THE MAMMALS

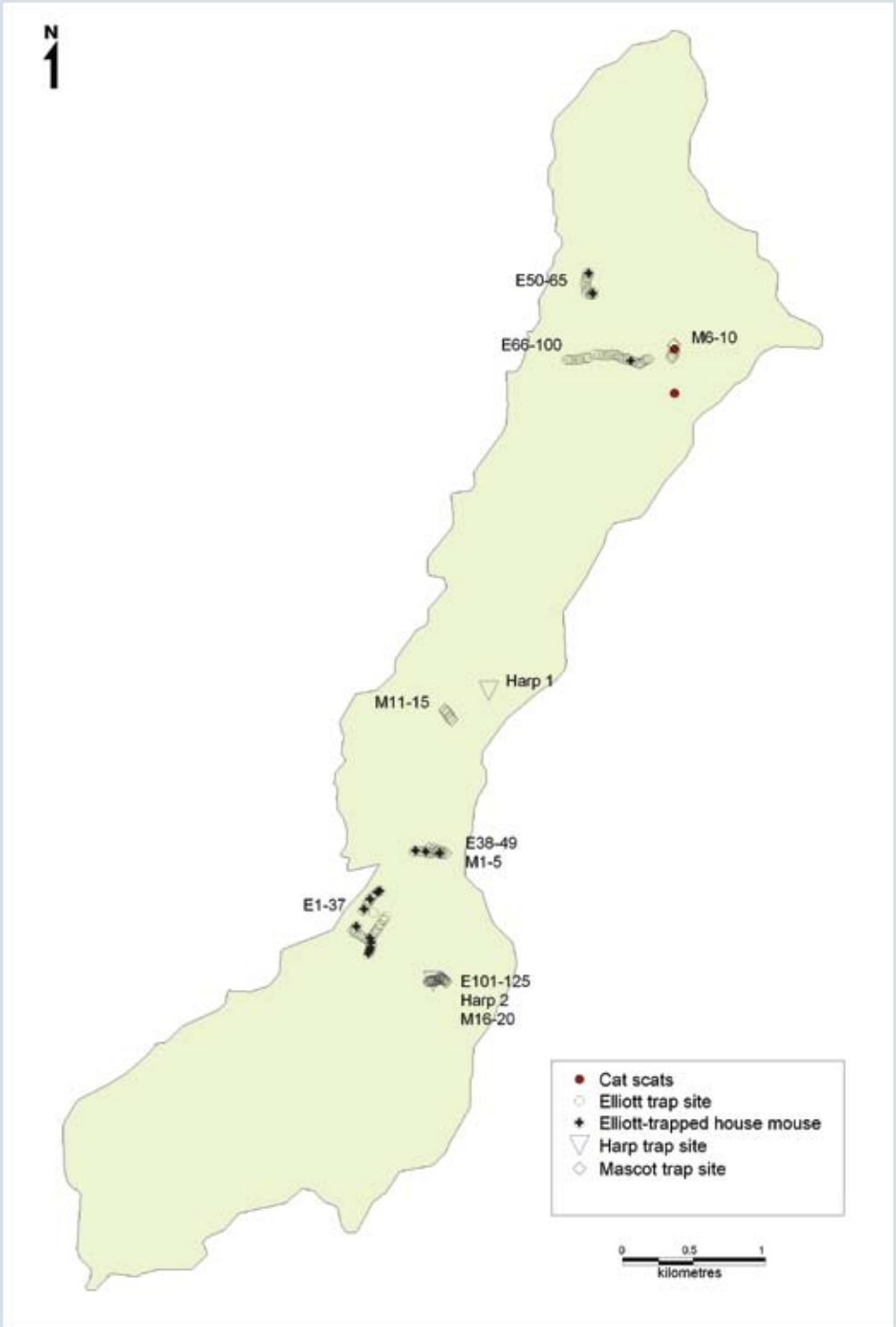
N
E50-65
E66-100
M6-10
Harp 1
M11-15
E38-49
M1-5
E1-37
E101-125
Harp 2
M16-20
Cat scats
Elliott trap site
Elliott-trapped house mouse
Harp trap site
Mascot trap site
0
0.5
1
kilometres

FIGURE 1 Trap sites and recorded locations of cat scats and trapped house mice. Trap references correspond to those in Table 1. Numerous cat scats were also found a few hundred metres north of trap sites E101-125, but their precise location was not recorded.

By C.E. Hawkins, M. Driessen, N. Mooney, D. Van Winkel, B. Moffat and S. Munks

Prime Seal Island was surveyed for mammal species from 14th - 18th October 2008. Small mammal traps (Mascots and Elliotts) and a harp trap were deployed, and 26 cat scats analysed for mammal fur. Five wild mammal species were identified. House mice (*Mus musculus*), feral cats (*Felis catus*) and the Tasmanian pademelon (*Thylogale billardierii*) were relatively common. Unidentified species of possum (*Trichosurus* sp.) and rat (*Rattus* sp.) were identified as 'probable' through analysis of hair found in cat scats. The swamp antechinus (*Antechinus minimus*), water rat (*Hydromys chrysogaster*) and unspecified species of potoroo and rat kangaroo have also been reported in previous surveys. These species may well have died out, but more intensive surveys would be required to confirm this with any confidence.

INTRODUCTION

Seventeen native mammal species have been recorded on the Bass Strait islands (Hope 1972), as well as six introduced species having established feral populations. Since 1800, mammal populations on many of the smaller islands have died out. The most recent land bridge between mainland Tasmania and the islands through to Wilsons Promontory was c. 12 000 years ago, with the link between the islands and Tasmania lost around 9 000 years ago (Jennings 1971). However, Prime Seal Island may have been linked to Flinders on frequent occasions much more recently and at least until c. 6 000 years ago (Jennings 1971).

There has been a very limited formal survey effort for mammal species on Prime Seal Island. Earlier surveys reported six species of mammal, including 2-3 feral species (detailed in Table 1). An archaeological investigation in 1988 (Brown 1988) found a large number of mammal bones in a cave on Prime Seal Island from at least four additional species, apparently brought to the cave by humans. Given that these were found among emu shells, these species could have long been extinct from the island at the time of the survey, and could have been alive at a time when Prime Seal Island was connected to Flinders Island and perhaps part of the land bridge between Tasmania and the Australian mainland.

The past habitat of Prime Seal Island may additionally have supported Australian sea lions as well as providing rocky foreshores for New Zealand and Australian fur seals to haul-out on. Australian sea lions prefer sandy beaches with scrub and bush adjacent for breeding. Commercial sealing by European settlers commenced in Bass Strait in 1798, with both fur seal species being harvested in the vicinity of Prime Seal Island. Australian sea lions were also harvested from Bass Strait. By 1840, at least 240 000 fur seal skins had come from the Strait (Ling 1999; Ling 2002). Hunting to supply local markets eventually ended in 1923. After the commercial harvest ceased, Australian sea lions, New Zealand fur seals and Elephant seals were extinct in Bass Strait. Australian fur seals remain on the remote offshore islands and New Zealand fur seals are starting to recolonise Bass Strait.

METHODS

Two types of terrestrial mammal trap were used: 10 cage traps (30 by 30 by 56 cm, Mascot Wire Works Pty Ltd, Parramatta, Australia) and 100 collapsible aluminium box traps (10 by 10 by 33 cm, Elliott Scientific Equipment, Upway, Victoria). These were set continuously on the nights of the 14th to 17th October 2008, as detailed in the results and on Figure 1, to cover areas of heath and *Allocasuarina* forest. On the last day of the trapping period, traps were set in a small area of *Eucalyptus ovata* forest that had subsequently been identified.

A harp trap (Faunatech and Austbat, Mount Taylor, Australia) was set along an *Allocasuarina* forest edge during the nights of 14th to 16th October 2008, and in an open patch of vegetation near the *E. ovata* forest on the night of 17th October (fig. 1).

Cat scats were collected wherever found, so that any mammals preyed

The mammal team.
Photo by Dylan van Winkel.

upon could be identified from hair and bone analysis by the expert consultant Barbara Triggs.

The island was also traversed each day along a range of different routes from 14th to 18th October 2008, by a minimum of four individuals, searching for vertebrate field signs. This included a thorough search through the *E. ovata* forest.

RESULTS

Small mammal trapping

A maximum of six house mice (*Mus musculus*) were trapped on any one of the four trapping nights (Table 1). The total effort was 321 Elliott trap-nights and 35 Mascot trap-nights. No other mammals were trapped.

Harp trap

The harp trap did not catch any species of mammal during the four trap-nights.

Cat scat analyses

Twenty-six separate scats were identified, primarily on a track in the south of the island, a few hundred metres north of the most southerly trap site. These were provided to Barbara Triggs for analysis. Each contained house mouse (*M. musculus*) hair. Seven also contained cat (*Felis catus*) hair, generally presumed to be from grooming although in one case the cat may have been a source of food. Additionally, one scat contained 'probable' possum (*Trichosurus* sp.) hair, and another contained 'probable' rat (*Rattus* sp.) hair.

Other field signs

Tasmanian pademelons (both living and shot carcasses) were observed, along with grazing sheep and two horse skeletons. Shallow diggings in the *Allocasuarina* forest were presumed to be signs of Tasmanian pademelons. No seals nor evidence of any other mammal species was found.

GENERAL DISCUSSION AND MANANGEMENT RECOMMENDATIONS

Five wild mammal species were identified during the present survey, including at least two native mammals. One of these, the possum, should preferably be confirmed and identified to species level, having only so far been identified as 'probable' through analysis of fur in cat scats. The last confirmation of this species on Prime Seal Island was in 1966 and the present manager is not aware of any possum species being

TABLE 1 Details of small mammals trapped on Prime Seal Island

Trap type: E = Elliott trap M = Mascot trap
No species other than *Mus musculus* was captured in the traps.

Traps	Habitat type	Set	Closed	Total trap nights	No. M. musculus captures/night
E1-49	Heath	14/10/08	18/10/08	196	3,3,6,5
E51-100	Heath	15/10/08	17/10/08	100	1,3
E101-125	*E. ovata* forest	17/10/08	18/10/08	25	0
M1-5	Scrub	14/10/08	16/10/08	10	0,0
M6-10	*Allocasuarina* scrub	15/10/08	17/10/08	10	0,0
M11-15	*Allocasuarina* scrub	16/10/08	18/10/08	10	0,0
M16-20	*E. ovata* forest	17/10/08	18/10/08	5	0

TABLE 2 Observations of mammals on Prime Seal Island during this and previous surveys

Species	2008 survey	Other sources	Comments
Domestic cat			
Felis catus	Scats; hair in scats	Trapped by land manager; Brothers (2001); Whinray (1971)	Present in 1920s & 1930s (Whinray 1971)
House mouse *Mus musculus*	Trapped; fur confirmed in cat scats	Brothers (2001); Whinray (1971)	Present in 1920s & 1930s (Whinray 1971)
Rat *Rattus* sp.	Probable fur in cat scats		No rats observed by land manager
Tasmanian pademelon *Thylogale billardierii*	Observed	Brothers (2001); John Cooper (pers. comm.); Scott (1828); Whinray (1971)	Brothers (2001) noted to be extremely common; land manager shot c.4000 individuals in winter/spring 2008
Possum *Trichosurus* sp.	Probable fur in cat scats	*Trichosurus vulpecula* Whinray (1971)	Introduced from Flinders in 1920s and still present in 1966 (Whinray 1971)
Swamp antechinus *Antechinus minimus*	No evidence	Thomas (1888) (in Whinray, 1971)	Specimen in British Museum (Natural History)
Water rat *Hydromys chrysogaster*	No evidence	Whinray (1971)	Present in 1920s & 1930s (Whinray 1971)
Forester kangaroo *Macropus giganteus*	No evidence	Brown (1988)	
"Wombat"	No evidence	Brown (1988)	
"Potoroo, rat kangaroo"	No evidence	Brown (1988)	
Bennett's wallaby *Macropus rufogriseus*	No evidence	Brown (1988)	
"Native rodent"	No evidence	Brown (1988)	

present on the island. Another species, an unidentified species of rat considered as 'probable' on the basis of fur in scat analysis, would merit confirmation and identification to species level to establish whether it is a native or exotic species. House mice and feral cats are clearly fairly common on the island.

The water rat and swamp antechinus, previously recorded on the island, were not identified during the present survey. The water rat was last reported on the island in the 1920s and 1930s (Frank Jackson, pers. comm. in Whinray 1971). Our surveys did not specifically target this species, so it is possible it was overlooked as it is not unreasonable for the species to still occur on the island. The only record of a swamp antechinus is a specimen lodged with the British Natural History Museum in 1858 (Thomas 1888). Given our experience surveying for this species elsewhere in Tasmania, it would be surprising if the species were not trapped if it were present. However, the heathland habitat on the island is very different from the coastal heathland on mainland Tasmania where this species, and other small marsupials and rodents, are found. The heathland on Prime Seal Island is much drier and dominated by shrubs, and lack many of the Restionaceae species found in coastal heathlands of mainland Tasmania. A more intensive, focussed survey would be required to provide confidence in the absence of both the swamp antechinus and the water rat.

It is also faintly possible that the diggings observed in the *Allocasuarina* forest were the same species of potoroo or 'rat-kangaroo' identified in bones through Brown's (1988) archaeological investigation, and again this would require a focussed survey for verification.

ACKNOWLEDGEMENTS

We are grateful to our fellow expeditioners for their companionship and for lively and enjoyable discussion.

Bridgette and Clare checking a trap.
Photo by Stephen Harris.

Nick, Dylan and Sarah setting a bat trap.
Photo by Stephen Harris.

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THE REPTILES

Eastern three-lined skink.
Photo by Dylan van Winkel.

By Dylan van Winkel

The composition and ecology of the reptile fauna on islands in the Bass Strait, Tasmania, is poorly known. This is especially true for outer lying islands and islands that are privately owned and managed. This paper describes eight species of reptile observed on Prime Seal Island, during an ecological survey in September 2008. Detailed observational accounts of each species, and notes on their habitat use and distribution across the island are provided. The results of the survey indicate that Prime Seal Island supports one of the greatest diversities of reptile species of all the outer Furneaux Islands, and species richness that is comparable to some of the larger Bass Strait Islands. This paper is a contribution to the knowledge of the reptiles found on islands in the Furneaux Group and may aid the understanding of distribution patterns and the origins of the reptile fauna in the Bass Strait region.

INTRODUCTION

The island's vegetation has been surveyed extensively by Harris *et al.* (2001) however, its fauna has received somewhat less attention with Brothers *et al.* (2001) providing a generalised species list. A systematic inventory of the island's fauna has never been conducted and only three reptile species have been recorded, including the metallic skink (*Niveoscincus metallicus*; Brothers *et al.* 2001), eastern three-lined skink (*Bassiana duperreyi*; Green & Rainbird 1993; Brothers *et al.* 2001), and the lowland tiger snake (*Notechis ater*; Brothers *et al.* 2003).

The distribution patterns of reptiles in the Bass Strait area are closely related to climatic and sea level changes during the Late Wisconsin glacial phase (Rawlinson 1974). Many of the reptiles that inhabit the islands in the Furneaux Group area are represented by glacial relicts which displayed widespread distributions across southeastern Australia and Tasmania, and were subsequently isolated c. 12 750 years B.P. by the rising waters of the Bass Strait (Rawlinson 1974). Therefore, identifying which species are present on each island can help provide evidence for the distribution patterns and origins of the reptile fauna in the Furneaux Group and Bass Strait area.

METHODS

The survey involved opportunistic observations and hand-searching during daily excursions around the island. Teams of one or more people traversed the island between 0800 and 1800 hours, over 5 days (14 – 19 September 2008) and recorded any sightings of reptiles. Hand-searching involved actively searching through a variety of habitats including, inter-tidal beach zones, coastal sand dunes, grasslands, heathland, and granite outcrops.

Nomenclature for scientific and common names of reptiles follows Hutchinson *et al.* (2001).

RESULTS

Eight species of reptile, comprising three families, were recorded during the survey. Each species is discussed *seriatim* below, and the appropriate information on observations, ecology, and potential range distributions across Prime Sea Island is presented. References attaining to species previously recorded from Prime Seal Island have been listed for completeness.

No amphibians were recorded during the survey, despite listening for calls and searching damp areas.

AGAMIDAE

Tympanocryptis diemensis (Mountain dragon)

Observations: A number of specimens were observed sun-basking within openly vegetated areas, by members of the survey team. A higher proportion of males were sighted compared to females and males appeared less threatened by our close approach. Males generally remained still upon our close proximity yet females fled quickly into thick vegetation. This species relies heavily on their cryptic camouflage but will sprint short distances when disturbed (Hutchinson *et al.* 2001).

Habitat and distribution: *T. diemensis* occurred extensively throughout the coastal grass and herbfield communities on the western side of the island (Harris & Kitchener 2005). This vegetation is dominated by *Austrostipa stipoides, Myoporum insulare,* and patches of *Leucophyta brownii* (S. Harris pers. comm. 2008). *T. diemensis* appeared to favour openly vegetated areas however, most animals were observed in close proximity to more dense vegetation allowing them to take refuge quickly if disturbed. Restriction to these habitats provides ideal conditions for *T. diemensis* which are avid thermoregulators who rely heavily on heat from the environment to maintain their high body temperatures (~ 32 °C) and incubate their eggs (Rawlinson 1974; Hutchinson *et al.* 2001). This species is known to occur on eastern Bass Strait Islands (Rounsevell *et al.* 1996) however, this survey provides the first records for *T. diemensis* on Prime Seal Island.

Literature records: Nil

SCINCIDAE

Bassiana duperreyi (Eastern three-lined skink)

Observations: *Bassiana duperreyi* were commonly observed on the island by lifting debris and searching through low vegetation. Two deceased individuals (male and female) were collected from under a large granite rock near the summit of the island. The male was clearly identifiable by his bright red/ orange throat; a feature associated with the breeding season (Hutchinson *et al.* 2001).

Habitat and distribution: This species was observed in a variety of different habitats on the island, including exotic grassland and improved pasture, coastal heathland, *Leptospermum laevigatum* scrub (*Bursaria spinosa, Leucopogon parviflorus*, and *Correa alba*) (Harris *et al.* 2001), granite outcrops, and coastal sand dunes. A number of specimens were observed under old farm equipment and debris scattered around the accommodation hut and woolshed situated on the eastern side of the island. *Bassiana duperreyi* typically occur in habitats which contain low tussocky or heath-like vegetation where tussocks and low herbs are used for basking sites (Rawlinson 1974; Hutchinson *et al.* 2001). Our observations complement these descriptions and suggest that *A. duperreyi* occurs widely across Prime Seal Island in openly vegetated and warm areas.

Literature records: This species has previously been recorded from Prime Seal Island. Green & Rainbird (1993) list an adult *Pseudemoia trilineata* collected on Prime Seal Island in 1984 and Brothers *et al.* (2001) recorded the three-lined skink as one of three reptile species present on the island.

Egernia whitii (White's skink)

Observations: *Egernia whitii* were observed on several occasions while lifting large granite rocks. Specimens were found beneath rocks in *Allocasaurina verticillata* forest, *Juncus krausii* rushland, *Myoporum insulare* closed scrub, and *Leptospermum laevigatum* scrub (*Bursaria spinosa, Leucopogon parviflorus*, and *Correa*

Mountain dragon.
Photo by Dylan van Winkel.

Juvenile White's skink.
Photo by Dylan van Winkel.

alba) (Harris *et al.* 2001). The lizards were occasionally found in pairs or small groups, often consisting of both large and small-sized animals. A number of large adults were examined, all of which possessed the typical pattern of a reddish brown vertebral stripe bordered by broad blackish stripes, each enclosing a series of pale dots and dashes (ocelli) (Hutchinson 2001; Mackay 1955). A single juvenile was captured and displayed highly speckled markings and a weak vertebral stripe.

Habitat and distribution: *Egernia whitii* were locally abundant across Prime Seal Island in habitats that supported medium to large-sized granite rocks. This species is known to construct tunnels beneath granite rocks where they live in small family groups. These tunnel systems were observed on a number of occasions whereby the resident skink(s) would use the tunnels as escape routes to evade capture. Although *E. whitii* has been recorded from Flinders Island (Rawlinson 1967), and several smaller islands in the Bass Strait (MacKay 1955; Rawlinson 1974, Hutchinson *et al.* 2001), this paper is the first to document them from Prime Seal Island.

Literature records: Nil

Niveoscincus metallicus (Metallic skink)

Observations: *Niveoscincus metallicus* was the most frequently observed lizard species and was observed in almost all habitat types on Prime Seal Island. The area surrounding the bunkhouse and woolshed on the eastern side of the island appeared to support a healthy population of *N. metallicus*. Individuals were found refuging beneath old farm machinery and debris, as well as basking on rocks close to dense vegetation. On several occasions, small brown skinks were seen disappearing into piles of seaweed at the high-tide mark and were assumed to be *N. metallicus* (based on their size and body shape). One individual was observed during the afternoon on a large exposed boulder, immediately adjacent to the ocean, with a large moth (Lepidoptera) in its mouth.

Habitat and distribution: *Niveoscincus metallicus* was present in a wide variety of vegetation types on Prime Seal Island, including exotic grassland and improved pasture, coastal heathland, *Leptospermum laevigatum* scrub (*Bursaria spinosa, Leucopogon parviflorus*, and *Correa alba*) (Harris *et al.* 2001), granite outcrops, coastal boulders, and in beach debris at the high-tide mark. They frequently occurred under fallen logs, debris, and under granite rock slabs. This species is the most common and widespread lizard

Metallic skink.
Photo by Dylan van Winkel.

