Assessing vulnerabilities and adaptive capacity in coastal communities

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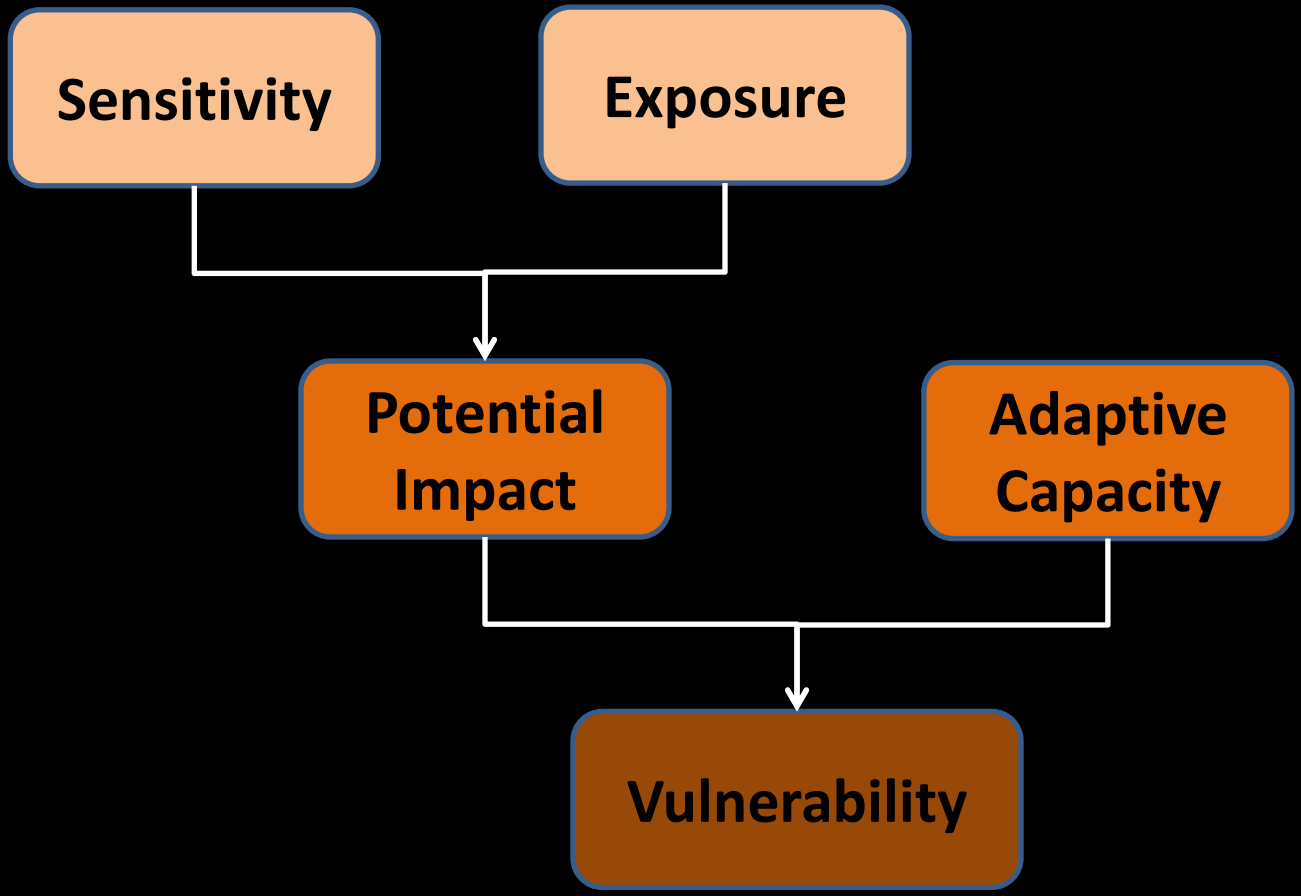
Current project objectives

