Investigation of woylie population declines

Adrian Wayne, Andrew Thompson, Andrew Smith, Andrea Reiss, Carlo Pacioni, Phil Nicholls, et al.

ACT NOW FOR THE FUTURE

Department of Environment and Conservation
Our environment, our future

PERTH ZOO

australian wildlife conservancy

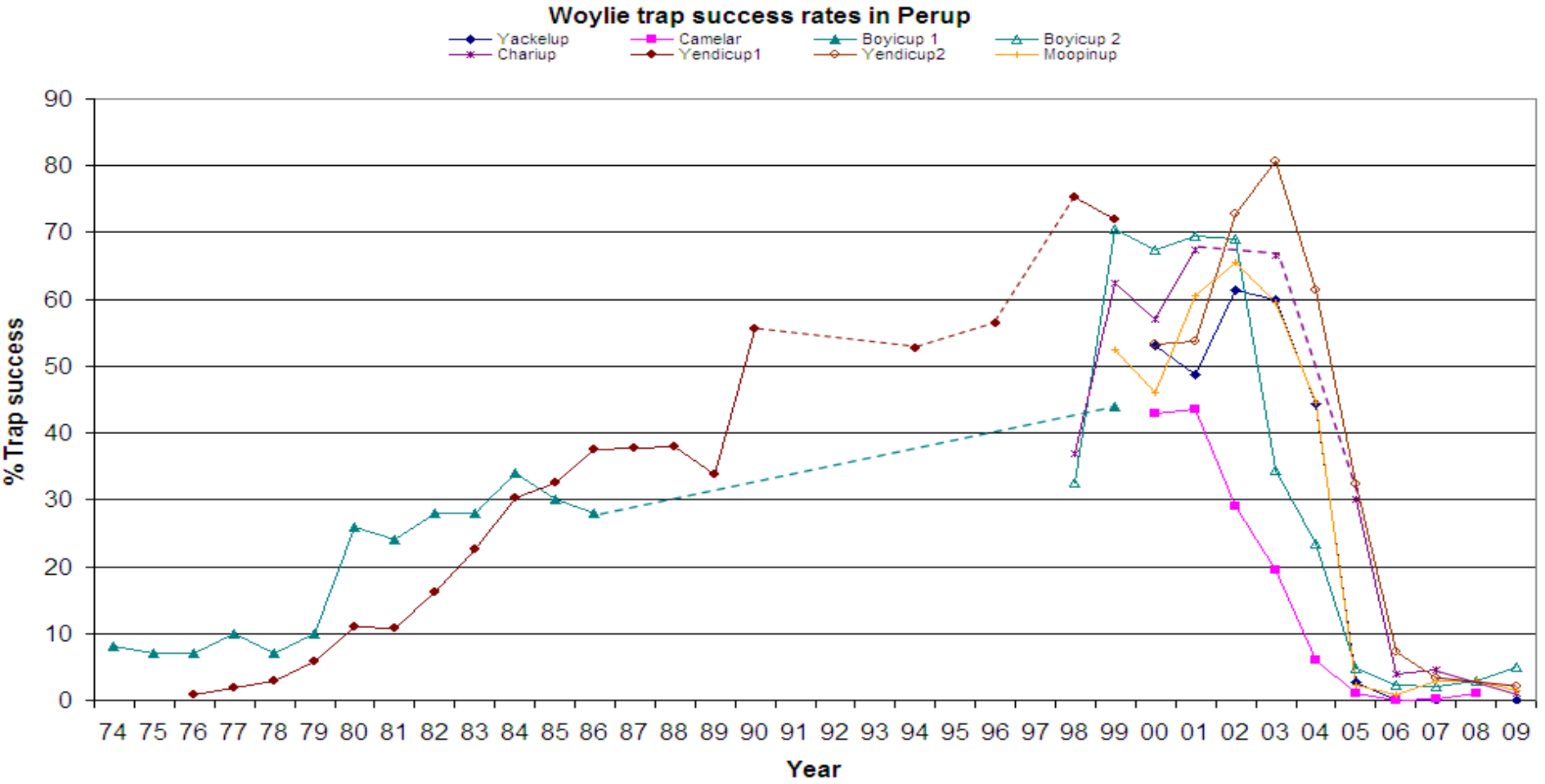
Murdoch UNIVERSITY

Subfossil evidence

Historical distribution

Current distribution

Recent woylie declines: Upper Warren



Recent declines

Rapid	25% – 95% per annum
Substantial	80% - 100% loss per site
Extensive	WA and SA
Population bias?	Largest / Indigenous
Species level:	~80% loss & <10,000 (CR) so far…
	<2,000 indigenous
	<6,500 SA islands (inbred)

Leading hypothesis

Upper Warren:

- increased mortality (at least adults)
- multiple factors?
- acute and density dependent?

