

Behavioral responses to human activities and mortality risk

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Motivation

A body of work has shown that wildlife adjust their behavior, particularly space use, in response to human activities (e.g. Tucker et al., Burton et al., Oliver, Yanco et al.). Observed behavioral responses are thought to potentially indicate that wildlife are capable of adapting to human activities. However, the consequences of behavioral responses have yet to be directly quantified.

We aim to:

- Investigate whether individuals' behavioral responses to human activities are adaptive or maladaptive.
- Test whether the same behavioral responses are adaptive for avoiding mortality directly due to humans versus other sources.

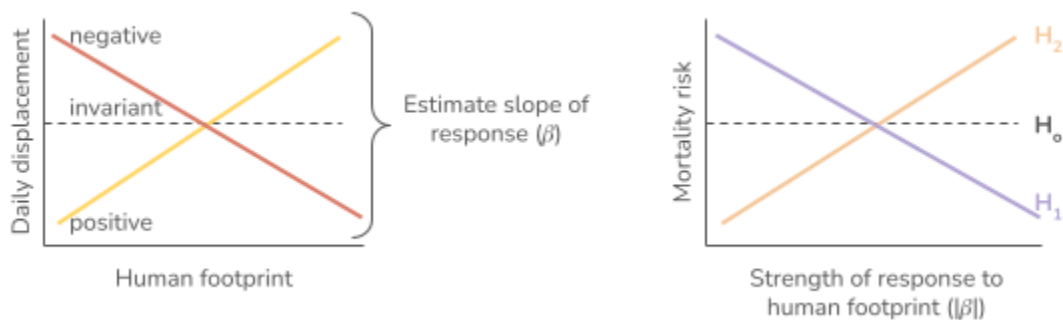
Questions and Hypotheses

Q1: Is responsiveness to human activities adaptive?

H₀: Mortality risk is not influenced by behavioral responses to human activities.

H₁ (adaptive): Stronger responses to human activities **decrease** mortality risk.

H₂ (maladaptive): Stronger responses to human activities **increase** mortality risk.



Approach:

- Find individual behavioral response to human activities
 - Daily displacement ~ HFI
 - Sample unit: individual-day
- Test relationship between behavioral responses and mortality risk

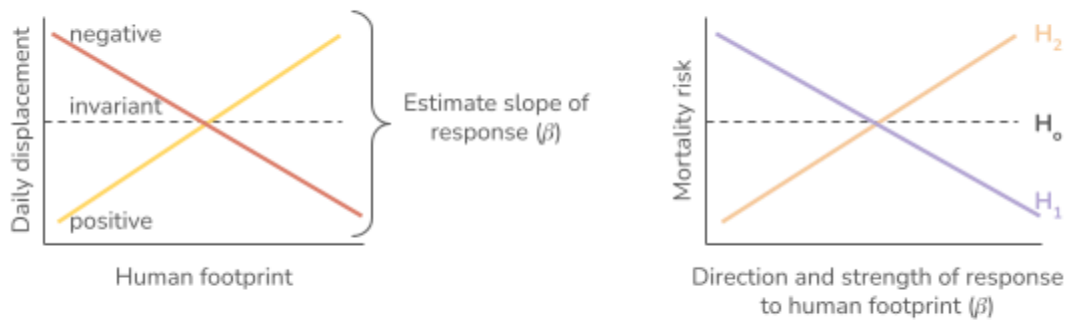
- Hierarchical Bayesian model, global model across species
- Mortality risk $\sim \alpha X$ where X is $|\beta|$ from daily displacement \sim HFI
- Sample unit: individual

Q2: What type of behavioral responses are adaptive?

H₀: Mortality risk is not influenced by the direction of behavioral responses to human activities.

H₁: Strong **positive** responses to human activities decrease mortality risk.

H₂: Strong **negative** responses to human activities decrease mortality risk.



Approach:

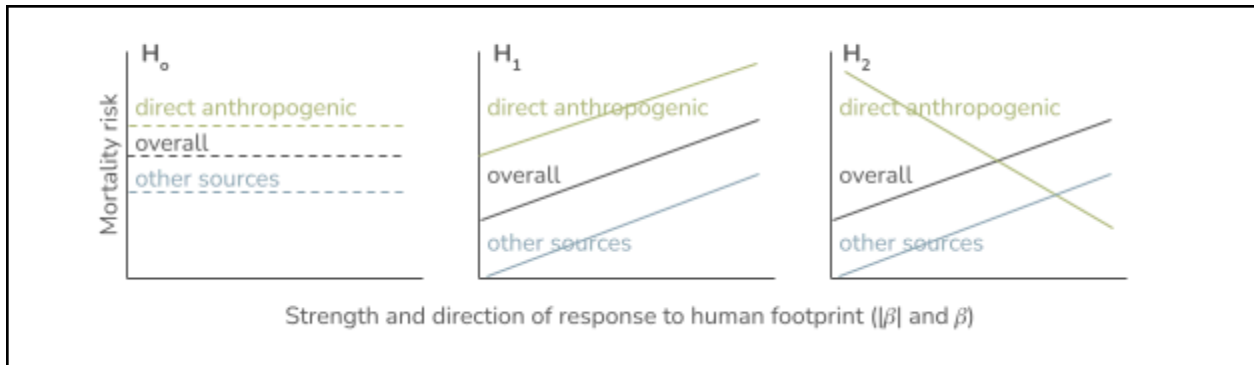
- Find individual behavioral response to human activities
 - Daily displacement \sim HFI
 - Sample unit: individual-day
- Test relationship between behavioral responses and mortality risk
 - Hierarchical Bayesian model, global model across species
 - Mortality risk $\sim \alpha X$ where X is β from daily displacement \sim HFI
 - Sample unit: individual

Q3: Are the same behavioral responses adaptive for direct anthropogenic mortality vs. other sources?

H₀: Responses are neither adaptive or maladaptive for either source of mortality (overall pattern holds).

H₁: Same responses are adaptive for both sources of mortality (overall pattern holds).

H₂: Different responses are adaptive for different sources of mortality (overall pattern breaks).



Approach:

- Test relationship between behavioral responses and mortality risk for different sources of mortality
 - Repeat approach for Q1 & Q2, subsetting by direct anthropogenic vs. other sources of mortality