



Pilbara northern quoll project

Surveying and monitoring *Dasyurus hallucatus* in the Pilbara,
Western Australia

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Department of
Parks and Wildlife



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1.1 Scope

This document outlines the objectives of the Department of Parks and Wildlife Pilbara northern quoll project, and provides methodologies to be used to achieve these specific objectives. Other organisations undertaking quoll monitoring projects can then align with these methods and contribute comparable data in to the regional survey.

1.2 Background

The northern quoll, *Dasyurus hallucatus*, is the smallest of all Australian quolls (300–1200g) and is restricted to five regional populations across Queensland, the Northern Territory and Western Australia, both on the mainland and offshore islands. The species appears to have declined in number and distribution over the last 50 years with a number of threats either directly or in combination with each other, contributing to the species decline. Threats include mortality caused by poisoning from cane toads, introduced predators, inappropriate fire regimes (predation after fire) and the removal, degradation and fragmentation of habitat as a result of development actions, mining activities and pastoralism. The northern quoll is listed as a threatened ('Endangered') species under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*.

The Pilbara northern quoll survey and monitoring project commenced in 2012 and will be conducted over 10 years with the aim of improving our understanding of distribution, ecology, abundance and demographics of the northern quoll in the region. The project aims to provide information to environmental regulators, biological consultants, resource development companies and other land managers that will allow appropriate management to ensure the persistence of resident northern quoll populations in the Pilbara region.

1.3 Objectives of the northern quoll project

1. To determine the northern quoll distribution in the Pilbara (including updating NatureMap records), and enhance our understanding of processes influencing distribution.
2. To estimate northern quoll abundance in the Pilbara and how this changes temporarily and spatially.
3. To improve understanding of northern quoll ecology and other demographic parameters in the Pilbara and allow comparison with studies in the Kimberley, Northern Territory and Queensland.
4. To inform management actions with regard to the persistence of northern quoll populations in and around mining sites and other developments in the Pilbara.
5. To clarify the taxonomic and conservation status of the Pilbara northern quoll population.

1.3.1 Desktop review

A desktop review of northern quoll distribution was undertaken in 2010 in order to update NatureMap records (Objective 1) and identify suitable quoll habitat for further survey (Objectives 2 & 3). Records included landholder sightings, museum specimens and capture records by environmental consultants and Parks and Wildlife staff. The review helped to inform placement of long-term monitoring sites. This report and the associated data will be available on the NatureMap Pilbara Threatened Fauna portal located at:

www.naturemap.dpaw.wa.gov.au/threatenedfauna

1.3.2 Presence survey and distribution modelling

To inform species distribution modelling (Objectives 1 & 4), Parks and Wildlife has commenced a survey of quoll presence at 100 sites throughout the Pilbara. At each site, staff will undertake scat searches and establish transects of baited remote motion sensor cameras in rocky areas to detect quoll presence. Habitat characteristics of each site are recorded according to Appendix A. Additional presence records and habitat data from environmental consultants, pastoralists and mine site environmental staff will be used to build and validate models of distribution.

1.3.3 Long term monitoring sites

Parks and Wildlife is also undertaking annual trapping at 10 sites throughout the Pilbara in order to achieve more detailed information on population demographics and abundance (Objectives 2 & 3). Those selected include Indee Station, Millstream Chichester National Park, Mt Florance Station, Mallina Station, De Grey Station,

Cane River Conservation Park, Yarrie Station, Red Hill Station, Dolphin Island Nature Reserve and Karijini National Park. The land tenure and security of the site has been taken into consideration, as these sites will need to remain free of mining and / or major pastoral disturbance for the duration of the project. Because of anticipated low capture rates and seasonal fluctuations in quoll population abundance it will be necessary to monitor sites over a long period (10 years) to detect trends in abundance and other demographic parameters.

We anticipate that there will be opportunities for ecological research projects such as examining den and feeding habitat use, movements across the landscape, impact of introduced predators, interactions with mine-sites and characteristics of natural den sites in order to inform artificial habitat creation. Collaborations with Murdoch University, University of Queensland and Edith Cowan University are underway.

1.4 Methods

1.4.1 Trapping

Once a quoll population has been identified, the following methods should be used for ongoing monitoring to be comparable to the Department's regional survey.

Northern quoll trapping should be conducted from 1 April to 30 September to avoid times when females have large or denned pouch young.

As northern quolls frequently live in linear rocky habitats, population monitoring is undertaken using trapping transects rather than grids. Transects are configured to achieve optimal cover of the sites. Two parallel lines of 25 traps each are laid across broader habitat types such as breakaways or granite outcrops.

