

Louisiana Gulf Hypoxia Program Update

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Louisiana Nutrient Reduction & Management Strategy Implementation

- The Louisiana Department of Environmental Quality (LDEQ) is lead agency for the cooperative agreement
- Project 1 implemented by Louisiana Dept. of Agriculture and Forestry (LDAF)
- Project 2 implemented by the Louisiana Coastal Protection and Restoration Authority (CPRA)



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Milestone Schedule for Years 1 – 3 (FY22-24)

Project 1: Nutrient Loading Reduction in Lake St. Joseph

- **Year 1:** Subawardee agreement and QAPP approval
- **Year 2:**
 - Purchase of equipment
 - Best Management Practice (BMP) Outreach and enrollment of producer landowners
 - BMP Implementation
 - Lab and data analysis
- **Year 3:**
 - BMP Implementation
 - Edge of field sampling
 - Lab and data analysis

Project 2: Coastal Transect Monitoring

- **Year 1:** Subawardee agreement and QAPP approval
- **Year 2:**
 - Boat-based monitoring and data collection of coastal transect sites
 - Development and testing of autonomous vehicle
 - Plan for transition to autonomous vehicle data collection Fall 2023
- **Year 3:**
 - Autonomous vehicle data collection
 - Data Processing, analysis, and outreach

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Project 1: Lake St. Joseph, Louisiana, Nutrient Loading Reduction

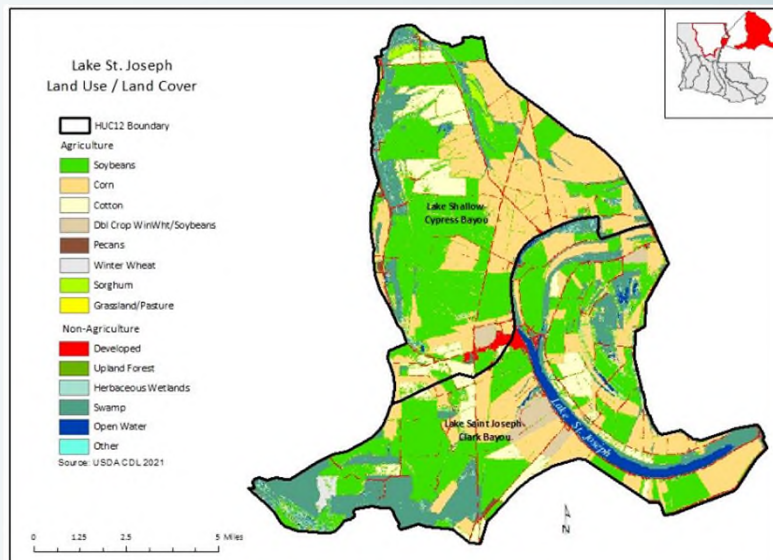


Figure 2. Lake St. Joseph watershed land use and land cover map. (from QAPP 3101)

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Objective



- Partners:
 - LDEQ
 - LDAH Office of Soil and Water Conservation Service (OSWC)
 - USDA Natural Resource Conservation Service (NRCS)
 - LDAH OSWC and USDA NRCS are managing BMP enrollment and implementation
 - Louisiana State University Ag Center (LSU Ag Center)
 - LSU Ag Center is managing edge of field sample collection
- Measure impacts of implemented targeted BMPs on nitrogen and phosphorous concentrations in edge of field runoff within the Lake St. Joseph-Clark Bayou and Cypress Bayou Watersheds in Tensas Parish, LA, with a goal of improved water quality and clarity compared to control monitoring site(s).

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Instrumentation



A no-till grain drill will be purchased by NRCS and available for landowners to rent



Image: <https://www.kuhn-usa.com/crop/seeder/mechanical-seed-drills/9400>

An Isco 6700 or 6712 automated sampler will be installed at each of five sample site locations

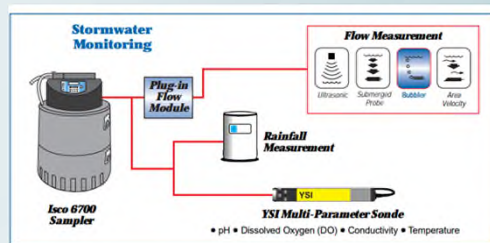


Image: http://www.equipservices.com/pdf/datasheets/isco_6700.pdf

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Method

- Producer landowners in study area enrolled in BMPs
- 5 sample locations selected – 4 experimental and 1 control
 - Experimental sites chosen by NRCS based on ranked maximum potential water quality improvement through BMP implementation
- Composite samples collected with an Isco 6700 or 6712 automated sampler via approved methods
- At least 1x/month samples collected and hand delivered or overnighted to LSU Ag Laboratory for analysis
- Parameters analyzed include:
 - Nitrogen (TKN, NO3NO2, NH3)
 - Phosphorous (PO4, TP)



