



RESTORATION & PLANNING FOR AN UNCERTAIN FUTURE IN COASTAL LOUISIANA

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Research Engineer
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**THE WATER INSTITUTE
OF THE GULF®**



- The Water Institute of the Gulf is a **not-for-profit, independent** research and technical services resource with a mission to help communities around the world thoughtfully prepare for the future through water management strategies.
- Through an **integrated and inter-disciplinary** approach, the Institute's work helps create more resilient communities, thriving economies, and a healthy environment.

ABOUT US



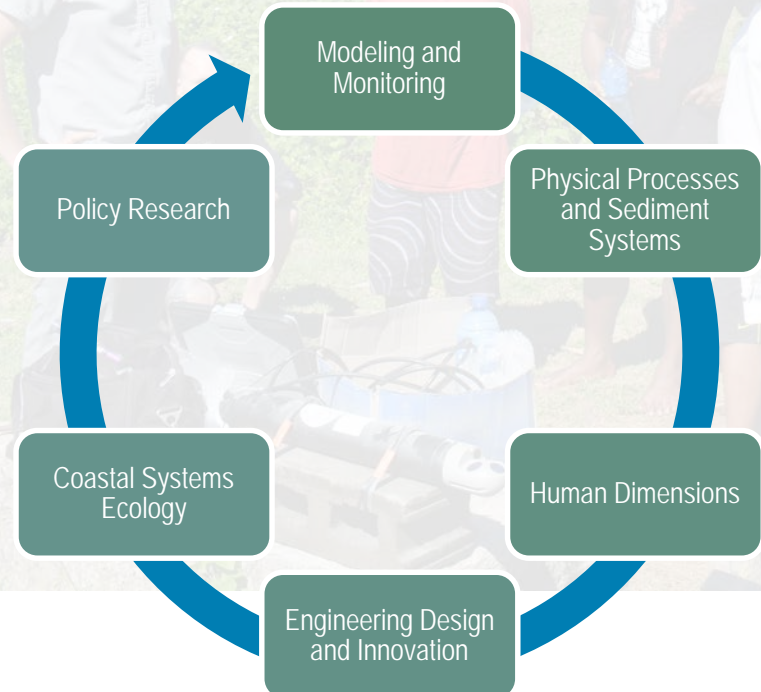
WHAT WE DO

Applied Research

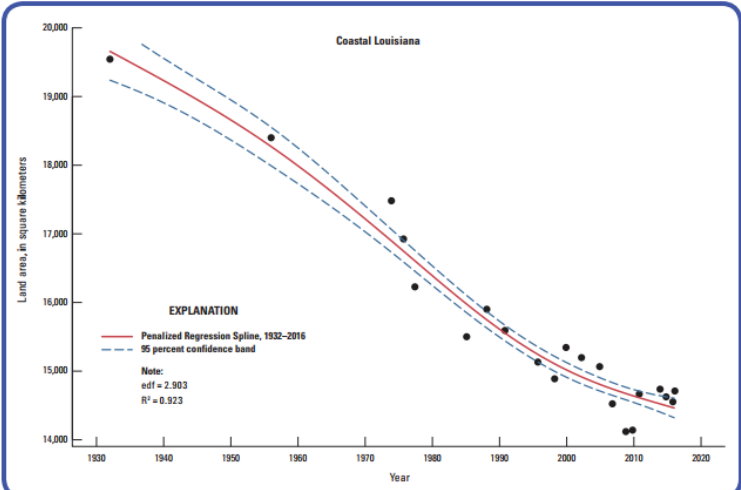
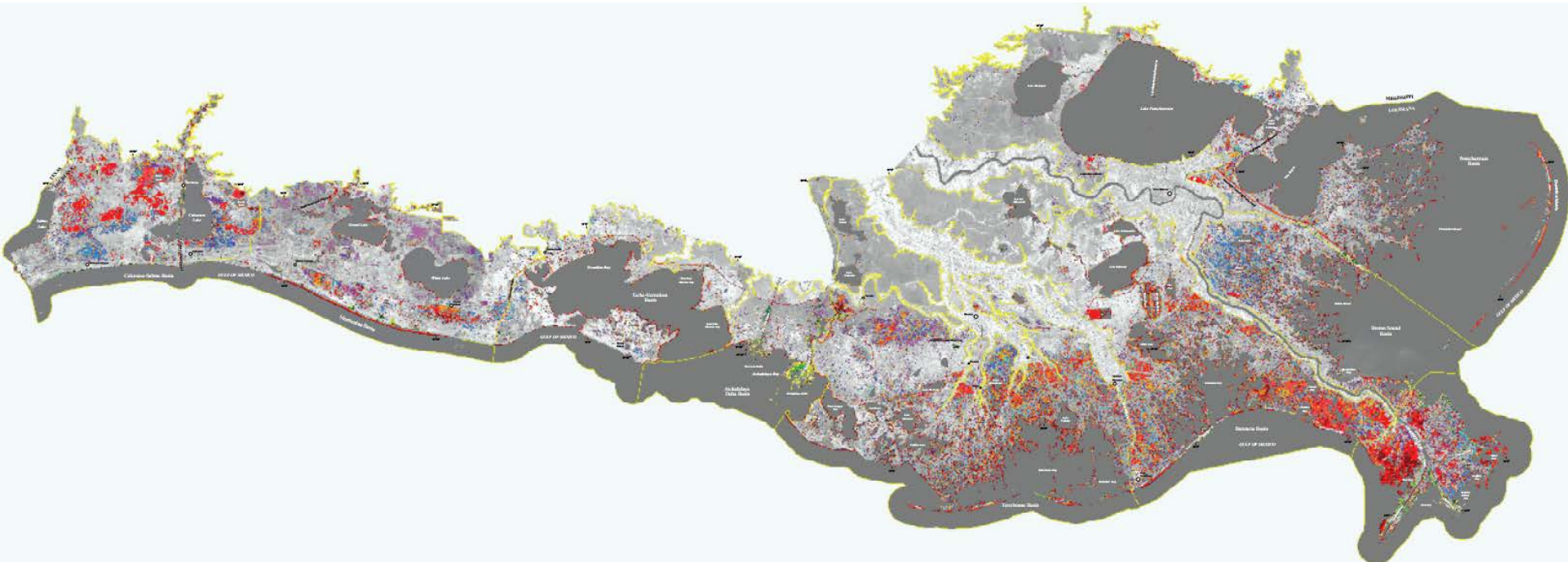
- Field Investigations
- Monitoring and real-time sensor data collection
- Integrated natural systems modeling
- Analytics and integrated decision support
- Societal and ecosystem impact studies
- Water resources management analyses

