Tasmanian Aboriginal Centre

Muttonbird Monitoring on Aboriginal Islands Dec 2013

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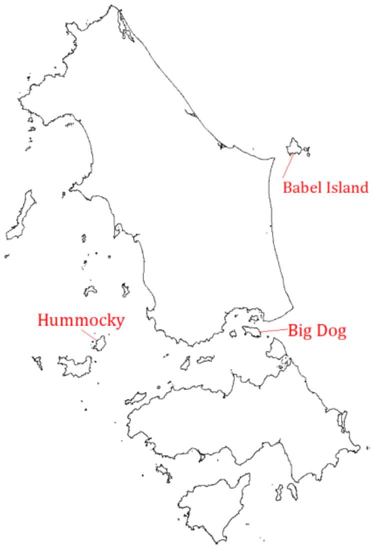

Species Targeted: Short-tailed Shearwater (*Puffinus tenuirostris*), (Muttonbird).

Islands Monitored: Babel Island; Great Dog Island (Big Dog); Mount Chappell Island (Hummocky).

Aims/ objectives of monitoring program

- To monitor the species over the long term to allow detection of major changes in the numbers of Short-tailed shearwaters.
- To obtain data with similar methods to those used by Department of Primary Industries, Parks, Water and Environment (DPIPWE) for several years. This is to allow valid comparison across islands with different tenure and harvesting regimes.

Background

Short-tailed shearwaters are an important cultural resource for the Aboriginal community. The cultural practices of harvesting and consuming the species remain important to life on country. The strong connections to these practices were pivotal in the argument for the return of Islands in Bass Strait. Of those lands returned to the Aboriginal Community, three islands have substantial muttonbird rookeries: Great Dog Island (Big Dog), Babel Island and Mount Chappell Island (Hummocky). Much land management work carried out on these islands aims to nurture rookeries and to help facilitate the cultural and commercial harvesting activities.

Monitoring of the species is identified as important in the 2010-2013 MERI plan (TAC Land management, 2010) because of the potential for population fluctuations to affect cultural practices. As noted by birders over the years, population numbers will fluctuate each season. It is valuable to have systematically recorded information in order to establish if large changes or trends in numbers of birds are outside of the "normally" experienced ebb and flow of numbers.

Long term annual monitoring of Short-tailed shearwater population trends has been carried out by the currently named DPIPWE for at least 13 yrs since 1997, with various other forms of research undertaken since the 1940s. The DPIPWE research is currently carried out on Little Green, Little Dog and Big Green Islands (which are all recreationally harvested), as well as East Kangaroo Island (closed to harvest since 1990) and Goose Island (never harvested). Information from the DPIPWE surveys feeds into decisions made in regards to recreational harvest management (bag limits for Tasmania, West Coast and Ocean Beach) (WMB, 2010).

The populations on the Aboriginal Islands have only had sporadic monitoring in the past. Such work includes:

- Studies on Great Dog Island (Big Dog) focusing on: hatching success (Meathrel *et al, 1993)*, patterns of growth (Wooller *et al*, 2000) and effects of human activity on growth rates (Saffer *et al* 2000).
- Counts of burrows on Babel Island in 1983 (Skira & Towney, 1983) and 2010 (TAC, unpublished data) and
- Inconsistent efforts on Mount Chappell and Babel Islands in 2012 and 2013 (TAC, unpublished data). This work helped design the current study by informing which areas are encroached by penguins and what level of effort is realistic with the resources available.

Methods

The methods used were based on those used by DPIPWE, as stipulated in the Wildlife Management Branch establishment report (2010). Alterations were necessary to make consistent annual repetition possible with available resources.
It is intended that 2013 was the first of several years of monitoring. The monitoring that was carried out includes:

- Surveys (sampled count) of burrow occupancy percentage and occupied burrow density (breeding adults in December), (Great Dog and Babel Islands).
- Counts of burrows only (Mount Chappell Island, December).

Where possible, permanent 100m transects were established in areas known to have been surveyed by Irynej Skira, and others, in the past, to allow some comparison of surveys. GPS points were recorded for all start and finish points of transects (GDA94 MGA zone 55). Tablet devices with cybertracker applications[1] were used to record all data.

At each transect, a 100 metre builders-line was stretched between the start and finish points, established by GPS points. Some inconsistent transect lengths occurred, which should not reoccur in the future with now-confirmed GPS points. One person is designated the role of recorder – using the tablet device to record numbers, relevant comments and photos while others assess the occupancy status of burrows, often dividing workload to each side of the transect line.

