Oyster-Reef Restoration in Louisiana

Why, Where and What?

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Why?

- Commercial Fishery
- Eutrophication Control
- Recycling nutrients
- Essential Habitat
- Erosion Control

Where?

HSI variables:

- V1 - percent of cultch cover on bottom (larval)
- V2 - mean summer salinity (larval)
- V3 - mean abundance of living oysters (larval)
- V4 - historic mean salinity (attached)
- V5 - frequency of killing floods (attached)
- V6 - mean substrate firmness (attached)
- V7 - mean predator abundance (attached)
- V8 - mean intensity of disease (attached)

HSI calculation:

- $CI_l = (SI_{VI} \times SI_{V2} \times SI_{V3})^{1/3}$
- $CI_a = (SI_{V4} \times SI_{V5} \times SI_{V6} \times SI_{V7} \times SI_{V8})^{1/5}$
- If $CI_a < CI_l$, then $HSI = CI_a$
- If $CI_a > CI_l$, then $HSI = (CI_l \times CI_a)^{1/2}$

Where?

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What?

- Material type

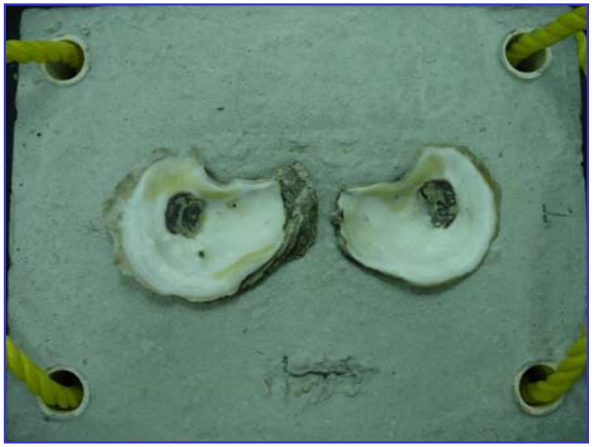
  - oyster shell, limestone, sandstone?

- Material configuration

  - habitat heterogeneity

    spatially-heterogeneous, and refuge-rich oyster reefs should serve as superior habitat for oysters and associated invertebrates and fishes.

- Horizontal no refuge (HNR)
- Vertical no refuge (VNR)
- Vertical with Refuge (VWR)



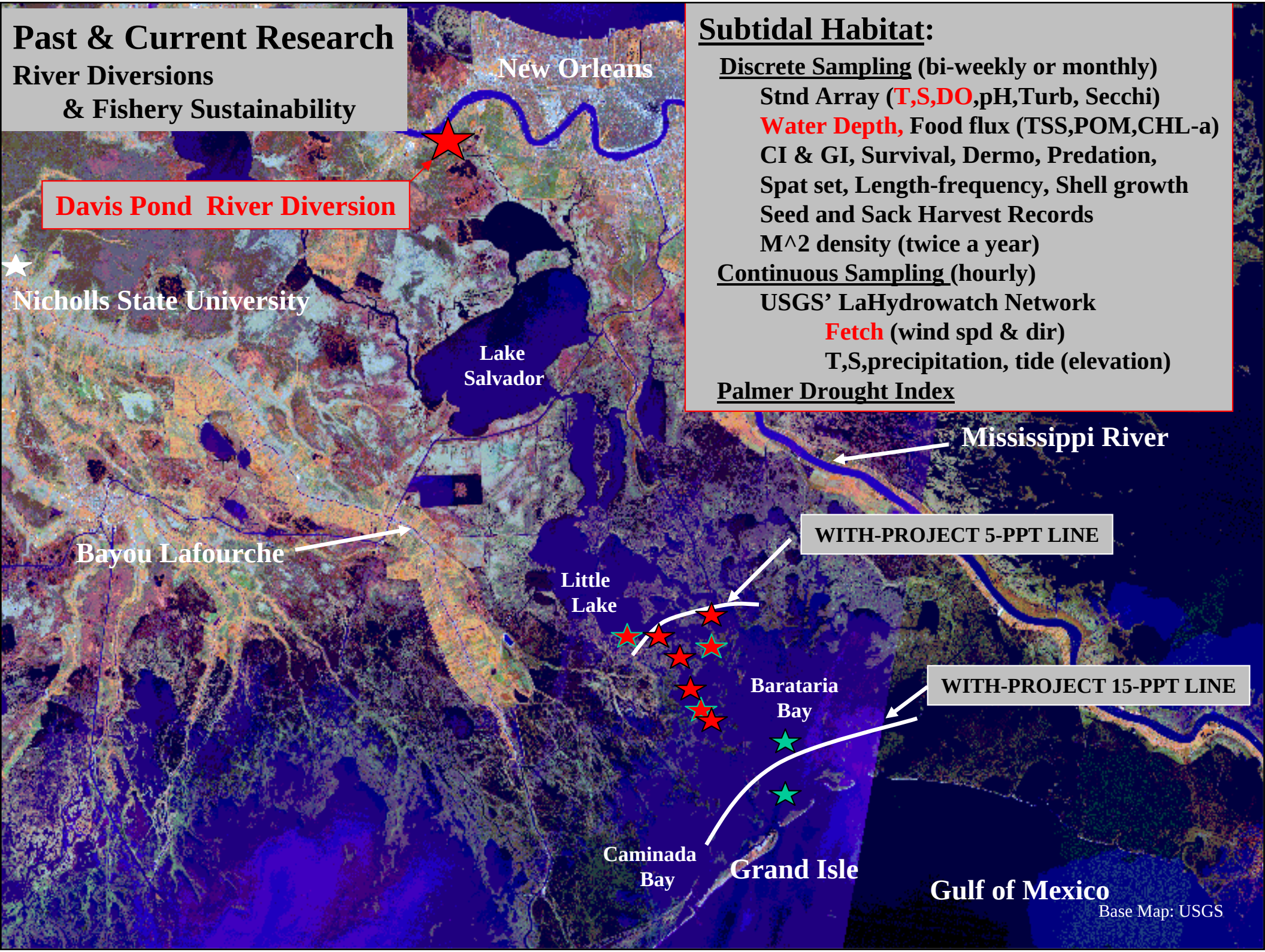
Models were used in three experiments:

