

Concept Plan SP 2020-006

Big and muscular, but still vulnerable: Ecology, threats and monitoring of the Pilbara Olive Python (*Liasis olivacea barroni*)

Animal Science

Project Core Team

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Project status as of March 3, 2020, 1:24 p.m.

New project, pending concept plan approval

Document endorsements and approvals as of March 3, 2020, 1:24 p.m.

Project Team	required
Program Leader	required
Directorate	required

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Biodiversity and Conservation Science Program

Animal Science

Departmental Service

None

Background

Monitoring is a vital component of threatened species conservation and management. In vertebrates, relative abundance is typically used as a measure of the size of a population; and changes to relative abundance are interpreted as population trends, either upwards or downwards. However, stochastic and seasonal variations are often not considered in these estimates, because there is insufficient baseline population data spanning a number of seasons and years. Even the regular collection of detailed trapping information on a highly trappable and habitat constrained species (e.g. rock-wallabies in the Wheatbelt) can lead to population estimates with still such a large margin of error that they could not detect population declines until near extinction (Kinnear *et al.* 1998).

The monitoring of species that are cryptic, not readily trappable using conventional means (physical traps or cameras), highly seasonal in their behaviour and at probable low densities is particularly challenging. One such species is the threatened Pilbara Olive Python (*Liasis olivacea barroni*). It occurs primarily in rocky ranges in the Pilbara region, including many areas that have active iron ore mines, industrial sites such as gas processing facilities, or are modified by infrastructure associated with these activities. Attempts to monitor the species to determine mining impacts have been based on a limited understanding of its biology and the use of inappropriate techniques that are unlikely to be sensitive to population changes. Road driving counts, remote cameras and eDNA sampling from water bodies have either not detected Pilbara Olive Pythons, or find few (and often the same) individuals on each sampling occasion. The diet of Pilbara Olive Pythons includes a diverse array of birds, reptiles and mammals and as a gape-limited predator, young pythons consume different and smaller prey than adults. Consequently, the use of a few mammal prey items as a 'surrogate' for monitoring Pilbara Olive Pythons is unlikely to be informative.

The Pilbara Olive Python is listed as Vulnerable under the EPBC Act 1999 and "Threatened" under Schedule 1 of the Wildlife Conservation Notice 2014 (WA). Limited information is available on its ecology, population structure/trends and conservation threats. Its massive size at maturity, restricted habitat preferences, probable low densities and an adult diet containing large vertebrates (including a number of threatened species) makes the Pilbara Olive Python vulnerable to a range of changes to its habitat. No decline in the overall population size or the distribution have been detected, but there is insufficient historical and recent data to establish any trends.

A number of potential threats could result in local or wider extinctions including: habitat destruction or alteration by infrastructure or mining projects; habitat degradation around water bodies due to cattle and frequent fires; possible predation of young by foxes and feral cats; and the loss of important food species (e.g. fruit bats, quolls, rock-wallabies) due to such factors as feral animals or unsuitable fire regimes. Information is available on the distribution of Pilbara Olive Pythons (Smith 1981, Pearson 1993) and some ecological work has been undertaken in association with community groups (Pearson 2003, 2007; Tutt 2002, 2004).

The rapid expansion of resources projects and infrastructure in the Pilbara over the last two decades has resulted in numerous referrals under the EPBC Act concerning the presence or probable presence of Pilbara Olive Pythons on mining leases. Better survey and monitoring techniques are required to assess and mitigate the impact of mining. To date, there have been limited offset funds sought for the presumed impacts of mining operations and road construction.

This project seeks to determine critical aspects of the life history and population dynamics that can be employed in monitoring protocols. For instance, female pythons are "capital breeders". They breed infrequently, relying on depositing substantial fat reserves to produce and incubate eggs. Loss of preferred prey items can potentially delay or halt reproduction. The collection of baseline information on life history parameters such as diet, reproductive patterns, recruitment and the survival of different cohorts will enable more sensitive monitoring of the species. Radio-telemetry will provide data on adult and large sub-adult pythons (transmitters can last up

to 3 years and be replaced), while experiments with models and cameras will be used to study the probable predators of neonates and juveniles.

Aims

1. Collate existing information about the Pilbara Olive Python and publish workshop outcomes and research data on the species.
2. Establish a long-term radio-telemetric study involving several Pilbara Olive Python populations to obtain baseline data on frequency of reproduction, nesting sites, population structure, diet and survivorship.
3. Undertake experiments to determine threats to juveniles, the population cohort likely to be most affected by feral animal predation or vegetation change due to fire or grazing.
4. Trial, investigate and improve survey and monitoring techniques to enable better assessments of potential and future impacts of resource projects and management activities on Pilbara Olive Pythons.

Expected outcome

The project will dramatically improve our knowledge of the ecology of the Pilbara Olive Python, techniques to survey and monitor populations and what management actions may be required to maintain its populations. It will allow the Department and other agencies to better assess the probable impact of resource developments and management activities on Pilbara Olive Pythons and techniques to mitigate those impacts (if necessary) and monitor their effectiveness. It will provide direction to consultants on the best ways to locate Pilbara Olive Pythons and establish monitoring programs.

