

An Engineering with Nature Demonstration Project: Creating River Island Habitat in the Lower Atchafalaya River

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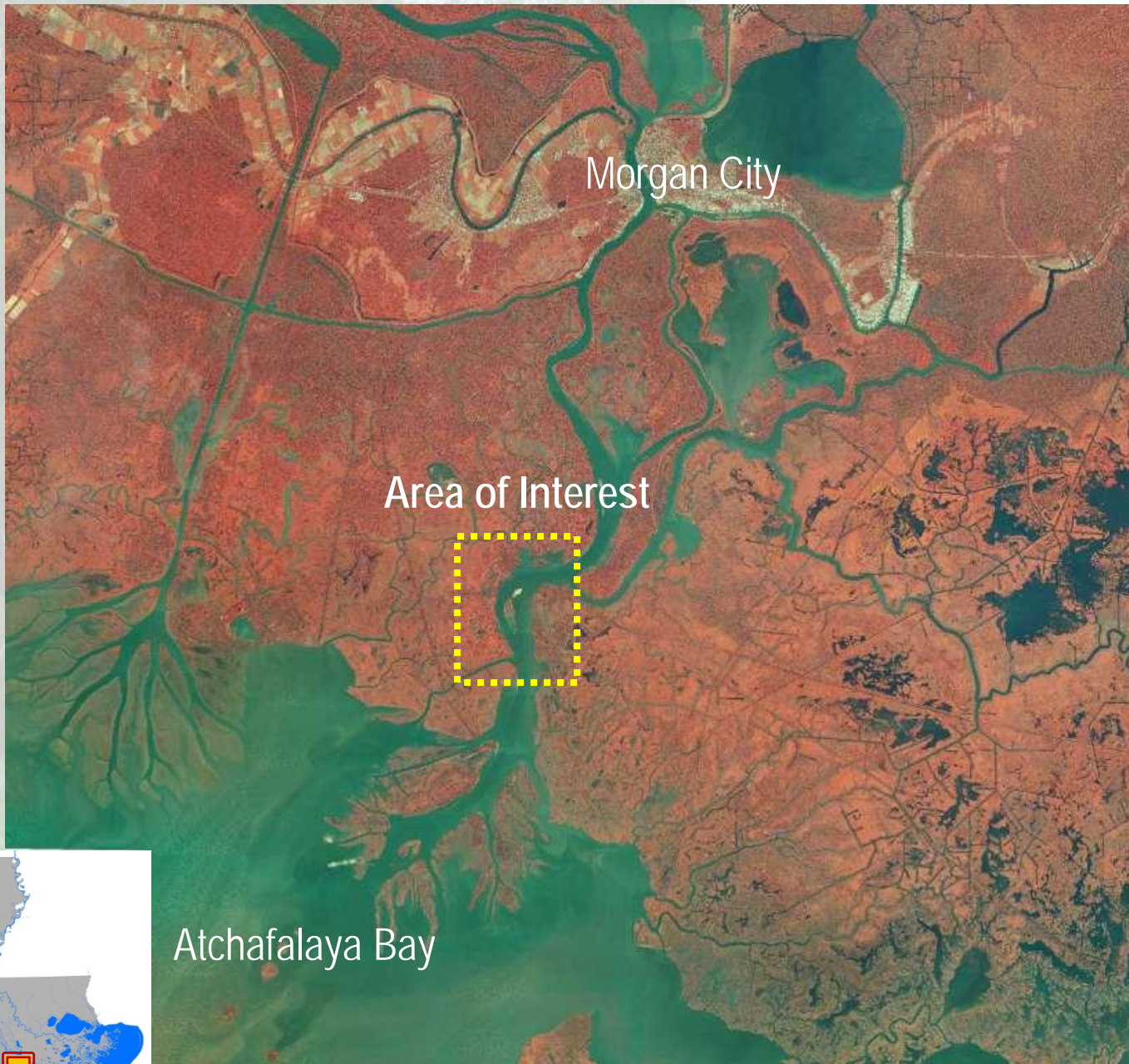
Jeff Corbino
USACE New Orleans District