- Water flow around models
- Settlement
- Recruitment

- Shell orientation significantly alters flow pattern
- Greater oyster settlement on horizontal surfaces
- Vertical relief ameliorates sedimentation
- Habitat heterogeneity promotes biodiversity
- Recruitment enhanced in refugia

Past & Current Research

River Diversions & Fishery Sustainability



Subtidal Habitat:

Discrete Sampling (bi-weekly or monthly)

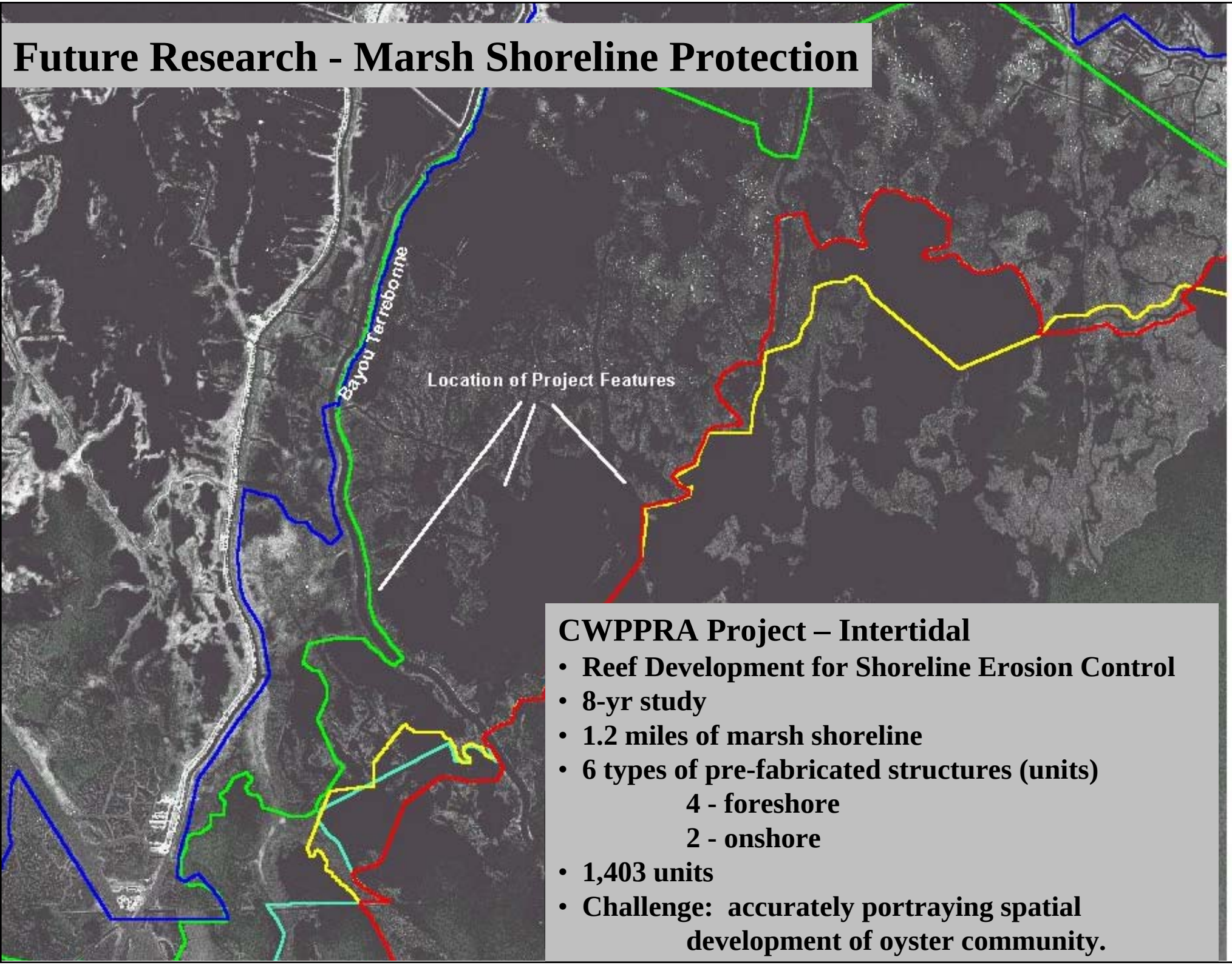
- Stnd Array (T,S,DO,pH,Turb, Secchi)
- Water Depth, Food flux (TSS,POM,CHL-a)
- CI & GI, Survival, Dermo, Predation,
- Spat set, Length-frequency, Shell growth
- Seed and Sack Harvest Records
- M^2 density (twice a year)

Continuous Sampling (hourly)

- USGS' LaHydrowatch Network
  - Fetch (wind spd & dir)
  - T,S,precipitation, tide (elevation)