Technical Support

- Independent technical peer review
- Expert opinion and advisement
- Expert panel development and coordination



HISTORIC WETLAND LOSS IN COASTAL LOUISIANA

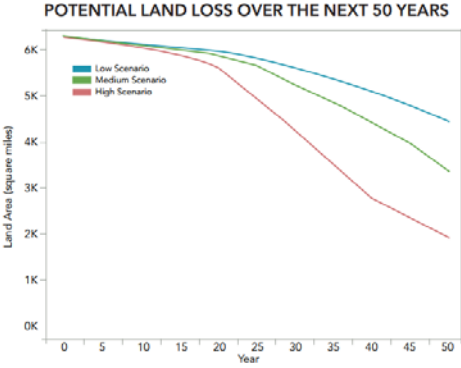
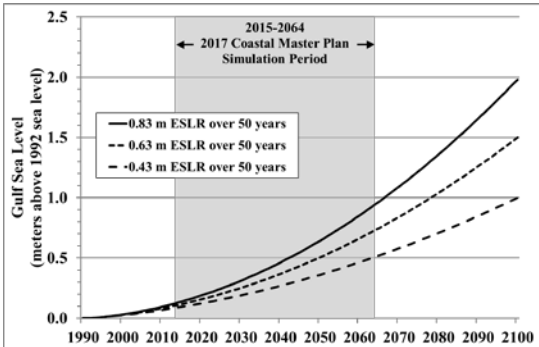


Estimated land loss from 1932 – 2016:
~ 4833 km² (1866 mi²)

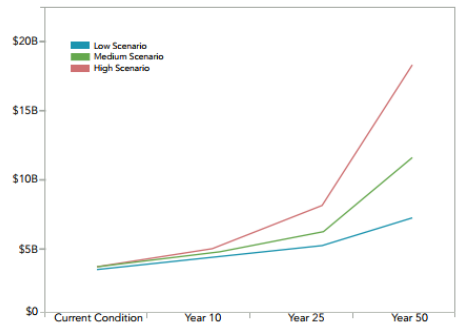
Equivalent to 25% of 1932 wetland area



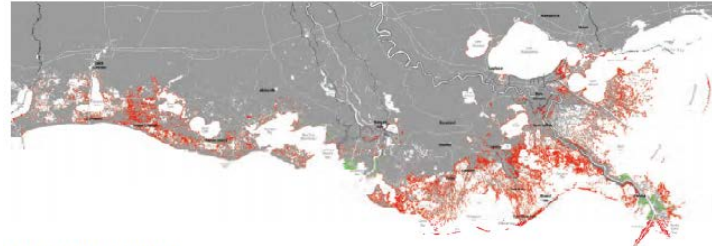
PROJECTED FUTURE CONDITIONS



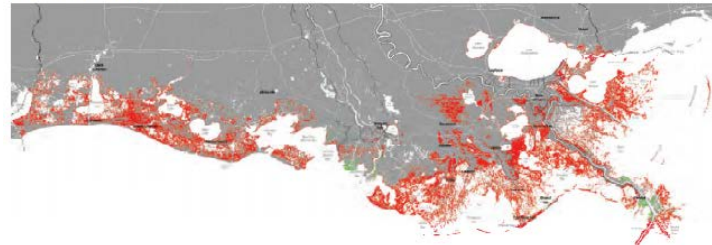
EXPECTED ANNUAL DAMAGE FROM FLOODING OVER THE NEXT 50 YEARS