- 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



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

SENSITIVITY

SENSITIVITY

EXPOSURE

POTENTIAL IMPACT

SENSITIVITY

EXPOSURE

POTENTIAL IMPACT

ADAPTIVE CAPACITY

SENSITIVITY

EXPOSURE

POTENTIAL IMPACT

ADAPTIVE CAPACITY

OVERALL CLIMATE CHANGE VULNERABILITY

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

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

Scott A. Rush[1], Eric C. Soehren[2], Mark S. Woodrey[3,4], Courtney L. Graydon[2], and Robert J. Cooper[1]
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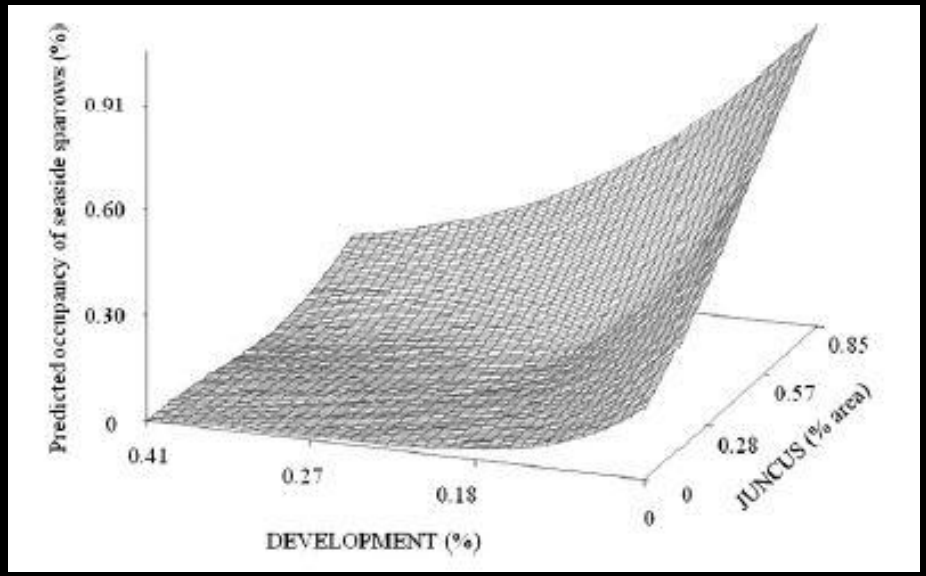
Species-specific responses to marsh vegetation and surrounding landscape

Seaside sparrow



Assessing sensitivities: example

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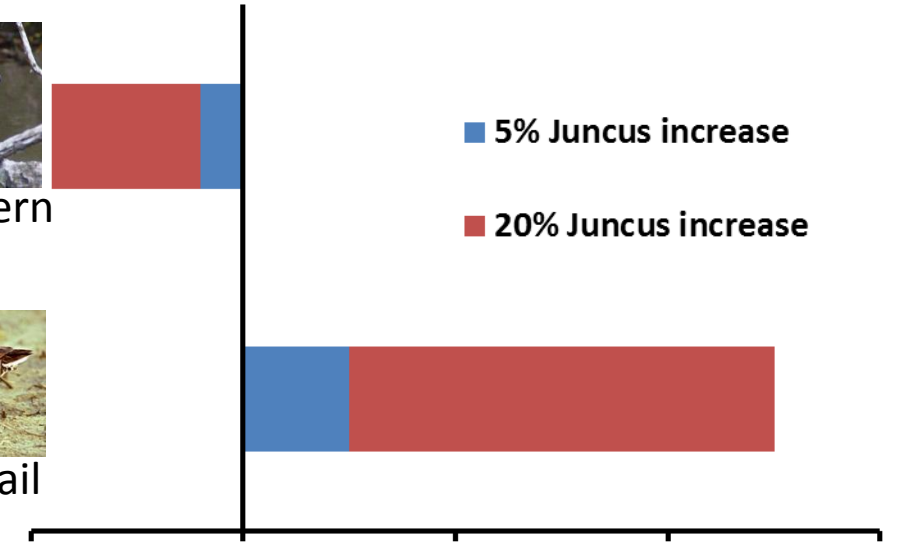
Least Bittern

