Cedar Bayou Tidal Inlet Restoration: 1 Year Update

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Morphology
• Where to Dredge
  → Straight Cedar Bayou Channel
  → Singular connection to Gulf
  → Connect with and activate Vinson Slough

• Dredge channel configuration?
  → Cross-section sufficient to sustain inlet open

• Where to put the material?
  → SW of Cedar Bayou mouth
  → Outside of inlet migration zone
  → Beneficial use in area of high erosion
Design

Volume excavated in 2014 ~ 600,000 cubic yards
April to Sept 2014 (6 months)

Construction
Preliminary Monitoring - Survey

October 2014

October 2015
Preliminary Monitoring - Aerial

October 2014

October 2015
Preliminary Monitoring

- Calculated migration rate = ~270 ft/year
- Actual migration after 1 year ~ 670 ft
- Reasons for larger migration
  - System trying to reach equilibrium
  - Meteorological influences (El Niño)
  - High tides
Preliminary Monitoring Results

October 2015

November 2015
• Strong **increase** of juvenile redfish in Cedar Bayou and Mesquite Bay indicative of newly established nurseries found in nearby **seagrass beds**. Local nurseries in Cedar Bayou and Mesquite Bay were nearly **non-existent prior to opening**.

• Evidence of long term increase and return of **key economic species** (sportfish) such as adult redfish, spotted sea trout, and flounder to Cedar Bayou where there were none in previous years

• Evidence of increased **blue crab recruitment** in Cedar Bayou, which will provide abundance of food for the endangered **wintering whooping crane**
“This study clearly shows that opening Cedar Bayou...led to an increased presence of numerous species that are vital to Texas’ ecology and economy.”

-Stunz et al, 2015
• As of September 2015, 29 individual piping plovers were identified, 3 of which were banded.
• On September 2013, 32 individual piping plovers had been identified, none of which were banded
• No observable impacts to piping plover populations in the area
Habitat Survey

November 2014

October 2015

Legend
- Habitat Type A (Forebeach)
- Habitat Type B (Backbeach)
- Habitat Type C (Coppice Mounds)
- Habitat Type D (Foredunes, Fordune Ridges and Backdunes)
- Habitat Type E (Coastal Prairie)
- Habitat Type F (Estuarine Wetland)
- Habitat Type G (Smooth Cordgrass)
- Habitat Type H (Tidal Sand Flats Port Aransas Tide Gauge)
- Habitat Type I (Non-Tidal Sand Flats)
- Habitat Type J (Unvegetated Uplands)
- Habitat Type K (Seagrass)
- Habitat Type L (Oyster Reef)
- Open Water
Figure 3.
One-Year Post-Construction Habitat Survey Results
Aransas County, Texas
USACE Permit No. SWG-2007-00813
Survey Dates: October 20-23 & 26, 2015

<table>
<thead>
<tr>
<th>Habitat Type:</th>
<th>Pre-</th>
<th>Nov. 2014</th>
<th>Oct. 2015</th>
<th>Compare</th>
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<tbody>
<tr>
<td>Forebeach</td>
<td>37.9</td>
<td>14.8</td>
<td>34.76</td>
<td>19.96</td>
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<td>Backbeach</td>
<td>55.58</td>
<td>78.5</td>
<td>31.93</td>
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<td>Coppice Mounds</td>
<td>117.5</td>
<td>109.6</td>
<td>79.75</td>
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<td>Foredunes</td>
<td>169.8</td>
<td>119.76</td>
<td>120.14</td>
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<tr>
<td>Coastal Prairie</td>
<td>58.1</td>
<td>64.58</td>
<td>91.90</td>
<td>27.32</td>
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<td>Estuarine Wetlands</td>
<td>30.8</td>
<td>31.94</td>
<td>58.36</td>
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<td>Smooth Cordgrass</td>
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<td>6.81</td>
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<td>Tidal Sand Flats (Copano Tide Station)</td>
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<td>Tidal Sand Flats (Port Aransas Tide Station)</td>
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<td>62.2</td>
<td>48.89</td>
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<td>Non-Tidal Sand Flats</td>
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<td>49.49</td>
<td>4.32</td>
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<td>Uplands</td>
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<td>17.2</td>
<td>16.23</td>
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<td>Seagrass Beds</td>
<td>6.8</td>
<td>8.7</td>
<td>11.50</td>
<td>2.80</td>
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<td>Oyster Reef</td>
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<tr>
<td>Open Water</td>
<td>63.3</td>
<td>119.19</td>
<td>446.38</td>
<td>327.19</td>
</tr>
</tbody>
</table>

Note: Comparison column shows the difference between the Nov. 2014 and Oct. 2015 surveys. The pre-construction acreages (2013) are for reference only.

- Above required area of tidal sand flats (15 acre creation required, 35.14 acres created as of November 2014)
- Smooth cordgrass located in project template increased by over ½ acre in 1 year.
- Seagrass beds increased by 3 acres in 1st year after opening.
Escarpment and Compaction

- Escarpment
  - 100% of beach had escarpments of 0-1 inches
  - Results from February to October nearly identical

- Compaction
  - Sand compaction ranged from 15 psi to 410 psi
  - PA-1 avg = 208.41 psi
  - PA-2 avg = 216.66 psi
  - Overall avg = 212.53 psi
  - None of the sand compaction readings exceeded 500 psi
Maintenance Dredging and Sedimentation Analysis

- Periodic dredging necessary for channel longevity
- Minimize dredging required during each event
- 10 reaches based on sedimentation rates
Cedar Bayou: 119,188 CY

Vinson Slough: 129,073 CY
Channel Orientation

- When Open, Cedar Bayou Mouth is perpendicular to the shoreline
- Vinson Slough curves into Cedar Bayou
Potential Alternative

- Adjust template to match natural morphology
- Create a template that mimics stable channel conditions
- Curve Vinson Slough into CB to eliminate sharp edges along channel
What does it look like now?