Research prospectus

for Queensland threatened species and conservation estate

Priorities and opportunities

September 2019

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Queensland Government

Introduction

The Department of Environment and Science (the department) administers a range of key environmental protection legislation and uses leading-edge science and research to guide its management responses and develop and prioritise appropriate policy and program actions to improve conservation outcomes.

The pervasive nature of drivers such as species loss and habitat loss, climate change and invasive pest animals and plants present significant challenges to conserving Queensland's biodiversity making it imperative to prioritise research, investment and actions that support better conservation outcomes.

These challenges along with the diversity and geographical spread of the state's threatened species and estate requires a coordinated approach to conservation management. This includes working in partnership with First Nations People, Commonwealth and local government agencies, as well as research, industry and community sectors to enhance on-ground management.

Working in conjunction with Queensland's science and research community, we aim to further enhance our knowledge and use evidence-based decision making to deliver improved conservation outcomes for both the estate and our threatened species.

Conservation estate

The department is responsible for protecting and managing Queensland's environment including its natural and cultural values and ecosystems. The department manages the conservation estate (the estate) to ensure there are dedicated places for the protection of biodiversity, threatened species and other natural, social and cultural values.

Our parks and forests provide clean air and water, maintain healthy ecosystems, and play a vital role in sustaining our environmental, cultural and social values. Healthy ecosystems also increase the environment's resilience to climate change. The conservation of our natural environment supports our economic prosperity facilitating ecotourism, recreation and heritage experiences and providing economic benefits to local and regional communities.

Threatened species program

The department has responsibility for managing and conserving threatened species in Queensland via the *Nature Conservation Act 1992*. However, a range of different user groups and individuals within all levels of government, the community and industry sectors undertake activities relating to threatened species.

The department's Threatened Species Program manages, facilitates and coordinates activities relating to the conservation and protection of threatened flora and fauna in Queensland.

Aim of the prospectus

This document aims to identify the research priorities and opportunities for the conservation estate as well as threatened species on conservation areas and other parts of Queensland. The research prospectus will assist scientific and research organisations to identify opportunities for projects, collaboration and partnerships.

Annually a list of prioritised projects will be available on the department's web page www.des.qld.gov.au to inform researchers and collaborators about current and emerging priorities.

Gibson's albatross (*Diomedea antipodensis gibsoni*) is a vulnerable species which continues to be threatened by accidental entanglement in long-line fisheries gear and consumption of marine debris
Photographer: David Stewart

Queensland's conservation estate

Queensland's estate includes marine and terrestrial reserves including five World Heritage Areas, and is managed by the department's Queensland Parks and Wildlife Service.

- Public protected areas—national parks, conservation parks and resources reserves—declared under the *Nature Conservation Act 1992*—97,688 km²
- Marine parks—Moreton Bay, Great Sandy and Great Barrier Reef Coast Marine Parks—declared under the *Marine Parks Act 2004*—approximately 72,000 km²
- Fish habitat areas declared under the *Fisheries Act 1994*—72 covering 12,000 km²
- State forests, forest reserves and timber reserves declared under the *Forestry Act 1959*—32,335 km²
- Five World Heritage Areas are approximately 360,000km², of which the Great Barrier Reef World Heritage Area (managed in partnership with the Commonwealth) makes up approximately 348,700 km².

Figures current as at September 2019

Threatened species in Queensland

Queensland's flora and fauna species are a valuable part of Queensland's rich biodiversity.

A threatened species is a plant or animal species that is assessed as being at risk of extinction. Different conservation classes are allocated to threatened species depending on the degree of risk. These classes are based on a number of criteria including trends in population size, distribution and threats.

Under the *Nature Conservation Act 1992* there are currently 961 threatened species comprising of 733 plants and 228 animals.

The department manages activities relating to the conservation and protection of threatened flora and fauna including species listing, monitoring and recovery plans and research collaborations to help improve management actions and outcomes.

Figures current as at September 2019

Research priorities and opportunities

Research is vital to supporting biodiversity and addressing key gaps to improved management of Queensland's key natural and cultural values. Queensland Parks and Wildlife Service (QPWS) protect threatened species both on and off estate, coordinating with government and the research and community sectors to achieve best outcomes for conservation.