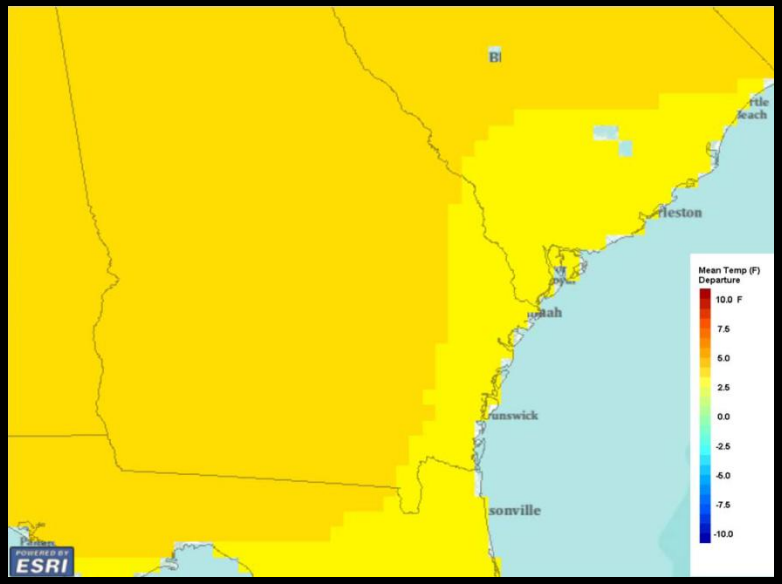
Clapper Rail



Assessing exposure

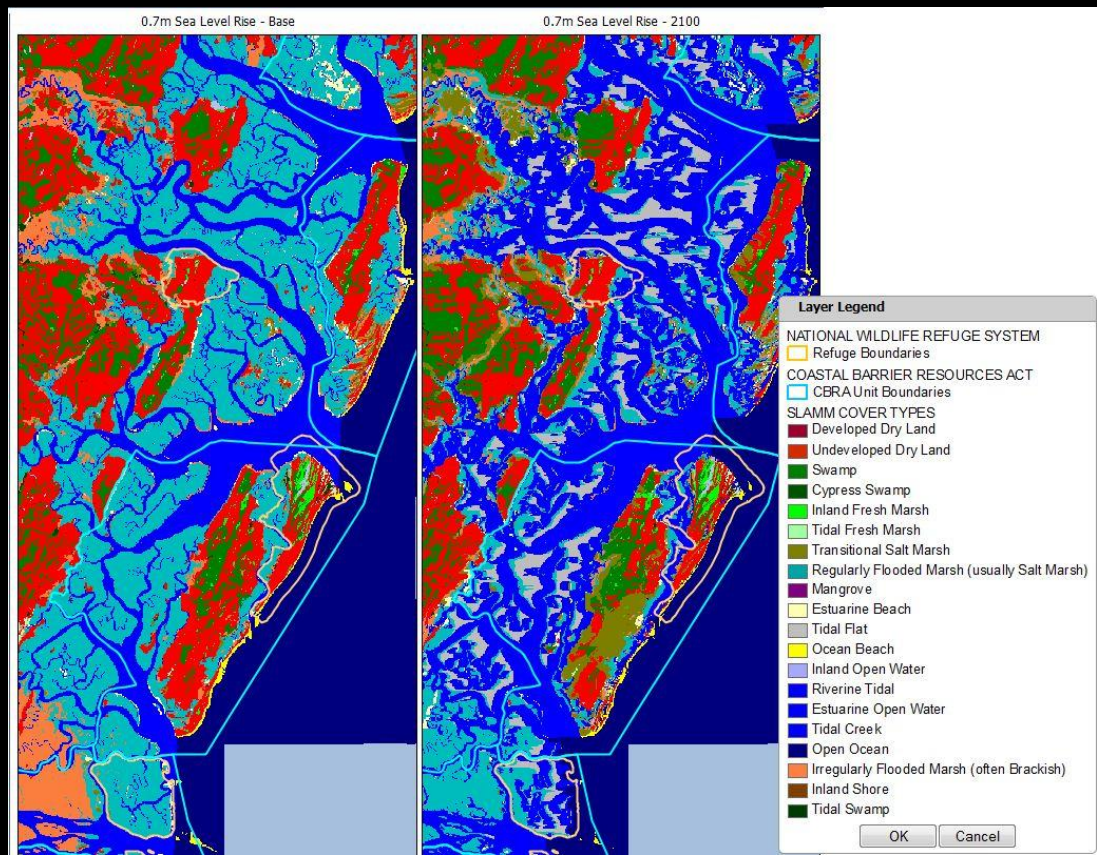
March – May projected temperature increase

