Decline in heathy woodlands - Eastern Otways

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- Mammals
- Vegetation, habitat (*Phytophthora* dieback)
- Restoration

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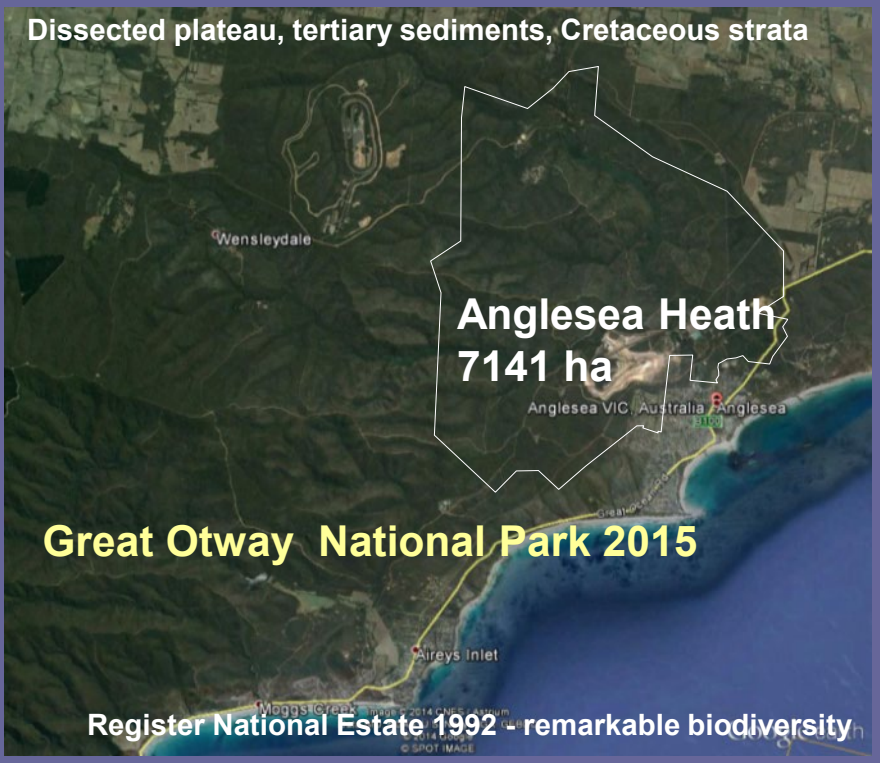
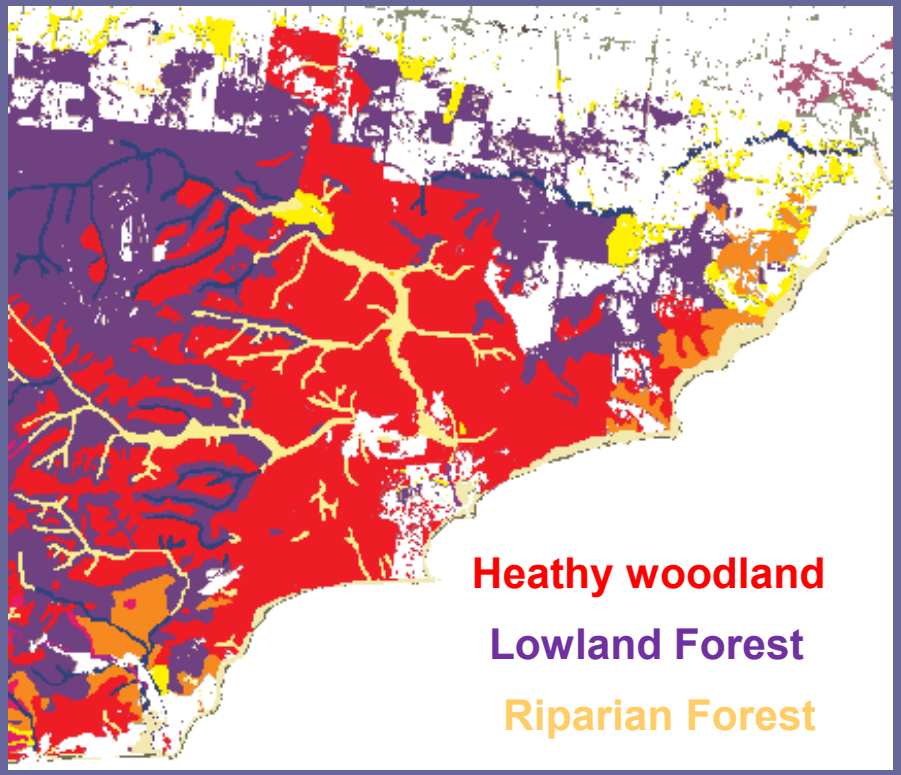
East Otway ranges - diverse vegetation