WEDA Gulf Coast Chapter Meeting
16 November 2016
Galveston, TX



US Army Corps of Engineers
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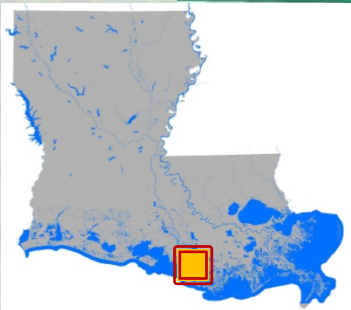




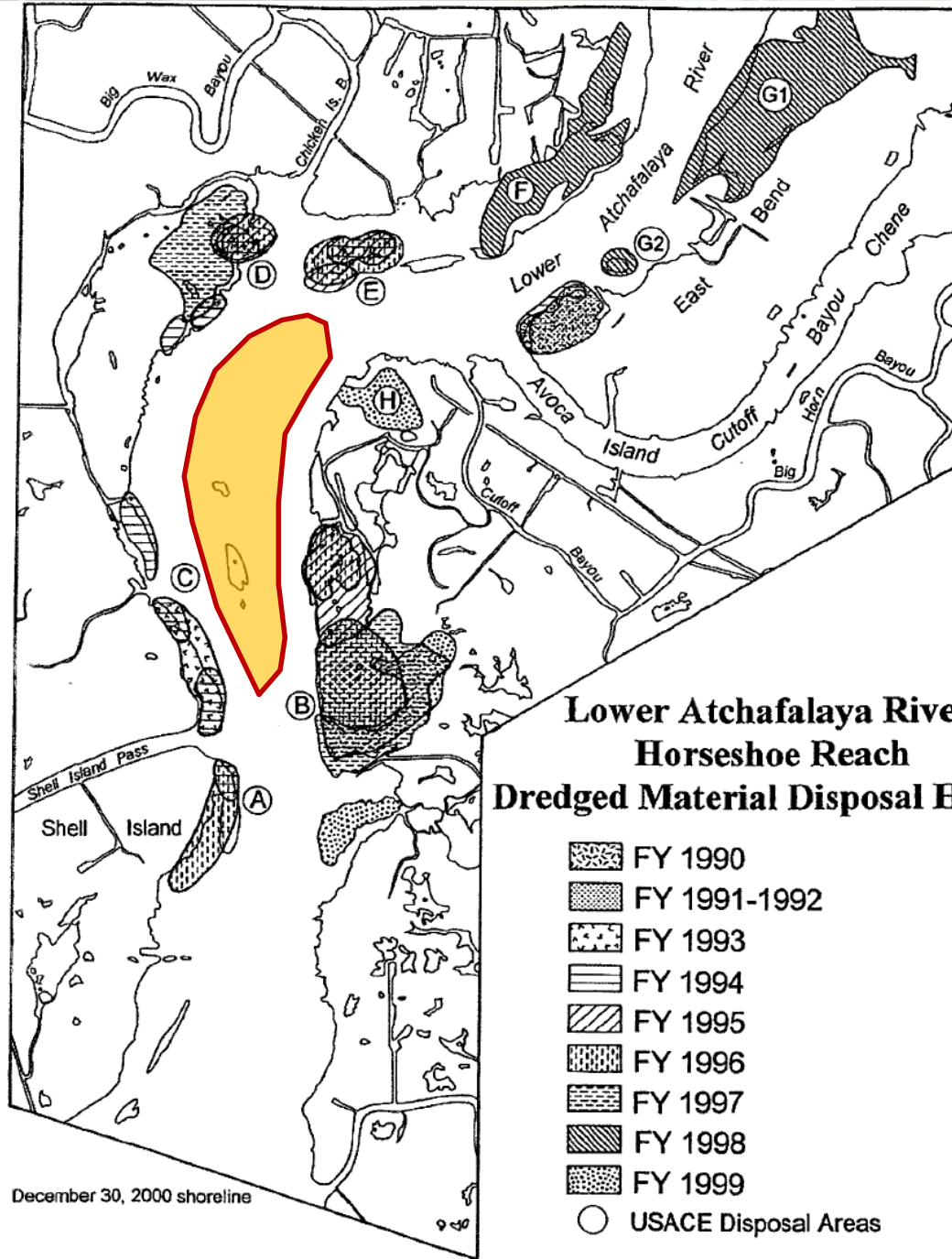
Morgan City

Area of Interest

