Ecology of the feral cat (*Felis catus*) in coastal & mallee heaths of the south coast of Western Australia

Sarah Comer

I pay my respects to elders past, present and emerging: the Wudjari, Ngatjumay , Menang and Koreng people who are the traditional owners and custodians of the land and waters on whose country I work, and the Whadjuk on whose land we are gathered today.

Supervisors: Peter Speldewinde, Dale Roberts, Dave Algar

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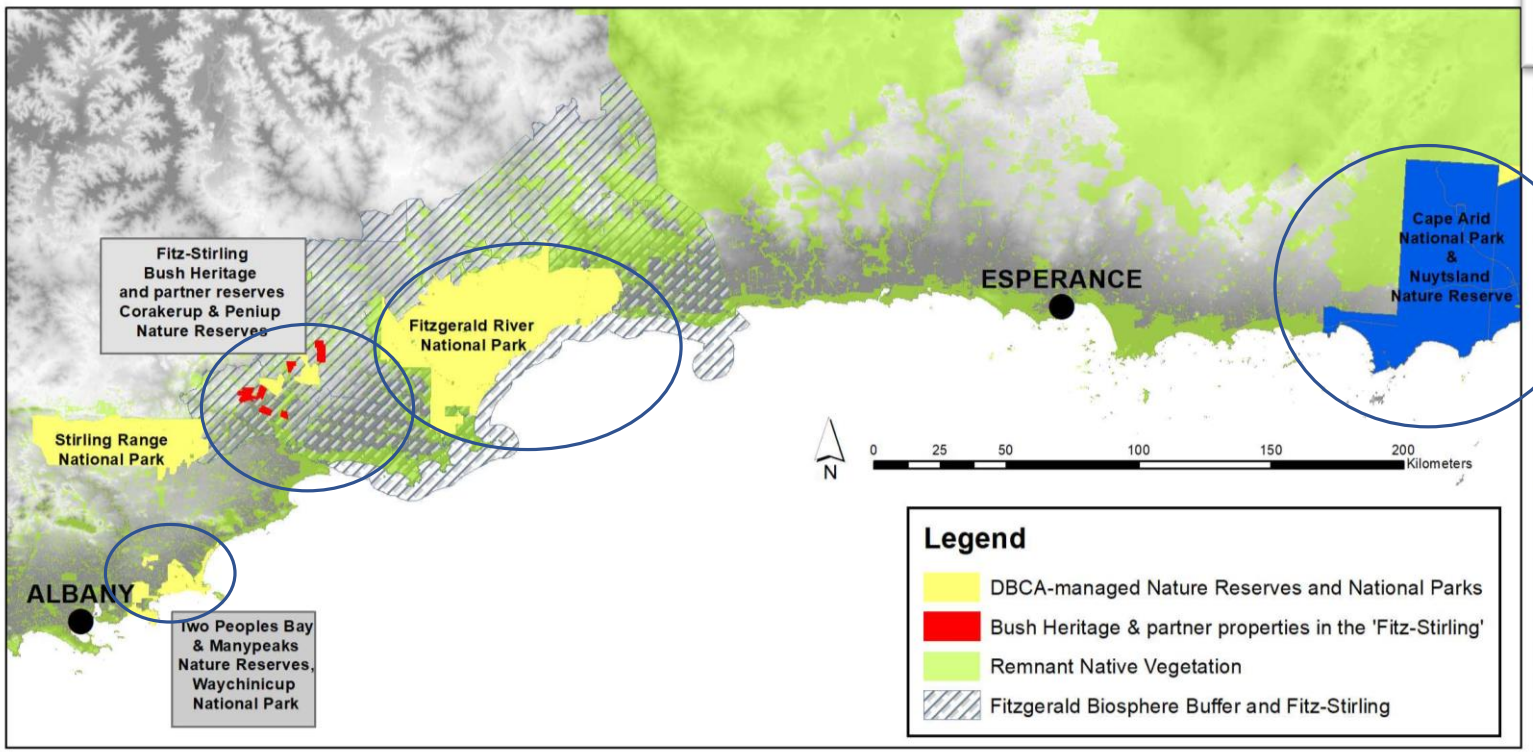
Background:

- South Coast Threatened Fauna Recovery Project
- Knowledge gaps - need for evidence-based management
- Cross-tenure management of cats needed in complex, unfenced landscapes in a biodiversity hotspot



Aim: to improve understanding of feral cat ecology to inform management of feral cats on the south coast of WA:

- Diet - including spatial and temporal shifts
- Quantify impacts threatened and non-threatened taxa in south coast ecosystems
- Behaviour and spatial ecology
- Predicting prey availability

Fragmented and non-fragmented ecosystems

Wildlife Research
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Integrating feral cat (*Felis catus*) control into landscape-scale introduced predator management to improve conservation prospects for threatened fauna: a case study from the south coast of Western Australia

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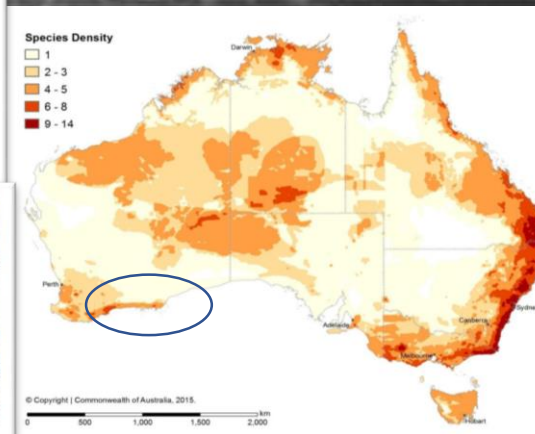
Adapted from EPBC Act threatened mammals, reptiles ar bird threatened by cat predation

'Background document for the Threat abatement plan for predation by feral cats, Commonwealth of Australia 2015'

