Project Plan SP 2017-001

Understanding and reducing python predation of the endangered Gilbert's potoroo

Animal Science

Project Core Team

Supervising Scientist	David Pearson
Data Custodian	David Pearson
Site Custodian	

Project status as of Oct. 6, 2020, 12:37 p.m.

Approved and active

Document endorsements and approvals as of Oct. 6, 2020, 12:37 p.m.

Project Team	granted
Program Leader	granted
Directorate	granted
Biometrician	granted
Herbarium Curator	not required
Animal Ethics Committee	granted

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Biodiversity and Conservation Science Program

Animal Science

Departmental Service

Service 6: Conserving Habitats, Species and Communities

Project Staff

Role	Person	Time allocation (FTE)
Supervising Scientist	David Pearson	0.1
Technical Officer	Stephanie Hill	0.1

Related Science Projects

Gilbert's Potoroo SP 1996-008

Proposed period of the project

March 27, 2017 – June 30, 2019

Relevance and Outcomes

Background

Carpet Pythons are predators of a range of threatened mammal fauna (Pearson 2002, Pearson et al. 2002), including the endangered Gilbert's Potoroo (draft Recovery Plan, Department of Parks and Wildlife 2016). Python predation, especially when populations are small or under pressure from drought or other predators, can potentially reduce adult survival as well as curtailing recruitment. This is particularly problematic when threatened mammal populations are highly confined by availability of habitat or if housed in enclosures for breeding or conservation. Current "predator proof" fences used to protect WA threatened mammal fauna, while effective at reducing or eliminating predation by foxes and feral cats, are likely to have little or no effect on levels of python predation.

The draft Gilbert's Potoroo Recovery Plan (Department of Parks and Wildlife 2016) identified python predation as a significant threat to the growth of the potoroo population in the Waychinicup NP enclosure. A total of 49 potoroos have been placed in this enclosure since 2010 and there have been 8 known python predation events of potoroos with tail radio-transmitters. Since only a proportion of potoroos are fitted with tail transmitters at any time, the number actually taken by pythons is likely to be much higher. Tail transmitters typically only stay attached to the tail for 4-6 weeks.

The estimated size of the potoroo population inside the enclosure in May 2016 was just 12 individuals. In a recent review of options following the Two Peoples Bay fire, it was stated that without management intervention, python predation was likely to cause their extinction within the enclosure (Tony Friend, options paper, December 2015). It appears that python predation is limiting population growth and hence the production of progeny for translocation to other sites.

The potoroo population at Two Peoples Bay was believed to be relatively stable between 2001 and 2012 (31 animals in 2008), but then declined to around one-third of its previous level (9 in March 2014, Friend 2016). Low rainfall rather than python predation was probably the main cause, but nonetheless predation pressure on a low population will stop or slow recruitment and recovery. Despite consistent production of young potoroos, the Waychinicup population has not shown strong growth. The low survival of founders compared with the Bald Island translocation, together with the generally good condition of individuals, indicates that a significant level of

predation is likely to be a major contributing factor to the lack of population growth (Department of Parks and Wildlife 2016)..

Carpet Python Biology

Carpet pythons are known predators of a range of native mammals up to the size of tammar wallabies (around 3 kg). They hunt primarily by ambush and since prey are swallowed whole, there is pronounced niche partitioning between juvenile and adult pythons, and in some areas between the sexes (Pearson et al. 2002a). Carpet pythons typically hunt in the warmer months to ensure timely digestion of prey and may cease to eat and remain inactive for many months in areas with cool winters such as Dryandra (Pearson, Shine and Williams 2005). Prey are taken by large pythons on the ground, while juveniles hunt on the ground as well as from raised positions in shrubs or even in the canopy of trees. However observations at Waychinicup indicate that Gilbert's Potoroos are taken by pythons all year round (Tony Friend, pers. comm.), which suggests that pythons are able to maintain warm enough body temperatures at Waychinicup to digest these relatively small meals (< 1kg).