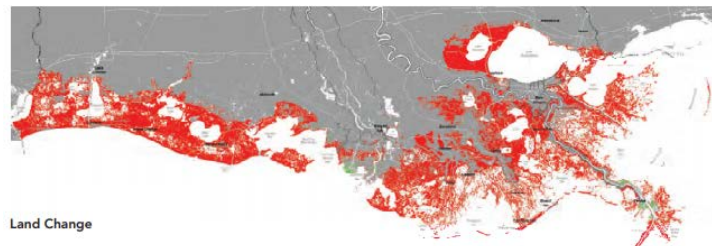
LOW SCENARIO



MEDIUM SCENARIO



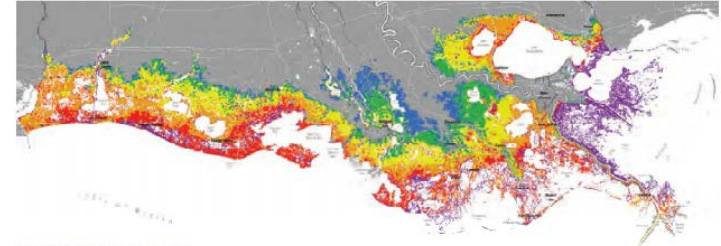
HIGH SCENARIO



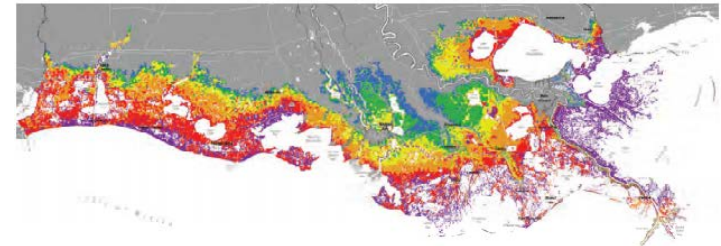
Land Change

- Land Gain
- Land Loss

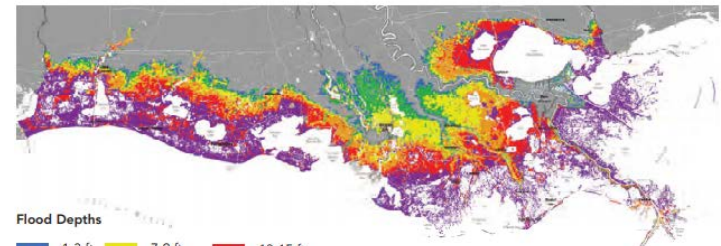
LOW SCENARIO



MEDIUM SCENARIO



HIGH SCENARIO



Flood Depths

- 1-3 ft
- 4-6 ft
- 7-9 ft
- 10-12 ft
- 13-15 ft
- Over 15 ft



LINKING KNOWLEDGE TO ACTION: THE INSTITUTE'S ROLE IN LOUISIANA COASTAL PROTECTION AND RESTORATION

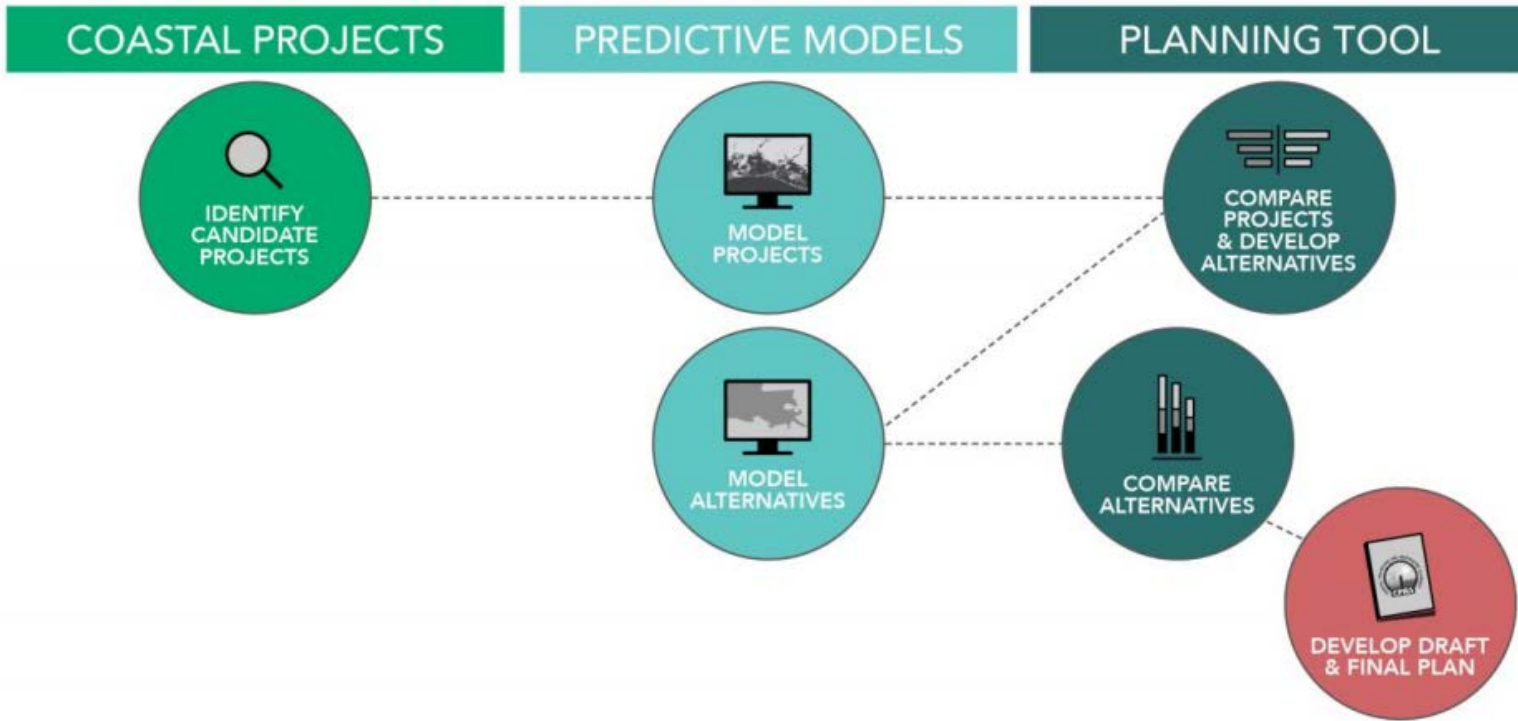


PROJECT EXAMPLES

- Coastal Master Plan Modeling/Support
- Mississippi River and Sediment Observation and Modeling