Blotched blue-tongue.
Photo by Dylan van Winkel.

species in Tasmania and is found on all but a few offshore islands (Hutchinson *et al.* 2001).

Literature records: Green & Rainbird (1993) and Brothers *et al.* (2001) have recorded this species from Prime Seal Island.

Tiliqua nigrolutea (Blotched blue-tongue)

Observations: A single individual was captured and examined on the final day of the survey. It was a large, aggressive female that initiated a threat display upon capture. Four large ticks (Acarina) were removed from within the ear cavities and beneath the body scales. The ticks were collected for identification.

Habitat and distribution: The individual was found basking on the edge of dense undergrowth (*Leptospermum laevigatum* scrub *Leucopogon parviflorus, Bursaria spinosa* and *Correa alba*) (Harris *et al.* 2001) and exotic grassland, within 100 m from the hut and during the late afternoon. *Tiliqua nigrolutea* are most active in clearings bordered or surrounded by dense heath or arboreal vegetation (Hutchinson *et al.* 2001). This habitat type is well represented on Prime Seal Island and may provide ideal habitat to harbour a healthy population of *T. nigrolutea*. Although only one specimen was observed during this survey, the current lease holder of the island has observed *T. nigrolutea* on several occasions (G. Jennings, pers. comm. 2008). Therefore, it is likely that this species is common and widely distributed across the entire island. This species is known to occur on some of the larger Bass Strait islands (Hutchinson *et al.* 2001; Rawlinson 1974) however, this survey provides the first records for *T. nigrolutea* on Prime Seal Island.

Literature records: Nil

ELAPIDAE

Austrelaps superbus (Lowland copperhead)

Observations: No live specimens were observed during this survey. However, a complete sloughed skin, from an adult *A. superbus*, was found wedged between coastal rocks at the most southern end of Peacock Bay. The species was identified by examining the shape and arrangement of scales on the head region of the skin. The frontal scale of *A. superbus* being much longer than broad compared with that of *Notechis ater* (Hutchinson *et al.* 2001). The current island lease holder has reportedly encountered *A. superbus* on a number of occasions (G. Jennings, pers. comm. 2008).

Habitat and distribution: *Austrelaps superbus* is usually found in close association with permanent bodies of water, such as marshes, lagoons, and low lying swamps, where prey are abundant (Fearn 1994; Hutchinson *et al.* 2001). *Austrelaps superbus* prey largely on diurnal surface active taxa, such as frogs and lizards (e.g. *N. metallicus*) (Shine 1987). However, on Prime Seal Island areas of free standing water are absent and no frogs have been recorded. The characteristics of this population appear similar

to an "unusual" population of *A. superbus* that occurs on the plateau-like summit of The Nut at Stanley (north-west Tasmania) (Fearn 1994). The Nut lacks permanent water and frogs, and as a result *A. superbus* populations have become concentrated around short-tailed shearwater (muttonbird; *Puffinus tenuirostris*) rookeries. *Austrelaps superbus* has been recorded using the nesting burrows of *P. tenuirostris* on other Bass Strait Islands (Green 1969; Fearn 1994). It is likely that *A. superbus* on Prime Seal Island may restrict their distribution to coastal areas where they have access to small skinks (*N. metallicus*), and to rookeries where muttonbird chicks and shelter, provided by *P. tenuirostris* burrows, are available.

Austrelaps superbus has been recorded on the larger Bass Strait islands, including Flinders, Great Dog, Little Green, and Preservation islands (Green & Rainbird 1993). However, this survey provides the first records for *A. superbus* on Prime Seal Island.

Literature records: Nil

Drysdalia coronoides (White-lipped snake)

Observations: A single specimen was observed basking in the afternoon on sand in an open patch of dense scrub at the north-western side of the island. The snake was in close proximity (~ 300 mm) to a male *T. diemensis* basking in the sun. Once disturbed by our approach, the snake retreated rapidly into the undergrowth. The individual was approximately 250 mm in length, grey in colour, with a prominent white stripe running along the upper lip, from the nostril to the side of the neck (C. Hawkins pers. comm. 2008).

Habitat and distribution: The single individual was observed just above the coast, approximately 50 metres from the ocean. The surrounding vegetation included *Austrostipa stipoides*, shrubbery, and coastal heath. This species is locally abundant in Tasmania and on most Bass Strait islands (Wilson & Swan 2003; Hutchinson *et al.* 2001); particularly where ground cover is dominated by tussock grasses and heath-like vegetation (Rawlinson 1974; Wilson & Swan 2003). Their diet consists almost entirely of small skinks (Wilson & Swan 2003). The vegetation composition, in combination with a high abundance and widespread distribution of prey (i.e. small skinks, including *N. metallicus* and *A. duperreyi*) on the island, suggests that *D. coronoides* may be widely distributed across Prime Seal Island. *Drysdalia coronoides* is found on many of the Bass Strait islands, including Flinders, Babel, Chalky, and Preservation islands (Green & Rainbird 1993). This survey provides the first record of *D. coronoides* from Prime Seal Island.

Literature records: Nil

Notechis ater (Tiger snake)

Observations: Large tiger snakes were sighted on at least five occasions during the survey. Three sightings were reported from the immediate vicinity of the bunkhouse and woolshed. These individuals were all observed in the late afternoon, crossing walking tracks and grazed pasture. Two other

tiger snakes were sighted near the northern and western sides of the island. The western specimen was described as highly coloured, showing intense red colouration under the belly and laterally (*M. Visoiu*, pers. comm. 2008). This animal was sighted in coastal tussock grassland (*Austrostipa stipoides*). The northern *N. ater* sighting was of the side of a large individual which rapidly retreated into low vegetation upon our approach. This specimen appeared superficially black and lacked the bright belly and lateral colouration, as described in the previous observation.

Habitat and distribution: On Prime Seal Island, the occurrence of *N. ater* in areas of human alteration (i.e. surrounding the accommodation hut, wool shed, and open pastures) was particularly apparent. Fearn (1993) noted that *N. ater* in Tasmania are very common in some semi-rural habitats where there is a mixture of remnant scrub/ re-growth mixed with open pasture or cleared land. It is likely that tiger snakes are attracted to these habitats by the abundance of prey, such as mice and rats, which tend to co-inhabit human occupied areas. Rodents, especially mice, were abundant around the hut and wool shed on the island, which may explain the higher number of *N. ater* sightings in this area, although may also be a result of greater observer activity in this area. Hutchinson *et al.* (2001), note that tiger snakes on some Bass Strait islands depend on short-tailed shearwater (muttonbird; *Puffinus tenuirostris*) chicks for nourishment. This may be true for some tiger snakes on Prime Seal Island, as the island supports a large colony of short-tailed shearwaters (Brothers *et al.* 2001).

In general, *N. ater* appeared to be common and widely distributed across Prime Seal Island. This is supported by the island lease holder who regularly encounters tiger snakes in all habitat types on the island (G. Jennings, pers. comm. 2008). On mainland Tasmania, *N. ater* are known to inhabit a variety of habitat types, from coastal heath at sea level to highland forests above 1000 m (Fearn 1993; Hutchinson *et al.* 2001).

Literature records: *Notchis ater* have been recorded from Prime Seal Island in the past, by Brothers *et al.* (2001).

GENERAL DISCUSSION

Eight species of reptile were recorded from Prime Seal Island as a result of this survey. We were able to confirm the presence of three previously recorded species (*N. metallicus, A. duperreyi,* and *N. ater*) (Green & Rainbird 1993; Brothers *et al.* 2001) and add a further five previously unrecorded species (*T. diemensis, E. whitii, T. nigrolutea, A. superbus,* and *D. coronoides*) to the island's reptile fauna inventory.

These results indicate that Prime Seal Island supports a considerable diversity of reptile species, when compared with other surrounding islands. The Furneaux Island Group is made up of three principal islands and a large number of outer islands (Harris *et al.* 2001). Twelve species of reptiles are known to occur throughout the Furneaux Group (Rawlinson 1974; Hutchinson *et al.* 2001), and two-thirds of these are shared with Prime Seal Island (8 spp.). The high diversity of reptiles on Prime Seal can be illustrated by comparing the diversity of a similar sized island, Badger Island (1 243 ha) which reportedly supports only five species of reptiles (Green & Rainbird 1993; Hutchinson *et al.* 2001). In addition, only the largest island in the eastern Bass Strait, Flinders Island (133 300 ha), supports more reptile species (10 – 12 spp.) than Prime Seal Island (Rawlinson 1967; 1974; Green & Rainbird 1993; Hutchinson *et al.* 2001). Therefore, Prime Seal Island appears to support the greatest diversity of reptile species of any of the outer Furneaux Group Islands. However, it is possible that the apparent low species diversity on other outer islands may be an artefact of low sampling effort.

It is likely that further reptile species, other than those recorded during this survey, may be present on Prime Seal Island. These are listed and briefly discussed below.

Niveoscincus ocellatus (Ocellated skink)

Ocellated skinks are moderately sized, beautifully patterned, and are endemic to Tasmania. They are found from sea-level to sub-alpine elevations throughout most of Tasmania and on surrounding islands, including those in the Furneaux Group (Hutchinson *et al.* 2001). This species exhibits very close associations with rocky habitats, where they use the rocky substrate for sun-basking and shelter sites. On Prime Seal Island, extensive granite outcrops and boulder fields exist across the island and would appear to provide ideal habitat for *N. ocellatus*. However, no observations of this species were recorded during the current survey. It is possible that this species was simply overlooked due to a lower search effort in rocky habitats.

Lerista bougainvillii (Bougainville's skink)

Bougainville's skink is a very secretive, burrowing species that is active just below the surface of ground substrates, such as leaf litter, rocks, or granite flakes (Hutchinson *et. al.* 2001). *Lerista bougainvillii* is a thigmotherm and is consequently limited to the warm, open habitats of south-eastern Australia, the eastern Bass Strait Islands, and barely colonising the Tasmanian mainland on its two north-eastern most promontories (Cape Portland and Waterhouse Point) (Rounsevell *et al.* 1996; Hutchinson *et al.* 2001; Wilson & Swan 2003). This species is found on several islands in the Furneaux Group, including Babel Island, Mt Chappell Island, Little Anderson Island, and Vansittart Island (Green & Rainbird 1993; Hutchinson *et al.* 2001). Considering the highly secretive fossorial nature of *L. bougainvilii,* and the lack of more specialised search techniques (e.g. raking through leaf litter) being employed, it is not surprising that this species was not detected during the survey. Prime Seal Island lies in the centre of *L. bougainvillii's* geographic distribution and this species has been found on islands in close proximity to Prime Seal Island (i.e. Mt. Chappell and Big Green Islands). Therefore, it is plausible that *L. bougainvillii* inhabits the island.

Pseudemoia entrecasteauxii (Southern grass skink)

A common but wary species, *Pseudemoia entrecasteauxii* is found throughout mainland Tasmania and on offshore islands, including Maria Island, King Island, and several islands of the Furneaux Group (Rounsevell *et al.* 1996; Hutchinson *et al.* 2001). This species is found in a variety of habitats, but is usually associated with open woody vegetation wherever an understorey of grassy or sedgy plants occurs (Hutchinson & Donnellan 1992). The Bass Strait island populations are usually strongly striped and the midlateral stripe of the male becomes bright red or orange during the breeding season, making them highly distinguishable from other species. The wide geographic distribution of *P. entrecasteauxii* across southeastern Australia, the islands of the Bass Strait, and mainland Tasmania suggest that this species is likely to be present on Prime Seal Island. More intensive, target-specific surveys are required to determine their presence/ absence on the island.

HABITAT FOOD RESOURCES AND PREDATORS

A large variety of habitat types exist on Prime Seal Island. This is a direct result of the island's size, topography, and high alkaline soils, which make it one of the more fertile islands in the Furneaux Group (Harris *et al.* 2001). Therefore, Prime Seal Island is capable of supporting a variety of vegetation types and consequently, a high faunal diversity in comparison with other outer Furneaux Islands. The high abundance of invertebrates, lizards, and small mammals (pers. obs.) is likely to provide sufficient food resources to support the diversity of reptile species present. For example, the presence of *D. coronoides,* which feeds exclusively on skinks, suggests that Prime Seal Island probably supports a relatively high abundance of lizard prey. Similarly, the high abundance of house mice (*Mus musculus*), determined via intensive small mammal trapping during the survey period, appears adequate to support larger species of snakes, such as *N.*

ater and *A. superbus* (MacKay 1955). Interestingly, the presence of both *N. ater* and *A. superbus* on Prime Seal Island, provides further justification for Prime Seal Island to harbour high reptile diversity, as these two species are not found together except on the largest islands where there is a greater diversity of habitats and abundance of prey (MacKay 1955; Green & Rainbird 1993). The presence of short-tailed shearwater colonies on Prime Seal Island may also provide additional food resources and habitat for *N. ater* and *A. superbus* (Hutchinson *et al.* 2001; Green 1969; Fearn 1994).

The presence two feral animal species – cats (*Felis catus*) and house mice (*M. musculus*) – could potentially have an effect on the island's reptile fauna. Feral pests are perhaps the most invasive threatening agent impacting the conservation of native fauna on offshore islands (RPDC 2003; Brothers *et al.* 2001). Feral cats are known predators of reptiles, especially small skinks (Dickman 1996). Bryant and Shaw (2006) suggested that *Cyclodomorphus casaurinae* on Tasman Island were being targeted by feral cats as prey, after a number of fresh lizard remains were found. They suggested that cats are the likely cause of decline in the lizard population, since observations had reduced significantly over time (Brothers *et al.* 2001, Bryant and Shaw 2006). Although both cats and mice exist on Prime Seal Island at relatively high abundance, no lizard remains were recorded as a result of direct cat or mouse predation. Nor were there any lizard remains found within cat scats, collected and analysed from the island (N. Mooney, pers. comm. 2009). Although only a small number of scats were examined, it is possible that feral cats prey almost entirely on house mice on Prime Seal Island.

ACKNOWLEDGEMENTS

I would like to thank the Prime Seal Island survey team, including Stephen Harris, Clare Hawkins, Michael Driessen, Nick Mooney, Micah Visoiu, Emma Betts, Oliver Strutt, Abbey Throssell, Kevin Bonham, Rolan Eberhard, Sarah Munks and Bridgette Moffat for their field assistance and contributions to the reptile inventory. Thanks to the Saunders family and trustees of the Hamish Saunders Memorial Trust for funding this ecological survey, and to Michael Driessen for his comments on the manuscript. Thanks to Phil Bell for assistance in Hobart.

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Removing ticks from a blotched blue-tongue.
Photo by Dylan van Winkel.

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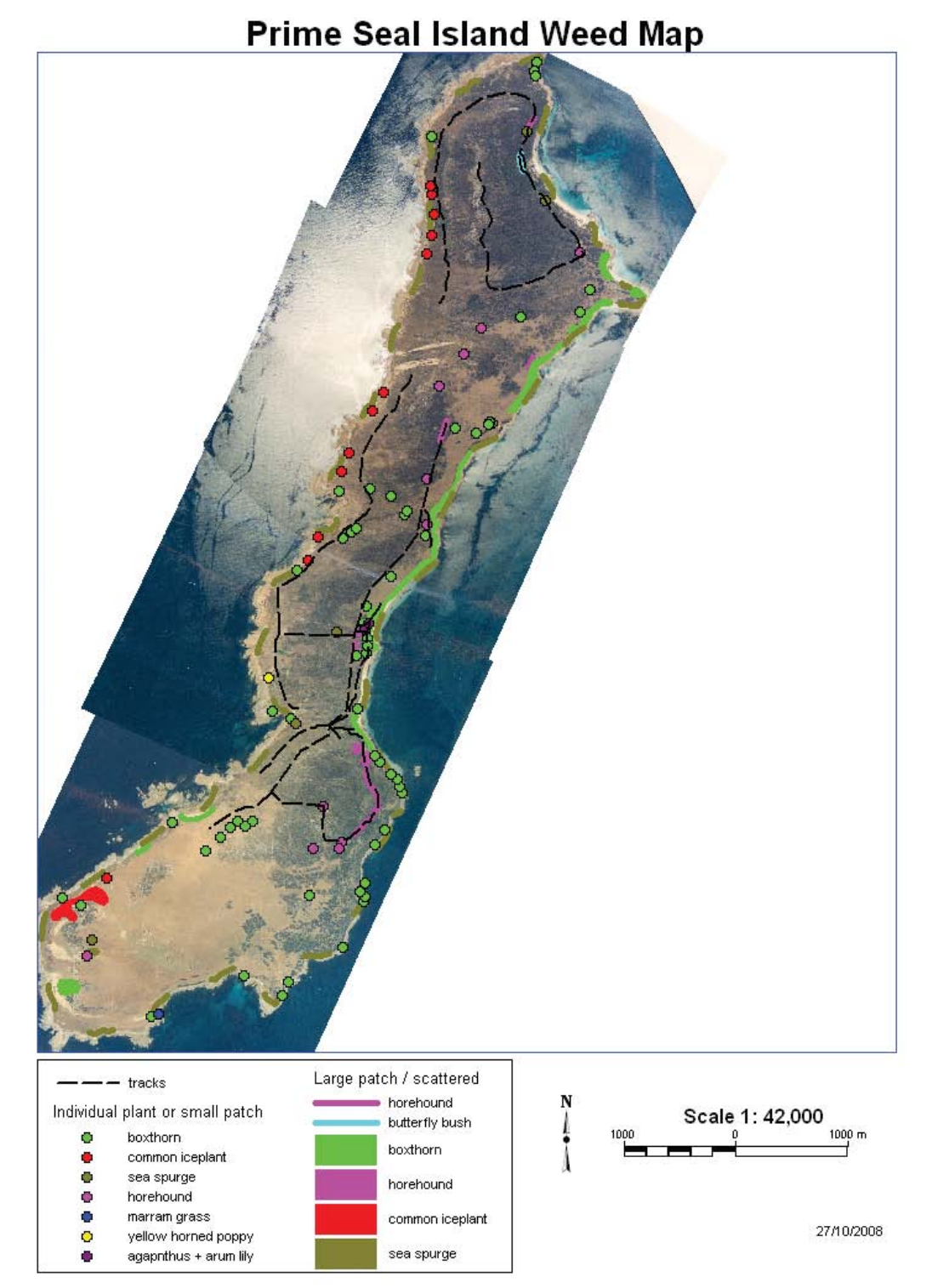
THE DISTRIBUTION and MANAGEMENT of ENVIRONMENTAL WEEDS



By Oliver Strutt

Environmental weeds, as on many islands are a potential threat to the important conservation values of Prime Seal Island. This study is based on the extensive surveillance of the island, mapping the eight most significant weeds. The extent and distribution of infestations were established and populations of new weeds were recorded. Determining the potential impact on natural values, the potential rate of spread and the feasibility of eradication, through the surveillance process, allowed for management actions to be prioritised.

INTRODUCTION

Prime Seal Island, located to the west of Flinders Island, is the most significant island of the outer Furneaux for flora conservation as it has eight species listed under the *Threatened Species Protection Act 1995* and is the Tasmanian stronghold for several of them (Harris *et al.* 2001a). Apart from the threatened species, the island also has flora of biogeographic significance, high conservation value vegetation types, sites of geoconservation and heritage significance, and a socially and economically important grazing enterprise. The principal issue for vegetation management on Prime Seal is the control of weeds (Harris *et al.* 2001a).

A weed is a plant that has, or has the potential to have, a detrimental impact on economic, social or conservation values (WeedPlan 2005). Environmental weeds are plant species that have established self-propagating populations in native vegetation outside of their natural range (Csurhes and Edwards 1998). Impacts of environmental weeds include competition for resources, prevention of recruitment, and alteration of geomorphological processes, hydrological cycles, nutrient content of soil, fire regimes and abundance of indigenous and non-indigenous fauna. Environmental weeds have been implicated in the extinction of indigenous plant species and they can threaten the functional complexity and stability of ecosystems (Williams and West 2001).

Weeds are of particular significance on Prime Seal Island due to a number of factors. Some weeds present are capable of invading the habitat of conservation significant flora, potentially outcompeting native species and dominating communities. The productive capacity of the grazing land can be impacted, reducing the resources available to the landholders for managing the island. Beach weeds in particular can cause major impacts, such as the alteration of coastal landforms and the degradation of sea bird habitat and aboriginal heritage. Due to a large percentage of Tasmania's beaches having been modified, maintenance of the integrity of the remaining natural coastlines is critical (Rudman 2003). Due to ocean currents carrying propagules from the North, the Bass Strait islands are Tasmania's early warning frontiers for observing the invasion of exotic plant species dispersed by currents (Harris *et al.* 2001a; Rudman 2003). Additionally, climate change may allow weed species to move south, with the Bass Strait islands providing an intermediate climate between Tasmania and the Australian mainland.

It is widely recognised that detection and intervention at the early stages of infestation maximises chances of eradication, minimises ecological damage and is the most cost-effective management of weeds (Csurhes and Edwards 1998; Harris *et al.* 2001b; Moncrieff 2006; Timmins and Braithwaite 2001; WeedPlan 2005). Surveillance facilitates early detection, and for weed control efforts to be successful, boundaries of the population must be thoroughly assessed to ensure the area is not continually reinfested from adjacent areas. This study aims to provide an example for the thorough weed survey of an island from which management can be informed and control measures prioritised. It also aims to contribute to the objectives of the Prime Seal Island Draft Management Plan, assisting the landholder with vegetation management (Poole *et al.* 2002), and the Tasmanian Weed Management Strategy (WeedPlan 2005) and the Tasmanian Beach Weed Strategy (Rudman 2003) which call for collaborative monitoring and reporting.

