CONSULTANCY REPORT

TRANSLOCATION OF THE WESTERN RINGTAIL POSSUM,

Pseudocheirus occidentalis,

FROM THE PORT GEOGRAPHE DEVELOPMENT SITE,

BUSSELTON, TO YALGORUP NATIONAL PARK, May-July 1995

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March 1996

Prepared for the Western Australian
Department of Conservation and Land Management.

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SUMMARY

A diurnal survey of dreys and nocturnal spotlight surveys suggested that between 10 and 15 western ringtail possums were using the defined survey area within Stage 3 at the Port Geographe Development Site.

Thirteen ringtails were caught:

- 9 adult females with a total of 8 naked pouch young;
- 3 adult males; and
- 1 dependent juvenile male.

Ten of the animals were from within the defined survey area, 2 from an adjacent area and 1 from within Stage 2 which was previously surveyed.

All ringtails caught were relocated at the southern of two prepared release sites within Yalgorup National Park where fox control has commenced. Eleven of the 13 ringtails were radio-collared, 1 adult female and 1 juvenile male were released uncollared.

On completion of the consultancy, all radio-collared animals were alive.

There was little evidence of dispersal from the release site.

Habitat use (diurnal rest sites) was not restricted to peppermint and included use of areas where eucalypt, melaleuca and banksia are dominant or common. Approximately 50% of rest sites were in exposed or partially exposed positions.

Construction of dreys and use of tree hollows was recorded within 16 days and 2 days respectively.

Continued radio-telemetry monitoring is recommended, concentrating on collection of data to allow assessment of survivorship and habitat use (day rest sites, nocturnal foraging areas and diet).

1 INTRODUCTION

1.1 The Port Geographe Development

The Port Geographe development is a marina, resort and residential canal development under construction c. 4 km north-east of Busselton in south west Western Australia. The original proponent (Interstruct Pty. Ltd. and Naturaliste Developments Pty. Ltd.) submitted an Environmental Review and Management Programme (ERMP) (LeProvost, Semeniuk & Chalmer, 1988) to the Environmental Protection Authority (EPA) in 1988. The proposal was reviewed by the EPA in 1989 (EPA, 1989) and approved in 1990 subject to conditions set by the Minister for the Environment (Minister for Environment 1990).

Interstruct Pty. Ltd. and Naturaliste Developments Pty. Ltd. later withdrew from the project. In 1994 Tallwood Nominees replaced Interstruct as the proponent and proposed modifications to the original proposal. These modifications were subsequently approved by the EPA subject to amended conditions (Minister for the Environment 1995).

The amended conditions relevant to western ringtail possums are effectively unchanged from the original conditions and comprise Ministerial condition 8 which is:

Condition 8-1: Prior to commencement of site works, the proponent shall implement the programme submitted to the Department of Environmental Protection for the protection of the population of Western Ringtail Possums in the project area, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Department of Conservation and Land Management.

Condition 8-2: Prior to commencement of site works, the proponent shall conduct a short term study of the Western Ringtail Possums utilising the project area, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Department of Conservation and Land Management.

Condition 8-3: Prior to clearing of *Agonis flexuosa* woodlands, the proponent shall ensure the capture of as many as possible Western Ringtail Possums occupying the site and their translocation to an approved zoo or other site, under the supervision of the Department of Conservation and Land Management, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Department of Conservation and Land Management.

Condition 8-4: Prior to commencement of site works, the proponent shall make provision for contribution to a fund for the maintenance of the captured Western Ringtail Possums, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Department of Conservation and Land Management.

Condition 8-5: Prior to commencement of site works, the proponent shall make provision for contribution to a fund for a three year study of the conservation requirements of the local Western Ringtail Possum population with a view to the re-establishment of Western Ringtail Possums in the project area, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Department of Conservation and Land Management.

Condition 8-6: Prior to commencement of site works, the proponent shall retain and plant *Agonis flexuosa* as recommended in Environmental Protection Authority Bulletin 386 (Section 5.4), to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Department of Conservation and Land Management.

1.2 Progress to date

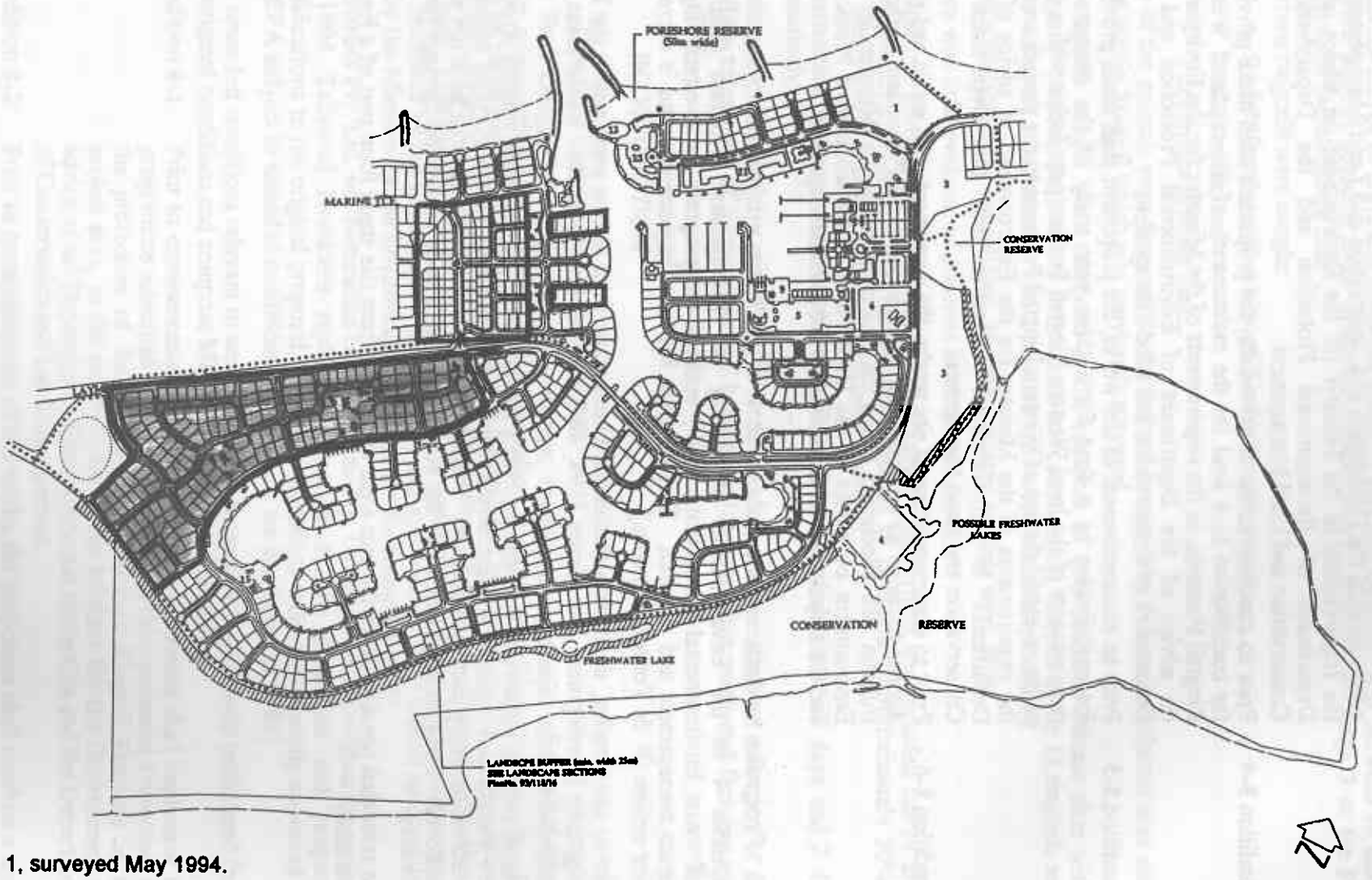
Appendix 4 of the Environmental Monitoring and Management Program (EMMP) (LeProvost Environmental Consultants, 1990) outlined the program for western ringtail possum management and research. This program has been implemented and is currently under review (P. de Tores, pers. com.).

Prior to site clearing, short term studies have been carried out at two areas within the Port Geographe Development Site (Jones 1994; de Tores and Rosier 1996). These areas are shown in figure 1.

Ringtail possum population size was estimated for each area. All catchable ringtail possums were caught and released at Leschenault Peninsula Conservation Park (CALM managed conservation estate north of Bunbury). Possums relocated from the first area have not been monitored. Possums relocated from the second area have been monitored through radio-telemetry.

The relocated possums from the two areas above and from this study form part of a longer term study.

Figure 1: Areas previously surveyed; possums removed from these site were relocated at Leschenault Peninsula Conservation Park (source: LeProvost Dames and Moore, 1995)



Area 1, surveyed May 1994.

Area 2, surveyed April - May 1995.

2 THE CONSULTANCY

2.1 Terms of Reference

The consultancy was undertaken in the period 10 May to 30 July 1995 and involved survey at the Port Geographe Development Site and translocation of western ringtail possums from the Site to Yalgorup National Park. The translocation formed the first of several stages of translocation from the Port Geographe Development Site to Yalgorup National Park.

The area of survey is within Stage 3 of Tallwood Nominees' development plan (figure 2).

The survey and translocation was undertaken in accordance with Ministerial Condition 8, the EMMP (LeProvost Environmental Consultants, 1990) and CALM's subsequent translocation proposal (de Tores, 1995).

After revision of the original agreement the consultancy required provision of the following services:

(i) assist in the public liaison process through production of an information brochure;

(ii) prepare cyanide capsules and assist with cyanide baiting at the proposed translocation release sites within Yalgorup National Park;

(iii) estimate the population size of western ringtail possum within the specified survey area of the Port Geographe Development Site;

(iv) assist with pre-baiting fauna surveys at Yalgorup National Park;

(v) assist in the capture, processing and translocation of possums from the development site to release sites at Yalgorup National Park;

(vi) undertake monitoring of radio-collared released animals at Yalgorup National Park on a daily basis for up to ten days immediately after release; and

(vii) submit a report to:

- identify the vegetation units, the location of existing dreys within the specified survey area and, where possible, identify dreys showing signs of recent activity; and
- provide results from diurnal and nocturnal surveys, estimating the number of possums within or using the specified survey area.

2.2 The Survey Area and Translocation Release Sites

The location of the survey area within the Port Geographe Development Site is shown in figure 3. The translocation release sites within Yalgorup National Park are shown in figure 4.

