MAMMAL MONITORING, BARROW ISLAND NATURE RESERVE

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1. INTRODUCTION

Barrow Island, as well as being of considerable nature conservation significance for other reasons, is one of Australia's most important mammal conservation areas. It supports 13 terrestrial mammal species, of which five are listed as threatened pursuant to the WA *Wildlife Conservation Act* (Table 1). (The Barrow Island Mouse, an endemic subspecies, qualifies as Vulnerable under IUCN Red List criteria, but is not currently listed.) Barrow Island has been a producing oil field since the mid-1960s, the operator being West Australian Petroleum Pty Ltd (WAPET).

The draft Interim Management Guidelines (CALM 1997) for Barrow Island Nature Reserve recommended that a formal mammal monitoring program be established. The NPNCA, in reporting on a visit in September 1997, also recommended additional mammal monitoring.

This report covers a visit from 2 - 11 November 1998 during which we established five mammal trapping grids, undertook opportunistic trapping at other sites and continued the standard spotlighting transects run since 1973.

Table 1. Terrestrial mammals of Barrow Island

Species	**conservation status**
Common Planigale, *Planigale maculata*	not threatened
Pilbara Pseudantechinus, *Pseudantechinus* sp.	not threatened
Barrow Island Golden Bandicoot, *Isoodon auratus barrowensis*	Vulnerable
Northern Brushtail Possum, *Trichosurus vulpecula arnhemensis*	not threatened
Barrow Island Boodie, *Bettongia lesueur* (Barrow Island subspecies)	Vulnerable
Barrow Island Spectacled Hare-wallaby, *Lagorchestes c. conspicillatus*	Vulnerable
Black-flanked Rock-wallaby, *Petrogale lateralis lateralis*	Vulnerable
Barrow Island Euro, *Macropus robustus isabellinus*	Vulnerable
Common Sheath-tail Bat, *Taphozous georgianus*	not threatened
Finlayson's Cave-bat, *Vespadelus finlaysoni*	not threatened
Rakali (Water-rat), *Hydromys chrysogaster*	not threatened
Djoori (Common Rock-rat), *Zyzomys argurus*	not threatened
Barrow Island Mouse, *Pseudomys nanus ferculinus*	not threatened (but VU using IUCN criteria)

2. OBJECTIVES

The following objectives were set for this visit:

1. Monitor abundance and condition of native mammals (apart from bats). Euros, Spectacled Hare-wallabies, Brushtail Possums and Boodies were monitored via spotlight runs, while Boodies, Golden Bandicoots, Brushtail Possums, native rodents and small dasyurid marsupials were monitored via trapping. Monitoring of rock-wallabies was not envisaged at present.

2. Monitor for incursion of exotic mammals, particularly rodents (Black Rats and House Mice).

3. METHODS

3.1 Trapping grids

Five trapping grids were selected. Each grid consists of 5 x 5 trapping stations, 20 m apart. Each trap point was marked by a metal dropper post with flagging tape attached. At each point

a cage trap (Sheffield wire 20 cm x 20 cm x 50 cm), a medium Elliott (25 cm x 9 cm x 10 cm) and a pit (PVC tube 15 cm diameter x 40 cm deep) with a 5 m drift fence, was set. Two of the grids, at Bandicoot Bay and John Wayne, were in sandy soils, and were fully established and run for four nights. The remaining three, on a scree slope at well S62, on limestone upland near well M21 and near WAPET landing, were each trapped for three nights using only the cage and Elliott traps. It is intended that pits will be installed at these three sites (utilising a portable rock drill and explosives) in September 1999. A summary of the trapping effort is shown in Table 2.

Brief descriptions of the trapping grids follow, together with descriptions of other places that were trapped.

- **Landing**. Located on the west side of the Landing road, 250 m south west of the storage sheds which lie to the south east of WAPET Landing. Located on brown gravelly sandy-loam with occasional limestone outcrops. Dominated by *Triodia angusta* to 1 m, 30 to 70%, with occasional *Acacia coriacea* to 2.5 m, *Myoporum acuminatum* and *Acacia bivenosa* to 1.5 m.

