

THE WATER
INSTITUTE

NEW MONITORING PROJECTS IN BARATARIA AND TERREBONNE: SETTING ECOLOGICAL BASELINES, FILLING KNOWLEDGE GAPS, AND IMPROVING MARSH HABITAT RESTORATION

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btnep

Barataria–Terrebonne
NATIONAL ESTUARY PROGRAM

Barataria–Terrebonne National Estuary Program

Management Conference Agenda - Meeting #113

Thursday, November 6, 2025 | 9:30 am - 12:00 pm

City of Plaquemine Community Center

57845 Foundry St., City of Plaquemine, LA 70764

Acknowledgements

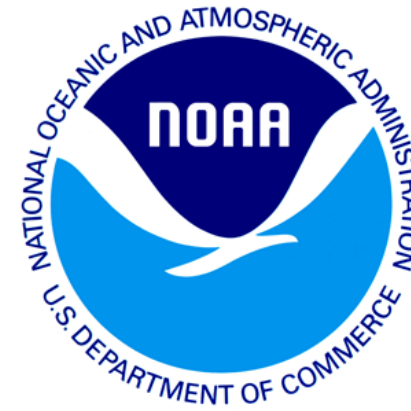
Thanks to many collaborators for their help with these projects, including those from:

- NOAA
- USGS
- The Water Institute
- Louisiana State University
- University of Louisiana at Lafayette
- Dynamic Solutions, LLC
- University of California Santa Cruz
- LDWF
- CPRA
- University of Miami - CIMAS

...and many thanks to the landowners of coastal Louisiana who have allowed us to pursue this work on their properties.

Funded by:

- Louisiana Trustee Implementation Group (LA TIG).
DIVER Portal Project IDs: 269 and 299

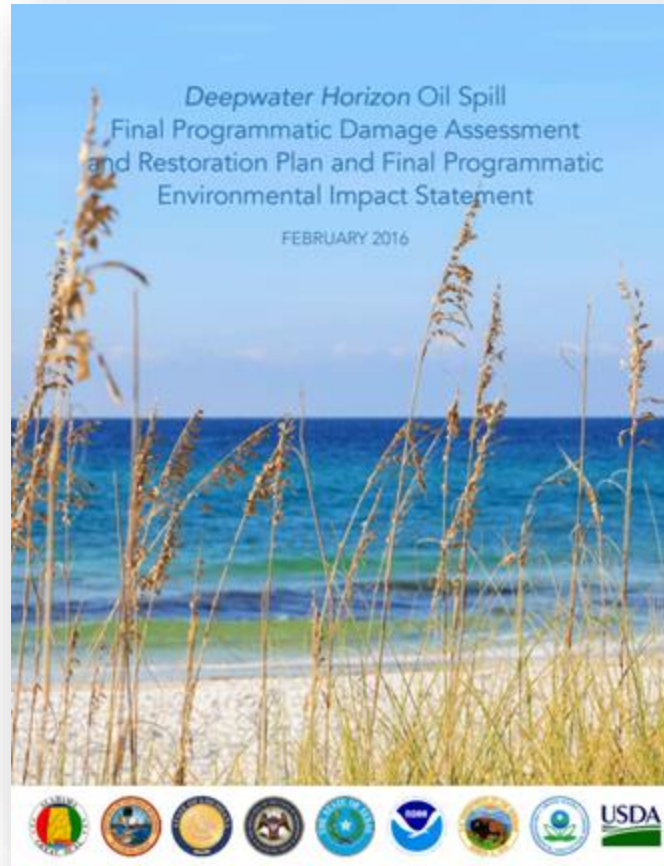


How we got here...