2050 (ensemble avg – A2 scenario)



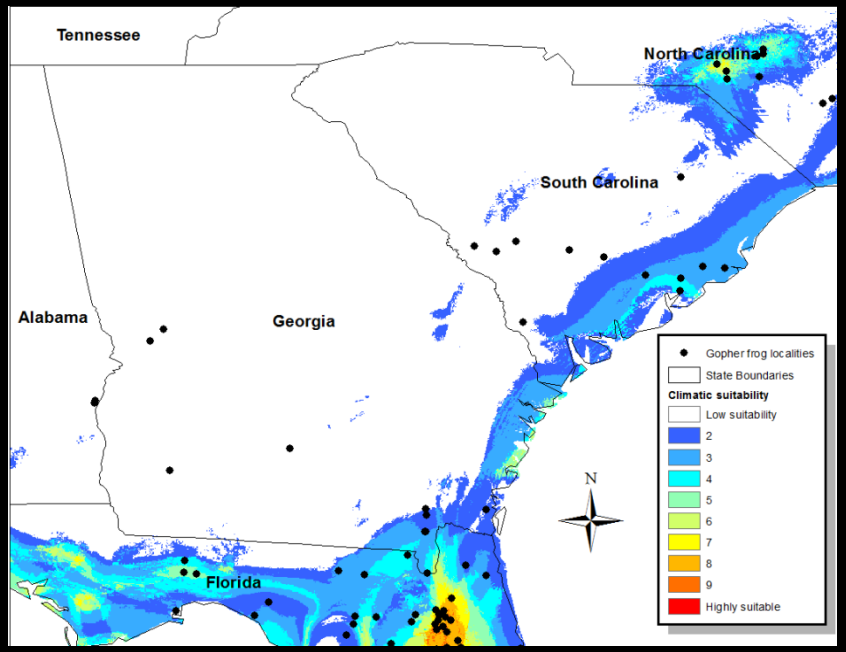
0.7 m sea level rise scenario

Current 2100 - projected

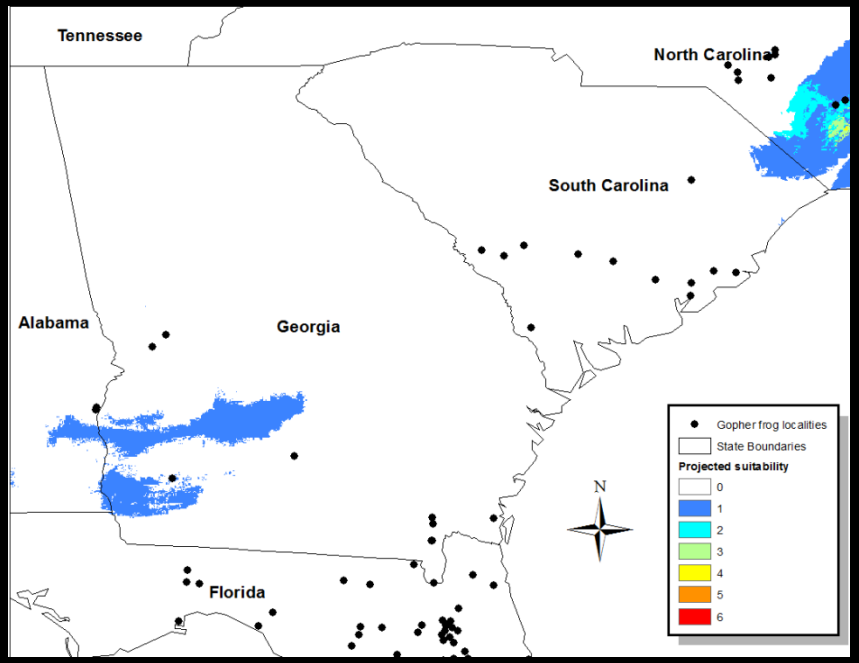


Assessing exposure: example

Current climatic suitability



Projected climatic suitability (B2a – 2050)



