



Critical Habitat for threatened mammals in Painkalac Valley (Matters of National Environmental Significance)

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Swamp antechinus



Southern B Bandicoot



Broad tooth rat

Eastern Otways - healthy mammal communities (1975 –2007)



New Holland Mouse - 17 sites
woodland, forest, spp. rich understorey,
High-density populations > aver. rainfall,
declined precipitously during drought,



Swamp antechinus - 30 sites
damp, dense heath, woodlands, tussock
grass sedgeland
High-density populations > aver. rainfall,
extirpated post wildfire

Other species
high site occupancy and abundance
Agile antechinus 61%
White footed dunnart 61%
Bush rat 70%
Swamp rat 61%

Eastern Otways significant mammal declines (2013 – 2018)

- **New Holland Mouse** - no captures since 2002
- **Swamp antechinus** - only 8 individuals 2013-15, none 2016-17
- **Woodlands, low forest, sand heathland, headland scrub**

very low mammal abundance, 67% of sites large - severe declines previously high mammal abundance, species rich (5 - 9)

Significant impacts of Millenium drought 1996 -2010

Coastal dunes, gullies

high abundance (20 - 47%) and species richness, including Swamp antechinus

- **Important mammal refuges**



Coastal dunes



Hutt Gully



Painkalac fauna survey 1989

Table 10. Mammals captured during 445 trap-nights October 23-27, 1989 study area, Aireys Inlet.

Transect 4 was only trapped for one night.

DATE	NO. TRAPS	OCT 23-24	OCT 24-25	OCT 25-26
Transect 1 Sedgeland & Poa grassland	20		1 <i>Rattus lutreolus</i> 1 <i>Mus musculus</i>	
Transect 2 Sedgeland & Poa grassland	20	1 <i>M. musculus</i>		1 <i>R. lutreolus</i>
Transect 3 Poa grassland	25	1 <i>Mastacomys fuscus</i>	1 <i>M. fuscus</i>	
Transect 4 <i>Leptospermum</i> heathland, saltmarsh & heathy dune scrub	25	1 <i>R. lutreolus</i>		
Transect 5 Remnant riparian	20	5 <i>Rattus fuscipes</i> 2 <i>Antechinus stuartii</i>	4 <i>R. fuscipes</i>	6 <i>R. fuscipes</i> 1 <i>A. stuartii</i>

PREPARED FOR THE
PAINKALAC CREEK VALLEY STUDY STEERING COMMITTEE

BY:

ECOLOGICAL HORTICULTURE PTY. LTD.
BIOSIS RESEARCH PTY. LTD.
CONTEXT PTY. LTD.
SCAT ENVIRONMENTAL AND WASTE TREATMENT
CONSULTANTS