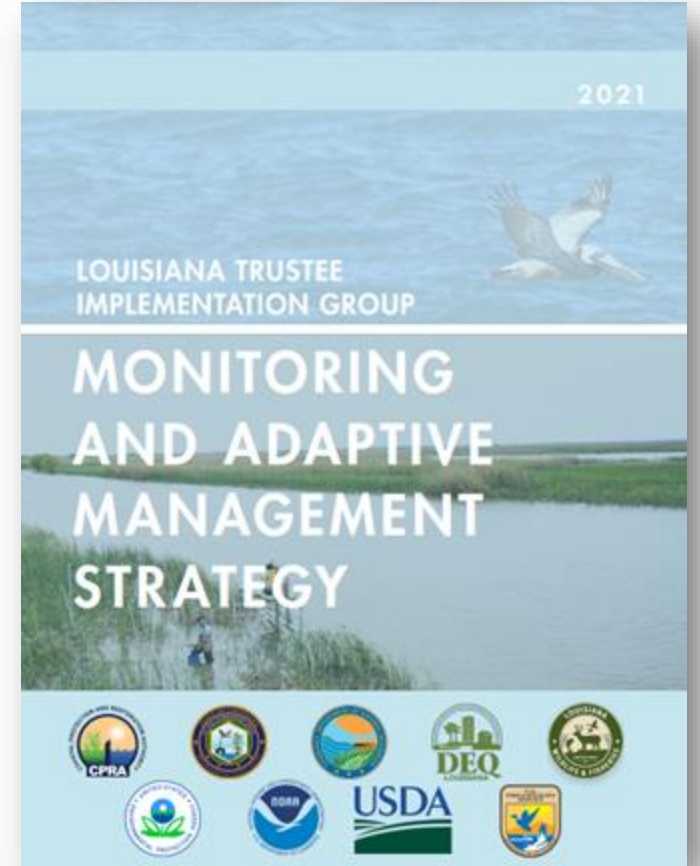
2010

Deepwater Horizon oil spill



2016

Damage Assessment
& Environmental
Impact Statement



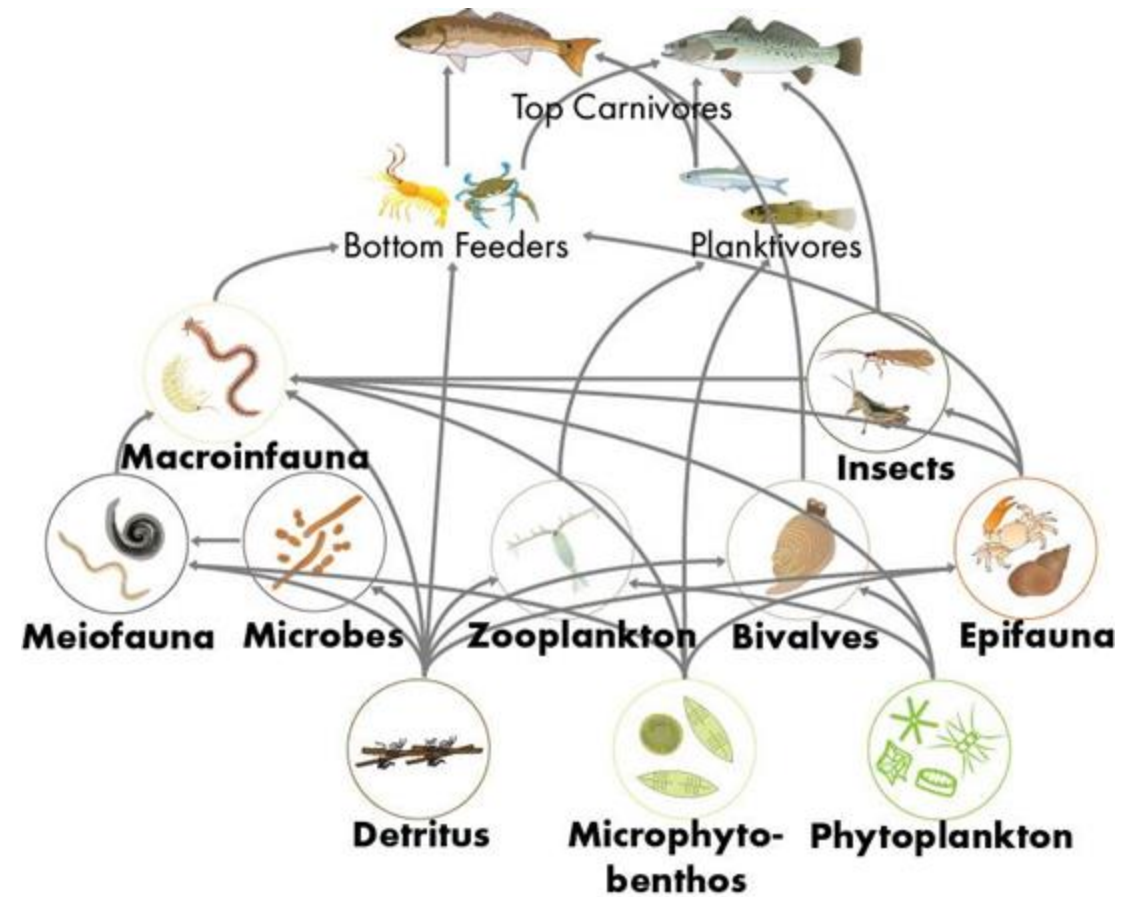
2021

Louisiana Trustees developed
a strategy to track recovery
and guide MAM funding



Marsh restoration objectives under DWH

- Trustees are charged with **restoring marsh habitat** that benefits Louisiana's coastal **ecosystems**
- Data to measure progress is very **limited** amidst our complex coastal ecosystems
- The LA TIG calls for **new data collection** to:
 - document & evaluate how marsh habitat restoration is restoring estuarine food webs and productivity
 - improve restoration planning & design



Addressing data gaps to inform restoration of wildlife impacted by the DWH spill

Seeking to optimize **ecosystem benefits** of marsh restoration

Lower Trophic Level Monitoring for Barataria Basin (PID 269)

