Monitoring Australia's Flying-Foxes:

Results from the National Flying-Fox Monitoring Program and other news

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NFFMP

- Initiative of the Commonwealth and State governments

- What are the status and trends of the EPBC-listed species?
- Where are flying-foxes and what does this mean for disease risk?

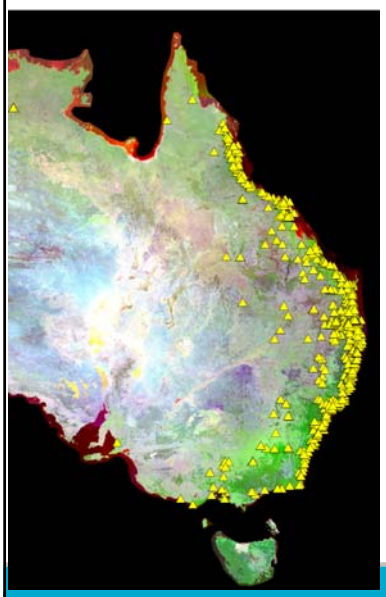
- Identified as a long-term monitoring program

NSW GOVERNMENT · Australian Government · Queensland Government · ACT GOVERNMENT · Government of South Australia · State Government Victoria

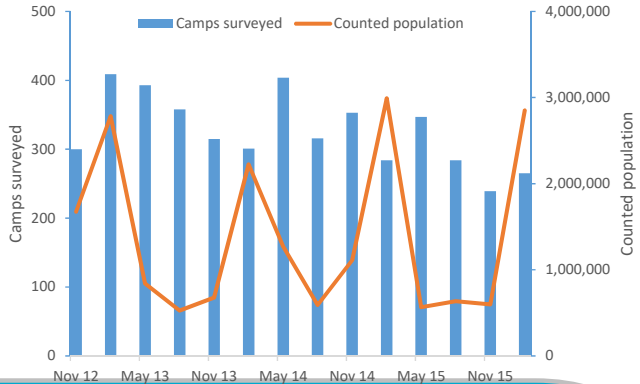
Methods

- Coordinated by the States
- Reliant on volunteers, state and LG staff
- Occupied camps visited over a 3 day period, each quarter
- No single counting method is appropriate for all circumstances
  - Area/tree, Direct, Fly-out, Estimate, (Distance)

NFFMP Coverage



- Four mainland species
- Extending into CQ, NQ, FNQ, Cape York and the NT
- >714 camps, >587 monitored, >364 occupied
- 15 survey bouts



(Westcott et al. 2015 Report to RIRDC)

Accuracy and Precision

- Accuracy of counting
  - Fly-out (partial) -15%
  - Other methods unknown
- Precision of counting
  - Within methods 17%
  - Between methods 15%

Method	Mean Precision, %	SD	N
Estimate	19	10	15
Area/Tree	18	10	27
Distance	15	11	14
Direct	14	11	20
Fly-out	16	12	19
All Methods	17	11	95

(Westcott & McKeown 2004; Forysth et al. 2006; Birt 2005; Westcott et al. 2012; Westcott et al. 2015)

