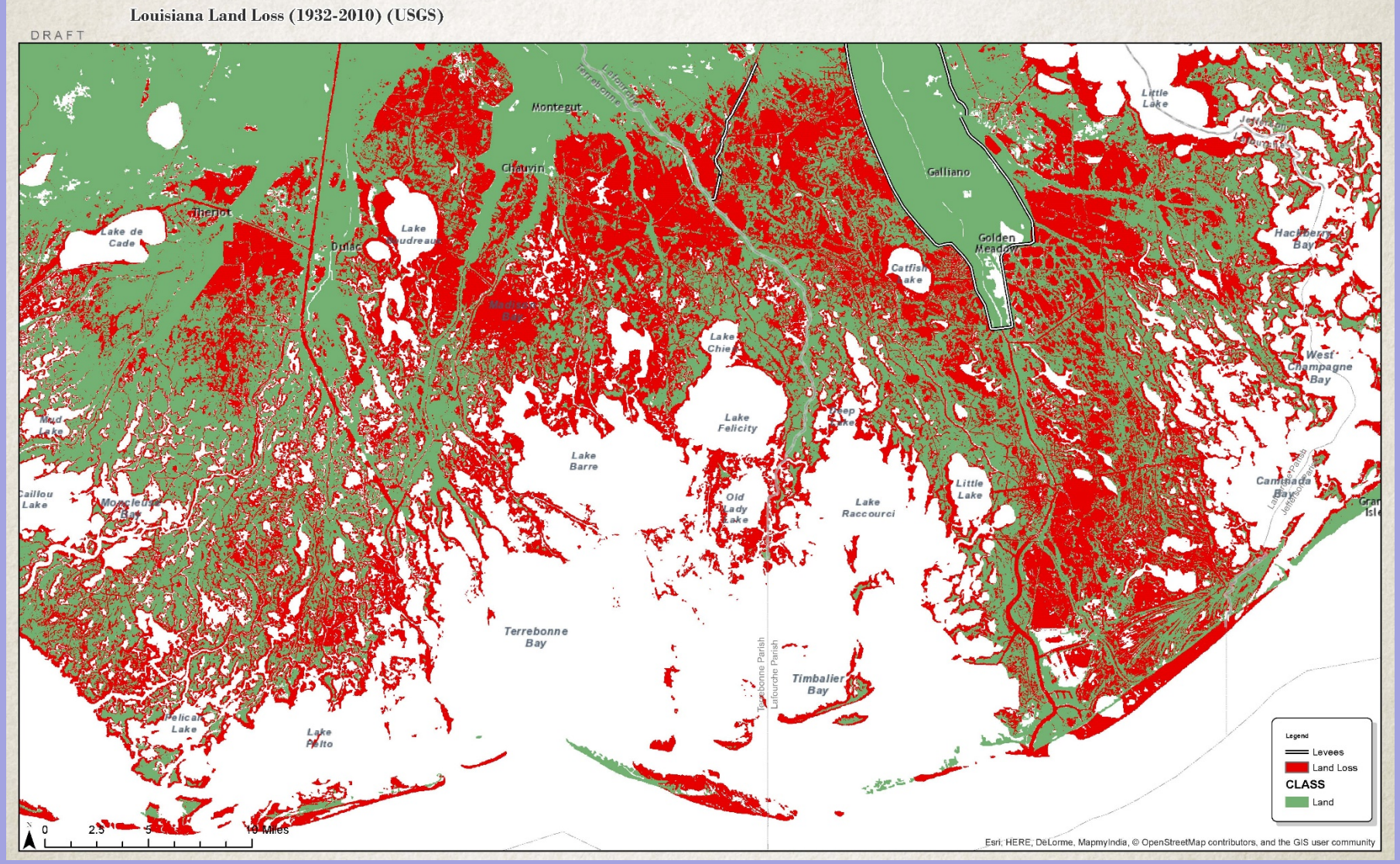
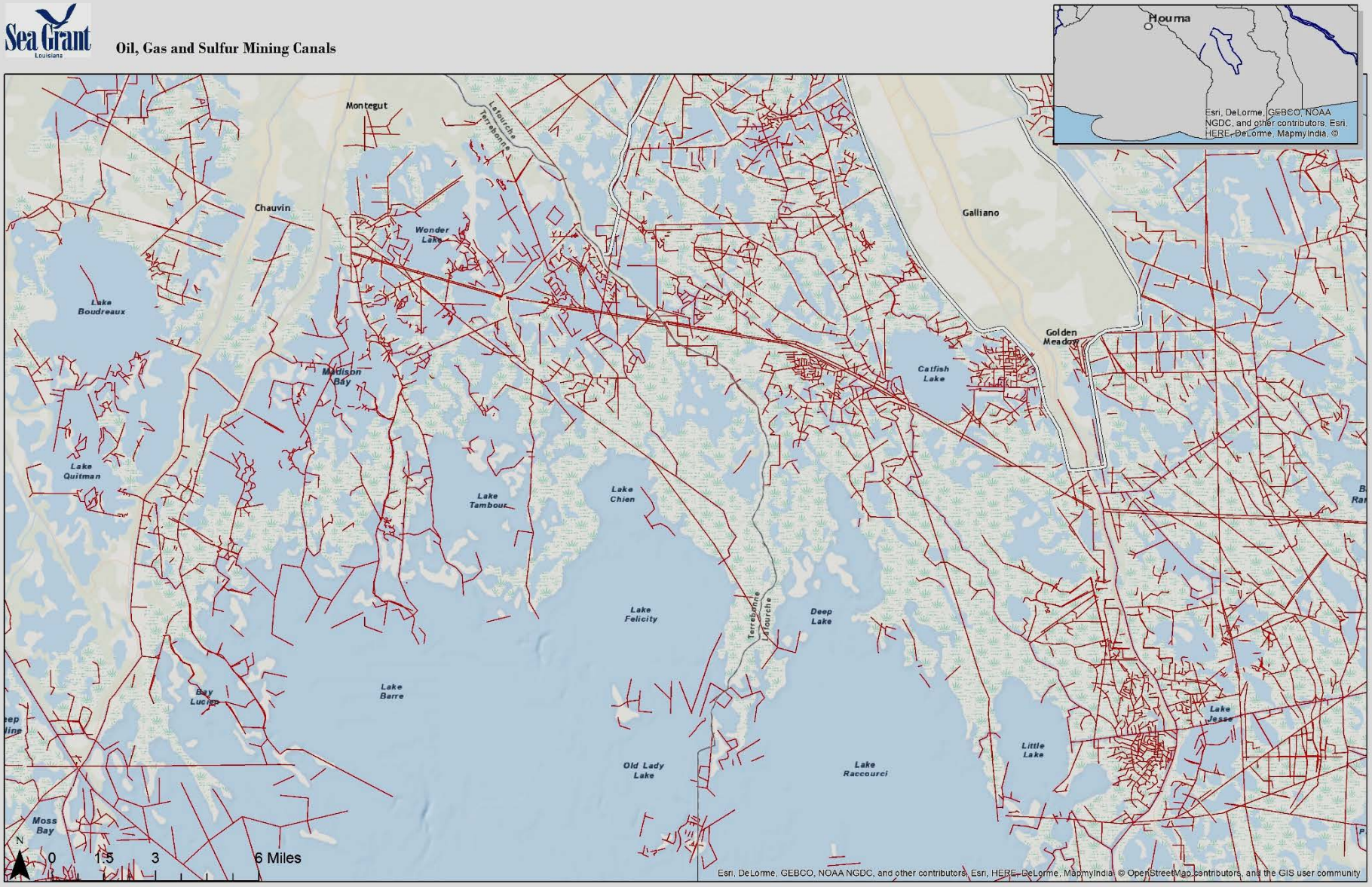
Determining localized risk perception and impacts of predicted sea-level rise to enhance stakeholder mitigation planning through visualization tools