All burrows within 1 metre of the line (if the centre of the burrow entrance burrow is within 1 metre, as measured by a 1m stick) are checked for the presence of a shearwater adult. This is usually done by inserting an arm, but often a thin wooden stick (approx 60cm long) is used, particularly for deep holes which may require lying on the ground and reaching in.

Pecking indicates presence of an adult shearwater, which is conveyed to the recorder with a shout of "bird". The presence of eggs or two birds are recorded the same as "bird", as the burrow is effectively occupied. Little penguins may be encountered, as indicated by distinctive calls. These are recorded separately.

If confident that a burrow has been comprehensively checked, and no birds are present, then an 'empty' call is shouted to the recorder. If it is not clear that the whole burrow has been reached, then an "unknown" is conveyed and recorded.

[1] Data collection and mapping applications customised by the Tasmanian Aboriginal Centre using android devices with GPS capabilities.

The results are used to determine shearwater occupancy rates and density of occupied burrows along all transects.

Equipment

- Tablet or other data collection GPS device
- 1m sticks,
- 100m line,
- Sticks for probing burrows,
- Gloves,
- First Aid Kit with snake bandages,
- Wet weather gear.

2013 details

Personnel: Shaun Thurstans; Tim Brown; Brett Newell; Stuart Wheatley
Dates: 11-15 December, 2013.
It is important that surveys do not occur before the 3rd of Dec. which is recognised as the last known date of laying in a highly synchronised breeding season (Meathrel *et al, 1993*).

Sites

Great Dog Island "Big Dog"

Four transects were established in the south and west of Great Dog Island. See appendix A.

Two (#1 & #2) were in an area subject to a non-commercial harvest.

Two (#3 & #4) were in an area in the west of the island in an area confirmed as monitored by Skira and others (evident from several old PVC burrow marking poles, Figure 1), but not emulating exact transects used by Skira).

Not all transects were precisely 100m, which was taken into consideration for the burrow density. These anomalies will be fixed before the 2014 season.

Figure 1: Burrow marker from Skira &/ or Meathrel surveys.

Babel Island

Six transects were re-established along transects 1 and 2 that were used by Irynej Skira for burrow counts in January 1983 (Skira and Towney, 1983), see Appendix B. The transect locations were copied from the map in Skira and Towney (1983) using landmarks (e.g. West Beach and Mount Capuchin) and evenly divided into four (1a, 1b, 1c, 1d) and three (2a, 2b, 2c) 100m transects respectively. The GPS points were confirmed in 2012, which made relocation faster in the field and less reliant on the 100m line for length. Transect 1d was not assessed as it was known to have a very small number of burrows.

Mount Chappell Island "Hummocky" [Burrow counts only]

Four transects were established on this Island in healthy rookeries, see Appendix C. Because of the high risk of snake interactions, only burrow counts are tallied here. The transects were set in the same way as other islands, but burrow entrances were counted without assessing the occupancy of each burrow.

Results

The results from transects where occupancy was assessed are shown in Table 1. The fact that several burrows are of unknown occupancy status requires an adjustment. The numbers of "unknown" burrows are distributed according to the proportions otherwise found in that transect, using the formula: (O/T*U)+O, where: O = Number of occupied burrows, T = Total burrows on transect, U = Unknown occupancy. Adjusted burrow densities are then calculated.

Those results are summarised for each island in Table 2. The counts of burrows on Mount Chappell Island are shown in Table 3. Figures from Tables 2 and 3 are also shown on maps in the appendices.

Table 1: All occupancy transects

Transect	Muttonbird	Empty	Unknown	No. of burrows	Burrow occupancy	Adjusted Occupancy	Occupied burrows (Unknowns distributed)	Transect Length (m)	Occupied burrow density (occupied burrows/m2)	Adjusted occupied burrow density (occupied burrows/m2)
Big Dog Island										
1	59	41	48	148	40%	59%	87	103	0.286	0.424
2	54	42	33	129	42%	56%	73	92	0.293	0.394
3	43	36	13	92	47%	54%	50	100	0.215	0.250
4	49	43	17	109	45%	53%	58	117	0.209	0.248
Babel Island										
1a	13	2	0	15	87%	87%	13	100	0.065	0.065
1b	23	17	0	40	58%	58%	23	100	0.115	0.115
1c	35	35	14	84	42%	50%	42	100	0.175	0.210
2a	16	8	0	24	67%	67%	16	100	0.080	0.080
2b	14	10	1	25	56%	58%	15	100	0.070	0.073
2c	48	29	5	82	59%	62%	51	100	0.240	0.256