Project 2: Pilot Transition to Autonomous Monitoring from Inshore to Offshore in Coastal Louisiana

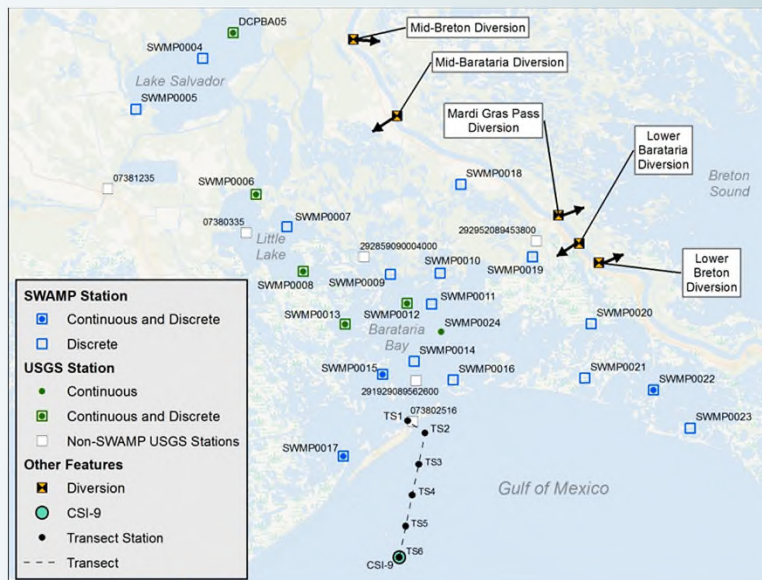


Figure 1. Water quality monitoring transect from Barataria Pass to Wavciss CSI-9 (from QAPP 3069)



Objective

- Partners:
 - LDEQ
 - CPRA
- Provide characteristic water quality data from inshore to offshore
- Coastal transect monitoring began in 2018 with Gulf of Mexico Alliance (GOMA) funding and has continued under EPA funding sources since 2019
- Monitoring has been conducted ~3x/year with boat-based surveys
- Goal is to transition from a boat-based survey in Spring 2023 to autonomous vehicle data collection by Fall 2023



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Parameters for Analysis

- **In situ measurements**
 - Sample Depth (m)
 - Water Body Depth (m)
 - Specific Conductivity ($\mu\text{mhos/cm}$)
 - pH (standard units)
 - Temperature
 - Dissolved Oxygen (mg/L)
 - Dissolved Oxygen Saturation (%)
 - Salinity (parts per thousand)
- **Laboratory samples**
 - Total Kjeldahl Nitrogen (TKN) (mg/L)
 - Nitrate-Nitrite Nitrogen (NO_3NO_2) (mg/L)
 - Ammonia (NH_3N) (mg/L)
 - Total Phosphorus (TP) (mg/L)
 - Orthophosphate (PO_4) (mg/L)
 - Turbidity (NTU) (mg/L)
 - Total Suspended Solids (TSS) (mg/L)
 - Silica (SiO_2) (mg/L)
 - Chlorophyll a ($\mu\text{g/L}$)



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Method

- Measurements and samples will be collected via boat-based survey in March, May, July, August, and September 2023 at surface, middle, and bottom depths using approved methods
 - Surface readings at depth of 0.5 m
 - Middle depth readings at one-half total depth
 - Bottom depth readings within one meter above bottom
- Autonomous Vehicle currently in development and testing in partnership* through the project *Unmanned Surface Vehicle for Autonomous Hypoxia Monitoring*
 - 0.91 m draft, can operate in <5 m to 50 m depths
 - Diesel powered, range ~68 nautical miles, 8.5 hours at 8 knots plus three hours max at stations
- Transition plans will be implemented in 2023



L3Harris | ASV (Photo by Stephan Howden)

* <https://ioos.noaa.gov/project/ott-asv-hypoxia/> <https://www.l3harris.com/> <https://www.integral-corp.com/> <https://www.tamu.edu/> <https://gcoos.org/>

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Summary

Project 1 Recap

- Implement agricultural BMPs within priority tracts in northeast Louisiana with a goal of reducing N and P runoff from edge of field.
- Both projects enable the state of Louisiana to implement key strategic actions using innovative technologies to address nonpoint source water quality management.

Project 2 Recap

- Continue to conduct coastal transect water quality monitoring surveys while shifting from boat-based to autonomous survey methods.

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Thank you

Questions?