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

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US Army Corps of Engineers
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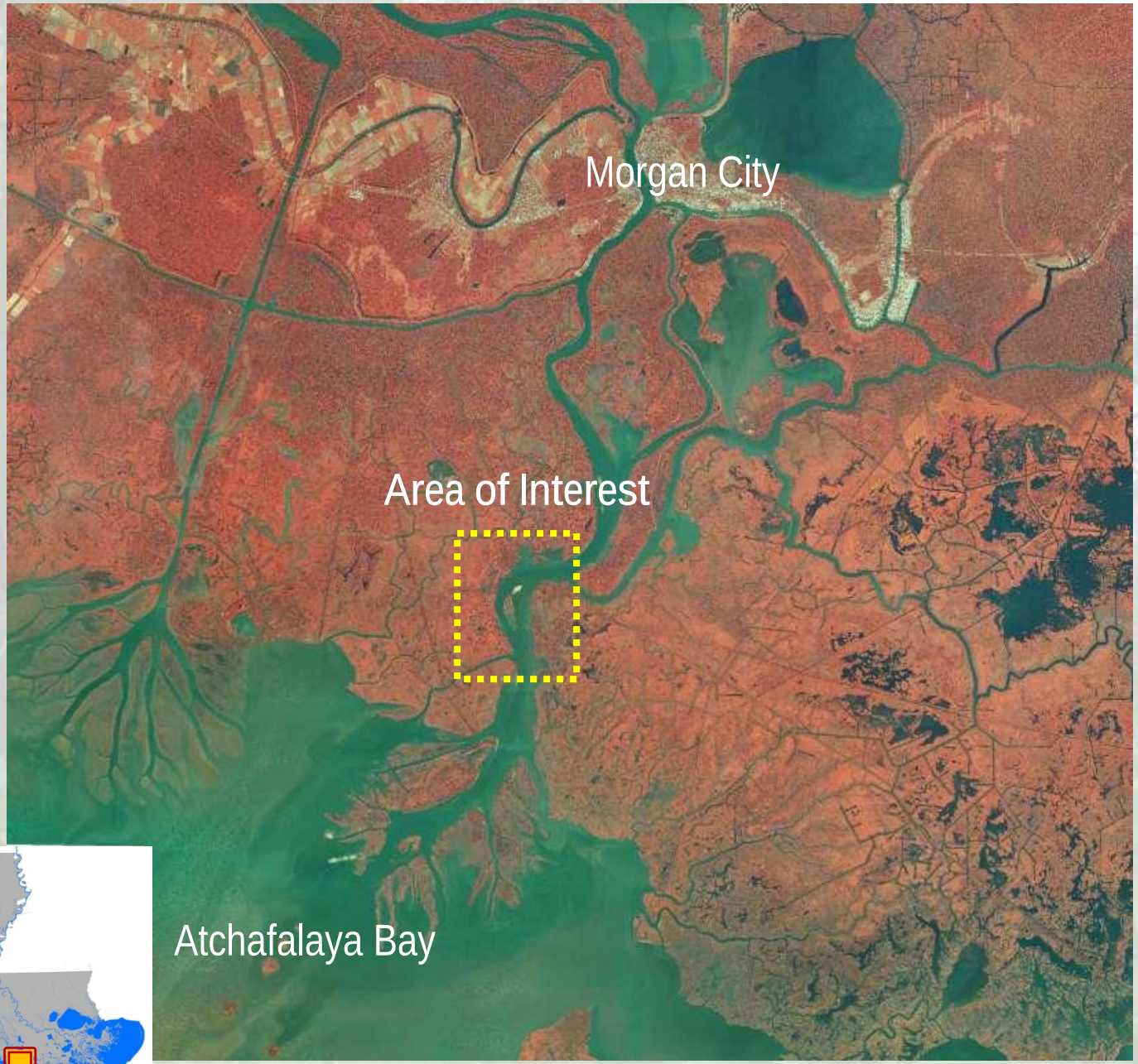