2016 Social Coast Forum
Charleston, SC, February 10

Pointe Aux Chenes Area Land Loss

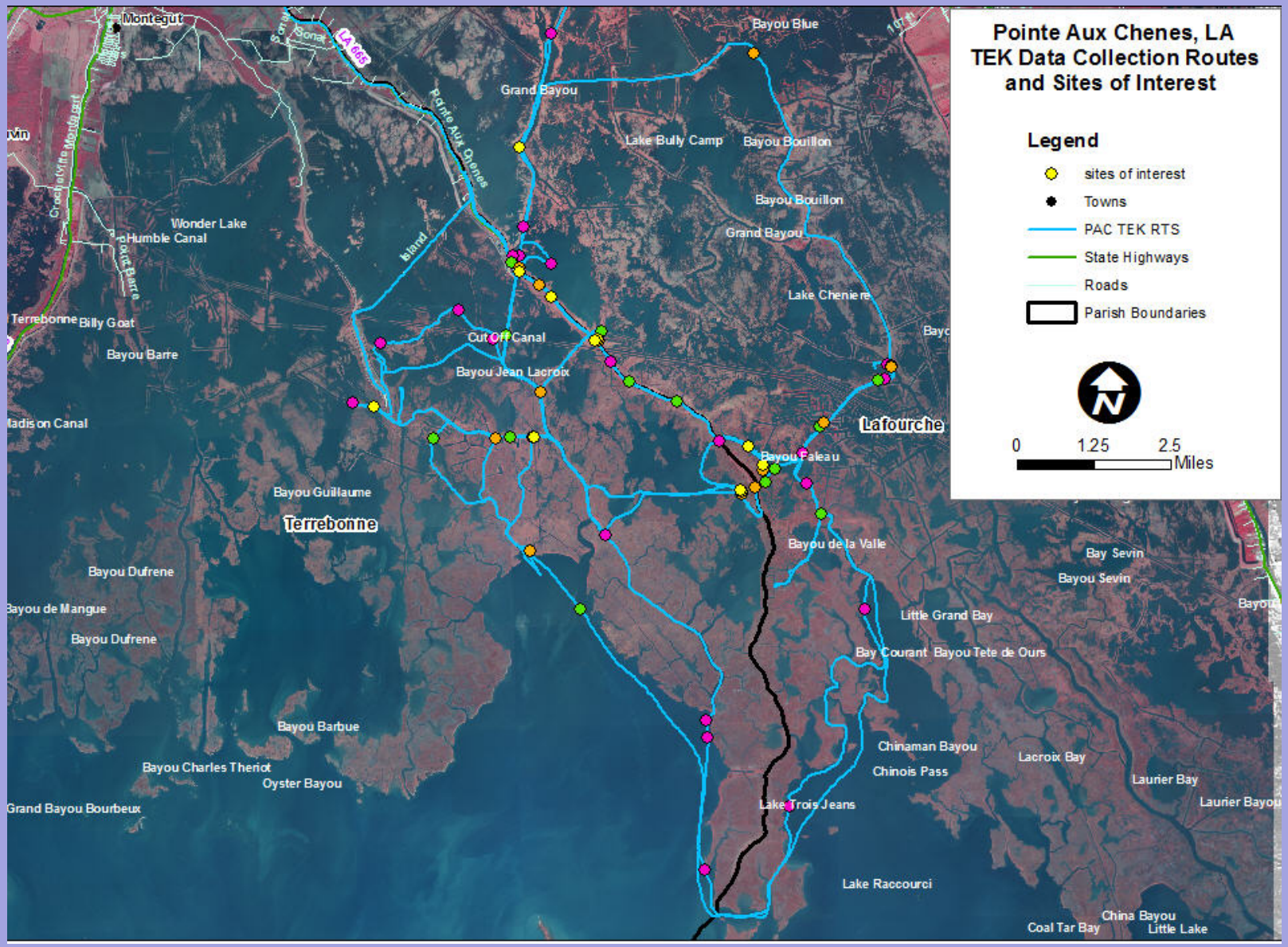


Network of Oil and Gas Canals

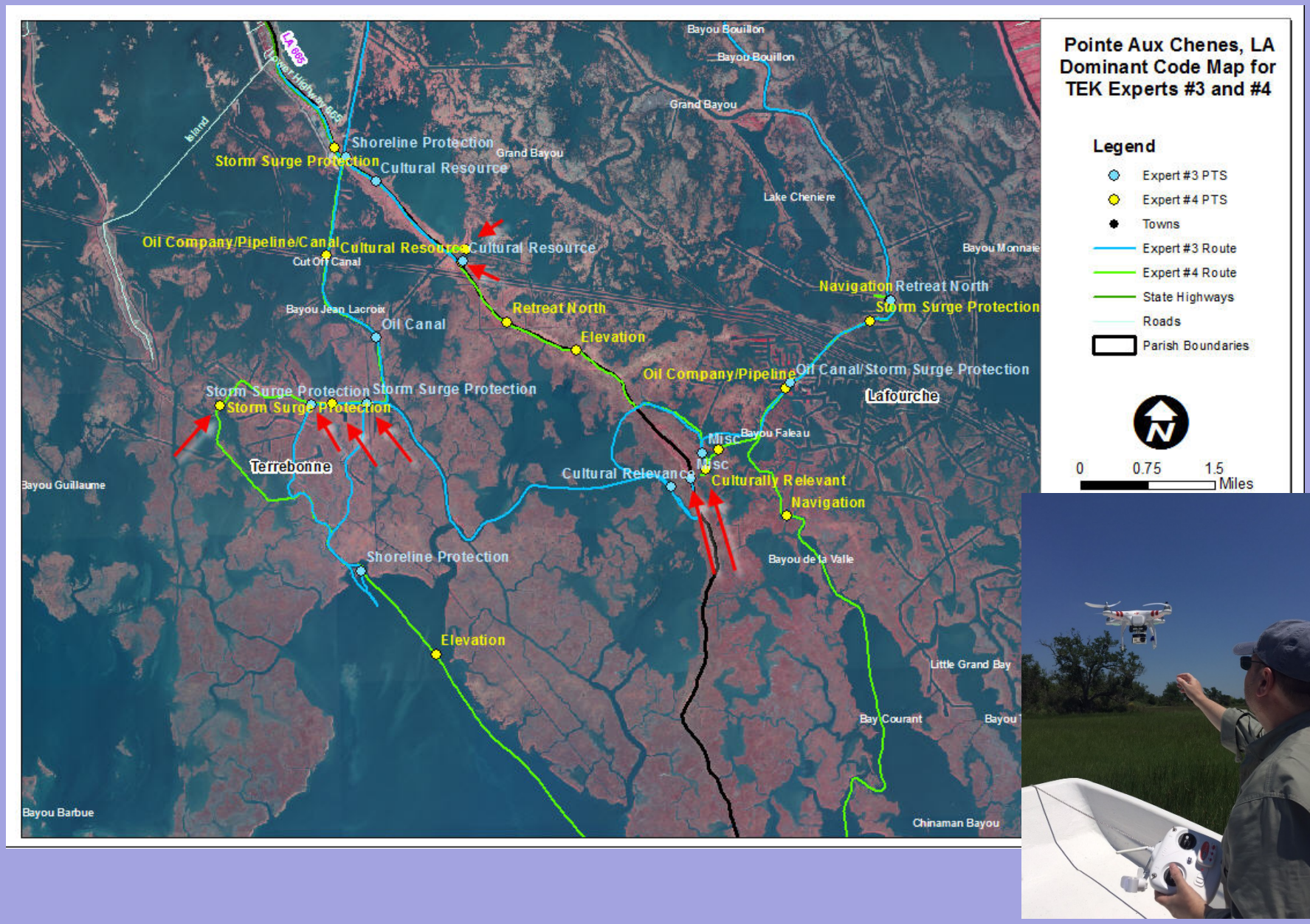


TEK Data Collection – Pointe Aux Chenes, LA

Pointe-au-Chien TEK Expert Routes and Sites of Interest



Common Themes Emerged in the TEK

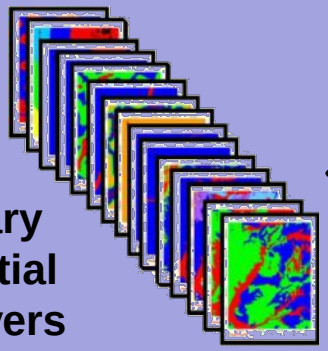


TEK Data Analyses

Point-au-Chien Emergent Themes

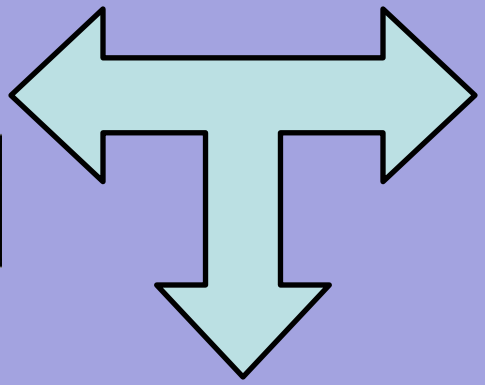
- Measures of code co-occurrence, code emphasis, and code presence among TEK experts
- Qualitative data analyses involves multiple coding techniques
- These techniques include coding for Manifest Content (tangible, on the surface) and Latent Content (underlying meaning)