MARCH 1990

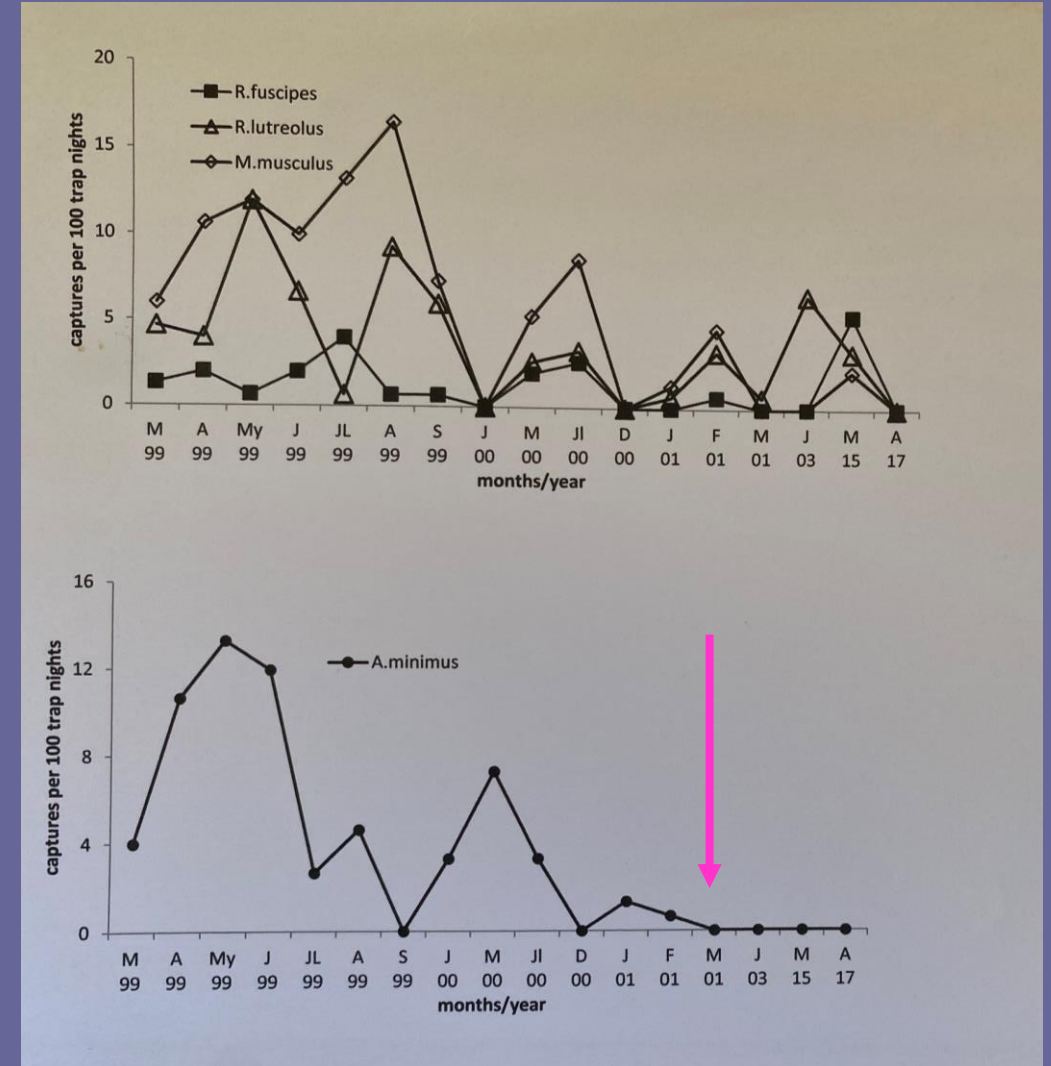


Painkalac Mammal surveys 1999 -2017



Swamp antechinus

- first recorded 1999, not 1990 -97
- capture rates high compared with other the sites
- declined to zero 2001 - 2017.



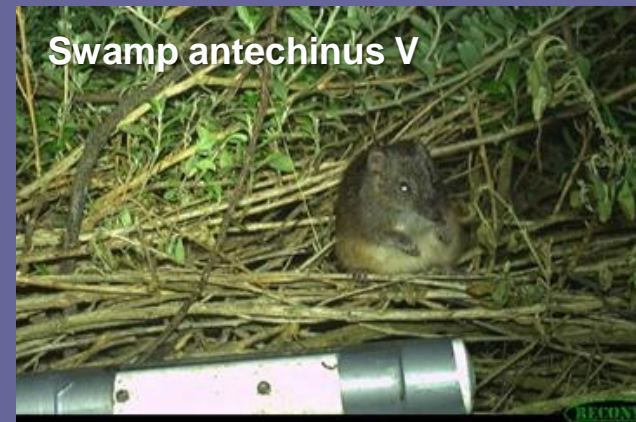
Wild Otways Initiative 2021 - 23

Conserving threatened small mammals in the Otway Ranges

Identification of spatial locations of threatened mammal species (EPBC Act, Endangered, Vulnerable) and their refuges across the Otways

