

# Is turning light off enough?

Impacts of intense temporary lighting on insectivorous bats

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White-striped Free-tailed Bat  
by Michael Pennay



We acknowledge Wurundjeri Woi-Wurrung and Bunurong peoples of the Kulin nation as the Traditional Owners of the unceded land on which this research was conducted. We pay our utmost respects to their Elders: past, present and emerging.

# The team



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Christine Hall

With support from



and many tennis clubs & schools

# Insectivorous bats

- “Microbats”
  - 69 species from 8 families in Australia
  - Echolocation
  - Keeps insect populations in check
  - Services to humans (>US\$3.7 billion/ year in agriculture)
- The most diverse group of mammals in our cities
  - 16 species in the greater Melbourne region
- Ignored, Misunderstood & Understudied



White-striped free-tailed bat © Michael Pennay



Little Forest Bat ©Lindy Lumsden





# Why study microbats?

- Integral to
    - Ecosystem health
    - Human health
    - Agriculture
  - Sensitive to
    - Multiple threats
    - Changes in environment
  - Multiple species even in CBD
- Useful **bioindicators**

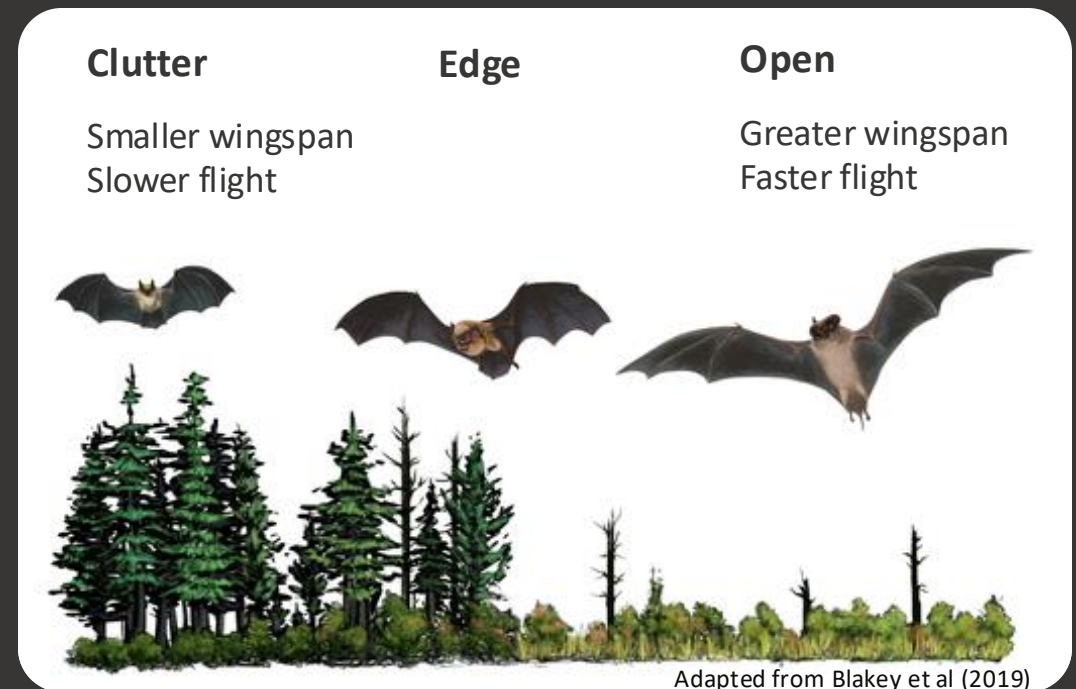


Lesser Long-eared Bat ©Michael Pennay



# Light and bats

- Predators of flying insects
  - Preys of nocturnal predators
  - Varied flight adaptations
- } Nuanced response to light
- Streetlights:
    - Lower diversity
    - Negatively impacts clutter-adapted



# Light and bats

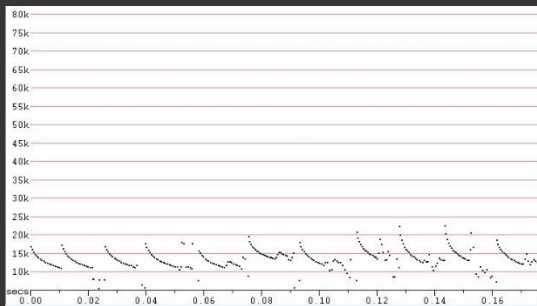


- Do microbats use green open spaces like urban parks and sporting fields?
- Do intense, temporary lighting impact microbat diversity and activity?
- If it does, what's the temporal footprint of the impacts?