Atchafalaya Bay



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Problem

Capacity of Bankline
Disposal Areas Exhausted

Alternatives

~~Conversion of Wetland
Disposal Areas into Upland~~

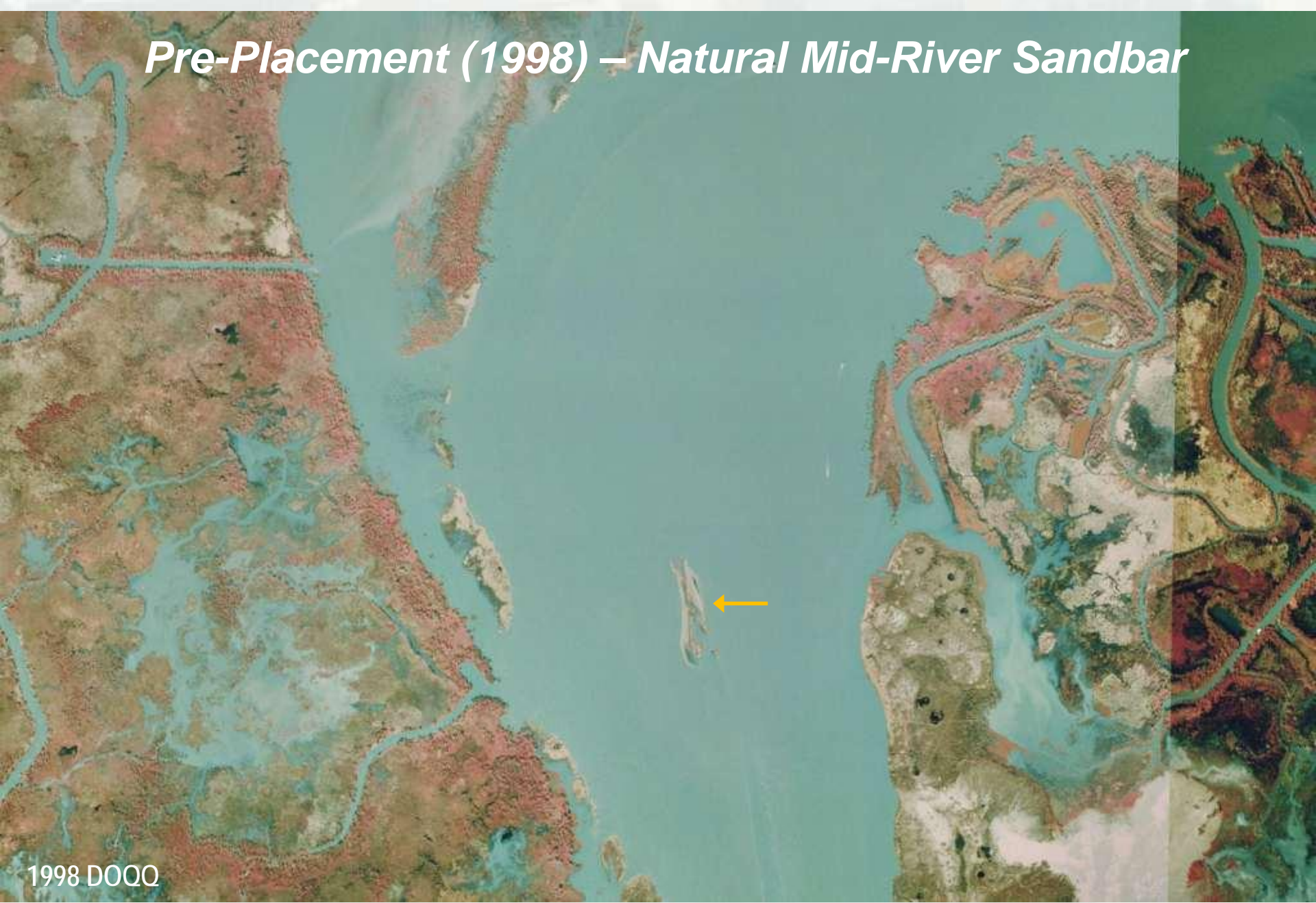
~~Open Water Disposal in
Atchafalaya Bay~~

