What can we learn from road-kill?

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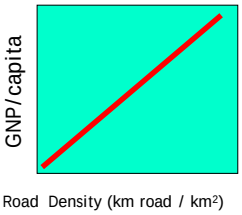
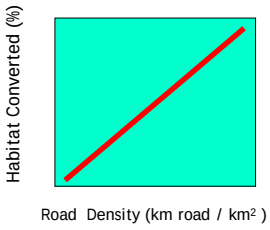
Global Problem

Roads

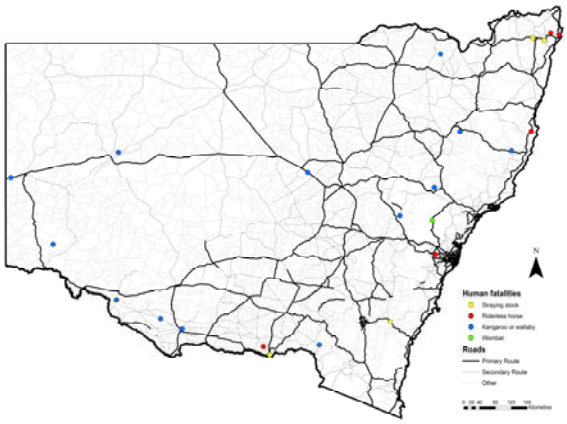




Wilkie D et al 2000 Roads, Development, and Conservation in the Congo Basin Conserv Biol 14: 1614-1622.

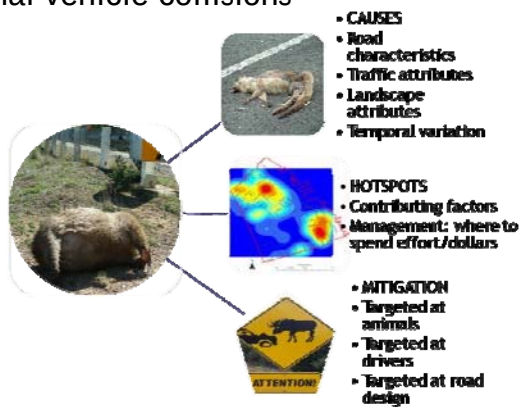
Australian situation

- Thousands of collisions between vehicles and animals each year
- A small fraction of crashes with animals are recorded
- Significant associated human fatalities/injuries (TADS database)
  - 23 human deaths in NSW 1996 – 2005



Ramp, D., Roger, E. (2008). Frequency of animal-vehicle collisions in New South Wales. In *'Too Close for Comfort'*. D. Lunney, A Munn and W. Meikle (Eds.). Royal Zoological Society of New South Wales, Sydney, Australia.

Animal vehicle collisions



What are the implications for wildlife?

- Loss of life
  - Have some data
- Local populations
  - Have some data
- Local biodiversity
  - Have no idea?

Benefits of population modelling

- A method for assessing the effect of roads on animal abundance and persistence
- Methods such as:

Habitat Suitability Modelling
Population Viability Analysis

Outline

- Common versus threatened species
- Variation in threatening processes across landscapes
- The implications of road development on biodiversity and ecosystems

Common versus threatened species

Common species

- Typically abundant and or wide-spread



Common species

- Typically abundant and or wide-spread
- Can shape ecosystems and show rapid population decline
- Trade-off between extinction and depletion of populations

Two 'common' species listed as threatened in NSW

Common planigale

Common blossom -bat

Common species
What is the long-term impact?

Year	Eastern grey kangaroo	Red-necked wallaby	Wombat
1998	411	20	16
1999	327	27	27
2000	381	23	23
2001	354	17	17
2002	410	29	29
2003	646	54	54
Total	2529	166	166

Ramp D, Caldwell J, Edwards K A, Warton D, Croft D B (2005) Modelling of wildlife fatality hotspots along the snowy mountain highway in New South Wales, Australia. Biol Conserv 126: 474-490

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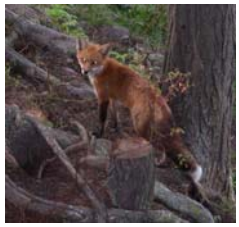
Common wombats

- Considered abundant and widespread
- But their distribution has declined

- Three threatening processes are likely to have contributed to their range reduction:

- Three threatening processes are likely to have contributed to their range reduction:
- Predation

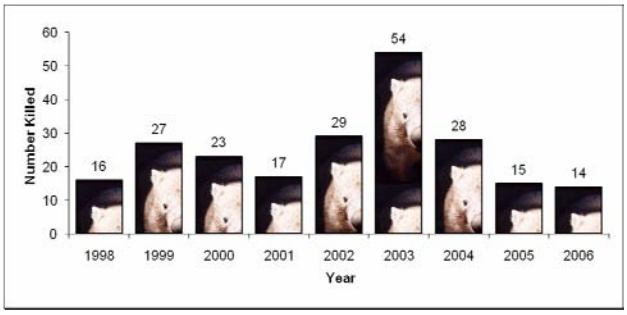


- Three threatening processes are likely to have contributed to their range reduction:
- Predation
- Disease