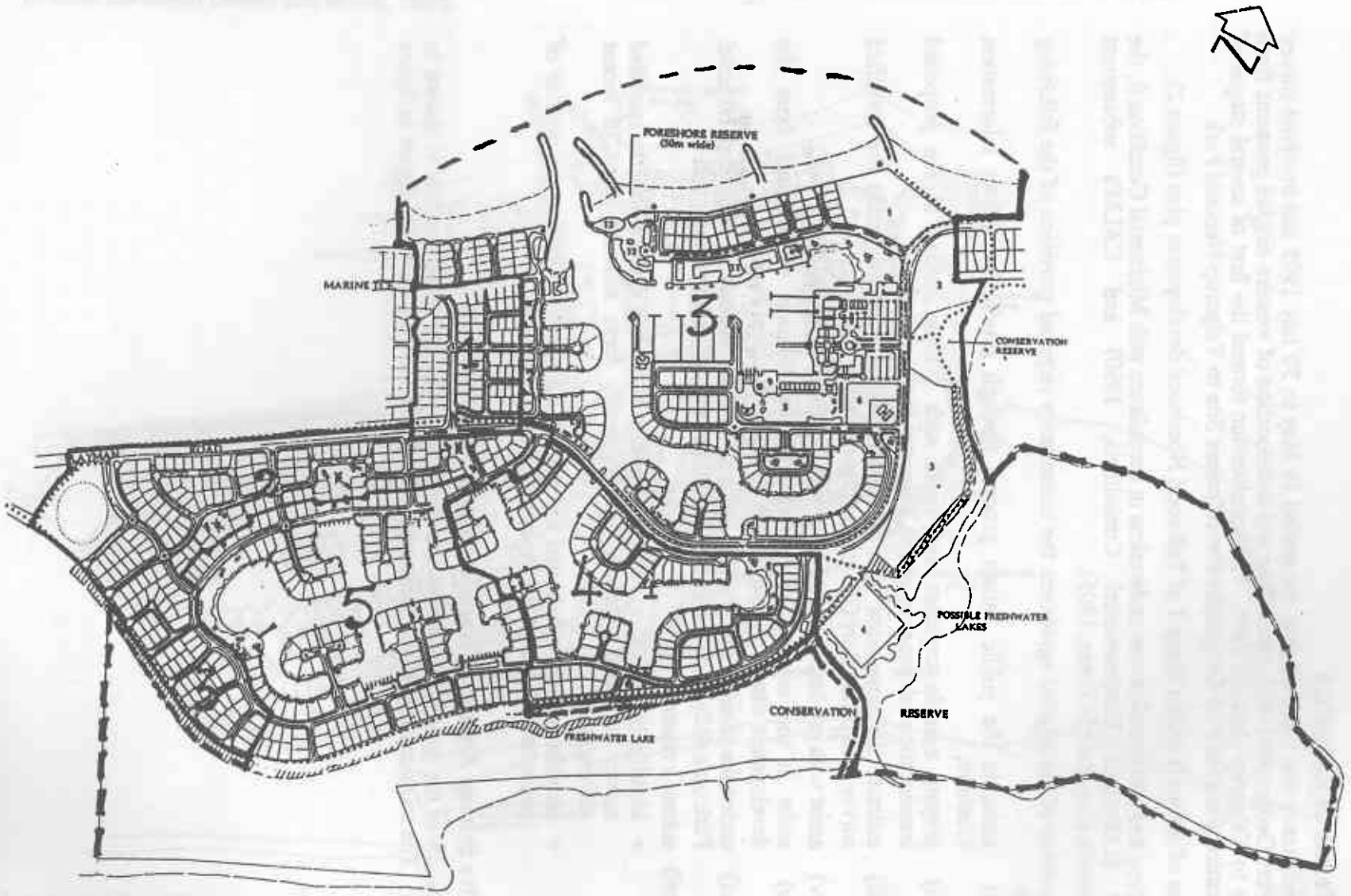


Figure 2: Plan of the Port Geographe Development Site showing stages to be developed sequentially.

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Figure 3: Survey area, Port Geographe Development Site 10 May - 30 July


N
survey area
Survey area specified
in consultancy agreement
0 50 100 150 200 km

Figure 4: **Translocation release sites, Yalgorup National Park.**

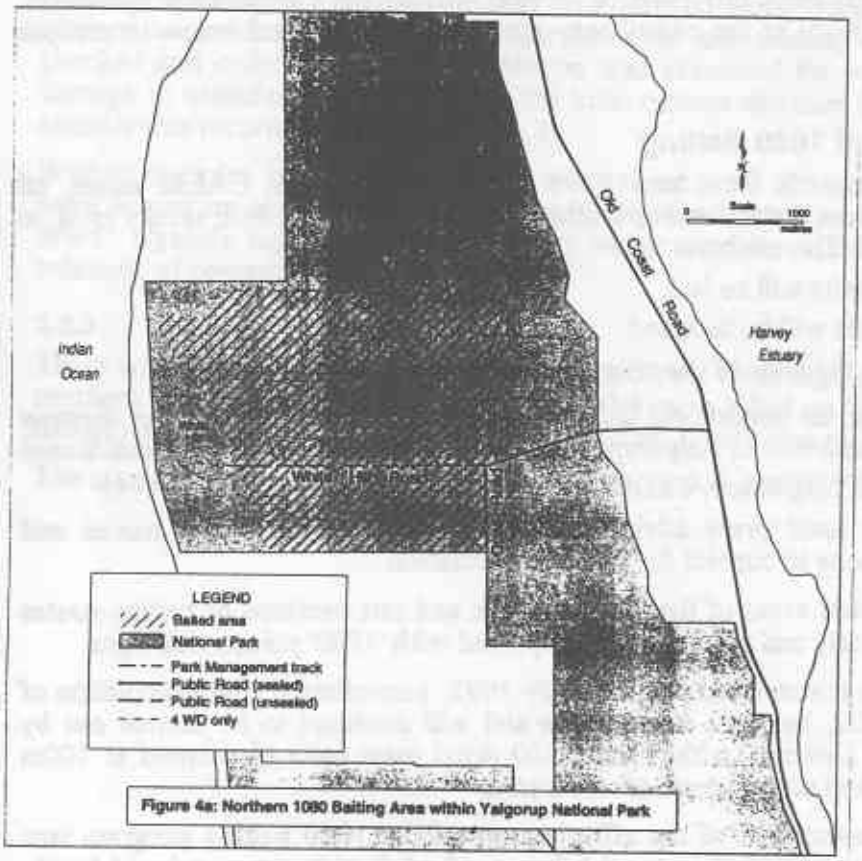
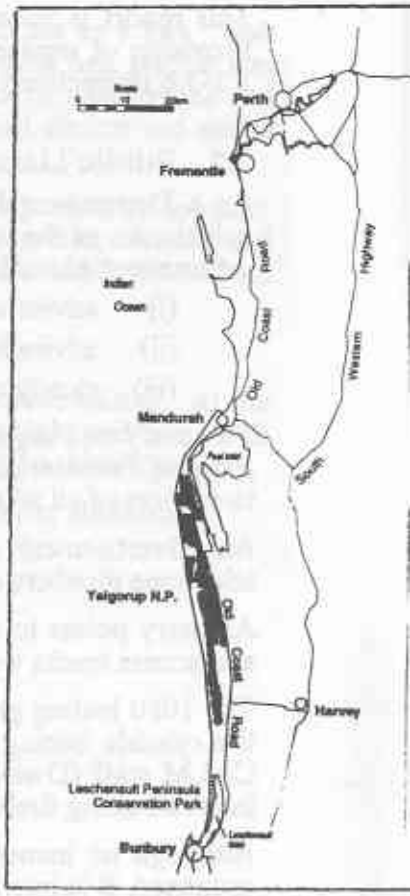


Figure 4a: Northern 1080 Baiting Area within Yalgorup National Park



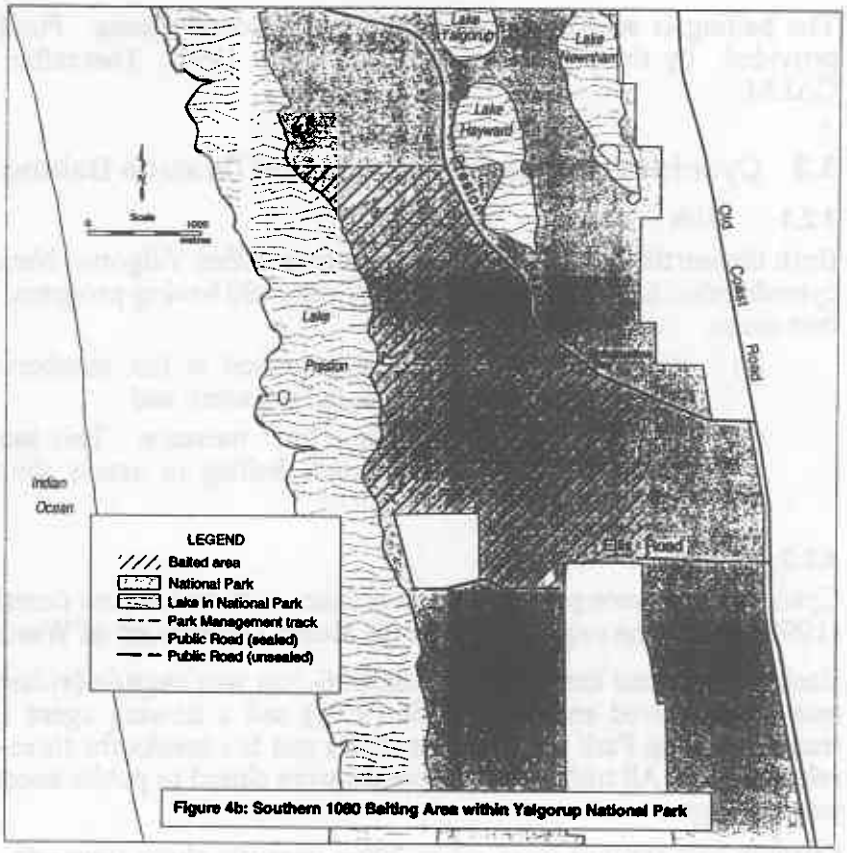


Figure 4b: Southern 1080 Baiting Area within Yalgorup National Park

3 SERVICES PROVIDED

This report is submitted to meet provision of service (vii) of the consultancy agreement. Provision of services in (i)-(vi) of the consultancy agreement are detailed below in sections 3.1-3.6 respectively.

3.1 Public Liaison and 1080 Baiting

As a Departmental prerequisite for a new '1080' baiting program on CALM estate, all neighbours of the baited area are to receive written notification at least two weeks prior to commencement of baiting. This notice is to:

(i) advise where baits will be laid;

(ii) advise how baits will be laid; and

(iii) clearly explain the aims of the program (de Tores, 1994).

To satisfy this requirement, an educational brochure entitled *"Conservation of the Western Ringtail Possum: Re-introduction at Yalgorup National Park"* was produced and distributed to owners of all adjacent properties. A copy of the brochure is appended (Appendix 1).

An advertisement in the local press advised of the program and supplied names and telephone numbers of persons to contact for further information.

All entry points to the baited areas of the National Park and intersections of baiting routes and access tracks were clearly and permanently signposted with '1080' poison risk signs.

The 1080 baiting program commenced on the 6 July 1995, immediately after completion of the cyanide baiting (see 3.2, below). Baiting was and will continue to be carried out by CALM staff (Dwellingup District), with 4.5mg 1080 dried meat baits distributed at 100m intervals along firebreaks and management access tracks.

Although no immediate assessment of the effectiveness of the 1080 baiting program was proposed, it is interesting to note that on the 8 July a dead adult male cat was found beside the access track to the southern release site.

The baiting is scheduled to continue on a monthly basis. Funding for 1080 baits will be provided by the proponent until September 1996. Thereafter baiting will be funded by CALM.

3.2 Cyanide Capsule Preparation and Cyanide Baiting at Release Sites

3.2.1 Aim

Both the northern and southern release sites within Yalgorup National Park were baited with cyanide prior to the commencement of the 1080 baiting program. This was undertaken with two aims:

(i) to achieve a rapid initial reduction in fox numbers immediately prior to the release of translocated ringtail possums; and

(ii) to derive a "kill per unit effort" measure. This may later be compared with results of subsequent cyanide baiting to assess the effectiveness of the 1080 program.

3.2.2 Method

Cyanide baits were prepared in accordance with techniques described by Algar and Kinnear (1992) and to the requirements of the Health Department of Western Australia.

Each cyanide bait consisted of a sealed 6-7cm wax capsule (either red or white) filled with a mix of powdered sodium cyanide (95%) and a flowing agent (5%). Baits were laid on transects along Park management tracks and fire breaks for three consecutive nights at both release sites. All tracks and fire breaks were closed to public access and posted with cyanide warning signs.

Cyanide bait stations were set at 200m intervals along transects. Thirty one stations were set in the southern release site, 36 in the northern. Each bait station consisted of two cyanide capsules (1 red, 1 white) secured to the ground with nylon coated steel fishing trace.

Red capsules were coated with a pureed liver mix, white with condensed milk (see photographs 1 and 2).

