Planning Hurricane Storm Damage Risk Reduction with an Emphasis on Minimizing Impacts to the Lake Pontchartrain Basin

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New Orleans District

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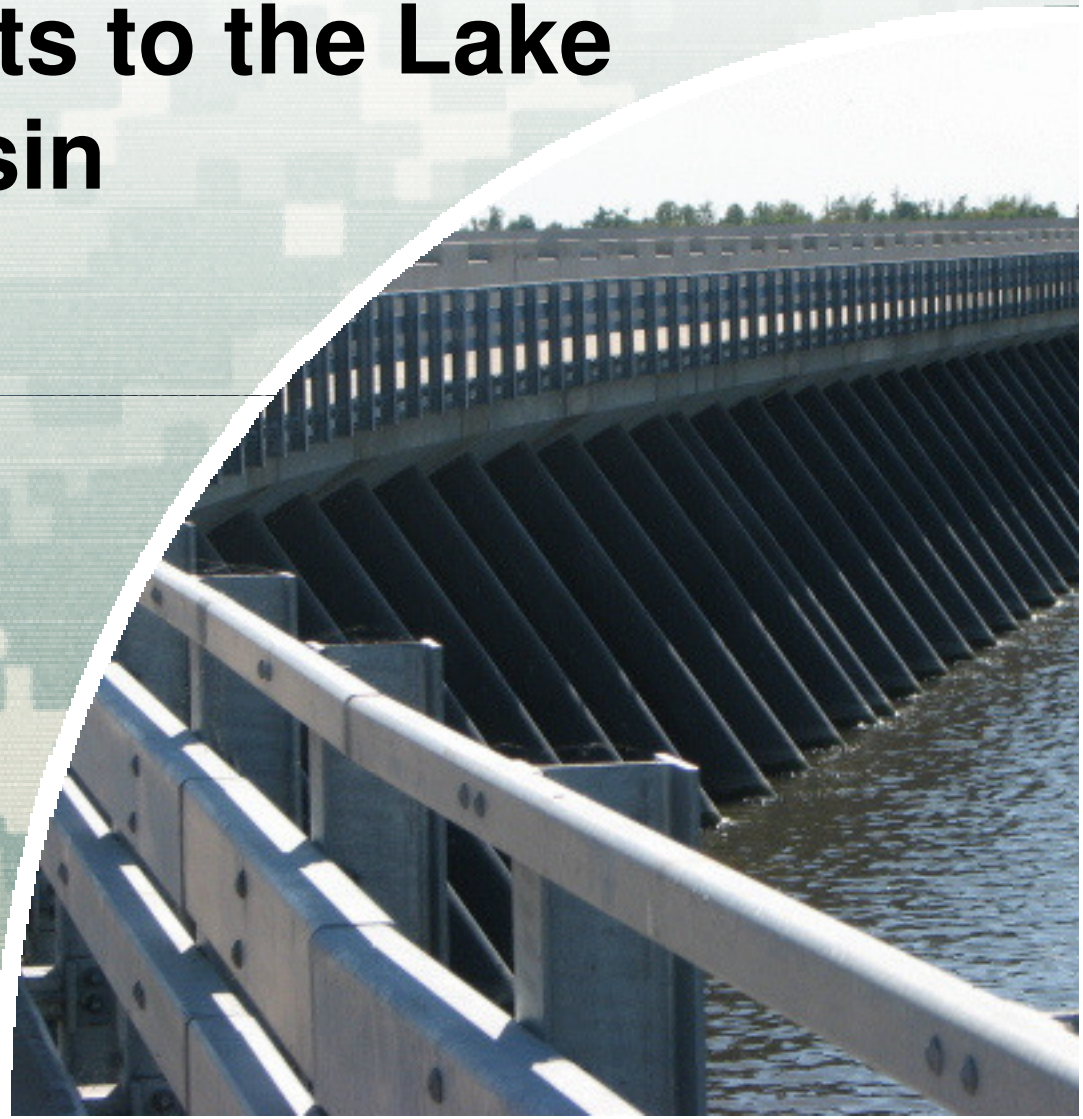
Evans-Graves Engineers



US Army Corps of Engineers
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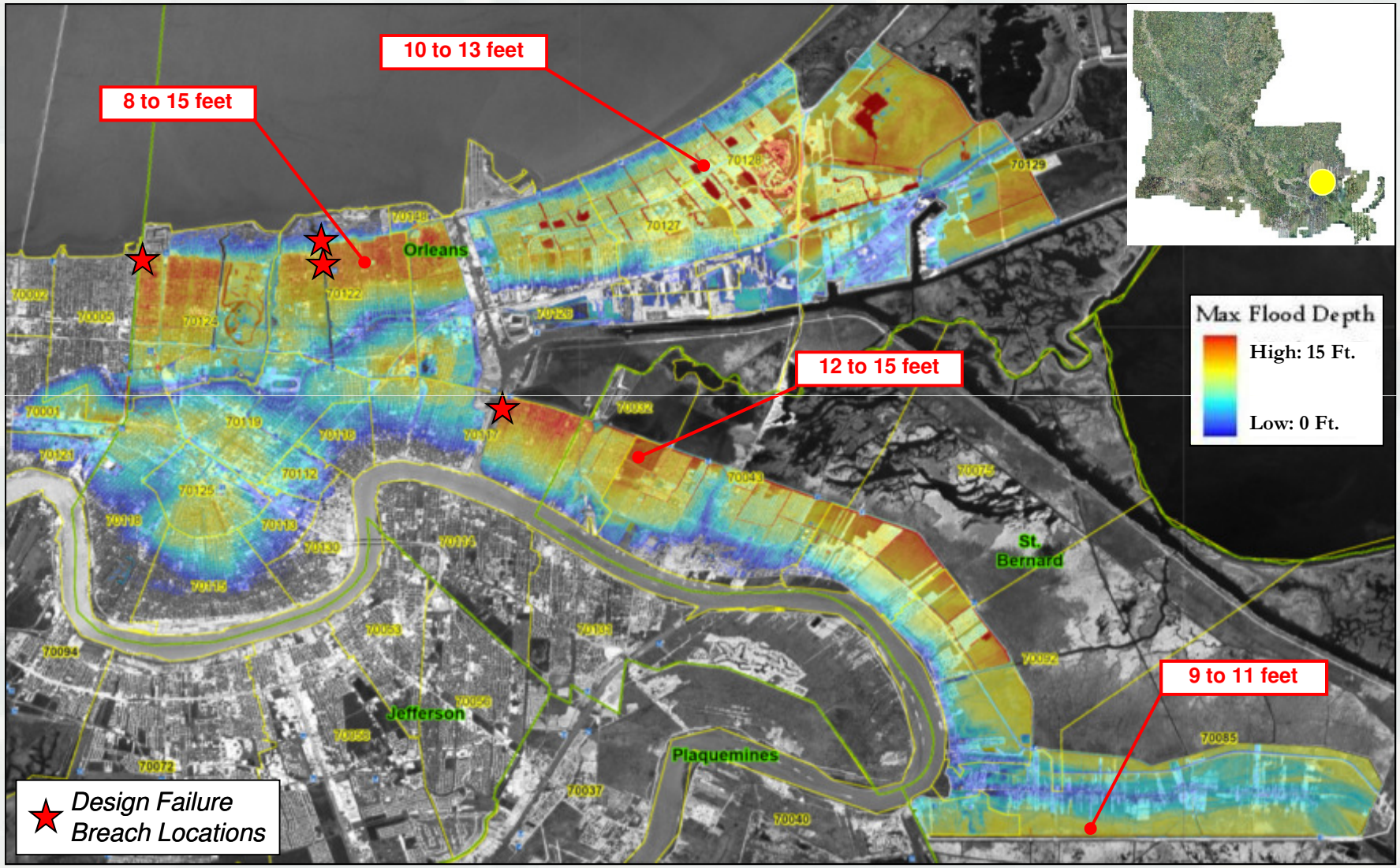
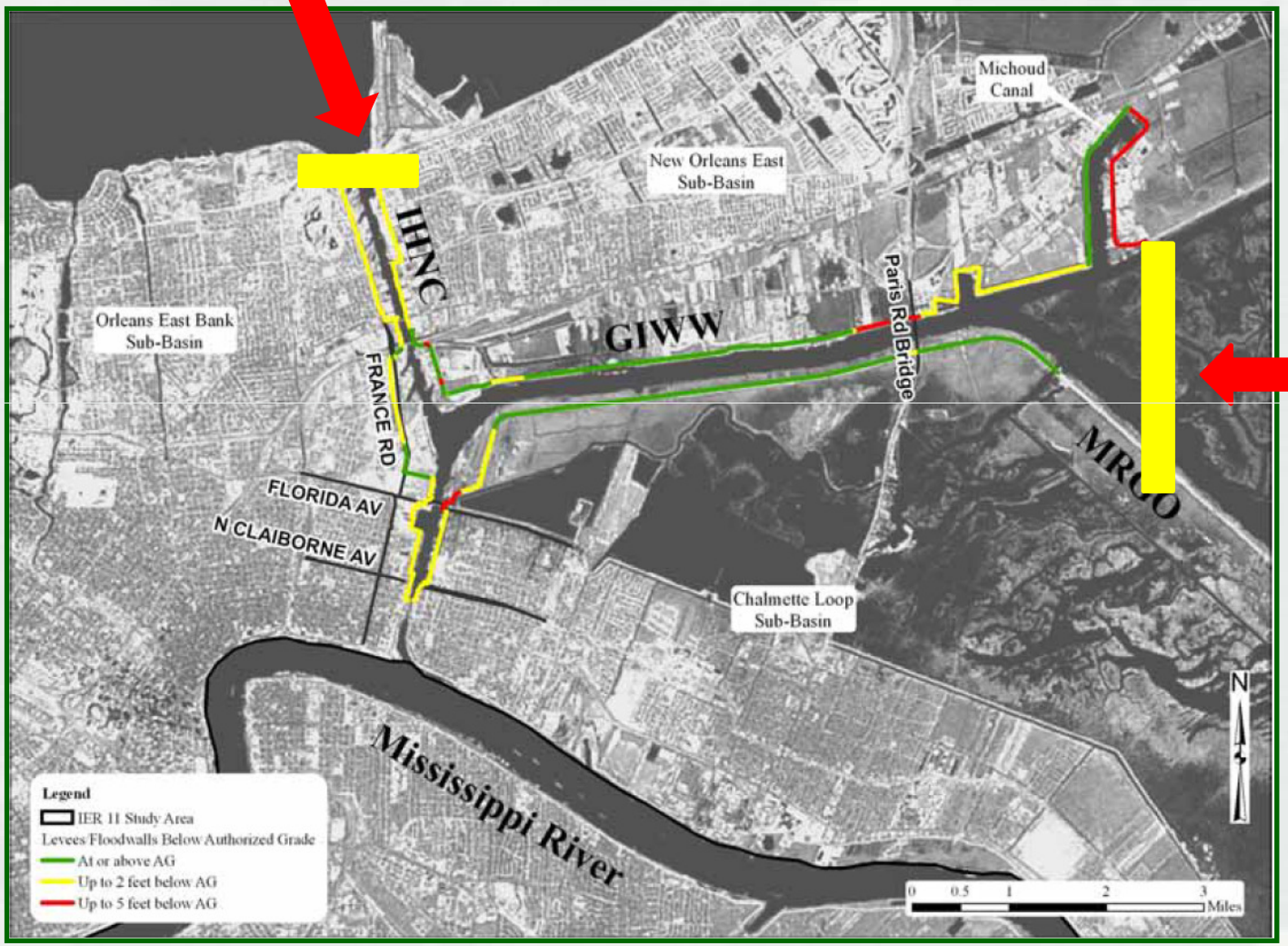
Hurricane Katrina Inundation