Palmer Drought Index

Future Research - Marsh Shoreline Protection

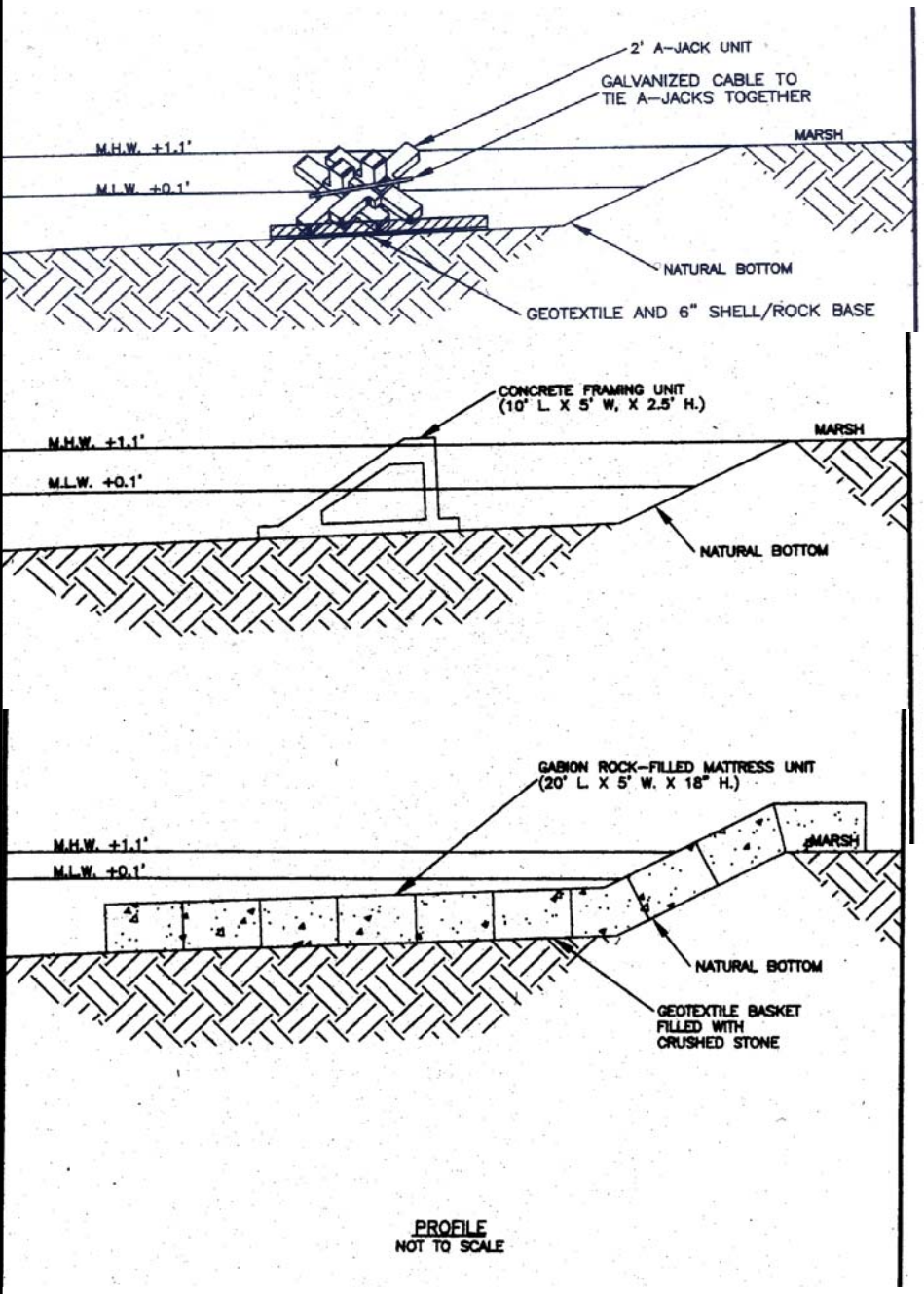


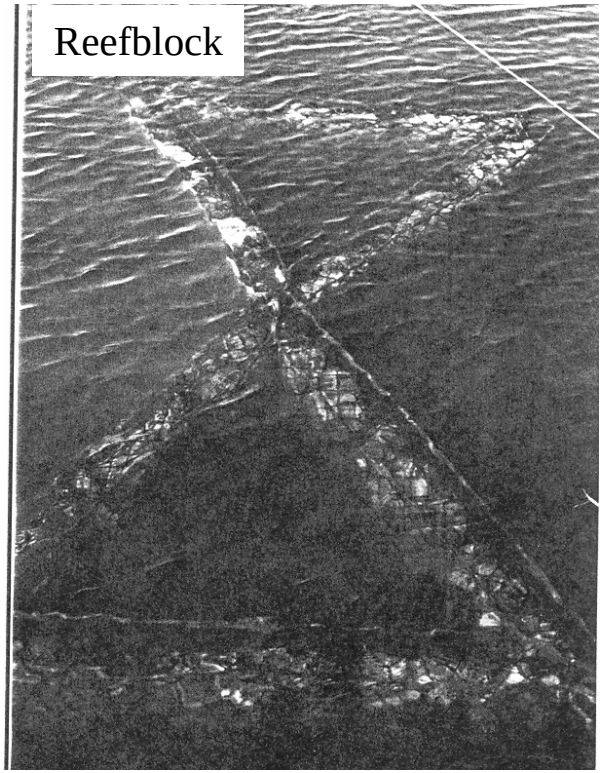
CWPPRA Project – Intertidal

- **Reef Development for Shoreline Erosion Control**
- **8-yr study**
- **1.2 miles of marsh shoreline**
- **6 types of pre-fabricated structures (units)**
  - **4 - foreshore**
  - **2 - onshore**
- **1,403 units**
- **Challenge: accurately portraying spatial development of oyster community.**

Figure 3. Map delineating the oyster harvest closure zones for 2001.