Applied research will contribute to improved policies, programs and management actions by enabling decisions to:

- be based on the best available scientific evidence
- benefit from innovative new approaches and harnessing new technologies
- incorporate an adaptive management approach.

Research priorities

MANAGING KEY VALUES	IMPROVING MANAGEMENT
Assessing condition and trend of key park values	Building knowledge
Measuring and managing threats	Solving management challenges
Filling knowledge gaps	Guiding future management
Assessing health and trends of threatened species	Informing species recovery actions

We encourage researchers and research organisations to collaborate with us to help support our research priorities and help us deliver on our conservation objectives. Our priorities and research opportunities will be regularly updated on the web page environment.des.qld.gov.au/wildlife/threatened-species.

Research priorities for threatened species

Research that addresses our priorities will contribute to better understanding of threatened species, their recovery and management.

Research needs	Examples of research projects	Management action
Priority research theme: Threatened species biology and ecology		
Address knowledge gaps for improved threatened species conservation and recovery.	Address identified knowledge gaps in threatened species biology and ecology. Improve knowledge gaps and trial recovery actions.	Integrate acquired knowledge into recovery programs, management plans and actions for threatened species.
Priority research theme: Threat management		
Improved knowledge of threats, their impacts, and mitigation options.	Interaction between threats, threatened species and threat mitigation actions. Identifying key threatening process for high-priority threatened species. Identifying effective mitigation methods for key threatening processes.	Direct action to mitigate impacts of pressures on threatened species.
Priority research theme: Social and cultural		
Improved knowledge and understanding of social and cultural values and perceptions associated with threatened species.	Interaction between human values and behaviours, and species management. Environmental economic accounting for threatened species and their habitats. Engage with Traditional Owners to apply knowledge and enhance threatened species management.	Integrate improved knowledge of social and cultural values into threatened species projects. Leverage community appreciation for enhanced engagement in management activities.
Priority research theme: Innovative species management solutions		
Deliver innovative management actions and methods	Developing novel and innovative methods to improve monitoring, threat mitigation and management actions. Applying new technology to species or threat management.	Use new and improved species or threat management solutions for positive conservation outcomes.

Case study:

Innovative technology to find one of Australia's rarest and most elusive bird species

The Coxen's fig-parrot is a small green parrot that is easily camouflaged in its preferred forest habitat. The species is extremely elusive. It feeds primarily on figs and is thought to have declined in distribution and number due to extensive urban development and clearing of lowland subtropical rainforests. The species is listed as endangered in both Queensland and New South Wales. A key focus of the *Coxen's fig-parrot Cyclopsitta diophthalma coxeni Recovery Plan*, is to locate and protect remaining populations.

Bird surveys are time consuming, and for rare and elusive species often yield poor results. Acoustic remote sensing offers a cost-effective method of detecting and monitoring birds. Using innovative adaptations to the recording devices, audio recording equipment can capture bird calls from further away than ever before. The enhanced recording footprint increases the chances of capturing evidence of the Coxen's fig-parrot.

Audio recordings run for many hours. The search for single bird calls is automated by developing a digital signature for a given species. To do this a pre-recorded audio of the target bird is required. As the Coxen's fig-parrot call has never been recorded, researchers have used bioacoustic attributes (body size and call frequency) of two closely related fig-parrots to estimate the audio search bandwidth of the Coxen's fig-parrot.

Coxen's fig-parrot
(*Cyclopsitta diophthalma coxeni*)
Illustration by Sally Elmer