Specific quoll trapping methods:

- Trap type: wire cage traps covered with hessian or similar (e.g. small Sheffield traps: 45 cm x 17 cm x 17 cm, Sheffield Wire co, Welshpool WA)
- Bait type: Universal bait (peanut butter, oats) with sardines
- Layout: 50 traps, each spaced 50 m apart, in two lines of 25 traps, with at least 50 m between each transect.
- Duration: Traps opened for four consecutive nights at each site (200 trap nights). Traps are checked and closed within three hours of sunrise, rebaited and opened in the late afternoon.
- Marking: Individual trap locations are fixed and marked (GPS) for the duration of the monitoring program. Sites are marked with permanent markers such as metal site tags.
- Searches: To verify a zero-capture record, personnel should also undertake a total of 10 person-hours of scat searches per site, and use at least five remote cameras at the site/surrounding area during the four nights of trapping.

Information collected from trapped animals:

Morphometric, survivorship, dietary, breeding and genetic information is collected for comparison with populations of northern quolls in the Pilbara and across Australia.

- All captured quolls are implanted with a subcutaneous microchip (PIT) for individual identification.
- Standard measurements collected from all captured quolls (body weight, short pes length, head length, age class, sex and reproductive condition) (see example datasheet in Appendix B)
- A small amount of ear tissue is collected from all individuals at initial capture for genetic analysis (stored in 100% ethanol, to be lodged with Department of Parks and Wildlife).
- A sample of scats is collected where possible for dietary analysis (stored in a paper envelope, lodged with Department of Parks and Wildlife).

- An estimation of fox/cat/dog/dingo activity at each site will be derived using visual signs and remote cameras.
- Habitat data sheets (Appendix A) should be completed for each trapping site and submitted to the Department of Parks and Wildlife.

These protocols outline the methods for regular monitoring of a population of northern quolls, in order to answer questions about abundance, survivorship and breeding demographics. More information on surveying for threatened mammals can be found here:

<http://www.environment.gov.au/system/files/resources/b1c6b237-12d9-4071-a26e-ee816caa2b39/files/survey-guidelines-mammals.pdf>

1.4.2 Camera trapping

Remote cameras can be useful to supplement trapping, for initial area searches to detect quolls and to assess quoll presence and activity in an area. Unlike traps, cameras can be used at any time of year. Duration of camera trapping will depend on the circumstances and goals of the individual project, but more information is collected from a longer set time. In general, camera traps should not be baited with food rewards for longer than five consecutive nights, to prevent impacts on normal animal behaviour (See Parks and Wildlife standard operating procedure 5.2 available from <http://www.dpaw.wa.gov.au/plants-and-animals/96-monitoring/standards/99-standard-operating-procedures>). Scent lures with no associated food reward may be useful, for example burley oil.

For our presence survey (Objective 1), standard methods are as follows;

- Transects of ten baited remote motion sensor cameras spaced at least 100 m for four nights.
- 10 person hours of scat searches in rocky areas
- Habitat data sheet (Appendix A) completed

It is important to note that this does not confirm absence, and proponents managing species-specific surveys will need to undertake more extensive searches.

1.4.3 Habitat monitoring and distribution modelling

Habitat attributes will be recorded at all sites (including camera survey and monitoring sites) and will be analysed to help predict the spatial distribution of suitable habitat and the probability of quolls occupying locations based on environmental attributes. Fire history and other disturbances such as livestock impact will also be assessed and monitored. Photo points and digital rain gauges will be established at all long-term monitoring sites. Site characteristics will be correlated with quoll presence or likely absence in order to inform predictive models. Standard data sheets used to record habitat attributes are in Appendix A.

1.5 Reporting

Much of the survey and monitoring data collected will be suitable for comparison with studies for quolls in the Kimberley, Northern Territory and Queensland. An annual report on population and habitat monitoring will be prepared, and peer reviewed papers prepared throughout the duration of the project.

All presence records, including those from the grey literature review and historical record, will be uploaded to NatureMap. Environmental consultants, mine-site environmental staff and others encountering Pilbara priority species (northern quoll, bilby, mulgara, Pilbara leaf-nosed bat and Pilbara olive python) are also encouraged to add records to NatureMap, via the Pilbara Threatened Fauna theme

www.naturemap.dpaw.wa.gov.au/threatenedfauna .