METHODS

This study was based on an on-ground survey of Prime Seal Island from the 14th to the 19th of October 2008. The island was traversed extensively on foot and weed locations were recorded using a hand-held GPS. Approximately 75 kilometres were walked, including the entire coastline and as much of the interior of the island as possible. A map was produced using the MapInfo GIS package, and management recommendations were prioritised by perceived threat to natural values, the rate of spread and the ease or likelihood of control/eradication. Of the 60 exotic species that have previously been recorded on Prime Seal Island (DPIPWE 2008) only those species that were not highly transient populations and were considered likely to threaten natural values were mapped.

RESULTS

The distribution of the nine mapped weeds is shown in the map (Figure 1). African boxthorn was scattered across the island with dense infestations in parts. It was most abundant along the east coast of the island from the house to Spit Point, where it was almost continual along the frontline vegetation and extended upslope scattered amongst the *Myoporum insulare* scrub.

Common iceplant was found in a large infestation of several hectares extending from the granite tor to the coast at the southern end of the island. The majority of this area consisted solely of iceplant, including a large patch of dead iceplant, but it also extended into the *Myoporum insulare* scrub and the *Austrostipa stipoides* tussock grassland. Small individual iceplants were also found scattered along the west coast.

Sea spurge was widespread, scattered in patches along the entire coastline, so was not mapped on the coast and is indicated as a broken line around the perimeter of the island on the map. Inland occurrences of Sea spurge were mapped, including a patch growing at the top of a sand blow approximately 120 metres above sea level at the southern end of the island, and another patch near the centre of the island blown inland in a low area between hummocks.

Horehound was widespread on the island, but was restricted to disturbed areas such as alongside the tracks, in sand blows and recently cleared areas of pasture.

Only one patch of Marram grass was found on the island, covering only approximately two square metres. This was located at an east-facing sandy cove at the southern end of the island.

Yellow horned-poppy was also only recorded at one location, on the west coast, just above the high tide line amongst the *Austrostipa stipoides* tussocks. There were several mature plants with remains of flowering stems and a scattered patch of immature plants covering a patch of approximately 50 square metres.

Arum lily was restricted to the vicinity of the house and shearing shed.

Butterfly bush (also known as swan plant or cotton bush) was found along a 100 metre stretch of track at the northern end of the island. There were approximately 200 mature plants.

GENERAL DISCUSSION

The most significant threat to the natural values of Prime Seal Island is the potential invasion of threatened species habitat and high conservation value plant communities by weeds that are capable of dominating those communities or dramatically altering ecosystem, geomorphological or hydrological processes. The comparative potential impact and prioritisation for management actions for the different species is summarised in table 1 and discussed below.

African boxthorn was planted on the island as a windbreak by early agriculturalists (Poole *et al.* 2002). It is capable of prodigious expansion, being spread by birds such as ravens and starlings, and it can form dense thickets, shading out other species and can be fatal to cape barren geese (Poole *et al.* 2002 DPIW 2002a). Since acquiring the lease in 1986, the current landholders have

undertaken extensive control of boxthorn, with evidence of manual removal across much of the island. Although boxthorn has a high potential impact on natural values, the feasibility of total eradication is low due to the extent of the infestation, so unless extensive resources are made available, boxthorn management should focus on eradicating outlying individuals (especially those in the vicinity of high conservation values) and restricting spread. Eradication of all boxthorn apart from the coastal strip from the house to Spit Point should be feasible in the short term. Control methods to be used may be found in the Department of Primary Industries and Water Boxthorn Control Guide (DPIW 2002a). Due to the occurrence of boxthorn on surrounding islands and the likely inter-island dispersal by starlings, continual reinfestation is probable, so continual monitoring will be required.

Common iceplant is a peculiar weed with several characteristics that make it particularly important to control. It is a salt-accumulator and after the plants die salt leaches into the surrounding soil creating an inhospitable environment for many other species. It thus comes to dominate areas, and on Prime Seal Island it occurs as a monoculture in an area of several hectares. Iceplant may also invade pasture and cropping land and can be fatal if eaten by stock (Borger and Stewert 2007). Iceplant is a significant weed of the Wheat Belt in Western Australia, but at present in Tasmania there are only records from Prime Seal and Babel Islands (DPIPWE 2008). Iceplant employs the Crassulacean Acid Metabolism (CAM) photosynthetic pathway, and it has been suggested that such plants will have a competitive advantage following climate change (Watson 2007). On Prime Seal Island iceplant appears to be spreading, occurring as scattered individuals just above the high tide line in sandy areas along the west coast, and the main population appears to be expanding. The main population appears to be located in an area that was mapped by Harris *et al.* (2001a) as dense African boxthorn infestation (which was subsequently eradicated), suggesting that iceplant has thrived in the disturbed conditions following boxthorn removal. It also appears to be expanding predominantly into areas with a high cover of bare sand, for example areas of *Austrostipa stipoides* tussock grassland that have been recently burnt and steep areas below the granite tor where erosion is present. Due to the potential impacts of iceplant, its current restriction to just a two islands in Tasmania and its potential to invade further south following climate change, eradication of iceplant

Table 1: Prioritisation of weed management actions for environmental weeds on Prime Seal Island

Common name	Scientific name	Potential impact on natural values	Potential rate of spread	Feasibility of eradication	Priority for action
African boxthorn	*Lycium ferocissimum*	High	Moderate/ High	Moderate/ Low	High
Common iceplant	*Mesembryanthemum crystalinum*	Moderate	High	Moderate	Moderate/ High
Sea spurge	*Euphorbia paralias*	High	High	Low	Low
Horehound	*Marrubium vulgare*	Low	Moderate	Moderate	Low
Marram grass	*Ammophila arenaria*	High	High	High	High
Yellow horned-poppy	*Glaucium flavum*	Moderate	Moderate	High	High
Arum lily	*Zantedeschia aethiopica*	Low	Low	High	Low
Butterfly bush	*Gomphocarpus fruticosis*	Moderate	Moderate/ High	Moderate/High	High

should be prioritised. The scattered individuals should be addressed first and may be removed by manual pulling. The West Australian Government's Department of Agriculture and Food provides more information for control techniques (Borger and Stewert 2007).

Sea spurge is one of the most significant coastal weeds in Tasmania and in only three decades has expanded its range from its first occurrences to cover much of the beaches of the North and West coasts (Rudman 2003). Sea spurge seeds are dispersed by water and it rapidly colonises coastal areas especially bare sand but also invading areas of low vegetation. Dense infestations alter sand movement and it can reduce the available habitat for beach nesting birds (Rudman 2003). Although Harris *et al.* (2001a) commented that any occurrences of sea spurge should be treated, since then it has become thoroughly established and eradication is very unlikely, especially considering the continual reinfestation from the constant source of seaborne propagules. The Tasmanian Beach Weed Strategy identifies the areas of Tasmania which are priorities for sea spurge control and the Bass Strait Islands lie outside of that zone (Rudman 2003). Sea spurge should be controlled on Prime Seal Island where it particularly threatens significant conservation values and as such the inland occurrences should be eradicated due to their proximity to threatened plant populations.

Horehound is widespread on the island but appears to be restricted to the sides of tracks and other disturbed areas such as recently cleared pasture, so although a potentially significant agricultural weed is not likely to have severe impacts on natural values. Horehound has also been the subject of weed control works on the island with Poole *et al.* (2002) noting that through aerial spraying it had been reduced to minor localised infestation. Horehound control may be required for the area approximately one kilometre south of the house where it occurs on a slope leading up to the area of native scrub and is adjacent to populations of the threatened plants *Zygophyllum billardierii* and *Lasiopetalum discolour.* If monitoring indicates that the horehound is invading this area, control would be a high priority. Control methods are discussed in the DPIW control guide (DPIW 2002b). To minimise the impact of horehound, care should be taken to avoid soil disturbance and the clearance of native vegetation.

Marram grass is another of the most devastating coastal weeds in Tasmania and following original deliberate plantings for stabilisation works, it is now widespread around Tasmania (Rudman 2003). Pieces of rhizome can be carried by the sea and establish new populations which spread rapidly by vegetative growth. It traps sands very effectively, dramatically changing beach and dune morphology, degrading the habitat of shore-nesting birds and out-competing native sand-binding plants (Rudman 2003). It is present on several of the Furneaux islands, but absent from others (DPIW 2008). Due to the small size of the infestation on Prime Seal Island it is likely to be a recent arrival. Manual removal is the highest priority for weed control due to the potential rate of spread of the weed and the ease of eradication whilst at such an early stage of infestation. Ongoing monitoring of the site to remove any resprouting plants will be necessary.

Yellow horned-poppy is also likely to be a recent arrival to the island and its rate of spread and impact on natural values are unknown at this stage. It is an uncommon weed in Tasmania with only four other recorded occurrences, one on Flinders Island, one on Inner Sister Island and two at Freycinet Peninsula (DPIPWE 2008). Early eradication is a priority due to the current restricted size of the population, its limited distribution and its unknown impact and rate of spread. Hand pulling should be an effective control method.

Arum lily would have been planted as an ornamental by early agriculturalists on the island. It does not appear to be threatening natural values as its current distribution is restricted to the vicinity of the house and shearing shed, and although it is a self-sustaining population the rate of spread appears to be very low. It does have the potential to invade native vegetation and is

also poisonous to stock (DEWHA 2008), so the population should be monitored and eradication may be considered necessary at some stage.

Butterfly bush is another uncommon weed in Tasmania with only two other records on Flinders Island as its only occurrence in the state (DPIW 2008). It is potentially very invasive, although restricted to high light environments (West 1996). At present it only occurs in the cleared strip on either side of a track, however it is a tall growing shrub capable of shading out other vegetation and it appears to be spreading along the track fairly rapidly, so eradication whilst at an early stage of infestation should be prioritised. Hand pulling is effective (West 1996) and other control methods are provided by the West Australian Government's Department of Agriculture and Food (DAF 2008).

Another potentially significant environmental weed is buckbush, *Salsola kalii*, and is fortunately rare in Tasmania. It has been previously sighted on Prime Seal Island (Harris *et al.* 2001a), although it was not found in this survey.

When undertaking weed control actions care should be taken to minimise soil disturbance, both to reduce the risk of erosion (which is high due to the sandy soil and strong winds of the island) and to reduce the bare ground available for the re-establishment of weeds. If dense infestations are to be removed soil stabilisation may be required either through the planting of appropriate native species or the sowing of benign pasture species depending on the situation. If eradication is undertaken for the dense coastal patches of boxthorn, it may also be necessary to assist revegetation with native species that will provide the same habitat and windbreak functions, such as *Myoporum insulare, Allocasuarina verticillata* and *Leptospermum laevigatum*. It is also important that control works are not undertaken for the coastal strip of boxthorn approximately one kilometre south of the house during the breeding season of white-bellied sea eagle, as there is a nest in this area that would be disturbed. Control of beach weeds should also not be undertaken during the breeding season of beach-nesting birds.

This study has ascertained the extent and distribution of the main environmental weeds of Prime Seal Island, allowing management actions to be planned and prioritised. It has allowed for the impact of the weeds to be assessed and has provided an example of the importance of regular surveillance. Previously unrecorded populations of marram grass, butterfly bush and yellow horned-poppy, were found which provides for allowing for early control options. Regular surveillance is required to monitor the known weed populations and to detect the occurrence of new ones. Mapping the weeds has allowed for the comparison in the future of weed distributions, to determine the spread of populations or the success of control measures. It is hoped that the study has been of some value for informing the land managers with regard to vegetation management.

ACKNOWLEDGEMENTS

Many thanks to Stephen Harris for advice in the preparation of this paper and to all the members of the 2008 Hamish Saunders Memorial Prime Seal Island Expedition for making the trip enjoyable and constructive.

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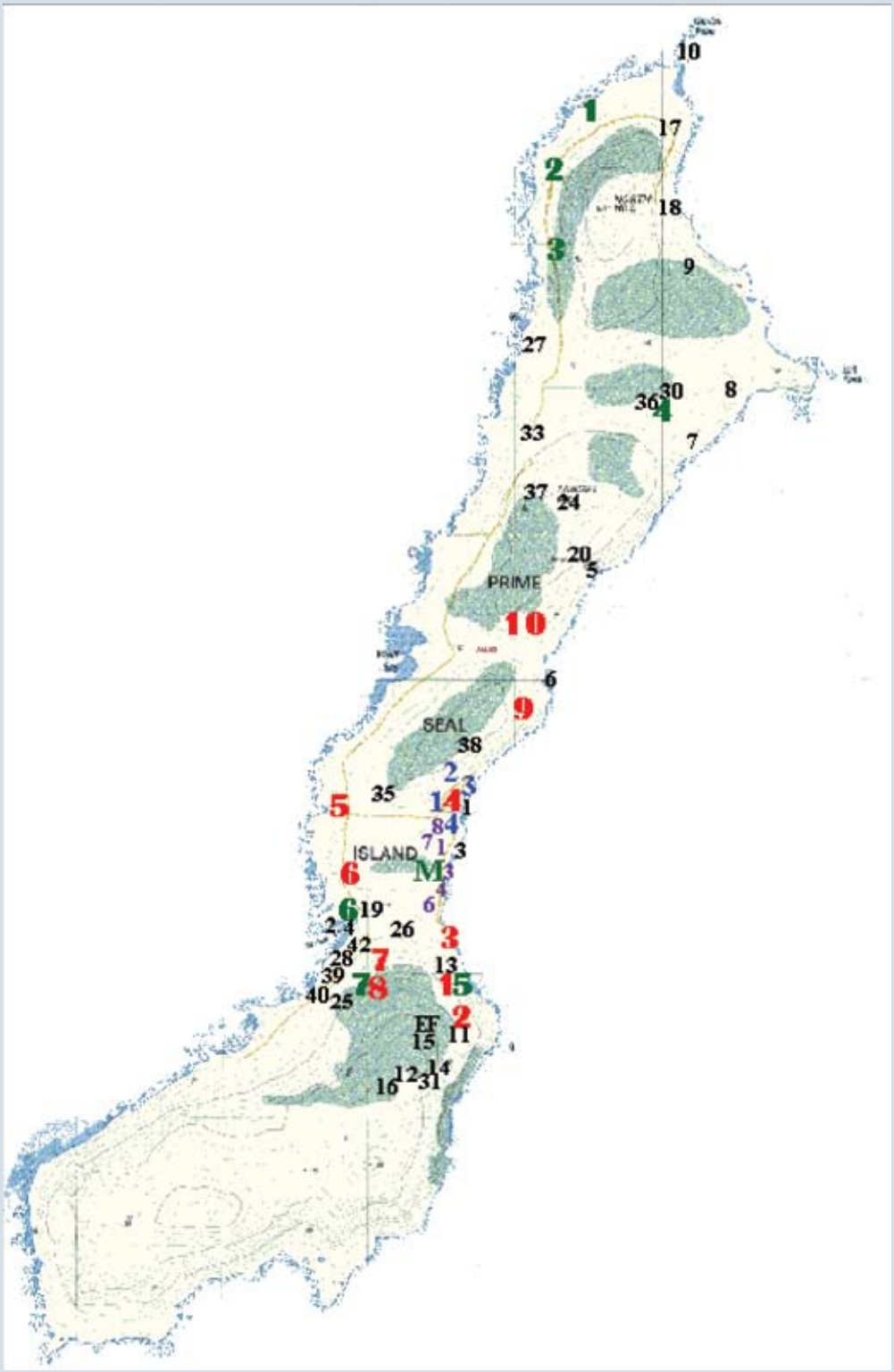
INVERTEBRATE SURVEY



Map 1 Invertebrate sample sites
(Red: pitfall, green: sweep/bash or malaise, blue: light, black: hand collection, purple: carcass. Note that sampling of another kind often occurred at sites designated as being of a particular kind, eg hand collection at pitfall sites.)

By Kevin Bonham

Prime Seal Island, previously apparently unsampled for invertebrates, was sampled for a range of invertebrate groups by methods of pitfall trapping, beating of shrubs, malaise and light trapping, hand collecting, sweeping and carcass sampling. 7168 specimens of at least 32 orders were recorded. Significant finds include a new species of centipede, an undescribed and possibly new species of bristletail, and four known or suspected moth records for the state. Results presented here are preliminary and include identifications for selected groups only (land snails, millipedes, centipedes, crustaceans, collembola, bristletails, spiders, beetles).

INTRODUCTION

This report gives interim results for invertebrate surveying conducted on Prime Seal Island, primarily by Abbey Throssell and Kevin Bonham. Detailed results for Orthoptera, Lepidoptera and Aranaea are reported separately by Michael Driessen, Abbey Throssell and Lynne Forster respectively.

Prior to this sample, we were unable to find evidence of any previous invertebrate sampling on Prime Seal Island (hereafter PSI). For some groups including land snails, PSI was the largest Tasmanian island (excluding Macquarie for groups absent from that island) that was bereft of previous records.

The primary aim of invertebrate sampling was to collect as many species of invertebrate from the island as possible.

METHODS

The following methods were employed to survey invertebrates on the island:

1. Pitfall trapping: Ten pitfall trap sites were established. Sites were selected subjectively to cover a substantial range of habitat types and substrates. To limit time taken to retrieve traps, sites were established relatively close to the homestead. At six sites (1, 2, 5, 6, 7, 9) the five traps were arranged in a line, each about 10 metres apart. At the remaining sites (3, 4, 8, 10) the five traps were arranged in a loose cluster with a similar distance of separation. We aimed to place traps in a wide range of microhabitats at each site, in order to increase the number of species likely to be recorded. Pitfall traps were about half-filled with 70% methylated spirits solution and a small amount of ethylene glycol was added to make complete evaporation of contents unlikely. Each trap was covered by a lid held on stakes about 2 cm above the trap (this height was chosen to reduce the risk of vertebrate captures while being unlikely to deter any but the largest ground invertebrates.) Each trap was retrieved after three nights (traps 1-4 on 17 Oct and the remainder on 18 Oct).

All traps were retrieved intact with at least some spirits remaining and at least partial lid cover except for traps 6C (lid completely missing and some contents spilled during decanting) and 8D (spirits completely evaporated); results from these traps are therefore likely to be significant undercounts. Sieving in the process of sorting and undercounting during sorting are likely to have led to the loss of most very small mites and some very small collembolans but is unlikely to have caused significant losses among other groups.

2. Beating: Six sites were sampled by beating of shrubs using beating trays. As diverse as possible a range of shrubs or tree foliage at each of these sites was beaten above a tray with litter thus collected from each beat being retained for later sorting where invertebrates were present and discarded where none were visible. Beating was conducted for about twenty minutes at each site. At three sites a single beat sample was taken and at the other three, two beat samples were taken at each. At two of these three (B4, B5), one sampler (KB) focused on habitats along the track or paddock edge of the habitat sampled while one (AT) focused on habitats in the interior. At the third (B3) the habitat sampled was not near a disturbed edge.

3. Malaise Trap: A single malaise trap was erected in a small clearing

within dense *Allocasuarina* woodland. Contents were retrieved after four nights.

4. Light Trapping: Light traps (contained in a bucket and placed above ground rather than buried) were established near the homestead for a total of six nights. One (LT1) was established at a fixed point for three nights while another (LT2-4) was placed at different sites on each night.

5. Sweeping: Five sites were swept with nets for about half a person-hour each. Habitats swept included grasses or other low vegetation in all cases except for one site at which we conducted aerial sweeping of insects swarming around the upper and middle branches of four-metre high vigorously flowering tea-trees.

6. Hand collecting (not including land snails): Opportunistic and unsystematic hand-collecting (including netting of flying specimens) occurred continually. A total of 48 hand-collecting events were recorded (26 by KB and AT and 22 by the remainder of the party). Most of these represented opportunistic collections of a small number of specimens (or several specimens of the same thing) at a given point. Significant hand collecting efforts occurred at the following sites:

- HC1 (homestead): primarily moths attracted to homestead lighting over several nights
- HC5 (near Mannalargena Cave): primarily turning of limestone boulders and hand-sampling of leaf litter in and near cave escarpment
- HC12 (*Bursaria* forest on hill south of homestead): under rocks and in leaf litter in *Bursaria* scrub
- HC13 (open area at base of hill): flying insects were frequently seen and netted in this area *en route* to sites
- EF, HB15 (eucalypt remnant): the small *Eucalyptus ovata* remnant was sampled both by other members of the party in a group, and by AT (combination of hand collecting and bashing from tree branches) and KB (ground litter/ rock hand sampling)

Land snails were targeted separately. KB conducted searching for land snails both during the establishment of pitfall trap sites and opportunistically at various points around the island and during other significant hand collection efforts noted above. As land snails were frequently seen lying dead on the ground, and as the species present pose no known identification problems, not all specimens seen were collected; however, numbers of each species seen at each site were recorded or, for more than ten specimens of a species at a site, estimated. The presence of exotic snails at sites was noted, but the exact number of specimens seen was only recorded when that number was very small; otherwise the density of shells of exotic snails seen was recorded as "some" or "many".

Because of the prolonged dry conditions leading up to and during our visit, live snails were rarely observed. Only 8% of native snails observed were alive and for exotic species (both of which have relatively large and durable shells) the percentage was much lower. Specimen tallies therefore included live and dead shells combined.

7. Carcass sampling: Seven pademelon carcasses in varying states of decay were turned and visible invertebrates collected from their undersides. A single pitfall trap was placed immediately adjacent to the remains of an eighth pademelon carcass and retrieved after two nights.