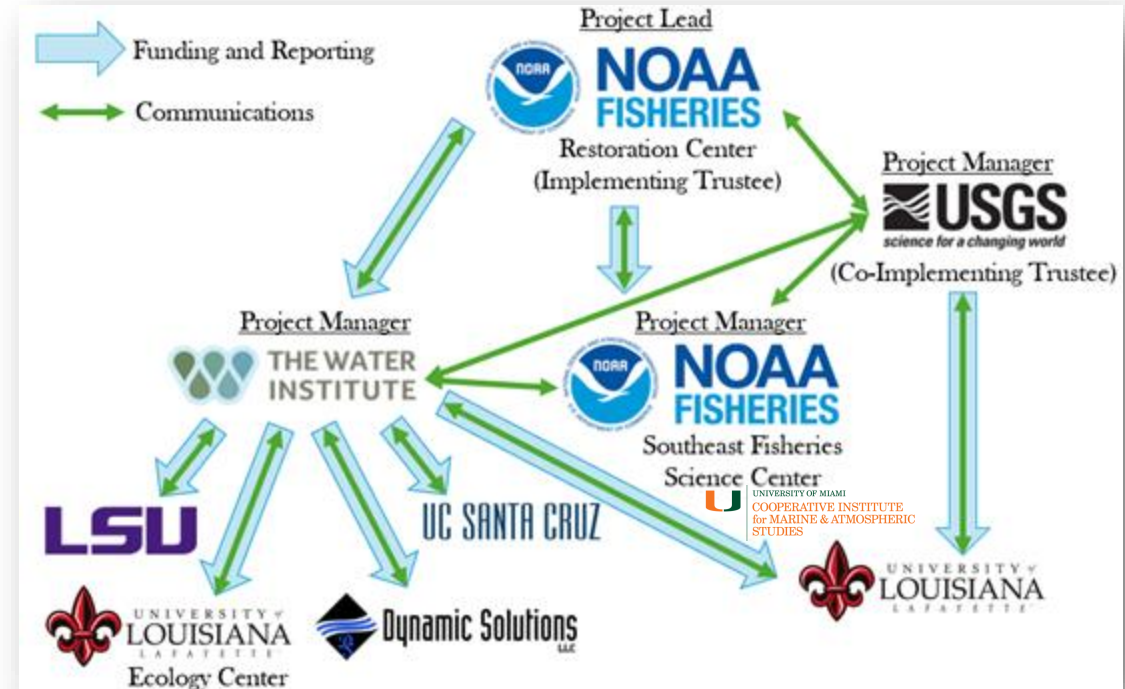


Monitoring the Effects of Coastal Wetland Restoration on Fish and