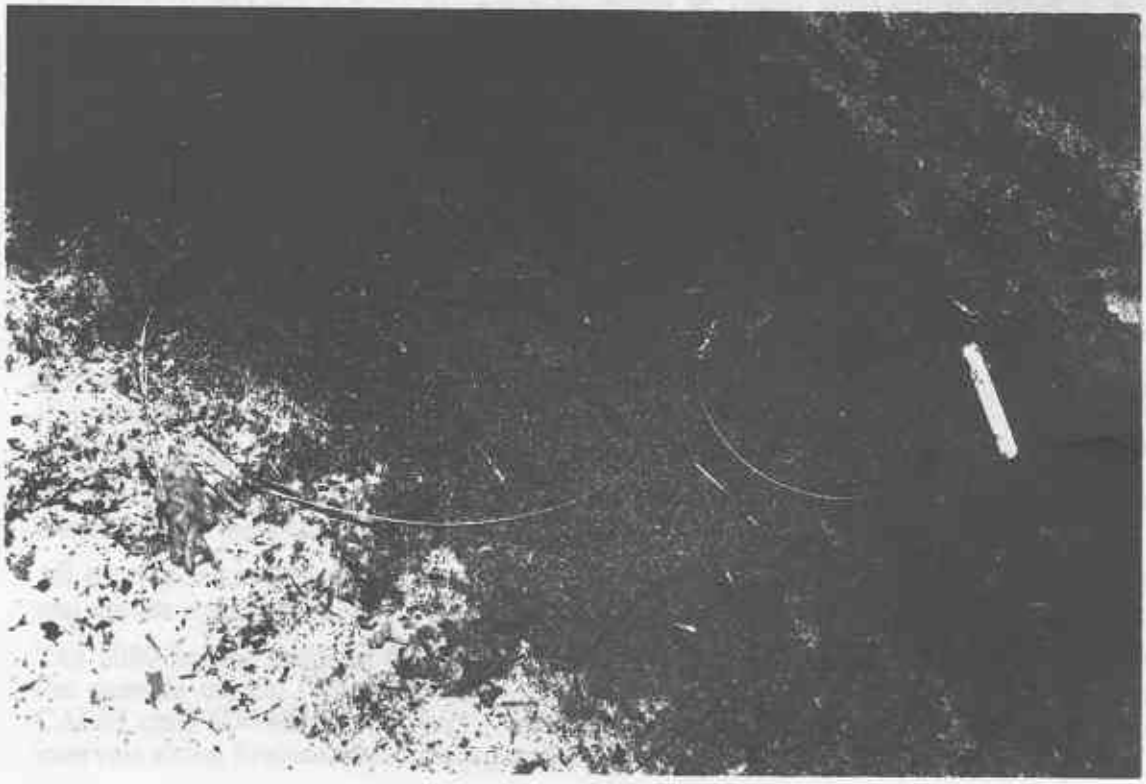
At dusk each day, a kangaroo carcass was dragged along transects to act as a lure. Bait stations were set at the same time. At dawn, or immediately after, each bait station was checked and collected. Each bait station was examined for evidence of interference and damage to capsules. The number of fox kills, carcass distance from bait station and sex of animals was recorded (see photograph 3).

Broken capsules and cyanide powder, neutralised with 1% sodium hypochlorite solution, were buried on site. Undamaged capsules were collected, soaked in water, cleaned and dried. Cyanide capsules contaminated by water were discarded. Those which showed no evidence of contamination were reused.

3.2.3 Results

There was no kills at the southern release site during three nights of cyanide baiting. At the northern release site 2 foxes (1 male, 1 female) were killed on the first night and two (both female) were killed on the second night of baiting. There was no kill on the third night.

The number of foxes removed is too low to derive a meaningful index to fox abundance.



Photograph 1: A bait station with cyanide-filled capsules, Yalgorup National Park, June 1995.

Photograph 2: Close-up view of cyanide capsule coated with pureed liver lure and attached wire trace, Yalgorup National Park, June 1995

Photograph 3: Fox kill during cyanide baiting, Yalgorup National Park, June 1995. The bait station is shown in the foreground. The fox carcass was 9m from the bait station

3.3 THE PORT GEOGRAPHE SURVEY

3.3.1 Vegetation

Peppermint, *Agonis flexuosa*, is the dominant overstorey species at the Port Geographe Development Site and within the survey area. The density of trees and tree form varies within the site. Understorey vegetation ranges from a dense shrub layer with a proliferation of creepers (*Cassytha racemosa* and *Hardenbergia comptoniana*) to a grassy understorey with scattered shrubs and open grassed areas. The most abundant shrub species are *Acacia littorea* and *Spyridium globulosum*. Other species include *Acacia cochlearis*, *Santalum acuminatum*, *Alyxia buxifolia*, *Hibbertia cuneiformis*, *Adriana quadripartita*, *Olearia axillaris*, *Acanthocarpus preissii*, *Rhagodia baccata* and *Eremophila glabra*. The sedge, *Lepidosperma gladiatum*, and arum lily, *Zantedeschia aethiopica*, are common in shaded areas beneath peppermints and in sheltered depressions. The area shows considerable disturbance as a result of human activity.

Figure 5 shows the vegetation classified on the basis of tree form, vegetation structure and composition. The following units were identified:

1. Old mature peppermints (8 to 14m) with thick dark gnarled branches and spreading umbrageous crowns, scattered to more dense shrub layer of *A. littorea* and *S. globulosum* to 2m and a grassy understorey. The canopy is continuous (photographs 4 & 5).
2. Stands of tall mature peppermints (to 15m) with a continuous canopy, *A. littorea* and *S. globulosum* open shrubland (to 2m) and an understorey of *L. gladiatum* and *Z. aethiopica*. Broken in places by open grassy corridors (photographs 6, 7 & 8).
3. Scattered medium height and tall mature peppermints (5 to 15m) surrounded by open grassed areas. Limited canopy connections (photograph 9).
4. A medium height peppermint overstorey (5 to 8m) surrounded by dense low vegetation (to 2m) of *A. littorea* and *S. globulosum*, *L. gladiatum* and *Z. aethiopica* covered with *C. racemosa* and *H. comptoniana*. Variable canopy connections (photographs 10 & 11).
5. Medium height peppermints (5 to 8m) with mallee habit, characterised by slender trunks and a fairly continuous canopy of bright green growth, with scattered shrubs of *A. littorea* and *S. globulosum* to 2m over grassland (photographs 12 & 13).
6. Scattered low to medium height peppermints (less than 8m) over mixed shrubland or dense shrubland of *A. littorea*, *A. cochlearis*, *S. globulosum* and *Santalum acuminatum* to 2m. Variable canopy connections (photograph 14).
7. Dense shrubland of *A. littorea* (to 2m).

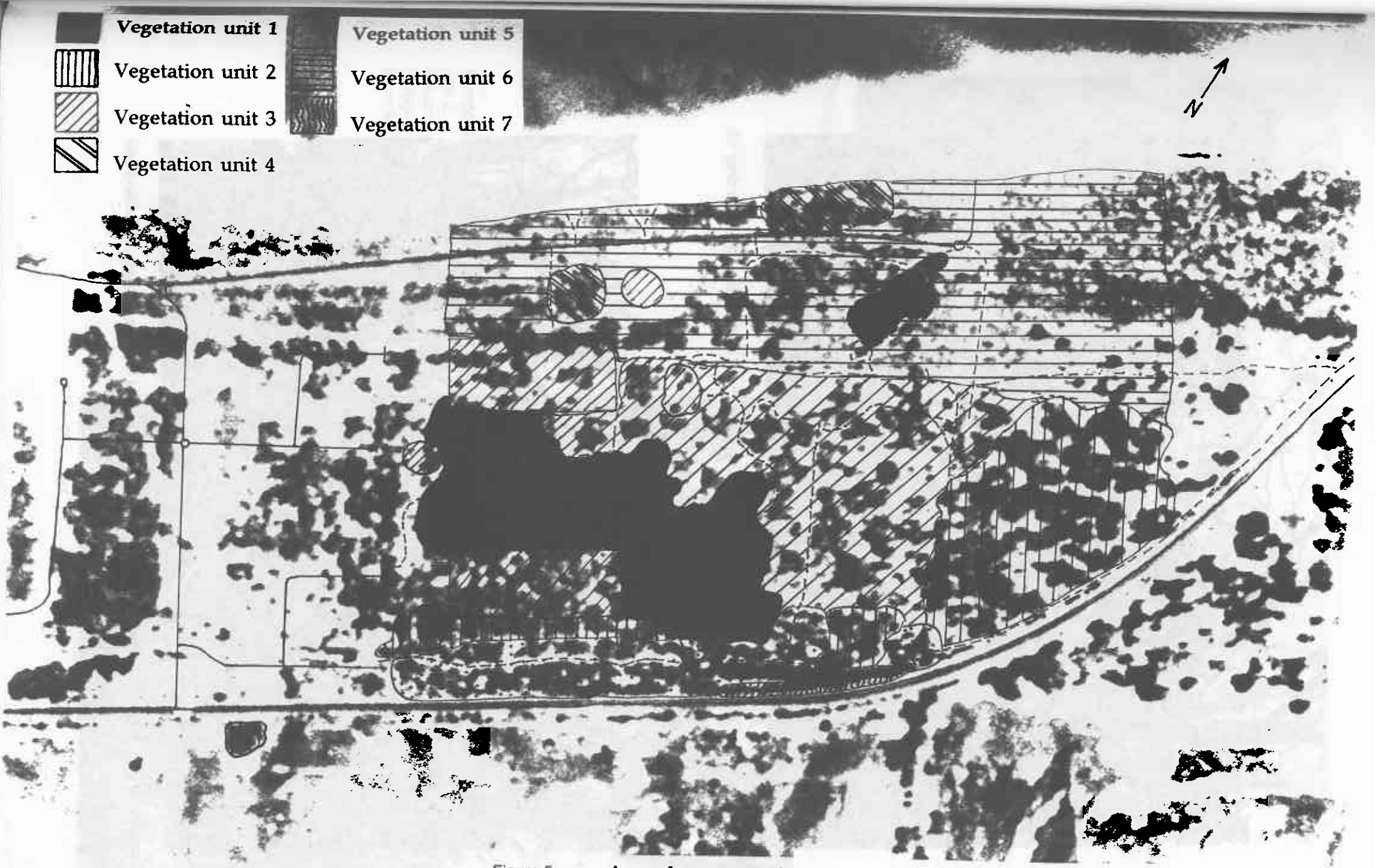


Figure 5: Areas of seven vegetation units identified within the Port Geographe survey area.

Photograph 4: Example of vegetation unit 1: a mature peppermint, *Agonis flexuosa*, near drey 13.

Photograph 5: Example of vegetation unit 1: mature peppermint, *Agonis flexuosa*, woodland with shrub, *S. globulosum*, understorey, near drey 13.

Photograph 6: Example of vegetation unit 2: with open grassy corridor, near drey 51.

Photograph 7: Example of vegetation unit 2: a stand of tall peppermint, *Agonis flexuosa*, with shrub, *Acacia littorea*, (foreground), sedge, *L. gladiatum*, and arum lily, *Z. aethiopica*.

Photograph 8: Example of vegetation unit 2, showing dense understorey: dense stand of *Acacia littorea* shrubs in centre background, near drey 81.

Photograph 9: Example of vegetation unit 3, near drey 37.

Photograph 10: Example of vegetation unit 4: view looking down into dense growth behind foredune, near drey 76.

Photograph 11: Example of vegetation unit 4: showing proliferation of creepers, *Hardenbergia comptoniana* (left foreground) and *Cassytha racemosa* (left background), near drey 69.

Photograph 12: Example of vegetation unit 5: showing mallee habit of peppermint, *Agonis flexuosa*, near drey 3.

Photograph 13: Example of vegetation unit 5: showing canopy linkages, near drey 69.

Photograph 14: Example of vegetation unit 6, near drey 58.

3.3.2 Western Ringtail Possum Survey

3.3.2.1 Aim

Diurnal surveys of dreys and nocturnal spotlight surveys were conducted in order to estimate the number of possums utilising the survey area, establish which dreys were being used and identify the areas of most possum activity.

3.3.2.2 Method

During daylight the peppermint canopy and lower vegetation in the survey area was visually searched for dreys. All possible dreys were recorded and flagged, even those likely to be abandoned dreys or bird nests.

Dreys were classified into one of four types:

1. Dense, well-made ball or slightly elongate form with a distinct entrance hole (photograph 15). In this type of drey the possum is completely enclosed.
2. Dense, well-made cup-shape nest with some material overtop, but not fully enclosed. A form intermediate between types (1) and (3) (photographs 16 & 17).
3. Dense, well-made cup-shape nest open at the top (photographs 18). The possum sits deep in the cup of the drey and may not be visible from the ground.
4. Platform of twigs, often in a tree or branch fork, with no more than a shallow depression where the possum rests.