Cause(s) of death

Proximate: Predation (esp. cats)

Ultimate: More vulnerable by other factor. Disease?

Not habitat loss/change, food, fire, human interference, breeding, *foxes, *climate, etc

* = important factors in other declining populations

Role of Disease?
Woylie Disease Reference Council

- Viral
- Bacterial
- Haemoparasites
- Endoparasites
- Ectoparasites
- Toxicology
- Nutrition

- Pathology
- Clinical
- Epidemiology
- Conservation Genetics

[Members: Murdoch University, Perth Zoo, DEC]

Disease investigation approaches

Direct evidence

- Routine field health checks
- Sampling – blood, scats, ectoparasites, ear tissue
- Radio-collared cohorts (mortality)
- Clinical cases
- Pathology

Pathology

Total # radio-collared woylies –Upper Warren	72
Total collared deaths	29
27 Predation involved	
2 COD inconclusive	
Necropsies on collared woylies (predated)	1.1
Others Necropsies:	
Upper Warren – opportunistic rd-kill, etc	6
Other declining pop.s (Dryandra - collared, Batalling)	7
Stable pop.s – Karakamia, Carers	21

→ baseline reference but added nothing remarkable regarding declines

Field and Clinical Checks

Upper Warren

1700 field exams (22 under anaesthesia)

3 clinical cases (Perth Zoo) – nothing remarkable

→ **Skin & fur conditions associated with declines**






Toxoplasma Pathology & PCR

- 6% seropositive @UW (MAT, n=153, Mar 06)
- 63% (n=35) +ve, brain tissue (PCR)
- Vertical transmission (PCR)
- Different genotypes in wildlife incl. woylies

Genetic diversity → potential for virulent strains & origin of *Toxoplasma* in Australian wildlife?

Trypanosoma

- New species, host specific? (Smith et al. 2008, in press)

	Upper Warren	Karakamia
Population state	Declining	Stable
n	124	123
Prevalence - PCR	49%	13%
Parasitemia - Microscopy	High	Not detected

*Associations with declines

- related or coincidence?
- cause of the decline or result of other factors?

Temporal prevalence: Balban

100

Disease Risk Assessment

Approach - qualitative, all macropods, rapid onset

Results

- Macropod Herpesvirus: Mod/High
- Macropod Orbivirus: Mod/High
- Encephalomyocarditis virus: Mod/High
- Chlamydiales: Mod
- Neospora: Low

Revision underway

Viruses - serology

DRA priorities - No seropositives yet…

Prevalence (95% confidence)