Sample locations are shown in Map 1. Specimens were sorted into taxonomic groups, which ranged from family to class depending on ease of rapid sorting.

A full list of all sample sites with grid references and habitat types is given in Appendix 1.

RESULTS

Not counting exotic snails, 7168 specimens were either collected or, in the case of uncollected native snails, recorded. Summary totals by sorted group are shown in Table 1. The figure for native snails is greatly inflated by deliberate collecting focus on snails, by the inclusion of sighted specimens and by the inclusion of dead shells.

A total of 31 different orders were recorded, not counting mite orders (mites have not yet been sorted to order). It is difficult to derive exact numbers of orders from the previous expeditions to Tasman Island and Three Hummock Island because of incomplete information about collembola and centipedes collected, but it is estimated that 24 different orders excluding mite orders were collected on each of those expeditions.

The following are excluded from the map: HC21,23,29 (no grid reference but very near P4 and HC1), WC2 and 5 (same as 1 and 4 respectively), HC41 (within metres of HC38), HC22, 32 and 34 (no grid reference).

Results by collecting method:

1. Pitfall trapping

Pitfall trapping specimen totals by group are given in Appendix 2.

4 444 specimens representing at least 24 orders (order count excluding Acari) were collected from the fifty pitfall traps. Acari were present in all 50 traps. The most frequently present orders excluding Acari were Aranaea (50 traps), Hymenoptera (49), Diptera (48), Entomobryomorpha (48), Coleoptera (44), Hemiptera (40), Poduromorpha (20), Gastropoda (16 – but mostly dead shells) and Isopoda (15). Excluding the 1165 Acari specimens the most numerous orders collected were Hymenoptera (1342 specimens), Diptera (666), Entomobryomorpha (329), Hemiptera (229), Aranaea (216), Coleoptera (192), Isopoda (71) and Poduromorpha (48). Two orders (the millipede order Polyxenida and the collembolan order Poduromorpha) were captured only by pitfall trapping and not by any other method.

The 10% of traps with the most Hymenoptera included 44% of specimens for that order, and a similar result (43%) was obtained for Diptera. With the exceptions of 87 of 229 Hemiptera occurring in a single trap and 33 of 71 Isopoda likewise, the other relatively common orders were generally less concentrated in a small number of traps.

Specimen totals varied considerably by site. The lowest total (169) was at the recently burnt site 7, and the highest occurred in *Myoporum* scrub at site 4 (665) and grassland on dunes at site 5 (658). Site 4 had unusually high numbers of Acari, Diptera and Collembola while Site 5 had very high numbers of ants in two traps.

Total numbers of orders varied relatively little by site; 12-15 orders were collected from each site except for sites 9 (pasture) and 10 (low tea tree scrub near pasture), which had only ten orders each. The mean number of orders per trap varied relatively from 6.8 orders at site 9 to 10 orders at site 4. The two traps that were not retrieved intact each had the lowest specimen runs for their site, and shared the lowest order total by trap (5) for the entire survey.

Four sites (2, 3, 4 and 5) generally had high than average total specimen numbers, total order numbers and mean order numbers per trap. The other sites generally ranked below average on all these figures, although site 10 had a high specimen total because of very high numbers of Diptera (36% of pitfall survey total).

2. Bashings

947 specimens representing just twelve orders plus Acari were captured in the relatively limited bashing tray sampling conducted. Acari (275 specimens) were common in most bashing samples, and Hemiptera (195), Thysanoptera (131), Aranaea (71), Entomobryomorpha (70), Lepidoptera (59 – mostly larvae), Hymenoptera (52) Coleoptera (42) and Psocoptera (30) were the commonest discrete orders. A large collection of scale insects at site SB1 contributed 81 of the 195 Hemiptera. No order absent from the pitfall samples was collected in

Table 1 Specimen totals by group and sampling method for all invertebrate groups. Five of 33 gastropods pitfall-trapped were exotic. Breakdowns of Collembola, Diplopoda and Chilopoda by order can be found in "Results by group".

Group	Level	Pitfalls	Bash	Malaise	Light	Sweep	Hand	Carc	Total
Formicidae	Family	1189	23		1		9	9	**1231**
Hymenoptera ex Form.	Order (part)	153	29	7	1	11	14		**215**
Diptera	Order	665	14	61	21	85	50	72	**968**
Diptera Larvae	(juv)	1	3					96	**100**
Mecoptera	Order					2	1		**3**
Dermaptera	Order	5					1		**6**
Heteroptera	Suborder	20	39	2	3	6	26		**96**
Sternorrhyncha	Suborder	125	137	6		2	5		**275**
Auchenorrhyncha	Suborder	84	19	3		8	4		**118**
Blattodea	Order						4		**4**
Coleoptera	Order	186	39	2	10	6	38	312	**593**
Coleoptera Larvae	(juv)	6	3				6	12	**27**
Lepidoptera	Order	17	3	30	55	27	52	5	**189**
Lepidoptera Larvae	(juv)	24	56			4	5		**89**
Neuroptera	Order		1	1			1	1	**4**
Neuroptera Larvae	(juv)	1						3	**4**
Thysanoptera	Order	7	131						**138**
Archaeognatha	Order						3		**3**
Psocoptera	Order	29	30	1					**60**
Orthoptera	Order	2	1			2	3		**8**
Odonata	Order						1		**1**
Collembola	Subclass	404	72					1	**477**
Acari	Subclass	1165	275	8		1	28	14	**1491**
Aranaeae	Order	216	71	2	1	13	17	3	**323**
Opiliones	Order	8					1		**9**
Scorpiones	Order	2					1		**3**
Pseudoscorpionida	Order	3					2		**5**
Diplura	Order						1		**1**
Isopoda	Order	71					16		**87**
Amphipoda	Order						4		**4**
Diplopoda	Class	12					36		**48**
Chilopoda	Class	12					7		**19**
Gastropoda	Class	33					531		**564**
Unknown		4	1						**5**
Total		**4444**	**947**	**123**	**92**	**167**	**867**	**528**	**7168**

Table 2 Bashing specimen numbers by specimen group.
Small letters in code denote collector (a=Abbey Throssell, k=Kevin Bonham) At sites 4 and 5 Abbey sampled the interior of the habitat type while Kevin sampled the edge.

	SB1	SB2	SB3Ak	SB3Ba	SB4Ak	SB4Ba	SB5Aa	SB5Bk	SB7	TOTAL
Formicidae	2		10	6		1			4	**23**
Hymenoptera	8	2	1	4	1	4	2	7		**29**
Diptera	2		2				1	4	5	**14**
Diptera Larvae					1		2			**3**
Heteroptera	3	1	1	2	10	6	3	4	9	**39**
Sternorrhyncha	82	2	12	7	11	7	4	7	5	**137**
Auchenorrhyncha	11	1		4	1			1	1	**19**
Coleoptera		10	6	2		6	10	2	3	**39**
Coleoptera Larvae					1			1	1	**3**
Lepidoptera				1	1			1		**3**
Lepidoptera Larvae	4	1	3	23	2	6	5	11	1	**56**
Neuroptera									1	**1**
Thysanoptera	14	19	11	48	9	1	6	20	3	**131**
Psocoptera	3		4	1		6		2	14	**30**
Orthoptera									1	**1**
Collembola	2	1	5	12	3	31	10	7	1	**72**
Acari	76	13	36	82	3	22	10	28	5	**275**
Aranaeae	9	4	8	2	12	19	6	8	3	**71**
Unknown	1									**1**
Total	**217**	**54**	**99**	**194**	**55**	**109**	**59**	**103**	**57**	**947**

Table 3 Specimen totals by sorted group for malaise and light traps.

	Malaise	LT1	LT2	LT3	LT4	TOTAL
Nights deployed	**4**	**3**	**1**	**1**	**1**	**10**
Formicidae					1	1
Hymenoptera	7	1				8
Diptera	61	9	3	3	6	82
Heteroptera	2	2			1	5
Sternorrhyncha	6					6
Auchenorrhyncha	3					3
Coleoptera	2	6		3	1	12
Lepidoptera	30	15	4	11	25	85
Neuroptera	1					1
Psocoptera	1					1
Acari	8					8
Aranaeae	2				1	3
Total	**123**	**33**	**7**	**17**	**35**	**215**

the bashings although there were significant differences in fauna at lower taxonomic levels (eg see Coleoptera, Aranaea and Collembola sections in Results by Group).

Bashing specimen totals are given in Table 2.

1. Malaise Trap

The single malaise trap, deployed for four nights, collected 123 specimens of eight orders plus Acari – predominantly Diptera (61) and Lepidoptera (30).

2. Light Traps

A total of six trap-nights of light trapping produced 91 specimens of six orders, predominantly Lepidoptera (55) and Diptera (21). One light trap location (LT4) produced more specimens in one night than another (LT1) had done in three.

3. Sweep samples

167 specimens representing eight orders plus Acari were collected in five sweep samples. Diptera (85) were by far the most numerous order captured. At site HC5 sweep sampling was specifically directed at Lepidoptera seen flying in large numbers over *Acaena* patches so it is not surprising that Lepidoptera were the commonest order in that sample. One order not captured by any of the above methods, Mecoptera, was captured by sweep sampling.

4. Hand collection

Hand collection results by sorted group are given in Appendix 3.

Excluding gastropods, for which hand collection results are treated separately (see Gastropoda under Results by Group), hand collections produced 336 specimens of 25 orders plus Acari. These results included six orders (Blattodea, Archaeognatha, Odonata, Diplura, Amphipoda and the centipede order Scolopendromorpha) that were not captured by any other collection method.

Specimen frequencies for the groups collected are essentially meaningless since hand collection was deliberately biased towards groups of interest, and some groups were much easier to capture when seen than others.

5. Carcass sampling

Carcass sampling results by sorted group are given in Table 5. 528 specimens of seven orders were collected but these results were numerically dominated by the single pitfall trap (WC3), which trapped 464 specimens in two nights. This is higher than the total invertebrate

Table 4 Specimen totals for sweep samples

	HC5	SB6	SB7	HC12	P2	TOTAL
Hymenoptera			1	3	7	**11**
Diptera	10	14	13	41	7	**85**
Mecoptera				2		**2**
Heteroptera	2			2	2	**6**
Sternorrhyncha					2	**2**
Auchenorrhyncha		7			1	**8**
Coleoptera				2	4	**6**
Lepidoptera	25	1	1			**27**
Lepidoptera Larvae				3	1	**4**
Orthoptera				2		**2**
Acari		1				**1**
Aranaeae		4		6	3	**13**
Total	**37**	**27**	**15**	**61**	**27**	**167**

count for any of the fifty pitfall traps left out for three nights elsewhere.

Results by group:

In this section, groups are ordered alphabetically by class or subclass, then by order, then by lower classifications as necessary. At the end of the section are some comments on groups that were conspicuously absent.

Arachnida: Acari

Mites were very common in pitfall and bashing samples and a minor component of the malaise trap, carcass, sweep and hand-collection samples. Additionally, 26 Acari were removed from a single blue-tongue lizard. No attempt at morphospecies assessment has been made although preliminary arrangements for transfer of specimens to an expert for further sorting have been made.

In pitfalls, Acari were commonest at sites 4 (*Myoporum* scrub near house), 2 (dense tea tree woodland) and 3 (dune scrub). They were least common at sites 8 (low shrubby heathland), 7 (recently burnt heathland) and 9 (pasture).

Arachnida: Aranaea

Spiders occurred in relatively low numbers in pitfalls, but with remarkable consistency: every pitfall contained at least one spider. Spiders were also fairly common in bashing samples and were collected by all remaining collection methods. A separate report on the spider fauna has been provided by Lynne Forster. Spider identifications by site are given in Appendix 5 – there are some minor unresolved discrepancies between datasets.

There was very little relationship between abundance and diversity of spiders at specific pitfall sites. Spiders were most diverse at sites 3 (dune scrub) and 6 (low rocky scrub) and least diverse at sites 9 (sheep pasture) and 7 (recently burnt heath).

Arachnida: Opiliones

Eight harvestmen were pitfall-trapped. Six came from site 4 (*Myoporum* scrub near house) with one each from sites 1 (*Allocasuarina*-dominated diverse scrub) and 8 (low shrubby heathland). One harvestman was hand-collected in dense *Bursaria* woodland (HC12). At least two species are present as the two specimens from sites P1 and HC12 are clearly distinct from the

Table 5 Specimen totals by sorted group for pademelon carcasses

	WC1	WC2	WC3pit	WC4	WC5	WC6	WC7	WC8	TOTAL
Formicidae						9			**9**
Diptera		1	70	1					**72**
Diptera Larvae	6	2	88						**96**
Coleoptera	5	6	279	10	4	1	3	4	**312**
Coleoptera Larvae			4		4	4			**12**
Lepidoptera	3	1	1						**5**
Neuroptera			1						**1**
Neuroptera Larvae			3						**3**
Collembola			1						**1**
Acari			14						**14**
Aranaeae			3						**3**
Total	**14**	**10**	**464**	**11**	**8**	**14**	**3**	**4**	**528**

Scorpion (Cercophonius squama).
Photo by Dylan van Winkel.

remainder.

Arachnida: Pseudoscorpionida

A single species of pseudoscorpion was collected from three pitfall traps (two in low rocky tea tree scrub and one in low shrubby heathland) and twice by hand collection from eucalypt woodland (EF and HB15). The species has not been identified but was also collected at Whitemark on Flinders Island immediately before the survey.

Arachnida: Scorpionida

The scorpion *Cercophonius squama* (Gervais, 1844), a ubiquitous Tasmanian species that also occurs widely in south-eastern Australia, occurred twice in pitfalls and was also hand-collected once and seen sporadically. The species is the only scorpion recorded in Tasmania and although the PSI specimens are very colourful, no external morphological difference between them and specimens collected near West Ridgley on the Tasmanian mainland is apparent.

Chilopoda

Nineteen centipedes representing five species from three orders were collected. Twelve specimens were collected in pitfalls and the remainder by hand collection. Results are shown in Table 6

Table 6 Species results for Chilopoda. Pitfall site numbers without a pit number (A-E) indicate hand-collection at that pitfall site. Specimen from HB15 was hand-collected.

Species	P1A	P1B	P1D	P2D	P2E	P4A	P5E	P2	HC5	HC10	HC12	HB15	TOTAL
Lamyctes emarginatus (Newport, 1844)	2	1	1	1	3	1					1		**10**
Cryptops sp. A											1		**1**
Tuoba laticeps (Pocock, 1891)							3						**3**
Tuoba n. sp.								1	1		1	1	**4**
Unidentified geophilomorph - not *Tuoba*										1			**1**

Lamyctes emarginatus (Lithobiomorpha: Henicopidae) is dubiously native to Tasmania (Mesibov, 2007) as it prefers Europeanised habitats. However, in these samples it was found almost exclusively at forested sites with relatively little disturbance.

Cryptops sp A (Scolopendromorpha: Cryptopidae) is widespread in northern and eastern Tasmania.

Tuoba laticeps (Geophilomorpha: Geophilidae) is strictly coastal and apparently widespread in Tasmania. A completely new species of *Tuoba* having 73 leg pairs compared to 59 for *T. laticeps* (R. Mesibov *pers comm.*) was hand-collected four times during this survey, in a range of forested environments, none of them strictly coastal.

Crustacea: Amphipoda

Amphipods were remarkably scarce in the collections, although more targeted sampling above high-tide lines would have produced many more specimens. Two specimens of *"Orchestia" australis* Fearn-Wannan 1968 were collected in such a habitat at site HC4. The only truly non-marginal terrestrial sites where amphipods were even seen were sites HC5 (especially around the cave mouth) and HC12. A single specimen of an undescribed *Keratroides* sp. (*"kershawi"* group) was captured at each of these sites.

Crustacea: Isopoda

87 slaters representing at least six species were collected. All species collected were native. Slaters were common at site P3 (coastal scrub on sand) and were present in low numbers at five of the remaining pitfall sites. Results are given in table 7.

The sole specimen of Styloniscidae? sp was collected by hand under a large calcarenite slab despite the pitfalls at that site collecting no slaters. This was the same rock under which the first specimen of the centipede Tuoba sp. nov was collected.

Diplopoda

48 millipedes representing four species from three orders were collected. Twelve were pitfall-trapped and the remainder hand-collected. Results are given in Table 8.

The record of *Propolyxenus forsteri* from PSI is the first record of the Order Polyxenida from any Bass Strait island. All four specimens were pitfall-trapped.

Entognatha: Collembola

Collembola were common in pitfalls and bashing trays but were not collected by any other methods. Collembola were identified to morpho-genera, 16 of which were recorded.

Collembola were most common and diverse at pitfall sites 2 (*Allocasuarina* woodland), 4 (*Myoporum* scrub near house) and 10 (low tea tree scrub near pasture), and to a lesser extent site 5 (grassland on dunes). They were less common and less diverse at all other pitfall sites, and

Table 7 Species by site results for Isopoda. Pitfall site numbers without a pit number (A-E) indicate hand-collection at that pitfall site.

Site	P3A	P3B	P3C	P3D	P3E	P4C	P5C	P5D	P5E	P7A	P7B	P7C	P7E	P8A	P9D	P2	HC4	HC5	HC6	HC24	sum
Ctam	1	3	9	2	6		2	1	1	1				1			8	2		1	**38**
Ctas															1						**1**
Pulv						1											1				**2**
S?																1					**1**
Lig																			2		**2**
P?	4	3	24		1		1		3	1	1	1	3								**42**

Species codes: Ctam = *Cubaris tamarensis* Green 1961, Ctas = *C. tasmaniensis* Green 1961 (?), Pulv = *Plymophiloscia ulverstonensis* Green 1961, S? = Styloniscidae? sp (tiny but mature), Lig = *Ligia australiensis* Dana 1853, P? = Porcellionidae? unidentified.

were scarcest at site 8 (low shrubby heath). A bashing sample at the same location as site 8 (SB7) also contained only a single collembolan.

The commonest collembolan by far in pitfalls, *Acanthocyrtus*, was not collected in bashing samples at all. The only two remotely common collembola in bashing samples, *Drepanura* and *Lepidobyra*, were both present in pitfalls, but in relatively low numbers. *Drepanura* was common at one pitfall site (P5) and one bashing site (SB4) but the habitats at these two sites – grassland on dunes and dense *Allocasuarina* woodland respectively – were very dissimilar. Results are given in table 9.

Entognatha: Diplura

A single immature dipluran was collected in eucalypt litter at site HB15. It has not been identified.

Gastropoda

Six native and two introduced land snails were collected. Land snail shells both native and introduced were very common on the island, but because of the dry conditions, live land snails were very seldom seen. Thus the totals given in Table 10 are primarily for dead specimens.

Tasmaphena sp. "Whinray" is a well-known undescribed rhytidid that is apparently endemic to the Furneaux and Kent Groups. It was collected sporadically during this survey, most commonly in wooded habitats with some development of litter. As a result of these collections, the species was photographed alive for the first time.

Pupilla australis is widespread on the Australian mainland, but known Tasmanian records are confined to the eastern Bass Strait islands and the east coast south to Triabunna. Tasmanian populations tend to occur in dense colonies while being absent from large areas of suitable habitat, and it is possible that the species is an Aboriginal introduction to some or all of its Tasmanian range. In this survey, the species was collected abundantly by hand at site P1, and single damaged shells were collected from sites P3 and P4.

The remaining four native species commonly occur together in coastal areas around the Tasmanian coastline. However, many specimens assigned to *Paralaoma caputspinulae* are unusually small and may turn out not to be that species when Tasmanian specimens attributed to it are revised. These specimens are very similar to unusual Kent Group specimens, and *Paralaoma* are very much commoner on PSI than on Flinders Island.

The native snail fauna of Prime Seal Island appears to be depauperate compared to that of Flinders Island (even taking into account habitat differences) and far more similar to that of the Kent Group (on which all

Table 8 Species by site results for Diplopoda. Pitfall site numbers without a pit number (A-E) indicate hand-collection at that pitfall site. Specimens from HB15 were hand-collected.

	P2B	P2C	P2D	P3A	P3B	P4E	P7A	P7E	P8B	P8E	P7	SB4	HC1	HC5	HC12	HB15	HC24	EF	TOTAL
Po		1	1	1			1												**4**
No								1	1		1			1					**4**
Di	1				1	1				1			2	2	1	3	1	15	**28**
pi			1									1							**2**
sp										1				2		5		2	**10**

Species codes: Po= *Propolyxenus forsteri* Conde, 1951 (Polyxenida), No= *Notodesmus scotius* Chamberlin, 1920 (Polydesmida: Paradoxosomatidae), Di = *Dicranogonus* sp (Polydesmida: Paradoxosomatidae), pi = unidentifiably immature polydesmidan, probably one of the previous two, sp = unidentified native spirostreptidan (Spirostreptida, Iulomorphidae)

Table 9 Species by site results for Collembola. Pitfall records are given by site with pits merged for space reasons. "Others" are specimens collected by other collectors without grid references.