The following information was recorded for each potential drey:

(i) the vegetation species in which the drey was located;
(ii) the height of the vegetation in which the drey was located;
(iii) vegetation type (using the classifications described above);
(iv) the number of other trees or shrubs to which the canopy was directly connected;
(v) the height of the drey from the ground;
(vi) classification of the drey into one of the four types;
(vii) comments on the condition of the drey; and
(viii) the presence of possum(s).

Spotlighting surveys were conducted on 26 and 27 May, 3 and 4 June, 6, 8, 13 and 15 July using headtorches, 50W portable spotlights (powered by large 12V wet cell batteries) and by spotlighting from a vehicle. Locations of spotlight sightings were flagged and mapped. When possible, sighted ringtails were sexed.

Photograph 15: Drey type 1: dense, well-made ball shaped drey.

Photograph 16: Drey type 2: view of drey 76.

Photograph 17: Drey type 2: close-up view of drey 76, dense, well-made deep cup-shaped drey with some material overtop. This drey was damaged during the capture of ringtail F001.

Photograph 18: Drey type 3: shallow cup shaped depression on a platform in a fork of *Acacia littorea*, drey 19.

3.3.2.3 Results

A total of 83 possible dreys was recorded, 80 of which were within the survey area (figure 6). An additional three dreys (nos. 83, 84 and 85) were recorded outside but adjacent to the survey area. Details are given in appendix 2.

Twenty-two of the 83 structures were identified as possible bird nests because of the small size and neat construction. Several potential dreys were very large, shallow and made of very coarse sticks (e.g. nos. 41, 42, 84). These were thought to be raptor nests.

Of the remaining 61 dreys, 7 were situated in *Acacia littorea* shrubs, but most were located in peppermint. All dreys were constructed from light twigs and sticks and often lined with peppermint leaves. In dense vegetation of unit 4, where the twining perennial *Cassytha racemosa* occurs, several dreys were largely supported by the vine.

The highest density of dreys occurred in a pocket of dense vegetation (unit 4) in the sheltered interdunal depression behind the primary beach dune. At least two possums were using this area on 27 May, but on 4 July several dreys (nos. 66, 67, 69, 70) had been disturbed or destroyed and vegetation showed evidence of human interference.

Of the 61 dreys, 41 were described as being in good condition, 9 were deteriorating and 9 were in poor condition or remnant. Two dreys were freshly re-constructed during the survey period. Drey 9 was initially recorded as an abandoned drey remnant, but was found to be a large well-made type 3 drey on the 4 July. Similarly, drey 64 appeared to be abandoned, but a much larger structure of fresh peppermint leaves was found in its place on 5 July.

Twenty-seven dreys were of the shallow platform type (type 4). There were 6, 5 and 13 dreys of types 1, 2 and 3, respectively. Ten dreys could not be classified by type because they were difficult to view clearly through the canopy.

Most of the dreys (45 of 61) were in trees or shrubs with canopy linkages to 3 or more adjacent trees or shrubs. Nine dreys were in isolated trees or shrubs. Two dreys had single canopy linkages and 5 were directly connected to two other trees or shrubs (appendix 2).

Possums were observed in or emerging from 10 of the 61 dreys during diurnal searches or spotlighting. All of the dreys in use appeared to be in good condition.

Sightings (both diurnal and nocturnal) suggested that vegetation types 2, 4 and 5 were most frequently used. Locations of sightings are shown in figure 6.

Initial surveys (prior to 5 June) suggested between 9 and 15 ringtails were using the survey area. In the subsequent capture process (see section 3.5), 10 ringtails were caught within the survey area. At the conclusion of the consultancy period, the survey and capture data combined suggested that between 10 and 15 ringtails were using the survey area.

3.4 Pre-baiting Fauna Survey at Translocation Release Sites

3.4.1 Aim

Anecdotal accounts and ad hoc surveys have been unable to confirm the presence of ringtail possums within Yalgorup National Park (P. de Tores, pers com.; S. Dutton, pers com.).

A limited pre-baiting fauna survey (wire cage trapping and spotlighting) was undertaken at both release sites within the Park. The survey was conducted to:

- assess whether populations of *P. occidentalis* occur within the Park;
- assess whether other medium size mammals are present at the proposed translocation release sites; and
- determine the presence and estimate the population size of brushtail possums, *T. vulpecula*.

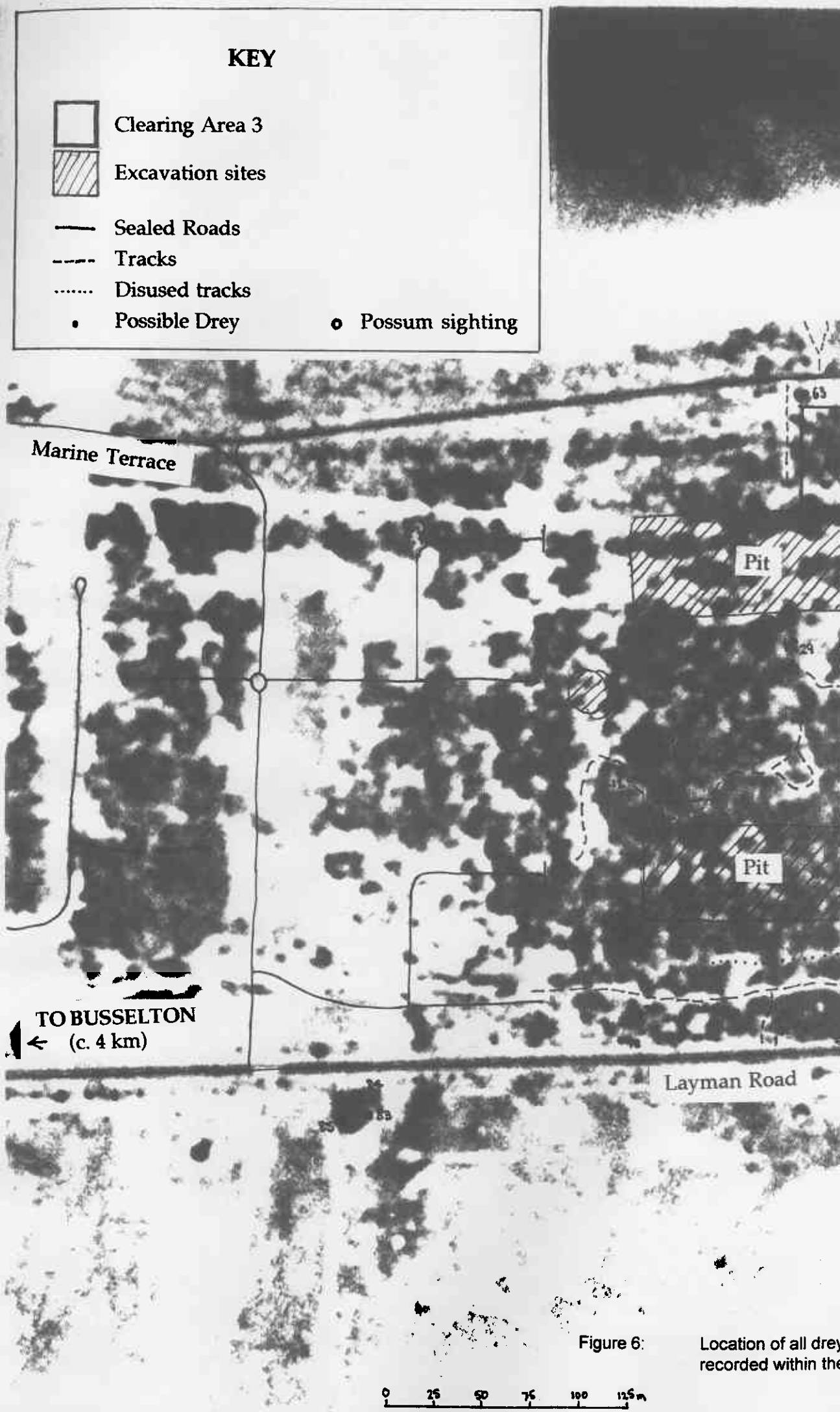
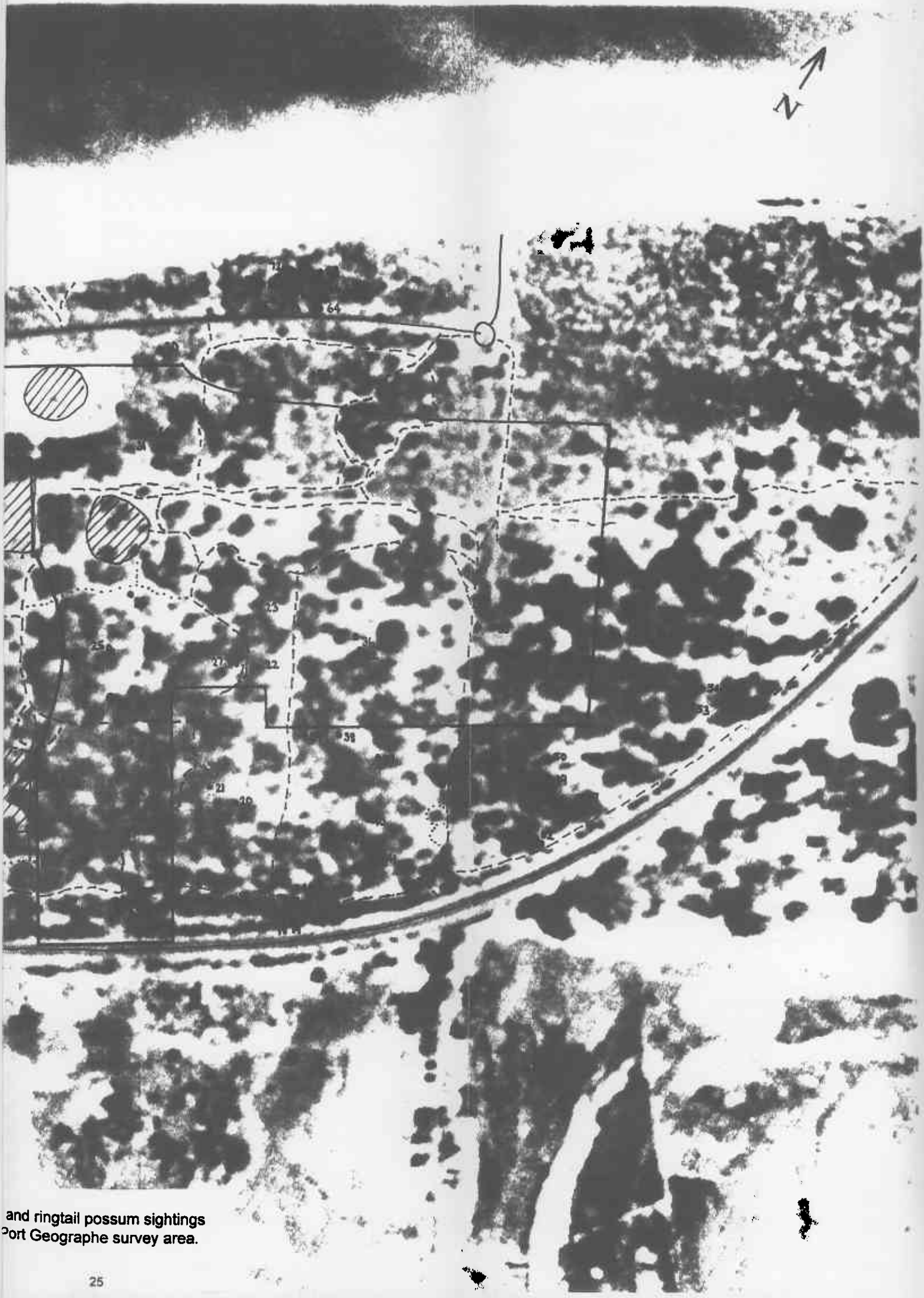


Figure 6: Location of all drey recorded within the



and ringtail possum sightings
Port Geographe survey area.