Priority research theme: **Innovative species management solutions**

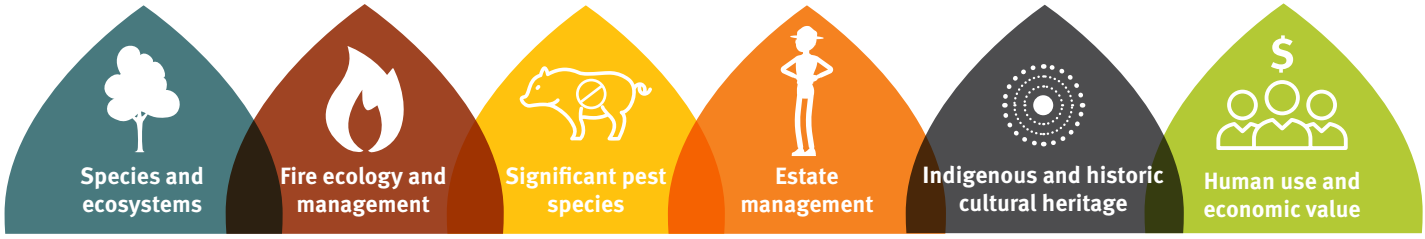
QPWS research partners: Queensland acoustics expert Edward Pedersen with support from Currumbin Wildlife Sanctuary, Noosa and District Landcare and the Queensland Museum.

Key research output: An enhanced method to remotely detect elusive populations of a threatened and cryptic bird species.

Management action: Model species distribution with current information collected using the innovative recording design. Address critical knowledge gaps by finding existing populations and describing habitat preferences.

Research priorities and opportunities for Queensland's estate

Research that addresses our priority research themes will contribute to better understanding of estate values and the management.



Research needs	Examples of research projects	Management action
Priority research theme: Species and ecosystems		
Improve knowledge of species and ecosystems to inform estate management.	Ecology and management needs of significant species. Methods for reliably detecting change in timeframes that facilitate effective response. Identify limits of acceptable change.	Use knowledge to promote effective conservation of species and ecosystems.
Priority research theme: Fire ecology and management		
Build knowledge of fire ecology. Identify methods and/or equipment for improved fire practices.	Use of innovative technologies in fire management. Effective planned burn targets and practices to achieve biodiversity conservation and mitigate community risk.	Adopt practices that improve risk mitigation and conservation outcomes.
Priority research theme: Dignificant pest species		
Improve understanding of pest species, their impacts and control options.	Identify key estate values most at risk. Quantify impacts of pest species. Determine rates of decline in values and limits of acceptable change. Develop cost-effective control methods.	Integrate research findings to enhance pest management.
Priority research theme: Estate management		
Identify and develop innovative approaches to estate management.	Methods for conserving key estate values. Methods for efficient, effective monitoring of key values. Sustainable asset design. Innovative technology solutions. Resource optimisation and efficiency. Managing visitor impacts.	Adopt innovative approaches to promote continuous improvement and effective management practices.

Research needs	Examples of research projects	Management action
Priority research theme: Indigenous and historic cultural heritage		
Build knowledge of heritage sites. Identify best practice management.	Engagement with traditional owners to apply knowledge and enhance management. Identifying and mapping areas of cultural heritage significance.	Ongoing and enhanced engagement and partnerships with traditional owners. Adopt research findings to improve management of cultural values.
Priority research theme: Human use and economic value		
Identify social and economic benefits of the estate.	Identify and quantify social and economic value of estate. Methods for effective monitoring of visitor expectations and satisfaction.	Integrate improved data and knowledge into communication products, management and monitoring.

Spotted-tailed Quoll (*Dasyurus maculatus gracilis)* lives in upland forests in the wet tropics and is an endangered species threatened by further habitation loss
Photographer John Augusteyn

Hawksbill turtle (*Eretmochelys imbricata)* is an endangered marine turtle, prized in illegal trade for its beautiful 'tortoise shell' carapace.

Giant-barred frog (*Mixophyes iteratus)* lives in large streams and wet forests in south-east Queensland and is an endangered species threatened by further habitat loss
Photographer John Augusteyn

Kowari (*Dasyuroides byrnei)* lives in the Sturt Sandy Desert and is a vulnerable species as a result of feral animals |
Photographer John Augusteyn

Case study:
***Pisonia grandis* restoration, Tryon Island, Capricornia Cays National Park**

Tryon Island is a coral cay within the Capricornia Cays National Park, with important breeding sites for threatened turtles and sea birds. The park also protects 86% of Australia's Pisonia grandis forest. *P. grandis* is a large-leaved forest tree that occurs between the Tropics of Capricorn and Cancer on cays with high phosphate levels. Lack of protection for this ecosystem outside of Australia makes the Capricornia Cays an internationally significant stronghold for the species. *Pisonia* is considered a key stone species being critical in nutrient cycling, soil stabilisation and the provision of nesting habitat on coral cays.

