INSTRUCTIONS

- *Pick a question from the jar*
- *Find the two other people in the class who pulled the same question*
- *Discuss the question and put your answer(s) on the whiteboard nearest to you*

Management Problem of the Day

- Healthy Hawaiian petrel chicks taken from burrows inland on Kauai two weeks prior to fledging will be used to supplement a small natural population at Kilauea. You are responsible for predicting which social behaviors might be affected by hand-rearing translocated chicks until fledging.

Introduction to:

Behavioral Ecology

NREM450

Learning Objectives

- *Describe the hierarchy of scales: landscapes, ecosystems, communities, species, populations, individuals, genetics, and infer how management approaches may differ at each scale.*
- Define “behavioral ecology”, and identify the types of questions that may be answered by studies in behavioral ecology.
- State the three requirements for behavior to evolve.
- State the behaviors that are important to fitness.
- Identify the levels (scales) where selection may take place.
- State Hamilton’s rule and describe the implications for behavior.
- State behaviors important to management, and describe ways in which these may be monitored or assessed.

Behavioral Ecology

- Evolutionary and ecological basis for behavior
- What is the role of behavior in enabling animals to adapt to environment?
- How do behaviors impact survival and reproduction?
- “Advantage” of behaviors depends on the ecology of the animal

Behavioral Ecology

- 2 basic themes:
  - Natural selection maximizes gene survival. Individuals should behave in ways that maximize *inclusive fitness*
  - Optimal behavior needed to maximize inclusive fitness will depend on (1) behavior of other individuals (2) ecological circumstances

Evolution & Behavior

Proximate vs. Ultimate causation

- Proximate: explanations of behavior based on immediate causes
- Ultimate: evolutionary approach; *why* proximate mechanisms occur; *based on fitness, why* organisms respond as they do

Proximate vs. Ultimate

Practice questions:

- Why do birds migrate south in fall and north in the spring?
- Why do birds breeding in temperate areas lay smaller clutches as the breeding season progresses?
- Why do humans seek particular characteristics in mates or potential mates?
- Why do ground squirrels give alarm calls?

Proximate questions

- How does a particular behavior develop in an individual?
- What stimuli elicit the behavior?
- What are the genetic, physiological, and anatomical factors that influence behavior, and how do they operate?

Ultimate Questions

- What is the adaptive significance of a particular behavior?
- Does a particular behavior maximize fitness?
- Why do other species exhibit similar or different behavior?

Behavioral Ecology

- The **Ultimate Questions** are the ones behavioral ecology is mostly concerned with

Natural Selection & Behavior

For behavior to evolve there must be:

- Variation
- Heritability
- Selection

Behaviors Important to Fitness

- Feeding behavior (how, where, what type, alone or in a group)
- Sexual behavior (searching, choosing, mating strategy)
- Territorial behavior (location, defend, size of territory)

Gene Selection

- “Selfish Gene” concept
- Animals follow strategies that maximize fitness
- Cost/benefit analysis: do positive results of behavior outweigh negative results?
- Ex: herds, flocking decrease the chance of predation on the individual

Cost/Benefit Analysis

- Do behavior when costs are low and benefits are high
- Cease behavior when costs are high and benefits are low

Hamilton's Rule

- Inclusive fitness
- Altruism
- Direct fitness: ½ * N
- Indirect fitness: ¼ * N (niece/nephew/sibling/grandchild)

Behaviors Important to Management

- Habitat selection
- Courtship behavior
- Reproductive physiology & behavior
- Territorial behavior
- Sexual segregation
- Circadian rhythms
- Dispersal
- Imprinting and parental care
- Migration

Behavior Monitoring

- Ethogram: catalog of discrete, conspecific behavior patterns form behavioral repertoire of a species
- Latency: time from specific event to onset of behavioral occurrence
- Frequency: # of occurrences of behavior pattern per unit time
- Duration: time span over which behavior lasts
- Intensity: degree to which behavior pattern is performed

Behavior Monitoring

- Do NOT anthropomorphize animal behavior