Mid-River Mounding of
Dredged Material



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Pre-Placement (1998) – Natural Mid-River Sandbar

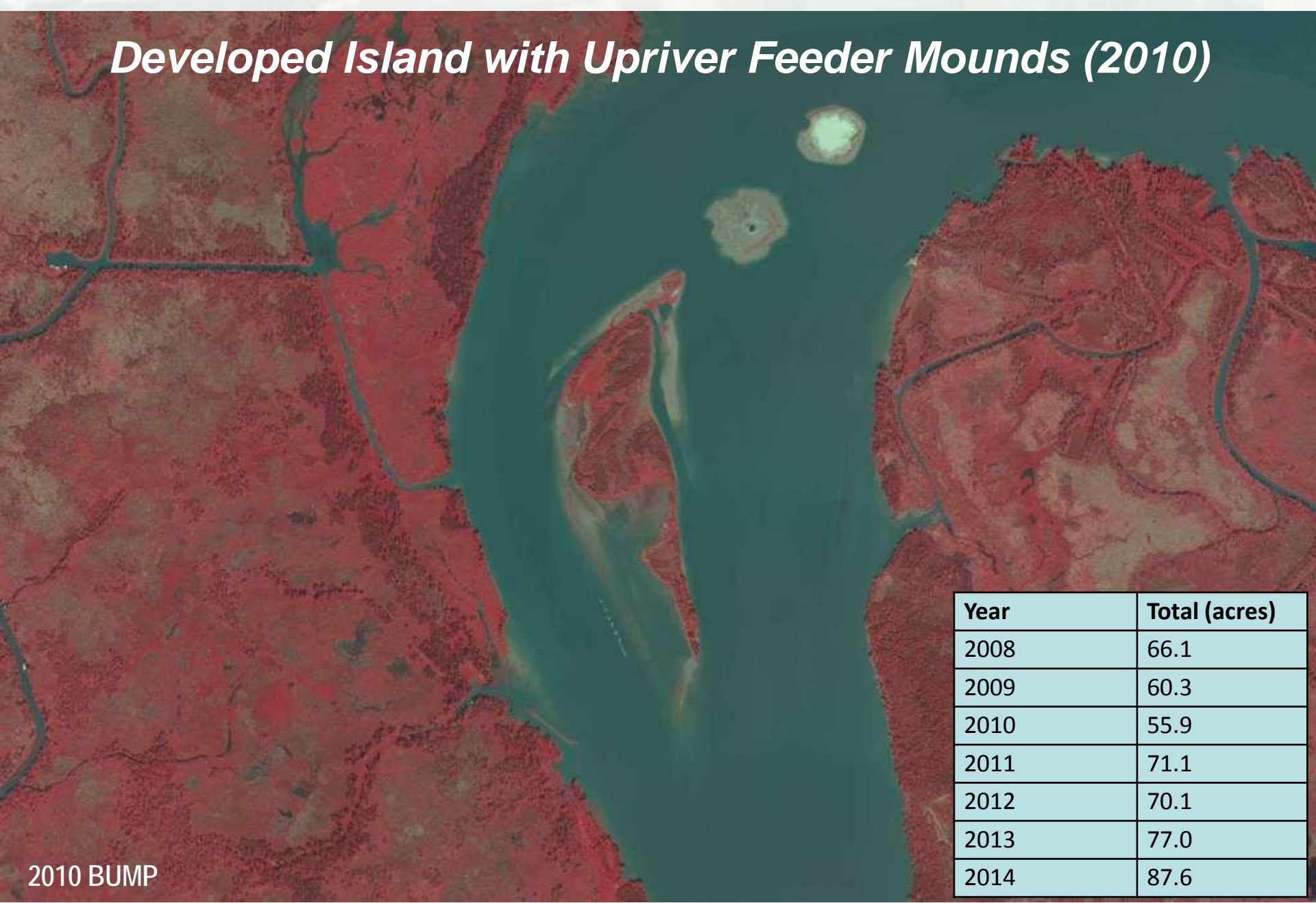


1998 DOQQ



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Developed Island with Upriver Feeder Mounds (2010)



| Year | Total (acres) |
|------|---------------|
| 2008 | 66.1 |
| 2009 | 60.3 |
| 2010 | 55.9 |
| 2011 | 71.1 |
| 2012 | 70.1 |
| 2013 | 77.0 |
| 2014 | 87.6 |