Table 2: Island occupancy summaries with standard deviations

Island	Number of Transects (100x2m)	Burrow occupancy (%)	Adjusted Burrow occupancy	Occupied Burrow Density (occupied burrows/m^2)	Adjusted occupied burrow density (occupied burrows/m^2)
Big Dog	4	42.89% ±3.078%	55.86% ±2.499%	0.249 ±0.045	0.325 ±0.093
Babel	6	55.19% ±14.884%	59.60% ±12.593%	0.240 ±0.069	0.256 ±0.080

Table 3: Mount Chappell Island burrow counts only

Transect	Number of burrows	Transect Length (m)	Burrows density (per m^2)
1	78	113	0.35
2	89	100	0.45
3	99	100	0.50
4	111	105	0.53

Discussion

Big Dog Island had consistently high numbers of burrows, which were higher in the rookery that is harvested (non-commercially, transects #1 and #2), with a healthy level of occupancy overall in 2013. The transect lengths did vary, which was incorporated into the density calculations. These transects will be standardized to 100m before the 2014 survey. It may be good practice to use an accurate 100m line for this, but it was found that if the GPS coordinates were pre-confirmed (as they were on Babel Is.), then it is possible to consistently set 100m transects regardless of the stretchiness of the line.

Babel Island varied dramatically in numbers of burrows with a pattern of greater numbers of burrows towards the tops of the hills than lower elevations. It is unclear why this is the case. There were very few burrows that were of unknown status– because they were generally shallower than those found on Big Dog. The occupancy rates show a high variability– with a high of 87% on the low elevation transect #1b being a relic arising from the low total number of 15 burrows.

The occupancy figures summarised for each Island are compared with 2013 DPIPWE surveyed figures in appendix D. Both Big Dog and Babel Islands have greater occupancy percentages than any Islands surveyed by the DPIPWE team in 2013, which indicated the lowest drop since monitoring started in 1997 (Figure 6). If Big Dog and Babel figures were plotted on this graph – they would be the unadjusted percentages of 42.89% and 55.19% respectively.

The raw numbers of burrows recorded for Babel Island can be compared superficially with burrow counts surveyed there in Feb 1983 (Skira and Towney, 1983) and Jan 2010 (TAC, unpublished) as shown in Appendix E. Despite the superficiality of such a comparison, it indicates a substantial decline in the average density of burrows on this Island over 30 years.

If resources allow, it would be useful to bolster the surveys by:

- Assessing the condition (weight) of a sample of breeding adults in December and
- Surveying burrow occupancy (of chicks) in February/ March.

Chappell Island saw the establishment of burrow count transects in rookeries with healthy numbers and general condition. It is hoped that this monitoring will help focus land management efforts to nurture these rookery areas, primarily preventing weed encroachment. Again, some transects were of inconsistent length, which will be rectified by the next survey.

References

Meathrel, C. E., Skira, I. J., Bradley, J. S. and Wooller, R. D. 1993. The influence of egg-size, mass and composition upon hatching success in the short-tailed shearwater *Puffinus tenuirostris* (Aves: Procellariiformes). *Journal of Zoology*, 230: 679–686.

Saffer, V.M., Bradley, J.S., Wooller, R.D. and Meathrel, C.E. (2000) . The Effect of Human Activity on the Growth Rates of Short-tailed Shearwater *Puffinus tenuirostris* Chicks. *Emu* **100** , 49–53.

Skira, I. & Towney, G., 1983. *Babel Island Muttonbird Rookeries.* Unpublished letter.