- **John Wayne**. Located on coastal plain near the west coast, with light brown sand, sand plain and low dune. Dominated by *Triodia angusta*) with *Olearia dampieri* ms (1 m), *Acanthocarpus preissii* (1 m) and occasional *Acacia coriacea* to 3 m.

- **S62**. Located 0.5 km south west of the John Wayne grid, on a limestone scree slope, gravelly with outcrops, and below a rugged cliff. Dominated by *Triodia wiseana* with occasional *Ficus platypoda*.

- **M21**. Located south of the main road between Camp and Base, between wells M21 and M22. Located mid-slope on brown gravelly sandy loam with occasional limestone outcrops. Dominated by *Triodia angusta* and *T. wiseana* to 1 m, 30 to 70% cover, occasional shrubs of *Melaleuca cardiophylla*, *Tephrosia rosea* and *Petalostylis labicheoides* with the herb *Trichodesma zeylanicum*.

- **Bandicoot Bay**. Located at the south end of Barrow Island, 500 m west of picnic area car-park on white sand, including an area of swale and dune. Dominated by *Triodia angusta*, 30 to 70% cover and emergent Aca*cia coriacea* to 2 m and *Myoporum acuminatum* to 1.5 m. *Spinifex longifolius* occurs on the seaward edge.

4.3 Opportunistic trapping.

Elliott traps were set around WAPET Landing and the warehouse to survey for introduced House Mice and Black Rats. Traps were set for two nights at the Landing (13 around storage sheds and 12 immediately west of the barge landing), and at Base (7 inside warehouse, 6 outside warehouse and 12 around the Mud Shed). Twenty five Elliotts were also set at the Narrow Neck in Bandicoot Bay, the site at which Black Rats were first detected on Barrow Island in 1990.

Trapping with cage and Elliott traps was also undertaken on Boodie and Middle Islands. Boodie Island was trapped (20 cage traps and 25 Elliotts for two nights) to assess the success of a reintroduction of Boodies undertaken in December 1993, and Middle Island was trapped (2 x 25 Elliotts for one night) to assess abundance of Golden Bandicoots. A Black Rat control program was undertaken on these islands in 1985 and 1991 respectively. Both islands were inspected for Black Rat tracks and droppings.

Table 2. Summary of trapping effort

Location	3/11	4/11	5/11	6/11	7/11	8/11	9/11	10/11	Total
Permanent grids									
M21	-	25 C 25 E	25 C 25 E	25 C 25 E	-	-	-	-	75 C 75 E
Landing	-	-	25 C 25 E	25 C 25 E	25 C 25 E	-	-	-	75 C 75 E
John Wayne	-	-	-	25 C 25 E 25 P	25 C 25 E 25 P	25 C 25 E 25 P	25 C 25 E 25 C	-	100 C 100 E 100 P
Bandicoot Bay	-	-	-	-	25 C 25 E 25 P	25 C 25 E 25 P	25 C 25 E 25 P	25 C 25 E 25 P	100 C 100 E 100 P
S62	-	-	-	-	-	25 C 25 E	25 C 25 E	25 C 25 E	75 C 75 E
Opportunistic									
Landing	-	-	-	-	25 E	25 E			50 E
Narrow Neck	-	-	-	-	25 E	25 E	25 E	25 E	100 E
Base	-	-	-	-	-	-	25 E	25 E	50 E
Boodie Island	20 C 25 E	20 C 25 E	-	-	-	-	-	-	40 C 50 E
Middle Island	-	50 E	-	-	-	-	-	-	50 E

Total Effort:	Cage traps	465
(# trap-nights)	Medium Elliotts	725
	Pits	200
		1 390

4.3 Other island visits

Pasco and Boomerang Islands were also visited and inspected for signs of Black Rats. A rat control program was undertaken on these islands in 1983. North and South Double Island were not inspected during this visit.

