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A Pit Trap Survey of Small Mammals, Lizards and Frogs on the Two Peoples Bay Nature Reserve

by

Stephen D. Hopper

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R E P O R T

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A PIT TRAP SURVEY OF SMALL MAMMALS, LIZARDS AND FROGS ON TWO PEOPLES BAY NATURE RESERVE

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ABSTRACT

Ten pitlines were placed in open low woodlands near Moates Lake and in upland and coastal heathlands near Mount Gardner on Two Peoples Bay Nature Reserve during February 1980 and February 1981. The trapping program established that Common Dunnarts (Sminthopsis murina) and Honey Possums (Tarsipes spencerae) were widespread in the reserve, and added three lizards and one frog to the list of vertebrates known to occur on the reserve.

Twenty mammals (15 native and 5 feral), four snakes, fifteen lizards, one tortoise and six frogs are now known on Two Peoples Bay Nature Reserve. They constitute a representative sample of the south-coastal vertebrate fauna of Western Australia. Their diversity adds to the considerable conservation values of this reserve which contains the only extant population of the Noisy Scrub-bird.

It is suggested that Two Peoples Bay would be a suitable site for further studies on the role of Honey Possums as pollinators of native plants.

I INTRODUCTION

Two Peoples Bay Nature Reserve occupies an area of 4638 ha on the south coast of Western Australia *ca* 30 km east of Albany (Fig. 1). The reserve was created in 1966 following the rediscovery of the Noisy Scrub-bird (*Atrichornis clamosus*) near the bay in 1961.

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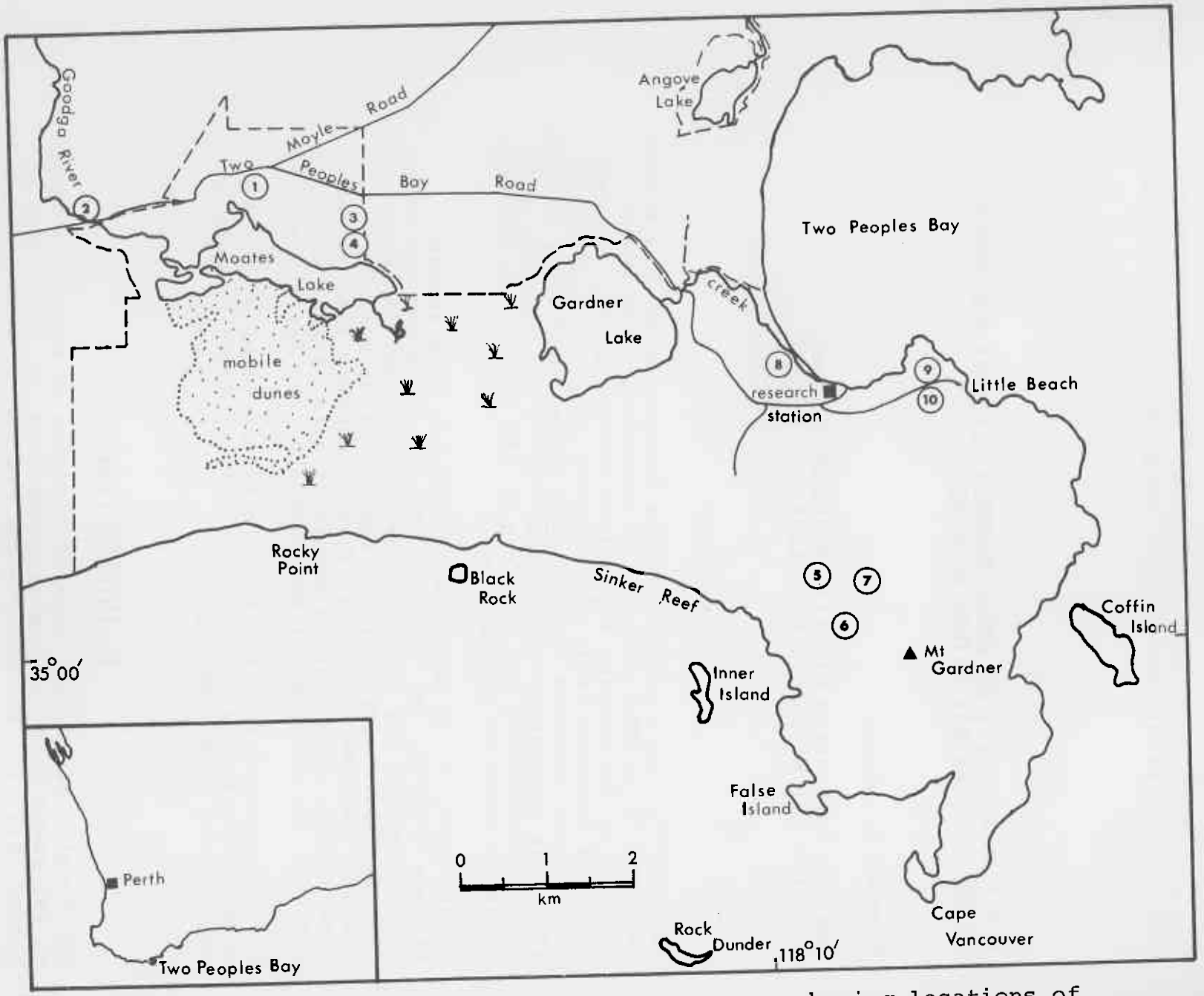