Levees and Floodwalls Below Authorized Level of Risk Reduction as of March 2008

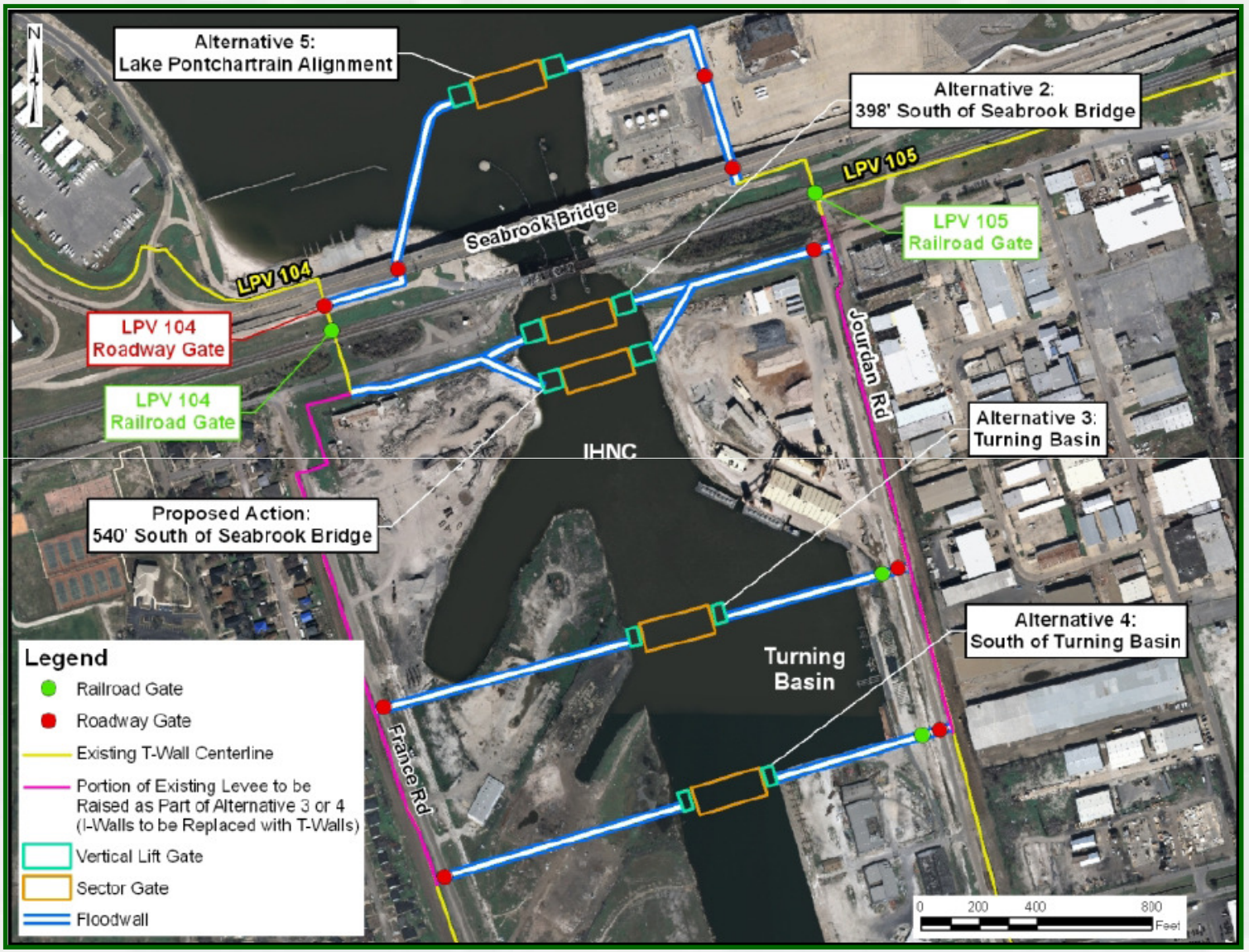


Steps to Minimize Environmental Impacts

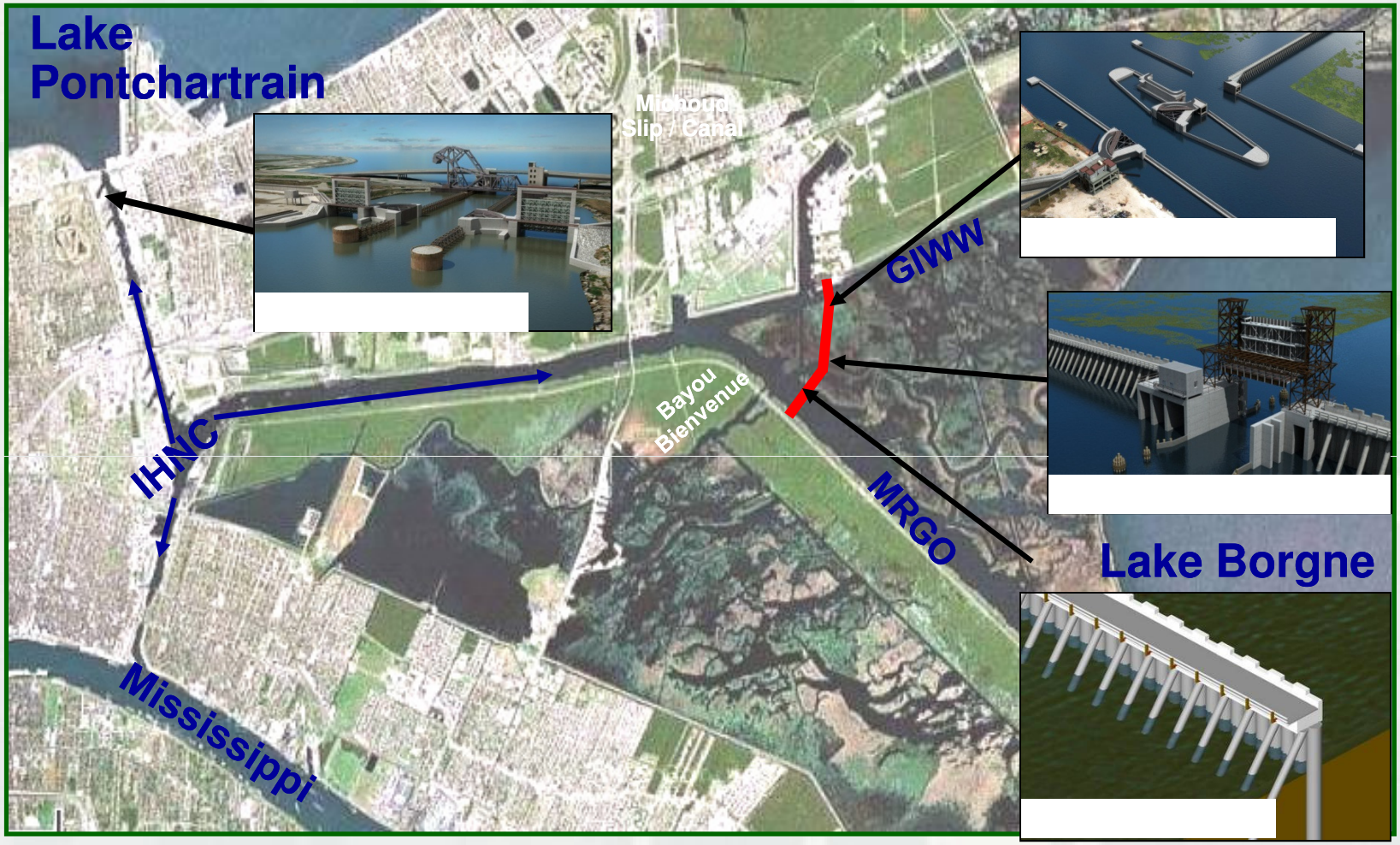
- Balance environmental impact with risk, cost & schedule in choosing alignments
- Environmental Design Parameters and Construction Techniques
- Impact Modeling
- Water Quality Monitoring