2010 BUMP



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Quantify Environmental Benefits

- Identify and Classify Distinct Habitat Types
- Catalogue Plants and Animals
- Evaluate Soil Horizons



Classify Habitat

Horseshoe Bend Dredged Material Island

Photo Area
(at Right)

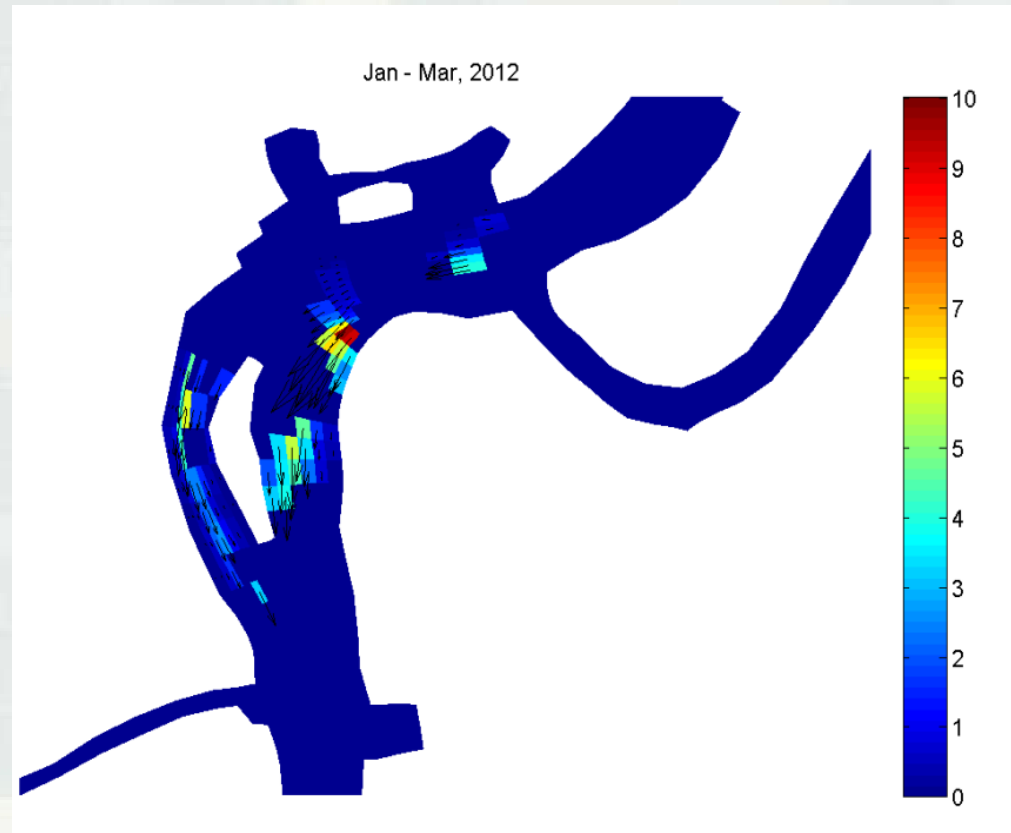


- Stability
Complexity
Age
Elevation
- ↑ + Mature Forested & Scrub-Shrub Wetlands
 - Young Forested & Scrub-Shrub Wetlands
 - Emergent Wetland Transition Zone
 - ↓ - Aquatic Bed Features



