments can lead to large variations in the numbers of individuals in a population and the habitats or sites occupied by a species – these variations may not necessarily be informative in relation to the conservation of a species at a property over the long term.

AWC is currently working on developing an evaluation framework for surveillance monitoring of faunal assemblages. At present, we will continue to present data on a range of metrics relating to indicator species and guilds.

Indicators and metrics

Biodiversity indicators and metrics are selected to monitor the status of and trends in native fauna on the sanctuary. On Faure, 16 biodiversity indicators (species and guilds) have been selected for monitoring (Table 1). All indicators were reported on in this 2021 Ecohealth, based on surveys conducted in 2019-2020. Four of the indicators are reintroduced species.

Threat metrics are selected to monitor the status and trends of weeds, introduced predators and herbivores, and fire regimes. Four threat indicators have been selected for monitoring (Table 2). Three of these threat metrics were reported on in 2021, based on surveys conducted in 2019-2020.

Table 1. Biodiversity indicators and metrics for Faure.

Reintroduced vertebrates

Indicator	Survey name/methods	Metric	Performance criteria
Shark Bay Bandicoot (*Perameles bougainville*)	Track Plot Survey	Occupancy	TBD Pending Population Management Plan
Burrowing Bettong or Boodie (*Bettongia lesueur*)	Boodie Spotlighting Survey	Population size	TBD Pending Population Management Plan
Banded Hare-wallaby (*Lagostrophus fasciatus*)	Banded Hare-wallaby Scat Plot Survey	Occupancy	TBD Pending Population Management Plan
Shark Bay Mouse (*Pseudomys fieldi*)	Track Plot Survey	Occupancy	TBD Pending Population Management Plan

Vertebrate assemblages and surveillance species

Indicator	Survey name	Survey method	Metric/s
Mammals			
Assemblage richness	Track Plot Survey, Boodie Spotlighting Survey, Banded Hare-wallaby Scat Plot Survey	All mammal survey methods	Number of species
Reptiles			
Assemblage richness	Standard Trapping Survey, Track Plot Survey	All reptile survey methods	Number of species
Small reptiles			
Assemblage richness	Standard Trapping Survey	Pitfall traps	Number of species
Barred Wedge-snout Ctenotus (*Ctenotus schomburgkii*)	Standard Trapping Survey	Pitfall traps	Occupancy
Blinking Broad-blazed Slider (*Lerista connivens*)	Standard Trapping Survey	Pitfall traps	Occupancy
Elegant Slider (*Lerista elegans*)	Standard Trapping Survey	Pitfall traps	Occupancy
West-coast Laterite Ctenotus (*Ctenotus fallens*)	Standard Trapping Survey	Pitfall traps	Occupancy
Western Pale-flecked Morethia (*Morethia lineocellata*)	Standard Trapping Survey	Pitfall traps	Occupancy
Fine-faced Gecko (*Diplodactylus pulcher*)	Standard Trapping Survey	Pitfall traps	Occupancy
Variegated Dtella (*Gehyra variegata*)	Standard Trapping Survey	Pitfall traps	Occupancy

Indicator	Survey name	Survey method	Metric/s
Bynoe's Gecko (*Heteronotia binoei*)	Standard Trapping Survey	Pitfall traps	Occupancy
Mottled Ground Gecko (*Lucasium squarrosum*)	Standard Trapping Survey	Pitfall traps	Occupancy
West-coast Banded Snake (*Simoselaps littoralis*)	Standard Trapping Survey	Pitfall traps	Occupancy
Large reptiles			
Gould's Monitor (*Varanus gouldii*)	Track Plot Survey	Tracks	Occupancy
Birds			
Assemblage richness	Bird Survey	Observational	Number of species
Terrestrial birds (guild)	Bird Survey	Observational	Richness

Table 2. Threat indicators and metrics for Faure.

Indicator	Survey name/methods	Metric/s	Performance criteria
Pest animals			
Feral cat	Track Plot Survey	Number of incursions	TBD Pest Animal Strategy
House mouse	Standard Trapping Survey	Occupancy	TBD Pest Animal Strategy
Weeds			
Weeds	TBD	TBD	TBD Weed Strategy
Fire			
Extent of planned and unplanned burns	Fire analysis (was not conducted as there were no fires)	Area burnt in planned fire (ha) Area burnt in unplanned fire (ha)	TBD Fire Management Strategy

Survey types and history

To report on the Biodiversity and Threat Indicators, our survey teams conduct a variety of surveys repeated on a schedule of 1-5 years, as required to obtain timely information on each indicator. These are:

For threatened and iconic species, including reintroduced species, a range of targeted surveys including:

- Boodie Spotlighting Survey
- Banded Hare-wallaby Scat Survey
- Track Plot Survey (Shark Bay Bandicoot, Shark Bay Mouse)

For surveillance monitoring of assemblages:

- Bird Survey (terrestrial bird guild)
- Standard Trapping Survey (small reptile guild, snakes)
- Track Plot Survey (Gould's Monitor; *Varanus gouldii*)

For monitoring threats, a range of targeted surveys including:

- Track Plot Survey (feral cats)
- Standard Trapping Survey (house mice)

None of the ecological surveys were conducted on Faure in 2021. Below is a list of surveys conducted in 2019 and 2020 that are reported upon in this Ecohealth Report (Table 3). The methodology is described and results of these surveys are reported on in this document.