Gopher Frog

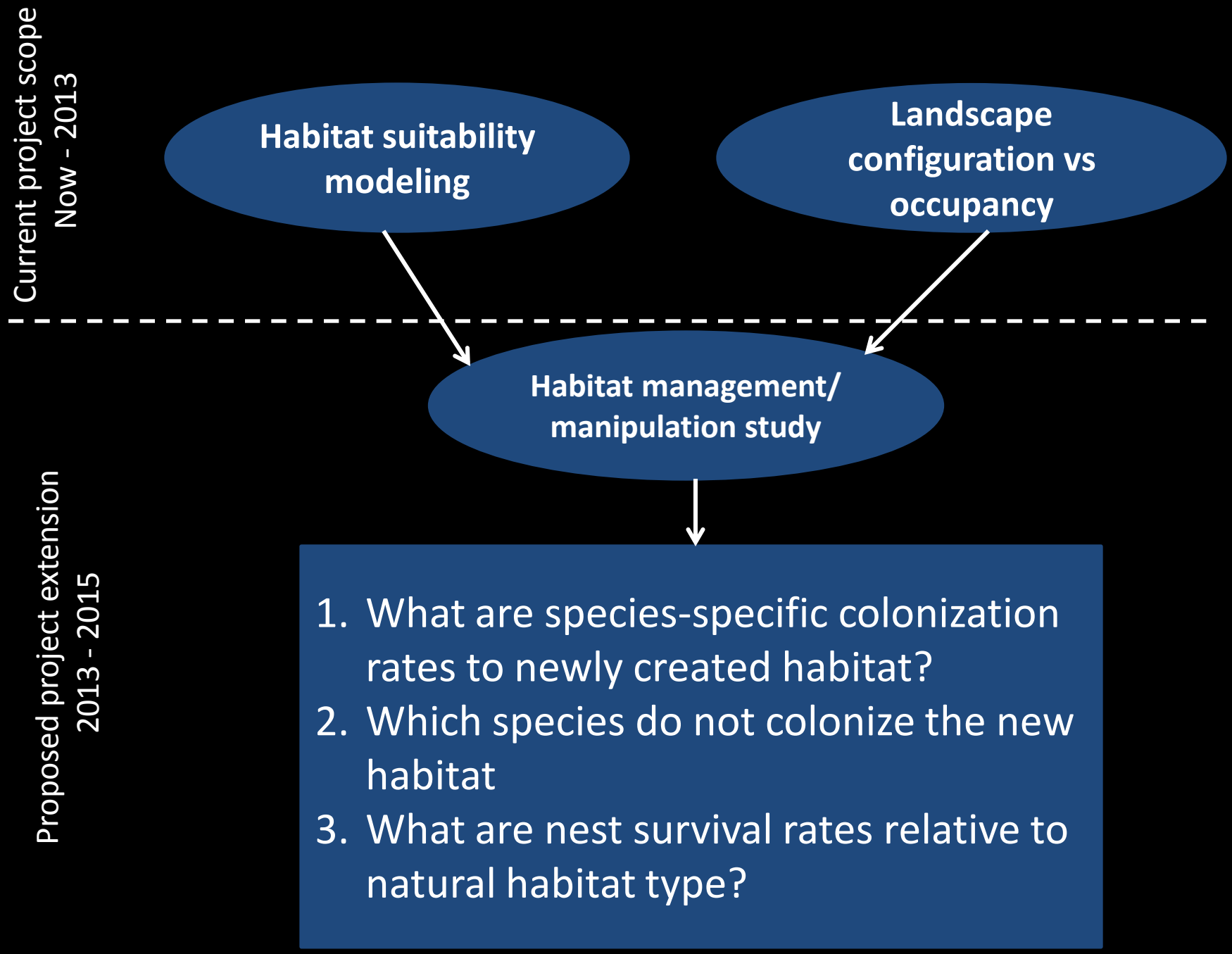
- Construct species distribution models
  - Capture climatic and habitat preference
  - Ensemble a range of future scenarios

Current project scope
Now - 2013

Habitat suitability modeling

Landscape configuration vs occupancy

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?


