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SCIENCE STRATEGY 2018-2023



Nature
Foundation



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Nature Foundation Ltd
Level 2 Payinhi
128 Prospect Road

PO Box 34
Prospect SA 5082

(08) 8340 2880
Email: info@naturefoundation.org.au
www.naturefoundation.org.au

Editor
Alex Nankivell

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Prof Chris Daniels

The Nature Foundation has, over the last 35 years, invested in conserving, restoring and protecting South Australian landscapes in order to ensure nature survives and thrives in this State.

To undertake this task, Nature Foundation invests in a broad portfolio of activities which include land purchase, water purchase and supply, education and involvement activities and creating enduring partnerships with like-minded individuals and organisations in SA and from elsewhere.

Of particular importance to the Foundation is our commitment to South Australian ecological science to ensure that we accumulate vital knowledge about our own ecosystems.

This knowledge also forms much of the basis for our investment decisions to ensure we are making the most efficient, effective and valuable contributions to conservation. In the past, the knowledge generation program has been primarily via grants to honours and PhD students and has been rather fragmented and without core principles.

This strategy provides a set of governing principles and a purpose for the science program and describes the investment mechanism and decision making process that will enable South Australian ecological science to grow and develop to benefit Nature Foundation, its properties and the broader community.

In addition, the plan will create an alumni from whom we can gain future support through a range of opportunities. Moreover, we will make the research outcomes more accessible to scientists and researchers in the state and elsewhere to improve conservation activities and to encourage others to participate in our programs on our properties and through our activities.



Banded Lapwing (*Vanellus tricolor*)

Why do we need research?

Professor Philip Weinstein

Professorial Research Fellow, University of Adelaide
Nature Conservation Committee, Nature Foundation



One of the greatest challenges for our generation is to conserve biodiversity for the next and following generations.

We are losing species at an unprecedented rate globally, and Australia is unfortunately one of the major offenders.

The Nature Foundation works on nature reserves and throughout South Australia to halt and reverse this trend – and doing this work often involves practices that are new, site specific, multidisciplinary, and helping to lead the field in conservation management not only locally, but internationally.

The knowledge required to succeed in this area can only be gained by one mechanism, and that is research; research underpins every aspect of Nature Foundation's work to connect with and inspire others to save, protect, restore and sustainably manage our unique biodiversity for future generations.

Healthy ecosystems are biodiverse ecosystems, and healthy ecosystems provide a set of ecosystem services that are critical to both the health of those ecosystems, as well as to the health of all human populations – because ultimately,

we all depend on the provisioning services (water, food, wood), regulating services (climate), and cultural services (recreation, spirituality) provided by healthy, biodiverse ecosystems.

The conservation of biodiversity therefore touches every aspect of our lives and sustainable future; and sustaining those services optimally is very much dependent on good research. As an integral part of its work, Nature Foundation therefore supports research both directly and indirectly. Directly, the organisation provides research grants, student support, and collaboration on grant applications. Indirectly, Nature Foundation's efforts and activities also increase awareness of the importance of biodiversity conservation, and the importance of research in underpinning and developing best practice in biodiversity conservation. Only by increasing awareness in this way can conservation programs ultimately become sustainable through the support and participation of informed and proactive citizens.

Research in the area of conservation management therefore has two critical components. First, a detailed understanding of the ecology of individual species as well as whole reserves is required: to save species. We need to

understand what conditions to provide for them to successfully grow, thrive, and reproduce. Second, the sociology of supporting the conservation effort must be understood. To sustainability manage reserves requires that communities value and invest time and resource in them.