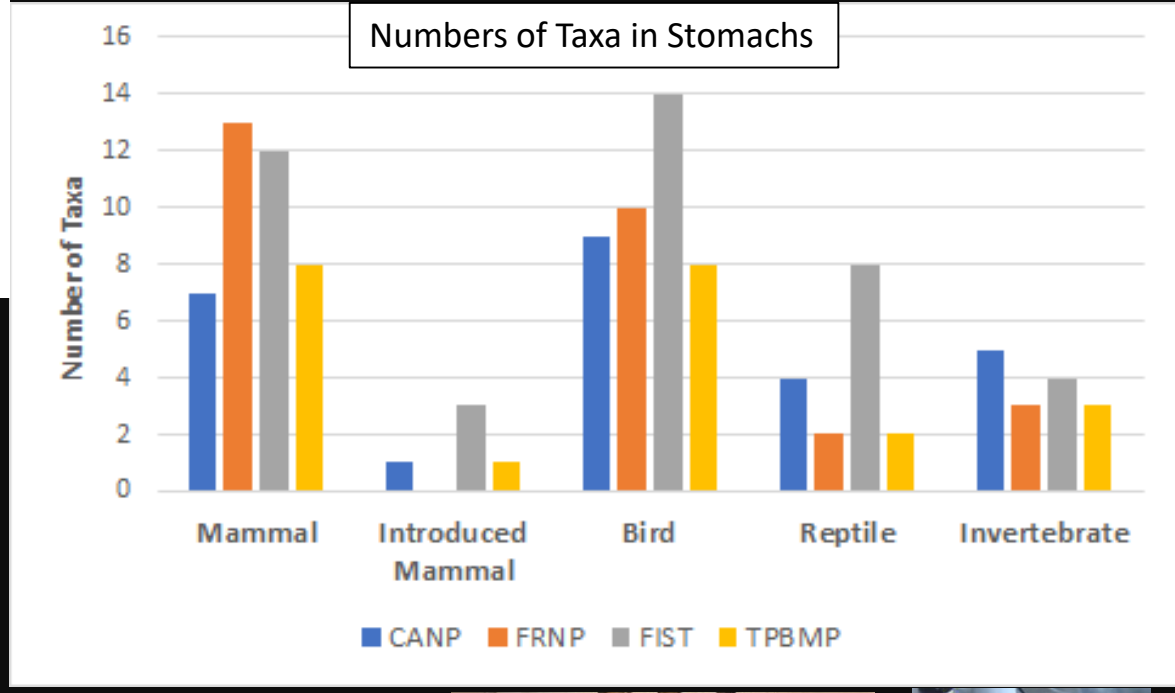


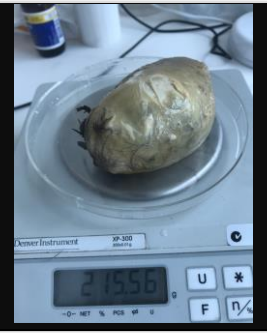
The last meal.....

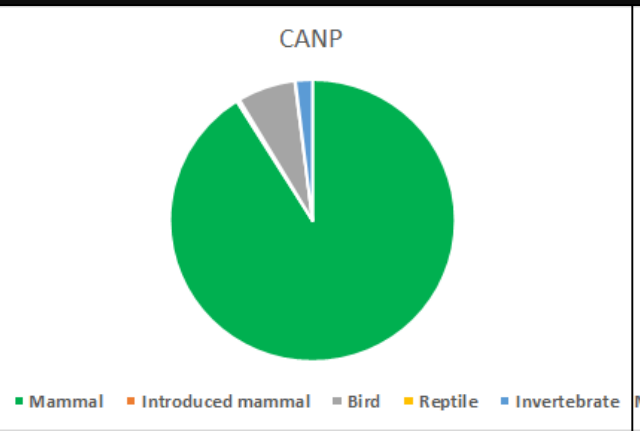
Traditional methods for four sites (multiple seasons)

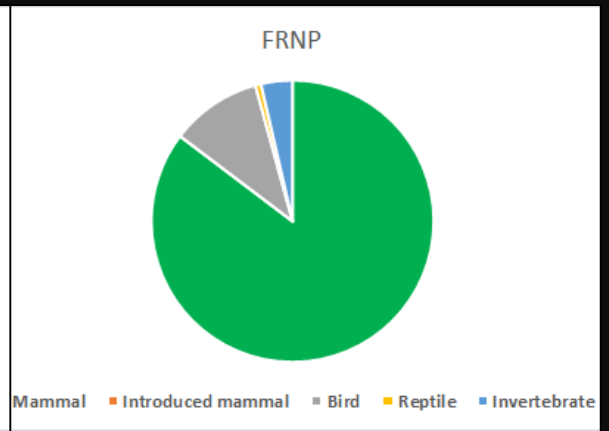
- Stomachs collected 2015-2022
- Number of taxa (and conservation significance)
- Frequency of Occurrence by area
- Index of relative importance (Piankas, 1971; 1976)
- Niche breath (Hurlbert's – resources scaled for availability)
- Limitations

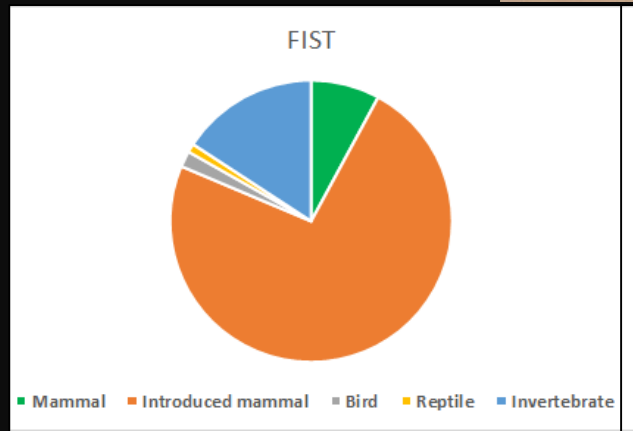
Baseline for investigation of using stable isotopes to increase temporal understanding of diet