3.4 Spotlighting

The standard spotlighting transects (one in the largely undisturbed northern end of the island and one within the oilfield towards the southern end of the island) were run on six nights. Each transect is about 30 km long. A 4WD tray-top vehicle is driven at ca 15 km/h with one spotlighter observing animals. Distance from the centre-line of the transect was recorded to enable density calculations. To eliminate observer bias, each spotlighting team records on both runs on consecutive nights and the data from the two nights is combined.

4. RESULTS

4.1 Grid trapping

The number of mammals trapped at the five grids is given in Table 3 and the trap success rates are shown in Figures 1 - 5. Trap success rates for Boodies and Brushtail Possums were calculated on cage trap numbers only, those for Golden Bandicoots on cage and Elliott trap

numbers, those for the Pilbara Pseudantechinus, Barrow Island Mouse and Common Rock Rat on Elliott and pit trap numbers, and those for the Common Planigale on pit trap numbers only.

Table 3. Number of mammals trapped on grids (re-traps).

Grid	Hare-wallaby	Boodie	Golden Bandicoot	Brush tail Possum	Common Planigale	Common Rock-rat	Barrow Island Mouse
Bandicoot Bay	1	5 (1)	29 (30)	0	1 (0)	0	6 (1)
John Wayne	0	1 (0)	49 (41)	8 (1)	1 (0)	1 (0)	2 (0)
Landing	0	8 (4)	18 (14)	4 (2)	0	0	3 (1)
M21	0	1 (0)	16 (4)	3 (0)	0	0	0
S62	0	1 (0)	20 (10)	8 (0)	0	0	0

The Golden Bandicoot was the most frequently trapped mammal at all sites, with trap-success varying from 13.3% at M21 to 45.0% at John Wayne. Boodies were also trapped on all grids but at lower success rates (1.3 – 16.0%). Two Common Planigales were captured in pit traps - one at Bandicoot Bay and one at John Wayne. It can be anticipated that this species, the Pilbara Pseudantechinus (which was not captured during this visit) and the Rock Rat will be trapped more frequently once pit traps have been installed in the three rocky habitat grids.

4.2 Opportunistic trapping

No introduced House Mice or Black Rats were trapped on Barrow, Boodie or Middle Islands. The trap success rate for Boodies on Boodie island was 75% and it was obvious from tracks that Boodies were moving over the entire island. Most activity was centred on the south east end of the island where most of the warrens are located in, or adjacent to, limestone outcrops. The results of this successful reintroduction will be published separately. The trap success rate for Golden Bandicoots on Middle Island was 36%, similar to that obtained at the last monitoring in 1993.

4.3 Other island visits

No signs of Black Rats were found on Pasco or Boomerang Islands. Tracks of Brushtail Possums and Golden Bandicoots were widespread on Boomerang Island.

4.3 Spotlighting

Gross spotlighting data are presented in Table 5. There was no significant difference between total mammals spotted in the north and south runs. Analyses will be made to see if there are any differences between species. Numbers of animals sighted increased over the period of spotlighting; this may have been due to the spotlighters seeing more animals with experience or to warmer, less windy and moonless nights in the latter period of the trip.

Spotlighting data will be analysed using the line transect method to produce density estimates.

Table 4. Total mammals sighted over two consecutive nights.

Date	North Run	South Run
3/4 Nov 1998	114	99
5/6 Nov 1998	125	139
9/10 Nov 1998	153	153
Total	392	391
Mean number sighted per night	130	130

4.4 Opportunistic observations

We visited caves near S67J and west of Y43M. Two species of bats were present at the S block cave (*Vespadelus finlaysoni* and *Taphozous georgianus*). No bats were present in the large coastal cave in Y block. Rock-wallabies (*Petrogale lateralis lateralis*) were observed in a cliff adjacent to well Q21.