Model Hydrodynamics

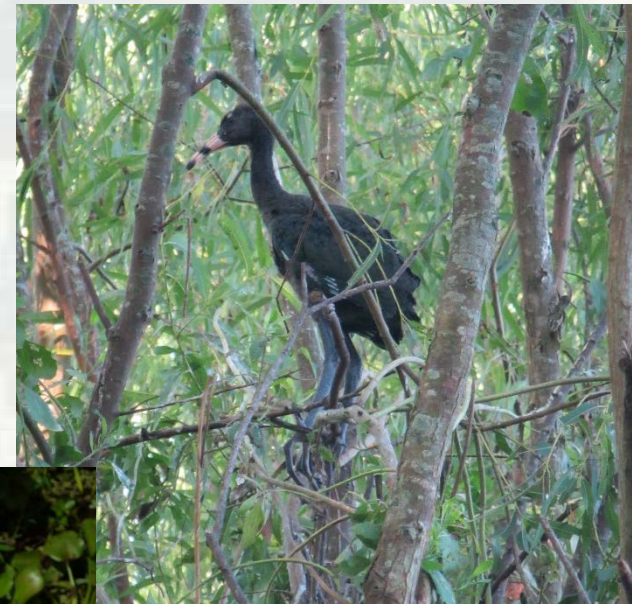
Mean suspended sediment
transport volume rate
during January - March
2012 ($\text{m}^3/\text{m}/\text{s}$)



Environmental Benefits

Created island supports:

- 35 ha habitat
- Four distinct habitat types
- 80 + plant species
- 20 + animal species
- Large wading bird rookery





