Whiskey Island/Isles Dernieres:
Restoration of a remote barrier island and impacts to key species

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Image from Williams et al. 1992: Atlas of Shoreline Changes in Louisiana from 1853 to 1989
History of Restoration: 1997
History of Restoration - 2010
Post-restoration
Imagery: late April 2018
Background

- USGS Wetland and Aquatic Research Center (WARC) Piping Plover surveys

  - Aug 2012 – Dec 2014 (pre-restoration)
    - Based on USFWS 2010 Biological Opinion
      - Louisiana Coastal Area – Terrebonne Basin Barrier Shoreline Restoration
      - Anticipating Caillou Lake Headlands restoration
  
  - Jan 2015 – May 2017 (pre-restoration)
    - May 2017 – May 2018 (during restoration)
      - Contracted by CPRA
      - Implementation of NRDA Caillou Lake Headlands Restoration Project (TE-0100)
      - Coastal Use Permit compliance

- Piping, Snowy, & Wilson’s plovers, Red Knot
  - Adequate sample sizes
  - Represent different life histories and habitat use
    - Broad evaluation of impacts of restoration
Field methods

- Censused intertidal habitats by foot


- For each individual detected:
  - (Focal species)
  - Latitude-longitude
  - Habitat type
  - Behavior

- Pre-restoration data sets:
  - Piping Plover 2012-2017
Piping Plover
Nonbreeding season: July-April

Algal flat
Bay-side beach
Tidal flat

PIPL (n = 850)

Habitat not specified
Tidal/algal Flat
Backshore Beach
Foreshore Beach
Sand Flat
Washover

Foraging
Other
Preening
Roosting/Loafing
Walking/Running
Wilson’s Plover

Nonbreeding season: August-February
Breeding season: March-July

Interior sand flat

Bay-side tidal flat

Gulf backshore beach/washover

WIPL (n = 5747)

- Breeding Behavior
- Flying
- Foraging
- Roosting/Loafing
- Unknown
- Vigilance
- Walking/Running

Joseph Kennedy

Wilson’s Plover (Charadrius wilsonia) is a small wader that breeds in the Americas. It is primarily found in coastal areas, such as beach and backshore areas. The species is known for its distinctive black and white plumage and its habit of walking on the tideline. Wilson’s Plovers are often seen in flocks during migration, and are important indicators of the health of coastal ecosystems.
Objectives

- Illustrate occupancy modelling approach to evaluate occurrence and distribution of plovers during the pre-restoration period
- Provide pre-restoration baseline of plover occurrence and distribution
- Question: Did plover occupancy change over time during pre-restoration period?
Data analysis
- Hierarchical Bayesian occupancy model
  - To estimate proportion of cells occupied each year
  - Accounting for imperfect detection
- Lat-long positions of birds assigned to fishnet grid (cells = sites)
Occupancy did not vary among years, prior to restoration activity.
The rest of the story...

- Remains to be told...
  - pending post-restoration data collection

- Covariates for occupancy models
  - habitat type
  - slope
  - area of intertidal zone
Restoration completed early-May 2018

Some immediate/short-term effects: breeding birds
Pre-restoration
Imagery: late February 2017
Post-restoration
Imagery: late April 2018
Least Tern

Pre-restoration

Post-restoration

6/19/2017

5/18/2018
Gull-billed Tern

Pre-restoration

6/8/2017
Gull-billed Tern

Pre-restoration

Post-restoration

6/8/2017

5/18/2018
Black Skimmer

Pre-restoration

7/13/2017

7/13/2017

Black Skimmer

# breeding BLSK

2015

2016

2017

0

100

200

300

400

500

600

700

800

900

1000

May 1, 2015

May 2, 2015

May 3, 2015

May 4, 2015

June 1, 2015

June 2, 2015

June 3, 2015

July 1, 2015

July 2, 2015

July 3, 2015

July 4, 2015
Black Skimmer

Pre-restoration

Post-restoration

7/13/2017

5/18/2018
Wilson’s Plover

Pre-restoration

![Graph showing breeding BLSK from 2015 to 2017]

5/16/2017
Wilson’s Plover

Pre-restoration

Post-restoration

5/16/2017

5/18/2018

5/16/2017

5/18/2018
Past projects: Describing benthic invertebrate assemblages in intertidal habitat

- Core samples: 5cm deep
- 6 transects, 2 islands
- Sample during fall & spring migrations, mid-winter
- Random + targeted samples
- Measure following environmental factors:
  - Particle size
  - Temperature
  - Soil moisture
  - Organic content

Photos courtesy of Clint Jeske
### Invertebrate Community

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Mean abundance</th>
<th>SE</th>
<th>Mean Density (m²)</th>
<th>% total abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haustoriiid amphipods</td>
<td>10.23</td>
<td>+/- 0.76</td>
<td>1128</td>
<td>89.9</td>
</tr>
<tr>
<td>Bivalves</td>
<td>0.79</td>
<td>+/- 0.23</td>
<td>87</td>
<td>6.9</td>
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<tr>
<td>Polychaetes</td>
<td>0.26</td>
<td>+/- 0.04</td>
<td>29</td>
<td>2.2</td>
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<tr>
<td>Insects</td>
<td>0.04</td>
<td>+/- 0.02</td>
<td>4.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Gastropods</td>
<td>0.03</td>
<td>+/- 0.03</td>
<td>3.5</td>
<td>0.3</td>
</tr>
<tr>
<td>All others</td>
<td>0.03</td>
<td>+/- 0.01</td>
<td>3.3</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Novel shorebird disease outbreak

- 20-30% of Sanderlings over-summering on Whiskey Island in June-July 2016 affected
- Collected 3 individuals for testing
- Necropsies by USGS NWHC showed infection by *Dermatophilus congoensis* bacterium
Future directions

• Power analysis for FWS: how much monitoring is needed to evaluate impacts of restoration on shorebirds?
• Breton Island NWR: invertebrate sampling (completed last year, currently working up samples)
• Little Dauphin Island: modeling elevation, vegetation, shorebird use in sea level rise scenarios
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- LUMCON