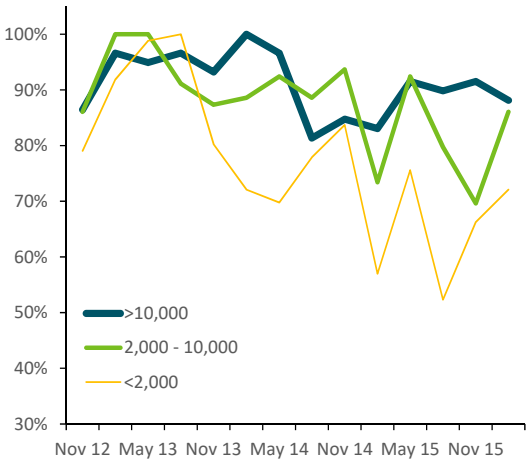
Other factors affecting accuracy

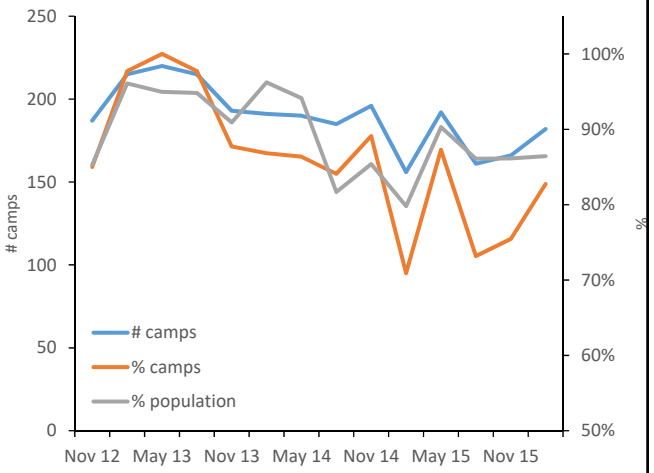
- Nights away from known camps

	summer	winter	
SFFS	20%	73%	(12 new camps -> 14% pop)
GHFF	0%	27%	(1 new camp)

- Missed camps
  - GHFFs - varies from count to count, can be as high as 27%
  - SFFs – all camps are checked each monitoring bout

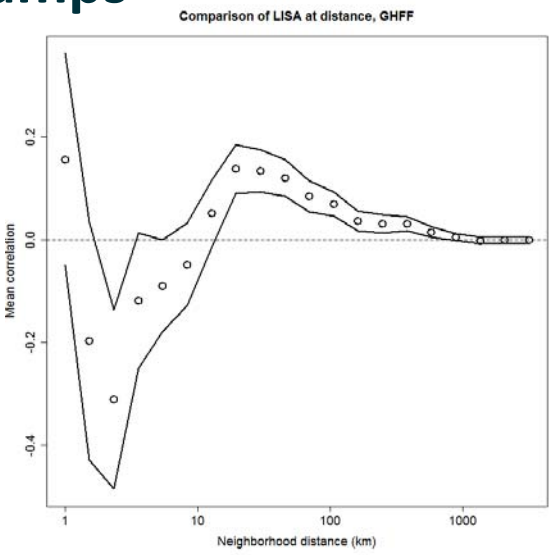
Minimising effect of missed camps - GHFF