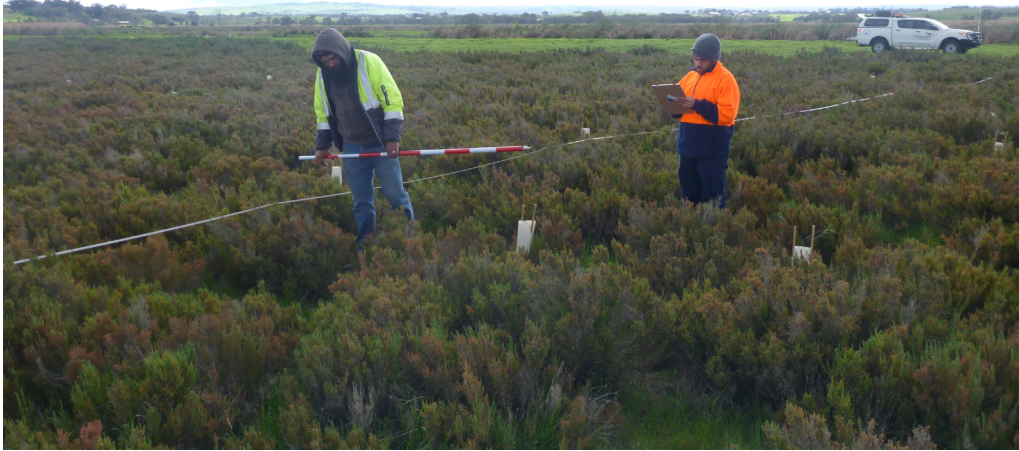
The research needs of Nature Foundation are therefore multidisciplinary, and the organisation is increasingly working with complex teams of researchers to optimise the applicability of the work undertaken.

To ensure that Nature Foundation's challenging research effort underpins the organisation's management of its reserves and engagement with the community, a multidisciplinary and highly skilled Nature Conservation Committee has been appointed. This committee reports directly to Nature Foundation Board, and meets regularly to inform the Science Strategy presented here.



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Murray Bridge Aboriginal Learning on Country team monitoring vegetation at Watchalunga Nature Reserve



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Bushblitz entomologists sampling invertebrates at Witchelina Nature Reserve



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Bushblitz zoologists setting up pitfall traps





Vision and Purpose

To deliver the best possible science based outcomes for conservation in South Australia and directly underpin the decision making of the Nature Foundation.

Under the guidance of the Nature Conservation Committee, reporting to the Board, the strategy will:

1. Deliver best practice around State, National and International Conservation requirements.
2. Deliver best practice in restoration issues - including but not limited to, best recovery from fire or invasive weeds.
3. Support multidisciplinary multi-partnered research in an era where research money for individual projects is increasingly difficult to obtain.
4. Build relationships with partners; including but not limited to DEW, Universities, CSIRO, SARDI, International researchers and community volunteer organisations including but not limited to –SEG, CVA Green Army and via Citizen Science.
5. Build the reputation, status and recognition of Nature Foundation in SA as a major player in conservation and restoration efforts and in so doing improving funding to the organisation via mechanisms including donations, bequests and grants.

In Addition:

1. By supporting Science, Nature Foundation creates an Alumni from whom we can:
 - a. Gain future support, including but not limited to financial, via their expertise and through their individual networks.
 - b. Increase the awareness reputation and status of Nature Foundation by profiling recipients in the scientific and popular literature and in the popular and social media.

Nature Foundation research priorities

THINKING FOR THE NEXT 5 YEARS

The Science Strategy is designed to be broad based with its priorities yet is also open enough to take on new opportunities as they arise. Individual topics and projects will be reviewed yearly under the broad 5 year priorities which are:

1. The ecological and landscape issues pertaining to our properties.
2. Ecological issues pertaining to either threatened or over-abundant species.
3. The material advancement of conservation and/or restoration of South Australian terrestrial, marine and freshwater ecosystems.
4. To provide ecosystem resilience towards climate change.
5. To improve the connection between community and nature through activities including ecotourism, citizen science and/or other engagement methodologies.
6. Water – especially including but not limited to – Water for Nature activities, and the Murray River.

Our research priorities were developed based on the following Nature Foundation core values:

1. The conservation and/or restoration based research must be framed using the best biophysical, landscape and/or ecological knowledge available and be of the most rigorous and clear scientific design.
2. The research must support social and/or social psychological underpinnings of decision making. To do so it must lead to a change of thinking and/or of behavior.
3. The research must tap into 'hearts & minds' of our community to promote increased supporting income including but not limited to-- donations in from public, grants and institutional support.
4. The research will preferentially support early career researchers (Honours and PhD students).
5. The research must be inspiring.



Photo upper right: Fat-tailed Dunnart
(*Sminthopsis crassicaudata*)



Photo bottom right: Sturt Desert Pea
(*Swainsona formosa*)

Nature Foundation's footprint

Nature Foundation is the largest South Australian based conservation land owner and the third largest in Australia. Nature Foundation currently owns and manages/co-manages seven properties for conservation purposes.