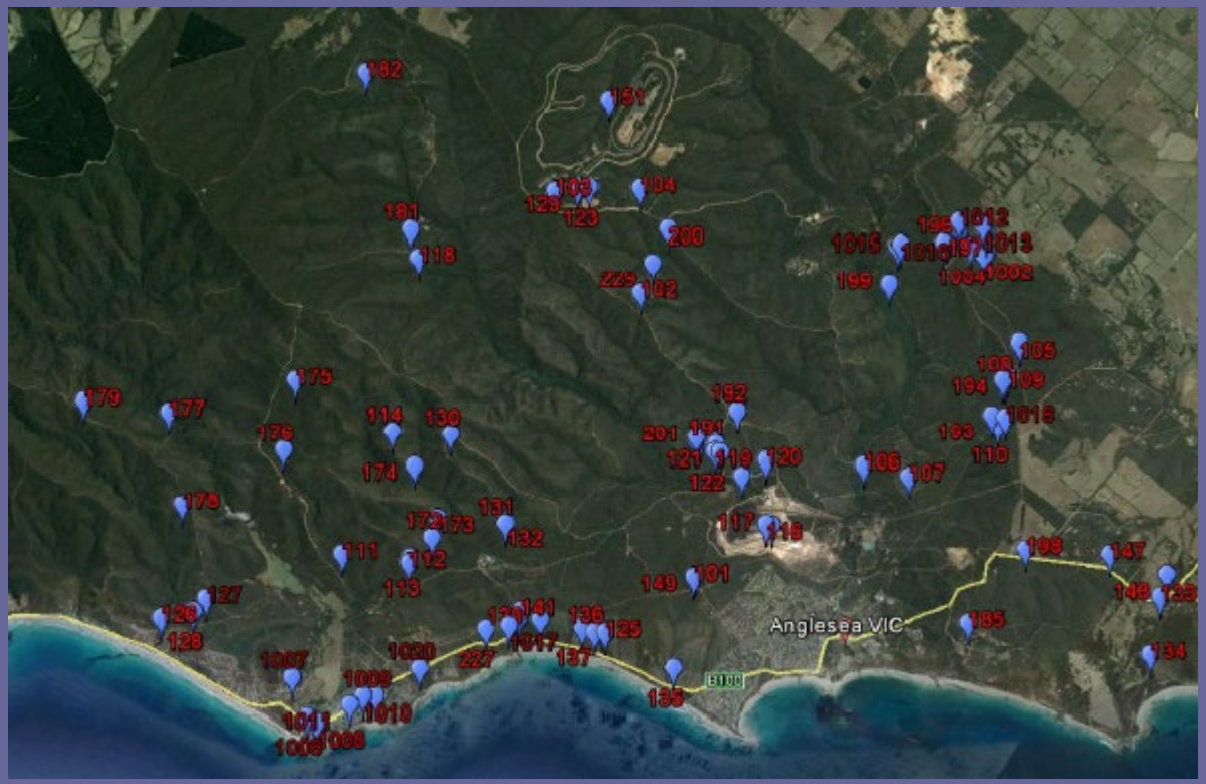
Significant, diverse mammal community

- 29 native species (monotremes, marsupials, rodents, bats)
- One of Victoria's richest assemblages small-medium mammals
- Introduced species: House mouse, Black rat, Cats and Foxes

Threatened species	EPBCA	FFGA	DSE (2013)
Swamp antechinus (*Antechinus minimus*)	V	*	NT
White-footed dunnart (*Sminthopsis leucopus*)		*	NT
Southern brown Bandicoot (*Isoodon obesulus*)	EN	*	NT
Long-nosed potoroo (*Potorous tridactylus*)	V	*	NT
New Holland mouse (*Pseudomys novaehollandiae*)	V	*	V
Broad toothed (*Mastacomys fuscus*)	V	*	E