5. FUTURE WORK

We believe that the grid trapping and spotlighting design described above is the most cost-effective compromise for monitoring Barrow Island terrestrial mammals. The spotlighting has the added advantage of being comparable with data collected every two to three years since 1973.

We recommend that mammal monitoring, utilising the trapping grids and spotlight runs, should be undertaken each year for five years by CALM and WAPET staff and the frequency of work reviewed at the end of that period. Four people are needed to operate the trapping grids, as these must be cleared early in the morning before rising temperatures can detrimentally affect trapped animals. The best staffing would be two CALM**Science**/WATSCU staff from CALM's WA Wildlife Research Centre, one person from the CALM Pilbara Region and one WAPET person.

The next visit is recommended for September 1999. Because the pit traps will have to be installed in the three rocky grids, a two week visit will be necessary. Thereafter, a one week trip per annum will be sufficient.

6. OTHER ISSUES

6.1 Hygiene and detection of incursions of exotic mammals

Rodents. The introduction of exotic mammals is the single greatest threat to the integrity of the native fauna of Barrow Island. Good hygiene procedures are essential to prevent incursions of exotic animals, particularly rodents, and WAPET have maintained excellent hygiene procedures for many years. Barrow Island may be the largest land mass in the world with no introduced rodents – an enviable record that we should do everything possible to maintain. We note that a House Mouse arrived on Barrow Island in a car body during 1998, apparently due to a failure by staff and/or contractors in carrying out the existing hygiene program. There was another mouse incursion in 1994. The vigilance of WAPET staff who noticed the 1998 hygiene breach and quickly acted on it should be commended. However, these incursions reinforce the need for frequent reviews of rodent control procedures.

We were briefed on the current rodent (and other exotic animal) hygiene procedures by

Stephan Fritz. Hygiene depends on detection of rodents by flour trays being placed in enclosed containers before they are shipped to Barrow, and on adequate checking of hygiene procedures on the mainland, on the barges and on the island.

We did not see any flour tray monitoring for rodents in the warehouse on Barrow during our visit. In September 1997, during the NPNCA/CALM inspection, it was suggested that Talon wax block baits be placed in all containers sealed on the mainland and removed on arrival at Barrow. Using poison should be a considerable improvement on or supplement to flour tray monitoring as the baits will kill, as well as detect, feral rodents. Talon (active ingredient brodifacoum), a third generation anticoagulant, kills rodents after a single feed, unlike first and second generation poisons that require several feeds. Unfortunately, this suggestion has not been taken up.

We recommend that the use of Talon wax baits in containers be investigated by WAPET.

Weeds. During our visit, a mature, fruiting Doublegee (*Emex australis*) was uprooted by a contractor on the 'lease' at a water injection well near Q46. WAPET should be congratulated on the effectiveness of its environmental awareness program, which lead to this detection. The most likely sources are vehicle tyres or boots.

We recommend that hygiene procedures be reviewed to ensure that vehicle tyres are inspected for double-gees (and other prickly seeds) before shipping to Barrow Island. We also recommend that consideration be given to occasional spot checks of boots and shoes of people arriving on the island.

6.2 Euro deaths

We were advised that there is concern at the number of Barrow Island Euros being killed by Lufkin pumps. These pumps are now electrically driven and pump intermittently on a timed basis. Euros take shelter in the shade afforded by the pump and are sometimes killed by the rotating counter-weight when the pump starts up after a period of silence. WAPET staff advised that they are considering ways of preventing deaths, such as making the risk area unattractive to euros. We believe that the problem might be overcome by installation of a simple, weld-mesh fence around the danger area.

ACKNOWLEDGMENTS

WAPET arranged our visit and paid all travel and accommodation costs. We received ready assistance from many WAPET and contract staff. We would particularly like to thank Stephan Fritz for arranging the visit and helping us during the first few days and Les McClements who assisted with the trapping and spotlighting programs. We also thank those who filled the positions of vehicle drivers and data recorders during spotlighting transects: Peter Doig, Alan Beasley, Mark Campbell, Danny Devenny and Adrian Wilmot. Bristow Helicopters arranged our visits to Boodie and Middle Islands, some of which were not charged. Their staff were most helpful in arranging our visits to these islands.