Witchelina Nature Reserve

Witchelina, a 421,000 ha nature reserve, is a magnificent outback expanse extending from Lake Torrens in the south to Marree in the north. It spans three bioregions, namely the Flinders Lofty Block, Gawler and Stony Plains. The conservation of Witchelina is a significant contribution to the protected areas network in South Australia.

Hiltaba Nature Reserve

Hiltaba, a 78,000 ha nature reserve, is located in the Gawler Ranges on the Eyre Peninsula. Comprising a diverse range of habitats, it is home to 40 state-listed species and nine species listed by the

Commonwealth for their conservation significance. Yellow-footed Rock Wallaby, the Slender-billed Thornbill and Desert Green-hood Orchid are among the important species protected at Hiltaba.

Para Woodlands Nature Reserve

Para Woodlands is a 320 ha nature reserve near Gawler, co-managed by Nature Foundation and DEW. Our aim is to re-establish critically endangered Peppermint Box Grassy Woodland.

Watchalunga Nature Reserve

Watchalunga comprises 92 ha of low-lying Fleurieu Peninsula Swamp at the mouth of the Finniss River. It contains several threatened species including the Mount Lofty Ranges Southern Emu-wren.

Tiliqua Nature Reserve

Tiliqua is a 85 ha nature reserve north-west of Burra. The reserve is dedicated to the protection of the Pygmy Bluetongue Lizard, which was once thought to be extinct, but was rediscovered near Burra in 1992.

Murbpook Nature Reserve

Murbpook is a 360 ha reserve on the western side of the River Murray between Blanchetown and Morgan.

Cygnets Park Sanctuary

Cygnets Park Sanctuary is a 300 ha nature reserve near Kingscote on Kangaroo Island, which has utilised the annual KI Planting Festival to increase habitat and biodiversity for native threatened species and plant communities.

Water for Nature

Water For Nature is an initiative of Nature Foundation. Established in 2008 during the Millennium Drought, Water For Nature has been helping to redress the loss and stress to the ecosystems and habitats of the River Murray caused by river regulation and drought.

Healthy wetland and floodplain environments are important for environmental, economic, cultural and social reasons, providing an optimal environment for flora and fauna, improved water quality for human consumption and agricultural use, and opportunities for recreation and tourism.

Over the last three years, Water For Nature has delivered 4.56 gigalitres of environmental water to more than 35 wetland and floodplain sites.



OUR FOOTPRINT



Nature Foundation owns seven conservation properties, and has contributed to many conservation initiatives in South Australia



PROPERTIES CURRENTLY OWNED/CO-OWNED OR MANAGED/CO-MANAGED BY NfSA

- | | |
|--------------|------------------|
| 1 Witchelina | 4 Para Woodlands |
| 2 Hiltaba | 5 Watchalunga |
| 3 Tiliqua | 6 Cygnet Park |



WATER FOR NATURE WATERING SITES

- | | |
|--|---|
| 1 Lower River Murray & Lakes (7 sites) | Since 2008 WFN has worked with communities to deliver over 4 gegalitres of environmental water to wetlands and floodplains. |
| 2 Riverland West (14 sites) | |
| 3 Riverland East (32 sites) | |