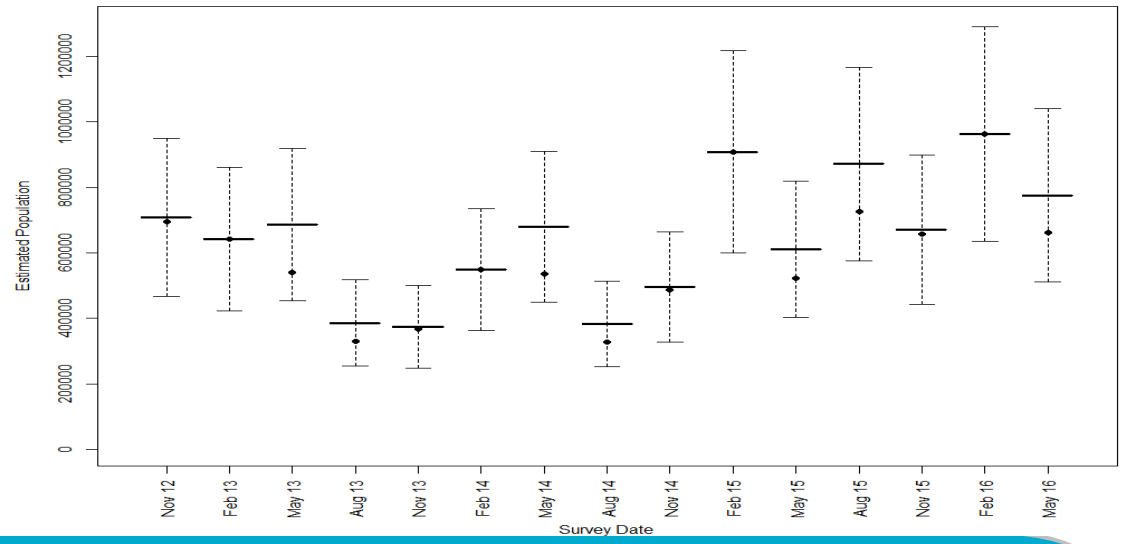


Accounting for missed camps

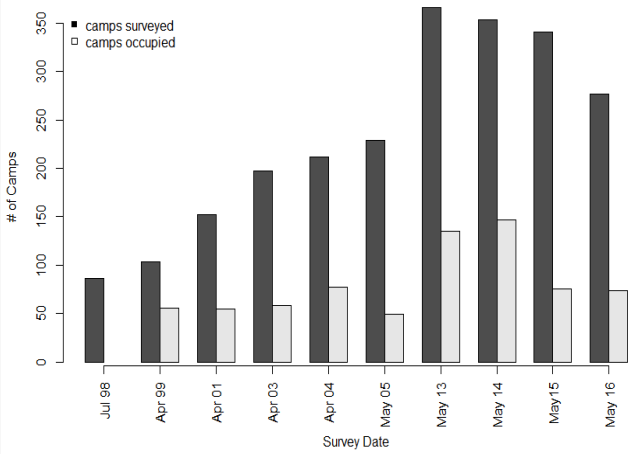
- Spatial smoothing technique, kriging
- Applied to camps that are expected/known to have animals
- Bootstrapping indicates
  - Performs well at population levels
  - Performs poorly for individual camps
- Exploratory will be refined with longer time-series