In the late 1990s an outbreak of the soft scale (*Pulvinaria urbicola*) sap-sucking insect resulted in the loss of almost 90% of *P. grandis* on Tryon Island. The outbreak was exacerbated by the introduced African big-headed ant (*Pheidole megacephala*) which dominated the ant fauna at the time. These ants 'farm' scale insects in order to harvest the sugary substance they produce.

Above: Tryon Island—trial plot D8 immediately after planting *P. grandis* cuttings (2006)
Below: Tryon Island—trial plot D8 ten years after planting (2016)

Priority research theme: **Estate management**

QPWS research partners: Queensland Museum, invertebrate experts in CSIRO and the Commonwealth Government, Bellmetrics, The Friends of the Cays (volunteer group).

Key research output: Pest control and revegetation methods were trialled to inform management of the Tryon Island outbreak, and future outbreaks on other islands. Biological surveys provided in-depth understanding of cay ecosystems, ecosystem processes and outbreaks. Bird surveys improved our understanding of visitation and habitat use by key species.

Management action: The *Pisonia* ecosystem on Tryon Island is substantially restored (see figures above). *P. megacephala* has been eradicated from the island and the diversity of the native ant fauna has increased. Protocols for controlling scale outbreaks have been successfully implemented on other islands in the Capricornia Cays; preventing any further loss of *Pisonia*.

Case study:
Northern bettong habitat management

The endangered northern bettong (*Bettongia tropica*) is a small, nocturnal marsupial that has disappeared from 50–90% of its former range. It is restricted to the western edge of the Wet Tropics region of north eastern Queensland where it lives in wetter eucalypt woodlands and forests that provide two critical food resources—truffles and the fleshy underground stem of cockatoo grass (*Alloteropsis semialata*). Managing the habitat to maintain these spatially and temporally variable food resources, as well as shelter, requires a good understanding of the fire ecology of the species and its habitat and effective application of that knowledge.

The Northern Bettong Management Project is an ongoing collaborative project that aims to identify best practice fire management to optimise shelter and food resources, as well as identify and manage threats such as competition from cattle grazing and predation by cats.

Northern bettong

Priority research theme: **Species and ecosystems, fire ecology and management, significant pest species management**

QPWS research partners: University of Queensland, James Cook University, World Wide Fund for Nature, Australian Wildlife Conservancy, Threatened Species Recovery Hub (National Environmental Science Programme), Wet Tropics Management Authority.

Key research output: Improved knowledge of population status and trends, their distribution, movement patterns, microhabitat requirements and habitat use. The northern bettong was confirmed as a keystone species. Fire management requirements are better understood but being further studied. Research findings have been published in scientific journals.

Management action: The research informed a Best-Practice Fire Management Guide. Recommendations in the guide are used to inform the frequency, intensity, patch size and timing of planned burns to help maintain healthy habitat and, in strategic locations, to redress woody thickening and loss of suitable habitat. Management will continue to adapt as new information becomes available.

Collaborative opportunities—how you can be involved

Researchers and research organisations are invited to support our objectives for species conservation and estate management by addressing priority knowledge gaps.

Here are some of the ways you can work with us to improve estate management and threatened species conservation:

- If you have conducted research on one of our priority threatened species or on the estate in Queensland, and you would like to discuss how your findings can improve outcomes, please contact us via the web page or contacts listed below.
- If you are interested in undertaking a new research project, view our priority research projects and contact us if you would like to discuss your project before you apply for your permit.

Where research directly contributes to high priority departmental objectives, the department may offer support such as in-kind field assistance; advice, guidance and expertise; access to equipment; on-estate accommodation; transport; or funding.

QPWS research webpage

For a list of our latest prioritised projects visit **www.des.qld.gov.au**.

Key contact for conservation estate and threatened species projects:

QPWS.research@des.qld.gov.au