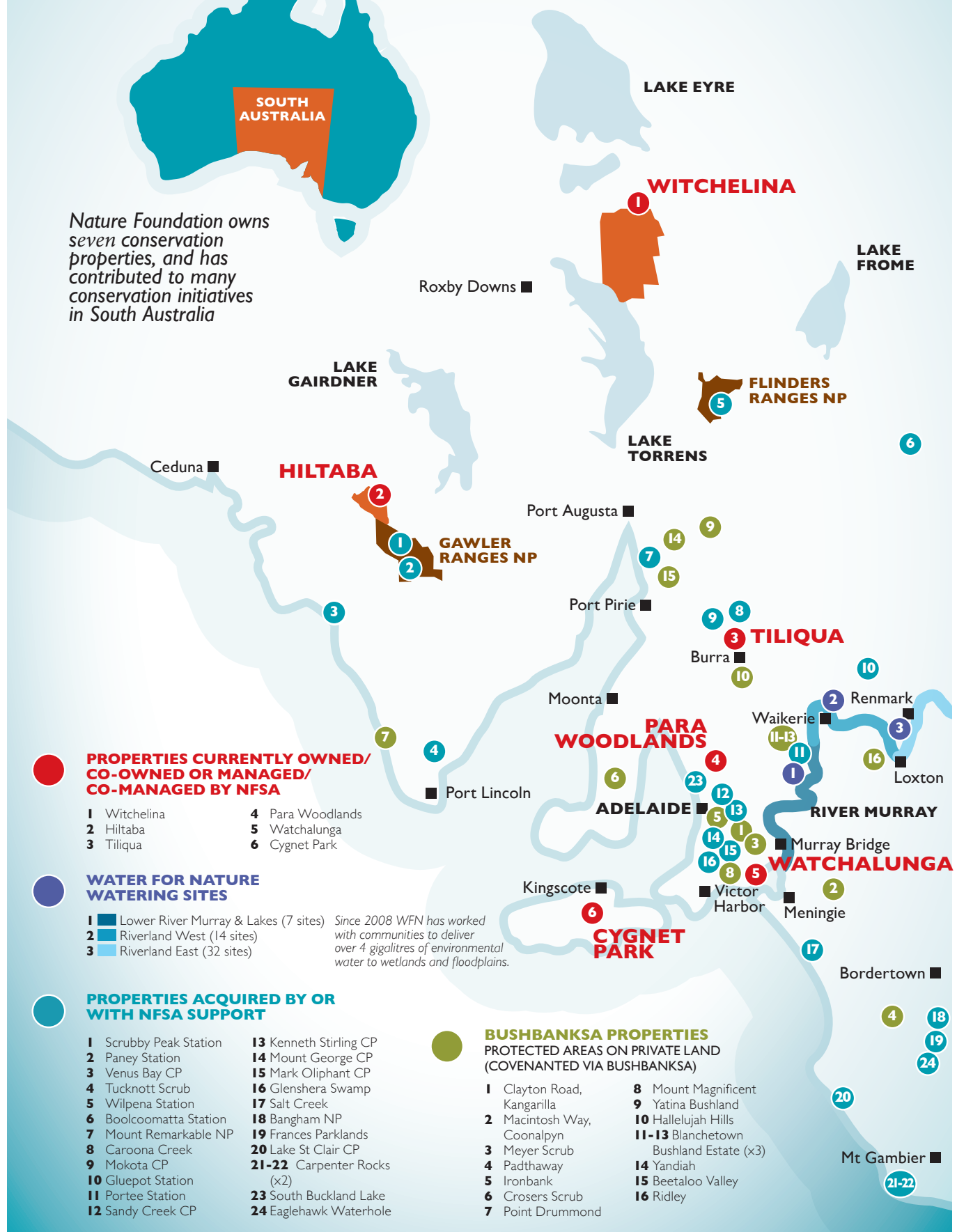
PROPERTIES ACQUIRED BY OR WITH NfSA SUPPORT

- | | |
|------------------------|----------------------------|
| 1 Scrubby Peak Station | 13 Kenneth Stirling CP |
| 2 Paney Station | 14 Mount George CP |
| 3 Venus Bay CP | 15 Mark Oliphant CP |
| 4 Tucknott Scrub | 16 Glenshera Swamp |
| 5 Wilpena Station | 17 Salt Creek |
| 6 Boolcoomatta Station | 18 Bangham NP |
| 7 Mount Remarkable NP | 19 Frances Parklands |
| 8 Caroon Creek | 20 Lake St Clair CP |
| 9 Mokota CP | 21-22 Carpenter Rocks (x2) |
| 10 Gluepot Station | 23 South Buckland Lake |
| 11 Portree Station | 24 Eaglehawk Waterhole |
| 12 Sandy Creek CP | |



BUSHBANKSA PROPERTIES PROTECTED AREAS ON PRIVATE LAND (COVENANTED VIA BUSHBANKSA)

- | | |
|----------------------------|--|
| 1 Clayton Road, Kangarilla | 8 Mount Magnificent |
| 2 Macintosh Way, Coonalpyn | 9 Yatina Bushland |
| 3 Meyer Scrub | 10 Hallelujah Hills |
| 4 Padthaway | 11-13 Blanchetown Bushland Estate (x3) |
| 5 Ironbank | 14 Yandiah |
| 6 Crossers Scrub | 15 Beetaloo Valley |
| 7 Point Drummond | 16 Ridley |



VISION AND PURPOSE

"To deliver the best possible science based outcomes for conservation in South Australia and directly underpin the decision making of the Nature Foundation."