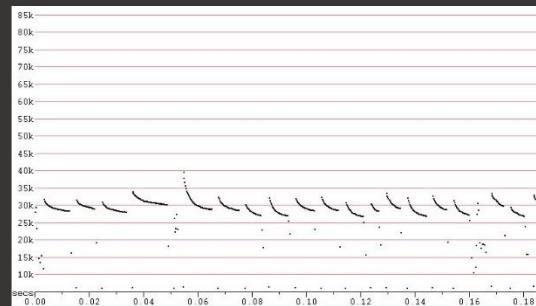


# Surveying microbats

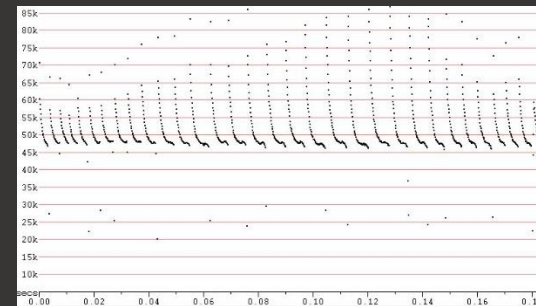
- Passive ultrasonic acoustic monitoring
- November - April
- Species IDed from call characteristics
- Number of calls = activity level



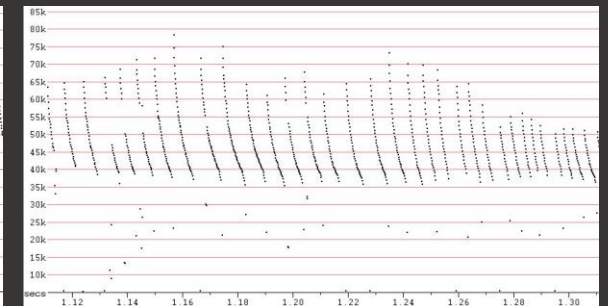
White-striped free-tailed bat



Gould's wattled bat



Little forest bat



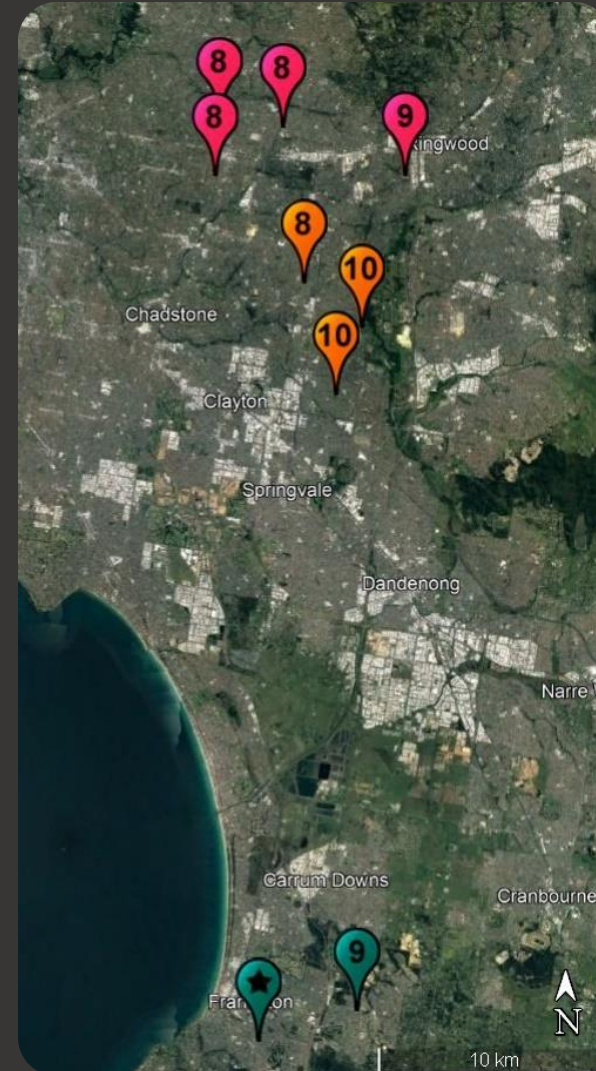
Lesser long-eared bat





# Use of urban open spaces by microbats

- 35 urban parks with open space (no light)
- 6 - 11+ species
  - Clutter-adapted drives difference
- **More trees within 25m**  
= greater diversity and activity



Callas et al. (2024)  
<https://doi.org/10.1071/WR23079>

# Impacts of intense temporary lighting



- 5x tennis court and control sites
  - Similar habitat features
- Surveys when light on/off
- Lux meter at light sites



# Impacts of intense temporary lighting



- **Lower diversity at light site**
  - Clutter adapted less active at light site
- Guild-specific
  - Open-adapted more active with light on
  - Clutter-adapted avoid area even light off  
→ **temporal footprint?**
- **Less activity near brighter light**