	No	Ac	Xe	En	Si	Dr	Ra	Br	Ka	Lb	Lp	Di	Cr	Co	Pa	Ls	Po	?	D	Spp
P1T	32	26					1			2								2	1	**3**
P2T	60	39	1	7	3					5		1		2	1				1	**8**
P3T	32	29	1			1		1												**4**
P4T	72	42	13	7	1			1	1	2		1						1	3	**8**
P5T	50	11	2	2		24	3			1								1	6	**6**
P6T	27	18		2	1			3										3		**4**
P7T	20	13	3	1		3														**4**
P8T	9	5		1			1											2		**3**
P9T	23	2	11	1				5										2	2	**4**
P10T	79	51	4	3			1	3		4	6		1					3	3	**8**
WC1 Pit	1	1																		**1**
SB1	2						1									1				**2**
SB2	1								1											**1**
SB3Ak	5					2				3										**2**
SB3Ba	12					3				7						1		1		**3**
SB4Ak	3					2				1										**2**
SB4Ba	31					29				2										**2**
SB5Aa	10					10														**1**
SB5Bk	7					3				2							2			**3**
SB7	1									1										**1**
Pitfall		236	35	24	5	28	6	13	1	14	6	2	1	2	1			14	16	**404**
Sites		10	7	8	3	3	4	5	1	5	1	2	1	1	1			7	6	
Bashing						49	1		1	16						2	2	1		**72**
						6	1		1	6						2	1	1		
Total		**237**	**35**	**24**	**5**	**77**	**7**	**13**	**2**	**30**	**6**	**2**	**1**	**2**	**1**	**2**	**2**	**15**	**16**	**477**

Key to top row: No – total collembola as sorted. Ac – *Acanthocyrtus*, Xe – *Xenylla*, En – *Entomobrya*, Si – *Sinella*, Dr – *Drepanura*, Ra – *Rastriopes*, Br- *Brachystomella*, Ka – *Katianna*, Lb – *Lepidobrya*, Di – *Dicyrtomidae*, Cr- *Cryptopygus*, Co – *Corynephoria*, Pa – *Paronellides* (?), Ls – *Lepidosira*, Po – *Polykatianna*, ? – unidentified, D – discrepancy (created through sorting and preservation loss of specimens).

six PSI species plus two others have thus far been recorded). However, the amount of searching devoted to snails was not enough to rule out the possibility of other species. In particular, *Succinea australis* Ferussac 1821 was not recorded but may well occur.

It was surprising to find only two exotic snail species, although it is possible that exotic slugs were present on the island but not found because of the dry conditions. The common garden snail *Helix aspersa* was found relatively scarcely on the island, mainly in dune habitat near the homestead and around Sealers' Cove. Although destructive in gardens, this species is not very invasive. Another introduction, *Prietocella barbara*, was almost ubiquitous on the island, and in some places very common.

Insecta: Archaeognatha

Bristletails are a poorly known group in Tasmania with only two named species and some known undescribed species (Peter McQuillan *pers comm.*) Three specimens were collected during this survey. A single specimen of the very widespread southern Australian species *Allomachilis froggatti* Silvestri 1906 was collected from under boulders at the high tide mark at site HC4.

Two specimens of an undescribed species of *Machiloides* Silvestri 1905 were collected under rock sheets at the southern end of the limestone scarp at site HC5. Only one species of *Machiloides* is described from Tasmania (*M. hickmani* Womersley 1939) and while these specimens are not that species, it is unknown whether they represent a previously collected undescribed species or not.

Insecta: Blattodea

Cockroaches were scarcely observed on PSI. Four specimens of two species were hand-collected.

Insecta: Coleoptera

Beetles were collected fairly commonly by most collection methods, and abundantly in the sole pitfall trap placed next to a wallaby carcass.

82 beetle species were collected (a similar diversity to that recorded in the preceding Three Hummock Island survey). True weevils (Curculionidae) were very diverse (17 species) and staphylinids and tenebrionids were also fairly diverse, however carabids (only two species collected in small numbers) and leiodids (only one species in small numbers) were exceptionally scarce. Chrysomelids were also scarce but the large black species *Paropsisterna morio* was present on the few eucalypts examined – the other two species collected were tiny.

The pitfall beetle collections (186 specimens of 40 species) and the bashing collections (39 specimens of 14 species) had only a single species of *Rhyzobius* in common.

The single most numerous beetle species in the collections by far was *Saprinus cyaneus*, however this species was only collected from carcass samples, together with several other well-known carrion feeders. In pitfalls, the commonest species were the staphylinid *Anotylus* sp, the latridiid *Aridius minor*, the weevil *Mandalotus*? sp 2 and an as yet unidentified scydmaenid. Of these *Anotylus* was the most numerous, but it occurred in only five out of 50 pitfall traps.

Beetles were relatively numerous and diverse at pitfall sites 2 (sheoak woodland), 3 (low scrub on dunes), 4 (*Myoporum* scrub near house) and 5 (grassland on dunes). They were numerous but not diverse at site 9 (sheep pasture), where *Anotylus* was commonest, and neither numerous nor diverse at the remaining five pitfall sites.

Totals for all beetle species and names of species collected (in some cases identifications remain incomplete) are given in Appendix 4, with individual pitfall traps merged for space reasons.

Many of the beetles collected are difficult to identify to known species and it is likely that full study of all available collections will result in some being identified as new at least for Tasmania.

Insecta: Dermaptera

A single species of earwig was trapped in pitfalls at sites 3 (1 specimen) and 4 (4 specimens) and hand-collected on a tied island at the far north of PSI at site 10 (1 specimen).

Table 10 Species by site results for Gastropoda. Pitfall records are given by site with pits merged for space reasons. "Others" are specimens collected by other collectors without grid references.

		Tw	Pa	Pc	Lc	Mt	Po	Ha*	Pb*
P1	Pitfalls		1	8			3		
P2	Pitfalls			1					
P3	Pitfalls		1						
P4	Pitfalls			2					2
P5	Pitfalls			3					
P6	Pitfalls			2	1		3		
P7	Pitfalls				1	2			
P9	Pitfalls								3
P1	hand		35	7	12	20	50		some
P2	hand	1		1			20		
P3	hand								some
P4	hand	3	1	5			8	many	many
P5	hand						5		some
P6	hand	1					50		some
P7	hand			3		2	5	some	many
P9	hand								some
P10	hand						1		some
HC5	hand	3		5	7	2	50		many
HC8	hand								many
HC9	hand	2					1		many
HC18	hand			1		2	5		some
HC12	hand				5		12		many
HB15	hand	17		13	20	2	56		some
HC16	hand			1			1		some
SB1	hand						4		some
SB2	hand			1		2	25		many
SB3	hand				4	3	15		some
SB4	hand			1					many
SB6	hand						1	many	many
EF	hand (o)	7		5	14		13		2
others	hand (o)	2					4	3	3
TOTAL		**36**	**38**	**59**	**64**	**35**	**332**		

Key to species: Tw *Tasmaphena* sp. "Whinray", Pa *Pupilla australis* (Angas, 1863), Pc *Paralaoma caputspinulae* (Reeve, 1851) (?), Lc *Laomavix collisi* (Brazier, 1877) , Mt *Magilaoma* sp. "tasmanica", Po *Pernagera officeri* (Legrand, 1870), Ha* *Helix aspersa* Muller, 1774 (exotic), Pb* *Prietocella barbara* (Linneaus, 1758) (exotic)

Insecta: Diptera

Flies were the second most numerous insect order collected and were collected in numbers by most collection methods. They were by far the commonest order in the malaise trap and in sweep samples. Relatively few flies were collected in bashing samples but this is probably because they tended to escape.

Although flies were present in nearly every pitfall trap, there was great variation in fly numbers between pitfall sites. 241 flies (36%) were collected at site P10 (low tea tree scrub near pasture) and 152 flies (23%) at site P4 (*Myoporum* scrub near house). Less than three flies per trap were collected from the two *Allocasuarina* scrub and woodland sites P1 and P2, from the open pasture site P9 and from recently burnt heath at site P7.

Insecta: Hemiptera: Auchenorrhyncha

Hoppers were collected sporadically by several collection methods. In pitfalls, they were commonest at sites 4 (*Myoporum* scrub near house) and 8 (low shrubby heath). They were absent from site 9 (sheep pasture) and very scarce at sites 7 (recently burnt heath) and 10 (tea tree scrub near pasture). Diversity has not yet been assessed.

Insecta: Hemiptera: Heteroptera

True bugs were relatively scarce, and contributed a few percent of the catch for most collecting methods but less than 0.5% for pitfalls. Diversity has not yet been assessed but is unlikely to be high.

Insecta: Hemiptera: Sternorrhyncha

This suborder including aphids and scale insects was more numerous than the other hemipteran suborders but two events contributed to this. In one pasture pitfall (site 9B) 87 specimens of an aphid believed to be introduced were trapped, and in one bashing sample 82 scale insects, apparently all of the same species, were captured. Aside from this the suborder occurred patchily in pitfalls (most commonly in sand dune grassland at site 5), fairly commonly in the remaining bashing samples, and rarely by other collecting methods. Diversity has not yet been assessed.

Insecta: Hymenoptera: Formicidae

Ants were abundant in pitfall traps but very few were collected by other methods. The collection will be referred to a specialist for identification.

Insecta: Hymenoptera: Other Hymenoptera

Wasps were collected in moderate numbers by most collecting methods. In pitfalls they were most numerous at site 3 (scrub on dunes) but scarce at sites 7 (recently burnt heath), 8 (low shrubby heath) and 9 (pasture). Wasps will be sorted to morphospecies and identified to family by Abbey Throssell.

Insecta: Lepidoptera

189 adult moths and butterflies (including two butterflies) and 89 caterpillars were collected. Adult Lepidoptera were captured by a wide range of methods while caterpillars were captured mainly in bashings and pitfall traps. Results are being reported separately by Abbey Throssell (see Throssell ,this volume).

Insecta: Mecoptera

Scorpionflies were seen fairly frequently on Target Hill and the track leading to that hill from the house. Three were captured, all the same species (as yet unidentified).

Insecta: Neuroptera

Four adult and three juvenile lacewings were collected by a range of methods. The adults include at least two species.

Insecta: Odonata

A single dragonfly, a female *Adversaeschna brevistyla* (Rambur, 1842), was netted at site HC17. This species is widespread in Australia, New Zealand, New Caledonia and Vanuatu (Theischinger and Hawking 2006). Dragonflies were seen sporadically on the island, but typically at great distance.

Insecta: Orthoptera

A total of eight juvenile grasshoppers were collected in pitfalls, bashing samples, sweeps and hand

Cave cricket.
Photo by Dylan van Winkel.

collections. All were too small to be identified. Remaining Orthoptera results are reported separately by Michael Driessen (see Driessen, this volume).

Insecta: Psocoptera

Psocopterans (barklice or booklice) were mainly captured in pitfalls and bashing samples. Most pitfall specimens were of a single species collected at site P5 (grass on sand dunes). Specimens collected by bashing are likely to be more diverse. Psocoptera were especially numerous in bashings at SB7, in which they were the most common order collected.

Insecta: Thysanoptera

Thrips were rare in pitfall traps but very common in bashing samples. Diversity has not yet been assessed.

Groups conspicuously absent

Some groups of terrestrial invertebrates that might have been expected on PSI were not recorded at all. The absences of flatworms, earthworms, leeches and slugs in the samples may have been a result of the very dry conditions at the time of our visit. Both flatworms and introduced slugs were seen abundantly on Flinders Island during the same trip, but Flinders Island clearly experienced more rain than PSI during the time of our stay.

Other groups not recorded included silverfish, symphylans, onychophorans (habitat probably unsuitable), and most insect groups dependent on fresh water for some stage of their life cycle. Possibly some of the groups not found in this survey would be found with more targeted searching on the island, perhaps during wetter conditions.

GENERAL DISCUSSION & MANANGEMENT RECOMMENDATIONS

These interim results show that the invertebrate fauna of Prime Seal Island is quite diverse both at ordinal and lower levels, and likely to be relatively intact, with fewer obviously exotic species than expected. Much more work will need to be done on the samples to obtain meaningful biogeographic results for most groups, and to determine how many species previously unrecorded from Tasmania have been collected. The results thus far suggest there will be many.

Sampling was conducted with the primary aim of collecting as many species of invertebrate as possible from the island, and the samples are not suitable for testing any particular hypothesis about environmental impacts on the island, because of:

- the relatively small number of pitfall traps deployed
- the concentration of pitfall traps in one localised site per habitat type
- deliberate bias in favour of diverse microhabitats when placing pitfalls

Nonetheless, the sheep pasture and recently burnt heathland sites, while far from bereft of native invertebrate fauna, appeared depauperate compared to the other sites sampled.

The results indicate the benefits of hand collection by workers familiar with invertebrates as well as more systematic methods such as pitfall trapping. Many species and higher groups collected would have been missed had surveying been largely confined to methodical sampling.

The invertebrate fauna of the island is likely to be best conserved by maintaining the island generally in a condition similar to its present condition. No specific management recommendations are made on the basis of these results, although some may follow when more material has been identified.

ACKNOWLEDGEMENTS

Thanks to Lynne Forster (spider identifications and assistance with beetle identifications), Bob Mesibov (millipede and centipede identifications), Alastair Richardson (crustacean identifications), Penny Greenslade (identifications of most collembolan vouchers), Peter McQuillan (comments on beetles) and all on the PSI expedition team for their assistance with collection and documentation of invertebrates.

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PRELIMINARY OBSERVATIONS of the SPIDERS

Huntsman.
Photo by Bridgette Moffat.

By Lynne Forster

A total of 317 spiders representing 75 species from 15 families was collected by a variety of methods on Prime Seal Island. Generally, the spider fauna assemblage reflected the dry habitat conditions, low numbers of litter-decomposing prey and the abundance of ants. Vagrant ground hunting spiders were dominated by the Lycosidae, Gnaphosidae, Salticidae and some species of tiny, introduced Theridiidae which prey on ants. Foliage species included a diversity of Aranaeidae, Theridiidae and Thomisidae. The largest spiders sampled were two burrowing spiders: the tube trapdoor, *Stanwellia pexa* (Nemesiidae) at 23 mm and Tasmania's largest wolf spider, *Tasmanicosa godeffroyi* (Lycosidae), with a body length of 26 mm. A number of spider species on the island were ground hunters that have an association with ants.

INTRODUCTION

Tasmania has approximately 1,800 species of spider, of which only 300 have been described, and 50 of approximately 66 spider families found across Australia. The number of described species represents little more than 15% of Tasmanian species and it is not uncommon for ecological studies of Tasmanian spiders to be unable to name over 90 percent of morphospecies (e.g. Churchill 1993, Coy *et al.* 1993). No previous account of the spider fauna on Prime Seal Island is known. Spiders were collected as part of a general invertebrate survey by Kevin Bonham and Abbey Throssell in October 2008 and passed on to the author for examination.

METHODS

Details of collection methods and sites are provided by Bonham (2009) in this volume. The specimens will be lodged with Tasmanian Museum and Art Gallery. Specimens were identified to species level where possible and those that could not be identified with certainty were allocated a morphospecies code at family level.

RESULTS AND DISCUSSION

Altogether, 317 spiders representing 75 species from 15 families were collected by a variety of methods on Prime Seal Island (Table 1; images of several species are shown in Fig. 1). Fifteen percent were identified to species level and a further nine percent were identified to genus level. The families with highest numbers of species were Araneidae (orb weavers), Salticidae (ambushers) and Lycosidae (vagrant hunters) with 15, 14, and 12 species respectively (Fig. 2). In terms of abundance, however, the three dominant families were Lycosidae, Theridiidae and Gnaphosidae (Fig. 3).

Collecting methods provided distinct differences in spider families sampled (Table 1). Not surprisingly, no orb weaving Araneidae or Thomisidae ambushers were caught in pitfall traps - they were all collected by hand, sweep netting or beating vegetation. Ground hunting Gnaphosidae, Oonipdae, Prodidomidae, Lycosidae, Zodariidae and Zoridae were caught only in pitfall traps or by hand. Some Salticidae and Theridiidae species were caught only in pitfall traps while others were collected from vegetation — a reflection of different habitat adaptations in this family. Five species caught in pitfall traps were also collected by hand.

It must be noted that collecting intensity differed between collection methods and that all habitats were not surveyed by all methods. Hence, the absence of many ground hunters from, for example, '*Bursaria* forest with grassy understory' is a result of no pitfall trapping in that habitat. For these reasons it is unwise to use this data to associate spider species with particular vegetation types. Nevertheless, it was possible to make a few comparisons amongst the 226 spiders caught in pitfall traps and amongst the 91 spiders caught by other methods. The greatest numbers of ground hunting spiders were caught in low tea tree shrub with grasses and in mature shrubby heath (50 spiders, Fig. 4). Sand dunes contained the next highest number of ground hunting spiders, both in the grassland on the dunes and at

the edge of boobyalla dune scrub. Fewest ground hunting spiders were found in flowering tea tree habitat beside track, eucalypt remnant amid *Allocasuarina* forest and in very dry boobyalla scrub. The largest number of web builders and ambushers on vegetation caught by methods other than pitfall trapping were in the interior of dense *Allocasuarina* forest (19 spiders, Fig. 5). This spider abundance decreased at the edge of the Allocasuarina forest and was lowest in heathland, very dry boobyalla scrub and tea tree/*Bursaria* scrub around the cave.

The largest spiders in the sampled Prime Seal Island fauna were two burrowing spiders: the tube trapdoor, *Stanwellia pexa* (Nemesiidae) at 23 mm and Tasmania's largest wolf spider, *Tasmanicosa godeffroyi* (Lycosidae), with a body length of 26 mm. Both were found where ground cover was grassy (native and pasture), a terrain for which *T. godeffroyi* is well adapted with long legs for running after prey such as butterflies.

It was not possible to distinguish any particular species of Prime Seal Island spiders which showed an affinity with Tasmanian or with mainland species. For example, *Myandra bicincta* (Prodidomidae), *Ambicodamus sororius* (Nicodamidae), *Tasmanicosa godeffroyi, Venatrix pseudospeciosa* (Lycosidae), *Cymbacha ocellata* (Thomisidae) *Stanwellia pexa* (Nemesiidae) and *Carelpaxis poweri* (Araneidae) are widely distributed across Tasmania and the southern mainland, while the latter genus includes a Gondwanan distribution. The disturbance history of the island is reflected by the presence of several small, introduced species: *Oonops pulcher, Gmogala scarabaeus* and *Steatoda grossa.*

A number of spider species on the island were ground hunters that are thought to predate on ants—from which they are protected by their sclerotised bodies. They include *Oonops pulcher,* (Oonopidae), the colourful *Dipoena setosa* and *Gmogala scarabaeus* (Fig. 1) (Theridiidae). The latter was the most abundant adult species collected (21 individuals, Fig. 6), present in 13 samples out of 75 in a variety of habitats from *Allocasuarina* forest to heathland and dune grasses. Another myrmecophile, *Myandra bicincta* (Prodidomidae), has a pair of exceptionally long spinnerets on the middle of its ventral abdomen to rapidly spin silk to bind ants. *Habronestes* sp 1 (Zodariidae) is a member of a genus of spiders which contain species that emit an ant alarm pheromone to attract meat ants upon which it preys e.g. *Habronestes bradleyi* (Allen *et al.* 1996). Also present were Gnaphosidae which are larger predators known to mimic ants. An introduced spider, *Dysdera crocata* (Dysderidae) known to have an aversion to ants was absent from the collected spiders, further suggesting that ant-spider interactions may have shaped the spider fauna of the island. It would be interesting to compare the spider and ant data at some stage.

Generally the spider fauna reflected an assemblage adapted to dry habitat conditions, low numbers of litter-decomposing prey and an abundance of ants. Vagrant ground hunting spiders were dominated by Lycosidae, Gnaphosidae, Salticidae and some species of tiny, introduced Theridiidae. Foliage species included a diversity of Aranaeidae, Theridiidae and Thomisidae.

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Figure 1. Photographs of some spiders from Prime Seal Island.

Neostorena sp1 (Zodariidae) 5.3mm

Habronestes sp 1 (Zodariidae) 5mm

Amaurobioidea sp 2 6.8mm

*Dipoena setosus** (Theridiidae) 2mm

*Gmogala scarabaeus** (Theridiidae) 1.8mm

*Oonops pulcher** (Oonopidae) 3.8mm

*Myandra bicincta** (Prodidomidae) 2mm

Argyrodes sp 1 (Theridiidae) 5.3mm

Thomisidae sp 2 4mm

Salticidae sp 2 4.2mm

Hedana sp1 (Thomisidae) 6mm

Dolophones maximus (Araneidae) 7.5mm

*=known to be associated with ants.

Fig. 2 – Numbers of species in each family.