Pre-fabricated structures



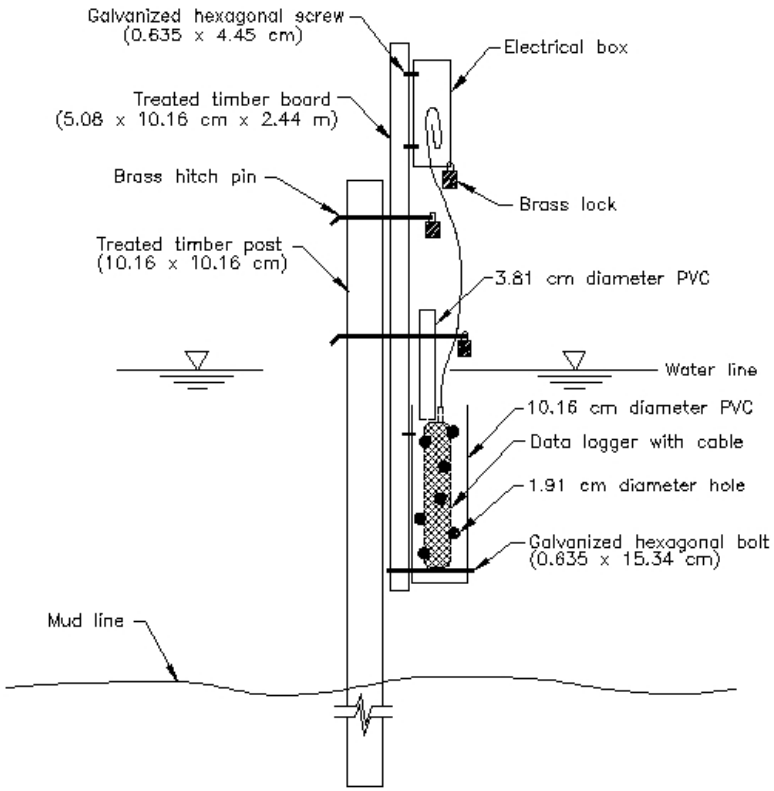


<u>Discrete Sampling</u> (monthly & yearly)

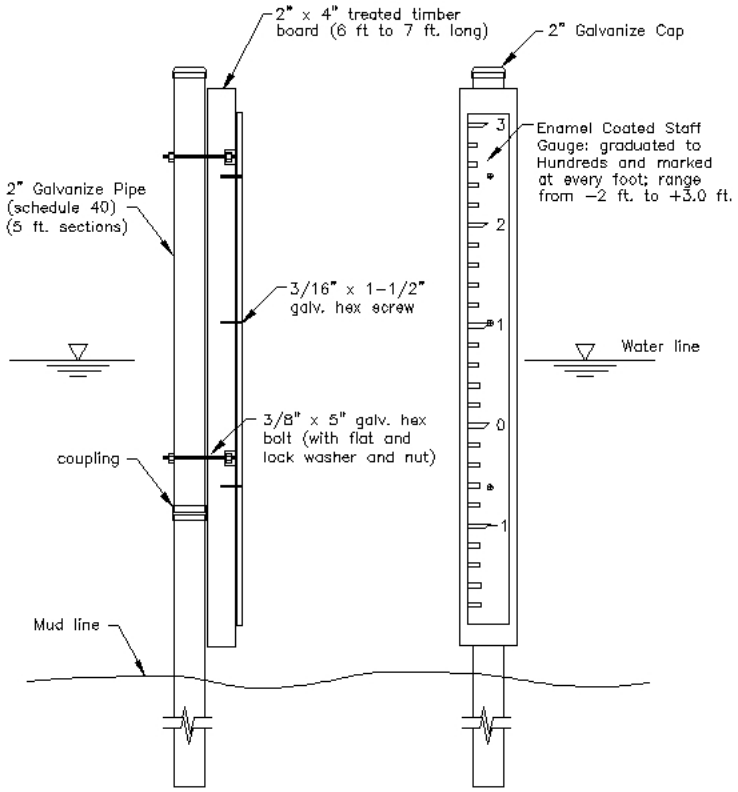
- **Stnd Array (T,S,DO,pH,Turb, Secchi)**
- **Water Depth & Current**
- **Food flux (TSS,POM,CHL-a)**
- **CI & GI, Survival, Dermo, Predation**
- **Spat set, Length-frequency, Shell growth**
- **M^2 density (with assoc. fauna) (yearly)**
- **subsidence (yearly)**
- **photograph at low tide**

<u>Continuous Sampling</u> (hourly)