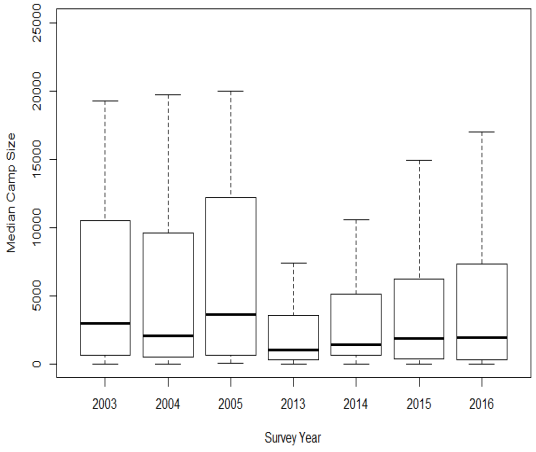


Grey-headed flying-fox

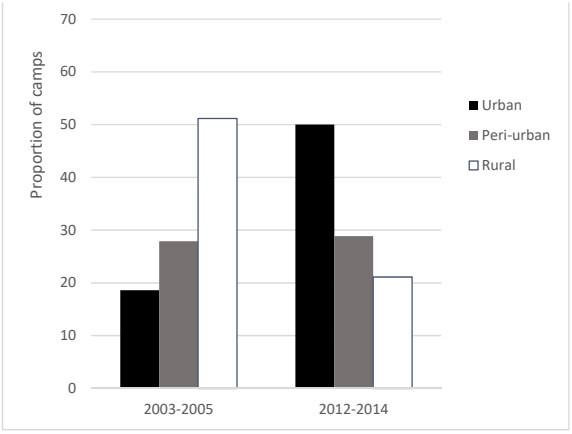


Comparison with the pre-NFFMP surveys

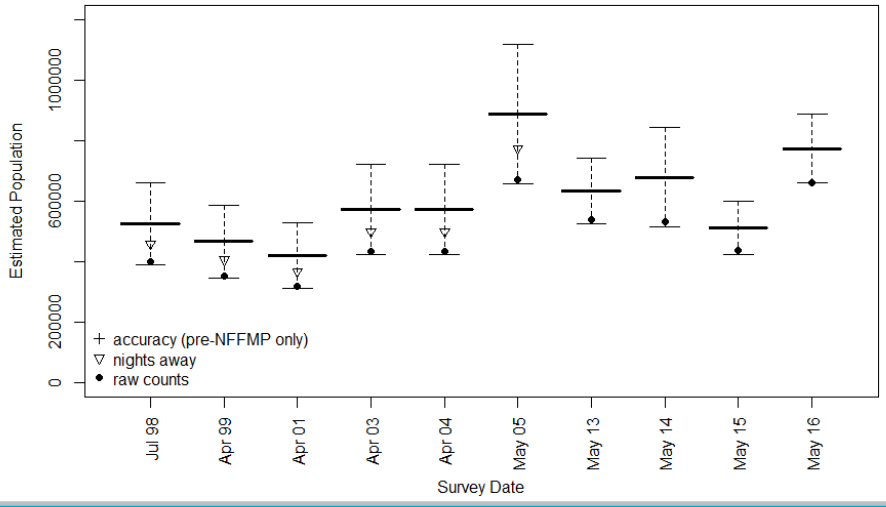




Comparisons with pre-NFFMP surveys



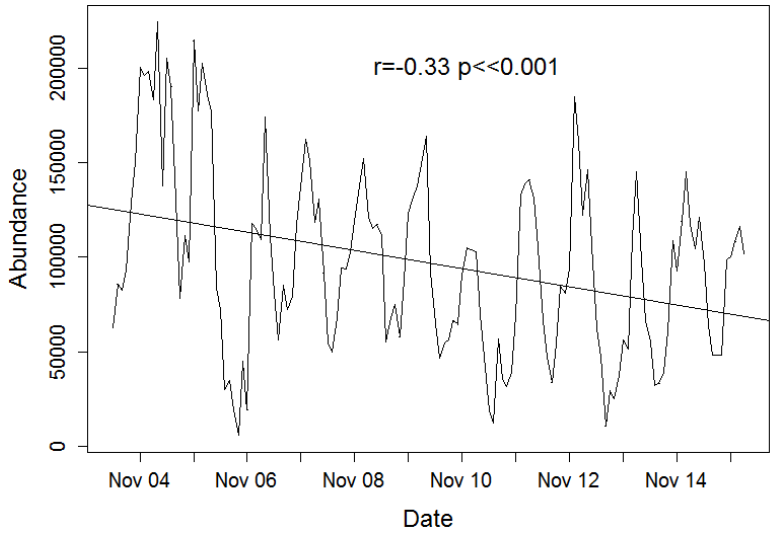
Comparison with Pre-NFFMP surveys



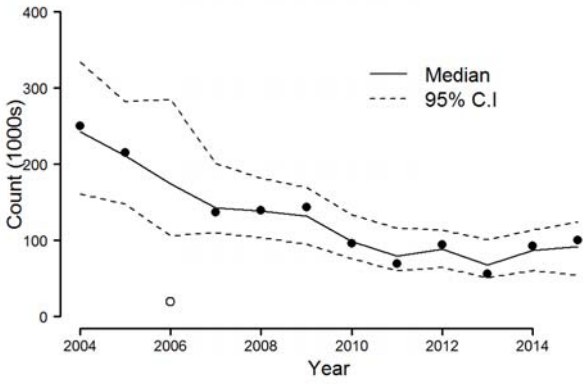
Summary

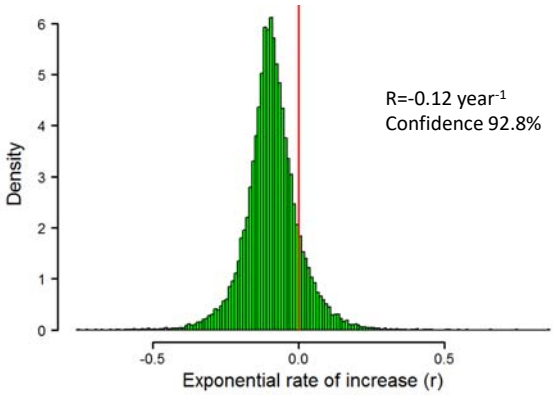
- Population estimate for Nov. 2015 of 690,695 (± 171,000)
- Direct comparisons with pre-NFFMP counts are fraught
  - Different methods
  - More camps and greater geographic coverage in NFFMP
