

**SURVEY OF MARINE TURTLE NESTING ON FLINDERS BEACH,
SOUTH OF MAPOON,
25- 30th October 2004**

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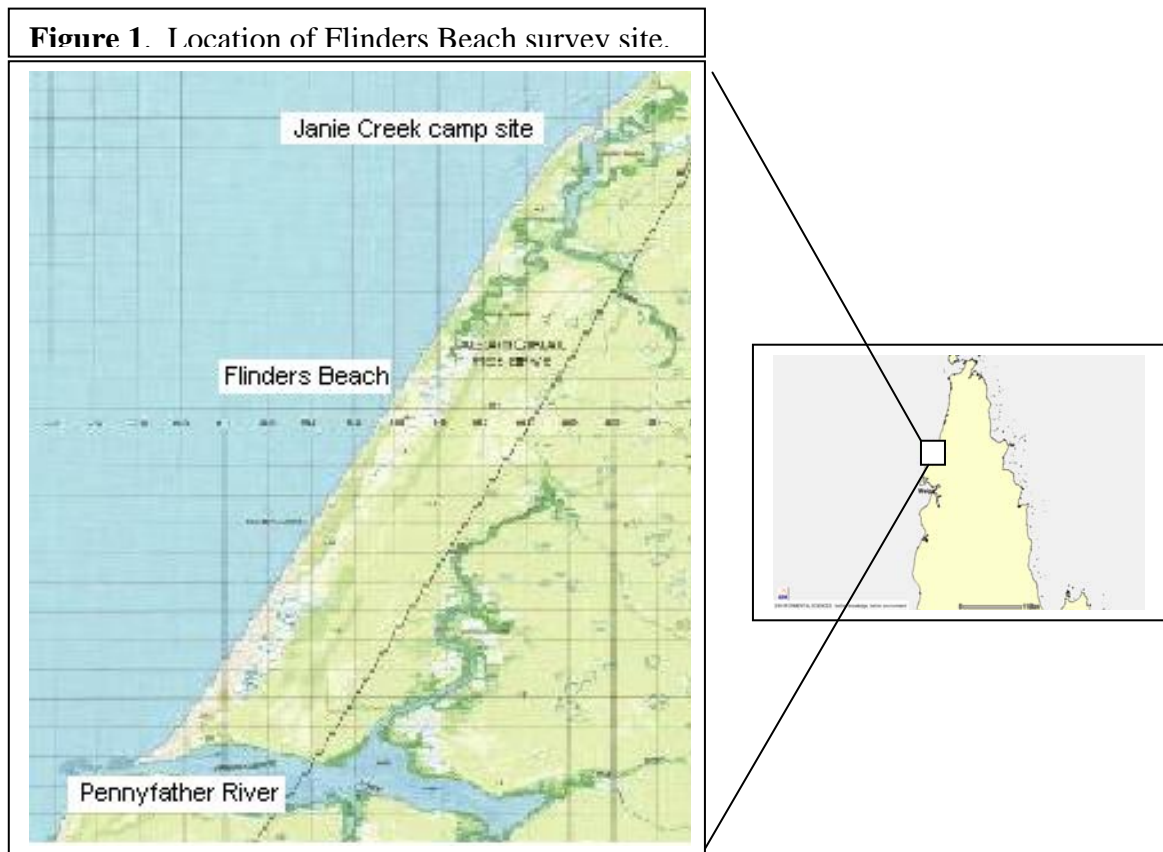
Key Recommendations

**Flatback and olive ridley turtle nesting populations – Flinders Beach, northwest
Cape York Peninsula**

- Continue to quantify the regional nesting populations by tagging a representative subset of the total nesting population for each nesting season;
- Continue to assess the quality of nesting habitat by determining the nesting density/success, fecundity, hatching success, and thermal profiles of the nesting habitat to provide baseline data for other marine turtle rookeries in Queensland;
- Continue to quantify the level of feral pig, dingo and varanid predation of turtle nests;
- Continue to place Feral Pig Exclusion Devices (FPEDs) on turtle nests outside control areas and;
- Assess the impact of Aboriginal and Torres Strait Islander harvesting on the marine turtle eggs and adults using the beaches north of Weipa.