Table 3. Survey history and effort for Ecohealth surveys on Faure presented in this report. Note, no surveys were conducted in 2021.

Survey name	Effort	Description/comment	Previous surveys
Boodie Spotlighting Survey	30 x 1 km transects [30 km] (2019)	2014-2015: drive spotlighting. 20 x 1km transects each driven 3 times. 2017-2019: walk spotlighting. 30 x 1 km transects each walked once.	2014 – 60 km 2015 – 60 km 2017 – 30 km 2018 – 30 km 2019 – 30 km
Banded Hare-wallaby Scat Survey	220 quadrat searches (2019)	2016: 19 sites with 5 quadrats per site. 2017-2019: 22 sites with 10 quadrats per site.	2016 – 95 quadrat searches 2017 – 220 quadrat searches 2018 – 220 quadrat searches
Track Plot Survey	135 plot searches (2020)	15 sites x 3 plots per site x 3 repeat visits	2016 – 135 plot searches
Standard Trapping Survey	315 trap nights (2020)	2013-2016: 15 sites x 7 pitfall traps x 3 days 2020: 15 sites x 7 pitfall traps x 3 days	2013 – 315 trap nights 2014 – 315 trap nights 2015 – 315 trap nights 2016 – 315 trap nights
Bird Survey	51 site searches (2020)	20 minute, 2 ha surveys at 17 sites x 3 repeat visits	None

Survey design and methods

Track Plot, Standard Trapping and Bird Surveys

Standard sites were established at 15 points across Faure for the Standard Trapping Survey, Track Plots and Bird Survey, with an additional two survey sites for birds (Figure 6).

Figure 6. Standard Trapping, Standard Bird and Track Plot Survey sites.

Sites were separated by a minimum of 1 km and were located in all major vegetation communities on the island. For the 15 main sites, there were three sites in each of the five main vegetation types, including:

- Shrubland (dense Acacia shrub, no buffel grass)
- Shrubland over buffel (medium-density Acacia shrub with buffel grass)
- Sparse Acacia shrub with buffel grass
- Coastal spinifex dunes
- Saltbush flats.

The two additional bird survey sites were added to cover all species likely to occur on the island:

- The 'date palm' site has a permanent water source known to attract birds.
- The *Lechenaultia* site is the only *Lechenaultia linarioides* vegetation community on the island.

Track Plot Survey

The Track Plot Survey consists of three tracking plots (3 m x 3 m) at each of the 15 standard monitoring sites (Figure 6). Each plot was cleared at the beginning of the survey and then checked and cleared in the morning and afternoon for three consecutive days. Tracks of target species were recorded at each plot (presence/absence).

Boodie Spotlighting Survey

In 2014 and 2015, Boodies were surveyed by spotlight from a vehicle driven on 20 x 1 km transects across roads traversing the major vegetation types on the island. Each transect was surveyed three times in a survey period. Transects were surveyed by observers standing in the tray of a vehicle, which was driven at a constant low speed. Animals were categorised as 'on track' or 'off track'; for each 'off track' observation, the sighting angle and the distance to the animal was recorded. Distances were measured with a rangefinder.

From 2017, surveys were conducted along 30 x 1 km walked spotlight transects (a subset of 50 existing transects) randomly located across the island (Figure 7). Transects traversed the major vegetation types on the island. Each transect was surveyed once in the survey period. A team of two, comprising one navigator and one observer, surveyed each transect. When an animal was detected, the observer recorded the point of detection and used a rangefinder (TruPulse 360) to record the distance and angle to where the animal was first sighted. If animals were observed in 'clusters' (i.e., in groups of two or more), the observer recorded the distance and angle to the mid-point of the cluster.