Figure 1. Map of Two Peoples Bay Nature Reserve showing locations of pitlines (encircled numbers)

A survey of the mammals, reptiles and frogs on Two Peoples Bay Nature Reserve was undertaken by staff of the Western Australian Museum and the Department of Fisheries and Wildlife during February 1970 (Bannister 1970, unpublished report). This survey involved the use of Elliott box traps, break-back traps, cage traps and unlined pit traps, as well as spotlight traverses at night and opportunistic searching in daylight. The presence of some 12 mammals, 11 lizards, 2 snakes and 5 frogs on the reserve was established. Circumstantial evidence of an additional 9 mammals, 2 lizards, 1 snake and 1 frog was also available at the time. Subsequent opportunistic observations by several workers (Table 3) have added 7 more mammals, 2 snakes, 1 lizard and 1 tortoise to the list of vertebrates confirmed on the reserve.

The present survey was undertaken primarily to determine whether Honey Possums (*Tarsipes spencerae*) were present on Two Peoples Bay Nature Reserve in large numbers comparable to those found further east near Manypeaks (Wooller *et al.* 1981) and at Cheyne Beach (Hopper 1980; Hopper and A.A. Burbidge unpublished). If so, the reserve could well be a suitable site for detailed studies on this nectarivorous marsupial. Because pitfall traps linked by drift fences were used to capture Honey Possums, and the earlier survey in 1970 did not use this trapping technique, the present survey also provided an opportunity to add to the list of known small vertebrates and their habitats on Two Peoples Bay Nature Reserve.

A. LANDFORMS, SOILS AND VEGETATION

The reserve encompasses a remarkable diversity of landforms. The eastern end is a rugged peninsula dominated by Mount Gardner (408 m). Steeply sloping exposed granite sheets are prevalent on the ridges and deeply incised gullies of the peninsula. When not exposed, the Archaean granite is overlain by sand and, in some places, limestone. Vegetation on the peninsula ranges from dense low heaths on the exposed coastal slopes and ridges, through dense thickets in slightly more sheltered situations, to dense low forests of *Eucalyptus cornuta, E. megacarpa, E. conferruminata, E. calophylla* and *Melaleuca baxteri* lining the well-watered gully bottoms and the edges of sheet granite. Although most of the peninsula's coastline consists of precipitous granite slopes and boulders, small sandy beaches are found on the north-eastern shore (Little Beach and Waterfall Beach) and at the base of a deep gully due north of Cape Vancouver. Just south of the last beach, yellow mineral deposits occur in shallow pools on coastal granite where fresh water seeps out beneath overlying limestone.

The neck of the peninsula has a more subdued and undulating topography. Extensive deposits of limestone in the southern half form ridges and hills bordered by sandy slopes and

swales. The south coast has steep limestone slopes that occasionally form breakaways and small dissected gullies. Limestone platform reefs line the shore.

The northern half of the neck of the peninsula consists of consolidated aeolian dunes, swales and flats. These dunes back onto the broad sandy beach of Two Peoples Bay itself. The vegetation is predominantly dense low heath with scattered emergents of *Agonis flexuosa*, *Banksia attenuata* and *B. littoralis* var. *littoralis*. Thickets of *Dryandra sessilis* occur on limestone hills and ridges, and scattered mallee eucalypts (*E. angulosa*, *E.* aff. *falcata*, *E. marginata*, *E.* sp. nov.) are sometimes evident above the heath. Thickets and scrub of *Adenanthos sericea* line the dunes backing Two Peoples Bay.