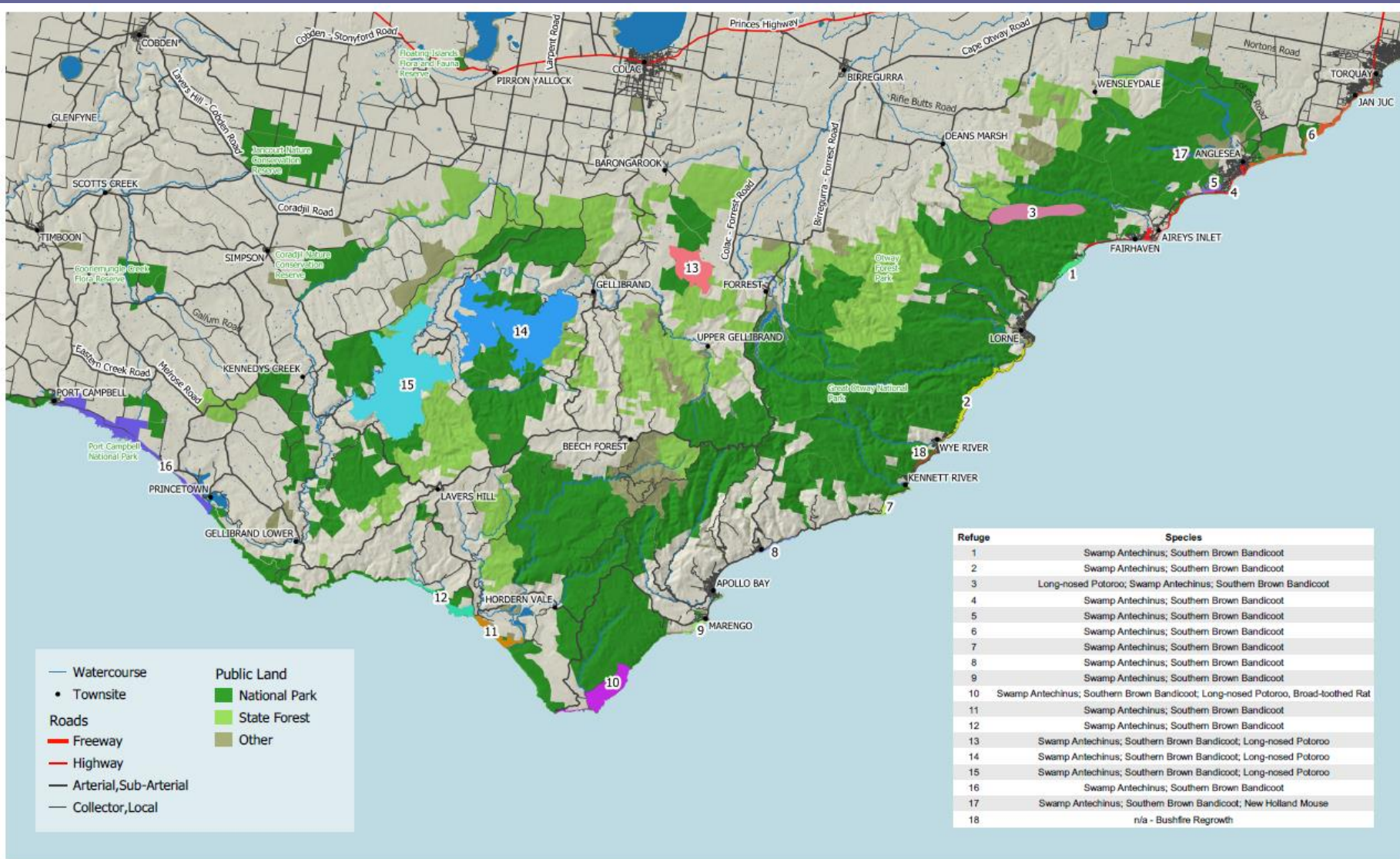
Development of Otways species management plans