Spatial Multi-Criteria Decision Analysis (SMCDA) GIS Mapping Procedure



Complimentary Scientific/Spatial Input Data Layers

- Land loss
- marsh vegetation type
- Elevation
- Land cover classification
- Marsh fragmentation
- Current and planned restoration/protection projects
- RS image data

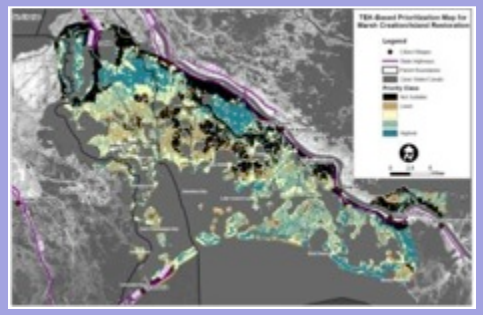


TEK related to vulnerability and sustainability factors for emergent focus issues

Parameters for input datasets defined by TEK

Standardized weighting based on TEK and merging datasets

SMCDA Model Map indicating TEK-based priority areas for each focus site



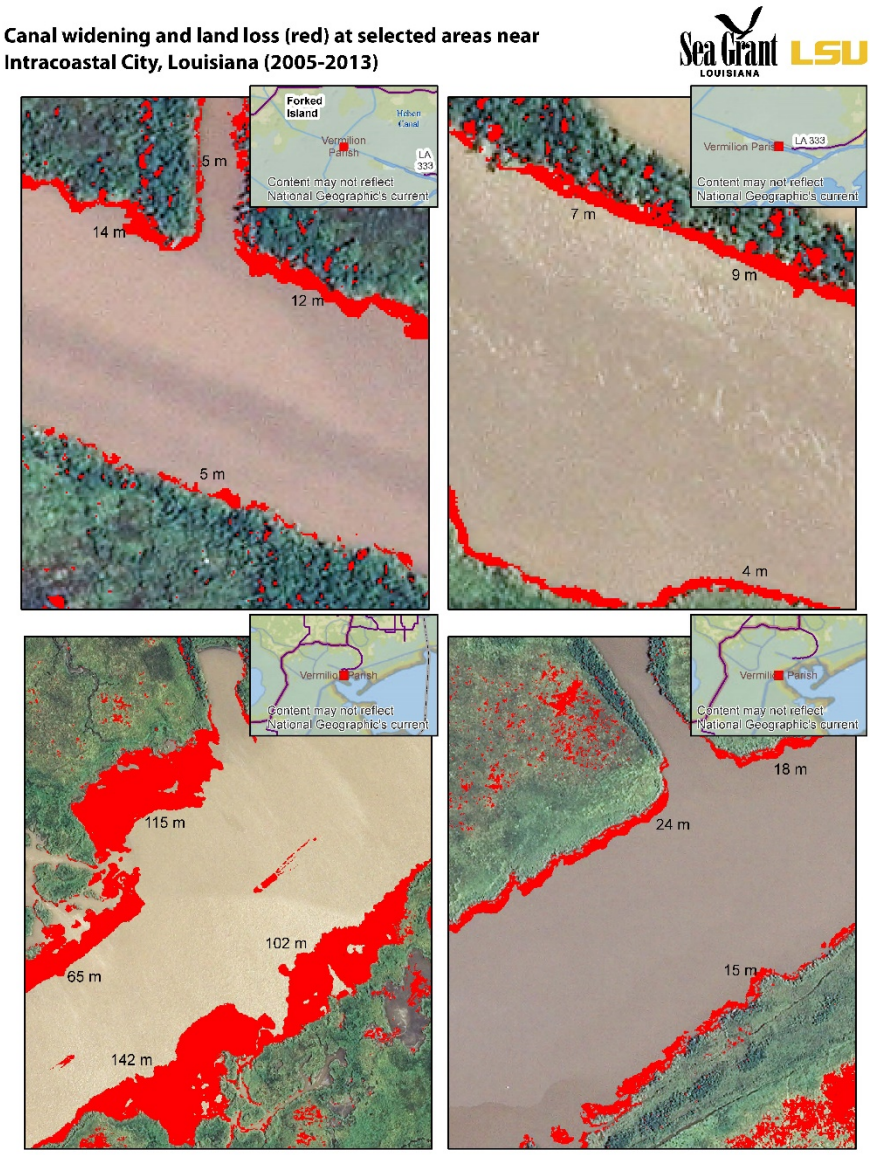
Vulnerability Logic Model Factor 1: Oil Canals