Borgne Barrier Alternative Alignments

Seabrook Alternative Alignments



Selected Alignment Optimization



Environmental Design Parameters

- Minimize impacts to wetlands and natural hydrological regime
- Minimize potential adverse impacts to fisheries
- Maintain a water flow capacity that is comparable to the waterway's capacity prior to construction
- Accommodate vertical and horizontal fishery distribution patterns with interior marsh tidal pathways and coastal passage
- Minimize the migratory distance from opening to enclosed wetland habitats
- Minimize creation of steep environmental gradients (i.e. changes in salinity regimes, changes in physical slope of channel)
- Maintain velocities suitable for fish passage (i.e. a maximum of 2.6 feet/second water flow during peak flood or ebb tides).
- Provide for reopening of structure even if electricity is unavailable. This could entail a manual mechanical opening system, using a tow boat, crane operated, etc.
- Minimize overall project footprint
- Structures shall be designed to close during storm events, routine testing, maintenance operations, or if closing the structure is needed to provide access to other features of the project.
- Minimize potential for turbidity-causing sediment erosion during construction and throughout the project life
- Avoid or minimize disturbance of contaminated sediments and other hazardous, toxic or radioactive waste in the project area.

Environmental Design Features

3 gates to minimize velocity impacts

Fish ramps and entrainment walls

Construction Techniques to Minimize Impacts

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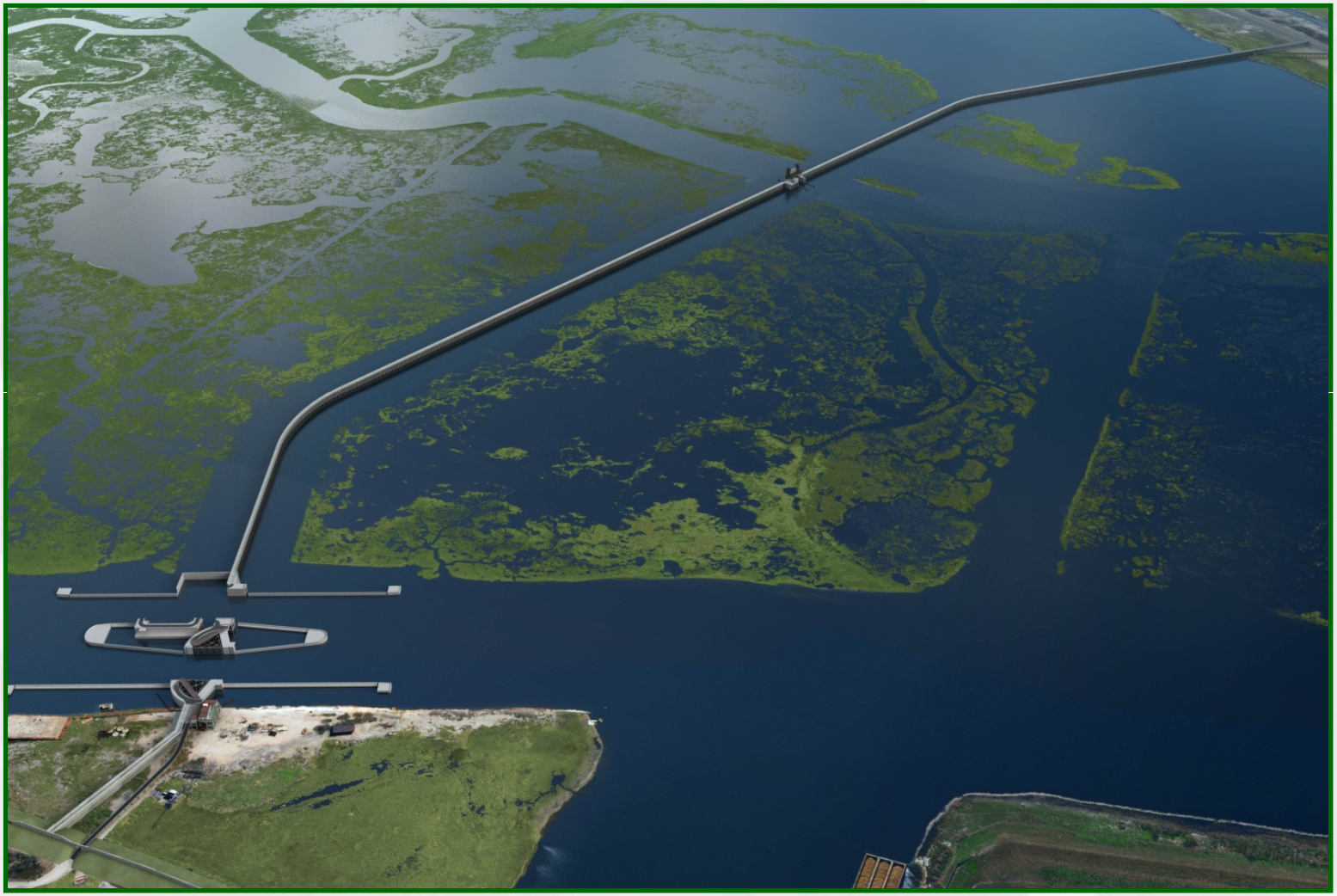
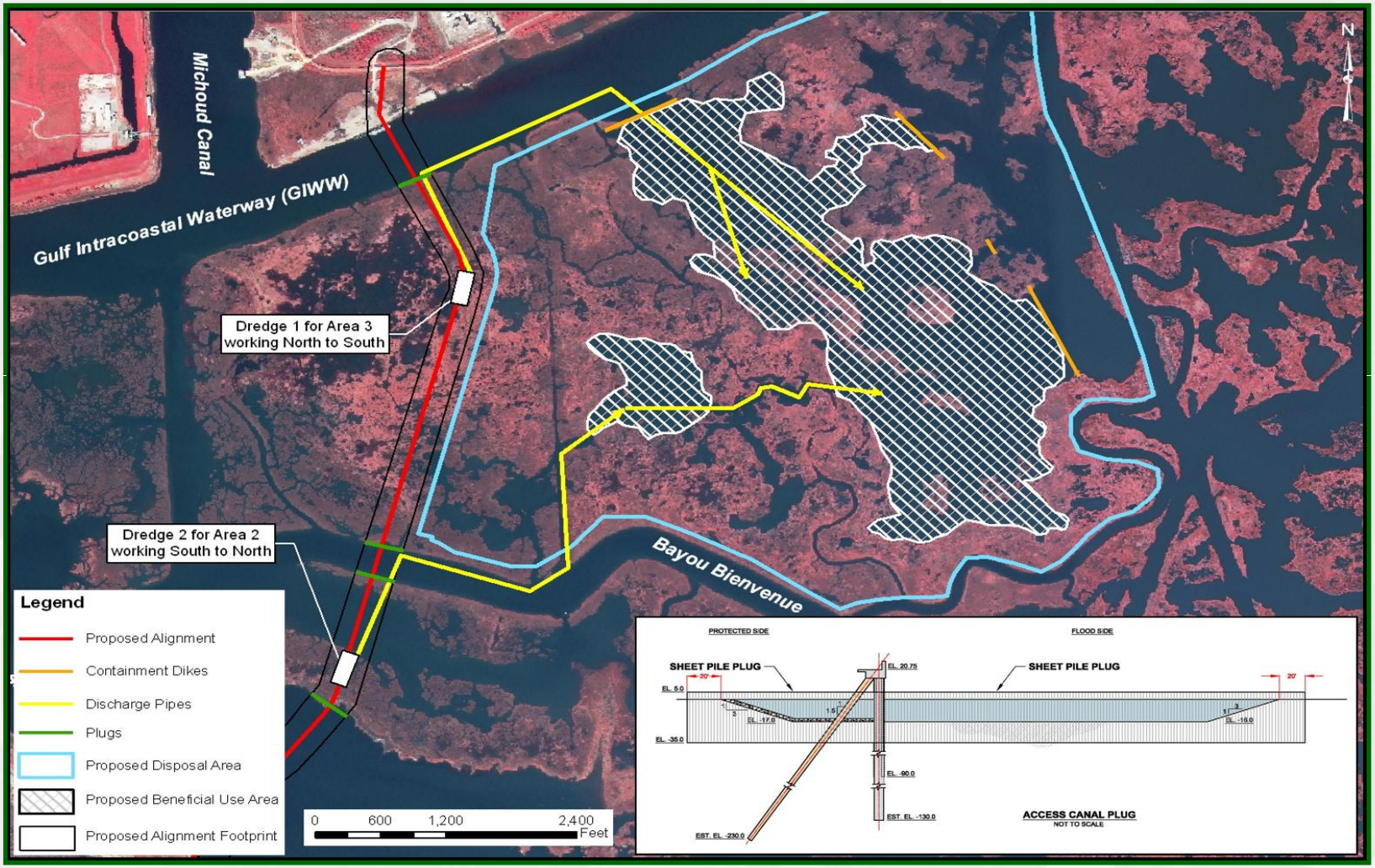
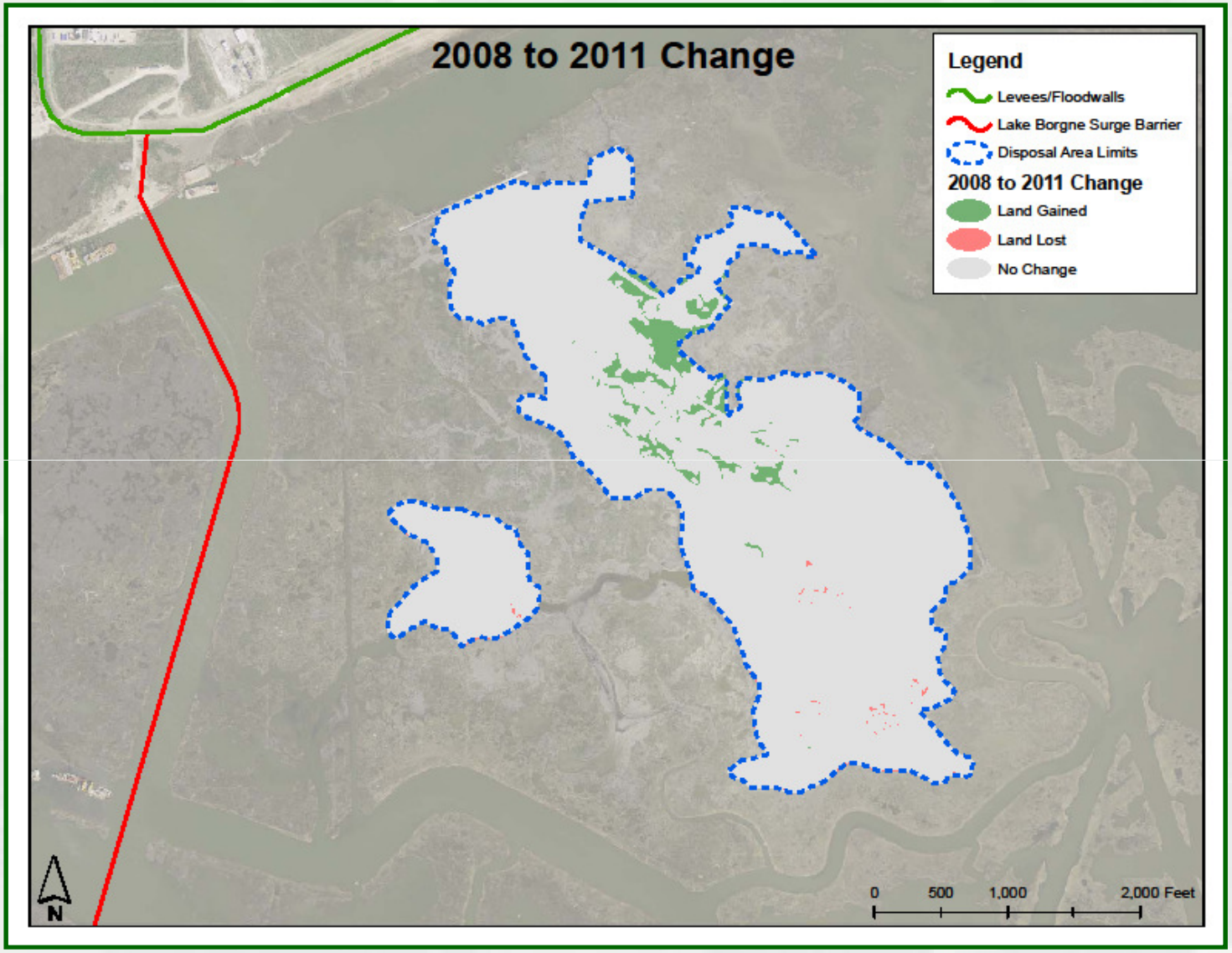
Borgne Barrier