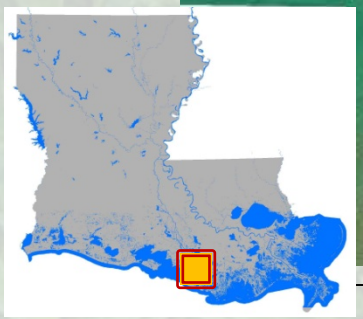

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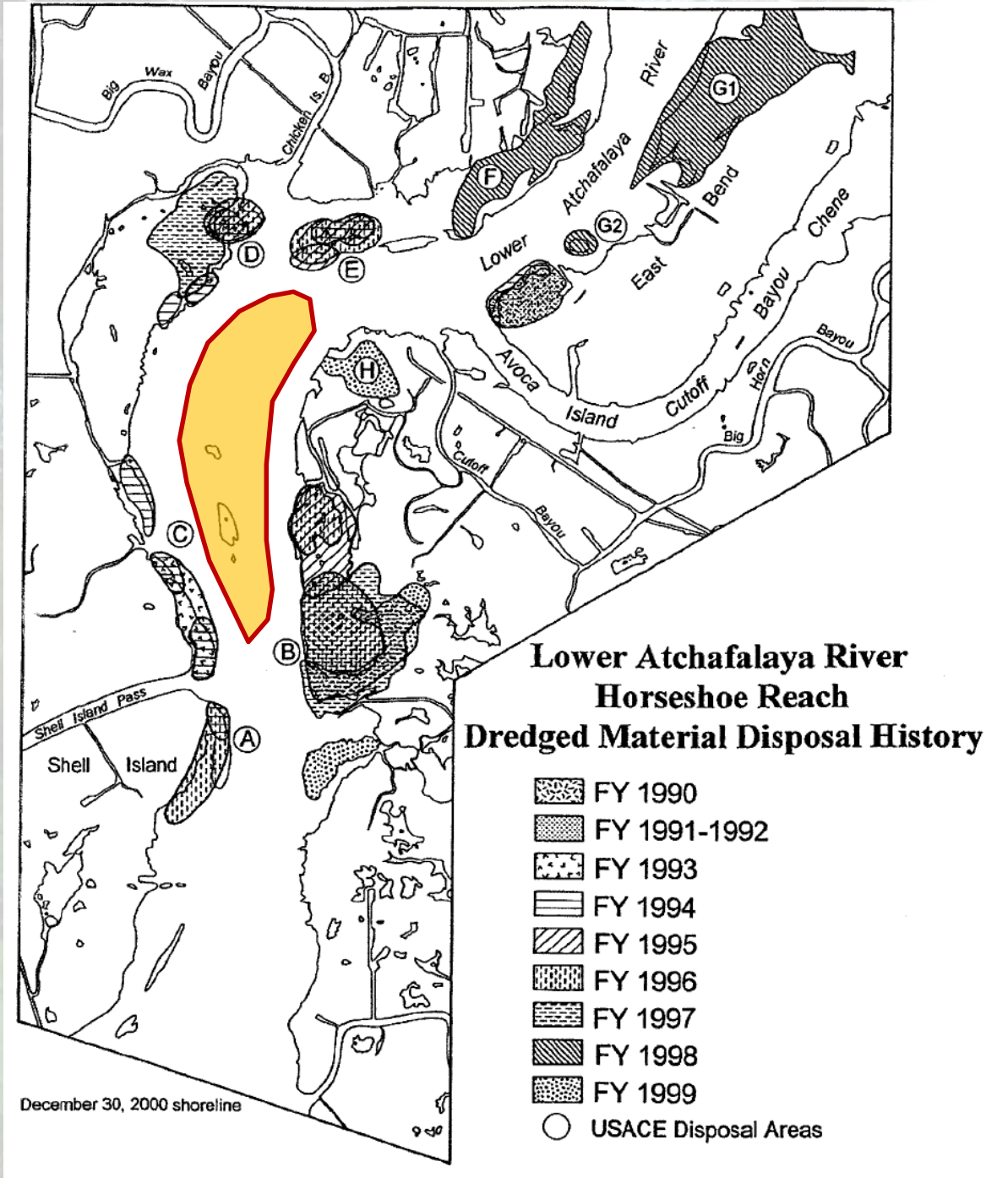