- Sediment Diversion Project Planning
- Coastal Monitoring Framework
- Louisiana Coastal Atlas
- Water Resource Assessment



2017 COASTAL MASTER PLAN



OUTREACH & ENGAGEMENT

State of Louisiana is legislatively mandated to update the coastal master plan every 5 years with most up-to-date science.

Restoration projects planned across state's coastal zone must be "consistent with Master Plan."

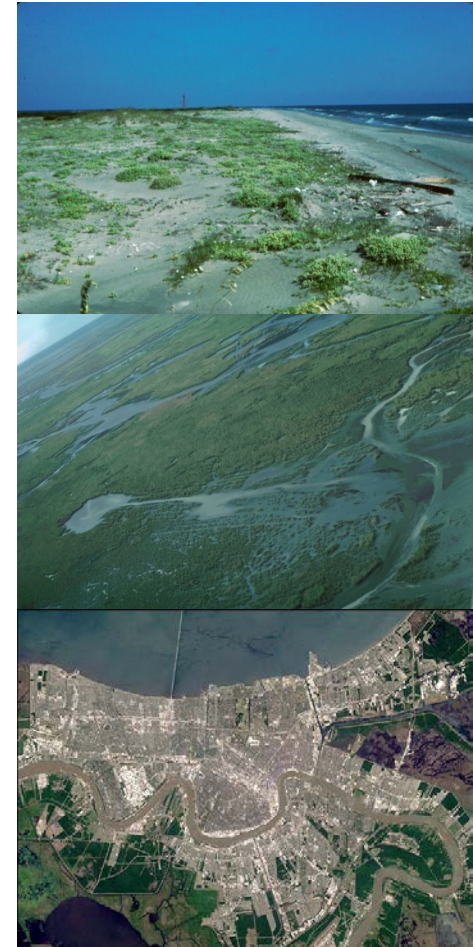
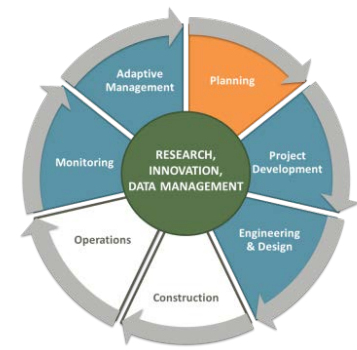
Projects chosen based on objective decision criteria

- Land area gain/sustained into the future
- Reduction in damages from storm surge events