Rodents



Marsupials

Refuges identified across the Otways 2021-23



Micro 39 - 339 ha (12)

Mid connected 718 - 942 ha (3)

Macro 1170 - 4859 ha (3)

Refuge - Painkalac Valley, Lot 2

Collaboration M. Loughnan, ANGAIR, Rewilding the Valley

Dec. 2020 - 2023

2021

Camera
 Swamp antechinus
 Agile antechinus
 Bush rat
 Brown rat
 Water rat
 House mice
 domestic dog

Otways Scat surveys
 (Zoos Vic, P. Burns, S.Kazi)

Broad toothed rat

40 of 61 sites, including
 Painkalac

Live trapping
 Swamp antechinus
 (breeding females)
 Bush rats
 Swamp rats
 House mouse



Juvenile



Breeding female



Rakali

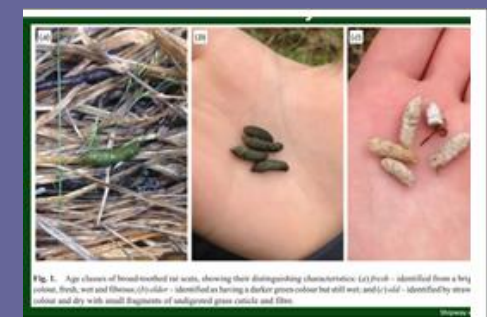
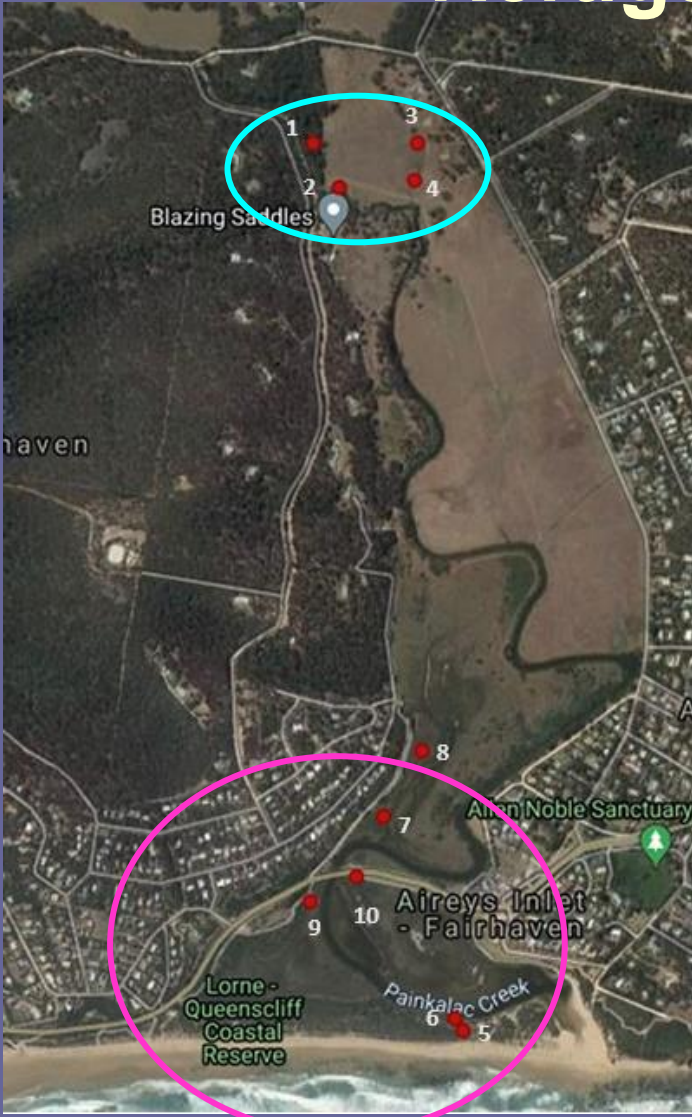