Problem

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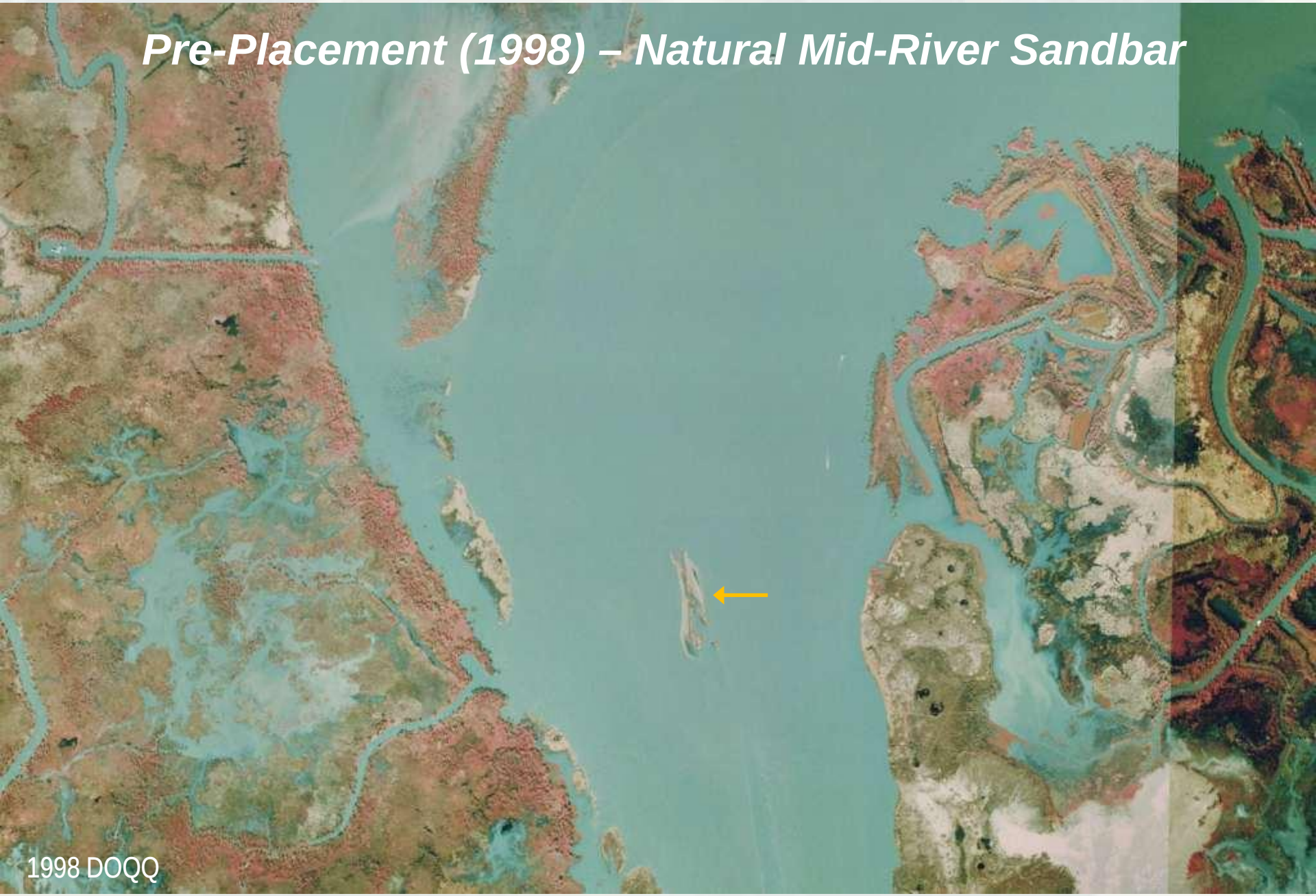