2017 COASTAL MASTER PLAN : WATER INSTITUTE ROLES

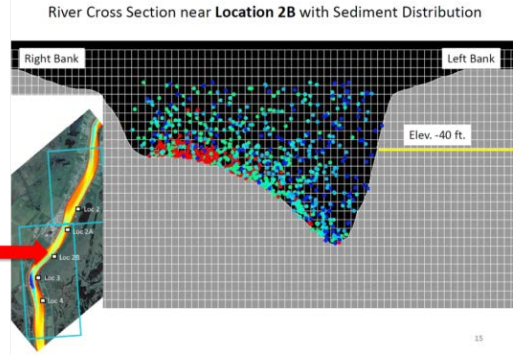
- Developed the Model Improvement Plan
- Updates to the model processes
 - Sediment distribution
 - Marsh edge erosion
 - Habitat suitability indices
 - Decision metrics
- Model integration
- Development of Future Environmental Scenarios
- Model validation/calibration
- Production run modeling
 - 99 model groups – most in triplicate
- Post-processes and support for decision making



DIVERSION PLANNING, OPERATIONAL DESIGN, & ENGINEERING SUPPORT



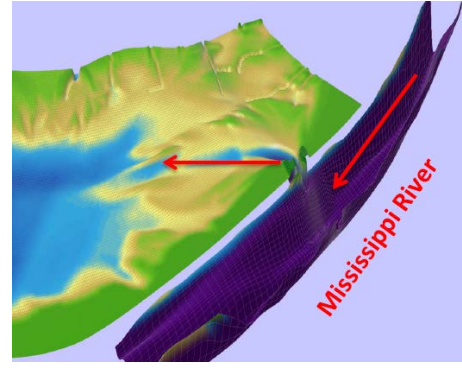
RIVER MODELS



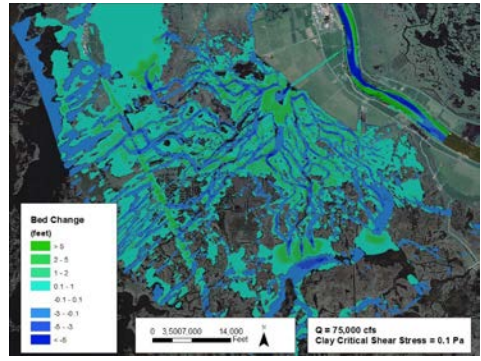
BASIN MODELS



MODEL VALIDATION



LAND BUILDING ANALYSIS



EXPERT PANEL



REAL-TIME MONITORING & FORECAST MODELING



Data Viewer | CEGAPS | 07-20-2016 12:00:00 GMT

- Measured
 - Import data from O
 - Import data from SI
 - RRS processed data
 - Import data USGS
 - Import data from G
 - Import data from C
 - Forecast
- Gridded Data
 - ESTOFS
 - NGOFS
 - HYCOM
 - GFS
 - Delft3D
 - Westbay
 - Super Regional
 - TO27 V1
 - TO27 V1 (what-if)
 - TO27 V1 (other)
 - TO27 V2
 - Waterlevel
 - Salinity
 - Temperature
 - TO27 V2 (what-if)
 - Gauges
 - Delft3D Test

4: Plot Overview

- Lower Grand River at Ba
- MISSISSIPPI SOUND AT US
- Middle Fork Bayou Long
- Mississippi River at Bato
- Mississippi River at Belle
- Mississippi River at Bura
- Mississippi Sound near C
- Mobile River at River Mil
- Murphy Lake near Bayou
- North Calcasieu Lake ne
- Northwest Bay Cardona

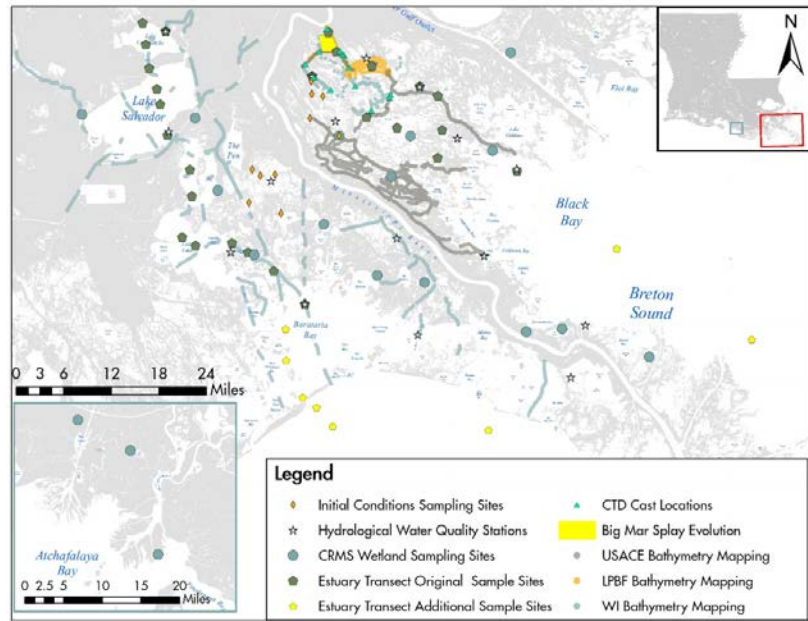
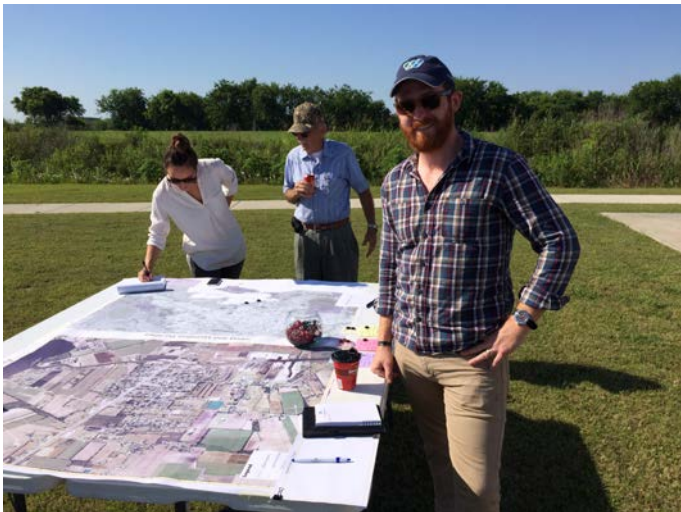
6: Logs | **9: Run Info** | **7: Forecaster notes**