Appendices

Appendix 1 Habitat data sheet

Appendix 2 Example trapping data sheet

PILBARA NORTHERN QUOLL DATA SHEET – Habitat Survey

Site name:		Recorder/s:
Date:	Time:	Contact email:
GPS datum:		GPS Accuracy:
GPS Co-ords:		Height above sea level:

Please consider a 50m x 50m patch for all questions. Many of these categories are derived from: National Committee on Soil and Terrain (2009) 'Australian Soil and Land Survey Field Handbook', CSIRO Publishing, Melbourne

1. LANDFORM ELEMENT

Morphological type				13
C	Crest	F	Flat	
U	Upper slope	V	Open depression (vale)	
M	Mid slope	D	Closed depression	
L	Lower slope	H	Hillock	
S	Simple slope	R	Ridge	

2. ROCK OUTCROP

TYPE (e.g. granite)				
Abundance				101
0	No bedrock exposed			
1	Very slightly rocky		<2%	
2	Slightly rocky		2-10%	
3	Rocky		10-20%	
4	Very rocky		20-50%	
5	Rockland		>50%	

3. SOIL

Colour				
R	Red	Y	Yellow	
O	Orange	G	Grey	
B	Brown	D	Dark	
Type				116
1	Clay	5	Coarse sand	
2	Fine silt	6	Fine gravel	
3	Coarse silt	7	Coarse gravel	
4	Fine sand	8	None; rock only	

4. GROUND COVER

% Cover Leaf Litter % Cover Bare Ground (including litter, rock cover and bare soil, excluding live vegetation)	
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5. COARSE FRAGMENTS ON THE SURFACE

Rock Abundance				97
0	No coarse fragments		0	
1	Very slightly; very few		<2%	
2	Slightly; few		2%-10%	
3	No qualifier; common		10%-20%	
4	Moderately; many		20%-50%	
5	Very; abundant		50%-90%	
6	Extremely; very abundant		>90%	

Rock Size				99
3	Gravelly		>60 mm	
4	Cobbly; or cobbles		60-200 mm	
5	Stony; stones		200-600 mm	
6	Bouldery; or boulders		600 mm-2 m	
7	Large boulders		>2 m	

6. LAND SURFACE

Disturbance of site				88
0	No effective disturbance			
1	No effective disturbance except grazing by hoofed animals			
2	Limited clearing			
3	Extensive clearing			
8	Highly disturbed, e.g. mining, urban			

7. EVIDENCE OF RECENT FIRE

Frequency		Intensity	
0	Long unburnt	0	No damage
1	Several years since burn	1	Minor
2	Burnt before last rainfall	2	Some defoliated
3	Burnt after last rainfall	3	Most defoliated
		4	Unknown

Distance to nearest unburnt patch (>5 ha)

1	<100 m	2	100-500 m
3	500m – 1 km	4	>1 km

Patchiness, % of area burnt:

8. NEARBY WATER BODIES

		R	River
1	Permanent	S	Soak/spring
2	Seasonal	C	Creek
3	Ephemeral	P	Pool
		B	Bore / windmill / dam

Distance (m):

9. EVIDENCE OF FERAL / INTRODUCED SPECIES (please list)

Please collect any cat, dingo or quoll scats

Place into an envelope (not plastic), label with collector's name, date, species, GPS location and lodge with DPaw for dietary analysis.

10. SITE PHOTOS (please attach)

Photo number:

Direction facing:

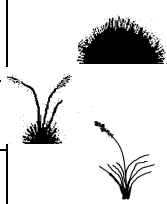
11. VEGETATIVE GROWTH STAGE

1	Early regeneration
2	Advanced regeneration
3	Mature vegetation
4	Senescent phase

12. NATIVE FIG (FICUS) PRESENCE

0	Absent
1	1–10 plants
2	> 10 plants

13. VEGETATION

Please tick 1 box in each row, and record dominant species where known			Absent	Isolated <2%	Very sparse 2–10%	Sparse 10–30%	Mid-Dense 30–70%	Dense 70–100%
TREES	Dominant species							
	> 30 m							
	10–30 m							
	<10 m							
MALLEES	Dominant species							
	Over 8 m							
	Under 8m							
SHRUBS	Dominant species							
	Over 2 m							
	1–2 m							
	Under 1 m							
HERBS & SEDGES	Dominant species							
								
GRASSES	Dominant species							
	Hummock							
	Tussock							
	Bunch							

SITE MAP

Showing relevant landforms, vegetation types, creeks, landmarks etc as well as an indication of trap/camera placement

TOP VIEW**SIDE VIEW**

Date ____/____/____

Traps set _____

*Pouch categories: U – undeveloped, D – developed, Y – pouch young, L – lactating. Any other info in comments. ^N/R/RT: N– new, R–recapture (caught in previous session), RT–retrap (caught already this session)