The northern and western areas of the reserve have permanent wetlands in Gardner Lake, Moates Lake and Angove Lake. A creek links Gardner Lake to the ocean and renders its water brackish, whereas Moates Lake and Angove Lake have fresh water. The fringes of these lakes have sedgelands backed by low woodlands and forests of *Agonis juniperina*, *Banksia littoralis* var. *littoralis*, *Melaleuca cuticularis*, *M. preissiana*, *M. rhaphiophylla* and *M. baxteri*.

Between Gardner Lake and Moates Lake is an extensive area of low dunes and swamps that remain inundated for most of the year. *Agonis flexuosa* and *Adenanthos sericea* form thickets on the dunes, while *Banksia littoralis* var. *littoralis* low woodlands and low forests occupy many of the swamps and swales. Occasional areas of permanently wet sedgelands are also found here.

A large mobile dune system lines the south shore of Moates Lake and extends southwards for two kilometres. This dune system is slowly encroaching onto the low dunes and swamps between the two lakes.

The south-western corner of the reserve has a sandy shore backed by a belt of limestone ridges, with undulating consolidated dunes further inland. Dense heaths and thickets occur on the ridges near the coast, while woodlands of *Agonis flexuosa* and *Banksia praemorsa* grow on the interior dunes and hills.

A small revegetating blowout midway down the western boundary carries a low woodland that is remarkably rich in banksias. *B. coccinea*, *B. praemorsa*, *B. quercifolia*, *B. occidentalis*, *B. littoralis* var. *littoralis*, *B. littoralis* var. *seminuda* and *B. grandis* are present, and *B. attenuata*, *B. nutans* and *B. ilicifolia* occur nearby.

The north-western and northern areas of the reserve bordering Moates Lake rise up onto hills capped with sand and lateritic gravel. Low forests of *Casuarina fraseriana*, *Eucalyptus*

marginata and scattered *E. calophylla* occur where gravel predominates, while open low woodlands of *Eucalyptus staeri*, *Casuarina fraseriana* and *Banksia coccinea* occupy sandy slopes and flats. Throughout these areas, the understory is usually a dense heath.

Four nearshore granitic islands are included within the reserve - Coffin Island, Inner Island, Rock Dunder and Black Rock. Coffin Island is the largest (28 ha.). It is a flat-topped granite ridge with steep slopes, and carries dense low heath of *Rhagodia radiata* bordered by prostrate shrubs, short grasses and sedges (Smith and Kolichis 1980).

II MATERIALS AND METHODS

The survey was undertaken in two consecutive summers, during February 2-9 1980 and February 2-7 1981. Ten pitlines were laid (Fig. 1), four towards the western end of the reserve and north of Moates Lake (1980), three on the north-western slopes of Mount Gardner (1980), one in the dunes backing Two Peoples Bay (1981) and two in coastal heath west of Little Beach (1981). Habitat details noted at each pitline included vegetation structure (using the classification of Muir 1977), dominant species, landform and soil.

Pitlines were located along kangaroo pads (lines 1-5,9) or the edge of firebreaks (lines 6-8,10) in areas where shrubs known to be food plants of Honey Possums were concentrated and in flower (e.g. *Beaufortia anisandra*, *Adenanthos cuneata*, *Banksia attenuata*; cf. Hopper 1980). Four shallow (30 cm) and two deep (60 cm) pits spaced ca. 5 m apart were dug at each site and lined with 10 cm diameter polythene pipe placed on top of a floor of aluminium fly-screen mesh. The floor of each pit was sprayed with insecticide as a precaution against ants attacking small mammals and reptiles in the pits. A 20 cm high drift fence of aluminium fly-screen mesh was run between pits at each site.

Traps were checked at dawn and dusk each day in 1980 to determine whether the common small vertebrates were active during daylight, at night, or during both periods. A voucher specimen of each species of lizard and frog was retained for identification by the Western Australian Museum, while all other individuals were released after being matched with the voucher specimens. Mammals were identified live in the field using Ride (1970) and subsequently released.