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07-22-2016 20:34:25 INFO - ***** Workflow Delft3D_TO27_V2_Hindcast Completed *****
07-22-2016 20:34:25 INFO - Start time: 2016-07-22 20:34:25 End time: 2016-07-22 20:34:25 To: 2016-07-20 12:00:00 User Id: common
07-22-2016 20:34:25 INFO - TaskRun.Completed: Task Delft3D_TO27_V2_Hindcast with ID 2493_2 completed in 0s
07-22-2016 20:34:25 INFO - TaskRun.TimeSpent: TransformationModule 0s 17% datastore 0s 3% cache files 0 B database 0s 0% (2 ms/query,535 B, 54 kB/s, 4 queries, 1 rows) reloaded 0 B time series read 8 (unique=6) time series written 7 (changed=5) files 0s 0%
logging 0s 0% gc 0s 0% cpu 86% max mem. 242 MB index mem. 9.4 MB db con. acquire time 0s 0% lock. acquire time 0s 0%
07-22-2016 20:34:25 INFO - DataStore.NewCurrentRun: Task run Delft3D_TO27_V2_Hindcast (TO=2016-07-20 12:00, Dispatch=2016-07-22 20:34, Id=2493_2) is made current automatically
07-22-2016 20:34:25 INFO - Workflow.ActivityCompleted: Workflow Delft3D_TO27_V2_Hindcast completed in 0s
07-22-2016 20:34:25 INFO - Completed Activity 'Delft3D_TO27_V2_Discharge_MR_Forecast' completed in 0s
07-22-2016 20:34:25 INFO - Started Activity Delft3D_TO27_V2_Discharge_MR_Forecast
07-22-2016 20:34:25 INFO - Workflow.ActivityStarted: Workflow Delft3D_TO27_V2_Hindcast
    