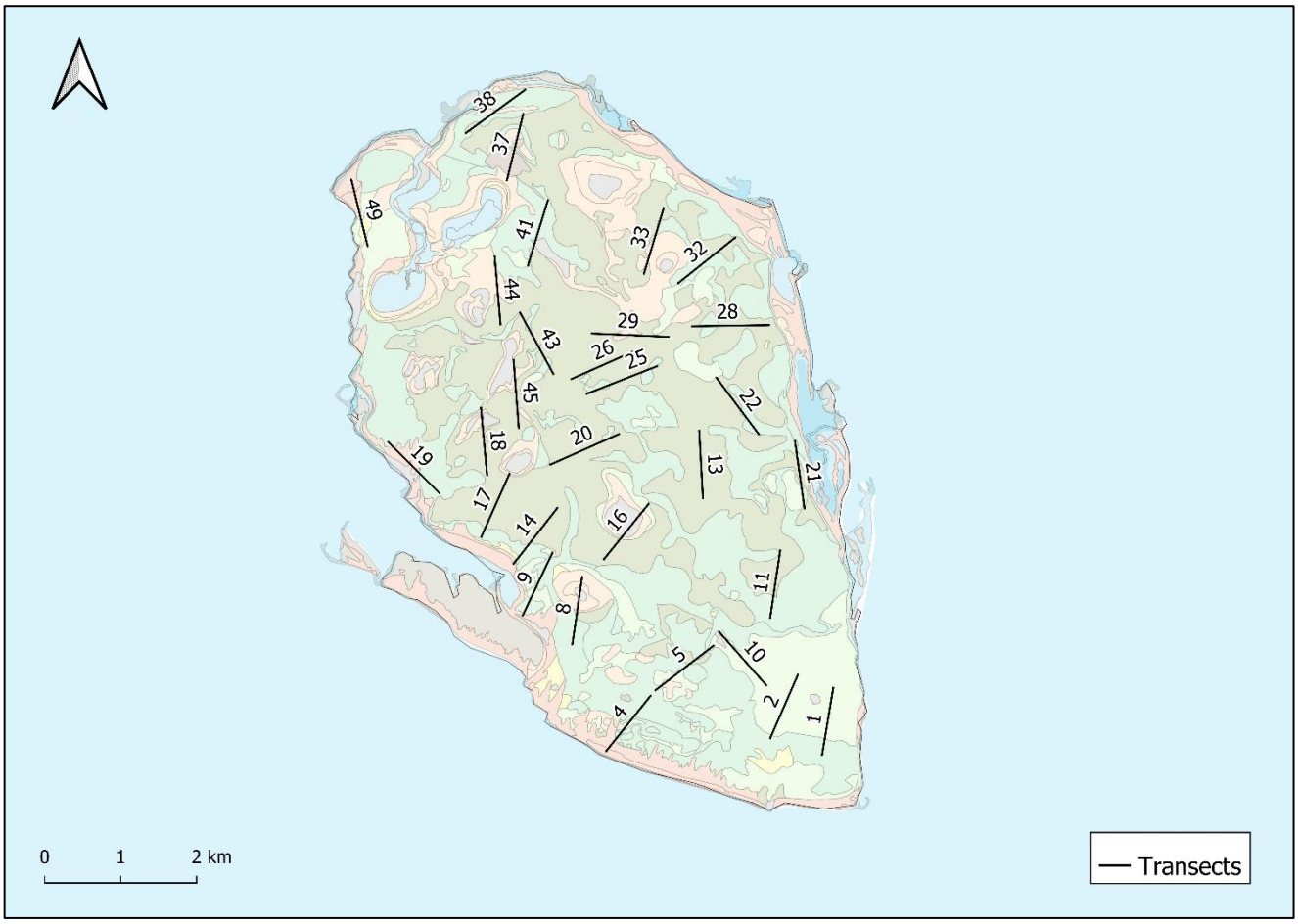

Figure 7. The location of the Boodie Spotlighting Survey transects (n = 30) on Faure.

Banded Hare-wallaby Scat Plot Survey

Surveys were conducted at 22 sites randomly located across the island (Figure 8). Each site had ten 3 m x 3 m quadrats. In 2016, only 19 sites, each with 5 quadrats, were surveyed. Banded Hare-wallaby scats in the quadrats were counted, categorised as either fresh or old and then removed.