Pollen loads on Honey Possums were investigated to determine probable food plants. The snout, head and ventral body

surfaces of each animal trapped in 1980 was brushed for ca. 30 seconds over a microscope slide covered with a thin veneer of vaseline petroleum jelly. Voucher slides of pollen from known plants were made in the field, and then used to identify pollen collected from Honey Possums. The number of pollen grains in three 60 x 0.6 mm microscopic transects along each slide was counted.

III RESULTS

A. ANIMALS TRAPPED

Appendix I gives habitat details for each of the ten pitlines, while Table 1 lists the numbers of mammals, lizards and frogs caught in each pitline. Totals of four mammal, nine lizard and two frog species were caught.

The most frequently captured small mammals were Common Dunnarts (*Sminthopsis murina* - 12 animals in 7 pitlines) and Honey Possums (*Tarsipes spencerae* - 10 animals in 6 pitlines). Both these mammals ranged widely in the reserve from the open low eucalypt woodlands at the western end to the dense coastal and upland heaths on the eastern peninsula.

Most of the lizards were caught in the western pitlines near Moates Lake, but *Sphenomorphus australis*, *Ctenotus catenifer* and *Lerista microtis* were also caught on the north-western slopes of Mount Gardner. The single legless lizard (*Aprasia striolata*) was caught in the latter area.

Of the three most frequently trapped lizards, *Sphenomorphus australis* and *Leiolopisma trilineatum* were caught both at night and during daylight, whereas *Ctenotus catenifer* was caught only during daylight.

Two species of frogs were trapped, *Heleioporus eyrei* in open low woodland near Moates Lake and in *Adenanthos sericea* scrub in dunes behind Two Peoples Bay beach, and *Ranidella ?subinsignifera* in open low woodland near Moates Lake.

B. POLLEN LOADS ON HONEY POSSUMS

It was possible to identify to species pollen of all plants found on Honey Possums except for that of *Eucalyptus angulosa*, *E.* aff. *falcata* and *E. staeri*, which was all similar in size and shape (Hopper 1980 provides shape and size descriptions

TABLE I. RESULTS OF THE PIT TRAP SURVEY AT TWO PEOPLES BAY NATURE RESERVE

	Number of animals caught in pitline										
	1	2	3	4	5	6	7	8	9	10	Total
Number of trapnights	30	12	24	12	24	24	24	30	30	30	240
Period when trapped (N=night, D=day)	N D	N D	N D	N D	N D	N D	N D				
MAMMALS											
Mus musculus	- -	- -	2 -	- -	- -	- -	- -	3	-	-	5
Rattus fuscipes	- -	- -	- -	- -	1 -	- -	- -	-	-	-	1
Sminthopsis murina	3 -	- -	2 -	- -	1 -	1 -	2 -	2	-	1	12
Tarsipes spencerae	1 -	- -*	- -	- -	1 -	2 -	- -	1	2	3	10
LIZARDS											
Aprasia striolata	- -	- -	- -	- -	- 1	- -	- -	-	-	-	1
Ctenotus catenifer	- 4	- -	- -	- -	- 1	- -	- -	-	-	-	5
Ctenotus labillardieri	- -	- 1	1 -	1 -	- -	- -	- -	-	-	-	3
Egernia napoleonis	- -	- -	- -	- 1	- -	- -	- -	-	-	-	1
Hemiergis peronii peronii	- -	- 1	2 -	- -	- -	- -	- -	-	-	-	3
Leiolopisma trilineatum	- 2	- 1	2 -	- -	- -	- -	- -	-	1	-	6
Lerista microtis	1 -	- -	- -	- -	- 1	- -	- -	-	-	-	2
Sphenomorphus australis	3 1	- -	- 1	1 -	2 2	- -	- -	-	-	-	10
Varanus rosenbergi	- -	- -	- -	1 -	- -	- -	- -	-	-	-	1
FROGS											
Helioporus eyrei	- -	- -	1	- -	- -	- -	- -	1	-	-	2
Ranidella ?subinsignifera	- -	- -	1	- -	- -	- -	- -	-	-	-	1

*A *Tarsipes* was seen 1m above ground in a flowering *Beaufortia anisandra* at 1505 hours on 1 February 1980 at this pitline

of the pollen of most plants mentioned herein). Table 2 gives quantitative data on pollen loads of four Honey Possums, one captured near Moates Lake and three on the slopes of Mount Gardner. Pollen loads were very small (4-23 grains in the samples examined), and consisted of grains of *Beaufortia anisandra*, *Eucalyptus* spp., *Melaleuca striata*, *Adenanthos cuneata* and *Agonis flexuosa*.