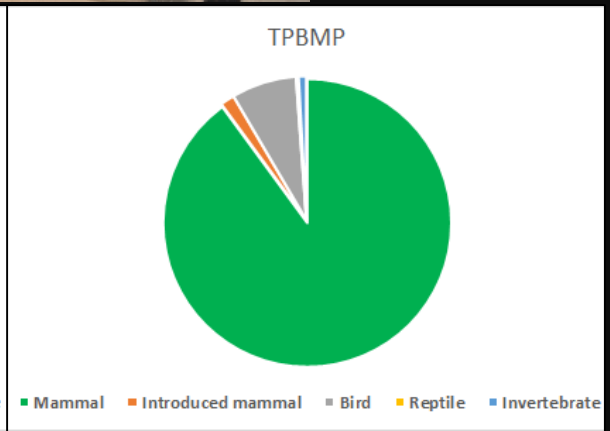












Beyond the last meal – stable isotopes

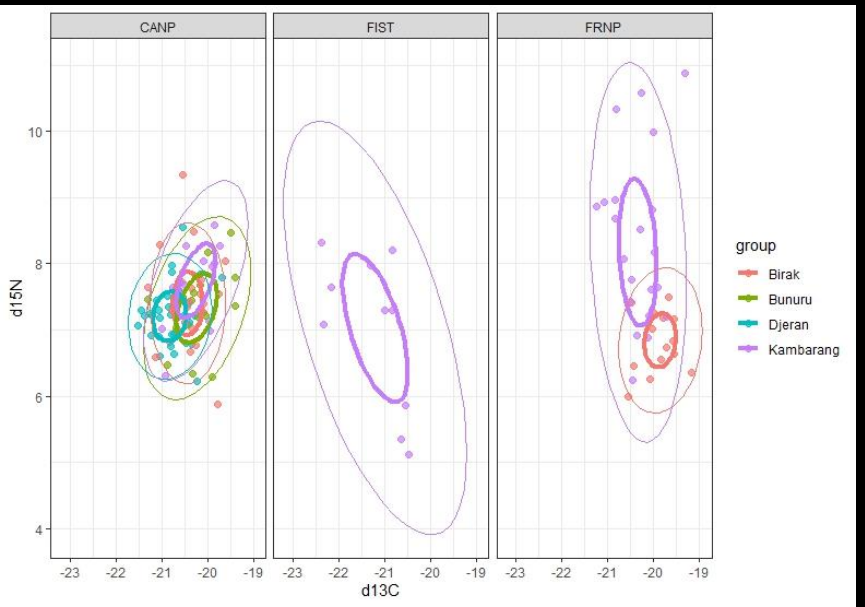
‘ you are what you eat + a few per mil’

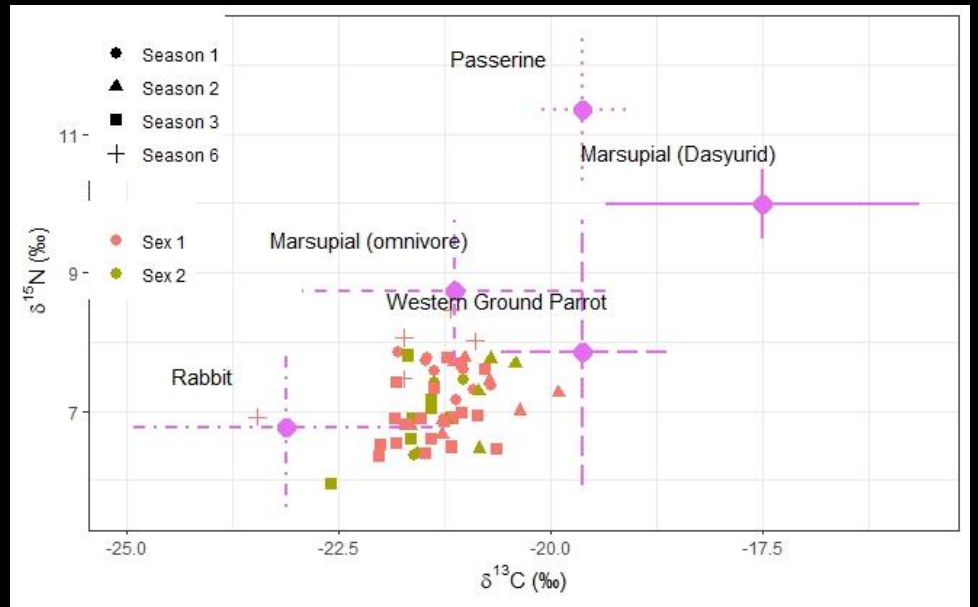
Exploration of methods for understanding longer term diet (& impacts)

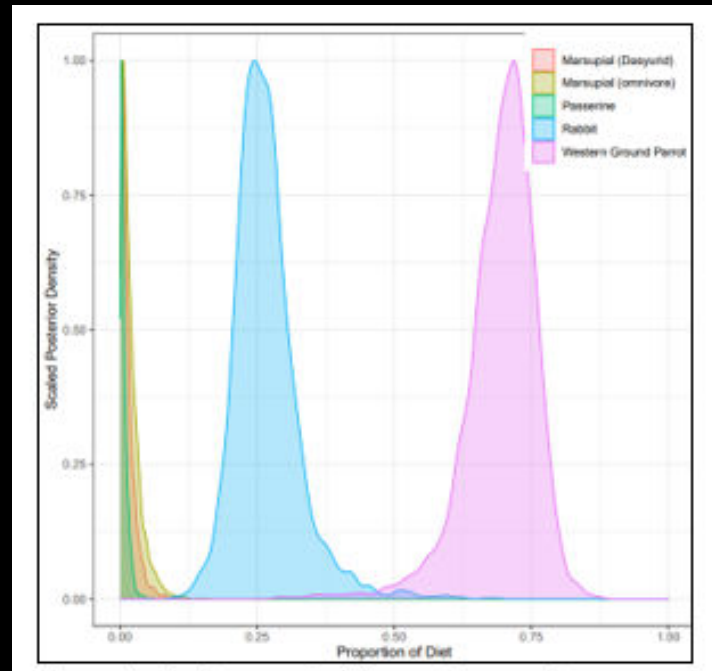
- Stable isotopes δ15N and δ13C (blood, tissue, hair)
- Exploratory seasonal niche shift models - dietary breath

Mixing models (Bayesian with informed priors from stomach content analysis)