Beach Survey

As with previous surveys (4-5 August 2004 and Camp Alpha 29 August – 3 September 2004 (Limpus et al., 2004)), a research base was established at Janie Creek from the 25 - 30th October (See Figure 1). Access to nesting sites on Flinders Beach was via dinghy and three 4wd vehicles patrolled the beach.



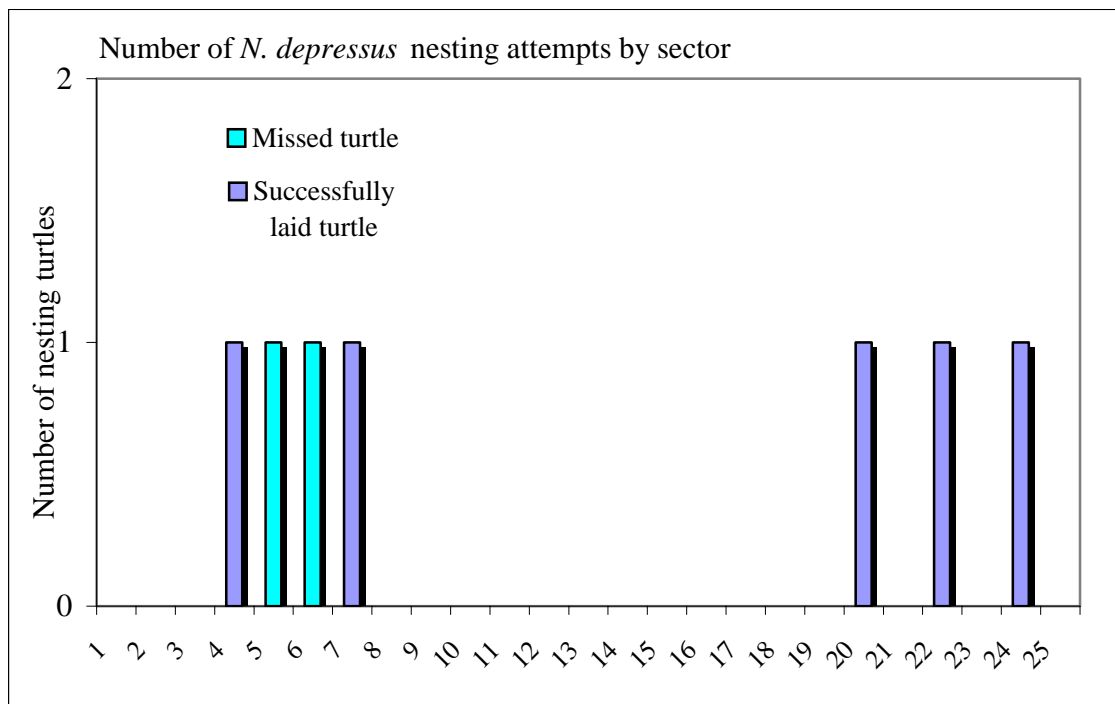
Turtle nesting activities were recorded as per the standard Queensland Turtle Conservation Project methodologies. Each nesting event was scored for turtle species and nesting success (Table 1). All nesting events were recorded to beach sector (Figure 2, Appendix 1) and a GPS location for each event recorded if available.

Flatback turtles (*Natator depressus*) were the only species of marine turtle recorded nesting on Flinders Beach during the survey period. Seventy-three pre-existing nesting attempts were recorded during the initial beach survey.

Table 1. Nightly census counts of flatback turtles on the Flinders Beach.

Date	Track count	Clutches laid	Tagged turtles	Emerged clutches	Nesting turtles dying
25/10/04	0			1	0
26/10/04	0			3	0
27/10/04	0			1	0
28/10/04	5	5 (?)	3	9	0
29/10/04	1	2	2	3	0

Figure 2. Frequency of nesting by sector at Flinders Beach, 25-30th October 2004.



Deployment of experimental feral pig exclusion devices was discontinued due to the expected commencement of the wet season. Sectors 0 and 1 were however selected for placement of scent devices. .

Tagging

The standard methodology of the Queensland Turtle Research Project was used in this study (Miller *et al* 2000a). Nightly beach patrols were made to quantify turtle nesting activity and to collect data about nesting females, their eggs and hatchlings. Self-locking titanium tags were applied to turtles when encountered.

No turtles were recorded with existing tags (recaptures). Damage or unusual morphological features displayed by the turtle were recorded.