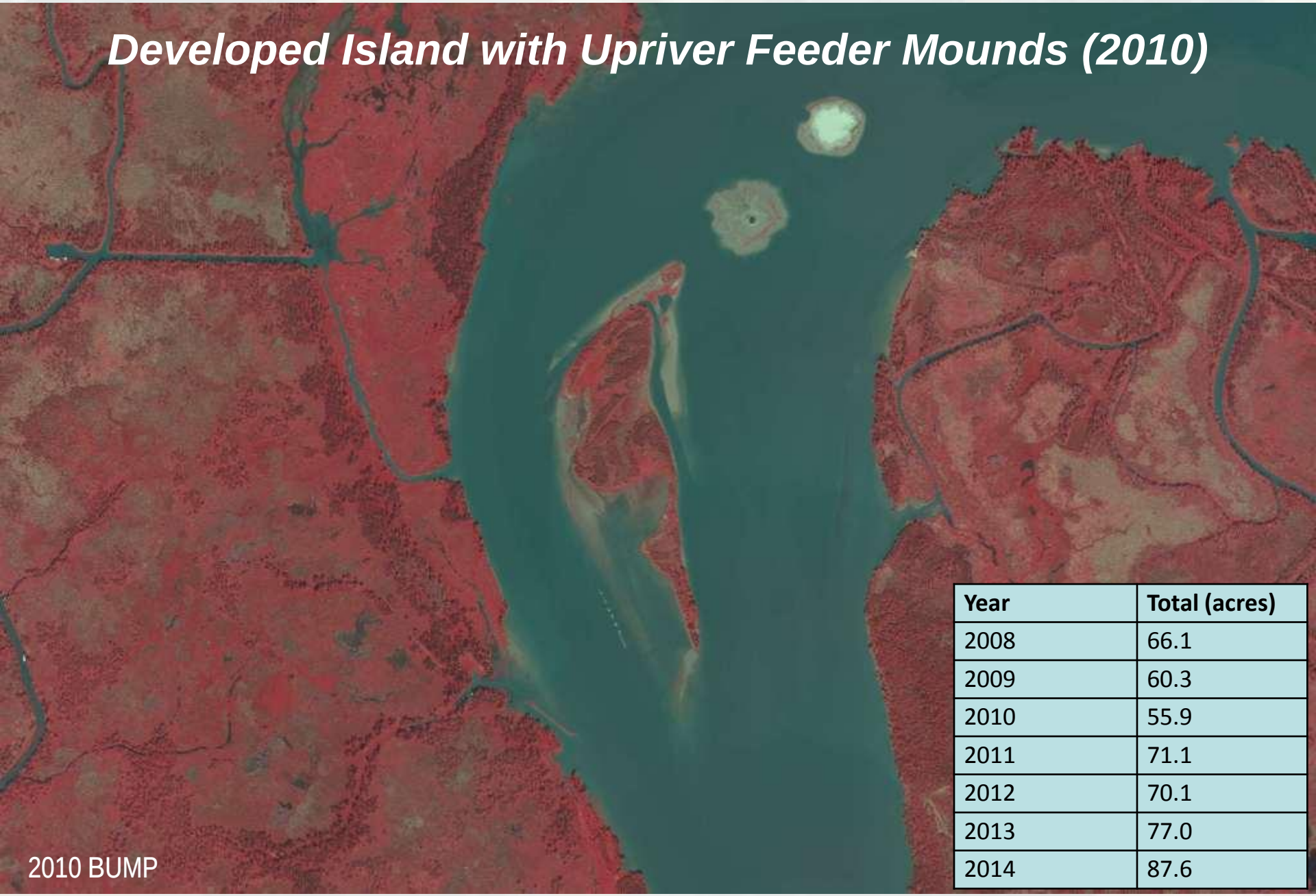
Pre-Placement (1998) – Natural Mid-River Sandbar