Figure 1. Mammal trap success rates on the Bandicoot Bay grid - November 1998

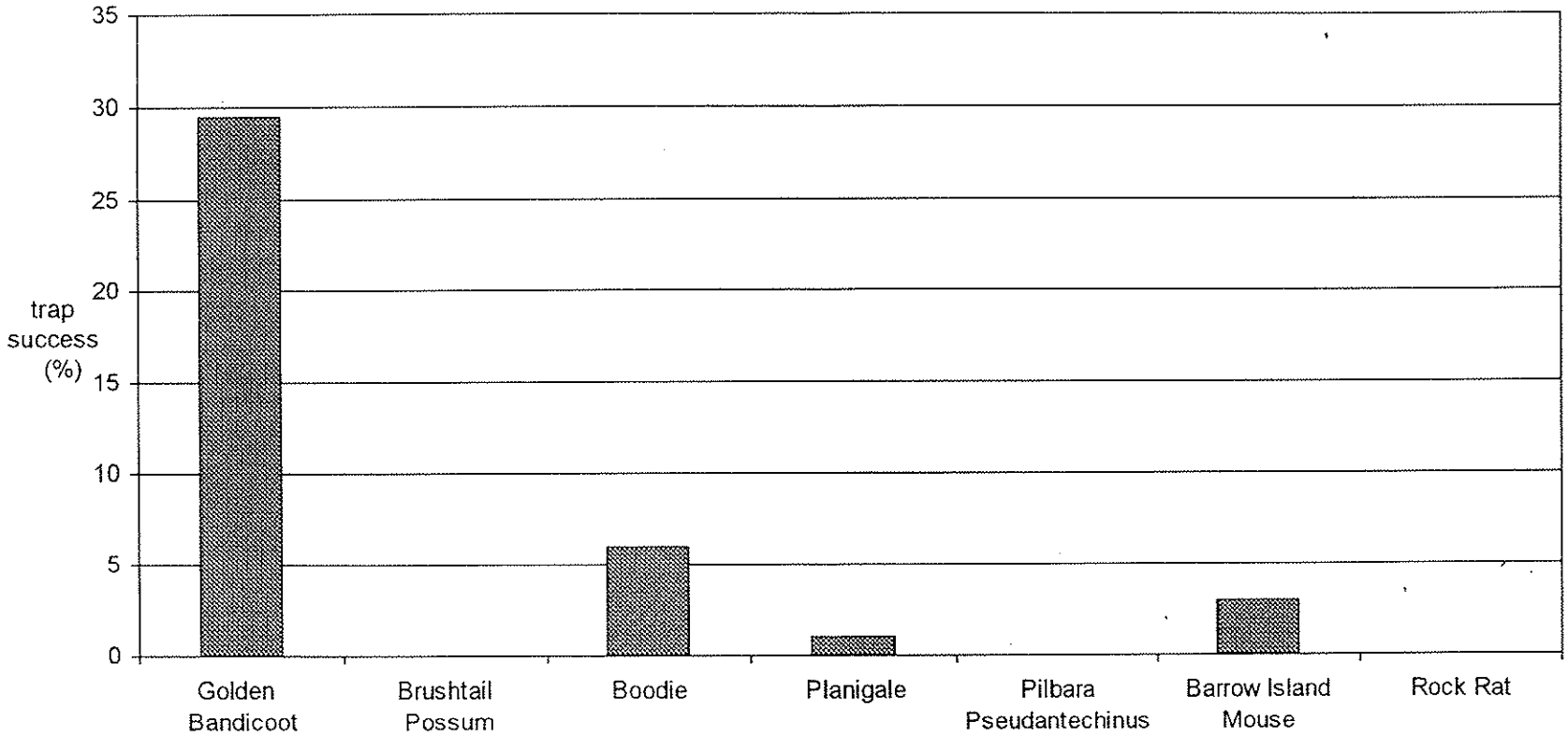