Stone walls Wittehlina Nature Reserve

Research Categories

Nature Foundation partners with researchers on several levels and has recently created three research categories that reflect the nature of the partnership relationship. These categories will assist researchers and Nature Foundation in understanding each parties' roles, responsibilities and foster successful scientific collaborations.

Collaborating partner

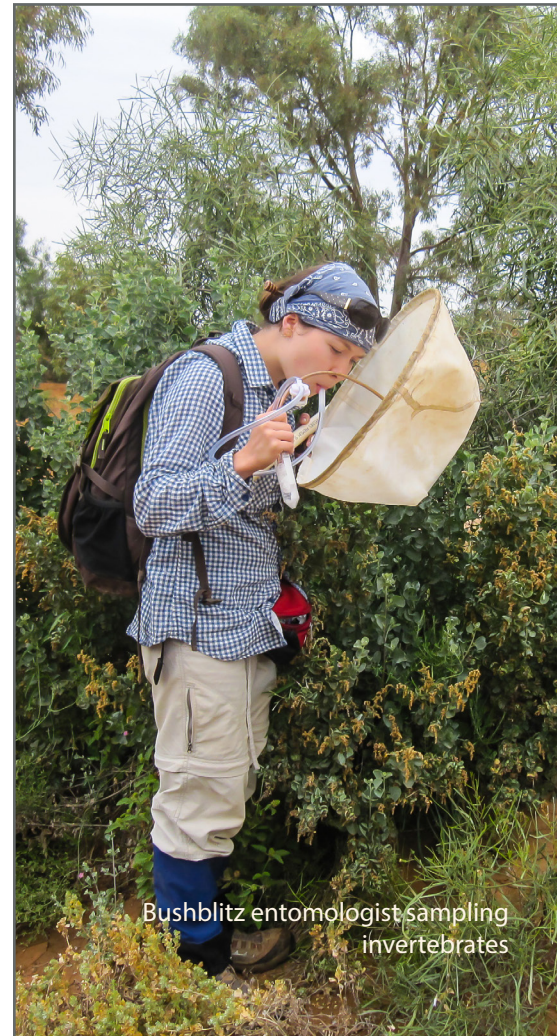
A collaborating partner will demonstrate a high level of strategic alignment with Nature Foundation's science strategy, be prepared to co-invest into a project or deliver cost neutral outcomes, co-publish findings and provide appropriate acknowledgement of partnership.

Visiting researcher

A visiting researcher is welcome to apply to the Nature Conservation Committee to undertake research activities on any of Nature Foundation's reserve provided that the project is aligned with the science strategy, is in accordance with Nature Foundation's animal welfare and ethics policy, provides all appropriate approvals, contributes to the operational costs of the reserve via fees e.g. accommodation, and provides appropriate acknowledgement of reserves and the Nature Foundation in all publications.

Research grant recipient

A successful grant recipient will enter into a grant agreement with the Nature Foundation and will be required to meet the terms of that agreement with respect to the use of funds, reporting and acknowledgement of the Nature Foundation and its science program.





Major Mitchell Cockatoo
(*Lophochroa leadbeateri*)

Nature Foundation research grants

Nature Foundation has been offering research grants to post graduate students since 2003. The creation of a formal process for distributing funds to Honours and PhD students has seen the Nature Foundation award 384 grants in the field of biological sciences to a value of \$1.5 Million dollars to universities and other research institutions.

The Nature Foundation is proud to have contributed to the development of so many bright young scientist in the early stages of their careers.

The Research Project

The delivery of the Science Strategy is via project funding involving researchers from throughout the State, Country and

Internationally. Individual projects must demonstrate capacity to deliver on at least one of the following outcomes;

1. Support the objectives of our properties.
2. Answer a question posed by Nature Foundation.

OR

3. significantly advance or solve a major environmental issue in South Australia.

And if a request is for multi-years,

4. Show how the money can successfully leverage additional funding from other organizations.

Successful Projects will demonstrate a capacity to address at least 6 of the following criteria (Applicants will be expected to tick the boxes relating to their project).