3.4.2 Method

Wire cage traps baited with rolled oats, honey and peanut butter were set at 50m intervals along transects. Fourteen traps were set at the northern site and 50 traps at the southern. Trapping was conducted over a period of 4 nights. The southern release site was saturated with 20 traps for an additional 4 nights after translocation commenced.

Prior to commencement of baiting, vehicle driven spotlight transects were carried out over 4 consecutive nights along Park management tracks at the southern release site. Walked transects (using hand held portable 50W spotlights and head torches) were carried out over 4 consecutive nights at the northern release site (P. de Tores, pers. com.). Opportunistic spotlighting (vehicle driven and on foot at the southern release site and on foot at the northern release site) was also carried out at both sites prior to commencement of baiting (P. de Tores, pers. com.).

3.4.3 Results

Only one animal (a male brushtail possum) was captured during the trapping period. The brushtail possum was captured at the southern release site, processed, fitted with an AVM whip aerial mortality collar and released.

During spotlighting, 2 brushtail possums were recorded from the southern release site and ringtail possums were not recorded from either site (P. de Tores, pers. com.).

The results are consistent with previous reports of low abundance of *T. vulpecula* and indicate the absence of *P. occidentalis* at both translocation release sites.

3.5 Capture at Port Geographe, Processing and Release at Yalgorup National Park

3.5.1 Methods

Three primary methods were used to capture possums for translocation:

(1) Drey Robbing: During the day, possums close to the ground or in sturdy vegetation could be "plucked" from dreys with minimal effort and little distress to the animal.

(2) Shepherding: If a possum was flushed from its drey during a capture attempt, it was "shepherded" (using a long, segmented aluminium pole with a shepherd's crook) to lower, thinner branches or to branches at the edge of a clearing. These branches were then bent to or near the ground and the possum captured either from the ground or "plucked" from the lowered foliage. This technique required the most effort and appeared to cause the most distress to the animal.

(3) Darting: At night, possums were caught through the use of a tranquilizing dartgun (Montech II, using a CO_2 pressurised chamber to fire a modified insulin syringe administering Zoletil at an approximate dose 10mg/kg). Darted animals became immobilised within 2-4 minutes, lost grip of the foliage or branch and were caught in a blanket. The technique required least effort from the captors and appeared to result in minimal distress to the animal.

The ringtails were sedated and processed. Each was weighed, sexed, measured (head, head-body, pes, tail), individually marked with an inert Trovan transponder and earpunched sequentially. The reproductive condition of females was assessed and pouch young sexed and measured. Adult animals were collared with AVM loop aerial mortality collars and released at night after recovery from the sedative.

All ringtails caught were released at the southern release site (Preston Beach Road) (figure 4).

3.5.2 Results

On completion of the consultancy a total of 13 ringtails (with 8 surviving pouch young) had been captured. Ten were captured within the survey area, two (F004 and M004) were captured in vegetation near drey nos. 83, 84 and 85 and one (F006) was captured in the

Stage 2 development area which had been previously surveyed and cleared of as many ringtails as possible (figures 2 & 3).

Seven of the ringtails captured were using flagged dreys immediately prior to capture. Darting at night proved to be the most successful method and resulted in capture of 9 animals. Three ringtails were caught by shepherding and only 1 ringtail was caught in its drey (table 1).

Of the 10 ringtails captured within the survey area, 5 were found in vegetation of unit 5 (F002, F003, F007, F009 and M003) and 1 each in unit 1 (F008), unit 2 (M001), unit 4 (F001), unit 6 (F005) and unit 7 (M002) prior to capture. The two ringtails (F004, M004) captured in an adjacent area were in a stand of peppermint of vegetation unit 2.

Capture locations are shown in figure 7.

Subsequent spotlight surveys indicated that at least two and possibly as many as five animals remain to be removed from the survey area.

Table 1: Summary of western ringtail possum, *Pseudocheirus occidentalis*, captures at Port Geographe and translocated to Yalgorup National Park, 2-22 July 1995.

Animal ID	Sex	Weight (g)	Capture Method	Vegetation unit	Drey no.	Nearest drey	Pouch condition	Release date
F001	F	1134	Drey robbing	4	76	76	empty	3 July 95
F002	F	1178	Shepherding	5	4	4	2 naked male young (2cm)	4 July 95
F003	F	1151	Shepherding	5	9	9	1 naked male young (5.5cm)	4 July 95
M001	M	962	Shepherding	2	48	48		5 July 95
F004	F	1162	Dart	2	83	83	2 dead young - deformed	8 July 95
F005	F	817.5	Dart	6		32, 33	1 naked male young (2.5cm)	8 July 95
F006	F	915	Dart			Stage 2	empty	8 July 95
F007	F	1156	Dart	5		77, 78	2 female naked young (5.5cm)	9 July 95
M002	M	1058	Dart	7	19	44		9 July 95
M003	M	523	Dart	5		77, 78		9 July 95
M004	M	1024	Dart	2	85	85		9 July 95
F008	F	806	Dart	1		11	empty, furred	16 July 95
F009	F	876	Dart	5			2 naked young (1-2cm)	22 July 95

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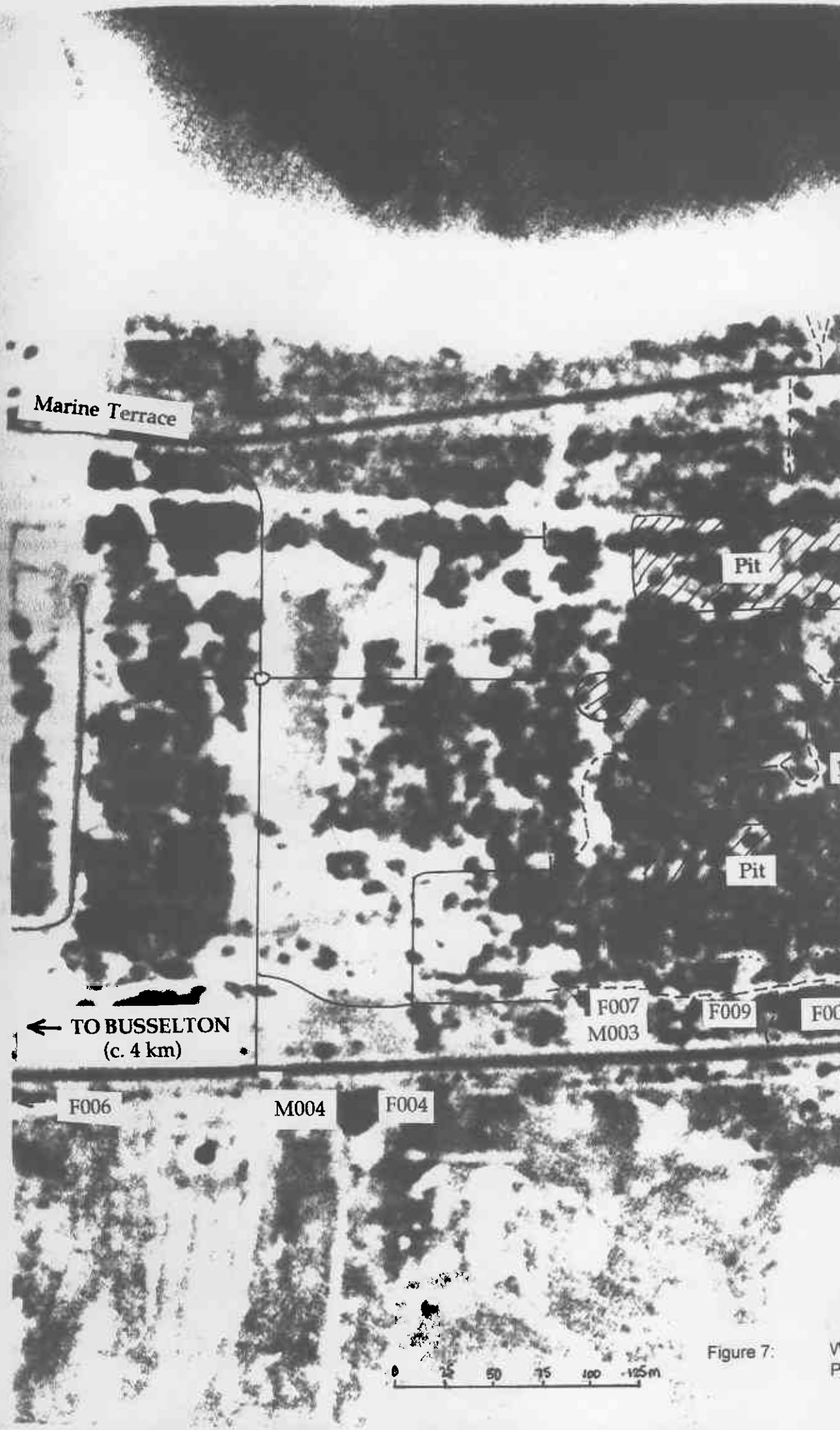
Marine Terrace
Pit
Pit
F007
M003
F009
F00
← TO BUSSELTON
(c. 4 km)
F006
M004
F004
0
25
50
75
100
125m

Figure 7: W
P

tern ringtail possum capture sites within the Geographe survey area from 2 - 22 July 1995.

3.6 Monitoring

Monitoring of radio collared released animals up until 30 July 1995 indicated that all translocated adult ringtails were alive from 8 to 27 days after their release. M003, the dependent young of F007, was not collared and has been sighted only once since his release.

F004 moved the greatest distance from the release site - almost 200m -and appeared to be using a diurnal rest site in a *Banksia littoralis*. The other translocated ringtails moved lesser distances. Several appeared to be using diurnal rest sites in tuart, *Eucalyptus gomphocephala*, banksia, *B. littoralis* and *B. attenuata*, paperbark, *Melaleuca rhaphiophylla*, and jarrah, *E. marginata*.

Approximately 50% of recorded day locations were in exposed or partially exposed positions.

There was evidence of drey construction. The first drey was recorded on 25 July 1995 and was occupied by male, M002. The drey was in a small fork in the outer foliage at approximately 5m in a 6m banksia. The drey was constructed of dead banksia, dead peppermint and fresh peppermint material.

A second drey was recorded on 29 July 1995 occupied by female, F001. The drey was in a multi-stemmed fork at 2m in a 5m banksia. It was a well constructed, roofed drey of very fresh peppermint and banksia. F001 had been recorded at this location 4 days earlier in an exposed position with no evidence of drey construction.

The use of tree hollows was recorded for 3 animals, (F004, F007 and M001).

Too few night observations were made to assess whether foraging was encompassing areas other than peppermint.

Monitoring of the one radio-collared brushtail possum indicated that the animal moved north-east from the release site. Several days later no signal could be detected, despite extensive searching, indicating that it may have moved from the immediate ringtail release area. Subsequent to this consultancy, the brushtail has been regularly recorded within the release area, close to its original capture site and appears to be using a suite of tree hollows not used by the translocated ringtails. The foraging area overlaps with that of ringtails (M. Crow, pers. com.).

4 CONCLUSION and RECOMMENDATIONS

At the conclusion of this consultancy, it was too early to determine if the translocation had been successful.

The use of newly constructed dreys (e.g. within sixteen days of release for M002) and the use of tree hollows (e.g. within two days of release for M001) indicated that the Preston Beach Road release site offers suitable habitat for construction of dreys and availability of other nest sites.

Jones *et al.* (1994b) reported that in the absence of *Agonis flexuosa*, ringtail diet consisted mainly of the two dominant eucalypt species, marri (*Eucalyptus calophylla*) and jarrah (*E. marginata*). Both of these, other mytaceous species known to be eaten by ringtails (de Tores pers. com.) and peppermint occur at the Preston Beach Road release site.

Continued monitoring is recommended to further assess the suitability of the site and the long term success of the translocation. Radio-telemetry monitoring is recommended to allow data collection on ringtail survivorship, the range of rest sites/dreys/tree hollows used diurnally, the nocturnal foraging areas and the range of diet.

J. Kinnear (pers. com.) and K. Morris (pers. com.) reported dramatic increases in brushtail possum abundance as a result of 1080 baiting. If similar trends develop at Yalgorup, competition for available nest hollows may limit ringtail possum abundance. Jones *et al.* (1994a) reported hollow abundance as a co-variate of ringtail possum abundance.