Current project scope
Now - 2013
Habitat suitability modeling
Landscape configuration vs occupancy
Habitat management/ manipulation study
Proposed project extension
2013 - 2015
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

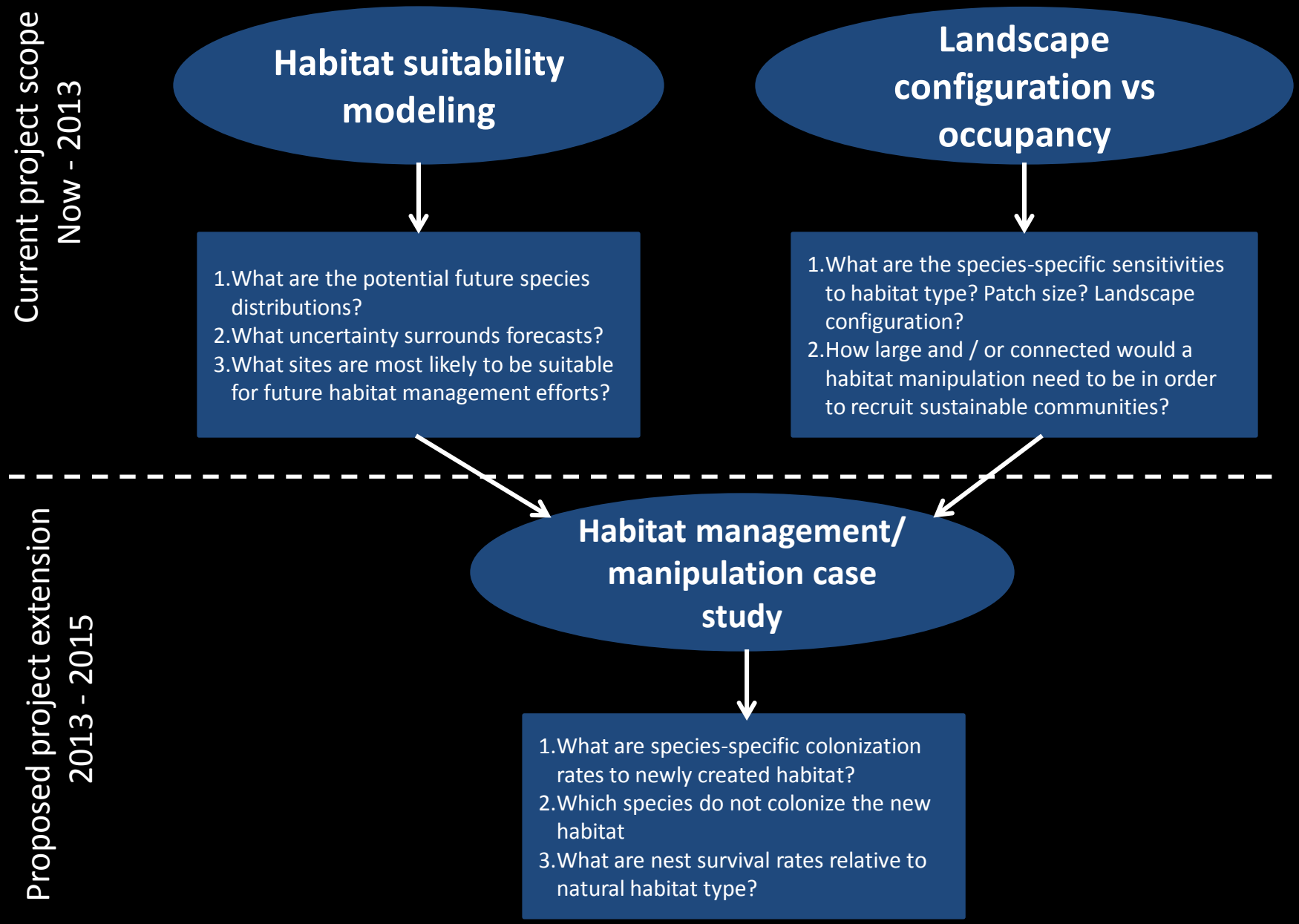
Inland marsh creation

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?


Current project scope
Now - 2013
Habitat suitability modeling
Landscape configuration vs occupancy
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?
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?
Proposed project extension
2013 - 2015
Habitat management/ manipulation case study
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?