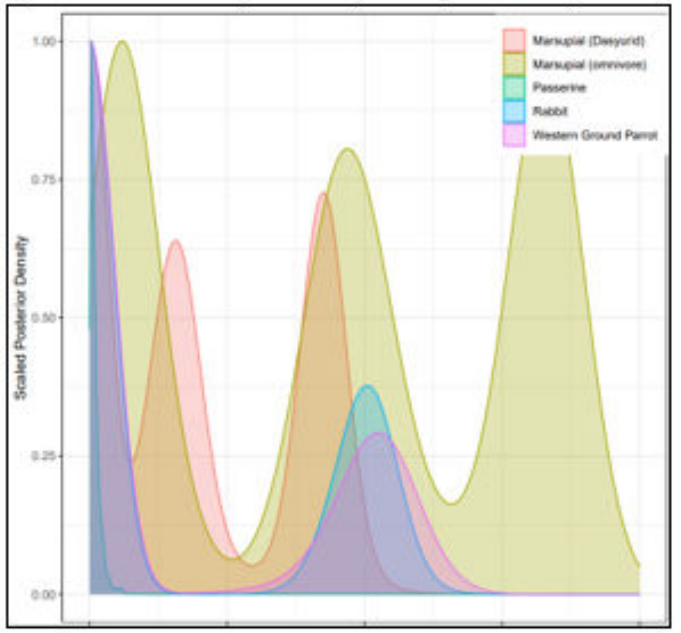
- Evidence of prey consumed not detected in stomach content analysis
- But also support for significance of stomach analysis







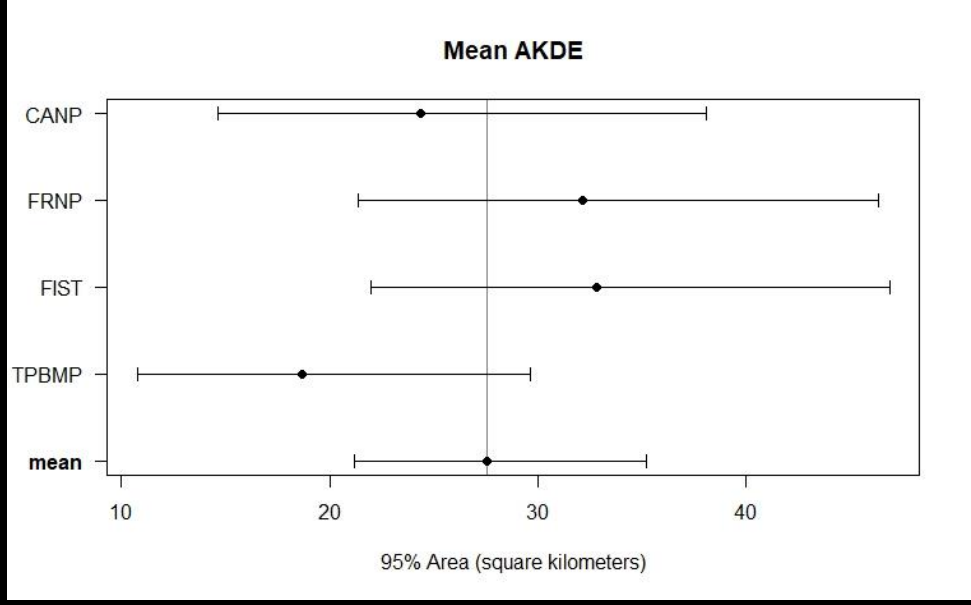
a) Male feral cat probability with generalist priors