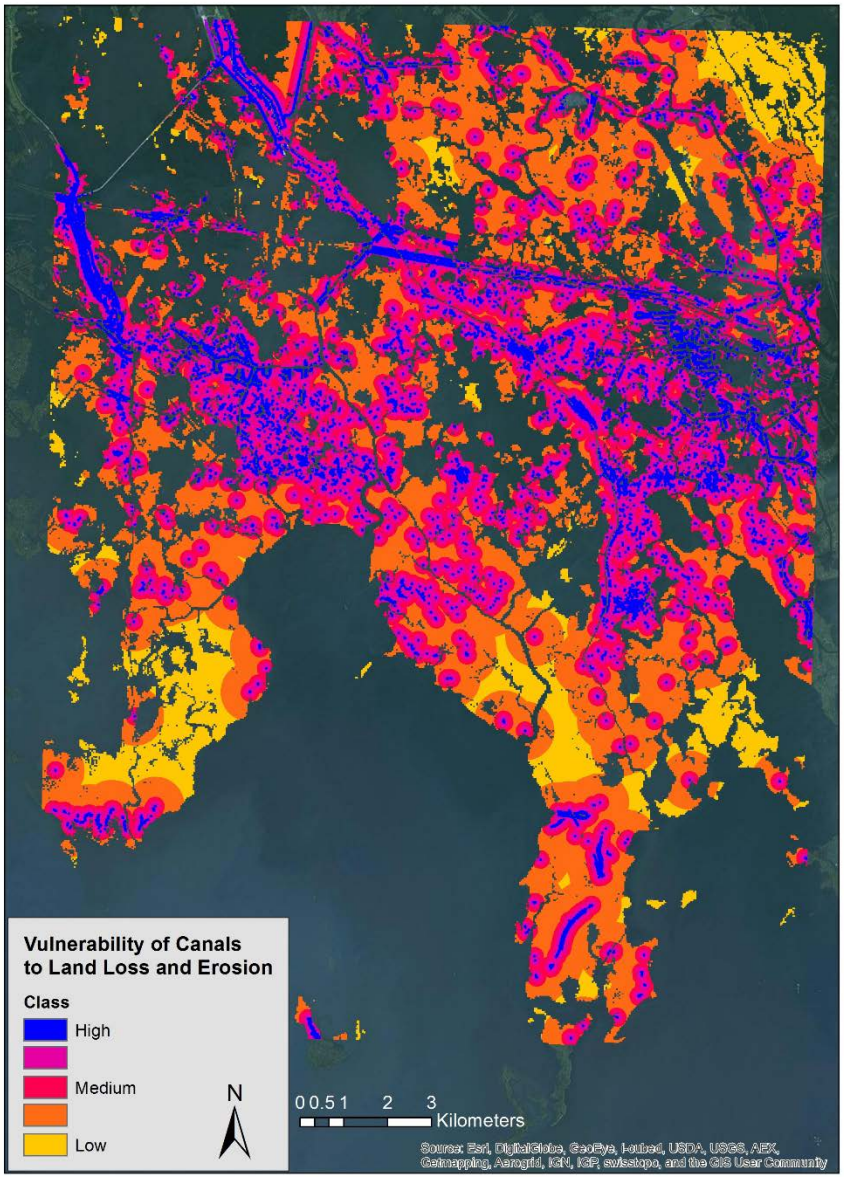
- **Vulnerability Factor One:** Canals cut in marsh that have widened from erosion contribute significantly to community vulnerability to SLR and exacerbated storm surge.

- **Quote:** "See this right here, this should be all solid land, all them cut canals, that would be a sort of a buffer that would stop the water from getting up there so quick"

- **Scientific/Spatial Data Sets:** Land loss data set from USGS, LiDAR elevation data, oil canal network dataset.