Invertebrates (PID 299)



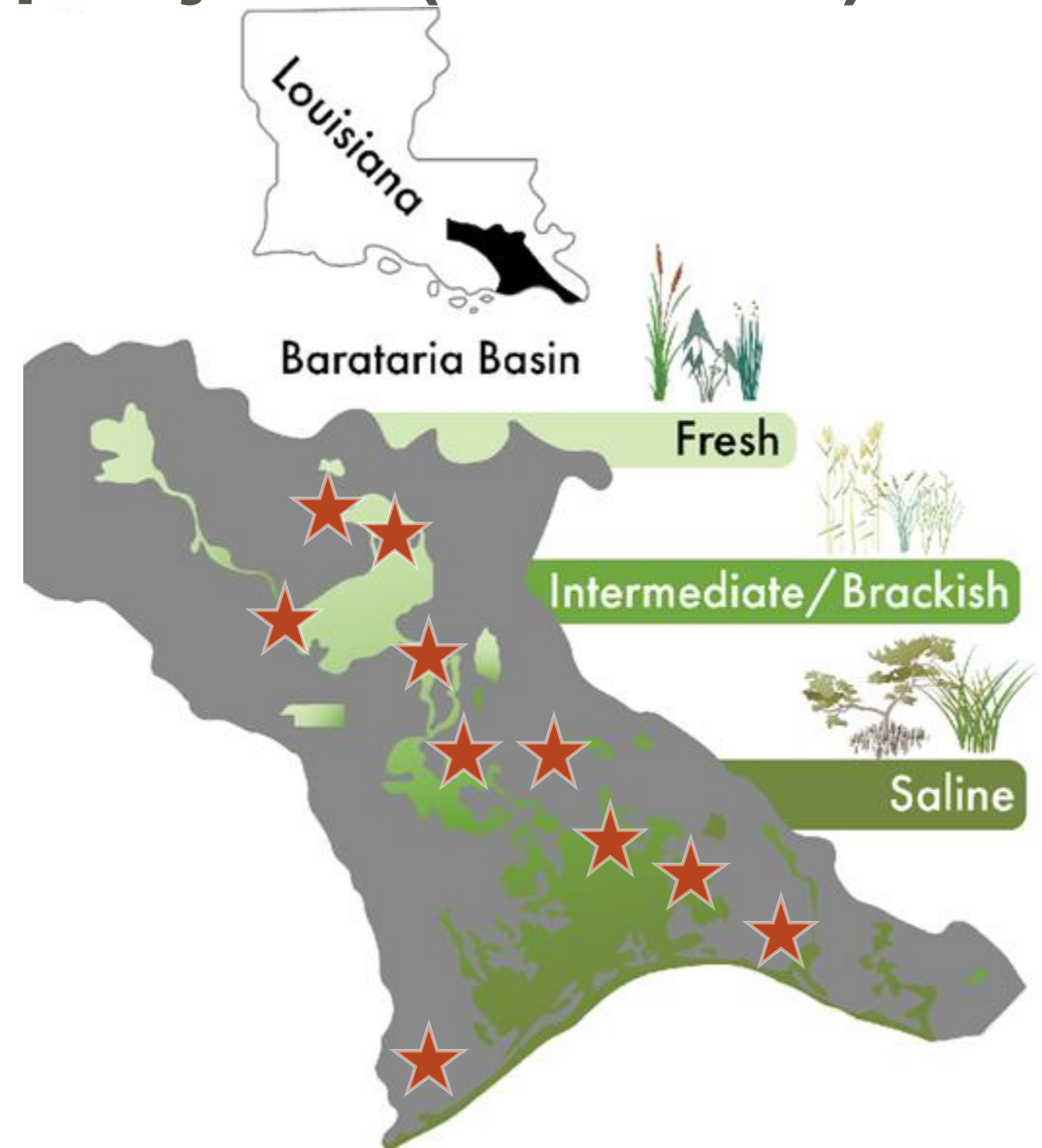
The **lower trophic level** project (PID 269)