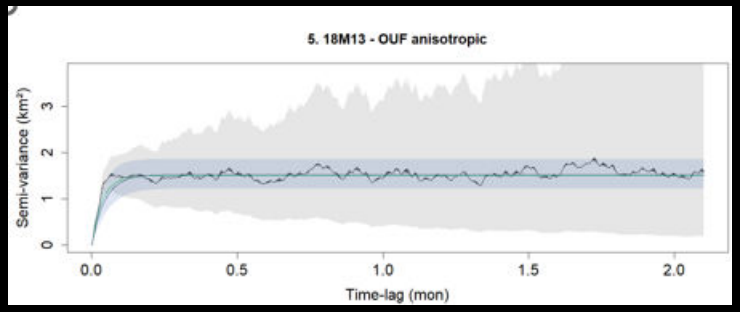


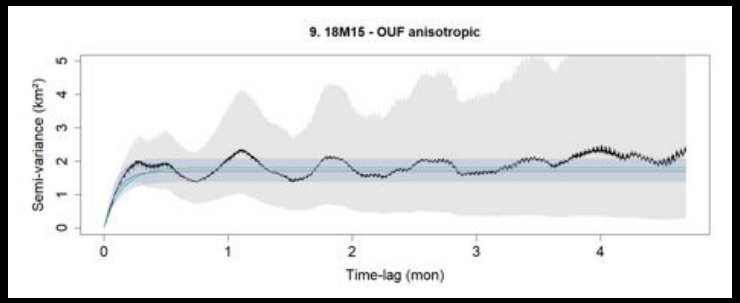
c) Male feral cat with informed priors

Behaviour & spatial ecology

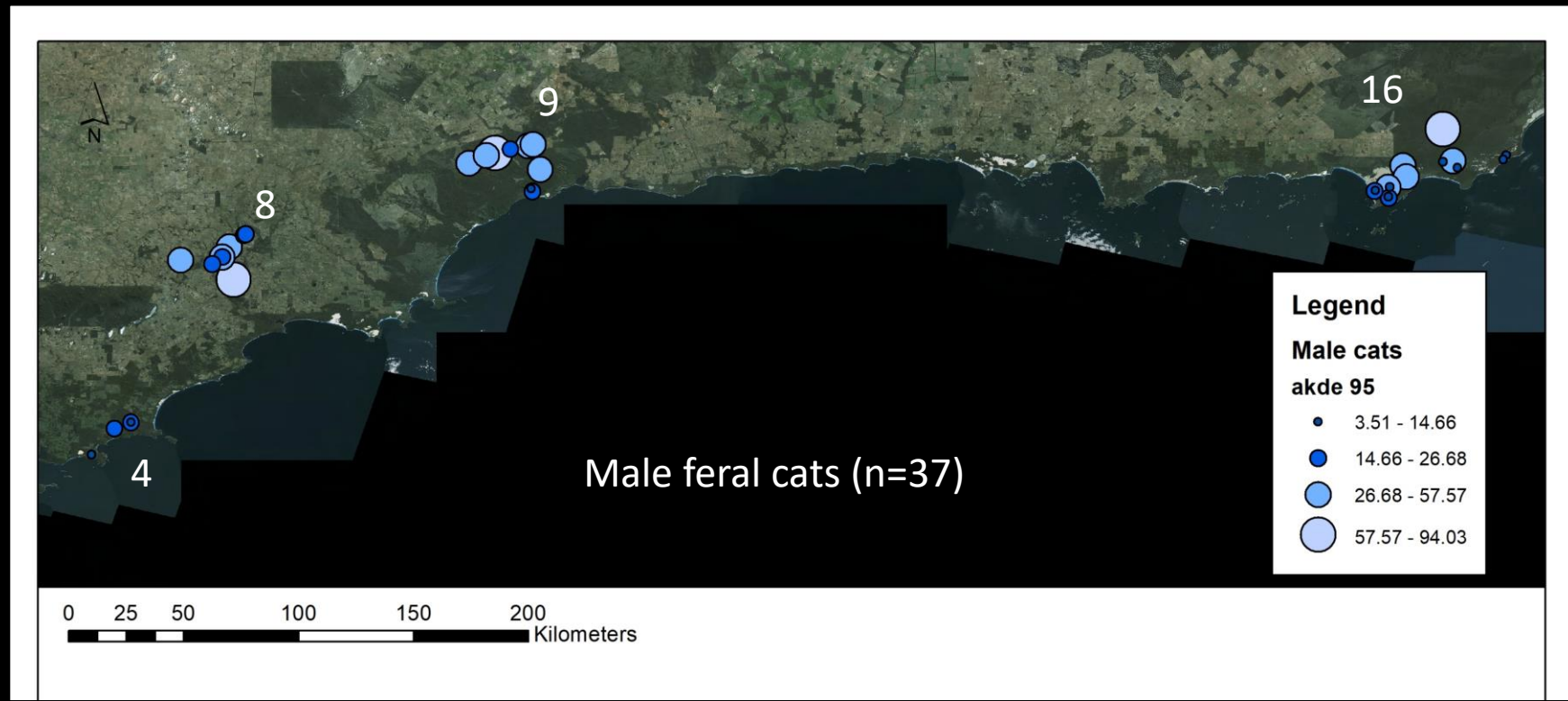
- 2012-2018 - 47 GPS collars (37M:10F)
- Range distribution (home range) analysis (ctmm)
- All cats demonstrated range residency (~2-5 days)
- Broad trends across populations
- Space use correlated with weight and site productivity





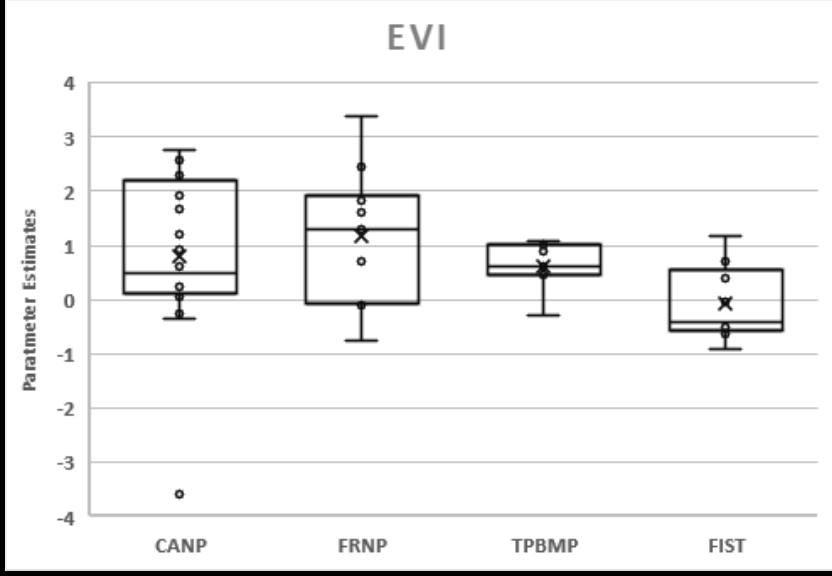


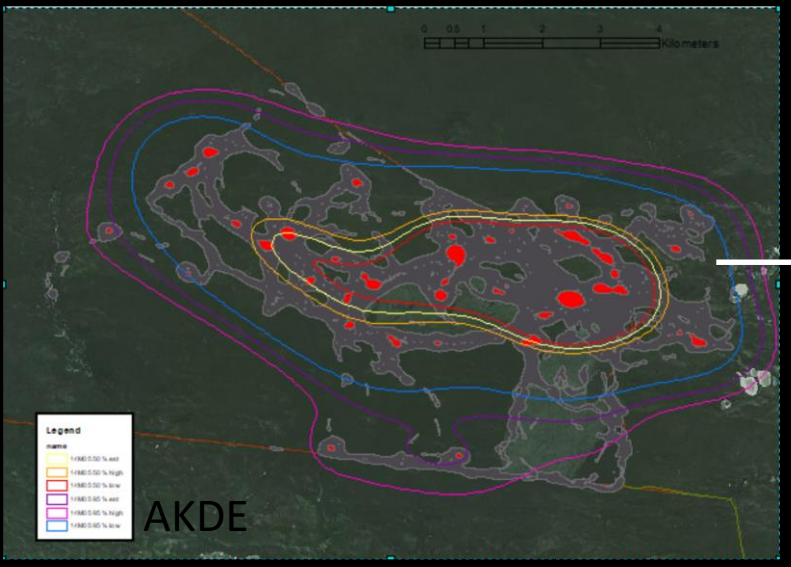
Fleming, C. H., et. al. (2015). Rigorous home range estimation with movement data; a new autocorrelated kernel density estimator. *Ecology* **96**, 1182-1188