- Three threatening processes are likely to have contributed to their range reduction:
- Predation
- Disease
- Road-kill

- Impact of all three threats on populations is poorly understood
- Their impact has only been assessed singularly not in conjunction

Wombat road fatalities on a 15 km stretch of the Snowy Mountains Hwy



Roger E, Ramp D (2009) Incorporating habitat use in models of fauna fatalities on roads. Divers Distrib 15: 222-231

Management strategies

Control- PVA based on current population parameters

Road- PVA based on 50% increased survival

Disease-PVA based on increased survival, dispersal and fecundity

Predation-PVA based on increased survival for juveniles

Population Viability Analysis Results

- Road mitigation scenario had the lowest probability of decline amongst single management strategies
- Combined strategies most effective in reducing probability of local extinction
- Roads most likely the easiest and most cost effective threat to mitigate

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Royal National Park

2nd oldest NP in the world

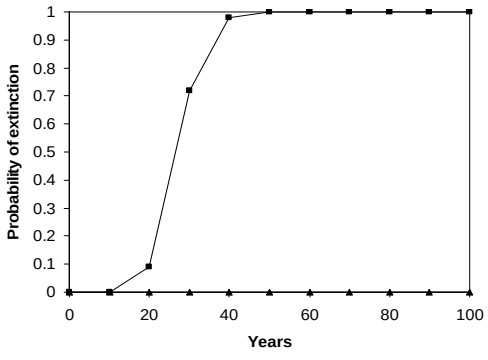
Population of peri-urban swamp wallabies

Ramp D, Ben-Ami D (2006) The effect of road-based fatalities on the viability of a peri-urban swamp wallaby population. J Wildl Manage 70: 1615-1624

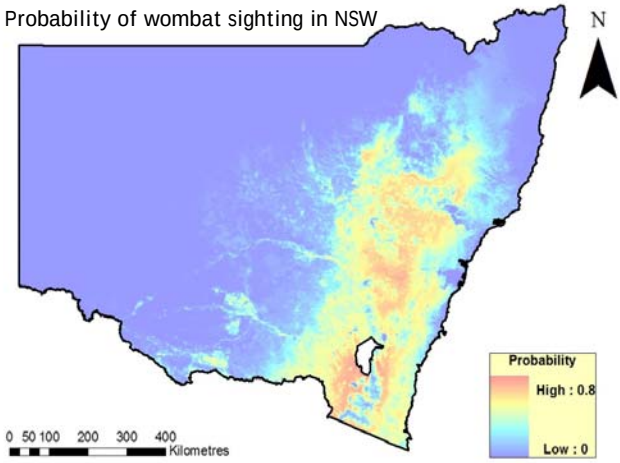
Royal National Park

Ramp D, Ben-Ami D (2006) The effect of road-based fatalities on the viability of a peri-urban swamp wallaby population. J Wildl Manage 70: 1615-1624

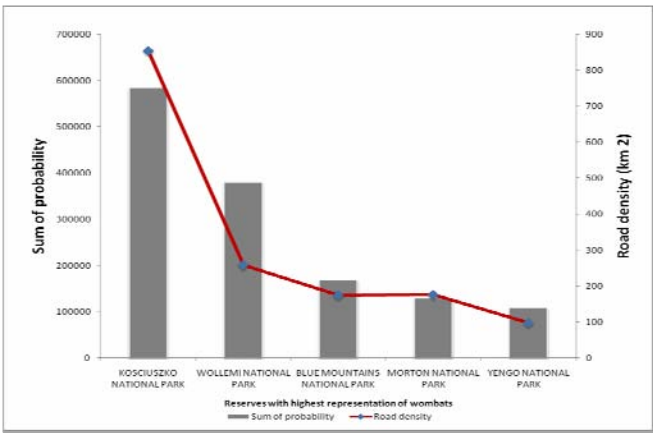
Swamp wallabies in the Royal National Park



Probability of wombat sighting in NSW



Reserves with the highest representation of wombats



Fraction of wombats living within 1 km of a road in NSW

	Percentage (%)	Area (km^2)
Primary Road	4	23,277
Secondary Road	5	35,045
Minor Road	15	123,402
Total	24	181,726

What can we learn from road-kill?

- Importance of monitoring and mitigating depletion events for all species
- Variation in threatening processes across landscapes, need to understand how these threats operate in conjunction with each other
- Implications of roads on biodiversity and ecosystems

Acknowledgements

Thanks very much:
Darryl Jones for the invitation to speak; Daniel Ramp, co-author and supervisor; Gilad Bino; and all the volunteers who have helped