Special terms are defined:

- Primary Tagging: a turtle tagged for the first time and has no indication of tag scars.
- Interseason Retag (ISR RTA): a turtle that has healed scars from a lost tag that was applied in a previous nesting season or survey.

A total of 5 individual nesting *N. depressus* were encountered out of 7 nesting attempts on Flinders Beach during survey duration. All turtles were encountered for the first time and none were re-captured on a successive evening.

Measuring

Curved carapace measurements were taken on all turtles encountered on the beach (Figure 3). The mean size of the nesting *N. depressus* is listed in Table 2. This mean size is similar to that recorded in Limpus *et al.* (2000; 2004) and in past studies undertaken at nearby Crab Island (Limpus *et al.*, 1983; 1993; 2000).

Figure 3. Traditional Owner Aidi Mamoose taking curved carapace measurement.



Nesting success

For each nesting event, the nesting success (probability that a clutch will be laid when a turtle comes ashore for a nesting attempt) was recorded. For *N. depressus*, 5 clutches were laid out of 7 nesting attempts on Flinders Beach. Although a very small sample size, this equals a nesting success of 77.4%. No existing clutches were recorded being dug into by the nesting females during the survey period.

Clutch counts and egg data

Immediately following oviposition, three clutches were excavated and the number of eggs counted (Table 2, Figure 4). A subset of 10 eggs from these three clutches was measured and the eggs were weighed. Clutch counts and egg measurements were within ranges recorded at other rookeries for the species.

Figure 4. Conducting clutch counts.



Hatchling emergence

Signs of hatchling emergence were recorded during nightly patrols (Figure 5). Fourteen *N. depressus* clutch emergences were documented, of these eight were excavated and emergence success determined. The recorded hatching success and emergence success values are within ranges recorded for the species at other rookeries (Table 2).

Figure 5. Assessing hatching and emergence success



Table 2. Measurements of nesting turtles, their eggs, hatchlings, nests and incubation success for *Natator depressus* recorded at Flinders Beach.

	Measurement			
	Mean	SD	Range	N
<i>Natator depressus</i>				
Curved carapace length (cm)	90.2	0.43	89.7 – 90.7	5
Clutch count				
Oviposition	53.7	7.02	47-61	3
Egg measurements				
Diameter (cm)	5.33	1.1	47.7-52.8	30
Weight (g)	73.5	2.53	69-78	20
Hatching success %	90.8	11.9	63.3-100	8 clutches
Emergence success %	83.6	16.7	63.3-100	8 clutches
Nest Temperature	33.8	1.256	32.5-35.0	3

Laparoscopy

Two nesting female turtles were internally examined using laparoscopy to determine recruitment rate into the 2004 breeding population, past breeding history and evidence of disturbance during egg laying (Limpus, 1992; Limpus and Limpus, 2003) (Figure 6). Both turtles showed evidence of having bred in the past, based on the presence of corpora albicantia in the ovaries.

Oviducts were checked for presence or absence of oviducal eggs. *Caretta caretta* and *Chelonia mydas* research in south Queensland is supporting the hypothesis that females making very long migrations are resorbing mature follicles to supplement energy and nutrient reserves for the homeward migration. With females making very long distance migrations, females resorb mature follicles before the end of the breeding season.

Data combined with the first survey indicates that corpora albicantia were found in only 17 of 18 *N. depressus* examined (Table 3). This represents a recruitment rate of 5.5% new females into the annual breeding population. This recruitment value is low but larger sample sizes are needed. Studies in eastern Queensland have demonstrated that recruitment should be in the order of 10-20% in a stable population (Limpus et al., 2000).

Based on size of the corpora albicantia for 12 *N. depressus* with a complete scoring of the data (Table 3), the following breeding histories were identified:

1 st time breeding	1
1 year remigration	nil
2 year migration	4
more than 2 year migration	7

Based on the presence or absence of atretic follicles recorded from this survey, the majority of the nesting females had no mature sized follicles in atresia. For some females, small follicles were in atresia. None were resorbing an entire clutch as occurs with females making very long migrations. If *N. depressus* and *L. olivacea* follow the same trends as the other species, then these data indicate that the majority of this nesting population have feeding grounds with a few hundred kilometres of the nesting beach.

Figure 6. Laparoscopy of nesting female turtles at Flinders Beach, October 2004.



Table 3. Summary of the results from laparoscopic examination of nesting *N. depressus* from camp Alpha and Bravo.