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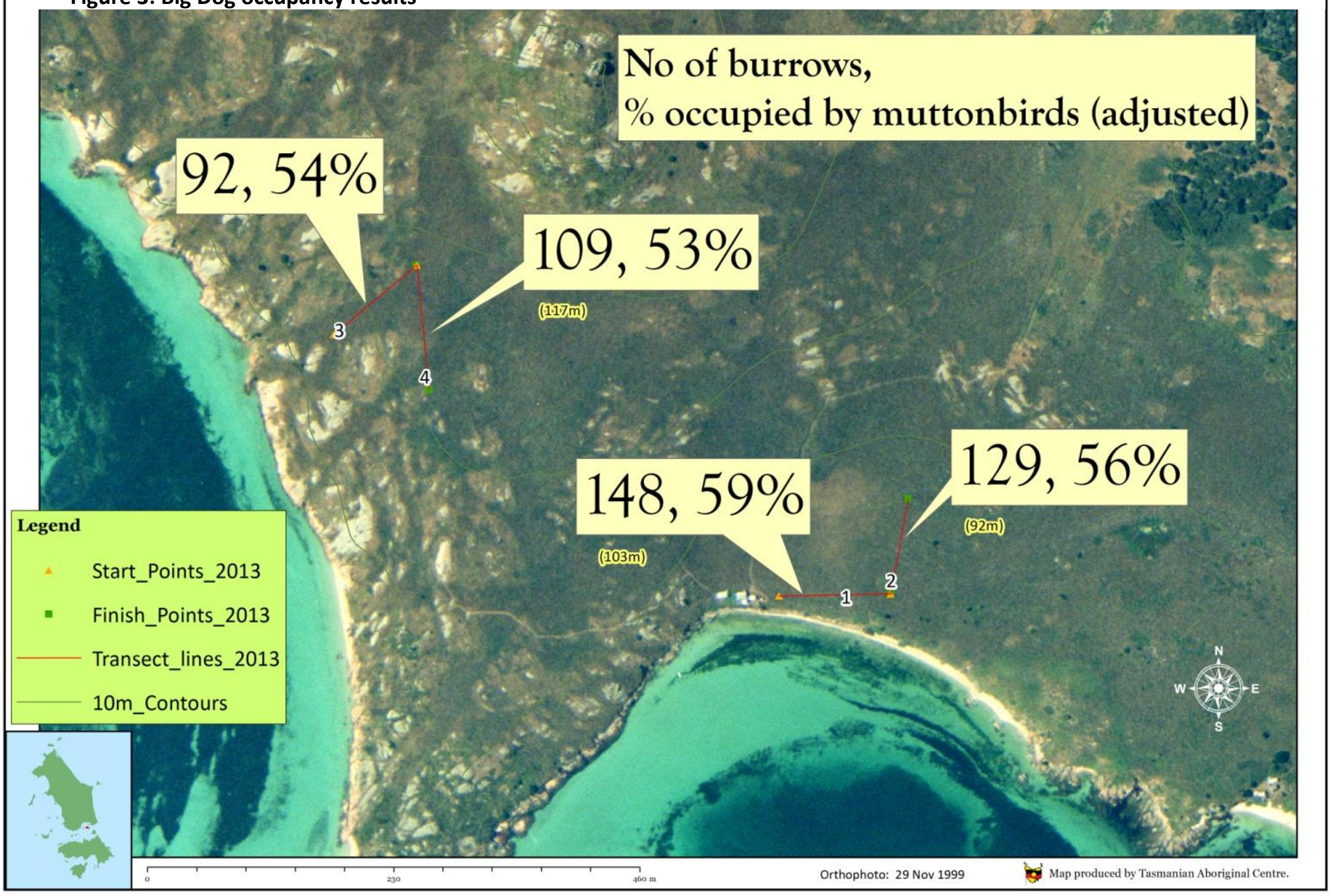
Wooller, R.D., Saffer, V.M., Meathrel, C.E. and Bradley, J.S. (2000) . Patterns of Growth in Nestling Short-tailed Shearwaters *Puffinus tenuirostris*. *Emu* **100** , 42–48

Appendix A. Great Dog Island (Big Dog) transects and results.