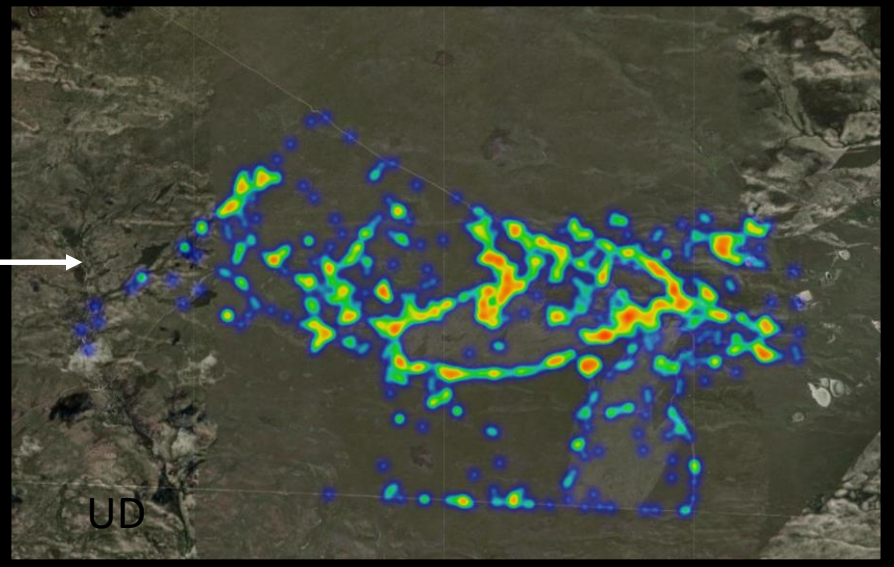


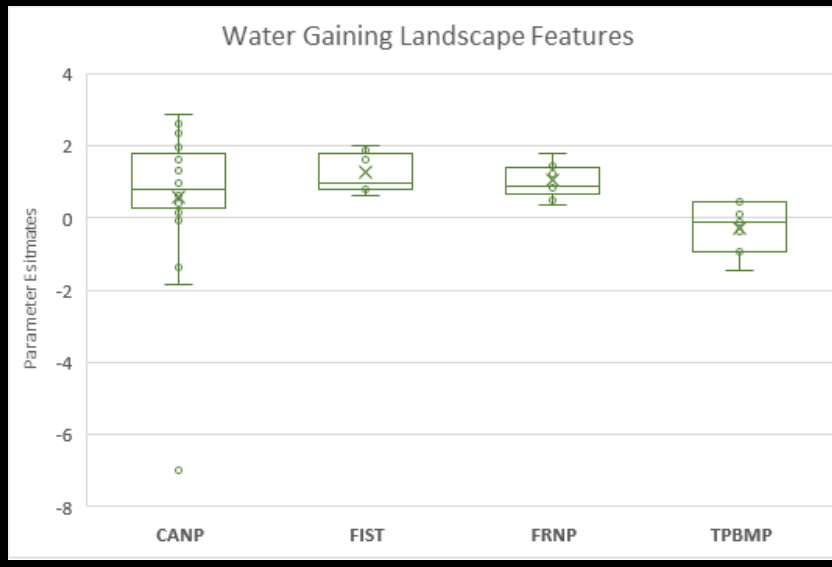
Resource selection models

- Landscape variables :
  - **Moisture gaining features * +ve selection CANP, FIST, FRNP**
  - Terrain Ruggedness – not significant
  - Distance from tracks and reserve edges – not significant
  - **Time since fire - * – ve selection CANP**
  - **Productivity (EVI) * + ve selection for CANP,FRNP, TPBMP**