Criteria:

1. Develop an understanding of the ecological and landscape environments of our properties or Water for Nature.

2. To enhance conservation and/or ecotourism strategies on our properties.
3. To underpin our decision making within the organization.
4. Build our profile by partner building, community recognition or creation of alumni.
5. Assist in attracting donor funding by demonstrating material improvement in an aspect of the State's ecology.
6. Directly support environmental, conservation and restoration in SA generally.
7. Build environmental relationships and capacity within Unis, DEW and/or partner eNGO's and also overseas organisations.
8. Help us to be outward looking by linking with other organisation's research priorities.
9. Support the new generation of researchers via Honours and PhD scholarships.
10. Understand the ecology of an important plant or animal species.
11. Understand the geology or paleontology of the State.
12. Connect people with nature.

The grant application process

We will tender for projects twice a year - March and August. If funds are available, otherwise a March round only to coincide with the commencement of the Honours year.

We will advertise our 'on-property' and 'State' general and yearly specific priorities well and early on our website and in the application template.

It will be a requirement of funding that:

1. a final report is submitted which includes a media release.
2. all publications and presentations acknowledge Nature Foundation as a resource.
3. The supervisor is expected to lodge a copy of the publication with Nature Foundation when the work is published.

In addition, Nature Foundation through the Nature Conservation committee will:

4. Liaise with universities/schools in advance to help with applications.
5. Review priorities each year at least 2 months before the advertised grant round.
6. Identify key academics (use personal contacts) and work with academics to tailor questions to fit both university and Nature Foundation requirements.
7. Work with community groups and other eNGOS as they fit the strategy.
8. Advertise ourselves to interstate universities/professors for their students to come and undertake research on our properties.



Nankeen Kestrel (*Falco cenchroides*)



Burrowing Frog (*Neobatrachus pictus*)



Sand Goanna (*Varanus gouldii*)

DELIVERING OUTCOMES AND TELLING THE STORY

Recognition of our Science Strategy

We will develop a program to showcase our Science by engaging in:

- Formal functions involving “Publishing” proceedings in electronic or print format and which promotes the program of Nature Foundation
- Supporting the development and collection of long term datasets (long term data on our properties will help with long term research at a regional level)
- Make data available to public online - important for citizen science
- Support or lead in the presentation of a regular science forum involving the presentation of results and announcement of grant rounds
- Recruit a Scientific officer to curate the information.

Financially Supporting the Science Program

The Nature Foundation will support its Science Program by obtaining funding directly for the Science Program aided by the inclusion of results, activities and ideas from its work directly into the marketing strategy.

Individual opportunities to attract funding include but are not limited to:

- Crowd funding with partners on specific topics.
- Cooperating with universities to partner on grants \$ for \$ [matching] – extra value add to grant scholarship fund.
- Identifying donation opportunities in cash, but also ‘in-kind’ (‘things people do via volunteering, citizen science etc.).
- Ensuring that the research that tells stories that engage people are better known to support marketing activities.
- Prioritizing forward management to initiate change (for the better).
- Highlighting threatened species, or overabundant species.
- Demonstrate networking opportunities and capacity to leverage off the promotional activities of other organizations.
- Highlight the diverse expertise and hence partnerships and the capacity of Nature Foundation to bring researchers together especially on property.

- Providing topics for our regular appeals.
- Inviting institutions to set up long-term projects.
- Demonstrate that money in to Nature Foundation = change for good.

Measureable outputs

Over the next 5 years the plan should provide for:

- Funding for a full time Science officer.
- Funding for 10 honours projects and PhD projects per round.
- Be the focus of 2 funding drives per year.
- Have Nature Foundation listed on 5 papers per year as funding body.
- Attract at least one research grant per year to Nature Foundation.



Spinifex Hopping Mouse (*Notomys alexis*)



Title: Indicators of gene flow at a landscape scale in the threatened Thick-billed Grasswren
Researcher: Amy Slender
Year: 2016

Indicators of gene flow at a landscape scale in the threatened Thick-billed Grasswren

Bird song can help us delimit species from subspecies. This is because when two populations have different song, it is possible they will not interbreed because they will not recognise each other.

Subspecies that do not interbreed should be classified as different species according to the Biological Species Concept.

Two subspecies of the threatened Thick-billed Grasswren have considerable genetic divergence and this project asks whether these subspecies will respond to song from the heterospecific subspecies in order to determine whether these populations are likely to interbreed.