It is further recommended that brushtail possum abundance and tree hollow use be monitored.

Because of the susceptibility of ringtail possums to predation (P. de Tores, pers. com.; Augee *et al.*, 1996) and because the release site is relatively small and presents the opportunity for re-invasion by foxes, continued 1080 baiting at the current regime is recommended.

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Appendix 1

Conservation of the Western Ringtail Possum: Re-introduction at Yalgorup National Park

Department of Conservation and Land Management

CALM scientists will be implementing a research program designed to assist in the conservation of the western ringtail possum. The program will involve re-introduction of ringtails at sites within Yalgorup National Park. 1080 baiting for fox control will be undertaken. Fox control will also protect other threatened mammals already present in the Park. This brochure provides some information about the project.

Introduction

Since European settlement, Australia has lost 18 mammal species - this is more than the rest of the world combined. Worse still, the extinction risk is still high for many other species - twenty four are listed as rare and endangered.

Australian birds appear to have fared better, except for ground dwelling and ground nesting species such as the ground parrot, bristle birds and the mallee fowl. Similarly, the reptiles have not suffered the same drastic decline as the mammals.

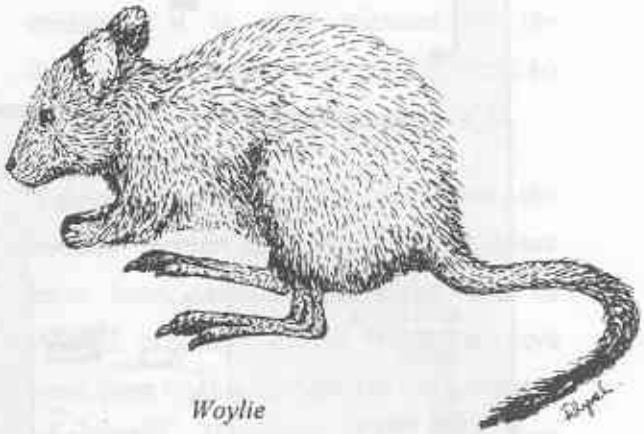
Reasons for Mammal Decline

A question often asked is: Why have so many Australian species, particularly the mammals, fared so badly since European settlement? There is no simple answer because so much has happened to the country and environment in that time. It has generally been assumed that habitat loss has been the major cause. It is argued that too much land has been cleared or too many environmental changes have occurred. It now seems certain that fox predation has also played a major role and that the fox still represents a serious threat to surviving species. The fox probably also affects carnivorous native species, such as the chuditch, through competition for food.

Fox Control: Benefits

Research carried out by CALM scientists during the past 10 years has consistently shown that wherever foxes are controlled, rare and endangered species become more numerous.

A good example is the woylie or brush-tailed bettong which was once common and widespread, but now only survives in a few conservation reserves.



Woylie

On Tutanning Nature Reserve near Pingelly, woylies were once abundant but none had been sighted for more than 10 years. In 1984, before fox control, it took a lot of time and effort to trap a woylie. After five years of fox control it became a relatively easy exercise as woylie numbers had increased 10 times (see Figure 1).

CALM has carried out comparable experiments elsewhere, involving other species, with similar results. To date it has been demonstrated that numbats, rock-wallabies, brushtail possums and tammar wallabies are similarly affected by foxes. Like woylies, these species increased when the fox was controlled. More recently it has been shown that in the jarrah forest, the chuditch will also increase in numbers if foxes are controlled.

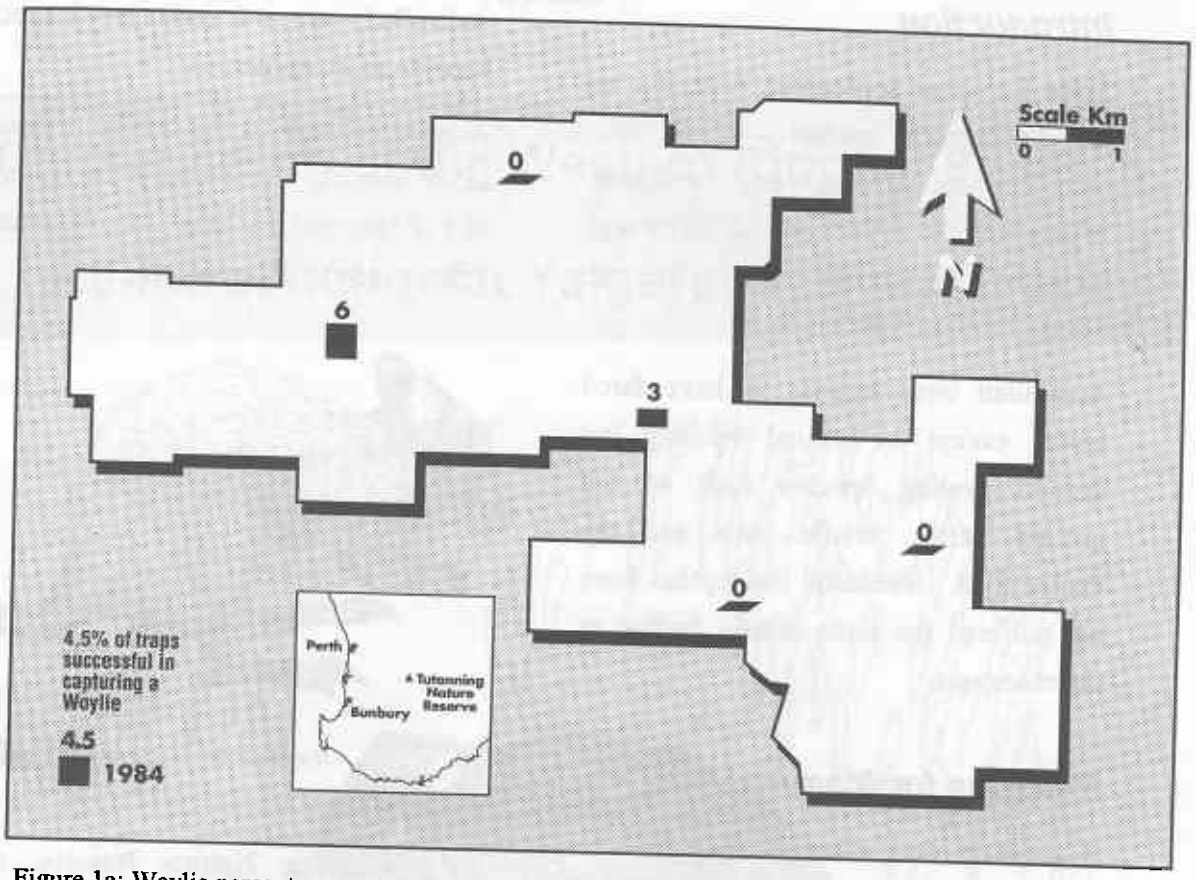


Figure 1a: Woylie percentage capture rate at Tutanning Nature Reserve before fox control was undertaken (Dr Jack Kinnear, CALM).

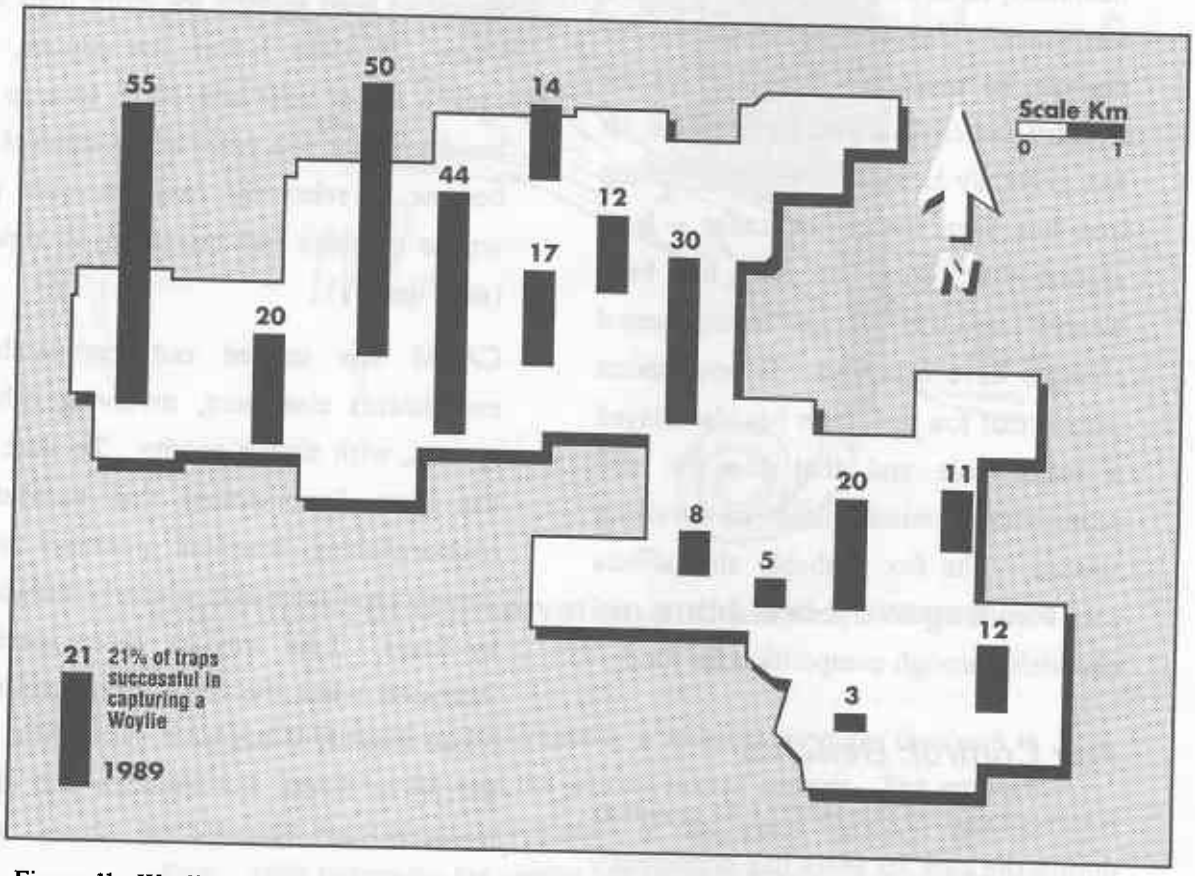


Figure 1b: Woylie percentage capture rate at Tutanning Nature Reserve after 5 years of fox control (Dr Jack Kinnear, CALM).

Decline in Distribution of the Western Ringtail Possum

The current and former distribution of the western ringtail possum is shown in figure 2. Although locally common in a few areas of Western Australia, the ringtail possum has shown a dramatic contraction in its range and is now almost exclusively restricted to coastal peppermint woodland.

The only known occurrences in non-peppermint habitat are at Perup Nature Reserve and surrounding forest blocks near Manjimup.

In 1983 the western ringtail possum was included on the Western Australian list of declared threatened fauna.

Recent research carried out at Leschenault Peninsula Conservation Park, immediately north of Bunbury, has shown that ringtails can be successfully re-introduced to peppermint woodland sites, provided fox control measures are undertaken and maintained.

An important component of management of ringtails is to determine whether the species can be re-introduced into other areas from which it has disappeared in recent times. As part of conservation measures it is now planned to re-introduce the western ringtail possum to Yalgorup National Park (see figure 3).

Yalgorup National Park is within the species former range. Although there have been unconfirmed reportings of ringtail possums in the Park, surveys have been unable to confirm the presence of ringtails. If present in the park, they are at very low numbers.

Successful re-introduction will extend the species range and re-establish the western ringtail possum in habitat from which it has disappeared in recent times.