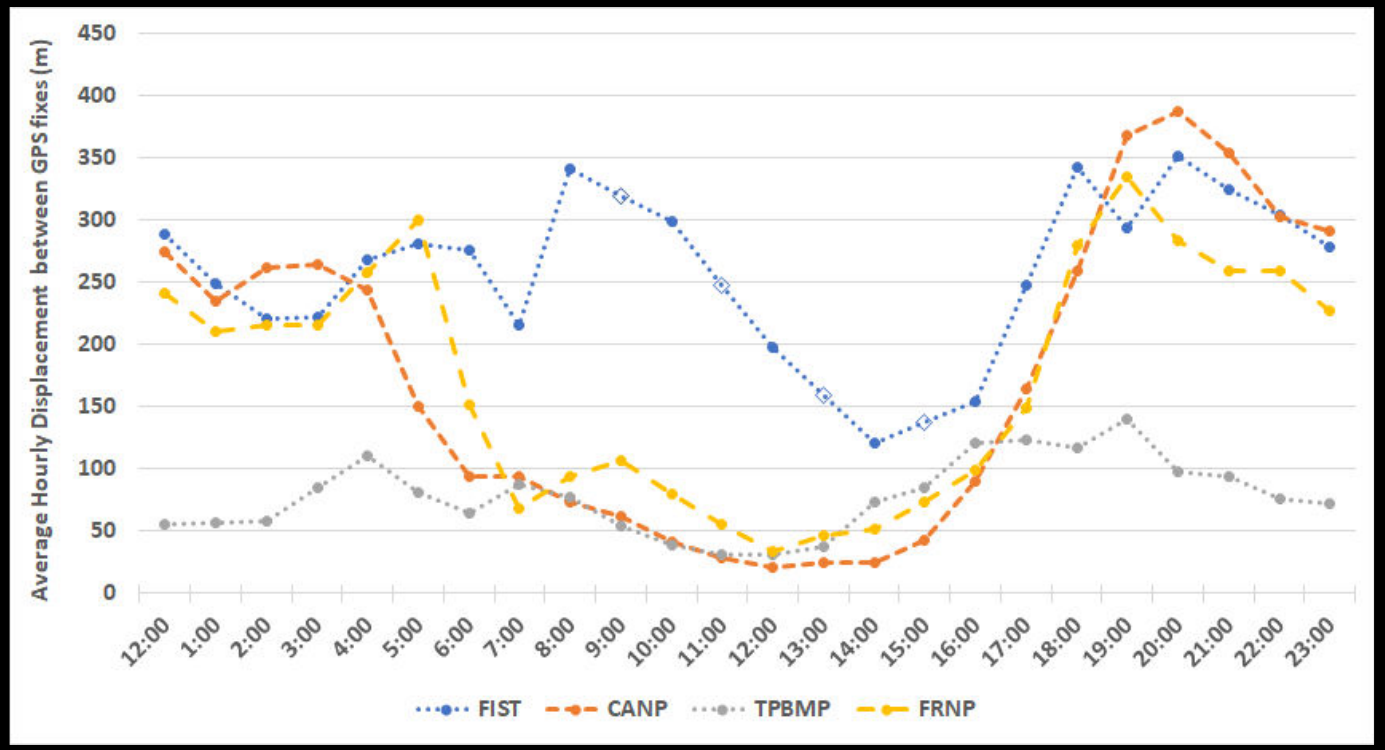


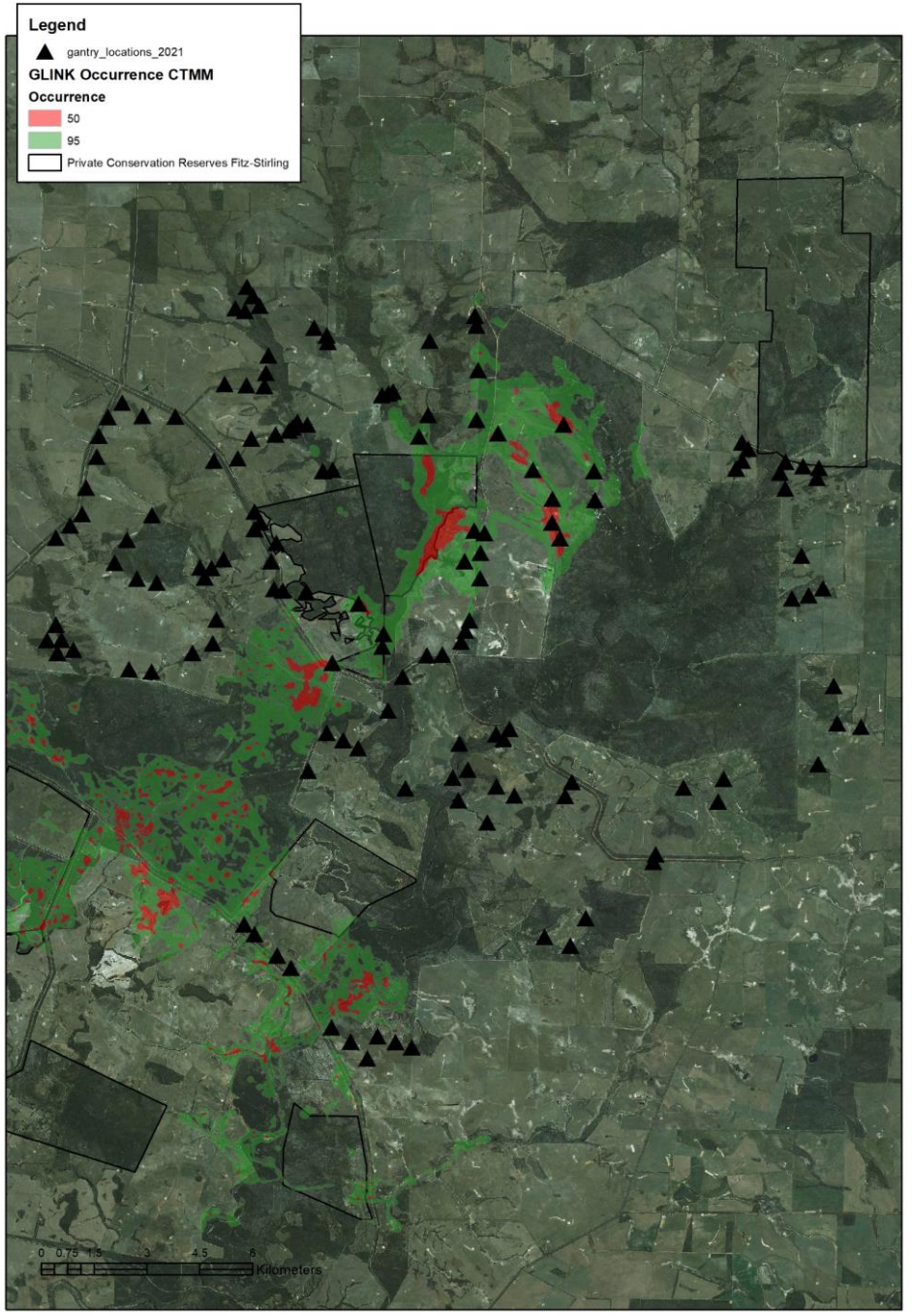




Spatial ecology - management

- Hourly displacement for regular movement patterns
- Inform spatial delivery of baits (deployment patterns and targeted control)
- Inform targets for other control methods





Prey availability Two Peoples Bay Nature Reserve: trap success & change in biomass

Can optimal baiting period be predicted (temporal)?

Hypothesis: no specific period where prey availability or encounter probability is limiting feral cats taking baits