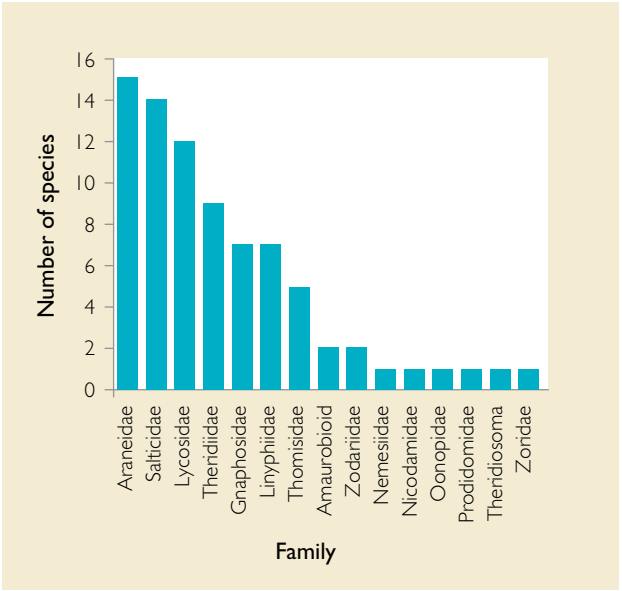

Fig. 3 – Numbers of individual spiders in each

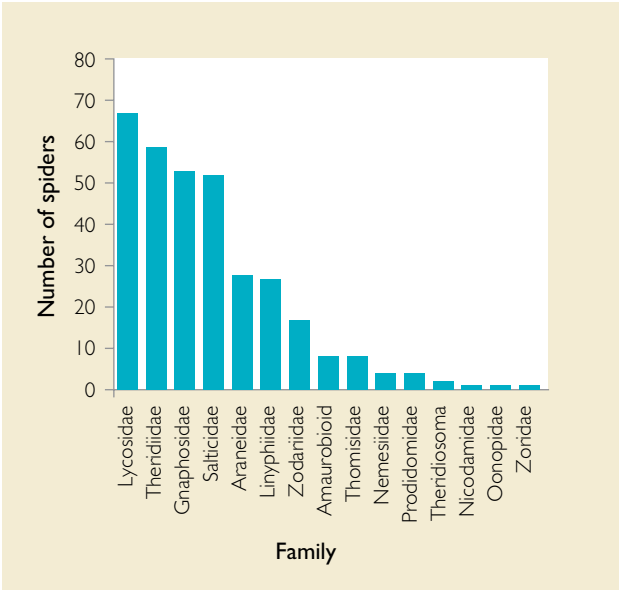

Fig. 4 – Abundance and species richness of ground hunting spiders in pitfall traps in different habitats.

Families represented: Gnaphosidae, Linyphiidae, Lycosidae, Nemesiidae, Oonopidae, Prodidomidae, Salticidae, Theridiidae, Zodariidae, Zoridae.

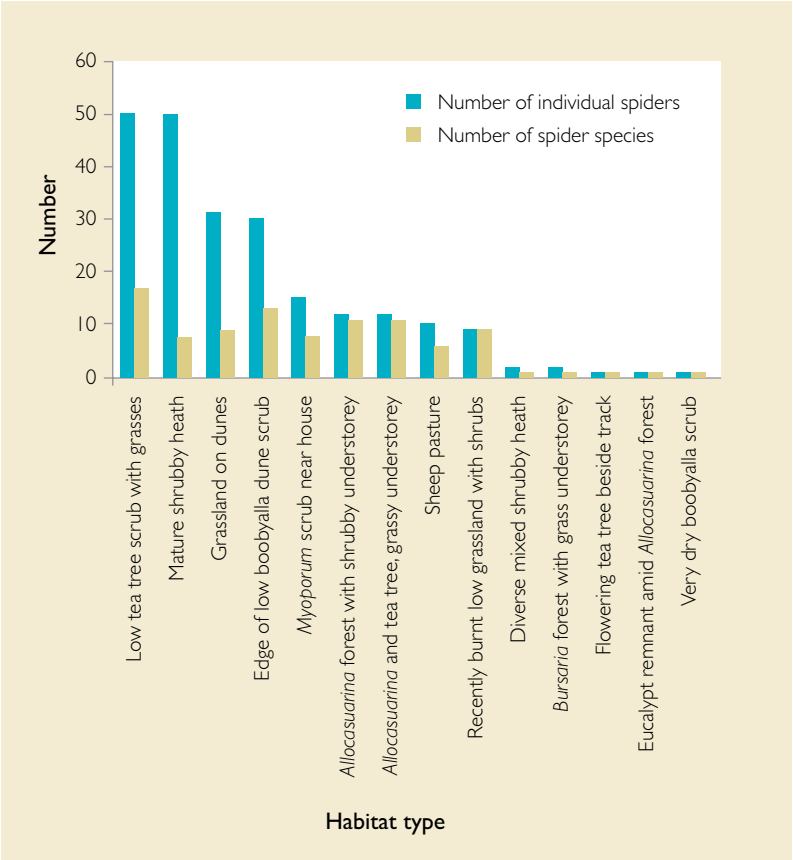

Fig. 5 – Abundance and species richness of web builders and ambushers on vegetation caught by methods other than pitfall trapping in different habitats.

Families represented: Amaurobiidae, Araneidae, Linyphiidae, Nicodamidae, Salticidae, Theridiidae and Thomisidae.

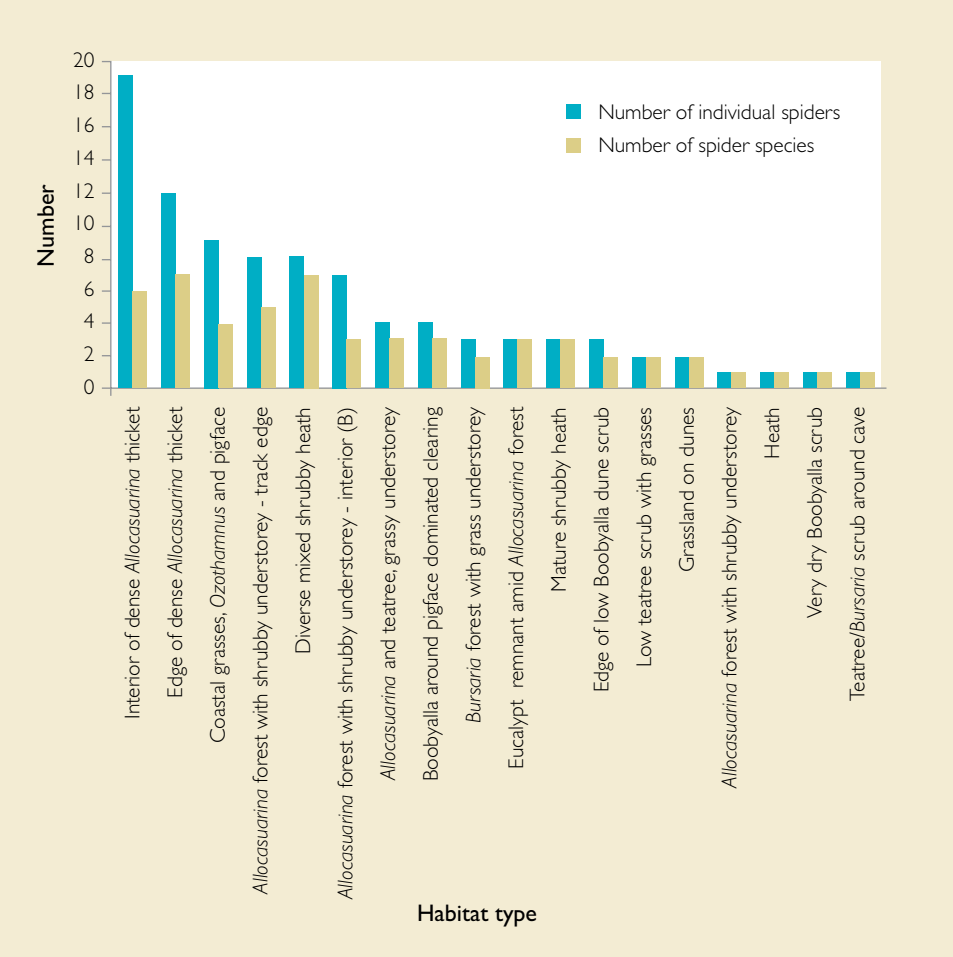

Fig. 6 – The top 20 most abundant spider species sorted in decreasing order of abundance

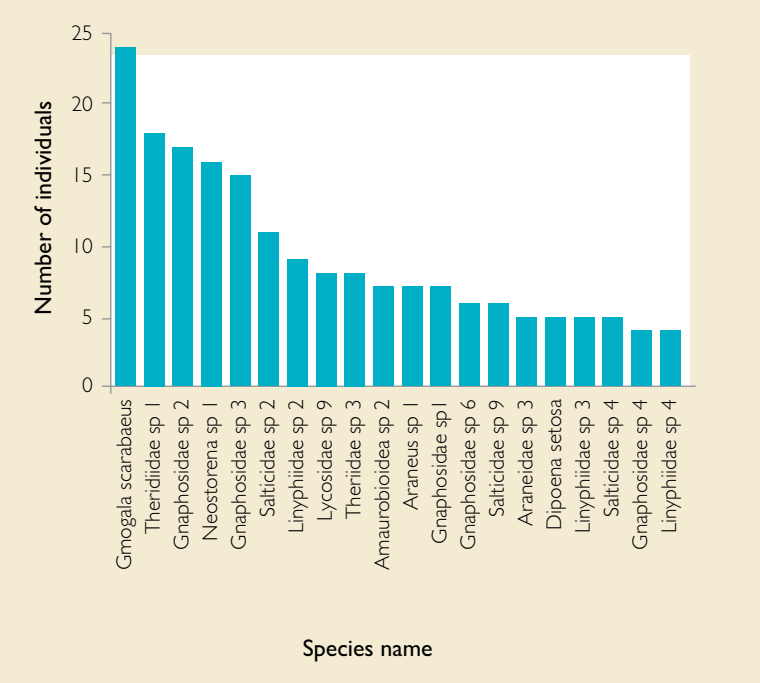

TABLE 1 List of Araneae species collected from different habitat types on Prime Seal Island

Method of collection: B = beating, C = pitfall next to wallaby carcass, H = hand, P = pitfall, S = sweep
Numbers refer to the number of specimens of a species collected in different habitats.

	Eucalypt remnant amid *Allocasuarina* forest	*Allocasuarina* forest with shrubby understorey	Edge of dense *Allocasuarina* thicket	Interior of dense *Allocasuarina* thicket	*Allocasuarina* forest with shrubby understorey –interior (B)	*Allocasuarina* forest with shrubby understorey –track edge	*Allocasuarina* and teatree, grassy understorey	Low teatree scrub with grasses	Flowering teatree beside track	Teatree/*Bursaria* scrub around cave	*Bursaria* forest with grass understorey	Myoporum scrub near house	Recently burnt low grassland with shrubs	Mature shrubby heath	Diverse mixed shrubby heath	Heath	Grassland on dunes	Edge of low Boobyalla dune scrub	Very dry Boobyalla scrub	Boobyalla around pigface dominated clearing	Coastal grasses, *Ozothamnus* and pigface	Sheep pasture	**Total**
Amaurobioidea																							
Amaurobioidea sp. 1	H1																						1
Amaurobioidea sp. 2				B1		B4														B2			7
Araneidae																							
Araneidae sp. 1								H1															1
Araneidae sp. 2																			H1	B1			2
Araneidae sp. 3			B2				S2			H1													5
Araneidae sp. 4																	S1						1
Araneidae sp. 6											S2												2
Araneidae sp. 8			B2																				2
Araneidae sp. 9			B1																				1
Araneidae sp. 11					B1																		1
Araneidae sp. 13						B1																	1
Araneus sp. 1			B2								S3						S2						7
Araneus sp. 2							S1																1
Araneus sp. 3														B1									1
Carelpaxis poweri																H1							1
Dolophones maxima	B1		B1																				2
Gnaphosidae																							
Gnaphosidae juvenile												P1						P2					3
Gnaphosidae sp. 1								P1						P1				P5					7
Gnaphosidae sp. 2								P9					P2				P2	P3				C1	17
Gnaphosidae sp. 3		P1					P1	P1				P2	P4	P2			P3					C1	15
Gnaphosidae sp. 4		P1												P1				P1				P1	4
Gnaphosidae sp. 5																						P1	1
Gnaphosidae sp. 6								P4					P1				P1						6
Linyphyiidae																							
Linyphyiidae sp. 1		P1																P2					3
Linyphyiidae sp. 2		P1					P2					P5						P1					9
Linyphyiidae sp. 3								P1													B4		5
Linyphyiidae sp. 4				B1				P3															4
Linyphyiidae sp. 5								P1							B1								2
Linyphyiidae sp. 7												P3											3
Lycosidae																							
Lycosidae juvenile							P1	P3									P5						9
Lycosidae sp. 1								P1					P1										2

Lycosidae sp. 2														P37				P2					39
Lycosidae sp. 3								P2															2
Lycosidae sp. 4		P1																					1
Lycosidae sp. 5		P1																					1
Lycosidae sp. 6																						P1	1
Lycosidae sp. 7																						P1	1
Lycosidae sp. 8												P1											1
Lycosidae sp. 9																	P8						8
Tasmanicosa godeffroyi																						H1	1
Venatrix pseudospeciosa																						P1	1
Nemesiidae																							
Stanwellia pexa							H1				H2	P1											4
Nicodamidae																							
Ambicodamus sororius																					B1		1
Oonopidae																							
Oonops pulcher								P1															1
Prodidomidae																							
Myandra bicinta							P1					P1	P1					P1					4
Salticidae																							
Salticidae juvenile		B1																			B1		2
Salticidae sp. 1		P1																					1
Salticidae sp. 2							P1	P4									P3	P1	P1			C1	11
Salticidae sp. 3																		P1					1
Salticidae sp. 4								P1									P4						5
Salticidae sp. 5							P1																1
Salticidae sp. 6		H1					P1		H1					P1									4
Salticidae sp. 7								S1															1
Salticidae sp. 8											S1												1
Salticidae sp. 9														B1	B1					B1	B3		6
Salticidae sp. 10														B1									1
Salticidae sp. 11															B1								1
Salticidae sp. 12															B1								1
Salticidae sp. 13		P1																					1
Theridiidae																							
Argyrodes sp 1	H1																						1
Achaeranea sp. 1												P1											1
Achaeranea sp. 2															B1								1
Gmogala scarabaeus		P2					P1	P6						P6			P4	P5					24
Dipoena setosa								P1						P1				P3					5
Steatoda grossa													P1										1
Theridiidae sp. 1				B14			B1	P1									S1	L1					18
Theridiidae sp. 2				B1																			1
Theridiidae sp. 3			B3		B3										B2								8
Theridiosommatidae																							
Theridiosommatidae sp. 1						B1																	1
Theridiosommatidae sp. 2				B1																			1
Thomisidae																							
Cymbacha ocellata	H1																						1
Diaea sp. 1						B1																	1
Hedana sp. 1			B1												B1								2
Thomisidae sp. 1															B2								2
Thomisidae sp. 2				B1		B1																	2
Zodariidae																							
Habronestes sp. 1							P1																1
Neostorena sp. 1		P1					P1	P10									P1	P3					16
Zoridae																							
Zoridae sp. 1														P1									1
Total	**4**	**13**	**12**	**19**	**4**	**8**	**16**	**52**	**1**	**1**	**8**	**15**	**10**	**53**	**10**	**1**	**35**	**31**	**2**	**4**	**9**	**9**	**317**

THE MOTHS

Aeolochroma sp.
Illustration by Georgina Davis.

By Abbey Throssell

This is the first account of moths on this large Furneaux Island. Forty-nine Lepidoptera species in 16 different families were identified, from 132 specimens. Nearly half of these were from three families: Geometridae, Noctuidae and Tortricidae. An undescribed geometrid moth, *Aeolochroma* sp., is a new record for Tasmania. A species of *Stathmopoda* (Oecophoridae), was also identified as a new record for Tasmania. There were several other possible new records and/or undescribed species collected. The most abundant moth found on the island was the geometrid *Chrysolarentia insulsata*, which occurs in New South Wales, Victoria and Tasmania.

INTRODUCTION

There are no known previous records of Lepidoptera (or any other invertebrates) from Prime Seal Island. Therefore, collection methods were primarily aimed at collecting as many species as possible. Sweeping and hand collecting especially were largely opportunistic rather than systematic, and more time was spent in areas where more invertebrates seemed to be present.

METHODS

Detailed description of collection methods and sites is given in a separate report by Kevin Bonham. Specimens were sorted into morphospecies, and identified at least to family and to species level where possible. This report deals only with Lepidoptera from sweeping, beating and hand collections; specimens collected in pitfall traps, and a small number of others that were stored in alcohol, have not been identified and are not included here. Specimens have been lodged with the Tasmanian Museum and Art Gallery.

RESULTS AND DISCUSSION

A total of 49 Lepidoptera species in 16 different families were identified, from 132 specimens collected by hand, sweep netting and in light traps. Nearly half of these species were from three families: Geometridae, Noctuidae and Tortricidae. More than half of the species collected were represented by only a single specimen, which suggests that further sampling, especially at different times of the year, would likely lead to many other species being found. Names, totals, collection methods and sites for all species are given in Appendix 1.

An undescribed geometrid moth, *Aeolochroma* sp., is a new record for Tasmania. This is a coastal species, usually found on the south coast of Victoria and southern Australia. The larvae feed on low *Beyeria* or *Melaleuca* scrub (P. McQuillan, University of Tasmania, pers. comm.), both of which are present on the island. The single specimen was hand collected in the evening, near a light outside the homestead.

There were several other possible new records and/or undescribed species collected. A species of *Stathmopoda* (Oecophoridae), also collected at the homestead light, was identified as a new record for Tasmania. One species of tortricid, known to feed on *Beyeria*, is undescribed. Two other tortricid species (subfamily Olethreutinae) and one species of *Lepidoscia* may also be undescribed (P. McQuillan, University of Tasmania, pers. comm.).

A member of the species group *Microdes villosata* (Geometridae) was collected at the homestead light and in UV bucket traps. The species usually referred to by this name is known to feed on *Acacia*; however, *Acacia* plants are rare on the island, the species found may be an undescribed member of the *M. villosata* species group (P. McQuillan, University of Tasmania, pers. comm.). One specimen of *Microdes diplodonta* was also collected from the homestead light.

The most abundant moth found on the island was the geometrid *Chrysolarentia insulsata*, which occurs in New South Wales, Victoria, Tasmania and South Australia (Zborowski and Edwards 2007). It was seen during the day in large numbers, especially in pasture and grassland, and collected by both daytime sweep netting and light traps at night. Another very common moth was the undescribed

noctuid known as *Ectopatria* "DPILMbrownshortpecten", of which many were seen at night and caught in light traps.

Ten species of noctuid moths were collected, although one of these, *Dasypodia selenophora*, was identified only from its distinctively-patterned wings lying inside the small cave on the island. The others were all collected in UV bucket traps and/or at the house light, with only one specimen of *Agrotis infusa*, the bogong moth, caught in daylight. *A. infusa* is well known for its mass migrations south and east in spring, to escape the summer heat of mainland breeding grounds, before returning to those breeding grounds for the winter. Two of the other noctuids, *Agrotis munda* and *Persectania ewingii*, are also known to migrate south in large numbers. All three species, along with *Agrotis porphyricollis* and *Diarsia intermixta*, are pests of various crops.

The vast majority of Lepidoptera species were collected at night, either in light traps or at the homestead light, though a number of these were also collected during the day. A number of species were found only in UV light traps, and conversely, some were hand collected at the homestead light and seen nowhere else, including the single specimen of *Aeolochroma* sp. A few species were collected solely during the day, by sweep netting, beating and/or hand collecting. These included the butterflies *Vanessa kershawi* and *V. itea*, the magpie moth *Nyctemera amica*, the tortricid *"Tortrix" standishana*, and the arctiid *Halone sejuncta*. It was therefore valuable to use a range of different collecting methods, so as to cover a wide range of habitats and activity periods of different species.

ACKNOWLEDGEMENTS

Many thanks to Cathy Young, Peter McQuillan and Lionel Hill for identification of, and comments on, many specimens, and to all on the PSI expedition team for their assistance with collection and documentation of invertebrates.

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Family	Species/site	Collection method	Hand (at light)	Sweep/hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Hand	Beat	Beat	Sweep	Light trap	Light trap	Light trap	Light trap
			HC1	HC5	HC1 1	HC1 2	HC1 3	HB1 5	HC1 6	HC32	HC35	HC36	HC37	HC38	HC40	HC42	EF	WC1	P2	SB3	SB5	SB6	LT1	LT2	LT3	LT4
Geometridae	*Chrysolarentia insulsata*		3	21		1										1							1			3
Geometridae	*Epyaxa hypogramma*		2	1																							
Geometridae	*Microdes villosata (grp.)*		3																							1	1
Geometridae	*Microdes diplodonta*		1																								
Geometridae	*Aeolochroma sp.*		1																								
Geometridae	*Neritodes verrucata*			1								1												1	1		1
Geometridae	*Scopula perlata*		1																								
Noctuidae	*Agrotis infusa*		1														1							2	1		
Noctuidae	*Agrotis munda*		1																						1	1	
Noctuidae	*Agrotis porphyricollis*		1																					2		1	
Noctuidae	*Diarsia intermixta*																									1	
Noctuidae	*Ectopatria "DPILMbrownshortpecten"*		4																					2		2	2
Noctuidae	*"Leucania" exarans*		1																								
Noctuidae	*Persectania ewingii*		1																						1		
Noctuidae	*Proteuxoa nr. melanographa 1*		1																								
Noctuidae	*Proteuxoa nr. melanographa 2*																										4
Noctuidae	*Dasypodia selenophora*			1																							
Arctiidae	*Nyctemera amica*								1																		
Arctiidae	*Damias procrena*																									1	
Arctiidae	*Halone sejuncta (?)*							1																			
Arctiidae	*Thallarcha jocularis*																										1
Arctiidae	*Thallarcha pellax*		1																								1
Tortricidae	*Capua sp. (Tortricinae)*		1							1																	
Tortricidae	*Epiphyas nr. posvittana*		1	1																						1	
Tortricidae	*Ericodesma liquidana*		1																								1
Tortricidae	*Merophyas divulsana*		1																							2	1
Tortricidae	*"Tortrix" standishana*			2																1							
Tortricidae	*Crocidocema plebejana*		1																								
Tortricidae	*Olethreutinae sp. 1*		1																								
Tortricidae	*Olethreutinae sp. 2*																										1
Tortricidae	*undescribed Tortricidae*										1																
Oecophoridae	*Stathmopoda sp.*		1																								
Oecophoridae	*Oxythecta sp. 1*																							2			
Oecophoridae	*Oxythecta sp. 2*																					1					3
Oecophoridae	*Zacorus carus*																										1
Depressariidae	*Eutorna sp.*		1																								
Gelechiidae	*Unidentified Gelechiidae*																				1						
Psychidae	*Lepidoscia sp.*																										1
Pyralidae	*Faveria tritalis*		1																								2
Pyralidae	*Unidentified Phycitinae*																										1
Crambidae	*Eudonia sp.*																									1	
Anthelidae	*Anthela nicothoe*		3										1														
Anthelidae	*Anthela ocellata*		1												1												
Nymphalidae	*Vanessa itea*																		1								
Nymphalidae	*Vanessa kershawi*				1																						
Pterophoridae	*Wheeleria sp.*		1				1																				
Lymantriidae	*Acyphas semiochrea*													1													
Tineidae	*Monopis ethelella*																	1									1
Plutellidae	*Plutella xylostella*		1																								
	Specimens		37	27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	4	11	25
	Species		27	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	4	9	16

OBSERVATIONS on ORTHOPTERA

Austracris guttulosa.
Photo by Michael Driessen.