Vulnerability Factor 1: Oil Canals





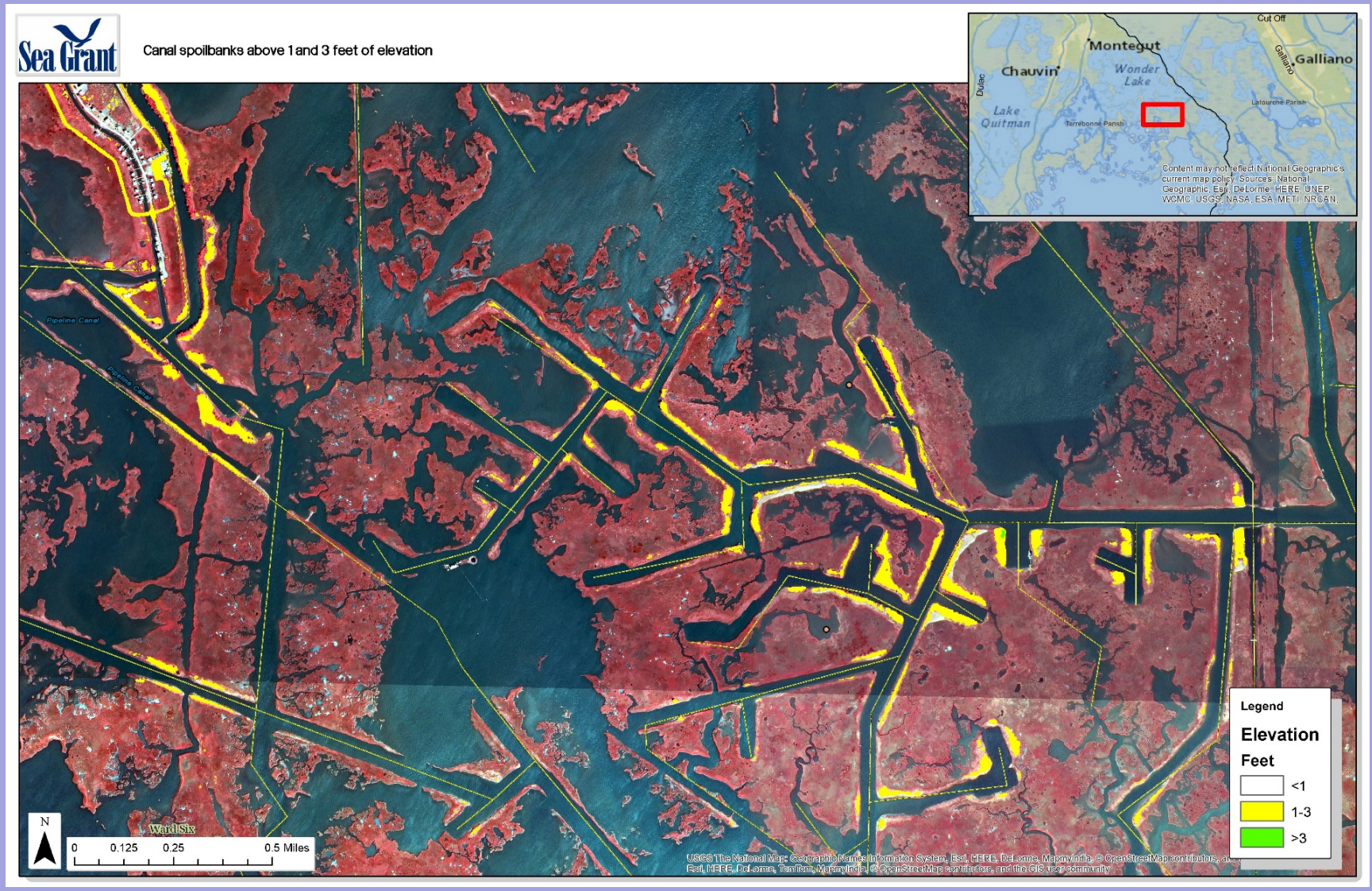
Sustainability Logic Model Factor 1: Oil Canal Spoil Banks

- **Sustainability Factor One:** Spoil banks of canals cut in marsh offer potential protection that can contribute to community sustainability related to SLR and exacerbated storm surge.

- **Quote:** "they got a lot of canals and they already all cut up already…try and put them to use…to slow down the surge…the spoil banks would sort of be like speed bumps"

- **Scientific/Spatial Data Sets:** Land loss data set from USGS, LiDAR elevation data, oil canal network dataset.