  - Additional corrections made to NFFMP
- However, no dramatic changes in GHFF abundance
  - Stable – slightly declining
- Threats persist and thus no argument for changing status
  - De-listing → pressure to shift camps, culling in orchards

Population trajectory - SFF



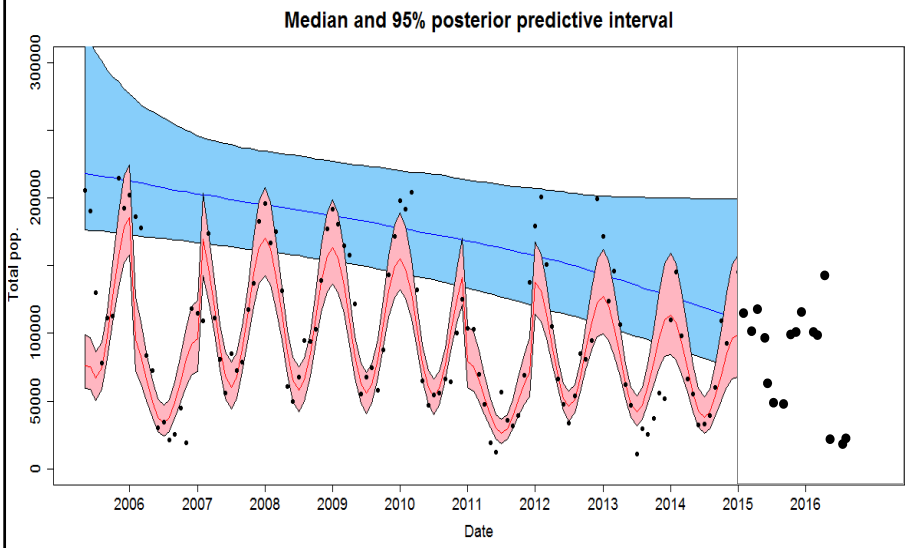
The SFF population is declining





R=-0.12 year^{-1}
Confidence 92.8%

Decline and a prediction fulfilled



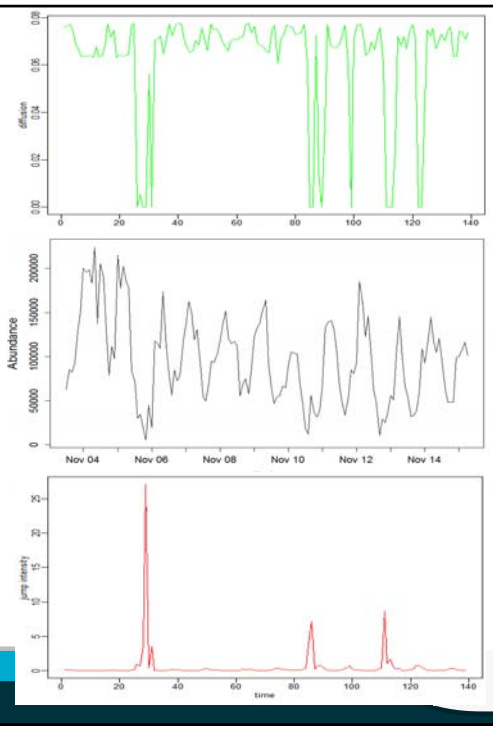
- 2004-2014 data - trained model
- Modelled monthly dynamics
- Modelled trend
- Predicted monthly dynamics
- Predicted trend
- 2015-2016 data