Telemetered pythons typically move around 100m a week in the summer season between ambush sites at Garden Island and Dryandra. Home ranges averaged around 17 ha; however adult males travel widely in the breeding season to locate receptive females. Exclusive territories are not apparent, with adults and juveniles having home ranges that are overlapping (Pearson et al. 2005). Growth rates are strongly driven by prey availability and there is pronounced sexual size dimorphism with males rarely exceeding 1.5 m in length and 1 kg in weight, while adult females can reach up to 2.5 m and 4 kg (Pearson, Shine and Williams 2002b).

Python predation risk to Potoroos

The relatively small size of Gilbert's potoroos means that they are vulnerable to predation from a range of python cohorts – sub-adult and adult females and adult males. Predation is most likely in summer months when warmer temperatures allow more frequent feeding and growth. Large adult female pythons involved in reproduction do not to feed during egg development and incubation; this is likely to constitute around one quarter to one third of the adult female population in any given summer. However, once egg incubation is completed in March, these females have lost up to 50% of their post-oviposition weight, are hungry and will attempt to rapidly regain weight by feeding on whatever prey are available.

The home range is relatively small and non-exclusive, so densities of carpet pythons may be high if there is suitable habitat with abundant prey. Inside the 380 ha Waychinicup enclosure there is likely to be a substantial number of resident pythons, with some inflow and outflow by juveniles establishing new home ranges, as well as adults looking for prey; and in the breeding season, males searching for receptive females.

An options paper for the control and removal of pythons in the Waychinicup enclosure was prepared by Pearson and Friend (2016). It listed fencing, the removal of resident pythons by hand, trapping pythons and using radio-telemetry of adult males in the breeding season to locate female pythons. Retro-fitting the existing Waychinicup fence to make it python proof was considered by senior staff to be too expensive, so this proposal focuses on the location and removal of pythons within and around the enclosure to reduce the level of python predation on Gilbert's Potoroo.

In addition, it may be possible to reduce python predation on the existing Mt Gardner population as it recovers from the November 2015 bushfire. In this area, the fitting of radio-transmitters to male pythons could assist in the location of adult females which are likely to be the most significant cohort preying on potoroos.

Aims

To determine the most effective ways to locate, trap and remove carpet pythons from in and and around Gilbert's Potoroo populations and so significantly reduce the current level of python predation.

Expected outcome

Reduced python predation of the critically endangered Gilbert's Potoroo, to prevent its extinction within the Waychinicup enclosure and so that recruitment is improved and more potoroos are available for translocations to other sites.

Since carpet pythons are important predators of a number of threatened mammals, the project would have applications beyond potoroo conservation and could assist with reducing python predation in other enclosures and even in field situations with wild populations if required.

Knowledge transfer

Conservation managers and planners responsible for managing small populations of threatened species that may be threatened by reptile predation. This would include Parks and Wildlife operational staff and managers, but also be potentially useful in other jurisdictions.

Tasks and Milestones

Application for animal ethics approval January 2017- Completed, animal ethics approved.

2. Acquistion of python transmitters- underway, transmitters to arrive by February 2017
3. Capture and implantation of male pythons- commencing February 2017 and ongoing for life of project
4. Briefing and training of South Coast field staff and Science staff- February 2017
5. Design and production of python trap boxes- completed by April 2017
6. Deployment of trap boxes at Waychinicup and Garden Island and monitoring effectiveness- April 2017
7. Trap box monitoring- April to June; assessment of effectiveness by July 2017
8. Radio-telemetry monitoring and capture of pythons; ongoing for project, but intensified during the breeding season, November to December
9. Spring trap trials from October to December; assessment of effectiveness by January 2018
10. Annual report January 2018 summarising the first year of project's operation; annual animal ethics report
11. Continuing trap tests and modifications if required at Waychinicup and Garden Island January-March 2018.
12. Continuing occasional radio-telemetry of males- ongoing
13. Intensified radio-tracking of male pythons to locate female pythons- November-December 2018.
14. Annual report January 2019, summarising second year of project; annual animal ethics report.
15. Continuation of trapping of pythons if effective trap developed and continued radio-telemetry of males if successful in locating females.
16. Assessment of the project and final report January 2020.
17. Preparation of a refereed scientific papers on trap design for pythons, the characteristics of python predation on Gilbert's Potoroos, natural history of pythons on the south coast WA including breeding observations and diet; implications for the management of other threatened species impacted by native predators. Drafts complete by June 2021.