Developed Island with Upriver Feeder Mounds (2010)



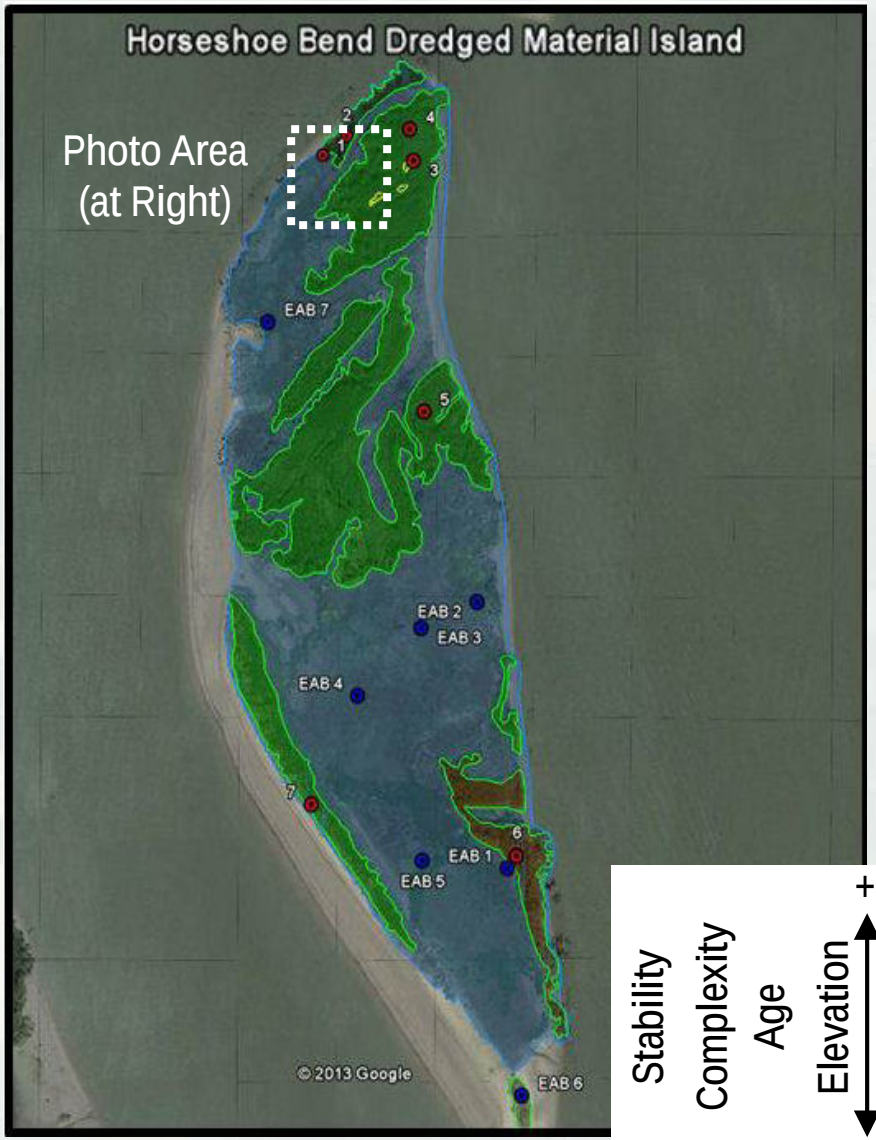
Year	Total (acres)
2008	66.1
2009	60.3
2010	55.9
2011	71.1
2012	70.1
2013	77.0
2014	87.6