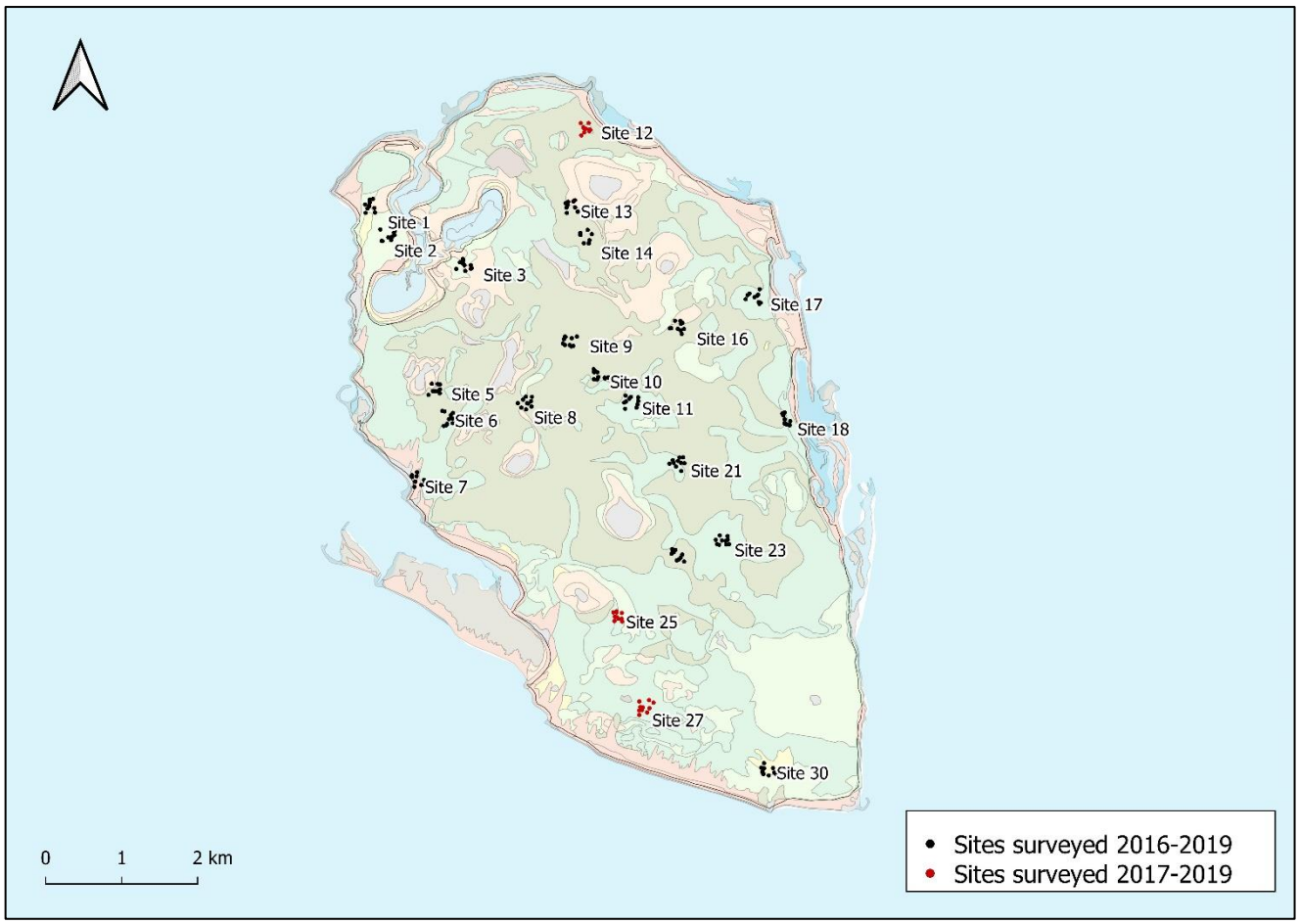

Figure 8. Location of Banded-hare Wallaby Scat Survey sites (n = 22) on Faure.

Standard Trapping Survey

The Standard Trapping Survey was conducted using pitfall traps for small reptiles at the 15 standard sites (Figure 6). Each trapping site consisted of one pitfall trap array, comprising seven pitfall buckets (60 cm depth x 20 cm diameter) connected by a 50 m drift fence in a 'T' design (Figure 9). Pitfall traps had 1-2 cm of dirt and a small square of insulation in the bottom to provide cover for animals. Traps were cleared twice daily (early morning and late afternoon). During each survey occasion, trapping was conducted for three consecutive nights.

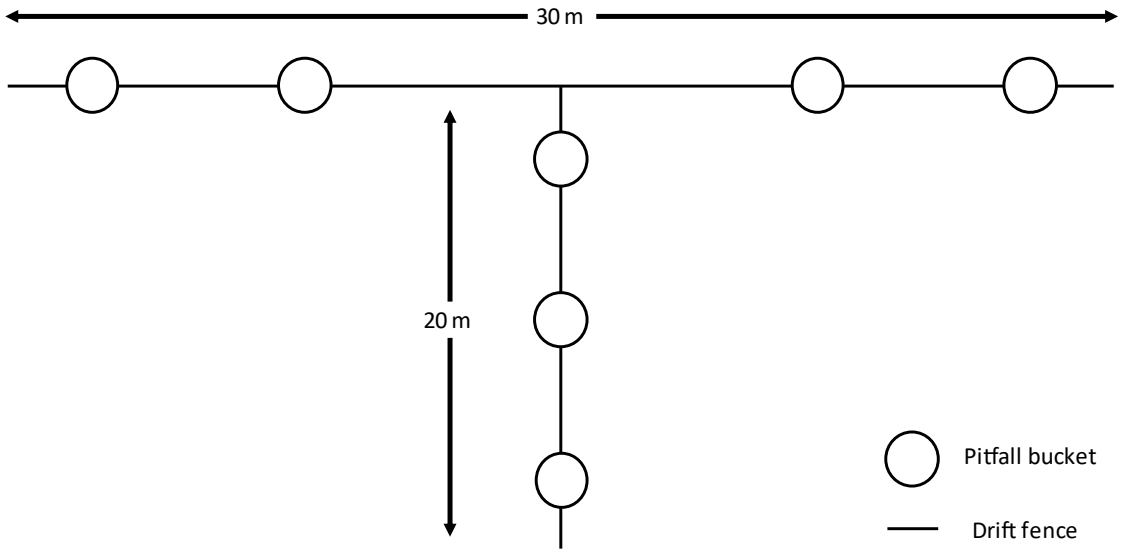

Figure 9. Standard Trapping Survey site layout on Faure.

Bird Survey

Bird Surveys were conducted at the 15 Standard sites and the two additional Bird Survey sites (Figure 6). Two hectare, 20 minute searches, consistent with BirdLife Atlas survey methods (Loyn 1986), were conducted using a circular area with a radius of 80 m (Figure 10). Surveys were conducted by three teams of two people, each visiting four sites daily for three days each. Each site was surveyed in the morning and the surveyor was rotated each day to minimise observer bias. All bird species observed during the 20 minutes were recorded, along with the method of observation (seen, heard, or flyover).

Figure 10. Example of the survey area and approach used in the Bird Surveys on Faure.

Analysis methods

Most Ecohealth metrics are common across the indicator species for Faure. Unless noted otherwise, the metrics are calculated as set out in Table 4.

Table 4. Metrics and associated calculations for Faure.