TABLE 2. POLLEN LOADS ON FOUR HONEY POSSUMS CAUGHT IN TWO PEOPLES BAY NATURE RESERVE IN 1980

Number* of pollen grains of	Pitline number			
	1	5	6	
			animal no. 1	2
Adenanthos cuneata	-	3	-	-
Agonis flexuosa	-	1	-	-
Beaufortia anisandra	18	-	3	2
Eucalyptus spp.	5	-	-	5
Melaleuca striata	-	-	1	4
Unknown	-	-	-	4
Total	23	4	4	15

*Number counted on three 60 x 0.6 mm microscopic transects along each vaselined glass slide.

IV DISCUSSION

A. ANIMALS TRAPPED

A complete list of vertebrates (other than birds) now known to occur on Two Peoples Bay Nature Reserve is given in Table 3. It includes 20 mammals (15 native and 5 feral), 4 snakes, 15 lizards, 1 tortoise and 6 frogs. The present study confirms that *Sminthopsis murina* and *Tarsipes spencerae* are both plentiful on the reserve. The 1970 survey team had only limited circumstantial evidence that these small marsupials were present.

Sminthopsis murina was captured at Two Peoples Bay far more frequently than it has been at Cheyne Beach (Hopper 1980; Burbidge and Hopper unpublished). *Tarsipes* was captured in some pitlines as frequently as it has at Cheyne Beach and at Millbroook Nature Reserve (Hopper unpublished), suggesting that it occurs in large populations at Two Peoples Bay.

The pit traps failed to capture *Antechinus flavipes* and succeeded in capturing only one juvenile *Rattus fuscipes*. Both these small mammals were captured on the reserve in reasonable numbers in baited Elliott box traps and break-back traps by the 1970 survey team. Clearly, pit traps with drift fences capture only certain components of the small mammalian fauna. They should be used in conjunction with other trapping techniques in any survey aimed at comprehensive results.

As with the small mammals, the pit traps captured several species of reptiles and one frog not detected in the earlier survey, but also failed to capture a number of species collected by other techniques. The addition of *Aprasia striolata*, *Ctenotus catenifer*, *Sphenomorphus australis* and *Ranidella ?subinsignifera* to the list of reptiles and frogs recorded by G.M. Storr (in Bannister 1970) amplifies his conclusions that the herpetofauna

> "is clearly south-coastal, characterised by (1) poverty in geckos and agamids, (2) richness in frogs, (3) among skinks richness in *Egernia* spp. but poverty in *Ctenotus* spp., (4) occurrence of *Egernia luctuosa*, *Lerista microtis* and *Elapognathus minor*, and absence of genera otherwise distributed throughout the State, e.g. *Lialis*, *Gehyra*, *Menetia*, *Pseudechis* and *Acanthopis*."

The poverty of reptiles and frogs from traplines near the summit of Mt Gardner (lines 6,7) and in the coastal heath on the peninsula (lines 9,10) was striking. Most were captured in low woodlands over heath in the vicinity of Moates Lake.

There are few published data on the fauna of other south coastal reserves that would allow for a comparison with the

results of this survey of Two Peoples Bay Nature Reserve. Nonetheless, a rich mammal, reptile and frog fauna representative of the wet south-coastal region is now evident on the reserve. This adds considerably to its importance as a conservation reserve.

B. POLLEN LOADS ON HONEY POSSUMS

As at Cheyne Beach (Hopper 1980; Hopper and Burbidge unpublished), Honey Possums at Two Peoples Bay were found to carry small amounts of *Adenanthos cuneata*, *Beaufortia anisandra* and *Eucalyptus* spp. pollen. In addition, pollen of *Melaleuca striata* and *Agonis flexuosa* was recorded on the Two Peoples Bay animals. The last two species have flowers that produce relatively small amounts of nectar and have floral characters typical of those conventionally regarded as being pollinated by insects. It seems clear that *Tarsipes* feeds on a wide variety of flowers in these south-coastal heathlands, and that these animals should be given serious consideration in any studies of pollination in the region.

Two Peoples Bay Nature Reserve is well-suited as a site for further studies on Honey Possums and their role in pollination. There appear to be reasonable populations of the animal distributed throughout the reserve, access to suitable habitat is relatively easy, and a research station is available on site. Moreover, the reserve contains a diverse assemblage of plants known or suspected to be food sources of Honey Possums. Areas such as the open woodland on the western boundary that contain up to seven species of *Banksia* growing together have outstanding potential for unravelling how Honey Possums influence pollen flow in plants.