To communicate this information, the following outputs are envisaged:

Peer-reviewed papers (with tentative titles) and could include;

1. Identification of threats to the conservation of the Pilbara Olive Python
2. Distribution, population structuring and conservation status of the Pilbara Olive Python.
4. Habitat preferences, diet and foraging behaviour in relation to the conservation of Pilbara Olive Pythons.
5. Reproductive behaviour in Pilbara Olive Pythons: a large capital breeder in an arid land.
6. Protocols for the survey and monitoring a large cryptic reptilian predator.
7. What potential role does fire management and feral animal control have in the recruitment and survival of the threatened Pilbara Olive Python.

Other written outputs would include:

1. Report on protocols to survey and monitor POPs for mining companies and consultants.
2. Annual reports to funding bodies.
3. Articles in Landscape and other popular magazines.
4. Media releases.

Other communications:

TV/documentaries- large pythons are popular with the public- I have been involved in 2 documentaries in relation to Pilbara Olive Pythons in the past (German VoxTierzeit and Wildlife Rescue on Australian TV). I would anticipate future interest from documentary production companies and television networks.

Strategic context

The Pilbara Olive Python is an iconic threatened species in the Pilbara and its possible presence on mining leases has resulted in numerous EPBC referrals in the last two decades. Consultants working on behalf of resource companies have struggled to find POPs and have not developed effective ways to monitor the impacts of mining activity on the species. POPs occur in several national parks and conservation reserves managed by the Department. It is WA's largest snake and a species popular with the wider public and Pilbara residents in particular. It is a listed "Vulnerable" species under the EPBC Act and "Threatened" under WA legislation. The aims and outcomes of this proposed project are consistent with the research priorities identified by the Commonwealth Conservation Advice on *Lialis olivaceus barroni* (Threatened Species Committee 2008) as outlined below:

Research priorities that would inform future regional and local priority actions include:

- Design and implement a monitoring program.
- More precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes.
- Undertake survey work in suitable habitat and potential habitat to locate any populations/occurrences.

It also aligns with the seven projects identified by Pearson and Morris (2011) in "Project Plan- The ecology and conservation of the Pilbara Olive Python 2011-2016" (Department of Parks and Wildlife):

1. Review of published and unpublished literature.
2. Development of survey and monitoring techniques.
3. Pilbara Olive Python genetics and population structure.
4. Detailed field ecology of Pilbara Olive Pythons.
5. Developing strategies to minimise Pilbara Olive Python mortality.
6. Reducing the impact of mining and infrastructure on Pilbara Olive Pythons.
7. Monitoring Pilbara Olive Python populations.

A POP workshop was held at the Department of Parks and Wildlife offices at Kensington on December 10, 2013 and identified the following research requirements:

1. Undertake a literature review; 2a. Develop survey techniques; 2b. Develop monitoring techniques; 2c. Better understand habitat requirements; 2d. Better understand breeding biology; 3a. Better understand prey relationships; 3b. Better understand predator relationships.

The proposed project examines the most critical of the research priorities identified by these three documents, focusing on reviewing available literature, developing and testing survey/monitoring techniques, resolving population relationships and structure via genetic techniques, identifying conservation threats and undertaking detailed ecological work to understand habitat requirements, diet and reproduction. Note that the project has a five year life on account of the apparent low reproductive frequency of female POPs to enable determination of factors associated with this. Funding required for Years 4 and 5 would each be similar to Year 3.

Expected collaborations

A range of collaborations are anticipated. The project will work in synergy where possible with existing DBCA work at Yarraloola and Red Hill. It will involve Pilbara regional staff wherever possible in site selection, capture of study animals, radio-telemetry and other aspects.

Outside the Department, the project will seek the involvement of indigenous ranger groups and the general public to report sightings and potentially radio-track pythons (this was successfully done in the past with volunteers in the communities of Dampier, Tom Price and Pannawonica). Environmental consultants will be asked to contribute scale samples for genetic analysis and will be consulted in relation to survey and monitoring techniques they are currently using or have attempted to apply.

A co-operative study of the genetic distinctiveness of Pilbara Olive Pythons relative to other populations of olive pythons with Dr Peter Spencer of Murdoch University is nearing completion. A preliminary report has been produced, but further samples will enable the publication in preparation to have a better geographic coverage and updated results from newer genetic methods.

Any specimens (e.g. roadkills) will be lodged with the WA Museum.

There may be opportunities to involve students in certain aspects of the project and this will be explored depending on funding available. Funding for the project will most likely to come from threatened species offsets and so it will be necessary to collaborate with mining companies and their environmental sections to prepare proposals, undertake fieldwork and to carry out any experimental habitat manipulations.

Proposed period of the project

None – None

Staff time allocation

Role	Year 1	Year 2	Year 3
Scientists	0.5	0.5	0.5
Technical	0.5	0.5	0.5
Volunteer	0.2	0.2	0.2
Collaborator	0.1	0.1	0.1

Indicative operating budget

Source	Year 1	Year 2	Year 3
Consolidated Funds (DBCA)			
External Funding	70 000	70000	70000