Indicator	Metric	Survey data sources	Description	Analysis summary/calculation
Boodie	Population estimate	Boodie Spotlighting Survey	Estimate of total number of individuals in the population based upon distance sampling	Population density is estimated by employing N-mixture models using the temporally replicated count data collected during spotlight surveys. Animals outside of 40m from the transect were excluded. Models are run within R software (R Core Team 2013) with the R2WinBUGS Package and WinBUGS (version 1.4.3; Lunn et al. 2009) using code provided by Kéry and Royle (2010). A Bayesian distance sampling model is used to account for the decline in detectability with distance from the observer, and between vegetation types, to produce a population estimate (Yamaura et al. 2016). A population estimate was obtained by multiplying the density estimate (animals/ha) by the area of the island.
Various	Occupancy	Track Plot Survey, Banded Hare-wallaby Scat Survey, Standard Trapping Survey	A measure of distribution; the proportion of sites where the species was recorded using a particular technique.	Number of sites at which the species was recorded/number of sites surveyed x 100.
Terrestrial birds	Richness	Bird Survey	A measure of diversity; average number of species per site.	The average number of species detected at each site during the three-day survey period, averaged across all sites surveyed.
Assemblage richness	Number of species	All surveys	A measure of intactness for the whole sanctuary	The number of species detected on the sanctuary within the last 2-5 years is compared to the number of species listed as 'confirmed', 'very likely' or 'likely' on the sanctuary species list.

Indicator	Metric	Survey data sources	Description	Analysis summary/calculation
Feral cats	Number of incursions	Track Plot Survey	A measure of distribution; the proportion of sites where the species was recorded using a particular technique	Number of occasions the species was detected.

Results

Reintroduced species

Shark Bay Bandicoot

Shark Bay Bandicoot were detected at all Track Plot Survey sites in 2016 and 2020 (100% occupancy in both years).

Boodie

In 2019, the population of Boodies on Faure was estimated at 15,570, up from the 2018 estimate of 9,310 (Figure 11). However, credible intervals overlap for all estimates from 2017-19, so no inference can be drawn on possible changes in population size between years. The vehicle-based spotlight transects conducted in 2014 and 2015 estimated 9,600-11,600 Boodies on Faure, broadly similar to recent estimates. It is apparent that the Boodie population on Faure is large and has been so for a number of years.

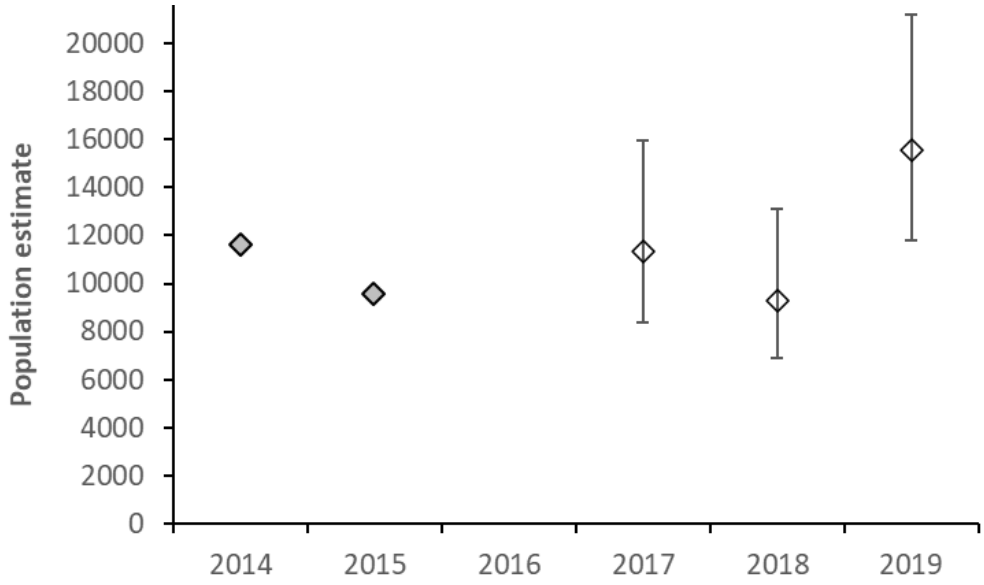

Figure 11. Estimated population size of Boodies on Faure, 2014-2019. Note that 2014-15 data were obtained from vehicle-based spotlight transects, and 2017-19 data from walking spotlight transects.

Banded Hare-wallaby

In 2019, Banded Hare-wallabies were detected at 100% of the Banded-hare Wallaby Scat Survey sites, a slight increase from 2017 and 2018 (Figure 12). Survey effort (quadrats per site) in 2016 was half that of 2017-2019 and this may account for the lower occupancy in that year. It is apparent that the Banded Hare-wallaby population is well-established across the island and has been for a number of years.