<4-7%	Macropod Herpesvirus
<12%	Orbivirus (Warrego, Wallal)
<7%	EMCV

n = 38 – 72 per site
n = 41 – 205 per virus

Genetics

High genetic variability

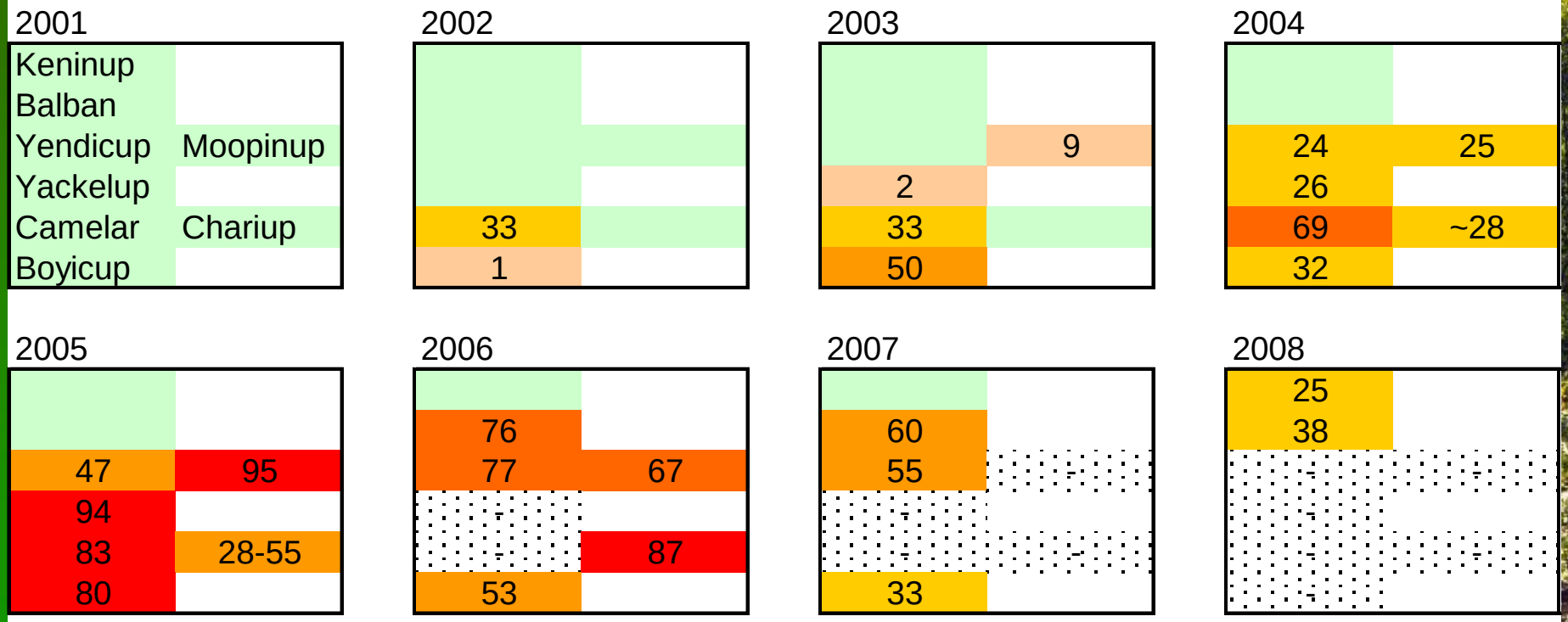
Gene flow

- between UW populations (>20 km)
- within populations –related individ.s (<1-6 km)

→ woylies can carry disease for long distances (directly or indirectly)