Figure 2: Big Dog transect locations

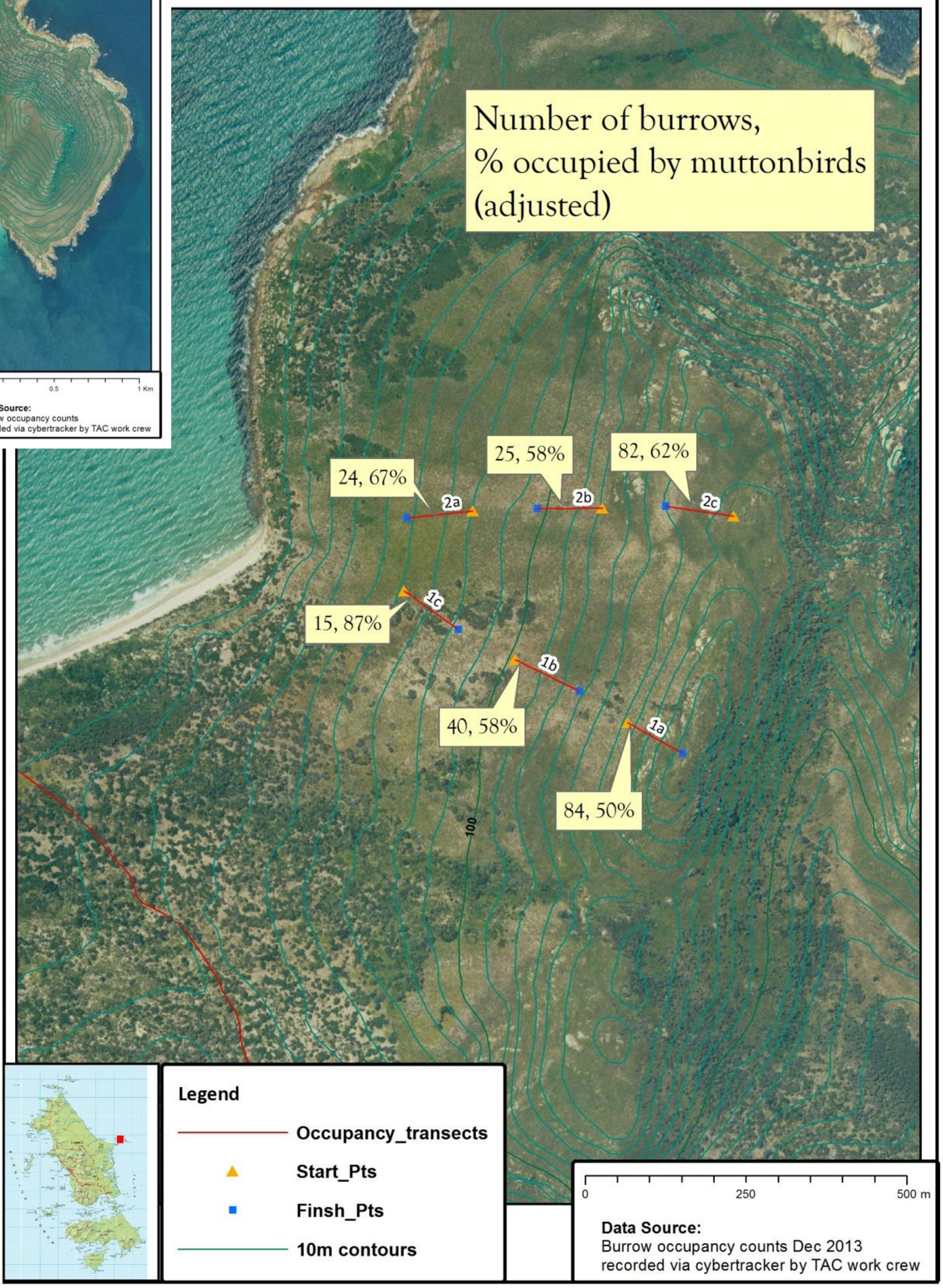
Figure 3: Big Dog occupancy results



Appendix B. Babel Island transects and results

Figure 4: Babel Island transects

Figure 5: Babel Island occupancy results.



Appendix C Mount Chappell Island transects and burrow counts.