V ACKNOWLEDGEMENTS

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TABLE 3. LIST OF MAMMALS, REPTILES AND FROGS CONFIRMED* TO BE ON TWO PEOPLES BAY NATURE RESERVE

Animal	Recorded by 1970 survey team	present study	other**
MAMMALS			
1) Native			
Antechinus flavipes Yellow-footed Marsupial Mouse	+	-	GLF
Arctocephalus forsteri New Zealand Fur Seal	-	-	IA
Chalinolobus gouldii Gould's Wattled Bat	-	-	GLF
Eptesicus pumilus Little Bat	+	-	-
Hydromys chrysogaster Water Rat	+	-	GLF
Isoodon obesulus Short-nosed Bandicoot	+	-	GLF
Macropus fuliginosus Western Grey Kangaroo	+	-	GLF, AAB, SDH
M. irma Brush Wallaby	-	-	RS, GLF
Neophoca cinerea Australian Sea Lion	-	-	RES, S&K
Pseudocheirus occidentalis Ring-tailed Possum	+	-	-
Rattus fuscipes Southern Bush Rat	+	+	-
Sminthopsis murina Common Dunnart	-	+	-
Setonix brachyurus Quokka	-	-	AD
Tarsipes spencerae Honey Possum	-	+	-
Trichosurus vulpecula Brush-tailed Possum	+	-	-

Table 3. Cont'd ...

Animal	Recorded by 1970 survey team	present study	other**
2) Feral			
Felis catus Cat	+	-	AD, GLF
Mus musculus House mouse	+	+	GLF
Oryctolagus cuniculus Rabbit	+	-	GLF, SDH
Rattus rattus Rat	-	-	GLF
Vulpes vulpes Fox	+	-	GLF, SDH
SNAKES			
Denisonia coronata Crowned Snake	+	-	GLF
Notechis scutatus Tiger Snake	-	-	AAB, GLF, SDH
Pseudonaja affinis Dugite	-	-	AAB, GLF
Python spilotus Carpet Snake	+	-	GLF, SDH
LIZARDS			
Aprasia striolata	-	+	-
Ctenotus catenifer	-	+	-
C. labillardieri	+	+	-
Egernia kingi	+	-	GLF
E. luctuosa	+	-	-
E. napoleonis	+	+	-
E. pulchra	+	-	-

Table 3. Cont'd ...

Animal	Recorded by 1970 survey team	present study	other**
Hemiergis peronii peronii	+	+	-
Leiolopisma trilineatum	+	+	-
Lerista microtis	+	+	-
Phyllodactylus marmoratus	+	-	-
Pygopus lepidopodus	-	-	AAB
Sphenomorphus australis	-	+	-
Tiliqua rugosa	+	-	-
Varanus rosenbergi	+	+	GLF, SDH
TORTOISES			
Chelodina oblonga Long-necked Tortoise	-	-	GLF
FROGS			
Heleioporus eyrei	+	+	-
Limnodynastes dorsalis	+	-	-
Litoria adelaidensis	+	-	-
L. moorei	+	-	-
Ranidella glauerti	+	-	-
R. ?subinsignifera	-	+	-

* In addition to the mammal species listed above, Bannister (1970) listed *Tachyglossus aculeatus* (Echidna) as "previously recorded by other workers but evidence not obtained on the (1970) survey"; he also listed *Cercatetus concinnus* (Western Pigmy Possum), *Nyctophilus* sp. (Long-eared Bat), *Tadarida australis* (White-striped Bat) and *Canis familiaris* (Dog) as "doubtfully present during the survey". G.M. Storr (in Bannister 1970) listed the lizard *Morethia lineoocellata* and the snake *Elapognathus minor* (Little Brown Snake) as "species recorded prior to survey but not recorded by survey party".

** Observations of IA Abbott 1979; AAB A.A. Burbidge; AD A. Danks; GLF G.L. Folley; SDH S.D. Hopper; RS R. Smith; S&K Smith and Kolichis 1980; RES Sokowlowski 1976.