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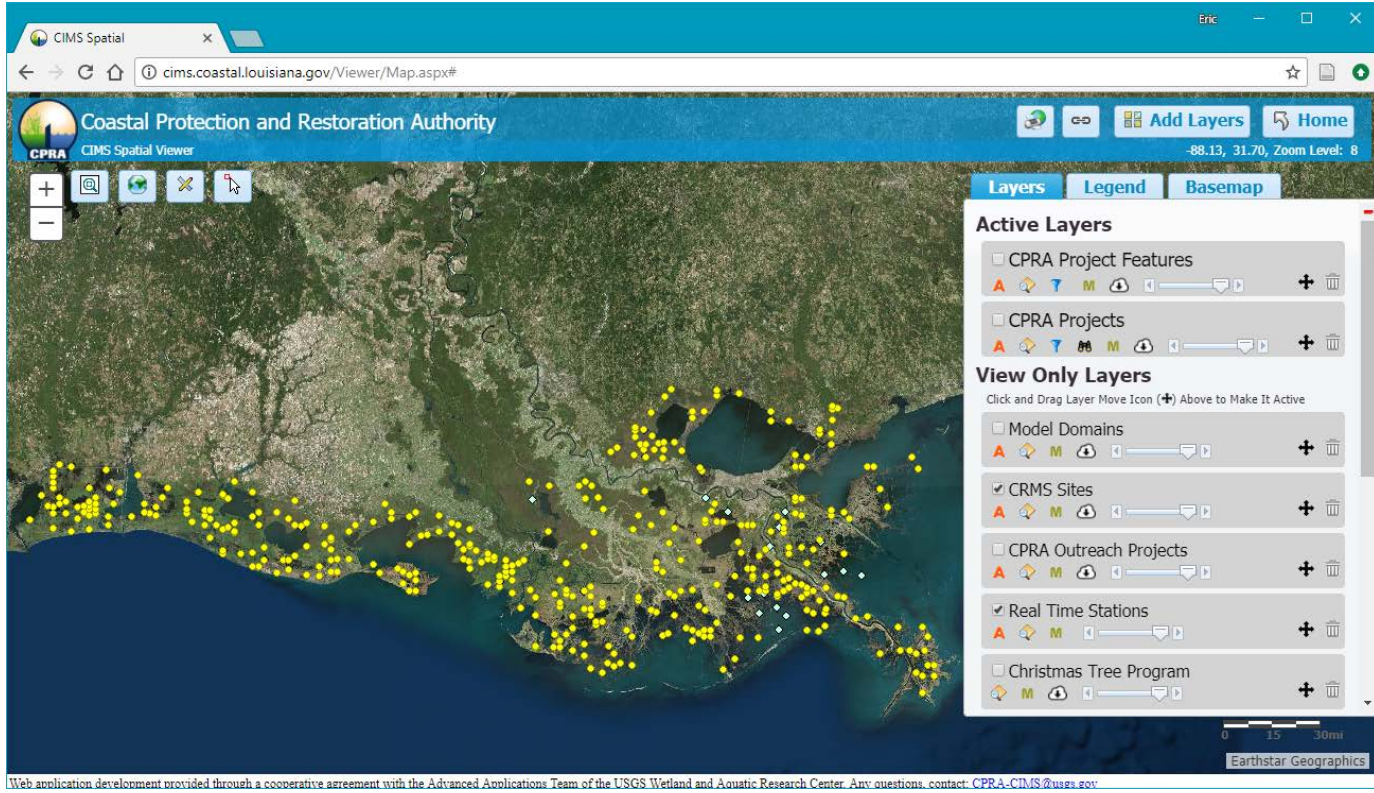
PROJECT SPECIFIC MONITORING & DATA COLLECTION



PROGRAMMATIC MONITORING & DATA COLLECTION



CRMS: Coastwide Reference Monitoring System



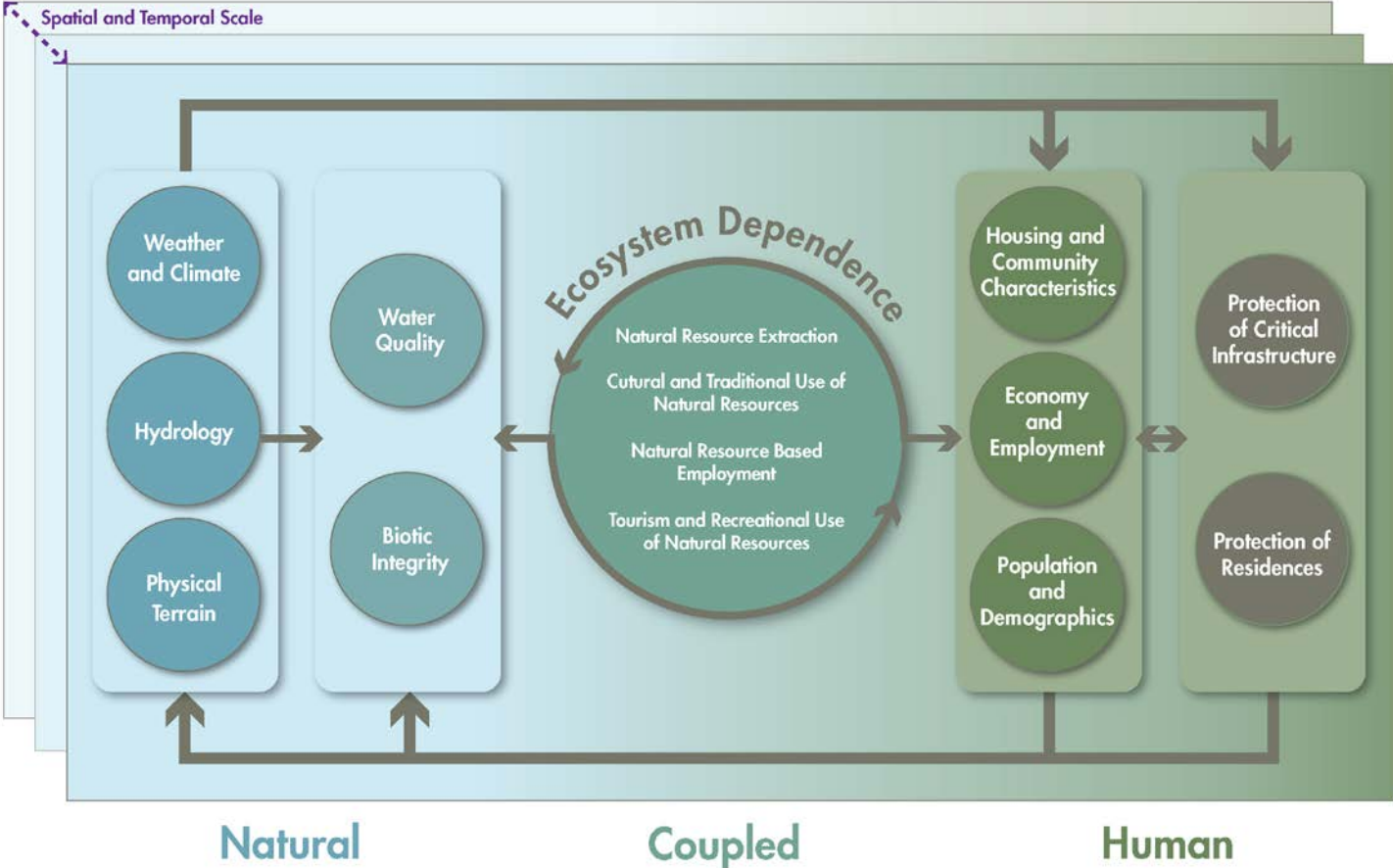
- Hourly Water Level and Salinity
- Annual Vegetation Surveys
- Annual Wetland Soil Accretion
- Annual Elevation
- Decadal Soil Properties