Sustainability Logic Model Factor 1: Oil Canal Spoil Banks

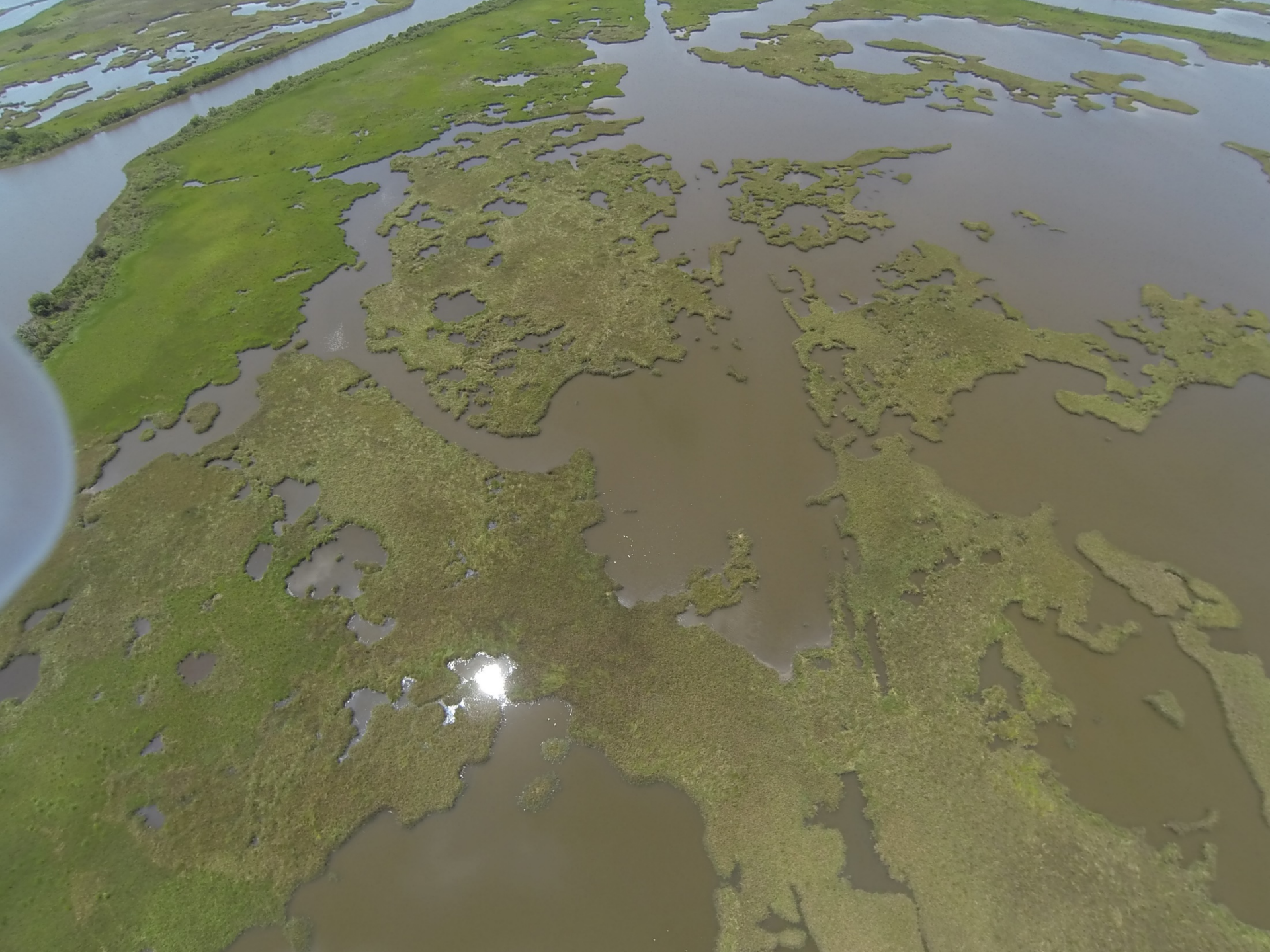


Vulnerability Logic Model Factor 2: Levee Alignment

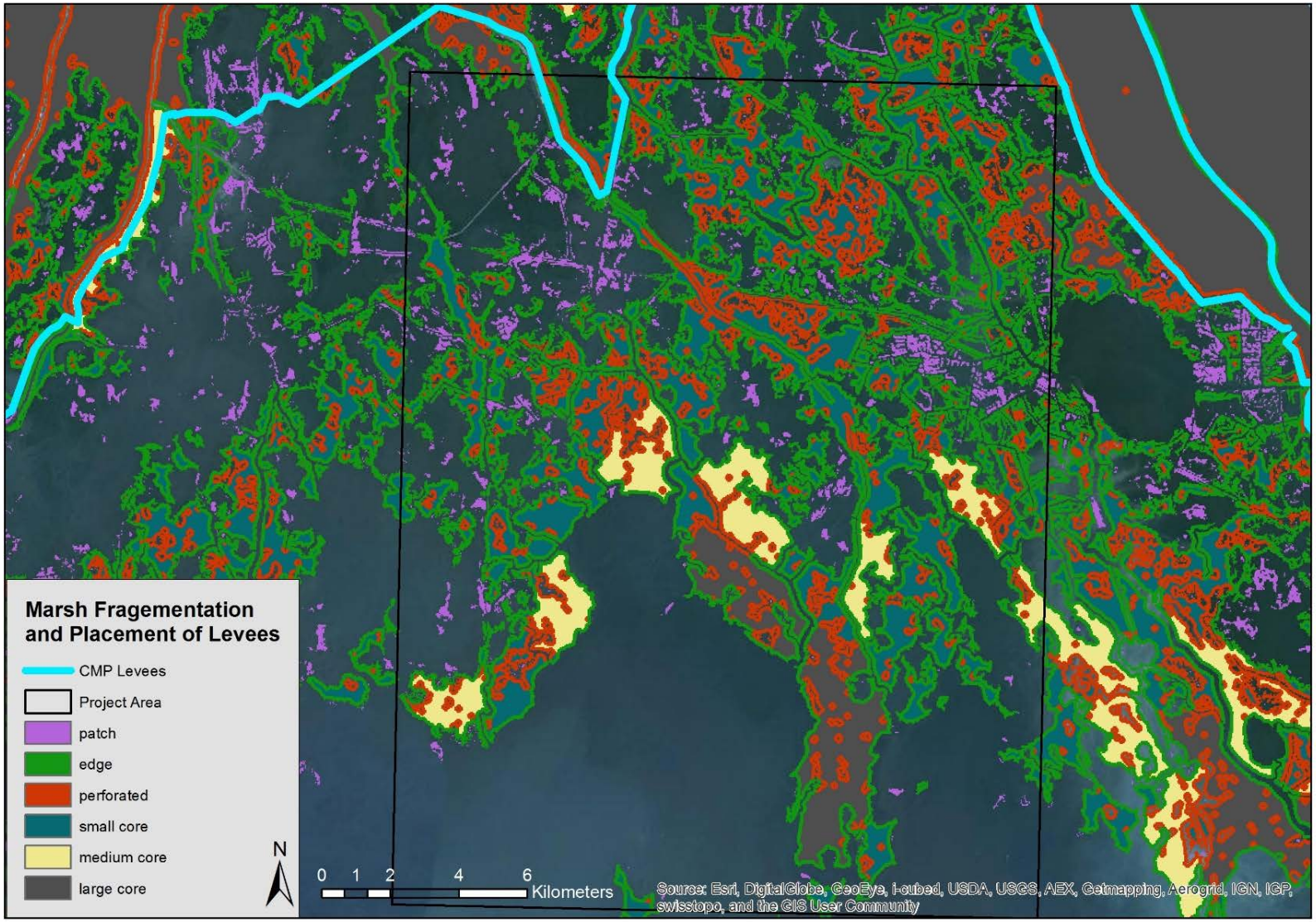
- **Vulnerability Factor Two:** Marsh vulnerable to loss that is or will be outside levees contribute to community vulnerability to SLR and exacerbated storm surge.

- **Quote:** "Once that goes (pointing to marsh outside of levee) it's all open water to the levee…Everything going and hitting that levee, four or five years down the road, they'll have to rebuild it every year to keep it up, and they won't…try to save this to slow it [storm surge] down a little bit…save that side [outside of levee] you'll save that side [inside levee]"

- **Scientific/Spatial Data Sets:** RS derived land/water data set, marsh fragmentation dataset, current and planned levee vector dataset.