Beneficial Use of Dredge Material & Channel Plugs



Borgne Barrier Beneficial Use Disposal Area



Borgne Barrier Beneficial Use Disposal Area June 23, 2011

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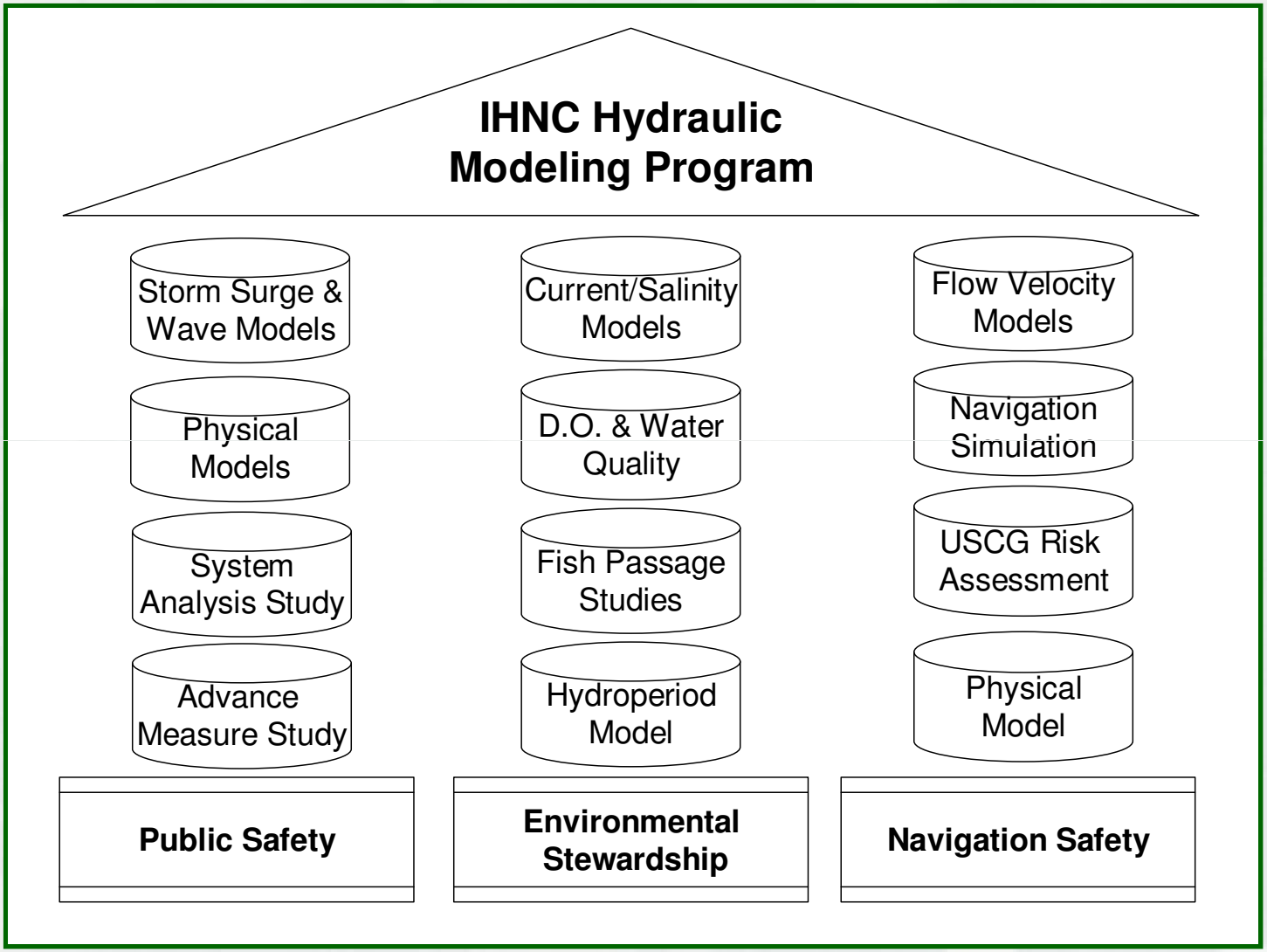
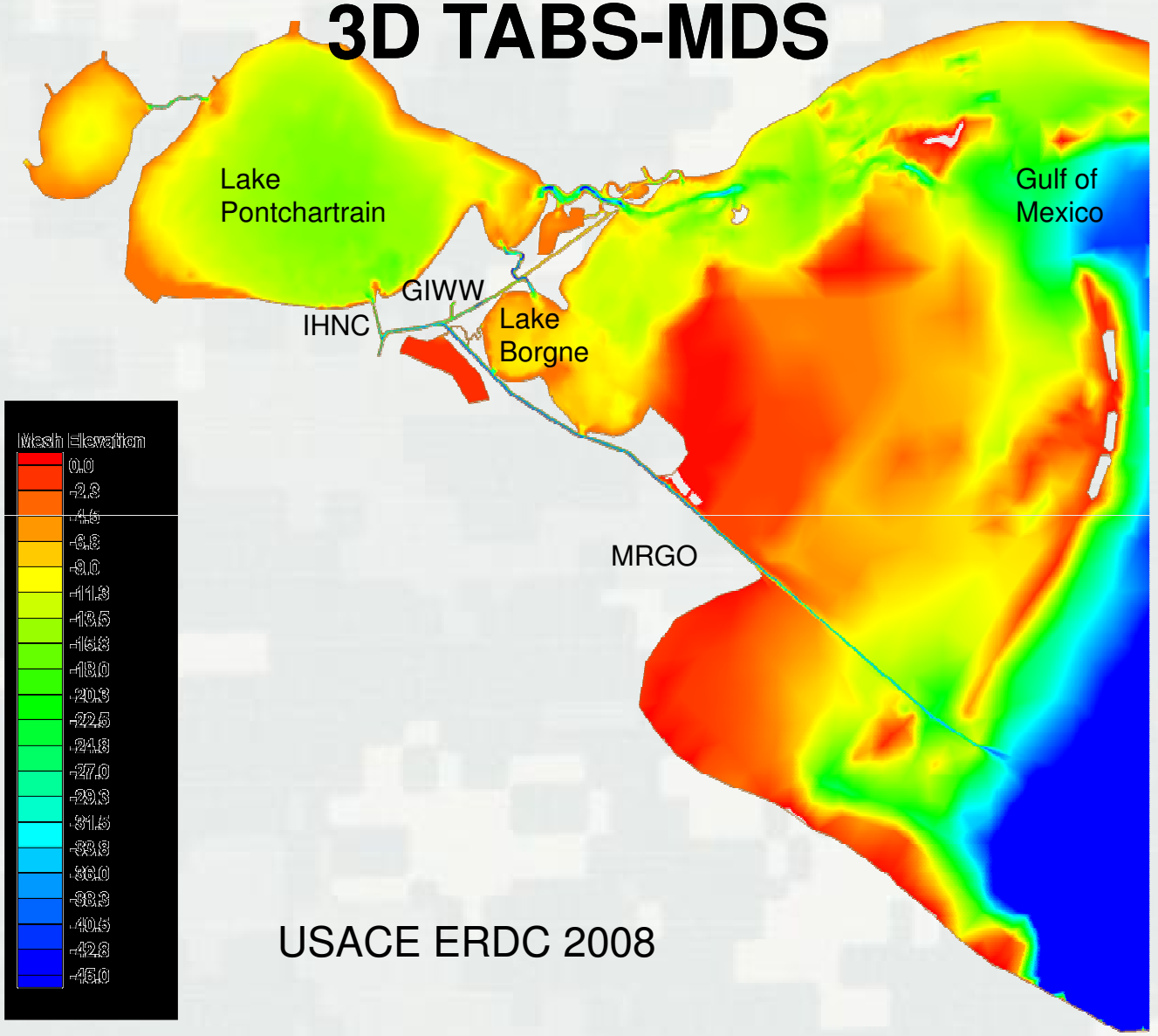
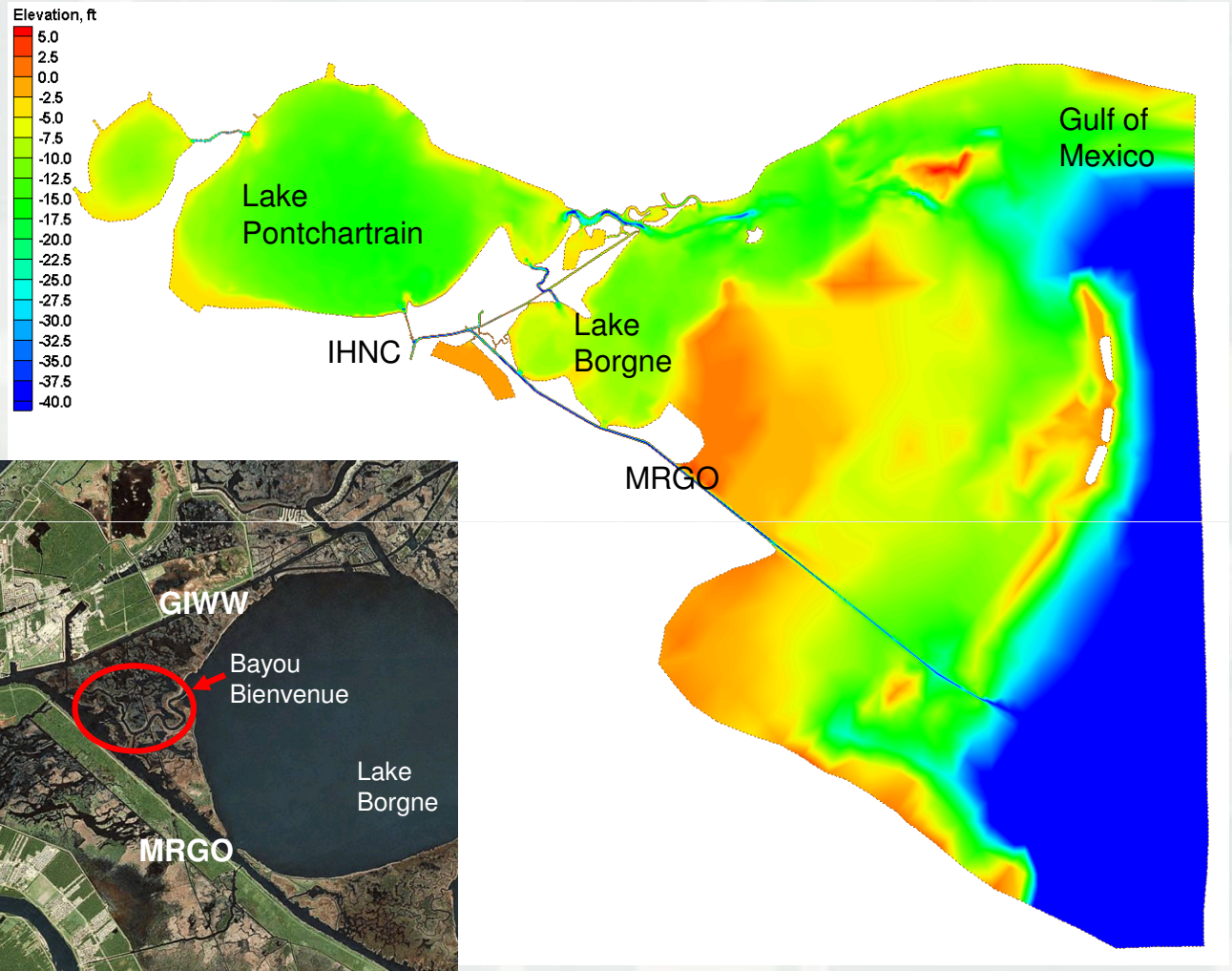

IHNC Hydraulic
Modeling Program
Storm Surge & Wave Models
Physical Models
System Analysis Study
Advance Measure Study
Current/Salinity Models
D.O. & Water Quality
Fish Passage Studies
Hydroperiod Model
Flow Velocity Models
Navigation Simulation
USCG Risk Assessment
Physical Model
Public Safety
Environmental Stewardship
Navigation Safety