Figure 6: Mount Chappell Island transects

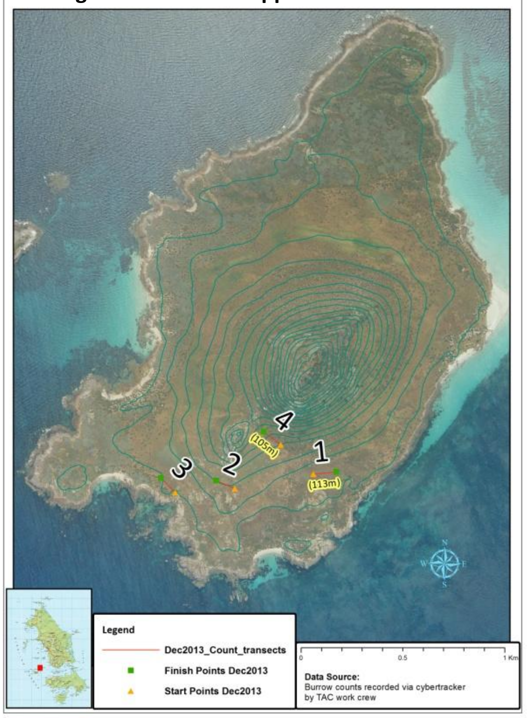


Figure 7: Mount Chappell