Tag no.	Date	Ovarian structure					Past breeding history
		Preparing another clutch	Corpora lutea	Corpora albicantia		Atretic follicles	
				3mm with white folds	small<2mm		
K64807	29/08	no	Lots	yes	yes	nil	Bred 2002, not 2003 Originally tagged 04 August, has laid at least three clutches for season; laying last clutch 29 August.
K64843	02/09	no	lots	Nil	yes	Small and large	Not bred 2003, 2002
K64848	03/8	no	yes			nil	-
K64875	29/08	At least 2 clutches	2 size classes	Nil	lots	nil	Not bred 2003, 2002
K64881	31/08	no	yes			small	-
K64884	02/09	yes	yes	Nil	yes	Few large	Not bred 2003, 2002
K64886	01/09	yes	yes	yes	lots	nil	Bred 2002, not 2003
K64887	01/09	yes	yes	yes	yes	nil	Bred 2002, not 2003
K64888	01/09	yes	yes	Nil	yes	nil	Not bred 2003, 2002
K64893	3/09	no	yes			Less than full sized	-
K64901	31/09	no	yes			Few small	-
K64904	31/08	At least 1 clutch	yes			nil	-
K64906	31/08	no	yes			nil	-
K64907	02/09	yes	yes	nil	yes	nil	Not bred 2003, 2002
K64927	02/09	yes	yes	nil	nil	nil	First time breeding
K64929	02/09	no	yes	yes	yes	nil	Bred 2002, not 2003
K64812	28/10	no	yes		Yes	Nil	
K63687	28/10	no	yes		yes	Few small	

Nest predation

Four sectors were chosen at random to assess the effectiveness of Feral Pig Exclusion Devices (FPEDS) (Figure 7). All nests protected by the devices remained un-predated, while the majority of unprotected nests had been predated (Table 4). All predation of nests was assessed to be by feral pigs, based on tracks adjacent to the nests.

Table 4. Summary of FPED effectiveness on protecting turtle nests.

Sector	Number of nests laid	FPED installed		No FPED installed	
		Predated	Not Predated	Predated	Not Predated
17-18	8	0	6	2	0
16-17	5	0	1	4	0
15-16	5	0	4	0	1
3-4	11	0	2	6	3

Figure 7. Installation of Feral Pig Exclusion Devices.



Beach-washed nets

Beach-washed nets were recorded along the entire length of Flinders Beach (Figure 8). A count of 348 nets along the 24km of beach was made and an attempt to document the origin of the nets was undertaken. Approximately 5km of Flinders Beach was surveyed and the nets identified and removed.

The majority of the beach-washed nets were of foreign origin (Korea, Taiwan, China, Indonesia, Thailand etc) with some Australian nets (primarily trawl) being present.

Figure 8. Pulling nets from the sand using 4WD vehicle.



Fauna Surveys

Incidental avian, reptilian and mammalian surveys were conducted while based at Janie Creek. Elliot trap-lines were installed in two different vegetation communities (mangrove riparian and freshwater riparian) to give a total of 160 trap nights.

All fauna encountered in the Flinders Beach and Janie Beach area were documented and are listed in Appendix 2.

MONITORING RECOMMENDATIONS

Continued monitoring of Flinders Beach nesting populations should include;

- Quantification of nesting densities to determine if significant trends are emerging.
- Quantification of hatching and emergence success to determine if a change in recruitment rate is occurring.
- Continuation of monitoring morphometrics (particularly curved carapace measurements) as an indicator of threats to the population, specifically the loss to the population of adult females.
- Comparison of Flinders Beach nesting cohort with central and southern Great Barrier Reef genetic stocks (Peak, Wild Duck, Heron Island, Mon Repos) to determine and compare trends.
- Use Flinders Beach nesting cohort as an independent baseline model, to provide a nesting site that is relatively isolated from most human influence (lights, boats, coastal development, pollution, and recreational use) on Western Cape York.
- Encourage State and Federal management agencies to maximise tag returns from far northern indigenous communities. Perhaps through funding a tag collection program.

Aerial surveillance

- To determine the spatial boundaries of nesting season during the peak of the nesting season.
- To observe courtship aggregations at the beginning of the nesting season.
- Opportunistic sightings, track counts to indicate when surveys should occur.

Continue quantifying the level of nest predation and effectiveness of FPEDs.