2010 BUMP

Quantify Environmental Benefits

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

Classify Habitat

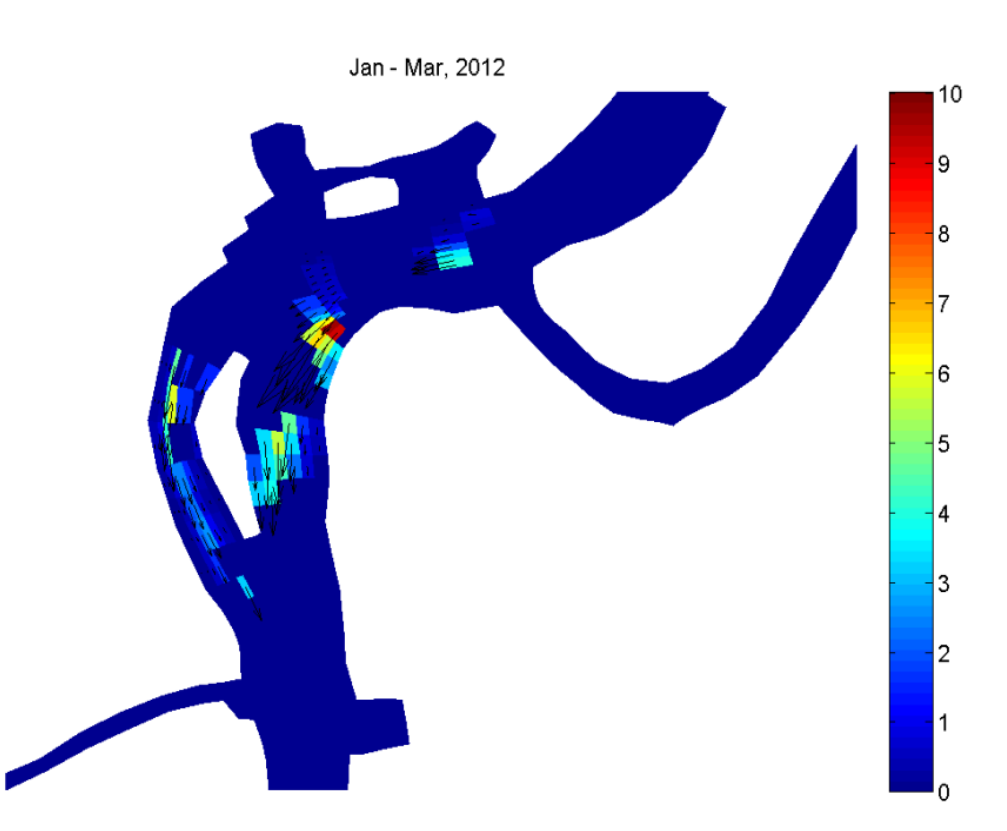


Stability
Complexity
Age
Elevation
+
–

- Mature Forested & Scrub-Shrub Wetlands
- Young Forested & Scrub-Shrub Wetlands
- Emergent Wetland Transition Zone
- Aquatic Bed Features

Model Hydrodynamics

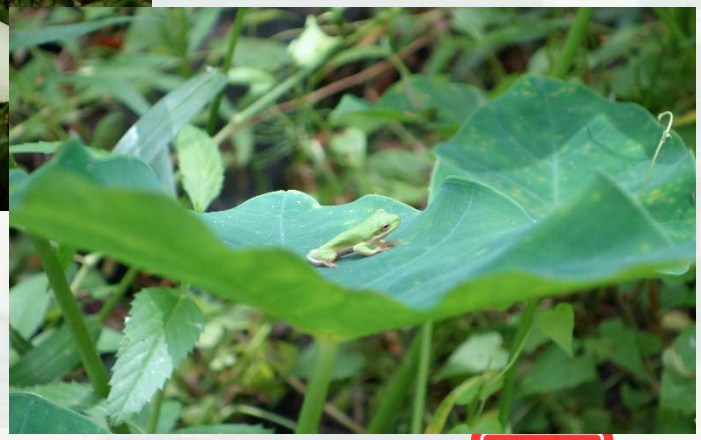
Mean suspended sediment transport volume rate during January - March 2012 ($m^3/m/s$)