We found that both *Amytornis modestus indulkanna* and *Amytornis modestus raglessi* respond similarly to conspecific and heterospecific song. This indicates that there is not likely to be a behavioural barrier to reproduction between the subspecies. This result suggests that although these subspecies have diverged, they have not yet diverged enough to be classified as species.

This has implications for how these subspecies should be conserved and suggests they should be managed appropriately as subspecies.

The Impact of sheep grazing on the endangered Pygmy Bluetongue Lizard

The pygmy bluetongue lizard (*Tiliqua adelaidensis*) is an endangered scincid lizard, endemic to the Mid North region of South Australia, where it occupies heavily fragmented patches of native grassland. All of this habitat is privately owned and almost exclusively used as grazing for sheep. The lizards are insectivores and a large percentage of their food consists of grasshoppers. This project investigates the direct and indirect effects of grazing by sheep on the pygmy bluetongue lizard. The results suggest that lizards living in paddocks with less grazing have a better body condition and give birth to larger litters than lizards living in paddocks with more intensive grazing. These results are likely to be due to a higher number of grasshoppers found in the less grazed paddocks.

The results also suggest that grazing by sheep increase the number of burrows that get destroyed over winter, although burrows with lizards in them are less likely to be destroyed than burrows without lizards.

The data indicate that, while some grazing is still thought to be important to maintain bare areas required around lizard burrows, over grazing can have adverse impacts on the lizards.

Finally it is shown that a dog can be trained to find pygmy bluetongue lizards. This is an important result as lizard burrows can be extremely hard to find by visual inspection, and a more consistent and effective method, would greatly improve the surveys of this endangered species.



Title: The Impact of sheep grazing on the endangered Pygmy Bluetongue Lizard
Researcher: Torben Nielsen
Year: 2015



Title: Habitat use of the western barred bandicoot (*Perameles bougainville*) within the Arid Recovery Reserve
 Researcher: Melissa Jensen
 Year: 2012

Habitat use of the Western Barred Bandicoot within the Arid Recovery Reserve

Fenced, predator-free reserves are becoming increasingly important for conserving endangered species, such as the Western Barred Bandicoot (*Perameles bougainville*). Absent from the Australian mainland since 1929, the western barred bandicoot has only survived as two small remnant populations on Dorre and Bernier Islands, off the coast of Western Australia.

An understanding of habitat use is essential for the successful management and conservation of any species, particularly those used in reintroduction programs.

This study investigated the habitat use of the Western Barred Bandicoot within the Arid Recovery Reserve. Located in northern South Australia, this reserve has had all feral predator species excluded from within its fence lines.

The activity of bandicoots within two different exclosures of the reserve were tested against the effects of high and low burrowing bettong (*Bettongia lesueur*) activity, differing leaf litter densities and different dominant tree species, using track analysis. All were found to have insignificant effects on the activity of bandicoots within the Reserve.

Western Barred Bandicoots exhibit flexibility in their use of habitat and a tolerance of high numbers of bettongs within the predator free area. Their positioning of nests in areas which are easily accessible to potential predators suggests that control of feral predator species may remain a high priority for the successful reintroduction of western barred bandicoots to new locations in the future.

Cryptic species, distributions and conservation status of long lived trapdoor spiders (Araneae: Idiopidae) of the Fleurieu and Southern Flinders regions of South Australia

Idiopid trapdoor spiders comprise a diverse group of genera, many of which are short range endemics and some of which are considered vulnerable or threatened.

The genus *Blakistonia* is of particular interest. Females are long-lived and spend their whole life in a single burrow. Preliminary information indicates that the type species, found on the Fleurieu, Yorke and Eyre Peninsula, the Flinders Ranges and the Adelaide Hills, and southern Flinders Ranges is not a single widely distributed species but rather a complex of short-range cryptic species.

This project has used a robust, 6 gene molecular dataset in combination with traditional morphological assessment to uncover 24 new species from across southern Australia. Fifteen of these species are only found in South Australia, many with extremely restricted distributions.

The final outcomes of the project has produced 1) a phylogeny of *Blakistonia* species, 2) a complete taxonomic revision of the genus, and 3) and taxonomic correction to a species from Kangaroo Island which has been transferred to another family.



Title: Cryptic species, distributions and conservation status of long lived trapdoor spiders (Araneae: Idiopidae) of the Fleurieu and Southern Flinders regions of South Australia
 Researcher: Sophie Harrison
 Year: 2016