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APPENDIX I

HABITAT DESCRIPTIONS FOR EACH OF THE TEN PITLINES ON TWO PEOPLES BAY NATURE RESERVE

Pitline	Vegetation	Landform	Soil
1. MOATES LAKE A 0.2 km WSW of Two Peoples Bay Road - Moyle Road intersection			
	Open low woodland B of *Eucalyptus staeri*, *Casuarina fraseriana* and scattered dead *Banksia coccinea*	Gradual hillslope NW aspect	Grey sand

Appendix Cont'd

Pitline	Vegetation	Landform	Soil
	over		
	Open low scrub B of *Beaufortia decussata, Adenanthos cuneata* and *Dasypogon bromelaefolius*		
	over		
	Low heath B - open low sedges		
2.	GOODGA RIVER 0.1 km N of Two Peoples Bay Road on E bank of the river (just outside the boundary of the nature reserve)		
	Dense thicket of *Beaufortia anisandra* and *Lambertia uniflora* with scattered emergents of *Eucalyptus staeri* and *Casuarina fraseriana* up to 7m tall	River bank	Fine grey sand
3.	MOATES LAKE B 0.4 km S of Two Peoples Bay Road along firebreak towards E end of the lake		
	Open low woodland A of *Eucalyptus staeri* and *Casuarina fraseriana* to 8m	Hillslope S aspect	Fine grey sand
	over		
	Dense heath B of *Beaufortia anisandra Melaleuca striata, Dasypogon bromelaefolius, Agonis* sp.		
4.	MOATES LAKE C 0.6 km S of Two Peoples Bay Road along firebreak towards E end of the lake		
	Low woodland A of *Eucalyptus marginata, Casuarina fraseriana, Banksia grandis* and *B attenuata*	Hillslope SW aspect	Fine grey sand
	over		
	Heath A of *Xanthorrhoea* sp., *Adenanthos cuneata, Agonis* sp. and dense sedges		

Appendix Cont'd

Pitline	Vegetation	Landform	Soil
5.	1.5 km NW of MOUNT GARDNER		
	Ecotone between Very open shrub mallee of *Eucalyptus angulosa, E. falcata* and *Agonis flexuosa* over Dense low heath C - Tall sedges of *Dasypogon bromelaefolius, Casuarina humilis, Adenanthos cuneata* and grading upslope into very open shrub mallee of *Eucalyptus angulosa* over Scrub of *Dryandra sessilis* over Dense low heath C	Hillslope NW aspect	Fine grey sand Grey/-yellow sand over limestone
6.	0.6 km WNW of MOUNT GARDNER		
	Dense heath B sedges of diverse species including *Hakea trifurcata, Dryandra formosa, Melaleuca striata, Eucalyptus marginata, Lambertia uniflora, Casuarina humilis* and *Adenanthos cuneata* with occasional emergents of *Banksia coccinea* to 2.5m, *B.attenuata* to 1m and *B.grandis* to 1m.	Crest of saddle	Grey/white sand
7.	0.9 km NW of MOUNT GARDNER		
	Ecotone between Dense thicket of *Dryandra formosa Beaufortia decussata, Eucalyptus marginata* and *Hakea* sp. grading upslope into Dense low heath - Low sedges of *Melaleuca striata* and *Adenanthos cuneata*	Swale on hillslope Hillslope W aspect	Grey sand Grey sand

Appendix Cont'd

Pitline	Vegetation	Landform	Soil
8.	1.0 km NW of RANGER'S OFFICE		
	Scrub of *Adenanthos sericea*, *Agonis flexuosa* and *Dryandra sessilis*	Undulating dunes	White sand
	over		
	Dwarf scrub C of *Adenanthos cuneata* and open tall sedges		
	over		
	Dense herbs		
9.	0.5 km NW of LITTLE BEACH		
	Dense low heath D - open low sedges, species - rich, including *Dasypogon bromelaefolius*, *Adenanthos cuneata* and *Melaleuca striata* with scattered emergents of *Banksia attenuata* and *B. coccinea* to 1.5m	Gradual Slope near coast, E aspect	White sand
10.	0.3 km W of LITTLE BEACH		
	Ecotone between: Low woodland B of *Casuarina fraseriana* and scattered *Eucalyptus marginata*	Steep hillslope N aspect	Grey sand
	over		
	Low heath C of *Melaleuca striata* grading eastwards into Dense low heath C of *Melaleuca striata* and *Adenanthos cuneata* with scattered emergents of *Banksia attenuata* to 2m.		