Hypotheses for the decline

1. We were really bad at counting in the first 2 years
   - 04/05 removed from the SS model

2. The range of the species has shifted
   - Telemetry found no change in range

3. Disturbance
   - Early warning analysis
     (Dakos et al. 2012 PLoS One, Dakos et al. 2015 Phil. Trans. Roy. Soc.)
   - Examines patterns of variation in time series data to identify perturbations
   - Diffusion small perturbations
   - Jumps large perturbations



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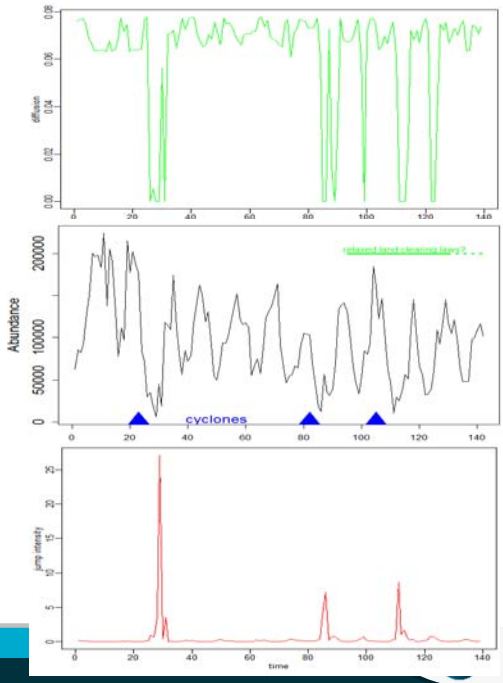
Are cyclones to blame?

- Larry big and bad
- Yasi big and bad
- Oswald small and sneaky

- Something else is going on post 2011
  - Vegetation Clearing effect?
  - Poor fruit and flowering seasons?



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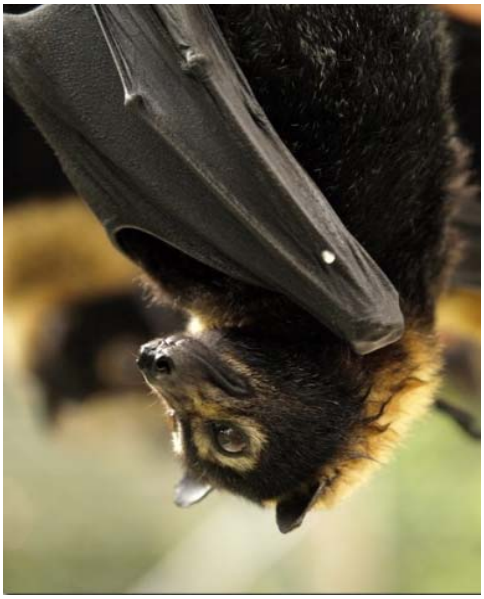
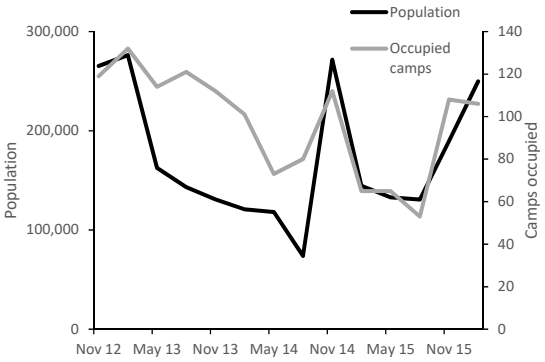
SFF summary

- Population has declined c. 50% since surveys began
- Current population estimate is 100,000
- Recommended listing as endangered under the EPBC Act.
- Do we want to just be voyeurs or do we want to do something about it?