Figure 2. Mammal trap success rates on the John Wayne grid - November 1998

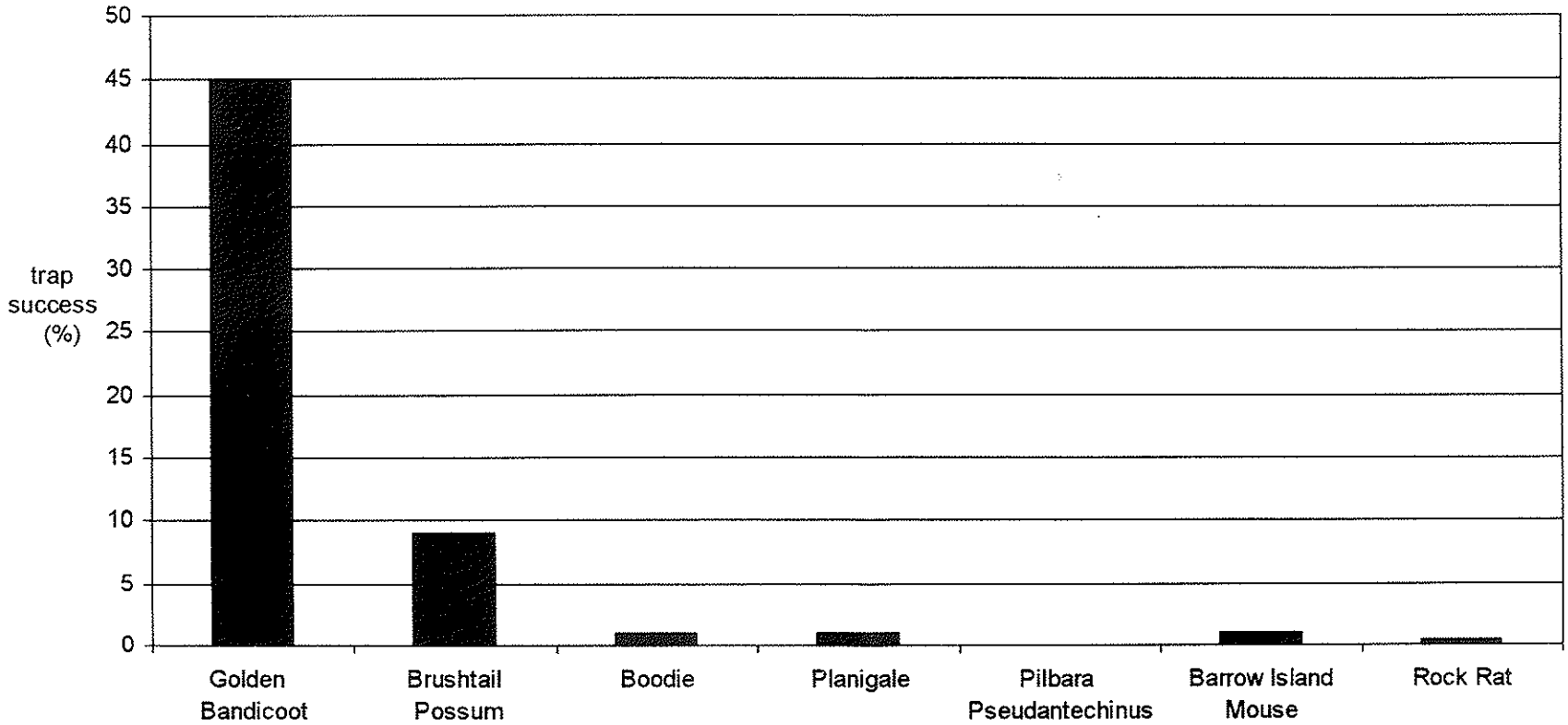

Figure 3. Mammal trap success