Environmental Benefits

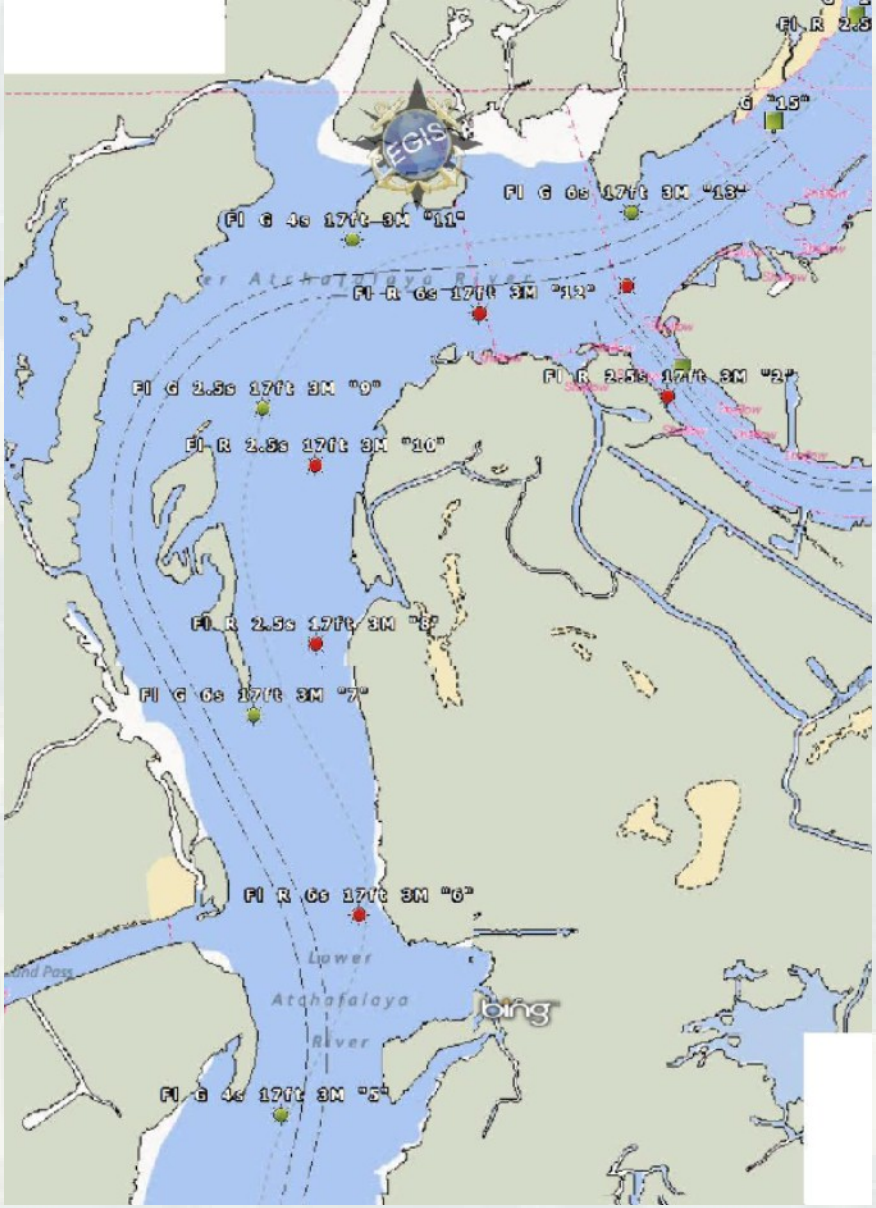
Created island supports:

- 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



US Coast Guard Ship Channel Realignment

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

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 (MTCO2e)
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