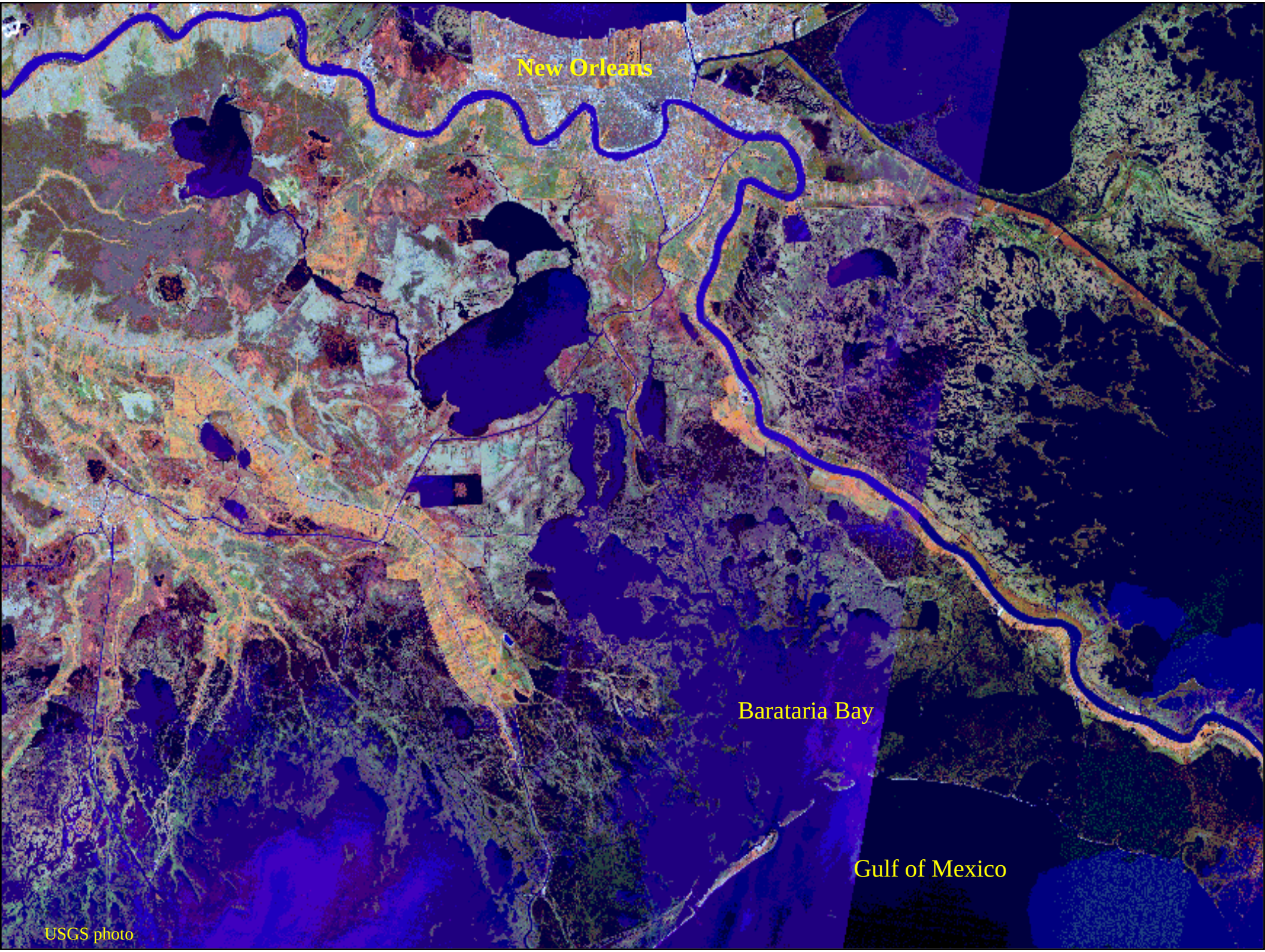
- **Continuous Recorder at each site &**
- **USGS' LaHydrowatch Network**
  - **Fetch (wind spd & dir)**
  - **T,S, tide (elevation)**



SONDE SETUP
(Not to Scale)



STAFF GAUGE SETUP
(Not to Scale)


New Orleans
Barataria Bay
Gulf of Mexico
USGS photo