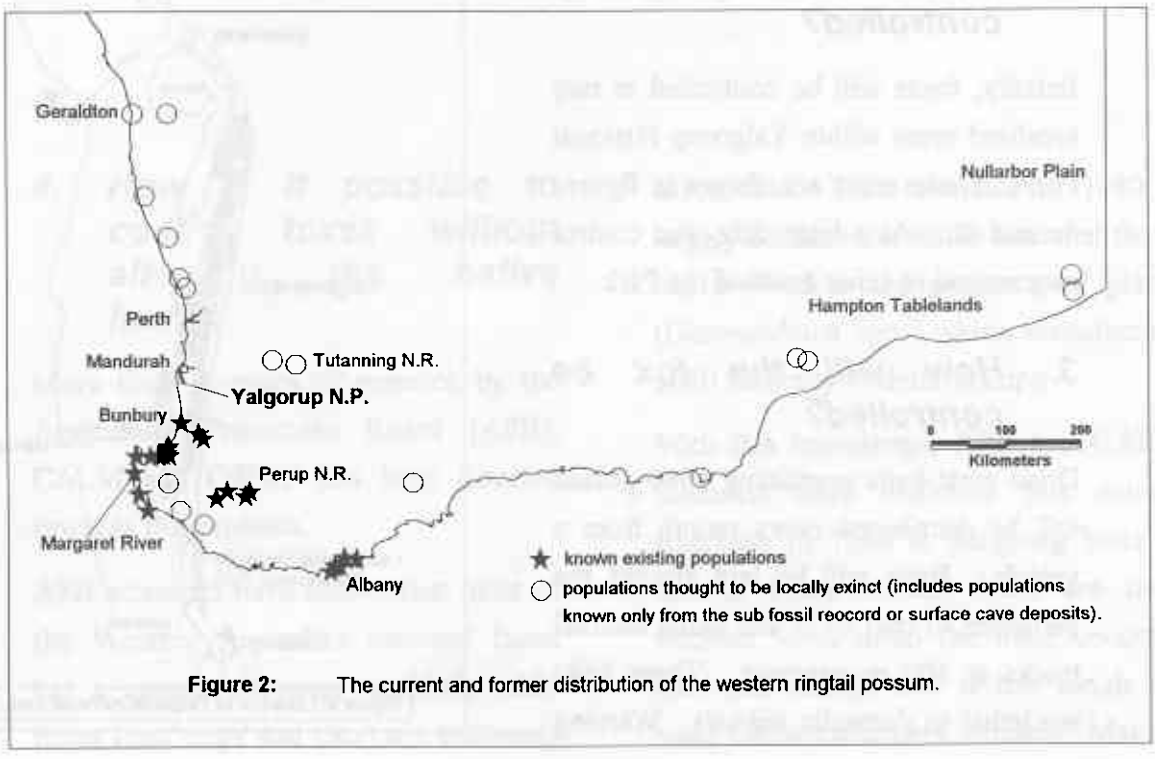


Figure 2: The current and former distribution of the western ringtail possum.

Fox Control Within Yalgorup National Park

Fox control using dried meat baits impregnated with 1080 poison will be distributed regularly within the Park to provide protection for the ringtail possum. This will also protect other native species present, such as the brushtail possum and chuditch. If successful, it may be possible to re-introduce other mammals that once occurred in the area.

Some Questions and Answers about Fox Control and 1080 Baiting at Yalgorup National Park

1. What is the research designed to do?

This project will contribute significantly to the conservation of the western ringtail possum by expanding its present range. It will also provide CALM with information to help in future re-introductions to other parts of Western Australia. The fox control program will increase what is known about the number of species threatened by foxes and help in the planning of fauna management programs elsewhere in the State.

2. Where will foxes be controlled?

Initially, foxes will be controlled in two localised areas within Yalgorup National Park. These areas are shown in figures 4a and 4b. At a later date, fox control may extend to other areas of the Park.

3. How will the fox be controlled?

Dried meat baits containing 1080 poison will be distributed every month from a vehicle. Baits will be laid around the perimeter of two areas and along internal tracks at 100 m spacings. These baits are lethal to domestic animals. Warning signs will be placed on all access routes into the Park. Baiting will be commencing in June 1995.

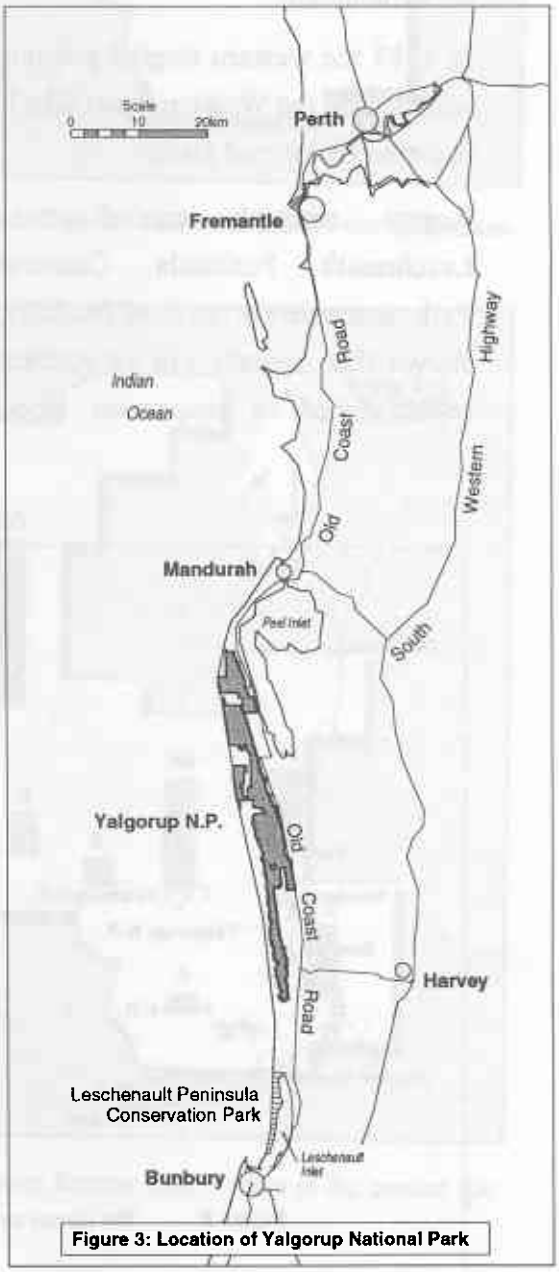


Figure 3: Location of Yalgorup National Park

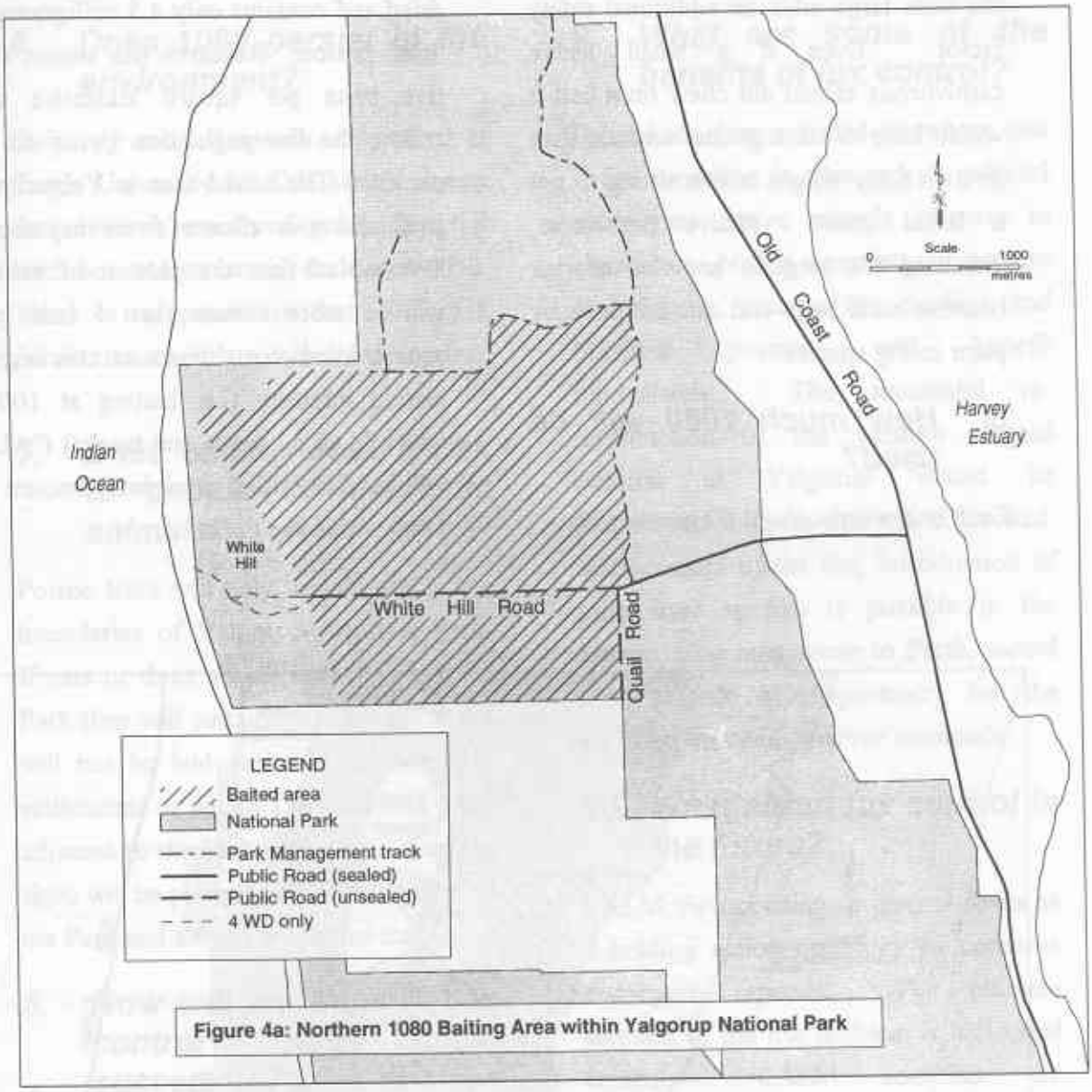


Figure 4a: Northern 1080 Baiting Area within Yalgorup National Park

4. How is it possible to control foxes without affecting the native fauna?

More than 15 years of research by the Agriculture Protection Board (APB), CALM and CSIRO has been directed towards this problem.

APB scientists have shown that most of the Western Australian mammal fauna has a natural tolerance to 1080, while foxes (and dogs and cats) are extremely susceptible. This tolerance to 1080 is largely because the native mammal fauna has evolved in the presence of plants (*Gastrolobium* spp.) which manufacture 1080 naturally to deter grazing.

With this knowledge, APB and CALM scientists have exploited this natural tolerance to 1080 in designing baits to control foxes. Meat baits are used because when dried the meat becomes hard and stringy and is too tough for small native carnivores to chew. Making

the baits large adds an additional safety factor. Even if a small native carnivorous animal did chew on a bait it would have to eat a greater amount than its own body weight in one sitting to get a lethal dose! Native herbivores, including the ringtail, are not at risk because meat baits will not be eaten by plant eating species.

5. How much 1080 will be used?

Each bait weighs about 60 grams when dried and contains only 4.5 milligrams of 1080 poison. Research has shown that five baits per square kilometre can reduce the fox population by up to 80 per cent. The baited area at Yalgorup is small and re-invasion of foxes may occur. Because of this, the pattern of baiting will be more intense than 5 baits per square kilometre. Even at this higher baiting intensity (i.e. baiting at 100 m intervals along roads and tracks) CALM will be distributing a minimal amount of 1080 within the Park.