Mammal research 1975 - 2007, 2013 -2020



40,000 ha, little unburnt

One of few long-term studies of assemblages in mesic terrestrial Australia

120 sites, repeat-measures, long-term database

Focus Swamp antechinus, New Holland mouse

Healthy mammal communities (1975 – 2002 - 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 and woodlands, tussock grass sedgelands, 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%

Regional significant mammal declines (2013 - 2020)

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

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

- **Coastal dunes, gullies**

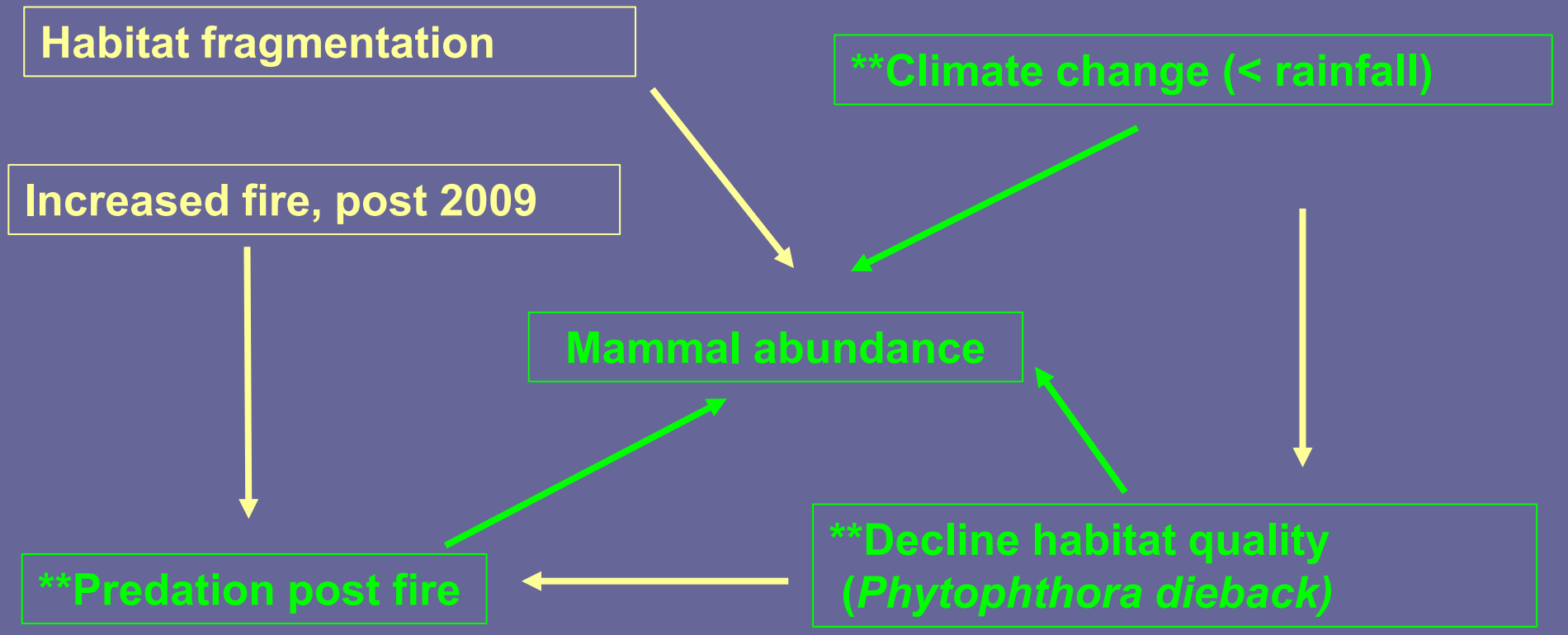
abundance high, species rich, including Swamp antechinus

- **Important mammal refuges – high vegetation cover, moisture, nutrients**

Characteristics of refuges

- Dense, high cover vegetation
- Coastal dunes - high nutrients from marine inputs, > mammal reproduction
- optimal for Swamp antechinus, Bandicoots, Potoroos, rodents
- even in presence of predators (fox, cat)

Factors contributing to mammal declines



Drivers of declines likely to be multifactorial
- combinations of all or some of above