Island burrow counts

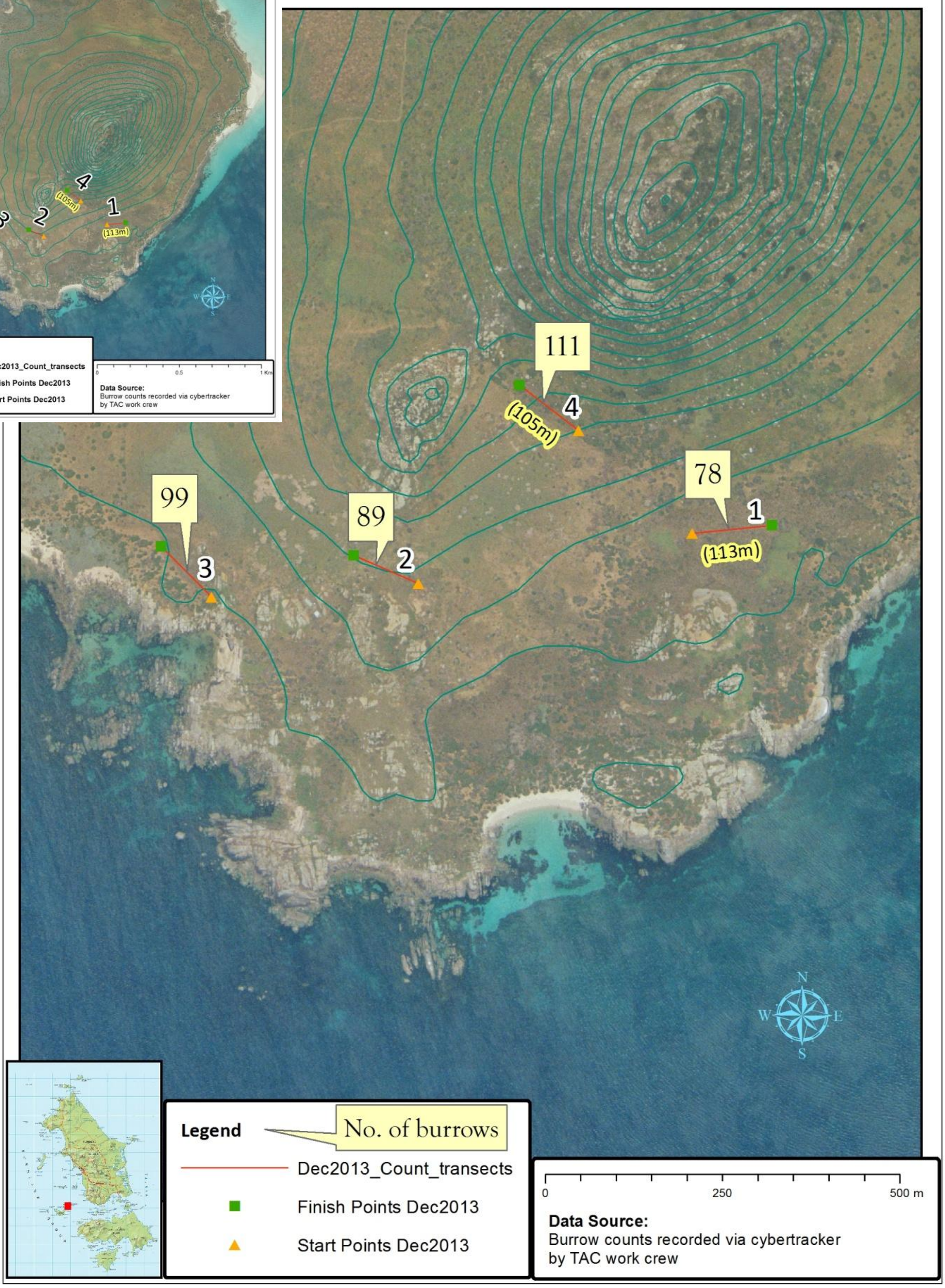
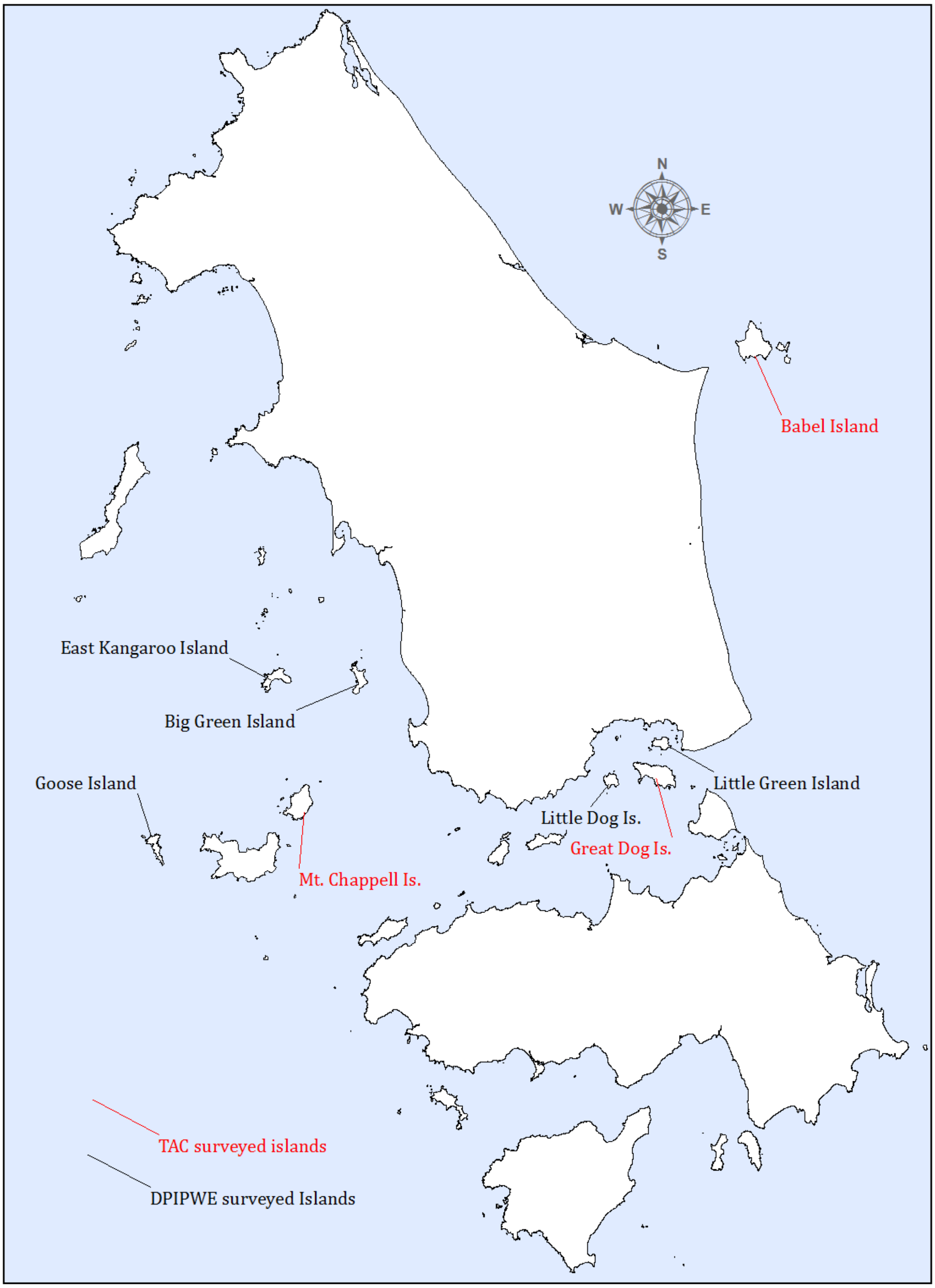