Species	Guild
Species richness	
Total activity	
Gould's wattled bat	Open / edge
Southern freetail bat	Open / edge
Inland broad-nosed bat	Open / edge
Large forest bat	Clutter / edge
Chocolate wattled bat	Clutter / edge
Little forest bat	Clutter / edge
Long-eared bats/ Large-footed Myotis	Clutter

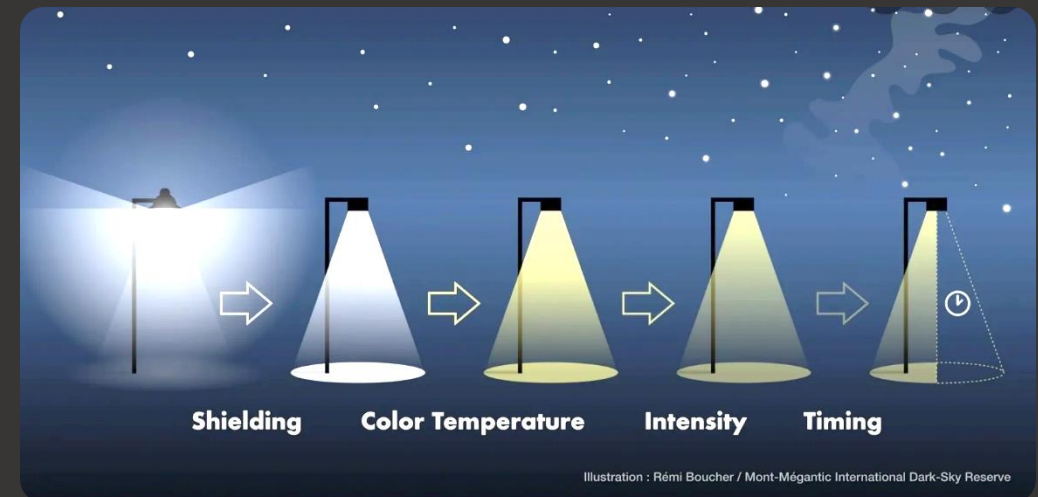


# What does this mean?



1. Urban parks can support **multiple microbat species**
  - Important habitat to maintain and improve
2. Temporary light **reduces bat diversity** with lasting impact
  - Avoid light near remnant patches, minimal lighting, reduce brightness
3. **Increase trees** around open areas
  - Greater diversity and reduced light spill
4. **More research** needed

Use minimal light, away from the remnant patches and plant more trees

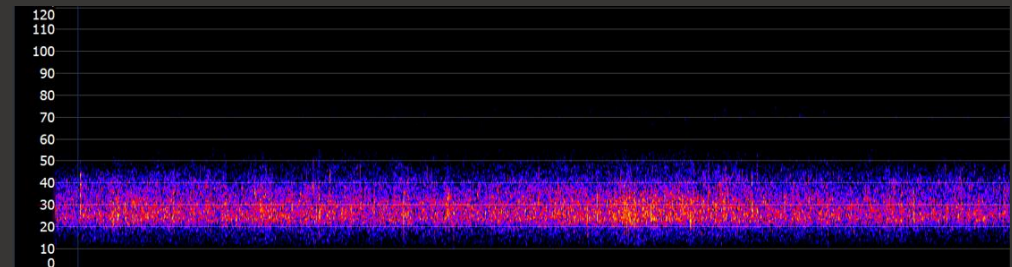
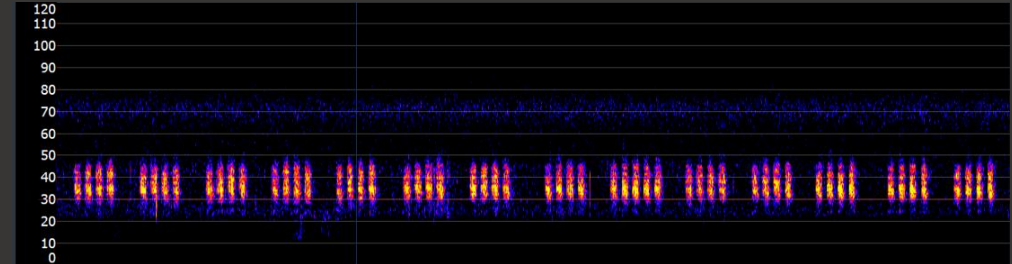


# What's next?



- Frequent ultrasonic noise at light sites
  - Emitted by the light/ associated structures
  - Irregular: with light on/off
- Impacts on microbats?
- Impacts of sporting lights in winter
- Other temporary/ more acute light events  
e.g.) Festivals, fireworks

→ **More wildlife-sensitive use of light**



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