By Michael Driessen

Three species of Orthoptera and several unidentified immature Acrididae were recorded on Prime Seal Island. A survey conducted during summer or autumn would substantially increase this species list for the island. A notable discovery was the Flinders Cave Cricket *Carvernotettix flindersensis* in Manalargenna Cave; a species previously known only from Flinders, Babel and Little Dog Island. The spur-throated locust *Austracris guttulosa,* a vagrant from the Australian mainland, is believed to be the first record of this species for eastern Tasmania with all previous records occurring in north west Tasmania.

INTRODUCTION

Sixty three described species of Orthoptera in 10 families have been recorded in Tasmania (Semmens *et al.* 1992) which represents about 4% of Australian species and 50% of Australian families. Twenty three species (37% of Tasmanian total) are endemic to Tasmania and most of these (14 species) are crickets in the family Rhaphidophoridae (cave/camel crickets). Prime Seal Island has not previously been surveyed for Orthoptera and it appears that no systematic surveys of the Furneaux islands have been undertaken. However, a number of taxonomic papers contain records of ten species in four families for the eastern Bass Strait islands (Table 1). Notable among these records are four species in two genera (*Parvotettix* and *Cavernotettix*) of Rhaphidophoridae that are restricted to the Furneaux and Kent islands. The Rhaphidophoridae of the Bass Strait islands are of significant interest because they have potential to provide insights into speciation and land connections between the islands, and between mainland Australia and Tasmania, during the Pleistocene. Rhaphidophoridae are wingless insects, extremely sensitive to temperature changes and requiring very high relative humidity which severely limits their ability for dispersal across water. Current distribution evidence supports a Tasmanian origin for *Parvotettix* and an Australian mainland origin for *Cavernotettix* (Richards 1974). Prime Seal Island has the potential to support Rhaphidophoridae given the presence of caves and seabird rookeries and, should they occur there, it is of interest to determine whether it supports its own species or a previously described one.

The aim of this report is to document observations made on Orthoptera during a short survey in October 2008 on Prime Seal Island.

METHODS

Observations of Orthoptera were made by the author during four day visit to the island in October 2008. Additional Orthoptera were collected by Kevin Bonham and Abbey Throssell as part of their invertebrate surveys and their sampling methods are detailed elsewhere in this report (Bonham this volume).

RESULTS AND DISCUSSION

Acrididae (locusts and grasshoppers)

Austracris guttulosa
Spur-throated Locust

Two adult females were collected and several other adults were observed in the coastal grass and herbfield vegetation on the western side of the island. This species breeds in northern parts of mainland Australia but ventures south into localities where they do not successfully breed (Rentz *et al.* 2003). No juveniles were observed which is consistent with this species being a vagrant. The species has occasionally been recorded on parts of north west Tasmania including King Island (Table 2). This is believed to be the first record of this species from eastern Tasmania and the Furneaux Islands

Juvenile Acrididae

Eight immature grasshoppers were collected by hand, pitfall trapping, sweeping and beating by Kevin Bonham and Abbey Throssell as part of their invertebrate surveys. These specimens were early instars and were difficult to assign to a species or genus with confidence. They all appeared to be one species and

their features were most consistent with that of the Southeastern Austroicetes *Austroicetes vulgaris* (Rentz *et al.* 2003).

Rhaphidophoridae (cave crickets/camel crickets)

Cavernotettix flindersensis Flinders Cave Cricket

A search of the rear chamber in Manalargenna Cave during daylight hours on two separate days revealed a small population of cave crickets. A total of 34 crickets were observed comprising 26 adult males, 4 adult females and 4 juveniles. Apart from two juveniles occurring on the wall near the cave floor, all crickets occurred on the domed ceiling. All adult females were in one small rounded crevice in the ceiling with an adult male. Other adult males were scattered around the ceiling or in other crevices.

Two adults of each sex were collected from the cave for the purposes of identification–which could only be done with the aid of a microscope. The characteristics of the suranal and subgenital plates were consistent with those described for *Cavernotettix flinderensis* (Richards 1967). The presence of this species on Prime Seal Island, as opposed to a new and endemic species, makes sense given the proximity of the Prime Seal Island to known populations of *C. flindersensis* and the history of land connection between Prime Seal Island and Flinders Island. *C. flindersensis* is known from Flinders Island, Babel Island and Big Dog Island (Richards 1967, 1974). Notably the species has been recorded from North Pats River on Flinders Island which is immediately east of Prime Seal Island. Since the last interglacial about 120 000 years ago, a land connection existed between Prime Seal Island and Flinders Island more often than not and the last connection was approximately 8 000 years ago (Eberhard this volume).

Gryllacrididae (raspy crickets)

Kinemania sp.2

A single juvenile female raspy cricket was found on a track adjacent to the *Allocasuarina verticillata* forest while spotlighting. In Tasmania there is one described species of raspy cricket (*K. ambulans*) and two undescribed species (Rentz and John 1990). This individual is consistent with the features provided by Rentz and John (1990) for one of the two undescribed species, *Kinemania* sp. 2. It had 3 spines on the middle tibia and the hind tibia was distinctly quadrate with a flat dorsal surface bearing distinct spines.

Cavernotetrix flindersensis (captive specimen from PSI photographed in Hobart).
Photo by Michael Driessen.

TABLE 1 Known records of Orthoptera for the eastern Bass Strait Islands

Taxa	Location	Source
Acrididae		
Minyacris nana	Cape Barren Island Fisher Island Flinders Island	(Key 1992)
Phaulacridium vittatum	Cape Barren Island Flinders Island	(Key 1992)
Tasmaniacris tasmaniensis	Cape Barren Island Flinders Island	(Key 1991)
Austroicetes vulgaris	Babel Island Flinders Island Great Dog Island	(Key 1954)
Pyrgomorphidae		
Psednura pedestris	Flinders Island	(Key 1972)
Gryllidae		
Bobilla tasmani	Cape Barren Island	(Otte and Alexander 1983)
Rhaphidophoridae		
Cavernotettix flindersensis	Babel Island Flinders Island Little Dog Island	(Richards 1974)
Cavernotettix craggiensis	Craggy Island	(Richards 1974)
Parvotettix whinrayi	Kent Group islands (Erith, Dover, North East Island, Deal Island)	(Richards 1974)
Parvotettix rangaensis	Cape Barren Island Flinders Island	(Richards 1971)

TABLE 2 Previous records of Austracris guttulosa for Tasmania.

Location	Observer	Date	Accession No.
Devonport, K-Mart carpark	L. Hill	2 Sep1992	33038
Devonport, Stony Rise	L. Hill	1 Apr 1996	51268
King Island	A.B Wherrett	Aug 1943	51269
Smithton	L. Hill	17 Apr 1992	33037
Devonport, Stony Rise	P. Gardam	4 Apr 2008	103896
East Devonport, TT Line wharf	F. Viney	17 Apr 2008	103897

Source: DPIPWE Invertebrate Collection, New Town

Photo by Nick Mooney.

CONCLUSION

Only a small number of Orthoptera species were recorded on Prime Seal Island, largely reflecting the time spent searching and the time of year the survey was undertaken. A survey undertaken in summer or autumn would substantially increase the species list for the island and would include several of the species already known from other islands in the Furneaux group. The survey has resulted in the first record of the spur-throated locust from eastern Tasmania, the first record of a raspy cricket from the eastern Bass Strait Islands and a range extension for an endemic Furneaux island cave cricket.

ACKNOWLEDGEMENTS

Thanks to Craig Read, Liz Turner and Cathy Young for searching their museum records for records of *Austracris guttulosa*.

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Birds

White-bellied Sea-eagle.
Photo by Dylan van Winkel.

By Nick Mooney

This survey is arguably the most comprehensive for avifauna in the locality yielding 47 bird species observed. A surprising record was a pair of wedge-tail eagles. No presently used nest of this species was found on the island although a disused nest was observed from a low aerial inspection.

INTRODUCTION

There is no exhaustive list of birds published from Prime Seal island, the only useful list coming from Brothers *et al.* (2001). The opportunity of having several experienced observers on an island in Bass Strait for 5 days was an invaluable opportunity to contribute to our knowledge of the biogeography of avifauna in eastern Bass Strait.

METHODS

Birds were recorded from 14 to 19 October 2008 using binoculars and telescope by three experienced observers in the course of other surveys, each covering about 80km and occasional specific survey as several excursions looking for eagle nests and searching beaches. Habitat coverage was therefore not systematic and bias undoubtedly exists toward those areas frequented (near the farmhouse at Peacock Bay, North Hill and open pasture, low scrub, and coast in between).

RESULTS

RECORDS

1. Brown Quail
   Coturnix ypsilophora
   Irregularly flushed in small covies of 3-5 individuals.

2. Cape Barren Goose
   Cereopsis novaehollandiae
   At least 10 broods seen varying in age from 1 week old to fledging and in number from 1 to 4 goslings. Estimated that about 50 goslings were produced, mainly on the south but also scattered along the east and centre. Seven recent nests found, mainly under boobyalla.

3. Grey Teal
   Anus gracilis
   A flock of 5 regularly seen in east coast rocky bays.

4. Little Penguin
   Eudyptula minor
   Commonly seen pursuing fish close in shore on the east in less than 1m of water at all tides

5. Common Diving-petrel
   Pelecanoides urinatrix
   Several seen within 2 km of the island while travelling to the island by boat.

6. Short-tailed Shearwater
   Puffinus tenuirostris
   Several old, beachwashed carcasses along the tide-line.

7. Black-browed Albatross
   Diomedea melanophris
   Reasonably common as adults and immature offshore.

8. Australasian Gannet
   Morus serrator
   Commonly patrolling along all coastlines and at times 50+ diving close inshore in late afternoon along the seagrass/ sand interface in 2-4m of water. Snorkelling survey showed their prey appeared to be Pilchards *Sardinops neopilchardus,* apparently common in that area.

9. Black-faced Cormorant
   Phalacrocorax fuscescens
   Common offshore in particular in areas of strong current on the north of the island. A daytime roost of 20+ on a large boulder on the northeast tip.

10. Australian Pelican
    Pelecanus conspicillatus
    Several adults seen irregularly in sheltered waters on east and west coast, flying over the island and on the north east beaches.

11. White-faced Heron
    Egretta novaehollandiae
    Reasonably common around all rocky shoreline. One seen catching crabs on east coast rock shelving at low tide.

12. White-bellied Sea-eagle
    Haliaeetus leucogaster
    A nest was previously known from just inshore of Koh-i-Noor Rocks on the southern east coast. The nest was in a broken *Allocasurina* about 1/5 up the hill. The nest is visible by telescope from the farm house and at

Hooded Plovers.
Photo by Dylan van Winkel.

almost all times an adult was sitting on the nest suggesting either eggs or very young chicks. From below with telescope, remains of little penguin were seen on the nest edge. An adult was seen to leave the nest to catch and eat what appeared to be small fish on the sand flats inside the above rocks on an ebb tide. One adult seen flying in from several km out to the south east. Estimated only 1 pair.

13. Wedge-tailed Eagle
Aquila audax fleayii

A surprise record. A pair, mostly seen laminar soaring over North Hill. At times they were airborne for over 4 hrs and on one occasion appeared to be completely stationary for 40 minutes while under telescope observation. One individual (the larger, assumedly the female) was unusually vocal and made a low pass over NJM whilst on top of North Hill. The male was seen by NJM gliding north from the area of Wolff Bay with a mature Cape Barren Goose in its talons at 0620 one morning. Telescope surveillance and a ground-based nest search was ineffective because of dense scrub. An empty nest in an *Allocasuarina* (the first such record in Tasmania) was located up in a depression on the north east face of North Hill during a private survey using John Duigan's ultralight aircraft (JD the pilot, NJM the observer).

14. Brown Falcon
Falco berigora

Adult pairs very active with territorial displays and low quartering hunting. Estimated 6 pairs (NJM). Only adults were seen. One pair was seen (NJM) flying directly east toward Flinders Island until out of sight. One was seen eating a European Goldfinch and another briefly (unsuccessfully) pursuing a Hooded Plover and another a Richard's Pipit (result unknown) (NJM).

15. Ruddy Turnstone
Arenaria interpres

A flock of 4 regularly seen on the north east corner.

16. Pied Oystercatcher
Haematopus longirostris

Common along all beaches. Three nests seen all with eggs. No chicks seen. Estimate 20+ pairs.

17. Sooty Oystercatcher
Haematopus fuligonosus

Less common. No nests seen. Estimate 10 pairs.

18. Hooded Plover
Thinornis rubricollis

Pairs seen at Peacock Bay and Spit Point but incomplete survey.

19. Banded Lapwing
Vanelles tricolor

One pair seen and again heard inland from Peacock Bay.

Blue-winged Parrot.
Photo by Dylan van Winkel.

20. Masked Lapwing
Vanelles miles
Two pairs with one young usually inland from Peacock Bay, another with one young inland from Split Point and possibly the same birds along the eastern slopes of Target Hill. Very nervous. Breeding appeared finished. Incomplete survey. Estimate 5 pairs.

21. Pacific Gull
Larus pacificus
Common around the coast and regularly crossing the island. Seen mobbing both (flying) White-bellied Sea-eagles and Wedge-tailed Eagles. No breeding survey.

22. Silver Gull
Larus novaehollandiae
Common around the coast. Not overly inclined to fish offal. Seen mobbing White-bellied Sea-eagles, Brown Falcons and Forest Ravens.

23. Caspian Tern
Sterna caspia
Uncommon, occasionally seen along north east coast. Only 1 pair confirmed.

24. Crested Tern
Sterna bergii
Commonly seen along the east coast. Day roost for 25+ on large rocks north west of Split Point.

25. Brush Bronzewing
Phaps elegans
Individuals were seen both in open paddocks, on tracks and in tea tree, typically exiting the latter at the last minute with explosive vertical flight (even more typically causing near-heart stoppage of passing people).

26. Green Rosella
Platycercus caledonicus
A pair was seen just inland from Peacock Bay early in the survey. There were no more records.

27. Blue-winged Parrot
Neophema chrysostorna
A pair were seen in dense scrub on Target Hill a day after a strong north-westerly change on 17th October. There were no more records.

28. Fan-tailed Cuckoo
Cacomantis flabelliformis
There were uncommon sightings until a day after a strong north-westerly change on 17th October when they appeared to be much more common. One was being scolded by Tasmanian Scrubwrens and White-fronted Chats.

29. Horsfield's Bronze-cuckoo
Chrysococcyx basalis
One record until a day after a strong north-westerly change on 17th October when they appeared to be much more common and often seen typically calling from the tops of trees.

30. Tasmanian Scrubwren
Sericornis humilis
This species was relatively common in all scrubby habitats at times including bushes and small trees isolated in paddocks, habitually roosting in African Boxthorn adjacent to the farmhouse behind the Peacock Bay beach.

31. New Holland Honeyeater
Phylidonyris novaehollandiae
This species was uncommon, usually being recorded amongst tall tea-tree between Target and North Hill. A dead one was found at the mouth of Mannalargenna Cave on Target Hill.

32. Tawny-crowned Honeyeater
Phylidonyris melanops
A pair were twice seen (and heard) in scrub above Sealers Cove.

33. White-fronted Chat
Epthianura albinfrons
This was one of the more abundant small birds and occurred in all grassy habitats around the island, even *Poa* above beach tide-lines. Several nests with 3 eggs were found (usually by back-tracking from adult distractive displays).

34. Grey Fantail
Rhipidura fuliginosa
This was one of the more abundant (and obvious) small birds and occurred in all tall scrubby habitats around the island at times including bushes and small trees isolated in paddocks.

35. Black-faced Cuckoo-shrike
Coracina novaehollandiae
This species was not recorded until a day after a strong north-westerly change on 17th October when it was then locally abundant. One was seen to catch a small skink (NJM).

36. Dusky Woodswallow
Artamus cuanopterus
This species was not recorded until a day after a strong north-westerly change on 17th October when a small flock of 9 individuals was seen coming in from the north to the top of North Hill (NJM). What were probably these birds were later seen in a loose flock hawking from high perches on the eastern slope of Target Hill.

37. Black Currawong
Strepera fulinosa
This was an obvious, relatively abundant species seen in most habitats including foraging under seaweed along tide-lines. One was seen being mobbed by Silver Gulls and another by a grey Fantail (NJM). Often seen mobbing Brown Falcons. Pellets that likely came from Black Currawongs contained at least Christmas beetle wing covers (genus unknown) and seeds from *Pimelea serpyllifolia* and they were seen feeding on the latter (NJM)

38. Forest Raven
Corvus tasmanicus
This was an obvious, relatively abundant species seen in most habitats including foraging under seaweed along tide-lines. It regularly mobbed raptors and was in turn occasionally mobbed by Silver Gulls and Crested terns, Masked Lapwing, Black Currawong and Black-faced Cuckoo-shrikes. There were occasional vigorous disputes with Brown Falcons inland from peacock bay, probably over nests in Allocasurina there.

39. Skylark
Alauda arvensis
This was an obvious, relatively abundant species seen over most pastures, typically hovering and calling then diving to ground. Several nests with eggs (2, 3 and 4) in exposed pasture were seen along the eastern slopes of Target Hill (NJM).

40. Richard's Pipit
Anthus novaehollandiae
This was an obvious, relatively abundant species seen over most pastures and venturing into

Black Currawong.
Photo by Dylan van Winkel.

low scrub. Several individuals were unusually confiding inland from Peacock bay and displayed breeding behaviour although no nests were seen.

41. Beautiful Firetail
Stagonopleura bella
Uncommon generally although commonly heard in dense tea tree thickets south of Peacock Bay and between Target Hill and North Hill. One occasionally seen in African Boxthorn adjacent to the farmhouse behind the beach at Peacock Bay. Several old nests found in tea-tree.

42. European Goldfinch
Carduelis carduelis
An uncommon species recorded in most pastures and weedy areas, occasionally (and unusually) individuals being seen and heard crossing exposed habitats at height. One (not surprisingly) was seen being eaten by a Brown Falcon (NJM). One was seen collecting nesting material (NJM).

43. Welcome Swallow
Hirundo neoxena
Pairs frequented the areas of Mannalargenna Cave (several old nests, one with chicks within) the top of North Hill and the area of the farmhouse behind the beach of Peacock Bay. Several were hunting Marsh Flies themselves hunting people along Peacock Bay beach.

44. Silvereye
Zosterops lateralis
This species was common in most scrubby habitat. Individuals were seen feeding on berries on African Boxthorn (NJM).

45. Common Starling
Sternus vulgaris
This invasive species was surprisingly uncommon and a small flock of 7 was regularly seen foraging in open pasture and along the shore-line.

46. Ring-necked (Common or Mongolian) Pheasant
Phasianus colchichus
A few pairs of this invasive species were seen around the island and one old nest was found behind Peacock Bay.

47. Indian Peafowl (peafowl, Peacock or Peahen)
Pavo cristarus
A few individuals including at least one male with full display tail were seen Peacock Bay. They were often heard and evidence of their foraging often seen in this area.

GENERAL DISCUSSION & MANANGEMENT RECOMMENDATIONS

The bird list is typical of what might be found in similar habitat on Flinders Island (Green 1969), except for nesting Cape Barren geese. None of these species would likely be restricted to the island and it was clear on several occasions that mobile species (eg brown falcon) freely travel between the island and Flinders Island. Several species listed by Brothers *et al.* (2001) were not recorded and vice versa but with such low numbers of individuals such differences can occur by chance. Arrivals of migratory species (eg dusky wood-swallows) seemed to be closely associated with north westerly fronts.

Despite continued control by trapping and shooting, numbers of feral cats remain on the island. Although analysis of cat scats suggest house mice are a main dietary item, pressure is probably maintained on bird populations by cats. It is possible that house mice themselves exert a pressure on species such as white-fronted chats and brown quail.

1. Eradication of cats would be possible and seems an obvious step in reconstituting such islands. It might be especially useful since Prime Seal Island, with its large population of wallabies, would seem a possible translocation site for Tasmanian devils in managing Devil Facial Tumour Disease.