Phytophthora 'dieback' EPBCA listed Key Threatening process

Eastern Otways impacts

One of world's most significant invasive alien species (IUCN)

Healthy

diverse vegetation, species rich

97 understorey species

Disease advance down slope

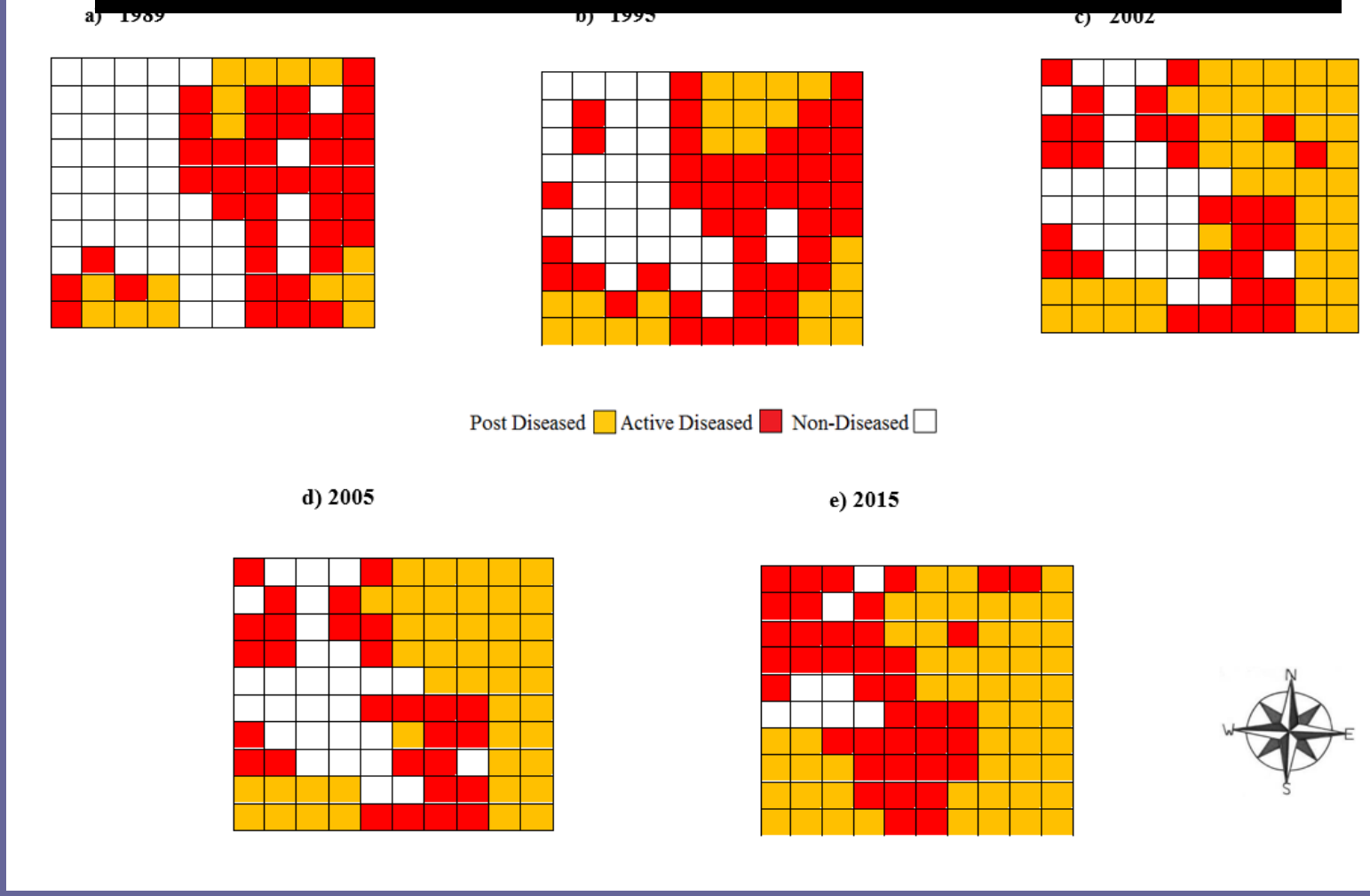
5 -10 years post disease

Species poor

11 understorey species

Loss of Grasstrees

Disease status and changes - 2(yrs

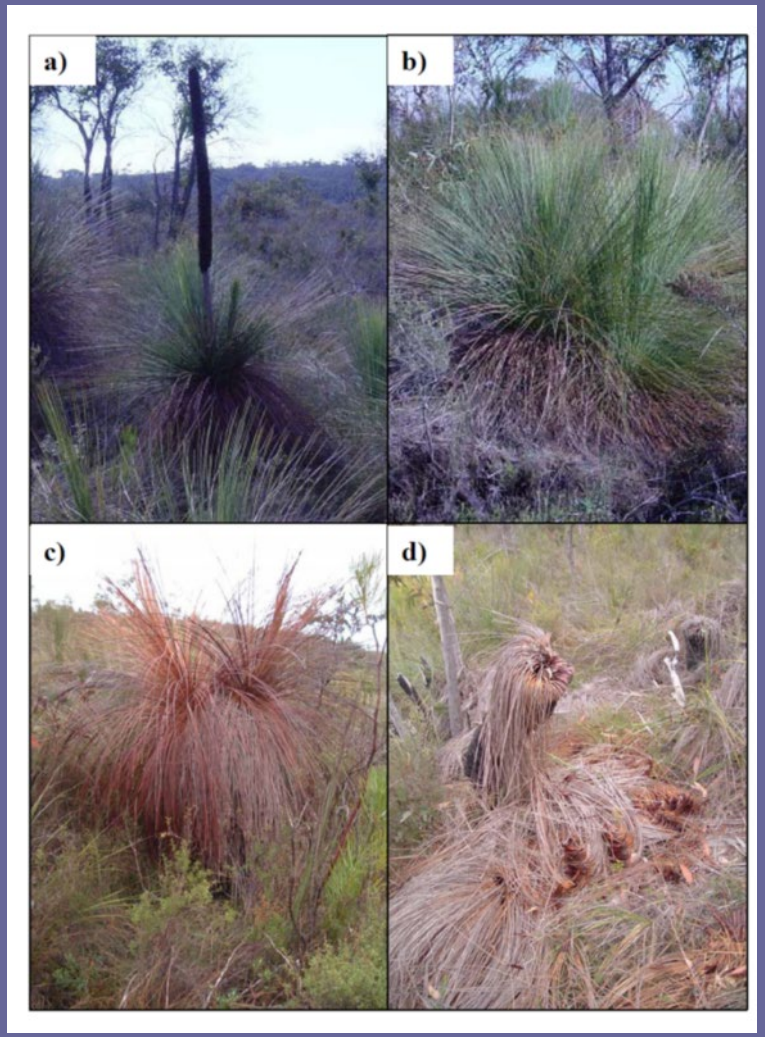


- non-diseased declined 46 - 8%

Effects of infection on *X. australis* (Grass-trees)

Dominant heathland species

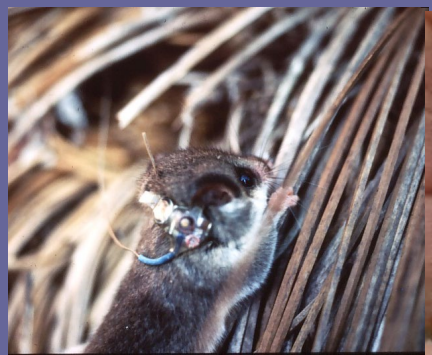
Habitat structure, invertebrates, fauna nesting, refuge habitat



(Annett 2005)

Disease impacts on small mammals

- Decline in number of species and total abundance
- Decline in species abundance (Agile antechinus, Bush rat, Swamp rat)
- Captures related to thick understorey - cover from predators
- Radiotracking - Grasstrees important for nesting (Agile antechinus, Pygmy possum, White footed dunnart)
- Decline of Grasstrees < nest sites




Restoration of habitats and mammals

Recovery unlikely without intensive management, focus on remnant or reintroduced populations, **precautionary principle**

- **Identify location, extent of refuges across the landscape**
- **Protect refuges – from fire**
- **Implement appropriate fire regimes**
- **Built refuges in post fire habitat**
- **Avoid burning if low rainfall to avoid extinctions**
- **Captive breeding, reintroduction strategies**
- **Effective *P. cinnamommi* management**
- **Monitor, evaluate, audit**