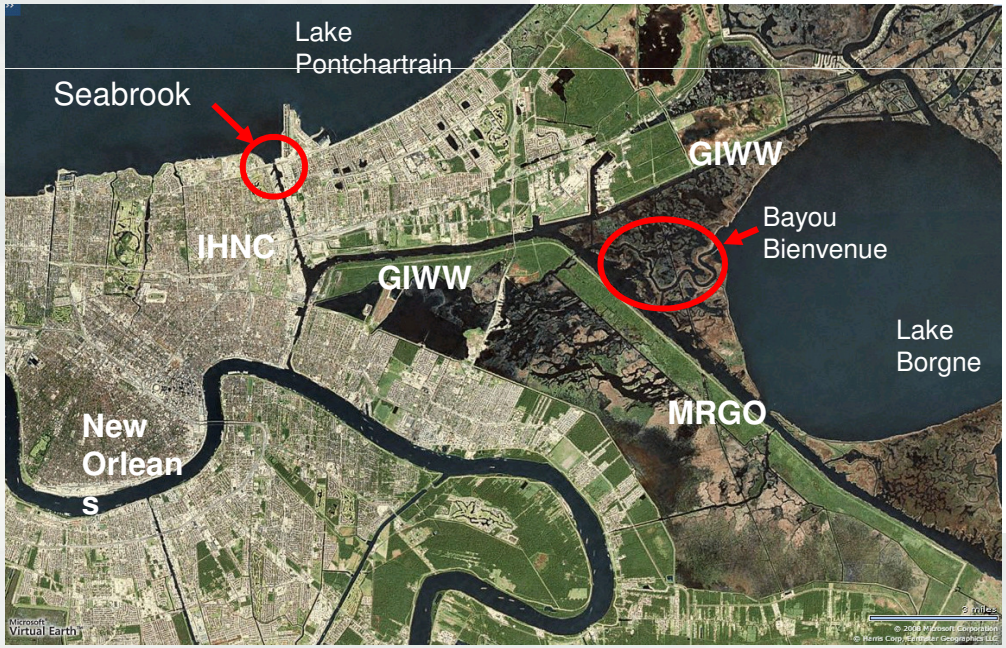
Velocity and Salinity Model
3D TABS-MDS



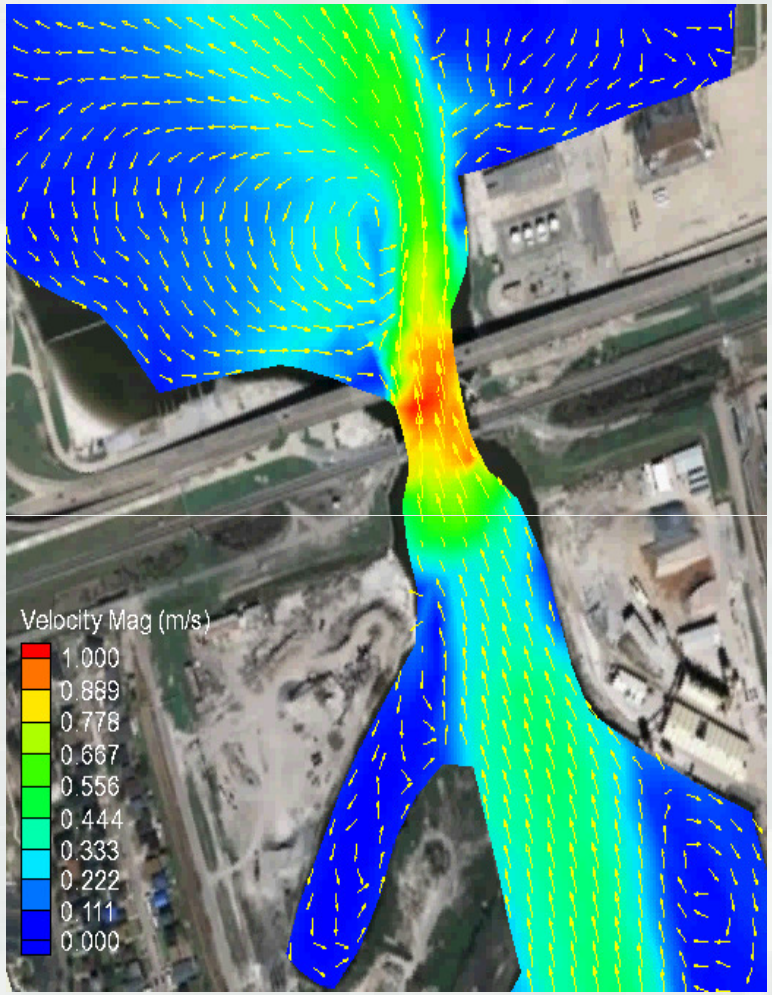
USACE ERDC 2008

ADH and PTM Mesh Domain

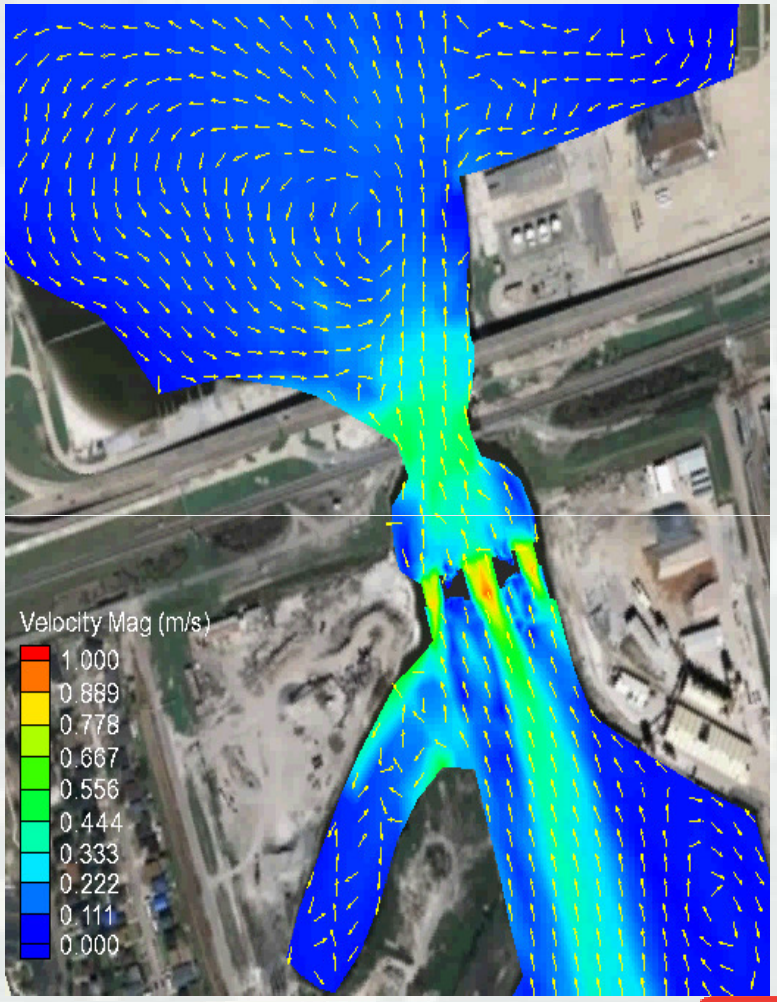




ADH Seabrook Velocity (March 2008)



Base

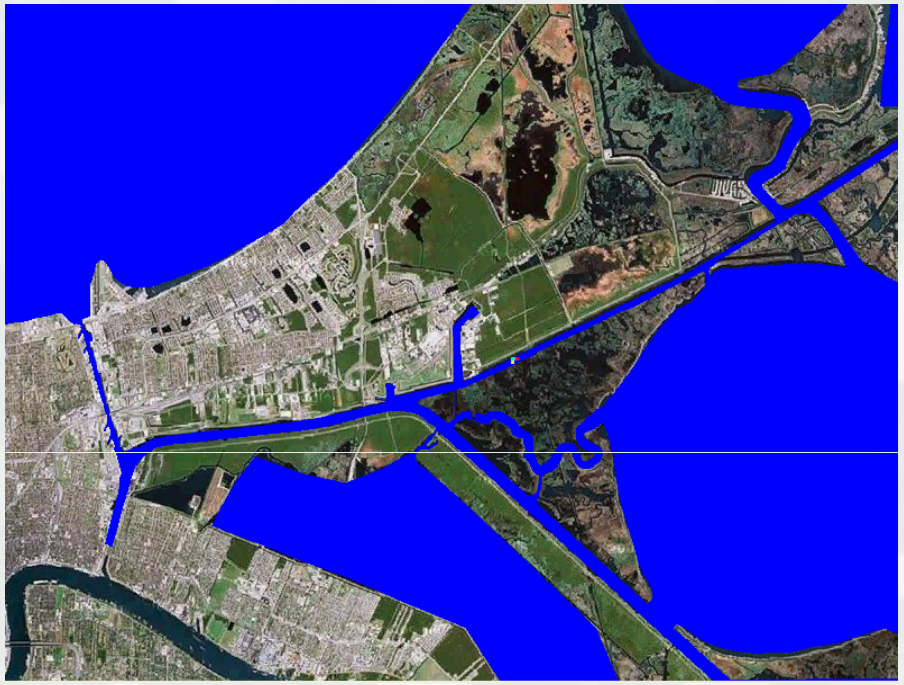


Final Plan

Particle Tracking Model Simulations

Behavior Effects
(Final Configuration)