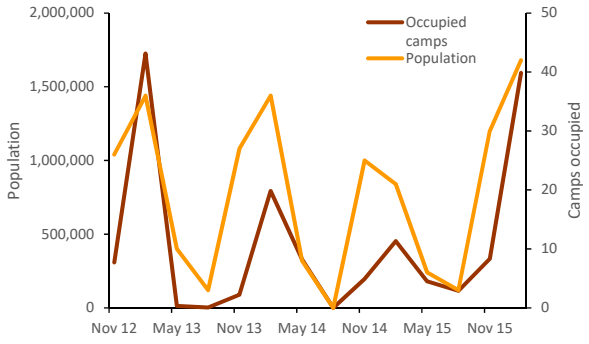


But what about the BFFs and LRFFs?

Blacks

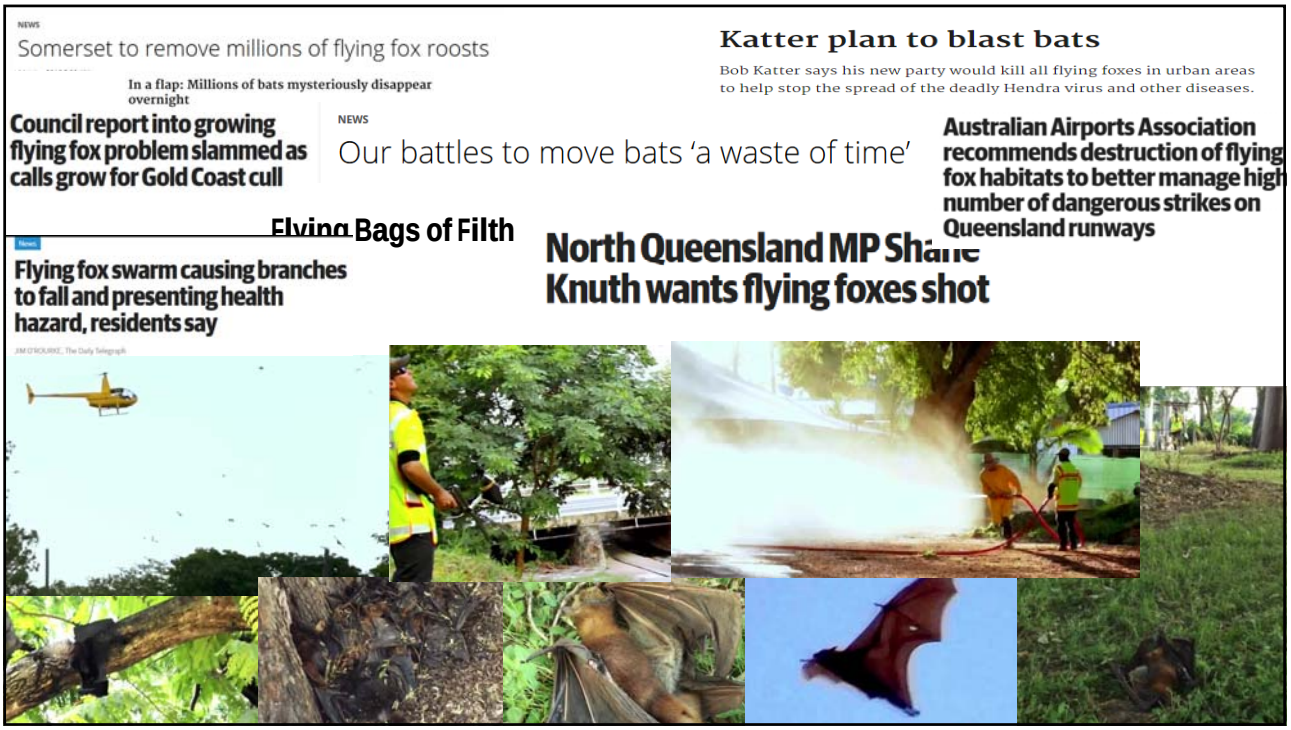


Little-reds



LRFF and BFFs in Northern Australia

- Assume that they are abundant, safe and everywhere
  - Vitrually no data
    - Two studies of LRFFs, 0.2% band recovery
  - Patchy and seasonal distribution
    - populations smaller than assumed
- We know there are threats, current and looming
  - Persecuted– lethal and “non-lethal” methods used
  - Climate change influences on flowering & seasonality
    - Starvation and extreme heat events
  - Development in Northern Australia
    - Habitat loss
    - Persecution in orchards
- We have no baseline data to assess current status
- We won’t be able to determine trends