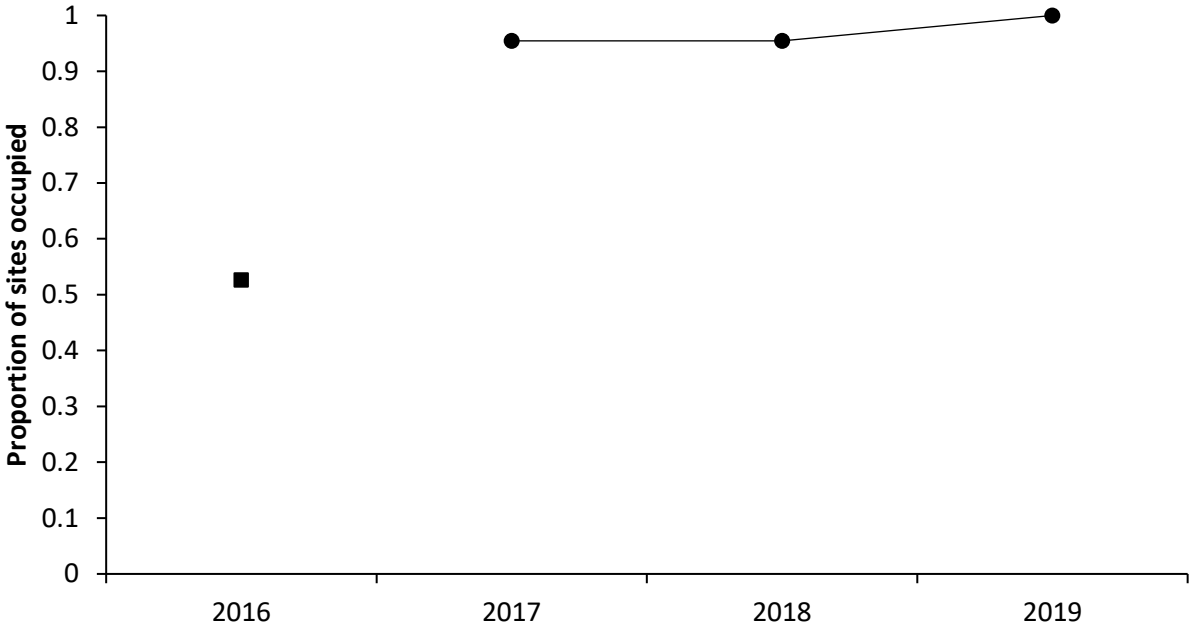

Figure 12. Occupancy of Banded Hare-wallabies on Faure from 2016-2019. Note that 2016 data were derived from 5 quadrats per site, while 2017-2019 data were derived from 10 quadrats per site.

Shark Bay Mouse

Shark Bay Mice were detected at 47% of Track Plot Survey sites in 2020; in 2016, the occupancy rate was 60%.

Vertebrate assemblages and surveillance species

Mammals

Four mammal species were recorded during the 2019 and 2020 surveys out of 5 native mammals known to occur. The Northern Mastiff Bat (*Chaerephon jobensis*) was not recorded and was not targeted by the surveys conducted.

Reptiles

A total of 18 reptile species were recorded from reptile surveys in 2019 and 2020 out of 36 species known to occur. Species that were not observed during that time include 9 marine taxa (sea snakes and sea turtles) and 4 terrestrial species that are rarely captured in pitfall traps (e.g., Stimpson's Python, *Antaresia stimsoni*) or known to occur at low densities on the island (e.g., Western Netted Dragon, *Ctenophorus reticulatus*).

Small reptiles

A total of 214 individual reptiles, comprised of 17 species, were trapped during the 2020 Standard Trapping Survey. The indicator species occupancies are listed in Table 5. Two species detected in 2016 were not recorded in 2020 (the Blinking Broad-blazed Slider, *Lerista connivens*; and West-coast Banded Snake, *Simoselaps littoralis*). The Blinking Broad-blazed Slider has substantially declined in occupancy since surveys

began; however, the West-coast Banded Snake is generally recorded at low numbers on Faure, and the absence of records in 2020 may not be material. In 2020, Bynoe's Gecko (*Heteronotia binoei*) was recorded at all sites (more than double its 2019 occupancy), and the Elegant Slider (*Lerista elegans*) was also recorded at substantially higher occupancy in 2020 than in all previous survey years.

Table 5. Results of the 2020 Standard Trapping Survey on Faure.

Indicator	Occupancy (% of sites detected)				
	2013	2014	2015	2016	2020
West-coast Laterite Ctenotus	53	27	40	53	40
Barred Wedge-snout Ctenotus	47	40	47	53	47
Blinking Broad-blazed Slider	40	40	33	33	0
Elegant Slider	20	27	27	47	73
Western Pale-flecked Morethia	47	73	73	87	93
Fine-faced Gecko	27	7	13	13	13
Tree Dtella	13	20	0	33	27
Bynoe's Gecko	40	67	47	47	100
Mottled Ground Gecko	7	20	0	13	13
West-coast Banded Snake	13	20	27	13	0

Gould's Monitor

Gould's Monitors were detected at 73% of the Track Plot Survey sites during the 2020 surveys, a similar level to 2016 (67% occupancy).

Terrestrial birds

A total of 19 bird species were observed during the Bird Survey in October 2020. In 2019-2020 a total of 26 bird species were recorded from the 127 known to occur on Faure, including detections from other survey methods including spotlighting and a trial shorebird survey. Of the 127 bird species, the species that have not been recorded in the last 2 years include 47 seasonal and regular visitors (e.g. shorebirds and migratory species, which are often not detected in the standard terrestrial bird surveys), 24 vagrants (these are rare visitors to the island) and 37 resident species that are likely to occur on the island during surveys but were not detected.

The average site species richness was 2.8 species over three days (Figure 13). The highest number of species were detected in the 'North Coast Spinifex' and 'North East Coast Spinifex' sites. The majority of species recorded were passerines. Zebra finches (*Taeniopygia guttata*), Tree Martins (*Petrochelidon nigricans*) and Redthroats (*Pyrrholaemus brunneus*) were the most frequently observed species. Several shorebird species were observed; however, these species were generally observed only once throughout the survey. Species richness was greatest at the Coastal Spinifex sites, likely due to these occasional observations of shorebirds.

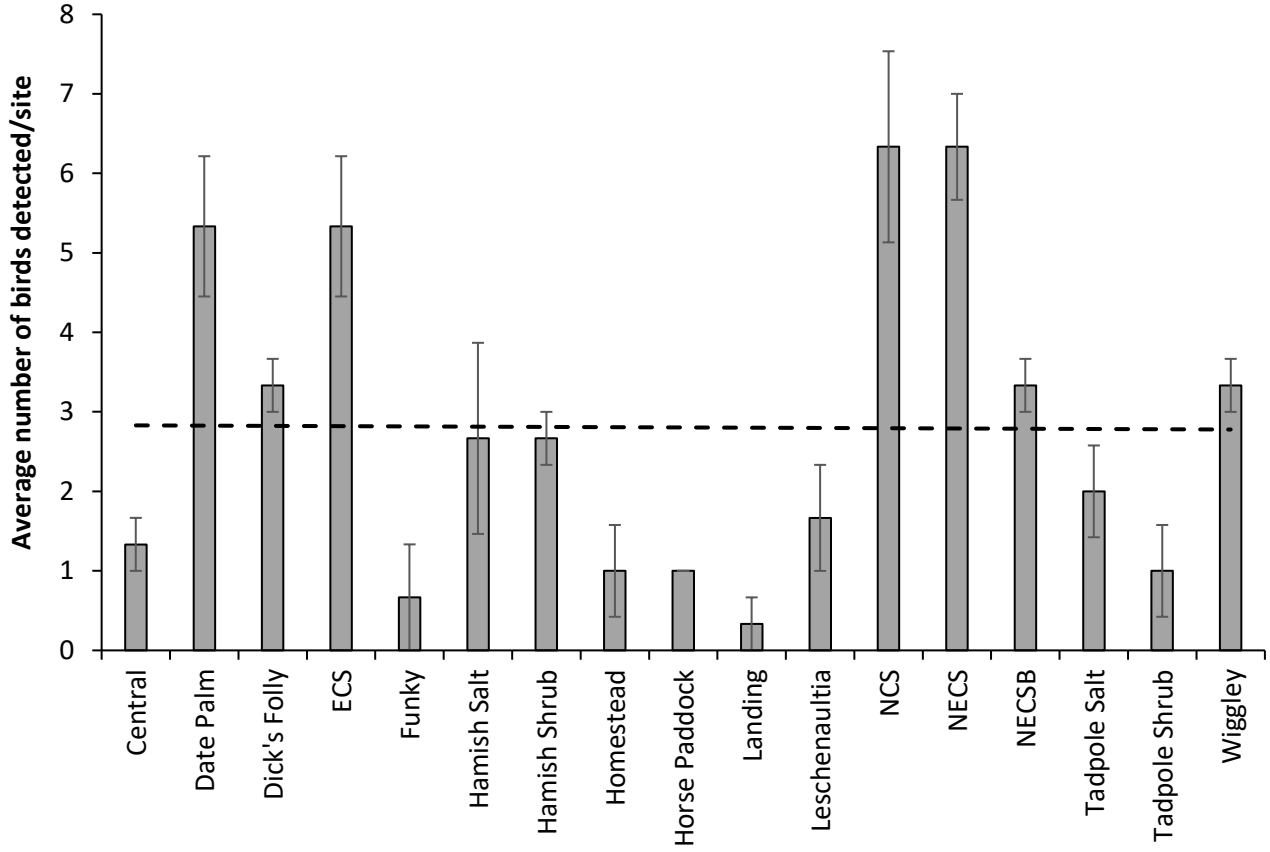

Figure 13. Average bird species richness per site over three days on Faure in 2020. Error bars represent standard error. Dashed line represents average species richness across all sites over the survey duration.

Threat indicators

Feral animals

There were no detections of feral cats during the Track Plot Survey in 2020. House mouse occupancy from the Standard Trapping Survey in 2020 was 0%; that is no house mice were detected.

Fire

There were no planned or unplanned fires on Faure in 2021. There have been no fires, either planned or unplanned, since AWC took over management and there are no records of any fires on the island prior to this date.

Discussion

Faure supports important reintroduced populations of four small–medium sized mammal species. From the 2019 Boodie Spotlight Survey, the population of Boodies was estimated at over 15,000 individuals, with the population remaining large (c. 10,000 or above) since at least 2014. However, because Boodies are so numerous on Faure and readily enter traps, it is challenging to obtain estimates of other species usually sampled using trapping.

The 2020 Track Plot Survey showed that both the Shark Bay Bandicoot and Shark Bay Mouse are well-established across the island, with records from 100% and 47% of sites, respectively. The Banded Hare-wallaby was present at 100% of Banded-hare Wallaby Scat Survey sites in 2019, the highest occupancy recorded to date. While the Track Plot and Banded-hare Wallaby Scat Surveys provide sufficient data to track occupancy for these species, it would be useful to have a method that allowed estimation of population size, as that metric is of particular relevance to population management. For this reason, AWC will continue to trial

various survey methods for reintroduced species, including walk- and driving-spotlight surveys, thermal cameras mounted on a drone, and/or scat DNA.