September 2007

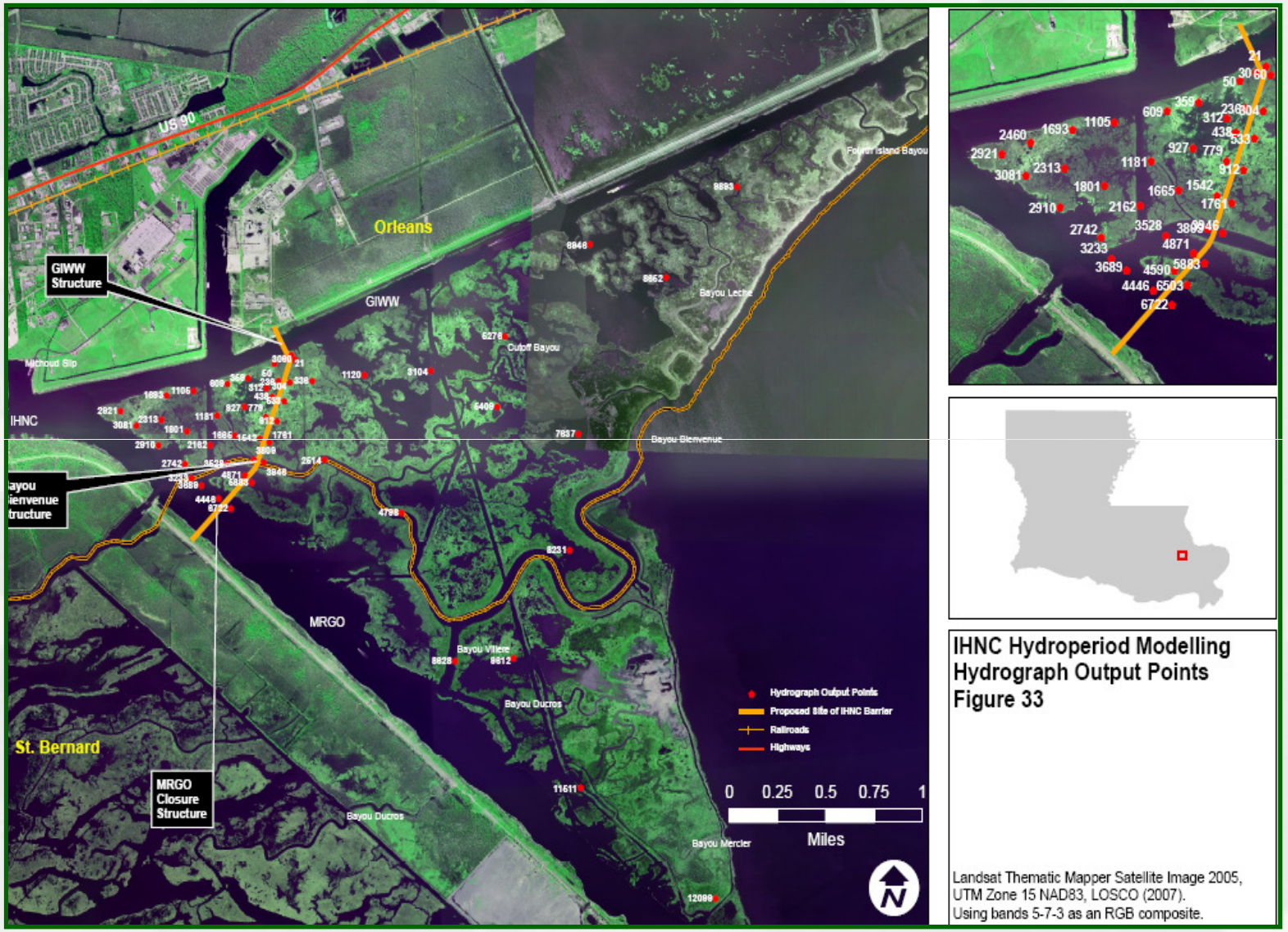


March 2008

Particles are color coded based on behavior

- Tidal Lateral
- Tidal Vertical
- Bottom Movers
- Passive

Hydroperiod Modeling
ADCIRC



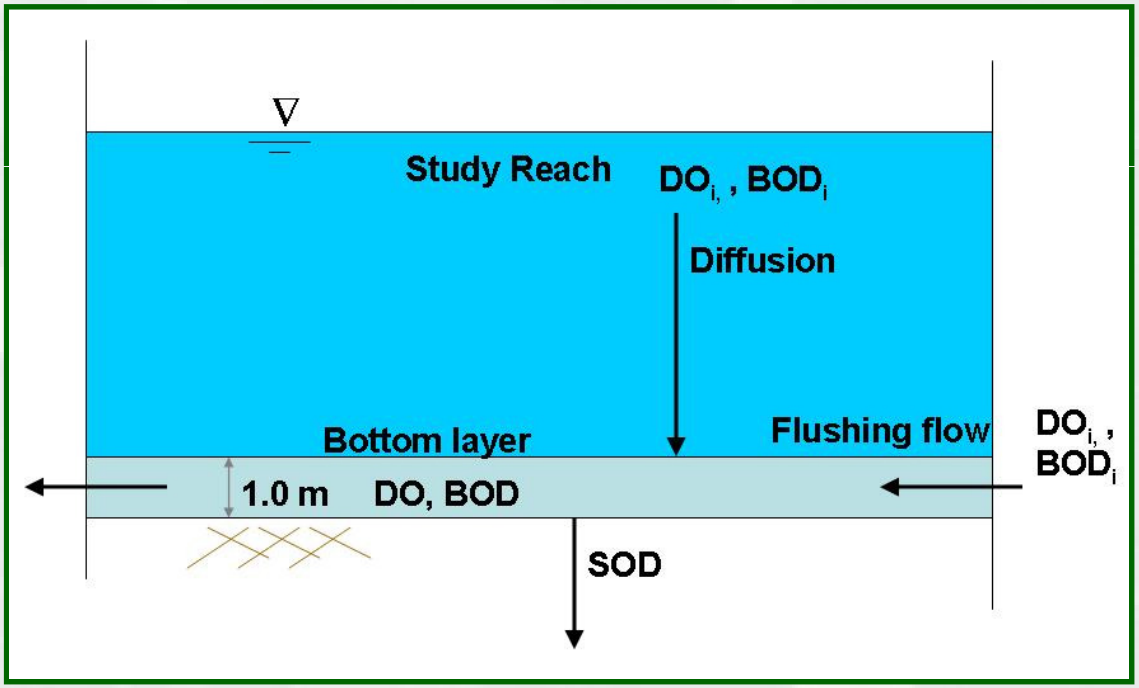
IHNC Hydroperiod Modelling
Hydrograph Output Points
Figure 33

Landsat Thematic Mapper Satellite Image 2005,
UTM Zone 15 NAD83, LOSCO (2007).
Using bands 5-7-3 as an RGB composite.

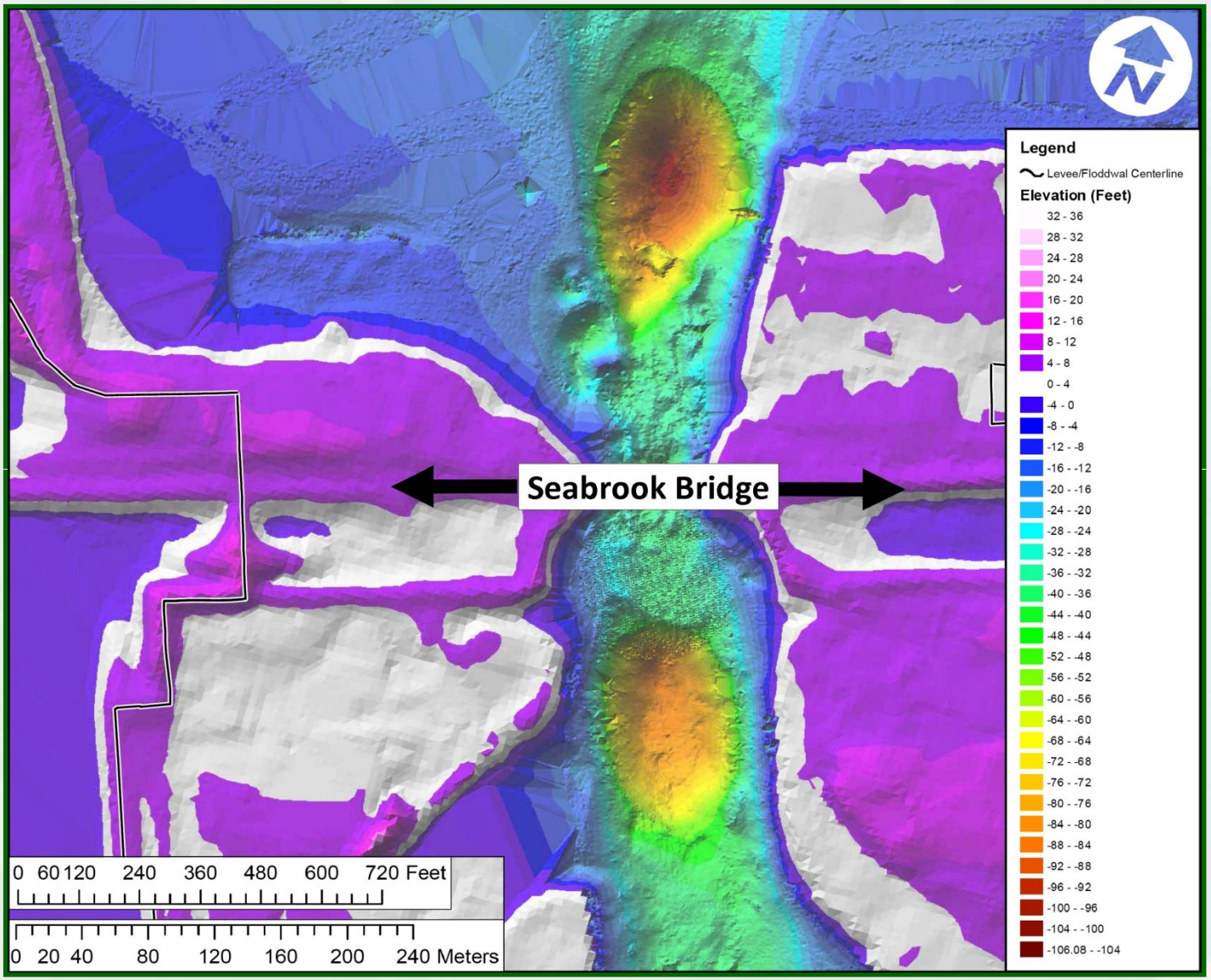
Mass Balance of DO and BOD, Solve for DO and BOD

$$V\frac{d\,DO}{d\,t} = Q\,DO_i - Q\,DO - A\;SOD + E_z^{'}\left(DO_s - DO\right) - k_1 V\,BOD$$