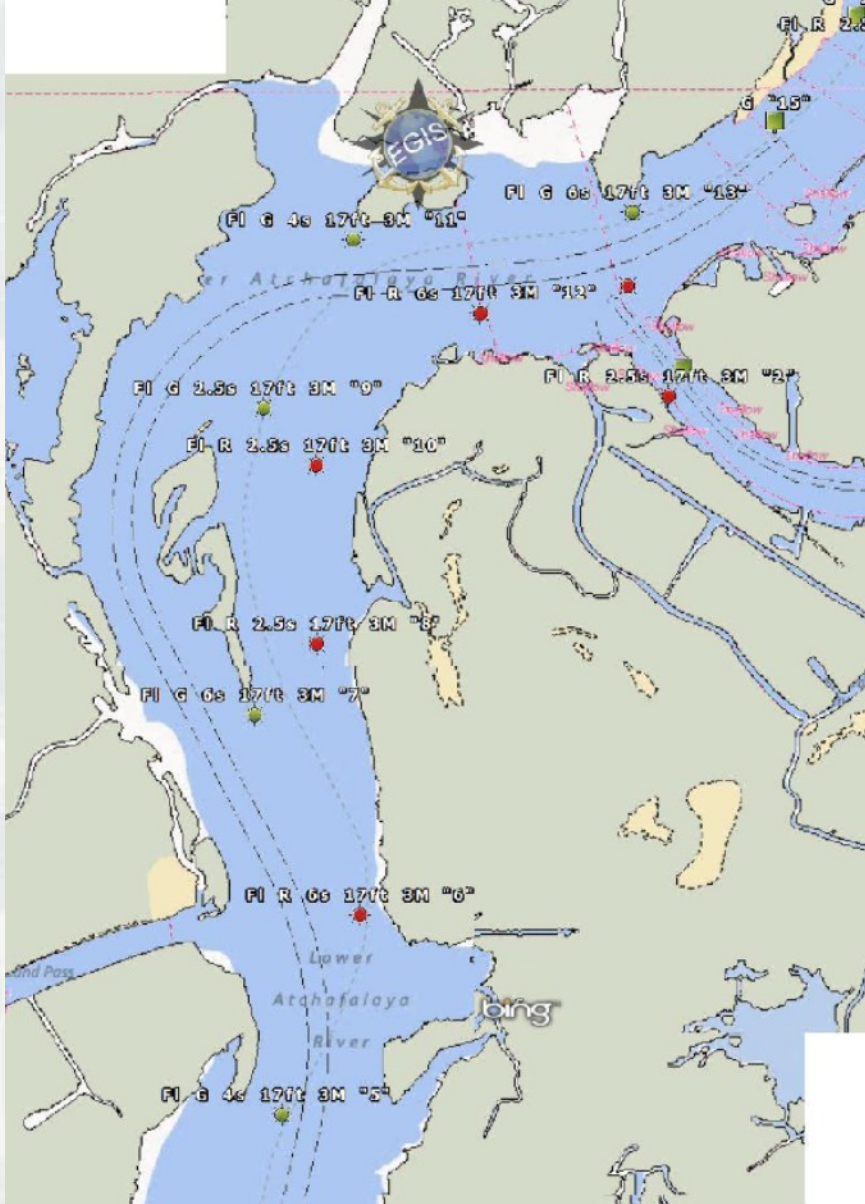
Geomorphology and Nutrient Cycling

- Formation of dark, organic rich surface soils
- Resultant chemical reduction
 - ▶ Carbon sequestration
 - ▶ Nutrient cycling
 - ▶ De-nitrification



Navigation and Climate Benefits

- Island formation reduced dredging requirements
- Natural channel formed east of the island due to self-scouring
- US Coast Guard realigned channel (red circles, left)
 - channel length reduced
 - sharp bends eliminated
 - improved navigation safety
- Reduction in long-term dredging requirements
- Resultant carbon savings and reduced air pollution



US Coast Guard Ship Channel Realignment



Marketable Gains per Service Realized from the Formation of Horseshoe Bend Island

| Service | Horseshoe Bend amount | Conversion | Value | Units |
|-----------------------------|--|---|--------------|--|
| Carbon sequestration | 6.15 ha emergent (15 acres) | 86 g-C/m ² each year over 100 years | 5220 kg | Average C per year |
| Water purification | 35 ha wetland (85 acres) | 7% reduction estimated for 10,093 acres | 0.059% | Nitrogen reduction in Gulf |
| Climate regulation | 49 liters (13 gal)/trip fuel savings each year | 49 liters (13 gal)/trip and 1,400 trips/year made by tugs and cargo ships | 186 | Metric tons of carbon dioxide equivalent (MTCO _{2e}) |
| Educational support | 4FY research support range \$125K - \$250K | \$850K/4 yrs | \$213K | 2015 US\$ |
| Navigation | \$22.9M -\$10M over 3 yrs | \$12.9M/3 yrs | \$4.3M | 2015 US\$ |



What Have We Learned?

- Four distinct wetland habitats within a small area (35 ha), supporting a larger than expected variety of plants and animals
- Over 80 plant species observed on island, compared to 53 plant species noted for natural wetlands along the lower river
- Soils are active, function to cycle nutrients and sequester carbon
- Allowing the island to “self-form” is key to creating comparatively improved wetland habitat relative to the two reference areas
- Multiple benefits realized and quantified: environmental, economic, and navigation



Other Applications – Soo Locks

- Construct spawning shelf along hydropower tailrace to create improved spawning habitat for sturgeon and other fish species
- Flow rates in the Corps hydropower tailrace from Unit 10 is ideal for sturgeon spawning (2-5 fps)
- Keep Rock Cut rock in watershed
- Stakeholder consultations



Take Away Points

- Effective waterways management practices are being implemented as part of maintenance dredging projects
- Many such practices are relatively unknown/not widely disseminated or publicized
- Communication essential to promote these good practices
- Lessons learned so innovative approaches can be more broadly applied
- Utilize nature's energy

Island Building in the Atchafalaya River, Louisiana USA An Engineering with Nature Demonstration Project

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Introduction
Over the past several years, the US Army Corps of Engineers (USACE) New Orleans District has been using dredged material to construct a small island that began forming naturally in the Atchafalaya River, Louisiana (LA). This effort has involved placing sediment dredged from a Federal navigation channel during routine maintenance or low relief periods upriver of the island since 2002 (Figure 1). The accumulated material has been designed to attract river currents to self-design the island. From 2002, dredged material was being placed directly into shallow depressions along the river banks to approach existing wetlands, but continued placement into these areas was not practicable because high quality wetlands would be converted into upland habitat.



Figure 1. December 2011 aerial infrared photograph of the Atchafalaya River island after multiple years of systematic monitoring of dredged material. The island's formation has reduced the overall cross-sectional area of the river, decreasing river flow through the navigation channel to the east sufficient to reduce channel and maintenance dredging requirements.