Fig 1. Age classes of broad-toothed rat scats, showing their distinguishing characteristics. (A) Fresh - identified from a bright red anal plug and (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z) (AA) (AB) (AC) (AD) (AE) (AF) (AG) (AH) (AI) (AJ) (AK) (AL) (AM) (AN) (AO) (AP) (AQ) (AR) (AS) (AT) (AU) (AV) (AW) (AX) (AY) (AZ) (BA) (BB) (BC) (BD) (BE) (BF) (BG) (BH) (BI) (BJ) (BK) (BL) (BM) (BN) (BO) (BP) (BQ) (BR) (BS) (BT) (BU) (BV) (BW) (BX) (BY) (BZ) (CA) (CB) (CC) (CD) (CE) (CF) (CG) (CH) (CI) (CJ) (CK) (CL) (CM) (CN) (CO) (CP) (CQ) (CR) (CS) (CT) (CU) (CV) (CW) (CX) (CY) (CZ) (DA) (DB) (DC) (DD) (DE) (DF) (DG) (DH) (DI) (DJ) (DK) (DL) (DM) (DN) (DO) (DP) (DQ) (DR) (DS) (DT) (DU) (DV) (DW) (DX) (DY) (DZ) (EA) (EB) (EC) (ED) (EE) (EF) (EG) (EH) (EI) (EJ) (EK) (EL) (EM) (EN) (EO) (EP) (EQ) (ER) (ES) (ET) (EU) (EV) (EW) (EX) (EY) (EZ) (FA) (FB) (FC) (FD) (FE) (FF) (FG) (FH) (FI) (FJ) (FK) (FL) (FM) (FN) (FO) (FP) (FQ) (FR) (FS) (FT) (FU) (FV) (FW) (FX) (FY) (FZ) (GA) (GB) (GC) (GD) (GE) (GF) (GG) (GH) (GI) (GJ) (GK) (GL) (GM) (GN) (GO) (GP) (GQ) (GR) (GS) (GT) (GU) (GV) (GW) (GX) (GY) (GZ) (HA) (HB) (HC) (HD) (HE) (HF) (HG) (HH) (HI) (HJ) (HK) (HL) (HM) (HN) (HO) (HP) (HQ) (HR) (HS) (HT) (HU) (HV) (HW) (HX) (HY) (HZ) (IA) (IB) (IC) (ID) (IE) (IF) (IG) (IH) (II) (IJ) (IK) (IL) (IM) (IN) (IO) (IP) (IQ) (IR) (IS) (IT) (IU) (IV) (IW) (IX) (IY) (IZ) (JA) (JB) (JC) (JD) (JE) (JF) (JG) (JH) (JI) (JJ) (JK) (JL) (JM) (JN) (JO) (JP) (JQ) (JR) (JS) (JT) (JU) (JV) (JW) (JX) (JY) (JZ) (KA) (KB) (KC) (KD) (KE) (KF) (KG) (KH) (KI) (KJ) (KL) (KM) (KN) (KO) (KP) (KQ) (KR) (KS) (KT) (KU) (KV) (KW) (KX) (KY) (KZ) (LA) (LB) (LC) (LD) (LE) (LF) (LG) (LH) (LI) (LJ) (LK) (LL) (LM) (LN) (LO) (LP) (LQ) (LR) (LS) (LT) (LU) (LV) (LW) (LX) (LY) (LZ) (MA) (MB) (MC) (MD) (ME) (MF) (MG) (MH) (MI) (MJ) (MK) (ML) (MM) (MN) (MO) (MP) (MQ) (MR) (MS) (MT) (MU) (MV) (MW) (MX) (MY) (MZ) (NA) (NB) (NC) (ND) (NE) (NF) (NG) (NH) (NI) (NJ) (NK) (NL) (NM) (NN) (NO) (NP) (NQ) (NR) (NS) (NT) (NU) (NV) (NW) (NX) (NY) (NZ) (OA) (OB) (OC) (OD) (OE) (OF) (OG) (OH) (OI) (OJ) (OK) (OL) (OM) (ON) (OO) (OP) (OQ) (OR) (OS) (OT) (OU) (OV) (OW) (OX) (OY) (OZ) (PA) (PB) (PC) (PD) (PE) (PF) (PG) (PH) (PI) (PJ) (PK) (PL) (PM) (PN) (PO) (PP) (PQ) (PR) (PS) (PT) (PU) (PV) (PW) (PX) (PY) (PZ) (QA) (QB) (QC) (QD) (QE) (QF) (QG) (QH) (QI) (QJ) (QK) (QL) (QM) (QN) (QO) (QP) (QQ) (QR) (QS) (QT) (QU) (QV) (QW) (QX) (QY) (QZ) (RA) (RB) (RC) (RD) (RE) (RF) (RG) (RH) (RI) (RJ) (RK) (RL) (RM) (RN) (RO) (RP) (RQ) (RR) (RS) (RT) (RU) (RV) (RW) (RX) (RY) (RZ) (SA) (SB) (SC) (SD) (SE) (SF) (SG) (SH) (SI) (SJ) (SK) (SL) (SM) (SN) (SO) (SP) (SQ) (SR) (SS) (ST) (SU) (SV) (SW) (SX) (SY) (SZ) (TA) (TB) (TC) (TD) (TE) (TF) (TG) (TH) (TI) (TJ) (TK) (TL) (TM) (TN) (TO) (TP) (TQ) (TR) (TS) (TT) (TU) (TV) (TW) (TX) (TY) (TZ) (UA) (UB) (UC) (UD) (UE) (UF) (UG) (UH) (UI) (UJ) (UK) (UL) (UM) (UN) (UO) (UP) (UQ) (UR) (US) (UT) (UU) (UV) (UW) (UX) (UY) (UZ) (VA) (VB) (VC) (VD) (VE) (VF) (VG) (VH) (VI) (VJ) (VK) (VL) (VM) (VN) (VO) (VP) (VQ) (VR) (VS) (VT) (VU) (VV) (VW) (VX) (VY) (VZ) (WA) (WB) (WC) (WD) (WE) (WF) (WG) (WH) (WI) (WJ) (WK) (WL) (WM) (WN) (WO) (WP) (WQ) (WR) (WS) (WT) (WU) (WV) (WW) (WX) (WY) (WZ) (XA) (XB) (XC) (XD) (XE) (XF) (XG) (XH) (XI) (XJ) (XK) (XL) (XM) (XN) (XO) (XP) (XQ) (XR) (XS) (XT) (XU) (XV) (XW) (XX) (XY) (XZ) (YA) (YB) (YC) (YD) (YE) (YF) (YG) (YH) (YI) (YJ) (YK) (YL) (YM) (YN) (YO) (YP) (YQ) (YR) (YS) (YT) (YU) (YV) (YW) (YX) (YY) (YZ) (ZA) (ZB) (ZC) (ZD) (ZE) (ZF) (ZG) (ZH) (ZI) (ZJ) (ZK) (ZL) (ZM) (ZN) (ZO) (ZP) (ZQ) (ZR) (ZS) (ZT) (ZU) (ZV) (ZW) (ZX) (ZY) (ZZ)