Faure also supports a diverse assemblage of reptiles and birds. The 2020 surveys suggested most reptile species have stable populations on Faure, with the possible exception of the Blinking Broad-blazed Slider. Future surveys will reveal whether the failure to record this species in 2020 represents a real decline. Analysis of long-term trapping data on AWC's Scotia Wildlife Sanctuary showed that exclusion of feral predators, and reintroduction of regionally-extinct mammals, was associated with a generally positive response from small mammals, but a negative response from some reptile groups (Roshier et al. 2020). The reduced abundance of some reptiles was attributed to predation by reintroduced mammals and/or predation by varanids, which can become abundant in feral predator-free environments. On Faure, Gould's Monitor is the only species of varanid but is common, with an occupancy of 73% of the Track Plot Survey sites in 2020.

No Ecohealth monitoring surveys were conducted in 2021 due to competing priorities. Spotlighting, track plot surveys and scat surveys are planned for July 2022. Standard trapping and terrestrial bird surveys are planned for 2023.

Acknowledgments

AWC acknowledges the Malgana people, the Traditional Custodians of the lands and waters of Faure Island. We also acknowledge their continuing connection to land, culture and community. We pay our respects to Malgana Elders past present and emerging.

AWC's Ecohealth Program is only possible because of the generosity of AWC's supporters. Thank you to our dedicated and passionate volunteers who donate their time in assisting the science team in their work. Thank-you to the entire South-West Science and Operations teams for their hard work on Faure Island that has made the running and collection of data from all our surveys possible.

References

Algar D, Angus G, Brazell R, Gilbert C, Withnell G (2010) Eradication of feral cats on Faure Island, Western Australia. *Journal of the Royal Society of Western Australia* 93, 133–140.

Aplin K, Donnellan S, Dell J (2008) The herpetofauna of Faure Island, Shark Bay, Western Australia. *Records of the Western Australian Museum Supplement* 75, 39-53.

Baynes A (2008) The original non-volant land mammal fauna of Faure Island, Shark Bay, Western Australia. *Records of the Western Australian Museum Supplement* 75, 25-31.

Berry L, Holland G, Anson J, Pierson J, Kanowski J (2021) *Bridled Nailtail Wallaby: Population Management Plan, Scotia Wildlife Sanctuary*. Australian Wildlife Conservancy, Perth, WA.

Bureau of Meteorology (BoM) (2021) Climate Data Online. Retrieved from: http://www.bom.gov.au/climate/data/.

Dell J, Cherriman S (2008) The birds of Faure Island, Shark Bay, Western Australia. *Records of the Western Australian Museum Supplement* 75, 55-70.

Kabat AP, Legge S, Page M (2012) *Ecological Health of Faure Island Wildlife Sanctuary 2011.* Australian Wildlife Conservancy, Perth, WA.

Kanowski J, Joseph L, Kavanagh R, Fleming A (2018) Designing a monitoring framework for Australian Wildlife Conservancy, a national conservation organisation. In: *Monitoring Threatened Species and Ecological Communities* (Eds S Legge, DB Lindenmayer, NM Robinson, BC Scheele, DM Southwell, BA Wintle) pp 241-253. CSIRO, Melbourne.

Keighery G, Muir W (2008) Vegetation and vascular flora of Faure Island, Shark Bay, Western Australia. *Records of the Western Australian Museum Supplement* 75, 11-19.

Kéry M, Royle AJ (2010) Hierarchical modelling and estimation of abundance and population trends in metapopulation designs. *Journal of Animal Ecology* 79, 453–461.

Loyn RH (1986) The 20 minute search - A simple method for counting forest birds. *Corella* 10, 58–60.

Lunn D, Spiegelhalter D, Thomas A, Best N (2009) The BUGS project: Evolution, critique, and future directions. *Statistics in Medicine*, 3049–3067.

R Core Team (2013) *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria.

Roshier DA, L'Hotellier FL, Carter A, Kemp L, Potts J, Hayward MW, Legge SM (2020) Long-term benefits and short-term costs: small vertebrate responses to predator exclusion and native mammal reintroductions in south-western New South Wales, Australia. *Wildlife Research* 47, 570-579.

Roycroft E, MacDonald A, Moritz C, et al. (2021) Museum genomics reveals the rapid decline and extinction of Australian rodents since European settlement. *Proceedings of the National Academy of Sciences*: 118 No. 27 e2021390118.

Schmitz A, Richards JD (2008) A survey of the terrestrial vertebrates of Faure Island, Shark Bay, Western Australia. *Records of the Western Australian Museum Supplement* 75, 33-37.

Wilson B (2008) Background information on Faure Island, Shark Bay, Western Australia. *Records of the Western Australian Museum Supplement* 75, 1-9.

Yamaura Y, Kéry M, Royle JA (2016) Study of biological communities subject to imperfect detection: bias and precision of community N-mixture abundance models in small-sample situations. *Ecological Research* 31, 289-305.