Continue the net counting, analysis, reporting and disposal of discarded nets on Flinders beach.

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Appendix 1

Latitude and longitude for the sector markers along Flinders beach and default values for Flinders Beach and Janie Beach.

Sector	Latitude	Longitude
Flinders Beach Default	12° 13.700' S	141° 43.632' E
Pennefather River, 0 – 1	12° 13.700' S	141° 43.632' E
1 – 2	12° 13.327' S	141° 43.988' E
2 – 3	12° 12.837' S	141° 44.281' E
3 – 4	12° 12.359' S	141° 44.527' E
4 – 5	12° 11.863' S	141° 44.743' E
5 – 6	12° 11.374' S	141° 44.966' E
6 – 7	12° 10.866' S	141° 45.194' E
7 – 8	12° 10.367' S	141° 45.426' E
8 – 9	12° 09.872' S	141° 45.637' E
9 – 10	12° 09.387' S	141° 45.839' E
10 – 11	12° 08.847' S	141° 46.068' E
11 – 12	12° 08.409' S	141° 46.272' E
12 – 13	12° 07.902' S	141° 46.504' E
13 – 14	12° 07.406' S	141° 46.727' E
14 – 15	12° 06.902' S	141° 46.958' E
15 – 16	12° 06.414' S	141° 47.186' E
16 – 17	12° 05.914' S	141° 47.417' E
17 – 18	12° 05.450' S	141° 47.628' E
18 – 19	12° 04.935' S	141° 47.846' E
19 – 20	12° 04.418' S	141° 48.055' E
20 – 21	12° 03.931' S	141° 48.243' E
21 – 22	12° 03.406' S	141° 48.448' E
22 – 23	12° 02.919' S	141° 48.666' E
23 – 24	12° 02.441' S	141° 48.904' E
24 – Janie Creek	12° 01.999' S	141° 49.218' E
Janie Creek	12° 01.962' S	141° 49.431' E
Janie Beach Default	12° 01.000' S	141° 50.000' E

Appendix 2: Fauna List

Bird list

Family	Scientific name	Common name	Conservation status NCA
Megapodiidae	<i>Alectura lathami</i>	Australian brush-turkey	C
Megapodiidae	<i>Megapodius reinwardt</i>	orange-footed scrubfowl	C
Anseranatidae	<i>Anseranas semipalmata</i>	magpie goose	C
Anatidae	<i>Anas superciliosa</i>	Pacific black duck	C
Anatidae	<i>Dendrocygna arcuata</i>	wandering whistling-duck	C
Anatidae	<i>Tadorna radjah</i>	radjah shelduck	R
Anatidae	<i>Anas gracilis</i>	Grey teal	C
Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe	C
Anatidae	<i>Nettapus coromandelianus</i>	Cotton Pygmy goose	R
Sulidae	<i>Sula leucogaster</i>	brown booby	C
Phalacrocoracidae	<i>Phalacrocorax melanoleucos</i>	little pied cormorant	C
Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant	C
Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican	C
Fregatidae	<i>Fregata ariel</i>	lesser frigatebird	C
Ardeidae	<i>Ardea alba</i>	great egret	C
Ardeidae	<i>Ardea intermedia</i>	intermediate egret	C
Ardeidae	<i>Egretta garzetta</i>	little egret	C
Ardeidae	<i>Egretta sacra</i>	eastern reef egret	C
Ardeidae	<i>Ixobrychus flavicollis</i>	black bittern	C
Ardeidae	<i>Ardea picata</i>	Pied heron	C
Ardeidae	<i>Nycticorax caledonicus</i>	nankeen night heron	C
Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis	C
Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis	C
Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy ibis	C
Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	black-necked stork	R
Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite	C
Accipitridae	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	C
Accipitridae	<i>Haliastur indus</i>	brahminy kite	C
Accipitridae	<i>Haliastur sphenurus</i>	whistling kite	C
Accipitridae	<i>Lophoictinia isura</i>	square-tailed kite	R
Accipitridae	<i>Milvus migrans</i>	black kite	C
Accipitridae	<i>Pandion haliaetus</i>	osprey	C
Gruidae	<i>Grus rubicunda</i>	brolga	C
Otididae	<i>Ardeotis australis</i>	Australian bustard	C
Scolopacidae	<i>Limosa lapponica</i>	bar-tailed godwit	C
Scolopacidae	<i>Numenius madagascariensis</i>	eastern curlew	R
Scolopacidae	<i>Numenius phaeopus</i>	whimbrel	C
		sandpiper	
		tattler	
Jacanidae	<i>Irediparra gallinacea</i>	comb-crested jacana	C
Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew	C
Burhinidae	<i>Esacus neglectus</i>	beach stone-curlew	V
Haematopodidae	<i>Haematopus longirostris</i>	pied oystercatcher	C