rates on the Landing grid - November 1998

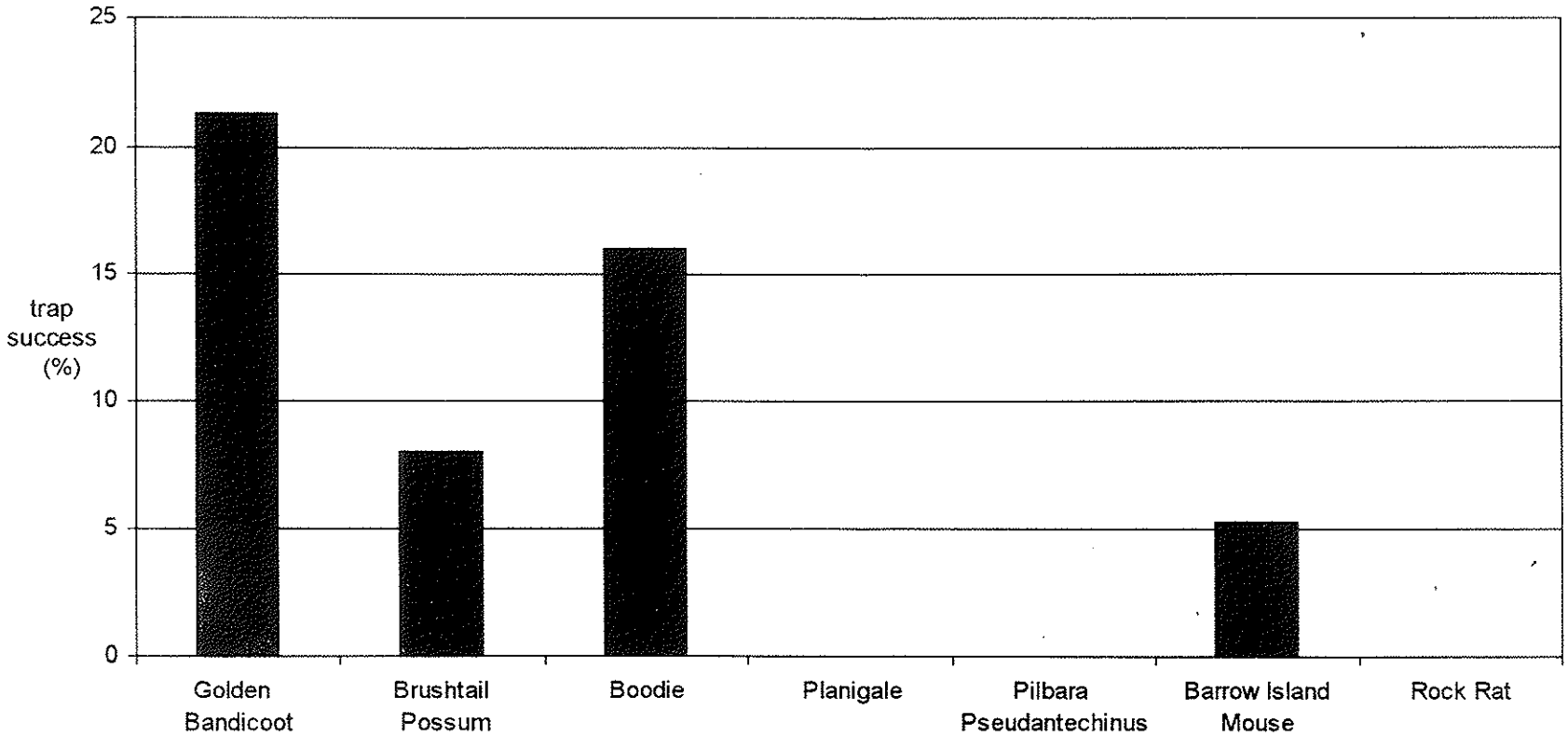

Figure 4. Mammal trap success rates on the