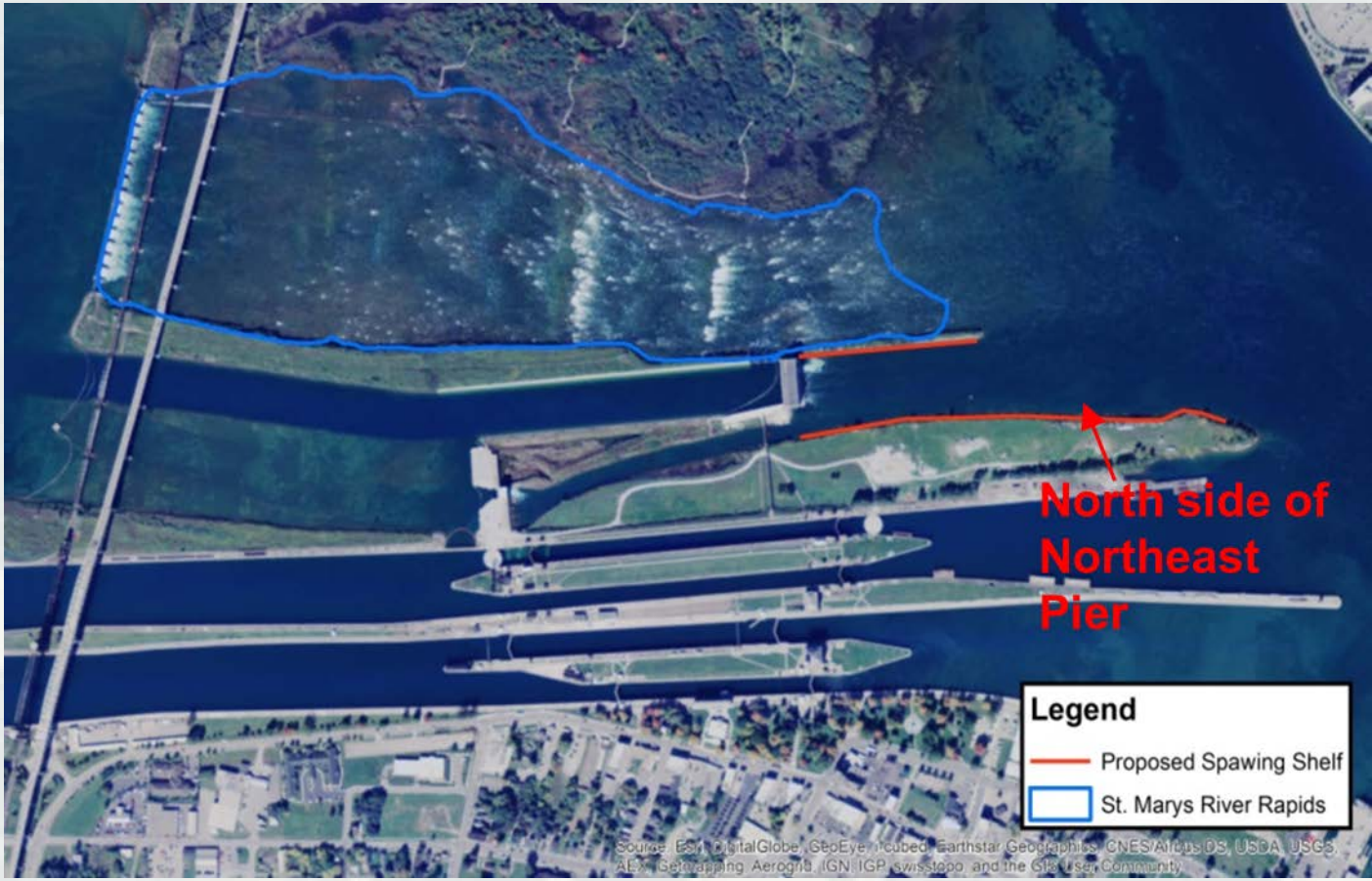
Other Applications – Soo Locks

-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

Working with Nature

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