Charadriidae	<i>Charadrius mongolus</i>	lesser sand plover	C
Charadriidae	<i>Charadrius ruficapillus</i>	red-capped plover	C
Charadriidae	<i>Vanellus miles miles</i>	masked lapwing (northern subspecies)	C
Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged stilt	C
Charadriidae	<i>Elseyornis melanops</i>	Black-fronted dotterel	C
Laridae	<i>Larus novaehollandiae</i>	silver gull	C
Laridae	<i>Sterna albifrons*</i>	little tern	E
Laridae	<i>Sterna anaethetus</i>	bridled tern	C
Laridae	<i>Sterna bergii</i>	crested tern	C
Charadriiformes	<i>Sterna bengalensis</i>	Lesser crested tern	C
Laridae	<i>Sterna sumatrana</i>	black-naped tern	C
Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove	C
Columbidae	<i>Geopelia striata</i>	peaceful dove	C
Columbidae	<i>Macropygia amboinensis</i>	brown cuckoo-dove	C
Columbidae	<i>Ducula bicolor</i>	Torresian imperial pigeon	
Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo	C
Psittacidae	<i>Aprosmictus erythropterus</i>	red-winged parrot	C
Psittacidae	<i>Trichoglossus haematodus haematodus</i>	rainbow lorikeet	C
Caprimulgidae	<i>Caprimulgus macrurus</i>	large-tailed nightjar	C
Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra	C
Halcyonidae	<i>Dacelo leachii</i>	Blue-winged kookaburra	C
Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher	C
Ptilonorhynchidae	<i>Chlamydera nuchalis</i>	Great Bowerbird	C
Motacillidae	<i>Anthus novaeseelandiae</i>	Richards Pipit	C
Cuculidae	<i>Eudynamis scolopacea</i>	Common Koel	C
Passeridae	<i>Taeniopygia bichenovii</i>	Double-barred Finch	C
Passeridae	<i>Poephila cincta(atropygialis ?)</i>	Black-throated finch	C
Dicruridae	<i>Grallina cyanoleuca</i>	Magpie lark	C
Meropidae	<i>Merops ornatus</i>	rainbow bee-eater	C
Meliphagidae	<i>Lichenostomus flavus</i>	yellow honeyeater	C
Meliphagidae	<i>Meliphaga gracilis</i>	graceful honeyeater	C
Meliphagidae	<i>Myzomela obscura</i>	dusky honeyeater	C
Meliphagidae	<i>Lichmera indistincta</i>	Brown honeyeater	C
Meliphagidae	<i>Meliphaga notata</i>	Yellow-spotted honeyeater	C
Meliphagidae	<i>Conopophila albogularis</i>	Rufous banded honeyeater	C
Dicruridae	<i>Myiagra inquieta</i>	restless flycatcher	C
Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike	C
Oriolidae	<i>Oriolus flavocinctus</i>	yellow oriole	C
Corvidae	<i>Corvus orru</i>	Torresian crow	C
Nectariniidae	<i>Nectarinia jugularis</i>	yellow-bellied sunbird	C

Mammals

Scientific name	Common name	Conservation status NCA
<i>Melomys burtoni</i>	Grassland melomys	C

Canis lupus dingo

dingo

Sus scrofa

pig

Reptiles

Scientific name	Common name	Conservation status
		NCA
<i>Diporiphora bilineata</i>	two-lined dragon	C
<i>Carlia longipes</i>		C
<i>Gehyra nana</i>		C
<i>Amphibolurus gilberti</i>	Gilbert's dragon	C
<i>Dendrelaphis calligastra</i>	northern tree snake	C
<i>Gehyra dubia</i>		C
<i>Cryptoblepharus plagiocephalus</i>		C
<i>Hemidactylus frenatus</i>	house gecko	
<i>Crocodylus porosus</i>	Saltwater crocodile	V
Ctenotis (sp)	numerous	
Varanid (unconfirmed species)	numerous	