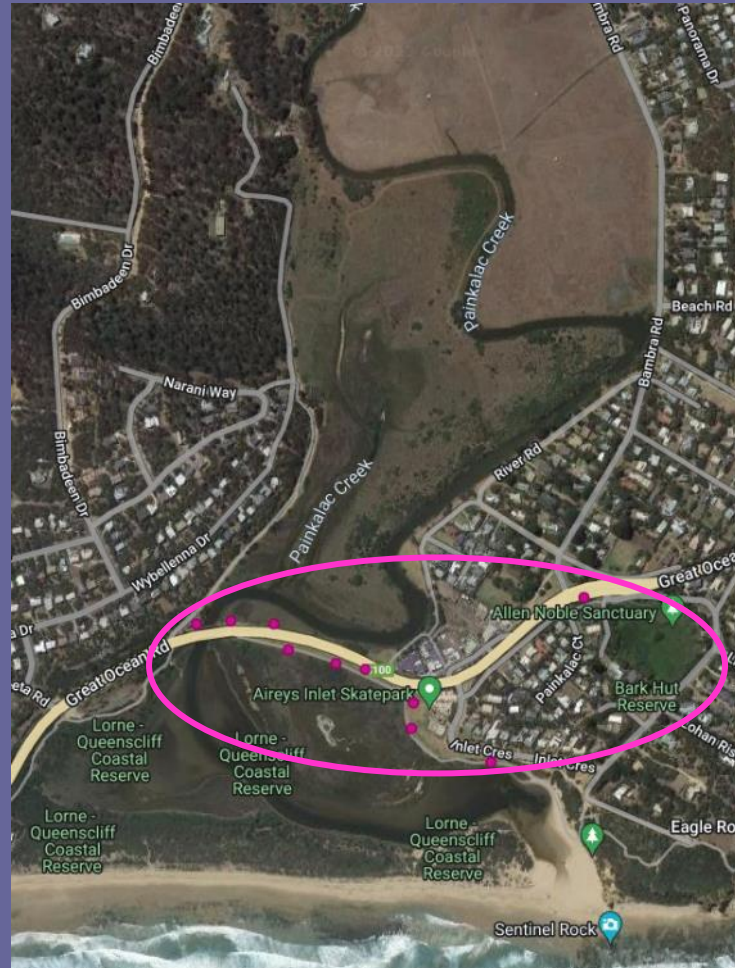
Refuge - Painkalac Valley – Lot 2

Bron Ives, Katie Pahlow, David Abbey

August 2023

10 deceased swamp antechinus,
8 males 2 females

Carcasses collected, tissues
supplied to Zoos Vic – genetic
analyses



Male swamp antechinus

Refuge - Painkalac Valley – Lot 2 November 27th 2023



Female swamp antechinus Inlet



Male antechinus Lot 2



GFNC



Trapping of male swamp antechinus at Lot 2 was unexpected and significant!

Although the habitat restoration at Lot 2 has been spectacular, it was expected that its suitability for swamp antechinus could take many years, maybe a decade

Ecological health Painkalac Valley – Lot 2

- High conservation value refuge - EPBCA listed mammals, species rich (Australia, Victoria, Otways)
- Very significant for Swamp antechinus - high density compared to other sites
- Long term monitoring - population decline and extirpation 2002 -2020
- Threats to mammals: fragmentation (Great Ocean Road, horse paddocks), foxes, cats, dogs, low rainfall, fire
- Management - predator control, protection from fire and habitat fragmentation

Impacts of artificial openings – unknown, when, how long

- habitat (vegetation structure) drying?
- water quality impacts
- changes to animal movements and breeding

Critical habitat (FFGA)

- (a) the area is critical to the persistence of a taxon or community of flora or fauna
- b) species aggregate in the area for reproduction or other important life stages
- (c) the area is used by species to move between populations, migrate or disperse, or as refugia during environmental stress
- (d) the taxon or community is not present in the area but was previously and there is potential to reintroduce it
- (f) the area is likely to be needed by a taxon or community of flora or fauna in the future

MNES Matters of National Environmental Significance

Under the EPBC Act an **action** will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

‘Referral’ of an action involves sending it to DCEEEW

Matters of national environmental significance

- world heritage properties
- national heritage places
- ‘Ramsar’ wetlands
- **nationally threatened species and ecological communities ****
- **migratory species***
- Commonwealth marine areas
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

Lot 2 Rewilding project



2020 plantings



2023 exceptional success



Photos: Rebecca Law, Lucky Frawley, Avalon Morrison, Kylie Murphy, Anna Madden
Bachelor of Photography Studies College Melbourne (PSC).