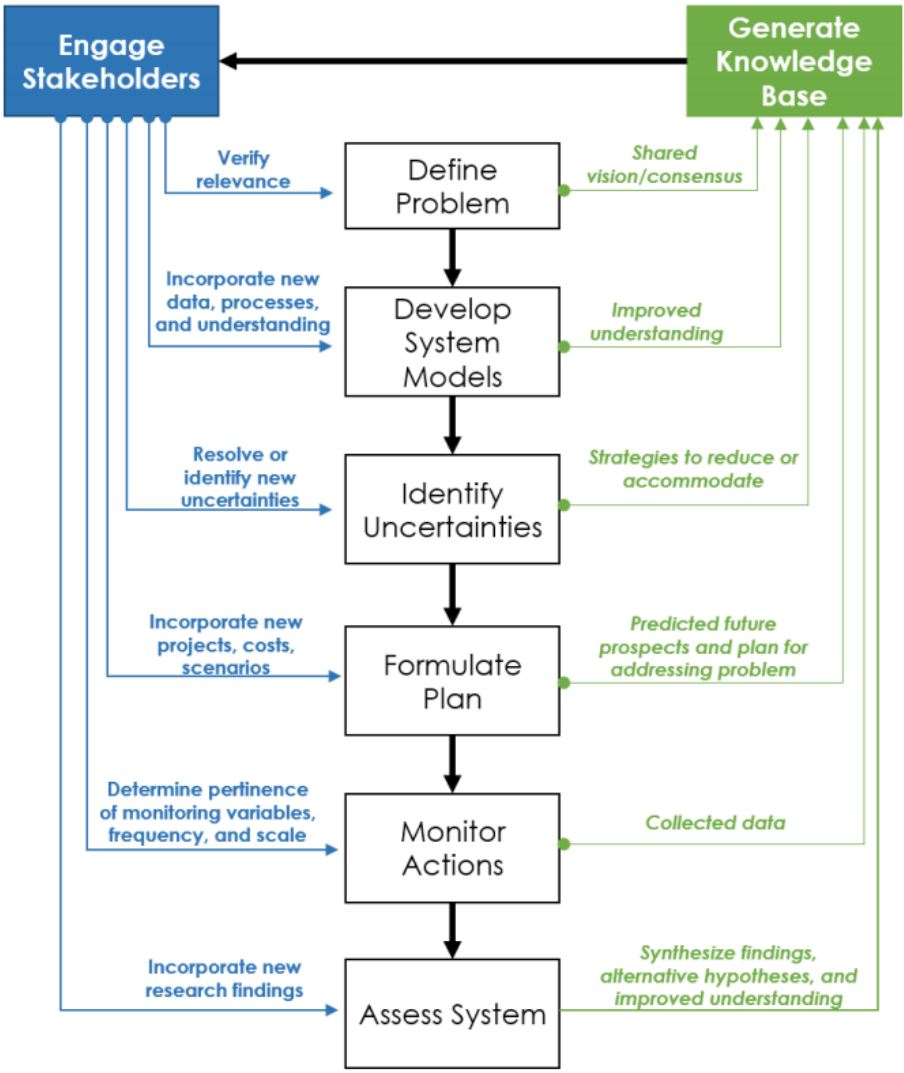
PROGRAMMATIC MONITORING & DATA COLLECTION



SWAMP: System-Wide Assessment & Monitoring Program



IMPLEMENT PROJECTS & ADAPTIVELY MANAGE





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THANK YOU

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