References

Courtenay, J. and Friend, T (2004). Gilbert's Potoroo (Potorous gilberti) Recovery Plan. Wildlife Management Program No. 32, Department of Conservation and Land Management, Perth.

Department of Parks and Wildlife (2016 draft). Gilbert's Potoroo (Potorous gilberti) Recovery Plan. Wildlife Management Program (number not yet allocated). Department of Parks and Wildlife, Perth.

Friend, T. (2016). Translocation Proposal- Gilbert's Potoroo (Potorous gilbertii). Bald Island and Two Peoples Bay to Michaelmas Island February 2016. Department of Parks and Wildlife, Science Division Albany.

Friend, T. and Button, T. (2016). Predation of Gilbert's Potoroos by carpet pythons. Unpublished report, Department of Parks and Wildlife, Perth.

Pearson, D. (2002). Ecology and Conservation of South-western Carpet Pythons (Morelia spilota imbricata). PhD thesis, University of Sydney

Pearson, D. and Friend, T. (2016). Reducing predation of Gilbert's Potoroos by Carpet Pythons inside the Waychinicup enclosure. Unpublished internal report, Department of Parks and Wildlife.

Pearson, D., Shine, R. and Williams, A. (2002a). Sex-specific niche partitioning and sexual size dimorphism in Australian pythons (Morelia spilota imbricata). Biological Journal of the Linnean Society 77: 113-125.

Pearson, D., Shine, R. and Williams, A.(2002b). Geographic variation in sexual size dimorphism within a single snake species (Morelia spilota, Pythonidae). Oecologia 131: 418-426.

Pearson, D., Shine, R. and Williams, A. (2005). Spatial ecology of a threatened python (Morelia spilota imbricata) and the effects of anthropogenic habitat change. Austral Ecology 30: 261-274.

Study design

Methodology

This project is essentially an adaptive research and management initiative to reduce python predation of Gilbert's Potoroos as quickly as possible. Several methods will be investigated and their effectiveness determined.

Searching and hand capture- to be undertaken by Albany-based Science and Regional staff during normal operations within the enclosure. Specific targeted searches will be undertaken during the spring and summer months by staff and volunteers (predominantly amateur herpetologists).

Body parameters will be recorded of captured pythons (SVL, gape size) and the contents of the lower intestinal tract gently manipulated to collect faecal samples. These will be analysed using hair, claws and bone in the pellets and compared with python characteristics. Pythons will then be released > 3 km from the enclosure.

Trap boxes using a heat pad and animal odour to attact pythons- A small portable box design will be developed with a solar-powered heat pad. Ten of these will be deployed in Waychinicup and another ten on Garden Island and their effectiveness determine by regular checks by staff and remote cameras. Designs may be modified as required and then tested against earlier designs in which cause simple visitation metrics will be used for Chi-squared testing.

Radio-telemetry of male pythons to locate females- Male pythons will be implanted with Holohil transmitters (life 3 months-2 years depending on python size) and tracked intensively during the breeding season to locate adult females. Radio-telemetry data will be stored in Access tables and imported into Ranges to examine daily movement rates and mating ranges of adult males. These data will be compared with existing data for Garden Island and Dryandra via Chi-squared tests.

Biometrician's Endorsement

granted

Data management

No. specimens

Herbarium Curator's Endorsement

not required

Animal Ethics Committee's Endorsement

granted

Data management

Python data and radio-telemetry data will be stored in Access and Excel and basic statistics and graph drawn in Excel. The program 'Ranges' will be used to analyse telemetry data and map home ranges and movement patterns.

Budget

Consolidated Funds

Source	Year 1	Year 2	Year 3
FTE Scientist	11000	11000	11000
FTE Technical	14000	14000	14000
Equipment	10000	4000	4000

Source	Year 1	Year 2	Year 3
Vehicle	6000	6000	6000
Travel	3000	3000	3000
Other (volunteer costs)	1000	2000	2000
Total	45000	40000	40000

External Funds

Source	Year 1	Year 2	Year 3
Salaries, Wages, Overtime			
Overheads			
Equipment			
Vehicle			
Travel			
Other			
Total			