1981



1983

Wildfire 40,000ha

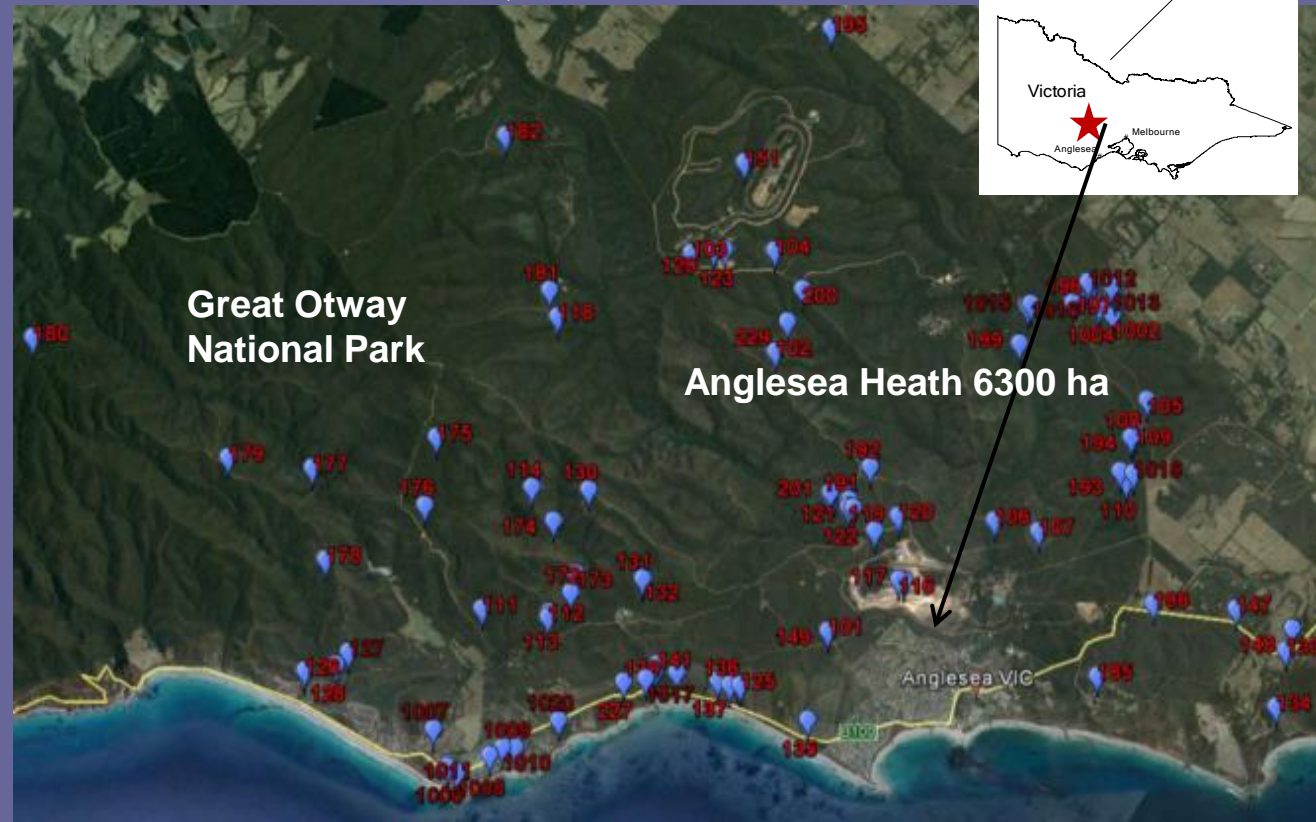


1986



2004

Long - term mammal studies: 1975 - 2007, 2013 -2024



Few long-term studies of assemblages in mesic Australia

Reproduction, ecology, impacts of fire, fragmentation, predators, climate change, *Phytophthora cinnamomi* dieback

> 120 sites, > 36 repeat-measures, long - term database, focus - Swamp antechinus, New Holland mouse