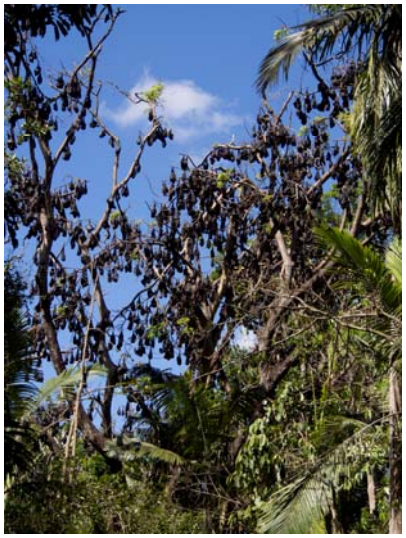
Need a people and ecology program

- Why do they roost in towns and what can be done?
- How can communities make better decisions?
- What are the management needs?

- Telemetry data is fundamental to each of these goals
  - Monitoring
  - Habitat use, resource distribution, movements
  - roosts, their characteristics, and their distributions
  - Powerful tool for communicating about FFs
- It is the underpinning technique for any study of FFs in the north

General Project Aims

- Understand their ecology in the north
  - Abundance, status and trends, distribution
  - Habitat use, resource distribution and dynamics
  - Camp habitat characteristics and site selection
- Communicate this understanding with local communities
- Camp Management
  - Review of outcomes across flying-fox Australia
  - Charters Towers – 100 years of flying-fox management
  - Work with Council to develop options



Conclusions

- NFFMP is a work in progress
  - Satisfactory performance to date, time for revisions
  - Expanding geographic and taxonomic scope
- GHFF
  - Population in November 2015 was estimated at c. 700,000
  - No evidence of significant changes since the pre-NFFMP counts
  - Recommended no change to status (Threatened)
- SFF
  - Population in decline – 50-62% over the monitoring period
  - Cyclones appear to be primary driver
  - Recommend listing as Endangered
- LRFF and BFFs
  - We need to know more

Thank you

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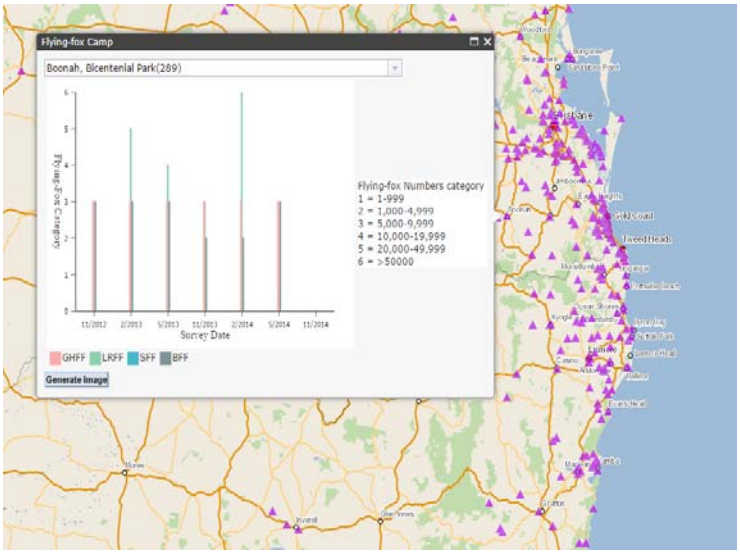
Should you wish



You can view the data at

http://www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring