

BIOL365: Marine and Terrestrial Ecology

Lecture 1: Practical introduction



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Welcome to the BIOL365/971

Prac schedule

Week 1 - 22 Jul 2024 Introduction to the practical schedule of learning

Week 2 - 29 Jul 2024 Phylogenetic module

Week 3 - 05 Aug 2024 Phylogenetic module

Week 4 - 12 Aug 2024 Phylogenetic module

Week 5 - 19 Aug 2024 Phylogenetic module

Week 6 - 26 Aug 2024 Conservation Behaviour module

Week 7 - 02 Sep 2024 Quiz 1 (covering lectures 1–13). Conservation Behaviour module

Week 8 - 09 Sep 2024 Conservation Behaviour module

Week 9 - 16 Sep 2024 Conservation Behaviour module

Week 10 - 23 Sep 2024 Conservation Behaviour module — Elevator pitch

30 Sep 2024 Mid-Session Recess

Week 11 - 07 Oct 2024 Seminar delivery (group 1)

Week 12 - 14 Oct 2024 Seminar delivery (group 2)

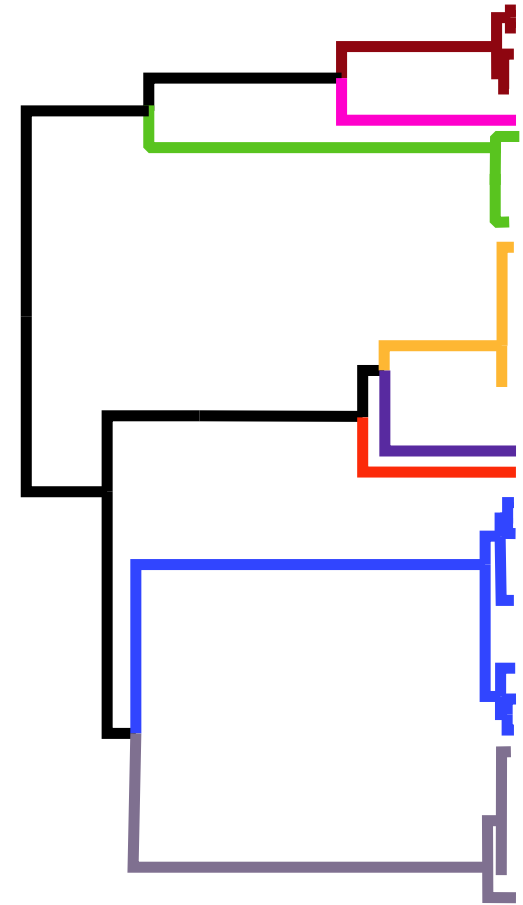
Week 13 - 21 Oct 2024 Quiz 2 (covering lectures 14–26)

Phylogenetics module

- Four-week module
- Tied to an assessment task
- You will present grant proposal
(phylogeny + 1,200 words)
- Worth 20%

What are phylogenies?

- Phylogenies are a representation of [possible] evolutionary patterns
 - Genetic data
 - Amino acids
 - Morphology
- Rooted or unrooted
 - outgroup



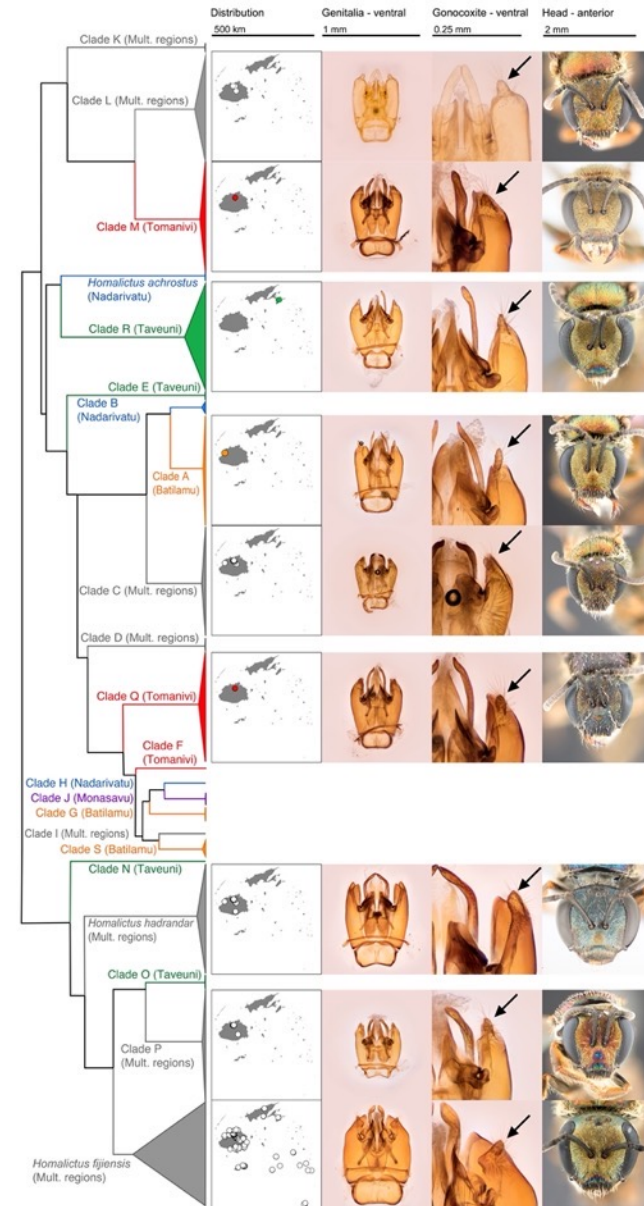
I'm an ecologist...

- Evolution is ecology
 - Over a longer time period
 - Answer questions that you cannot with classical ecological inquiry



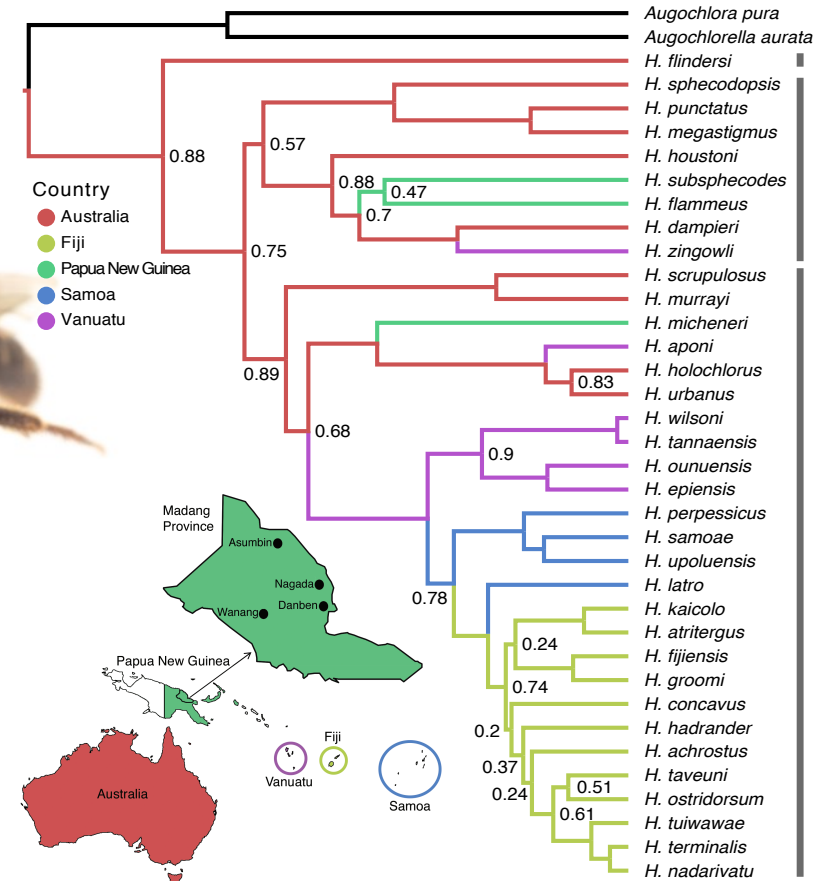
Example: Fijian *Lasioglossum* bees

- Describe new species



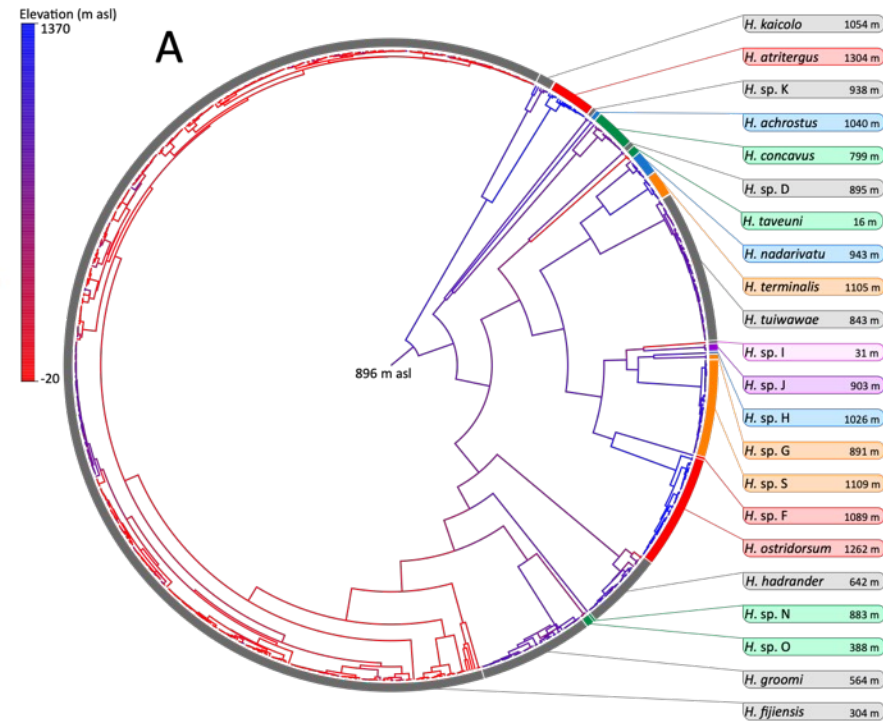
Example: Fijian *Lasioglossum* bees

- Infer traits & biogeography



Example: Fijian *Lasioglossum* bees

- Infer traits & biogeography



Geographic Location

Batilamu

Monasavu

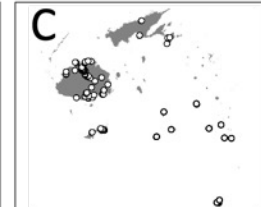
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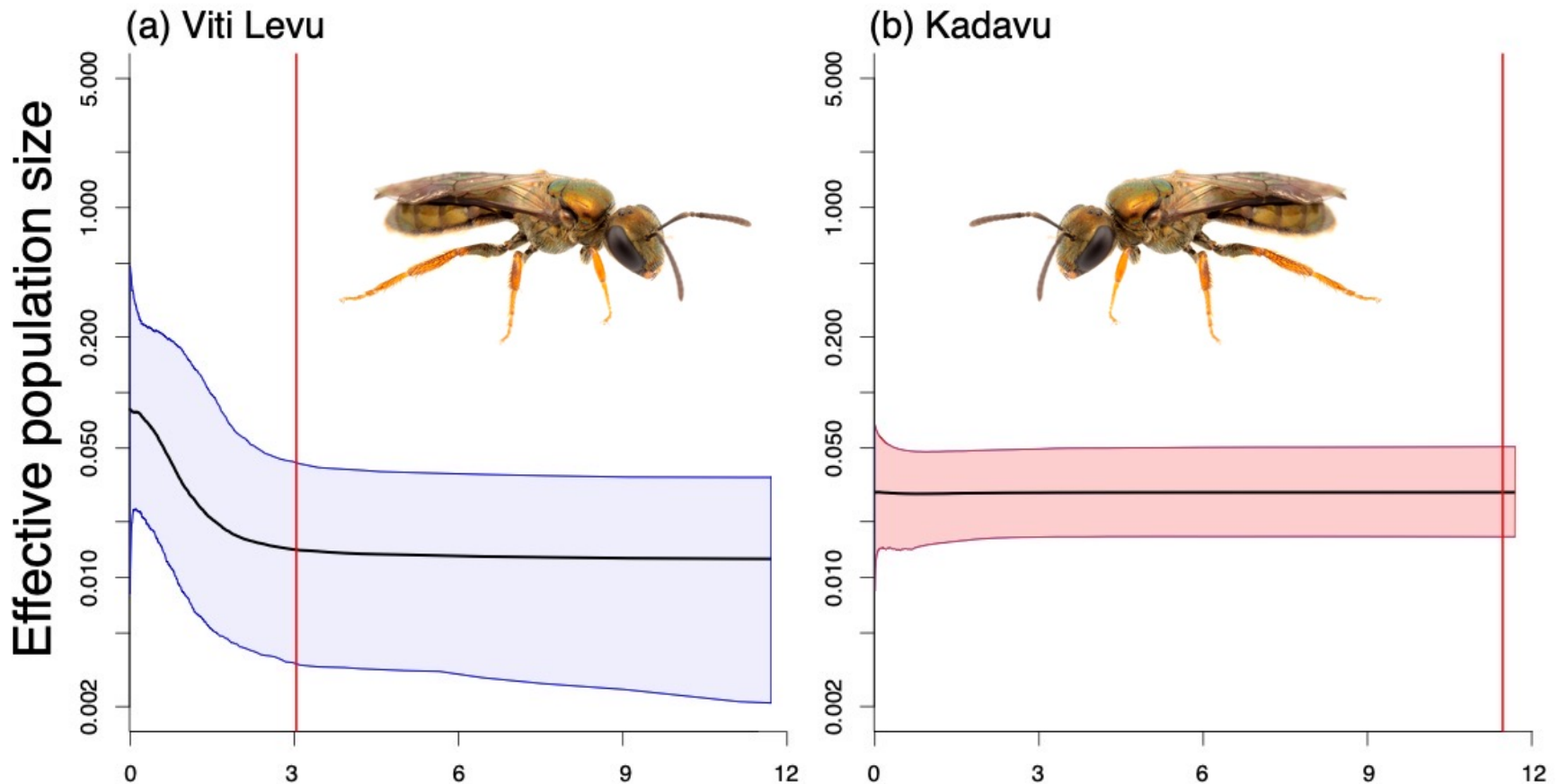
Mult. regions

Single lowland



Example: Fijian *Lasioglossum* bees

- Infer demographic changes



What will you be doing?

- 1. **Activity:** Address a macroevolutionary question
- 2. **Aim:** 2–3 pracs learning about phylogenetics in R
- 3 **Assessment:** Apply this knowledge to your question in a Grant Proposal (20%)



Grant Proposal assessment

In two parts:

1. Preliminary phylogeny (5%)

a) Apply your R skills to answer a question

2. Grant proposal (15%)

a) Apply your writing skills to a grant



Grant Proposal assessment

What is a grant proposal?

- Request project funds
- Relevant in many fields
- Requires:
 - Understanding priorities
 - Excellent writing
 - Evidence
 - Following guidelines
 - ...



Grant Proposal assessment

A last word on R...

- I don't expect mastery
- Errors are totally fine (we want to help you deal with them)
- Not just phylogenetics or data manipulation — you are learning a language
- It's a tool

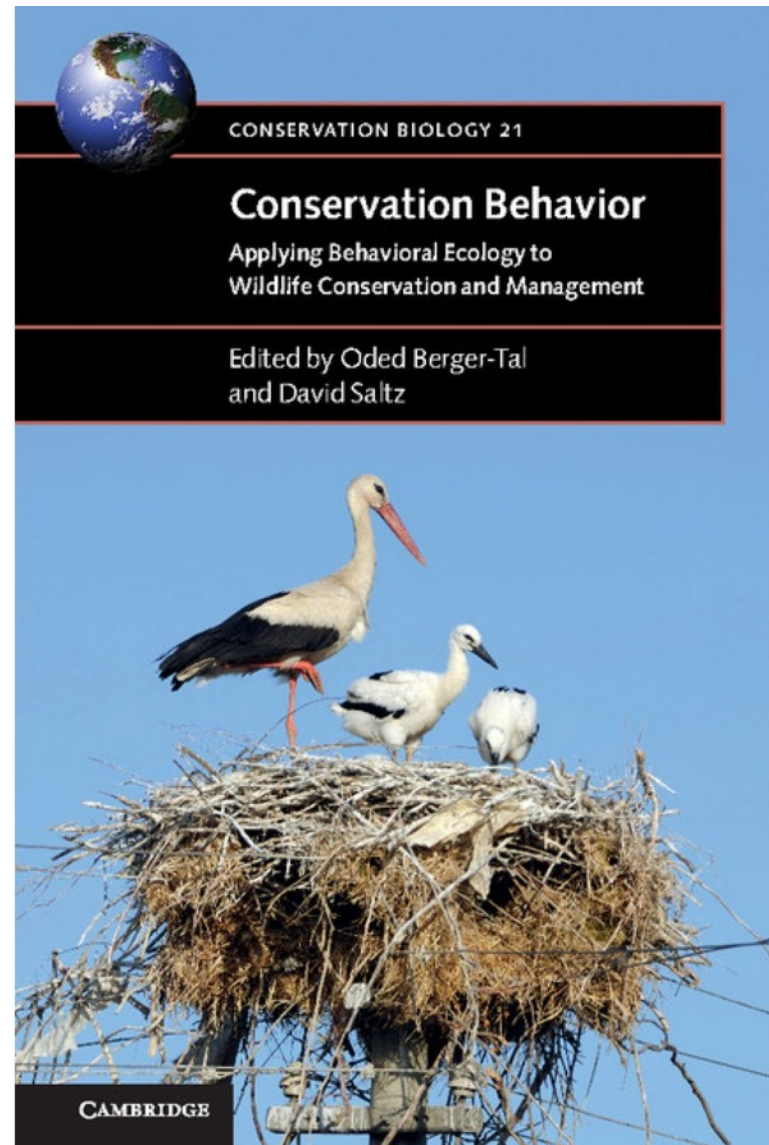


Conservation Behaviour module

- Four-week module
- Tied to an assessment task
- You will present an elevator pitch to the class (5 minute talk)
- Worth 20%

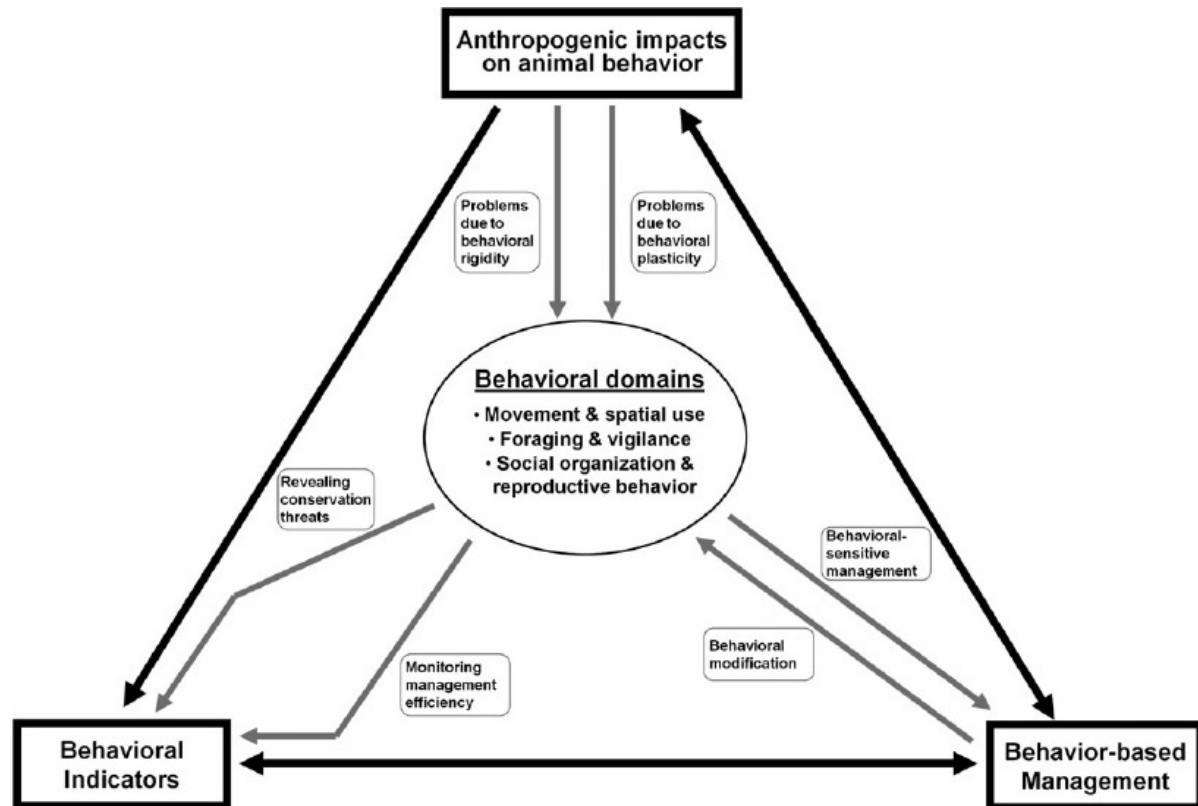
What is Conservation Behaviour?

- Conservation behavior is a relatively new interdisciplinary field.
- Aimed at investigating how proximate and ultimate aspects of animal behavior can be of value in preventing the loss of biodiversity.



Conservation Behaviour Framework

- The conservation behavior framework is composed of 3 basic interrelated conservation themes
- The black arrows represent interactions between the conservation themes.
- Gray arrows represent the pathways that connect each theme to the behavioral domains.



Behaviour Based management

-**Concept:** Manipulate environments to control behaviour

- **Example:** Predatory behaviour in NZ mammals and shorebirds

-Use of aversive stimuli (unpleasant stimuli) to condition predators

-**Approach:** Infuse Vaseline with bird odour at nest sites 5 weeks before birds arrived and 8 weeks after

-Teaches predators to ignore scent as a reliable indicator of food

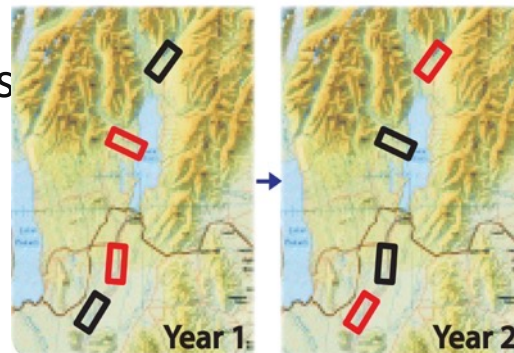
-**Outcome:** Chick production increased 1.7 fold at odour treated sites



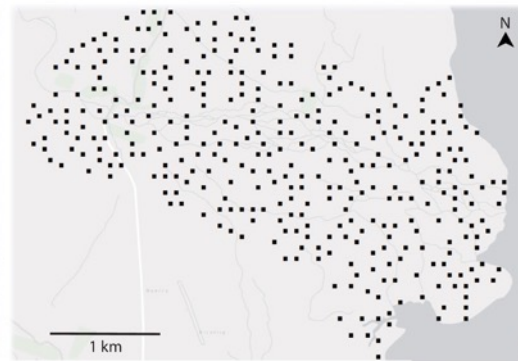
Study area in New Zealand with invasive predators (inset)



Native ground-nesting birds (inset) and a camera trap monitoring one of their visually cryptic nests



Novel experimental design: treatments reversed in year 1 & year 2. ■ = treatment (odor) ■ = control (no odor)



Large scale: 300-400 odor points per site

-REF: Grant et al (2021). "Misinformation tactics protect rare birds from -problem predators." *Science Advances* 7, no. 11 (2021):

Anthropogenic impacts on animal behaviour

- **Concept:** Behavioural plasticity causes fitness problems
- **Example:** Foraging behaviour in Sulphur-crested cockatoos
- Birds learning from each other to open lids
- Cultural transmission of knowledge
- Before 2018 bin opening only observed in 3 Sydney suburbs
- Now spread to 44 suburbs
- **Problem:** Sub optimal nutrition compromising bird health



Behavioural indicators

- Concept:** monitoring behaviour can indicate success of a conservation action
- Example:** Black Rhino re-introduction in Zimbabwe
- Rhinos showed progressive and consistent changes in movement patterns and habitat selection
- shifting from large-scale movements during the early stages of release to smaller-scale movements after home ranges were established



-REF: Wielgus, et al (2023). "Bringing the Black rhino back: Key factors for reintroduction success." *Global Ecology and Conservation* 48 (2023): e02756.

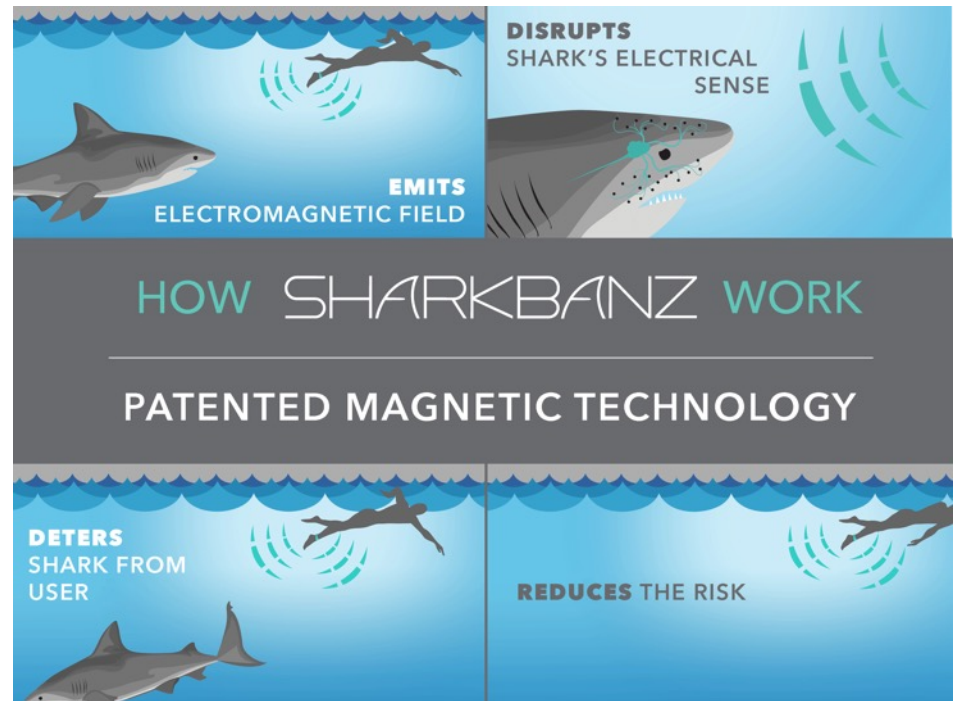
Conservation behaviour valuable for resolving Human-wildlife conflict

- **Human-wildlife conflict:** when encounters between humans and wildlife lead to negative impacts
- Conservation behaviour provides a potential solution to many conflicts
- **Example:** Olfactory control of elephant movement behaviour and crop damage in Kenya using repulsive odour from local ingredients
- Elephants have 2000 olfactory receptors (5 x humans)



Conservation behaviour valuable for resolving Human-wildlife conflict

- Encounters with dangerous species
- **Example:** Shark deterrents
- Sharks use electric signals in communication and prey detection
- Research into electromagnetic shields used by ocean users



Some examples of local conflict

- 1. Magpie aggression

- Magpies become aggressive during nesting season

- **Problem:** attack people

- **Outcome:** People killing magpies (biodiversity loss issue)

- Cable tie deterrent makes no difference to incidence of attack



Some examples of local conflict

- 2. Feral deer aggression

- During breeding season males become aggressive
- **Problem:** damage property
- **Outcome:** People killing deer (animal ethics issue)



Some examples of local conflict

- 3. Flying foxes

- Communal roosting behaviour.

Roost in large camps (up to 60, 000 bats)

- **Problem:** Nuisance species. Noise and smell disturbs residents

- **Outcome:** People killing bats (biodiversity issue)

-Bats are an important pollinator species

-Councils using scare guns, smoke machines and sprinklers



What will you be doing?

- 1. **Activity:** Spend 1-2 prac classes wandering the campus, botanic gardens or local green space.

-2. **Aim:** to observe interactions between humans and wildlife and document a human-wildlife conflict.

-3 **Assessment:** Present a 5 minute 'Elevator pitch' to the class where you draw on principles of evolution and behavioural ecology to pitch a 'solution focussed project' to a funding body (e.g. Wollongong City Council, UOW).



What is an elevator pitch ?

- An elevator pitch is a brief and succinct speech to outline your background, or your idea for a project, with the goal of drawing someone into a collaborative relationship.
- It should be delivered in 5 minutes or less.
- A breakdown of the components of the pitch and a marking guide will be provided in the first prac class of the module



What will we do in each prac class?

Week 6: Introduction to the prac and overview of the assessment and marking guide. Brainstorming session with Phil and peers. Risk assessments.

Week 8: Field work. Observation of a conflict. Take time to walk around campus, botanic gardens, beach or any local greenspace. Opportunity to meet in class to discuss ideas with Phil.

Week 9: Fieldwork and/or opportunity to meet in class to discuss observations with Phil. Opportunity to work on the elevator pitch in class.

Week 10: Presentation of the elevator pitch to the class.

Seminars in weeks 11 and 12

- Seminars on hot topics in ecology and evolution
- 10 minute talk worth 20%
- **Half the class present in week 11**
- **Half the class present in week 12**
- Topics are on moodle
- Read the description and put your name next to a topic in today's class
- If you want, you can come up with your own topic



Questions