2. Better fencing to keep sheep from some prime areas of original habitat may benefit birds on Prime Seal Island.

3. Fire should be carefully managed on the island

4. The eagle nests should be avoided during early spring-summer.

Table 1 List of birds observed on Prime Seal Island and the vegetation habitats in which they were observed

	NAV	NAV	SCA	SHC	GHC	SRC	GLC	OSM	PEP	FAG	FWU	FRG	ARS	TPR	SEA
Brown Quail			X				X			X					
Cape Barren Goose			X				X			X				X	
Grey Teal														X	X
Little Penguin															X
Common Diving-petrel															X
Short-tailed Shearwater															X
Black-faced Cormorant															X
Australasian Gannet															X
Black-browed Albatross															X
Australian Pelican														X	X
White-faced Heron			X											X	
White-bellied Sea-eagle			X							X					
Wedge-tailed Eagle			X		X					X					
Brown Falcon			X		X					X					
Ruddy Turnstone														X	
Pied Oystercatcher														X	
Sooty Oystercatcher														X	
Hooded Plover														X	
Banded Lapwing					X					X					
Masked Lapwing			X		X		X			X				X	
Pacific Gull										X				X	X
Silver Gull										X				X	X
Caspian Tern														X	X
Crested Tern														X	X
Brush Bronzewing	X												X		
Green Rosella			X												
Blue-winged Parrot			X												
Fan-tailed Cuckoo	X		X							X					
Horsfield's Bronze-cuckoo			X												
Tasmanian Scrubwren	X		X							X					
Striated Fieldwren				X											

New Holland Honeyeater			X												
Tawny-crowned Honeyeater															
White-fronted Chat										X		X		X	
Grey Fantail	X	X	X												
Black-faced Cuckoo-shrike	X		X							X		X			
Dusky Woodswallow			X												
Black Currawong	X		X							X		X		X	
Forest Raven	X		X							X		X		X	
Skylark										X		X			
Australian (Richard's) Pipit										X		X			
Beautiful Firetail			X							X					
European Goldfinch										X		X			
Silvereye			X												
Welcome Swallow										X				X	
Common Starling										X		X		X	
Ring-necked Pheasant			X												
Peacock			X												

(NAV= *Allocasuarina verticillata* forest; DOW= *Eucalyptus ovata* forest and woodland; SCA= Coastal scrub on alkaline sands; SHC=Heathland on calcarenite; GHC=Coastal grass on herbfield; SRC=Seabird rookery complex; ARS= Saline sedgeland/ rushland; GLC= lowland grassland complex; OSM= SandMud; FPF= *Pteridium esculentum* fernland; FAG= agricultural land; FWU= Weed infestation; FRG= Regenerating cleared land. (nomenclature follows Harris and Kitchener 2005)

ACKNOWLEDGEMENTS

John Duigan for the voluntary use of his ultra-light in checking and searching for eagle nests.

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NOTES on NEARSHORE FISHES

Shaw's Cowfish.
Etching by Brett Littleton.

By Nick Mooney

Fifty-one fish species were recorded inshore on a small portion of the east coast of Prime Seal Island in eastern Bass Strait. The species are typical of what could be expected to be observed in this locality.

INTRODUCTION

The inshore fish fauna of Tasmania is generally well known although detailed site surveys at remote locations such as Prime Seal Island contribute to the confidence we can develop in predicting the fish fauna around the coast.

METHODS

Survey was by snorkelling for approximately 200 m south of the farmhouse just inland from the beach on Peacock Bay. Survey was from the high tide mark to 4m depth and encompassed sandy bottom, rocky headlands and seagrass beds. Three swims each of 1 hour were carried out over the same ground at different stages of tide. A small underwater torch was used to aid survey in crevices. Rocks were not overturned. Fish names follow Last *et al* (1983).

To give a measure of abundance, each species seen alive was scored using a Log3 scale as

1 = 1-2 individuals

2 = 3-9 individuals

3 = 10-25 individuals

4 = 26-80 individuals

5 = 81-250 individuals

6 = 251-750 individuals

7 = 751=2000 individuals

8 = 2001-7000 individuals

9 = >7000 individuals

An average estimate over the three dives was used with 1 being the minimum for species recorded.

Water temperature varied closely around 14 degrees Celsius.

RESULTS

Comments on species are presented under species accounts and include an abundance score.

1. Draughtboard Shark
   Cephaloscyllium laticeps
   Three 1-1.2m specimens dead on the Peacock Bay beach as by-catch of local gill-netting for feral cat bait.

2. Spotted Stingaree
   Urolophagus gigas
   One seen in 0.5m deep water (1).

3. Pilchard
   Sardinops neopilchardus
   Small scattered schools seen in 3m over seagrass (4).

4. Bearded Rock Cod
   Peudophycis barbata

One seen under a ledge in 2-3m (1).

5. South Australian Garfish
   Hyporhamphus melanochir
   Several small specimens (estimated 20cm) seen in 1-2m over sand (2).

6. Hardyhead
   Atherinason sp.
   Several small schools seen in 1m over sand (3).

7. Deep-bodied Pipefish
   Kaupus costatus
   Several seen in seagrass (2 but probably more abundant)

8. Common Red Rock Cod
   Scorpaena ergastulorum
   Several seen deep in crevices in 2-3m (2).

9. Rock Flathead
   Platycephalus laevitagus
   One large (2kg) specimen collected on seagrass in 3m (1).

10. Castelnau's Flathead
    Platycephalus speculator
    Several 1-2 kg specimens collected along sand/seagrass edges in 2-3m (2).

11. Sea Moth
    Acanthopegasus lancifer
    One partial specimen dried out as beachwash.

12. Blotch-tailed Trachinops
Trachinops caudimaculatus
Occasional small schools under ledges in 2-3m (3).

13. Southen Cardinalfish
Vincentia conspersa
Occasional under ledges in 2-3m (2)

14. Long-finned Pike
Dinolestes lewini
A small, dispersed school in 3-4m (2).

15. Eastern Australian
Salmon Arripis trutta
Several moderate sized specimens (estimated 1kg) seen in 4m; one seen used as cat bait (2).

16. Silverbelly
Parequula melbournensis
Occasional individuals and pairs over sand in 2-4m (2).

17. Western Red Mullet
Upeneichthys sp.
Occasional individuals and pairs on sand patches in seagrass in 3-4m (2).

18. Common Bullseye
Pempheris multiradiatus
Occasional under ledges in 2m (2)

19. Black Drummer
Girella elevata
Several seen over reef in 2m (1).

20. Zebrafish
Melambaphes zebra
Large and small specimens common along rocky shoreline in 1-3m (4).

21. Mado Sweep
Atypichthys strigatus
Occasional specimens over reef in 1-3m (2)

22. Sea Sweep
Scorpis aequipinnis
Occasional juveniles at more wave-active sites in 2-3m (2)

23. Sweep
Scorpis lineolatus
Occasional juveniles at more wave-active sites in 2-3m (2)

24. Old Wife
Enoplosus armatus
Unusually common in along rocky foreshore in 0.5-2m; one seen used as cat bait (2).

25. Long-snouted Boarfish
Pentaceropsis recurvirostris
A pair under a ledge in 4m (1).

26. Scalyfin
Parma victoriae
Regularly seen on reef (3).

27. Marblefish
Dactylosargus arctidens
Several large specimens on reef in 2-3m (2).

28. Magpie Perch
Cheilodactylus nigripes
Several specimens over reef in 2-3m (2).

29. Dusky Morwong
Dactylophora nigricans
One juvenile seen on seagrass in 4m (1).

30. Yellow-eyed Mullet
Aldrichetta forsteri
A school regularly seen in 1m (3).

31. Short-finned Pike
Sphyraena novaehollandiae
One large specimen seen in 4m (1).

32. Castlenau's Wrasse
Dotalabrus aurantiacus
Common in reef of 1-3m (3 but could be more abundant).

33. Senator Wrasse
Pictilabrus laticlavius
Common on reef/seagrass edge in 1-4m (3).

34. Purple Wrasse
Pseudolabrus fucicola
Small specimens locally common around reef in 0.5-4m (4).

35. Blue-throated Wrasse
Pseudolabrus tetricus
All sizes regularly seen in 2-4m (3).

36. Blue Rock Whiting
Haletta semifasciata
Common in seagrass at 2-4m (3 but could be more abundant)

37. Little rock Whiting
Neoodax balteatus
Common in seagrass at 2-4m (3 but could be more abundant)

38. Long-rayed Rock Whiting
Common in seagrass at 2-4m (3 but could be more abundant)

39. Rainbowfish
Odax acroptilus
One specimen seen in 3m in seagrass (1).

41. Pygmy Rock Whiting
Siphonognathus beddomei
Common in seagrass at 2-4m (3 but could be more abundant)

40. Herring Cale
Odax cyanomelas
Occasional over reef (2).

42. Dragonet
Bovichthys variegatus
Common in crevices from 0.5-4m (3)

43. Common Weedfish
Heteroclinus perspicillatus
Several specimens seen in 2m (2 but could be more abundant).

44. Blenny
Pictiblennius tasmanianus
Common in crevices from 0.5-4m (3)

43. Goby
Nesogobius sp.
Occasional over sand in <0.5m (3).

44. Brown-striped Leatherjacket
Meuschenia australis
One seen on reef in 3m (1).

45. Yellow-tailed Leatherjacket
Meuschenia flavolineata
A pair seen over reef in 3m (1).

46. Six-spined Leatherjacket
seuschenia freycineti
One seen in seagrass in 4m (1).

47. Horse-Shoe Leatherjacket
Meuschenia hippocrepsis
A small school seen over reef in 3m (2).

48. Toothbrush Leatherjacket
Penicipelta vittiger
Occasional on reef in 2-3m (2).

49. Shaw's Cowfish
Aracana aurita
One female seen over seagrass in 2m (1).

50. Barred Toadfish
Contusus richei
One seen dead on beach.

51. Globefish
Diodon nicthemerus
One seen in seagrass in 3m and several beach-washed around island (1).

DISCUSSION

Fishes recorded seemed typical for shallow water Bass Strait with a mixture of seagrass, sand and foreshore reef in a semi-exposed, highly tidal area (Last *et al.* 1983, Edgar *et al.* 1982).

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BRIDGETTE MOFFAT

Bridgette Moffat traversing Poa tussock grassland habitat.
Photo by Dylan van Winkel.

By Bridgette Moffat

Hamish Saunders Memorial Trust Travel Award Recipient 2008

As an undergraduate student, with no qualifications, relatively little field experience and next to no contacts in the world of science, it is an extremely rare occasion when someone is willing to offer you an opportunity to work with skilled people and undertake significant research as a part of their team. Rarer still, is the chance to do this in another country, with the full support of funding from home.

Hamish Saunders Memorial Trust goes out of its way to work alongside the Tasmanian Government to be able to provide opportunities such as this and for undergraduate students; it is an absolute eye opener to the potential which science has to offer.

My personal encounter with the Hamish Saunders Memorial Trust, led me to an uninhabited island in the Bass Strait, with a team of scientists who I had known for less than two days. As the youngest member of the team undertaking the biological survey and geological diversity assessment, I had a lot to learn. Throughout the survey, I had exposure to many new situations which presented me with occasions for discussion and observation. It was great to be able to ask questions and get really in depth answers from a variety of people. Consequently, this gave me new knowledge and a perspective on many things which studying at University cannot always provide.

My own achievements were acquiring new skills in animal handling and management, as well as the ability to set live traps. Discovering the characteristic features of animals such as scats, tracks and behaviours was an aspect of the trip that I really enjoyed. I also gained a lot from identifying organisms because it highlighted how important physiology is to taxonomy, which was something I had previously overlooked. The experience in working with various forms of animals and their habitats has given me better insight into conservation management. It was especially exciting to be working in an overseas environment, where the plants and wildlife differ so greatly from home.

Finally, I would like to thank the Trust for their offer and for giving me a really valuable learning experience. It has taught me more about wildlife and conservation, but also about myself and what I'm capable of. Thanks to the Tasmanian research team, for their hospitality and support. Thank you for accepting me –even as that 19 yr old undergraduate student, with no qualifications and little field experience. It was really encouraging to have such a great team to be a part of and I wish you the very best for future surveys.

DYLAN VAN WINKEL

Dylan van Winkel with a blotched blue-tongue lizard.
Photo by Dylan van Winkel.

By Dylan van Winkel

Hamish Saunders Memorial Trust Travel Award Recipient

Experiences

Like any like ecological minded person, the opportunity to travel to a remote destination and document plants and animals, was quickly snapped up. I often dream about travelling to far away lands and learning about new and exciting plants and animals. I was fortunate enough to be selected to travel to an island off the coast of Tasmania and work with a team of ecologists to conduct the first ecological survey of Prime Seal Island. Information on the island's flora was documented some time ago (by Stephen Harris) however; there is a very limited knowledge of the wildlife present there.

After a three hour flight to Melbourne, followed by a one hour flight to Hobart, I was greeted at the airport by Louise Jerrim. At this point I was aware that Bridgette would be travelling on the same flight but, I had not met her yet. After a light chat with Louise, Bridgette arrived, introduced herself, and we left for town. In downtown Hobart we were introduced and shown around by Phil Bell of the Department of Primary Industries and Water (DPIW). That night we settled into a hotel for some much needed shut-eye. The next few days were spent familiarising ourselves with Hobart and getting ourselves organised for the island excursion. On the 13th we drove up to Launceston and boarded a light plane to Flinders Island. Here we spent the day playing with baby orphaned wombats and purchasing groceries from the island's only local supermarket. Our team managed to purchase the island's entire stock of fresh fruit and vegetables and left most of their shelves bare! We also spent time at the local bakery filling up on wallaby pies and coffee. The next morning we set off in a charter boat to Prime Seal Island, while watching huge soaring albatross as we motored across the ocean.

The island falls within a group of islands in the eastern Bass Strait, known as the Furneaux group. Prime Seal Island is Crown owned but is leased for private farming practices. With only two members of the team having spent time on the island, we were all excited to get going and explore. Both Bridgette and I were assigned to the mammal team and over the following 5 days we trekked across much of the island setting up and checking small mammal traps. All we ever seemed to catch were introduced house mice! The particular mammal we were targeting on the island was the New Holland mouse; endemic to Tasmania and highly threatened; and apparently it looks identical to a common house mouse… except much cuter! (we were told). Apparently, the only way to tell them apart is to perform a dental check to find a tiny notch in the back of their front incisors. This is not the easiest task to perform on tiny 3 gram animals, which are very inclined to bite! However, the job soon became routine and unfortunately we did not detect any New Holland mice on the island.

Every day was filled with adventure and if we weren't scrounging around in pitch black caves for cave crickets, or tracking wedge-tailed eagles to their nest sites, we were hiking vast distances and bashing through thick bush in order to set up bat traps. No stone went unturned (or any object on the ground for that matter) when we were around, and under every one a new and exciting critter. We caught beetles, crickets, lizards, scorpions and huge spiders! Everything recorded and labelled in our trusty notebooks. Every night around the dinner table, the team discussed their discoveries and swapped funny stories from the day. Our species lists for the island kept growing and growing! Even up until the last day when I stumbled upon, pursued into a thorn bush, and captured a huge blotched blue-tongue lizard!

But unfortunately, our time in paradise had to end. Our final evening on the island was filled with a huge feast of freshly caught abalone (Tassie delicacy), fish (hilariously filleted on an open laptop computer which was brought along for just such an occasion!), followed by an enormous barbeque

of steak, burgers, chops, wallaby sausage, and a heap of salads. The next morning we departed back to the mainland via Flinders Island.

Success of the expedition

The expedition was a huge success as noted by all those involved. Almost every part of the island was visited at least once and extensive flora and fauna surveys were conducted in all habitats. The expedition teams were divided into sections depending on the specialties of the members. Bridgette and I formed part of the four man mammal team, while the other teams comprised three botanists including a weed specialist, two entomologists, two geologists, and a raptor (bird of prey) expert. I was nominated as the expedition's herpetologist (reptile expert) due to my knowledge, lizard catching skills, and enthusiasm for stalking tiger snakes.

Hundreds of invertebrate specimens were collected from all habitats across the island. All the specimens collected were previously unrecorded from the island since no previous invertebrate surveys have been conducted there. It is very possible that many of these specimens represent new species.

Prime Seal Island supports a huge diversity of vegetation types, including several rare and threatened species. The vegetation on the island was first recorded and mapped by Stephen Harris (current team leader) in 1986 and was documented in his book titled 'One Hundred Islands: The Flora of the Outer Furneaux' (2001). During our expedition, many more species were recorded and the distribution of several plants extended.
The island shares many species commonly found on mainland Australia but some of which are absent in Tasmania. This is of interest as it provides evidence for the biogeographic history of the Bass Strait Islands and the separation of Tasmania from mainland Australia. Prime Seal Island was found to support large patches of plants that are rare in Tasmania and the island also supports several plant species of biogeographic importance, including *Apalochlamys spectabilis* and *Threlkeldia diffusa*. Large extended areas of the island are covered in pasture for grazing.

Apart from pademelons (small wallabies), house mice, and large brown, woolly animals that roamed the island (which actually turned out to be sheep covered in dry dust), we found no confirmed evidence of other native mammals or marsupials during our expedition. The mammal team focused on detecting New Holland mice (a small, highly endangered Tasmanian mouse). However, after a week of intensive trapping efforts only introduced house mice were captured much to our dismay.

We did manage to find some animal sign, in the form of 'nosings' in the dirt, which provided some hope for the presence of bandicoots on the island although no confirmed sightings eventuated.

No frogs were found or heard on the island, probably due to the lack of free-standing water and the absence of high altitude cloud forest. Eight species of reptile (three snake and five lizard species) were confirmed inhabiting the island. The results from our expedition added six unrecorded species to the list of reptiles previously recorded from the island.

Upon returning to Hobart, a press release was launched immediately and the success of our expedition was voiced to the Australian public, via a radio broadcast on the ABC network. Stephen Harris, Bridgette Moffat, and I were interviewed in front of TV cameras and asked to speak about the Hamish Saunders trust, describe our experiences on the island, and talk about what we gained from participating in the expedition. What an experience this was!!!

The official results of the survey are to be written up as individual papers that will be compiled into a single report. This compilation will describe and document our trip to Prime Seal Island.

Personal gains from participation

Pages upon pages could be written on my experiences from the trip to Prime Seal Island however, I will keep it short by describing some key experiences that I will carry with me into my future career and for the rest of my life. A key ingredient to any successful expedition is the ability of the team members to work together. This can be especially

daunting if all the members are unfamiliar to you. However, our team was fantastic and I got along with everyone really well. I tried to learn and work with all the different parties and this meant that I broadened my knowledge extremely about the flora and fauna of Tasmania, both theoretically and practically through application of field techniques for surveying Tasmanian species. Prior to the expedition, I was familiar with several of the survey techniques but I had no experience actually applying them in the field. Getting the chance to learn and apply these was extremely important to me and I will use what I have leant in my future career. Since many of the techniques differed from those used in New Zealand, I feel I have gained some understanding of international approaches to conservation. This is very important and has allowed me to convey new perspectives to the conservation of New Zealand's wildlife.

Being surrounded by such a knowledgeable group of people was great! I really enjoyed discussing, listening, and absorbing their experiences and advice about Tasmanian wildlife around the dinner table. Ninety percent of the time my obscure questions regarding the formation, cultural history, and wildlife of the island were answered. Everything is new and exciting when you travel to a place you have never been before!!!

But, the most important and meaningful (possibly life-changing) element I gained from this experience is that it ignited my drive for exploration and travel. I regularly dream about travelling, exploring, and documenting remote parts of the world but I thought that watching adventurers on the discovery channel is as close as I would get. The Prime Seal expedition was a dream come true and has taught me that there are still many places worth exploring.

The importance of conveying experiences such as these to others and promoting further conservation perspectives should not be underestimated. Passing on personal experiences to others may inspire them to become involved in similar programmes and think about the environment that surrounds and supports us. Like Hamish, this is a legacy I would like to become a part of. Exploration must be one of the most gratifying and exhilarating experiences in life and I am eternally grateful to the Hamish Saunders memorial trust for providing this opportunity and allowing me to experience what Hamish loved doing best.

Recommendations

I have thought long and hard about how I could offer advice and/ or recommendations about future Hamish Saunders trust surveys, but I cannot think of a single one. From the point of filling in the application forms to flying back to New Zealand everything was perfectly organised and went unbelievably smoothly. The DPIW team was amazing and offered their hospitality and services throughout the entire trip. I am sure Bridgette will agree that both of us were looked after extremely well. I think the structure of the project works really well (i.e. survey, follow-up report to the trust, and the survey results published). A photograph collection was completed for the Trust.

There is only one element that I would like to recommend for future volunteers. This would be to personally meet members of the Saunders family and trustees of Hamish Saunders trust. As a representative for the trust it seems only natural to speak directly to those who were close to Hamish, and share experiences about adventure and conservation. In saying this, I really hope I will get the opportunity to meet the family and trustees of the HSMT.

Thanks and acknowledgements

I would like to extend my many thanks to the Saunders family and trustees of the Hamish Saunders Memorial trust for the opportunity to travel to Prime Seal Island and partake in the ecological survey. I would also like to thank the team members from Tasmania including, Phil Bell, Stephen Harris, Clare Hawkins, Michael Driessen, Nick Mooney, Micah Visoiu, Emma Betts, Oliver Strutt, Abbey Throssell, Kevin Bonham, Rolan Eberhard, Sarah Munks, and Bridgette Moffat. Special thanks to Bridgette for her companionship, friendship, and laughs during our trip.

NOTES

Cover and inside cover photos by Rolan Eberhard.
Moth illustration by Georgina Davis.

This report is printed on Monza Satin recycled paper, derived from sustainable forests, elemental chlorine free pulp and certified environmental systems.

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