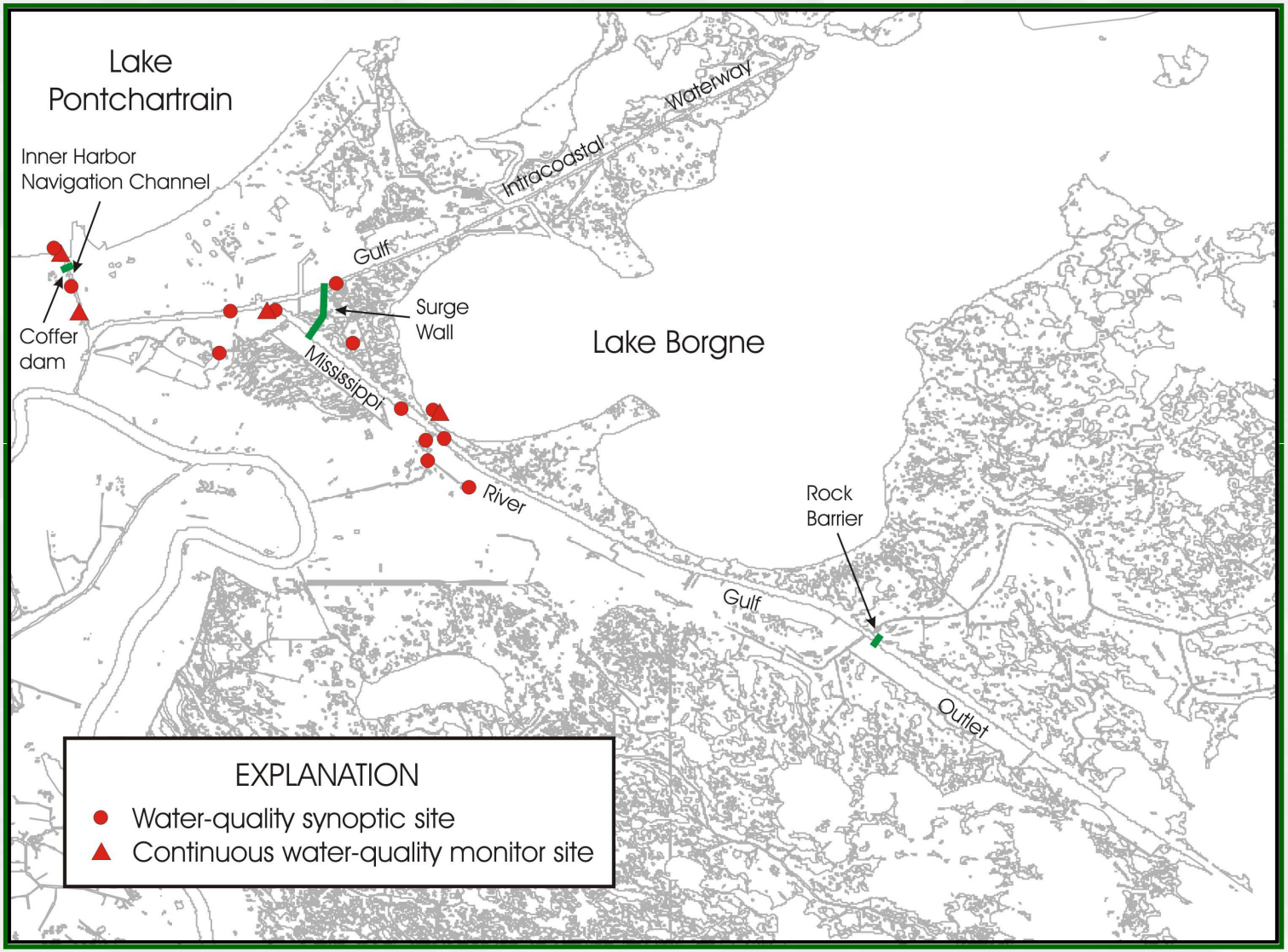
$$V\frac{d\,BOD}{d\,t} = Q\,BOD_i - Q\,BOD + E_z^{'}\left(BOD_s - BOD\right) - k_1 V\,BOD$$



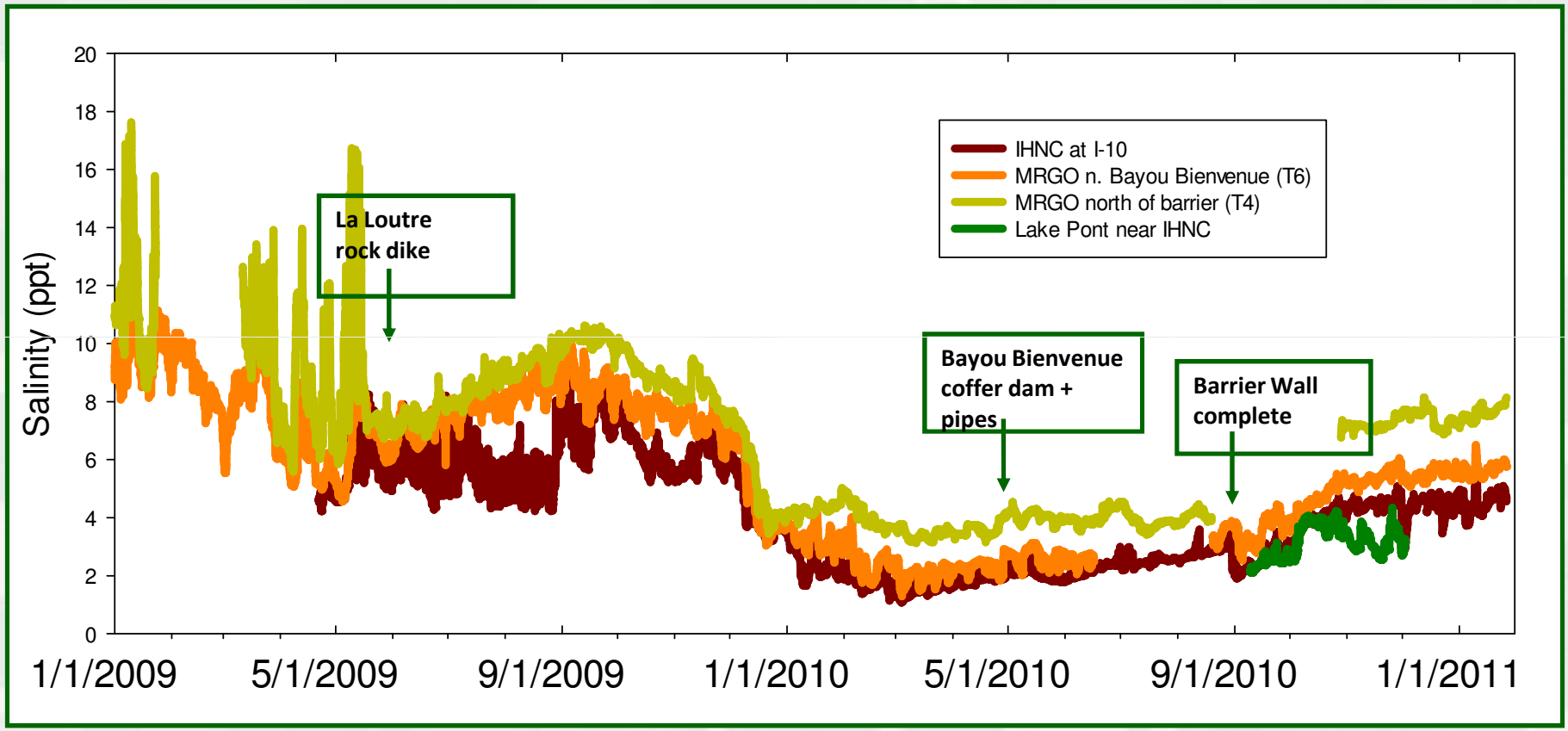
Seabrook Dissolved Oxygen Impacts



Water Quality Monitoring



Preliminary USGS Data



Acknowledgements

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