Spatio-temporal characteristics

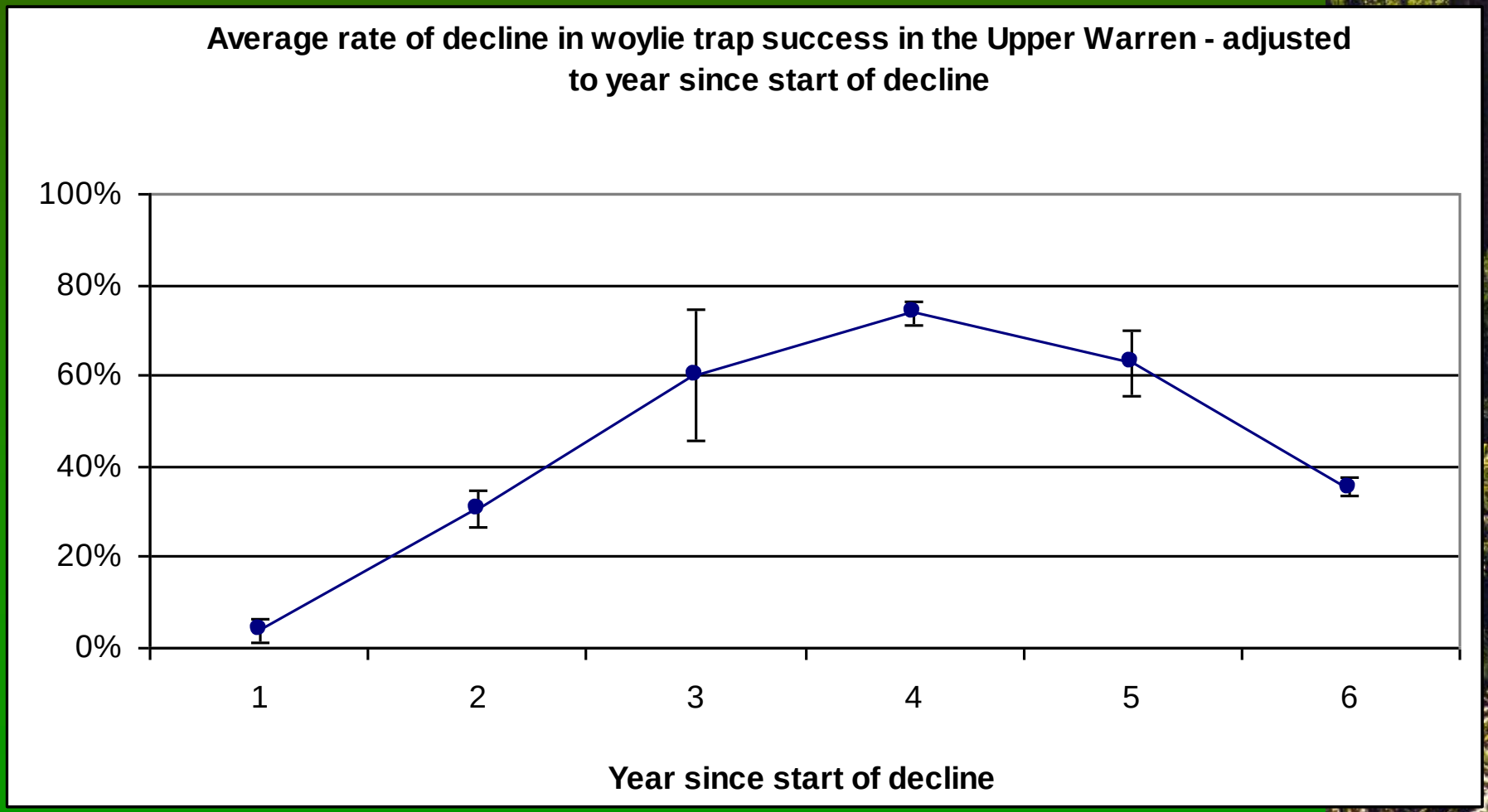
Perup schematic map



Legend

Pre decline	21-40% decline p.a.	61-80% decline p.a.	Post decline
1- 20% decline p.a.	41-60% decline p.a.	81-100% decline p.a.	

Time-adjusted rates of decline



Other investigations

Honours

- *Theileria penicillata* – Jia Rong

PhD

- Epidemiology – Carlo Pacioni
- Enteric parasites – Unaiza Parkar
- Bacteria – Yazid Abdud
- Ectoparasites – Halina Burmej

Wildlife Disease ARC – Smith et al.

Role of Disease ?

- X Little baseline / incomplete information
- X Direct evidence missing
  - No symptoms
  - Pathology – limited material
- ✓ Spatial pattern
- ✓ Predation inconsistencies
- ✓ Associations – Skin/coat, Toxo, Tryp
- X No direct/definitive tests on disease effects on woylies (behaviour, fitness, condition, reproduction or survival).

External Review 2008

- Rupert Woods, David Obendorf, Pam Whitley, Lee Skerratt

Main points

- Bodies for pathology – Achilles' heal
- Gaps in bio-intelligence
- Epidemiology
- Strategy and action plan
- Develop links
- Dedicated disease investigator

Woylie Priorities

Secure critically important populations

- Predator management (wild pop.s)
- Sanctuaries
- Captive Breeding (exceptional cases only)

Understand causes of declines / no recovery

- Role of predators
- Role of disease & related factors
- Decline characterisation, analysis, modelling

<u>Resources – Funding, expertise, time</u>

Bigger Picture Value

- Collaborations
- Capacity Building – e.g. biosecurity, conservation, wildlife disease, etc
- Diagnosing other declining species
- Model for other challenges

Photo: Sabrina Trocini

For more information go to, www.dec.wa.gov.au/programs/saving-our-species/**woylie-conservation-research-project**.html

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