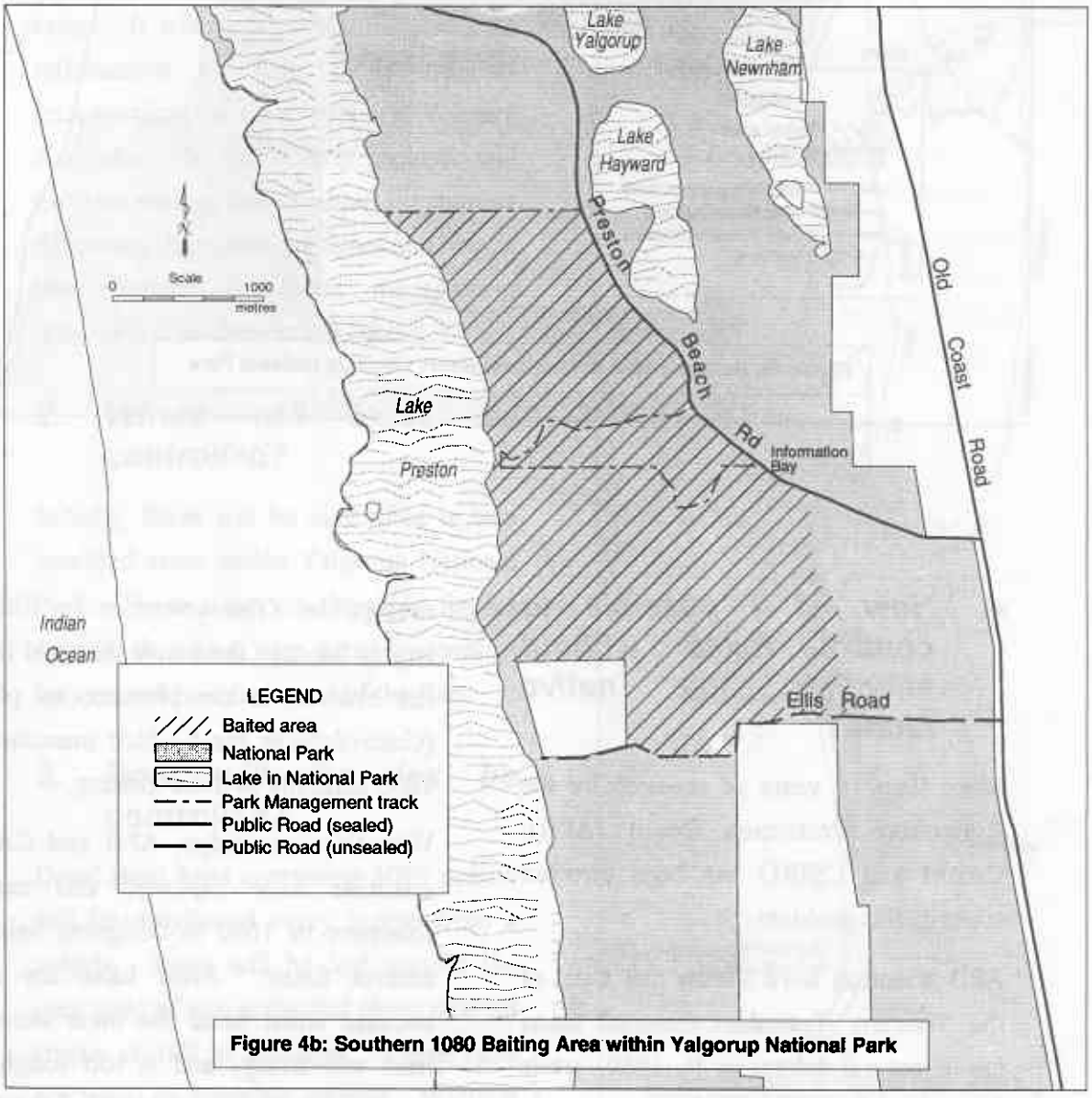


Figure 4b: Southern 1080 Baiting Area within Yalgorup National Park

6. Does 1080 persist in the environment?

Definitely not. Research undertaken at Curtin University for CALM has shown that 1080 is rapidly degraded by soil microbes and moisture, such as rainfall. There is no possibility that 1080 will persist or accumulate in the environment.

7. Does baiting pose a risk to people or domestic animals?

Poison baits will only be laid within the boundaries of Yalgorup National Park. If cats or dogs are allowed to enter the Park they will certainly be at risk. Baits will not be laid within 1 kilometre of settlements or within 150 metres of gates adjacent to the Park boundary. Warning signs will be placed at all access points to the Park and along the internal tracks.

8. How will we know if fox control has been successful?

Fox abundance will be estimated by track counts and/or transects before the baiting commences. The abundance of native animals will also be determined. This will continue after fox baiting has commenced. After the release at Yalgorup, western ringtail possums will be closely monitored using radio-tracking techniques.

The fox baiting technique to be employed at Yalgorup has also been trialed successfully at several sites in Western Australia.

9. What are some of the benefits of fox control?

It has been demonstrated elsewhere that if fox predation is removed or reduced many rare native animals increase in abundance. Native mammals still present at Yalgorup, such as the chuditch and brushtail possum, will benefit immediately. The successful re-introduction of the western ringtail possum at Yalgorup would be jeopardised if foxes are not controlled. With control of the fox, introduction of other rare species is possible in the future. This area, close to Perth, would then provide an opportunity for the public to see unique native mammals.

10. What about fox control in the future?

CALM views baiting to control foxes as a holding action necessary to conserve endangered species. The ultimate solution to the fox problem is biological control. CALM scientists are participating as members of the Cooperative Research Centre for Vertebrate Biocontrol in a national effort to achieve this solution.

Further Information

For further information please contact:

Paul de Tores
CALM Wildlife Research Centre
Telephone: (09) 405 5100

or

Steve Dutton
Ranger-in-Charge
Yalgorup National Park
Telephone: (097) 391 067

Appendix 2: Summary of drey survey data

Drey	Tree Species	Tree Height (m)	Vegetation Type	Canopy Linkages	Drey Type	Height of Drey (m)	Drey condition	Possum Present	Comments
1	*Agonis flexuosa*	7	5	3+	2	6	good		
2	*Agonis flexuosa*	5	5	3+		5	good		
3	*Agonis flexuosa*	8	5	3+		5	deteriorating		
4	*Acacia littorea*	2.5	5	3+	3	2	good	1 x adult	24/05/95, 26/05/95, 4/06/95
5	*Agonis flexuosa*	8	5	3+	4	7	good		
6	*Agonis flexuosa*	5	5	3+	3	4	good		
7	*Agonis flexuosa*	5	5	2		4	deteriorating		
8	*Agonis flexuosa*	5	5	3+	3	5	good	1 x adult, 1 x juv	24/05/95
9	*Agonis flexuosa*	8	5	3+	3	7	fresh	1 x adult	4/07/95
10	*Agonis flexuosa*	11	2	3+	4	8	poor		
11	*Agonis flexuosa*	5	5	3+	4	3	good		
12	*Agonis flexuosa*	7	1	3+		4	deteriorating		bird nest
13	*Agonis flexuosa*	12	1	3+		1.5	good		bird nest
14	*Agonis flexuosa*	8	5	3+	3	7	deteriorating		
15	*Agonis flexuosa*	5	5	0	4	4	deteriorating		
16	*Agonis flexuosa*	8	5	3+		4	deteriorating		
17	*Agonis flexuosa*	7	5	2	4	3	deteriorating		
18	*Acacia littorea*	2	7	3+	4	1.5	deteriorating		
19	*Acacia littorea*	2	7	3+	3	2.5	good	1 x adult, 1 x juv	25/05/1995, 26/5/95
20	*Agonis flexuosa*	9	3	2		5	deteriorating		bird nest
21	*Agonis flexuosa*	11	3	2	4	8	deteriorating		bird nest
22	*Agonis flexuosa*	7	3	2		3	good		
23	*Agonis flexuosa*	9	3	2	2		good		bird nest
24	*Acacia littorea*	2.5	1	1	4	2	good	1 x adult	25/05/95
25	*Agonis flexuosa*	12	1	3+	4	11	good		
25a	*Agonis flexuosa*	12	1	3+		2.5	good		
26	*Agonis flexuosa*	7	3	0		4	poor		
27	*Agonis flexuosa*	7	3	0	4	lower	poor		
28	*Agonis flexuosa*	7	3	0	4	upper	good		
29	*Agonis flexuosa*	7	3	0	4	6.5	good		bird nest
30	*Agonis flexuosa*	4	6	0		2	poor		
31	*Agonis flexuosa*	7	6	3+	2	4	good		bird nest
32	*Agonis flexuosa*	8	6	3+	2	2	good		
33	*Agonis flexuosa*	8	6	3+		3	good		
34	*Agonis flexuosa*	8	3	3+		5	good		bird nest
35									
36	*Agonis flexuosa*	3	3	1		2	deteriorating		bird nest
37	*Agonis flexuosa*	13	3	2		2	deteriorating		bird nest
38	*Agonis flexuosa*	6	3	1		5	poor		bird nest

Appendix 2: Summary of drey survey data (cont.)

Drey	Tree Species	Tree Height (m)	Vegetation Type	Canopy Linkages	Drey Type	Height of Drey (m)	Drey condition	Possum Present	Comments
39	*Agonis flexuosa*	11	3	2		2	poor		bird nest
40	*Agonis flexuosa*	12	2	0	4	5	deteriorating		
41	*Agonis flexuosa*	13	2	3+	4	10	good		bird nest
42	*Agonis flexuosa*	12	2	3+	4	7	good		bird nest
43	*Agonis flexuosa*	13	2	3+	4	11	good		bird nest
44	*Agonis flexuosa*	7	2	3+		5	poor		
45	*Agonis flexuosa*	10	2	0	4	8	good		
46	*Agonis flexuosa*	6	2	1	4	5	good		
47	*Agonis flexuosa*	12	2	3+	4	3	good		
48	*Agonis flexuosa*	13	2	3+	1 or 2	11	good	2 x adults in tree	3/06/95 (night)
49	*Agonis flexuosa*	13	2	3+	3	3	good		
50	*Agonis flexuosa*	7	2	0	4	5	poor		
51	*Agonis flexuosa*	10	2	3+			poor		
52	*Agonis flexuosa*	12	2	3+	4	4	good		
53	*Agonis flexuosa*	11	2	3+	4	3	good		bird nest
54	*Agonis flexuosa*	10	2	3+	4	9	good		bird nest
55	*Agonis flexuosa*	8	2	0	4	4	good		bird nest
56	*Agonis flexuosa*	8	2	3+	3	7	good		
57									
58	*Agonis flexuosa*	7	6	0	4	1	good		
59	*Agonis flexuosa*	4	6	3+	4	2	good		
60	*Agonis flexuosa*	5	6	3+	3	2	deteriorating		
61	*Agonis flexuosa*	4	6	3+	4	3	good		
62	*Acacia littorea*	2	4	3+	4	1.5	good		
63	*Agonis flexuosa*	7	6	0	4	4	good		bird nest
64	*Agonis flexuosa*	5	4	3+	3	3	fresh		
65	*Agonis flexuosa*	6	4	3+	4	3	good		
66	*Acacia littorea*	2	4	2	1	1	good		
67	*Acacia littorea*	2	4	2	1	1.5	good		
68	*Agonis flexuosa*	3	4	3+	3	1.5	good		
69	*Agonis flexuosa*	5	4	3+	1	3	good		
70	*Agonis flexuosa*	5	4	3+	2	2	good		
71	*Agonis flexuosa*	5	4	3+	4	2	unknown		
72	*Agonis flexuosa*	3	4	3+	3	1	good		
73	*Agonis flexuosa*		4	3+	4	2	poor		
74	*Agonis flexuosa*	4	4	3+	3	2.5	good	1 x adult	27/05/95
75	*Agonis flexuosa*	7	4	3+	1	2	good		
76	*Agonis flexuosa*	9	4	3+	2	2	good	1 x adult	4/06/95
77	*Agonis flexuosa*	8	5	3+	3	7	good		

Appendix 2: Summary of drey survey data (cont.)

Drey	Tree Species	Tree Height (m)	Vegetation Type	Canopy Linkages	Drey Type	Height of Drey (m)	Drey condition	Possum Present	Comments
78	*Agonis flexuosa*	2	5	2	4	1.5	poor		
79	*Agonis flexuosa*	11	2	3+	4	10	good		bird nest
80	*Agonis flexuosa*	11	2	2	4		good		bird nest
81	*Agonis flexuosa*	10	2	3+	4	9	deteriorating		bird nest
82	*Agonis flexuosa*	12	2	3+	2	3	good	1 x adult	27/05/95, 3/06/95, 5/06/95
83	*Agonis flexuosa*	10	2	3+	1	9	good	1 x adult	5/07/95, 6/07/95
84	*Agonis flexuosa*	10	2	3+	4	8	good		
85	*Agonis flexuosa*	10	2	3+	1	9	good	1 x adult	5/07/95, 6/07/95