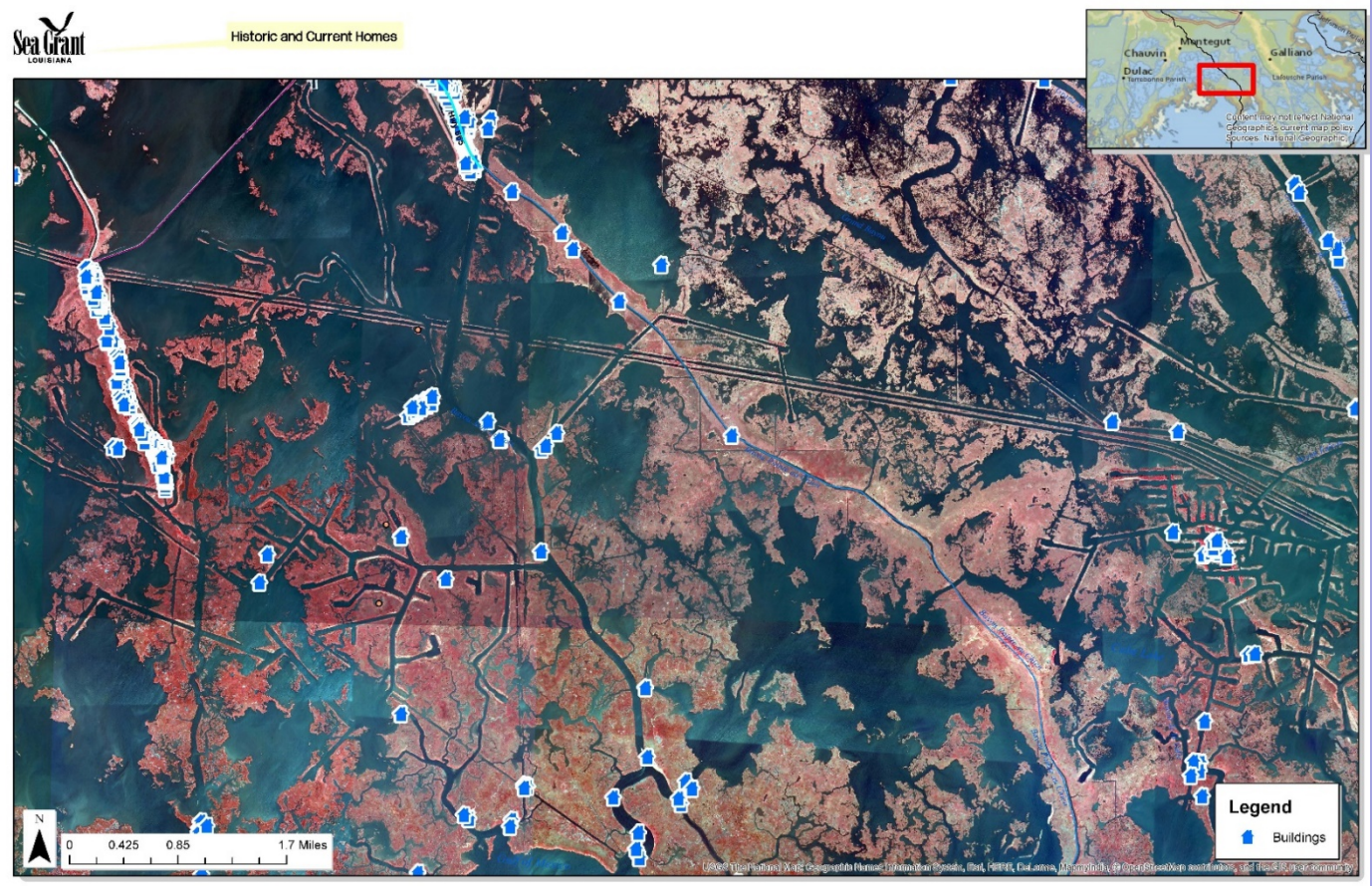
Vulnerability Factor 2: Levee Alignment

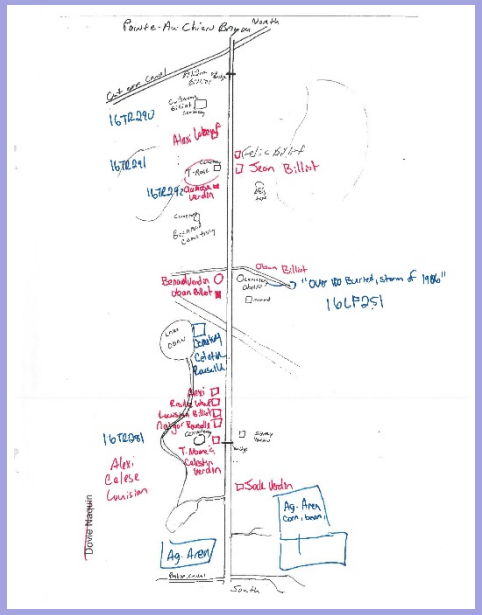


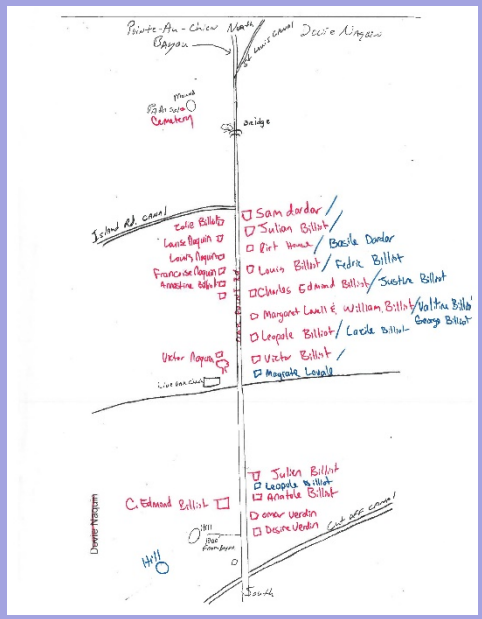
Validating TEK Analysis: Map Meetings

- Use maps to facilitate conversation and allow experts to verify coding analyses results
- Gain any additional input experts wish to offer after seeing initial results
- Address any follow-up questions that emerged from coding and mapping

An Adaptive Management Approach is Key



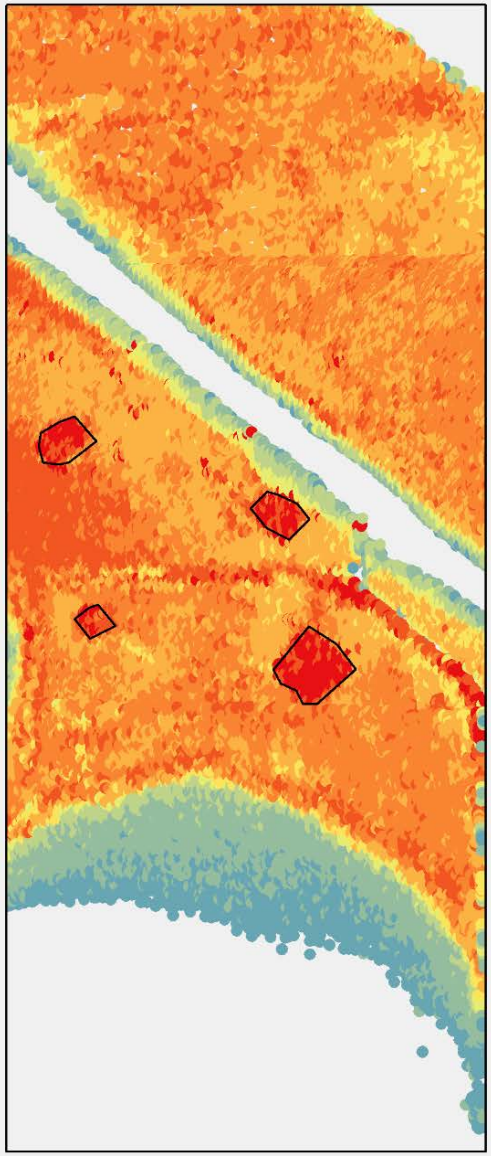




"They lived down here for the trapping, and they had a big community here. This is where they planted the sugar cane and fruit trees and everything. They had everything they wanted, they even made their own grits…The bricks are still there where they used to make the sugar"

Methodology for discovering proposed investigation sites

3D Lidar (Light Detection and Ranging) Data to detect changes in elevation



Infrared, Vegetation and Soil Data to detect changes in plant density and type, plant health, unusual soil types.

Traditional Ecological Data (TEK) and archaeological reports to find areas that may be known to be significant.