GLMs: small mammal biomass and trap success (3 years

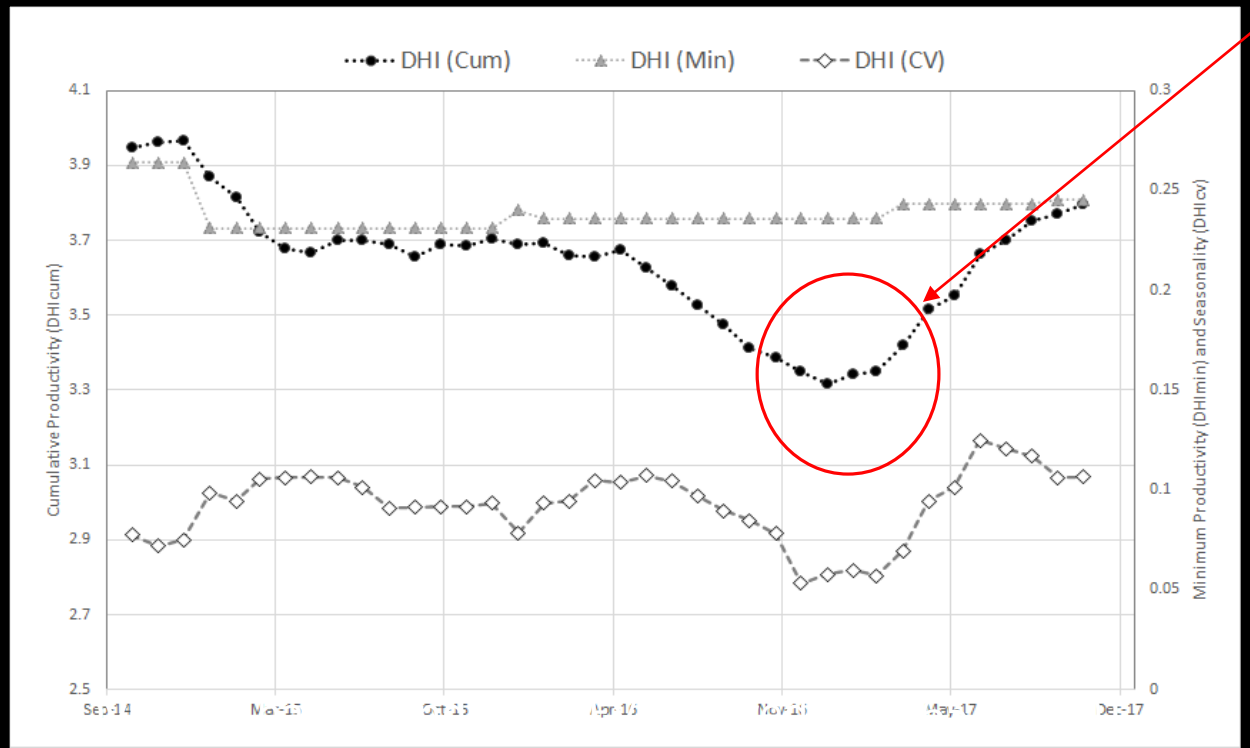
- Dynamic habitat indices NDVI/EVI (cumulative annual productivity, seasonal variation, minimum)
- Rainfall and other climatic variables

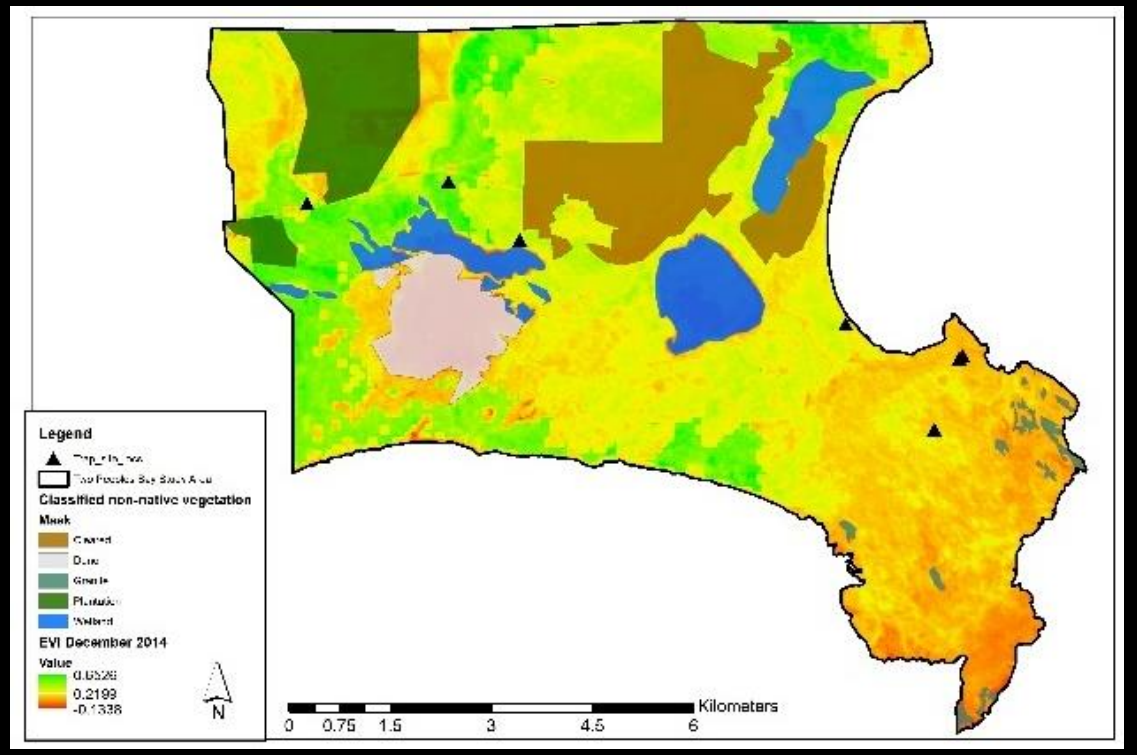
Model Selection

Trap Success: Rainfall in the preceding 12 months ($t = -2.433$, $p=0.02$),

Biomass: DHI_{cum} derived (NDVI or EVI)

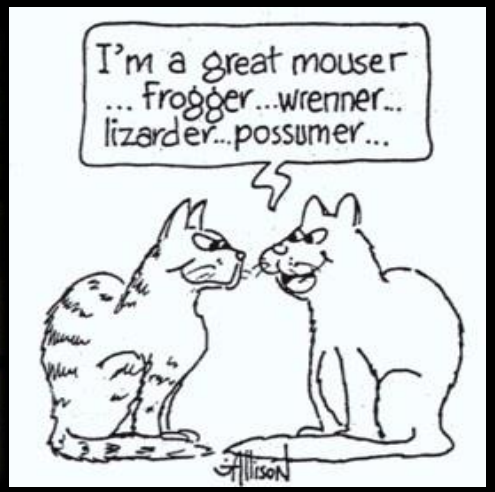
NDVI ($t = -2.466$, p-0.02); EVI $t=-2.965$, $p<0.01$).





Summary.....

- Increased understanding of impacts- species at risk
- Inform temporal and spatial delivery of baiting programs at a patch scale – cost efficiencies
  - Bait encounter probability
  - Interaction with prey resources
- Still need to be integrated and adaptive approach– allow for stochastic events



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- Bush Heritage staff and supporters
- Many volunteers (trapping, tracking)
- Supervisors

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