Assessing vulnerabilities and adaptive capacity in coastal communities

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Current project objectives

• Assess sensitivity and exposure of select coastal vertebrates to climate change
  – Occupancy modeling (local and landscape scale)
  – Species distribution modeling

Potential future project

Assess adaptive capacity of vertebrates following habitat management efforts
Assessing vulnerability to climate change

Sensitivity

Exposure

Potential Impact

Adaptive Capacity

Vulnerability

Adapted from Glick and Stein (2011)
*Scanning the Conservation Horizon*
SENSITIVITY
SENSITIVITY

EXPOSURE

POTENTIAL IMPACT

ADAPTIVE CAPACITY

OVERALL CLIMATE CHANGE VULNERABILITY

LOW  LOW

HIGH
Assessing sensitivities (target measures)

• Habitat features that correlate with occupancy and abundance

• Mechanistic drivers of species- occupancy

• Landscape factors (e.g., connectivity, patch size, and edge density)
Assessing sensitivities: example

Species-specific responses to marsh vegetation and surrounding landscape

Seaside sparrow
Assessing sensitivities: example

OCCUPANCY OF SELECT MARSH BIRDS WITHIN NORTHERN GULF OF MEXICO TIDAL MARSH: CURRENT ESTIMATES AND PROJECTED CHANGE

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Least Bittern

Clapper Rail

% change in mean area occupied

5% Juncus increase
20% Juncus increase
Assessing exposure

March – May projected temperature increase
2050 (ensemble avg – A2 scenario)

0.7 m sea level rise scenario
Current 2100 - projected
Assessing exposure: example

- Construct species distribution models
- Capture climatic and habitat preference
- Ensemble a range of future scenarios

Gopher Frog

Current climatic suitability

Projected climatic suitability (B2a – 2050)
1. What are the species-specific sensitivities to habitat type? Patch size? Landscape configuration?

2. How large and/or connected would a habitat manipulation need to be in order to recruit sustainable communities?
1. What are species-specific colonization rates to newly created habitat?
2. Which species do not colonize the new habitat?
3. What are nest survival rates relative to natural habitat type?
Habitat management / manipulation study

Inland marsh creation

Marsh inundation (mimic SLR)
Species selection

• Focusing on species of conservation concern
  – Prioritizing species listed by > 1 state
  – For birds, PIF listing considered
• Ease of monitoring
• Represent diverse natural histories

Collaborative opportunities?
1. What are the potential future species distributions?
2. What uncertainty surrounds forecasts?
3. What sites are most likely to be suitable for future habitat management efforts?

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