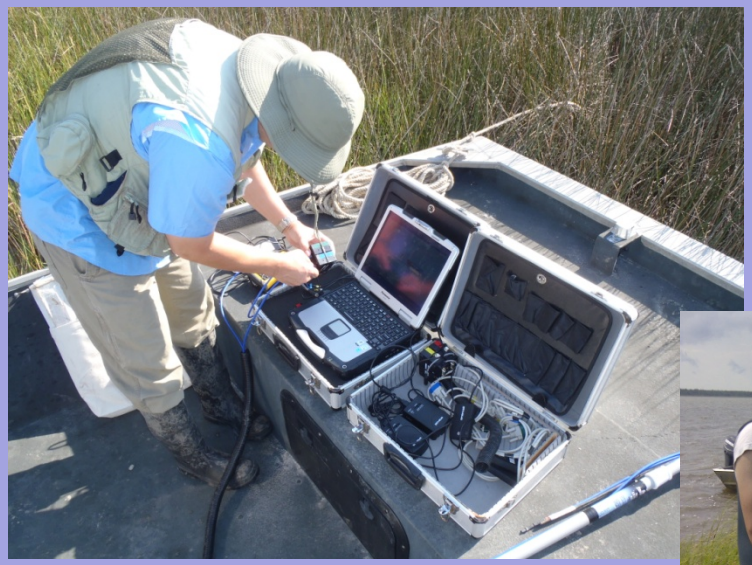
Map Details

2011 Lidar (meters in elevation)

- +1.26 - +643
- +0.87 - +1.26
- +0.7 - +0.87
- +0.5 - +0.7
- +0.22 - +0.5
- -0.02 - +0.22
- -0.18 - -0.02
- -0.34 - -0.18
- -146 - -0.34
- -146

Sea Grant LOUISIANA

Scientific Data Collection

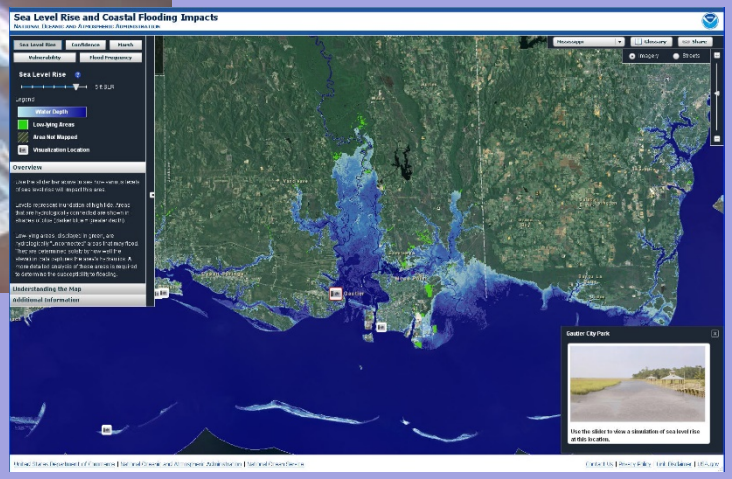


Measurements at gps-located sampling sites includes:

- spectral reflectance
- leaf area index
- above-ground biomass plot samples

Data Visualization Workshops

- Use visualization tools to facilitate interaction and allow experts to overlay and integrate TEK and SLR mapping results
- Assess how/if perceived vulnerability and sustainability factors change given the information presented
- Determine how/if the information presented benefits hazard mitigation planning

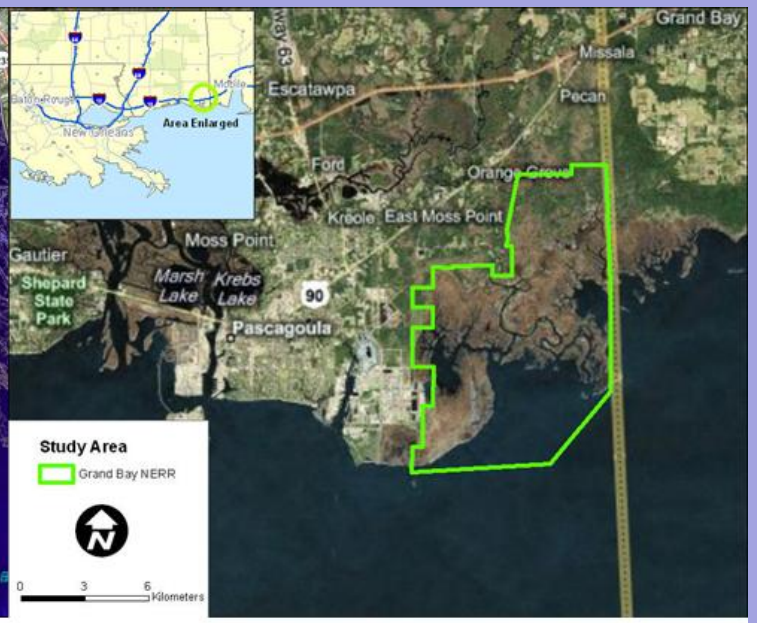


Thank You!

Questions?

Study Areas

with key characteristics of natural resources and community affected by SLR



- Louisiana (not in SLR viewer)
- Native American Tribe – living within the resource area
- "High" population density, homes of inhabitants, many land-owners.
- Income from fishing and other natural resource extraction activities.
- Subsidence and saltwater intrusion cause land-loss.
- Freshwater forest and marshes being replaced by saltmarsh or open water.

- Mississippi (in SLR viewer)
- Land managers and scientists – working within the resource area
- Low population density, few buildings, small number of land-owners.
- Income from state and federal funds, not dependant on natural resources.
- Erosion main process resulting in land-loss with lack of sediment inputs.
- Saline and brackish marshes may be able to migrate upland over time.

TEK Summary

Grand Bay:

- Priority SLR impacts - marsh fragmentation, biodiversity, cultural history (middens), ponding of low lying areas (loss of salt pans), fisheries
- SLR risk mitigation strategy – Natural, facilitated habitat progression and transition; mitigation strategies that do not have a negative (or minimal) consequence to other natural processes
- Information needs for SLR mitigation planning – 1) timeframe estimates for predicted SLR scenarios; 2) better inundation predictions and corresponding marsh tolerance; 3) best practices to maintain biodiversity

TEK Summary

Pointe Aux Chenes:

- Priority SLR impacts – storm surge exacerbation, protective marsh loss, cultural history (burial sites), stress on protective levees and flood gates, low-lying access roads and buildings

- SLR risk mitigation strategy – currently there is no formal community-based plan; however, recommendations = natural ridge and marsh restoration as ‘speed bumps’; mitigation strategies that help to slow the impacts to allow residents time to either ‘transition up the bayou’ or adapt their homes

- Information needs for SLR mitigation planning – 1) timeframe estimates for predicted SLR scenarios; 2) better information (and input) regarding planned structural protection projects; 3) impact of predicted SLR to local storm surges and tides