M21 grid - November 1998

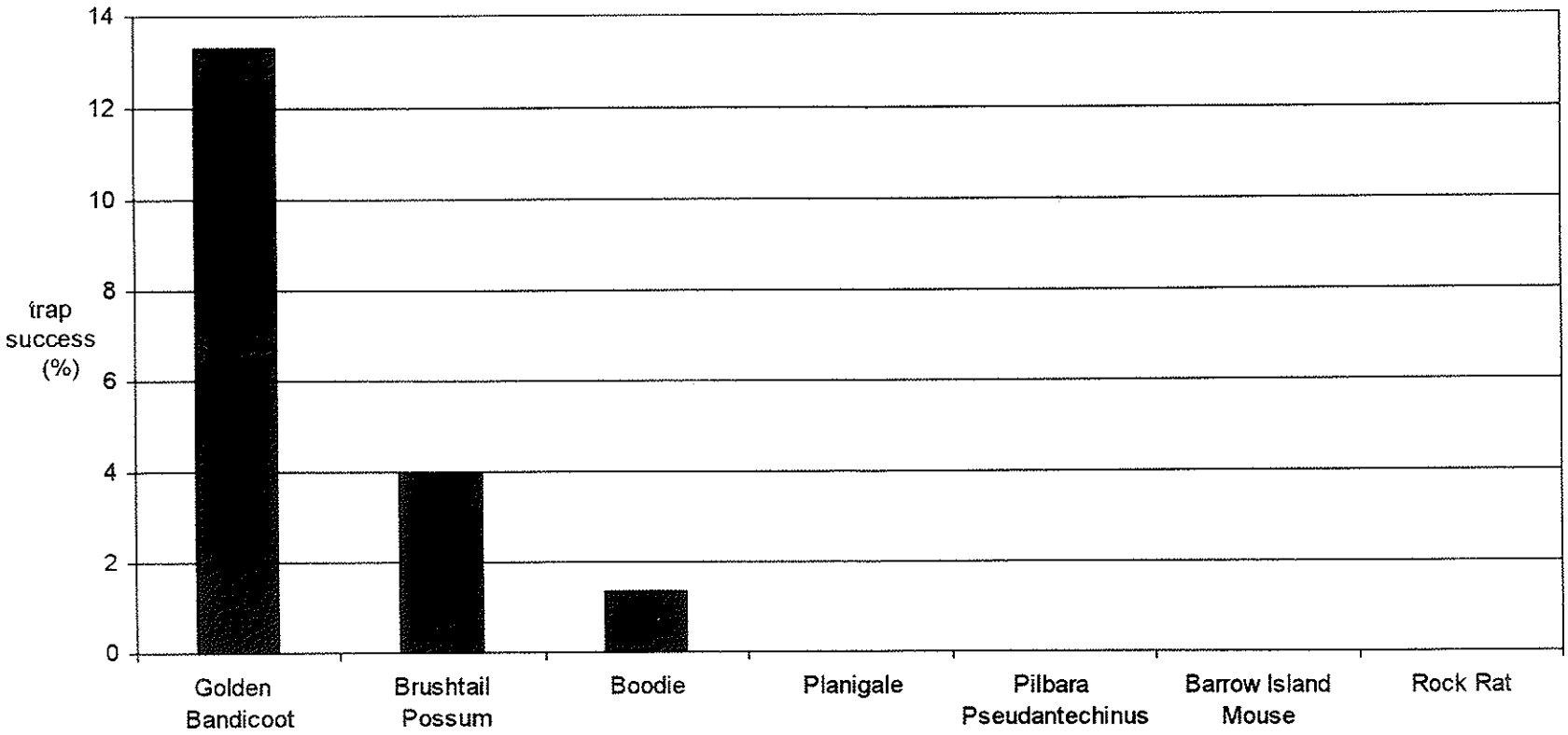

Figure 5. Mammal trap success rates on the S62 grid - November 1998