Figure 6: Furneaux Islands surveyed by TAC and DPIPWE.



Base image by TASMAP (www.tasmap.tas.gov.au), © State of Tasmania.

Appendix D Comparison with DPIPWE monitoring on other Furneaux Islands.

Table 4 DPIPWE surveyed burrow occupancy across all Islands surveyed 9-12 December 2013

Island	Number of Transects (100x2m)	Burrow occupancy (%)	Adjusted Burrow occupancy (%)	Occupied Burrow Density (occupied burrows/m²)	Adjusted occupied burrow density (occupied burrows/m²)
Little Dog	6	31.89% (±5.2)	37.89% (±6.3)	0.22 (±0.04)	0.25 (±0.04)
Little Green	6	16.98% (±2.3)	19.15% (±2.8)	0.11 (±0.01)	0.13 (±0.01)
East Kangaroo	8	30.85% (±2.6)	35.68% (±2.4)	0.06 (± 0.01)	0.07 (±0.01)
Big Green	8	30.45% (±2.3)	35.21% (±2.85)	0.08 (± 0.01)	0.09 (±0.02)
Furneaux (Average)	**28** (total transects)	**27.99% (±1.86)**	**32.91% (±2.85)**	**0.11 (±0.01)**	**0.13 (±0.02)**

Table 2 (repeated) TAC surveyed burrow occupancy surveyed 12-14 December 2013

Island	Number of Transects (100x2m)	Burrow occupancy (%)	Adjusted Burrow occupancy (%)	Occupied Burrow Density (occupied burrows/m²)	Adjusted occupied burrow density (occupied burrows/m²)
Big Dog	4	42.89% (±3.1)	55.86% (±2.5)	0.249 (±0.05)	0.325 (±0.09)
Babel	6	55.19% (±14.9)	59.60% (±12.6)	0.240 (±0.07)	0.256 (±0.08)

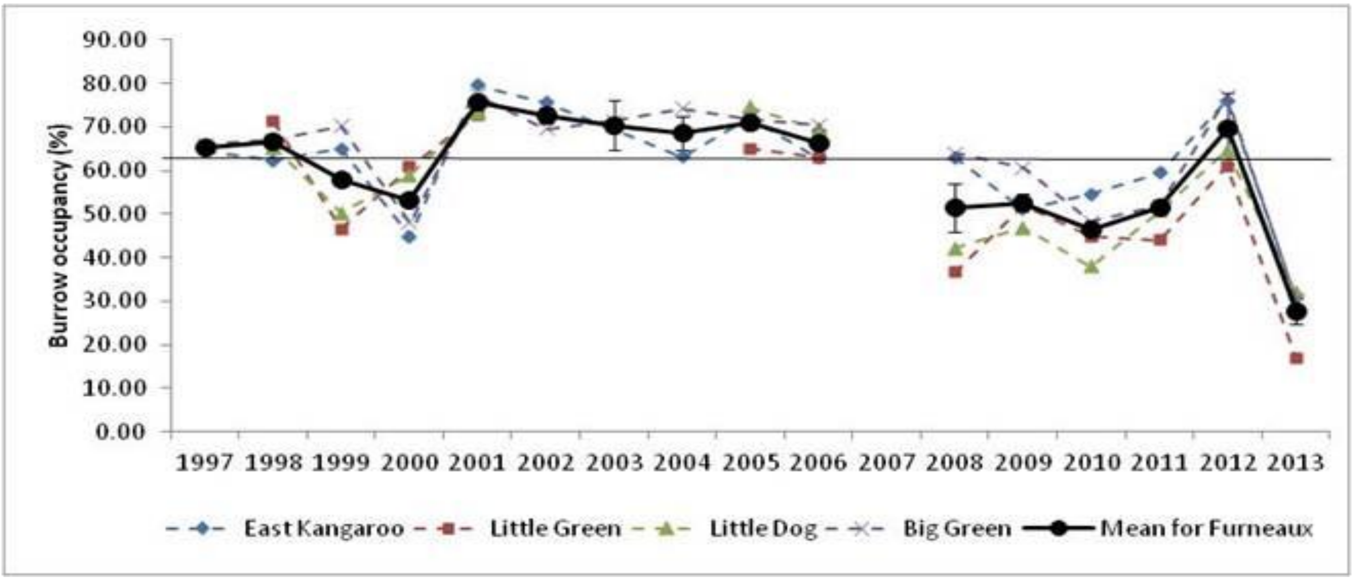


Figure 7: Showing UNADJUSTED burrow occupancy as a percentage of all burrows surveyed.

Appendix E Babel Island Burrow counts

Note that comparing these figures is somewhat superficial because methods may have differed between counting 'active' burrows in Feb 1983 & Jan 2010 and counting all burrows in Dec 2013. Sources : Skira & Towney (1983), TAC (2010, unpublished data) and surveys documented here.

Table 4: Babel Island burrow counts

Transect	Number of burrows			Burrow density		
	Feb-83	Jan-10	Dec-13	Feb-83	Jan-10	Dec-13
1a	157	112	84	0.785	0.56	0.42
b	160	124	40	0.8	0.62	0.2
c	126	56	15	0.63	0.28	0.075
d	54	11		0.27	0.055	
2a	135	24	24	0.675	0.12	0.12
b	173	84	25	0.865	0.42	0.125
c	123	156	82	0.615	0.78	0.41
3a	117	159		0.585	0.795	
b	144	231		0.72	1.155	
c	194	159		0.97	0.795	
d	220	142		1.1	0.71	
4	72			0.36		
5	77			0.385		
6	89			0.445		
7a	223	108		1.115	0.54	
7b	122	169		0.61	0.845	
8	130			0.65		
9	236			1.18		
10	173			0.865		
11	232			1.16		
12	98			0.49		
13	208			1.04		
14	196			0.98		
			Averages:	0.752	0.590	0.225

Figure 8: All Babel Island transects