- *Nearly a decade in the making*, this project develops an understanding of the **base of the estuarine foodweb** in Barataria Basin
- The Trustees funded a data gap analysis & planning effort in 2021 and a field implementation effort in 2023
- The project is being implemented by **a large partnership** that includes The Water Institute, federal agencies, universities, and a private company



The **lower trophic level** project (PID 269)

- We began field operations in March 2025 and will produce **thousands of datapoints** collected across:
 - The Barataria estuarine salinity gradient (10 stations from fresh to saline)
 - All four seasons
 - Three consecutive years (2025-2027)



The **lower trophic level** project (PID 269)

Monthly Field Campaigns:

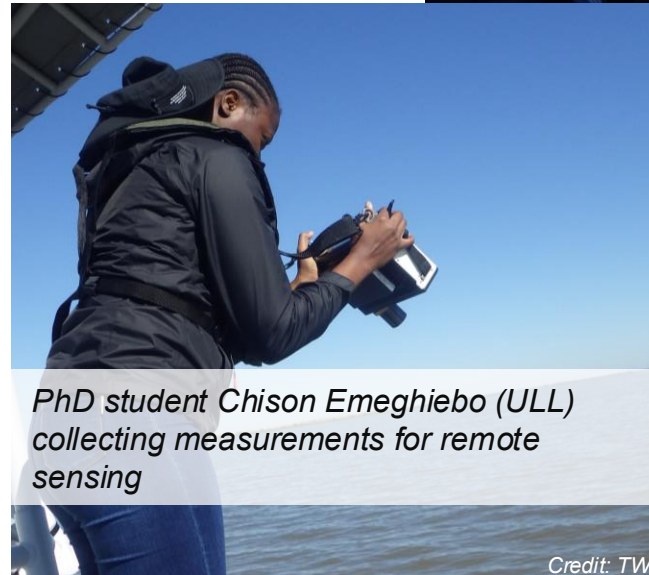
Sampling at 2 open water sites at each of 10 stations across the Basin (20 sites total)

- Phytoplankton biomass, community composition, and cyanobacteria toxins
- In-situ measurements for **remote sensing** data products (pigment absorption, reflectance, etc.)
- **Micro- and mesozooplankton** biomass, community composition, density
- Water column **nutrients** and suspended solids concentrations
- **Environmental parameters** (water temperature, salinity, DO, etc.)

Erin Kiskaddon and Emelia Marshall (TWI) collecting phytoplankton



Emelia Marshall (TWI) collecting mesozooplankton



PhD student Chison Emeghiebo (ULL) collecting measurements for remote sensing



Erin Kiskaddon and Emelia Marshall (TWI) rinsing a plankton net for mesozooplankton

The **lower trophic level** project (PID 269)

Seasonal Field Campaigns

Sampling at 5 open water and 5 marsh edge sites at each of 10 stations across the Basin (100 sites total!)

Conduct the same open water sampling as monthly *PLUS*:

- **Microphytobenthos** (surface algae on bottom) biomass, cell density, and community composition
- **Macroinfauna** (sediment-dwelling organisms) density, biomass, and community composition
- **Sediment characteristics** (grain size, bulk density, % organics) > Gina Woods and Kohinur Akter (LSU) collecting a sediment core in open water

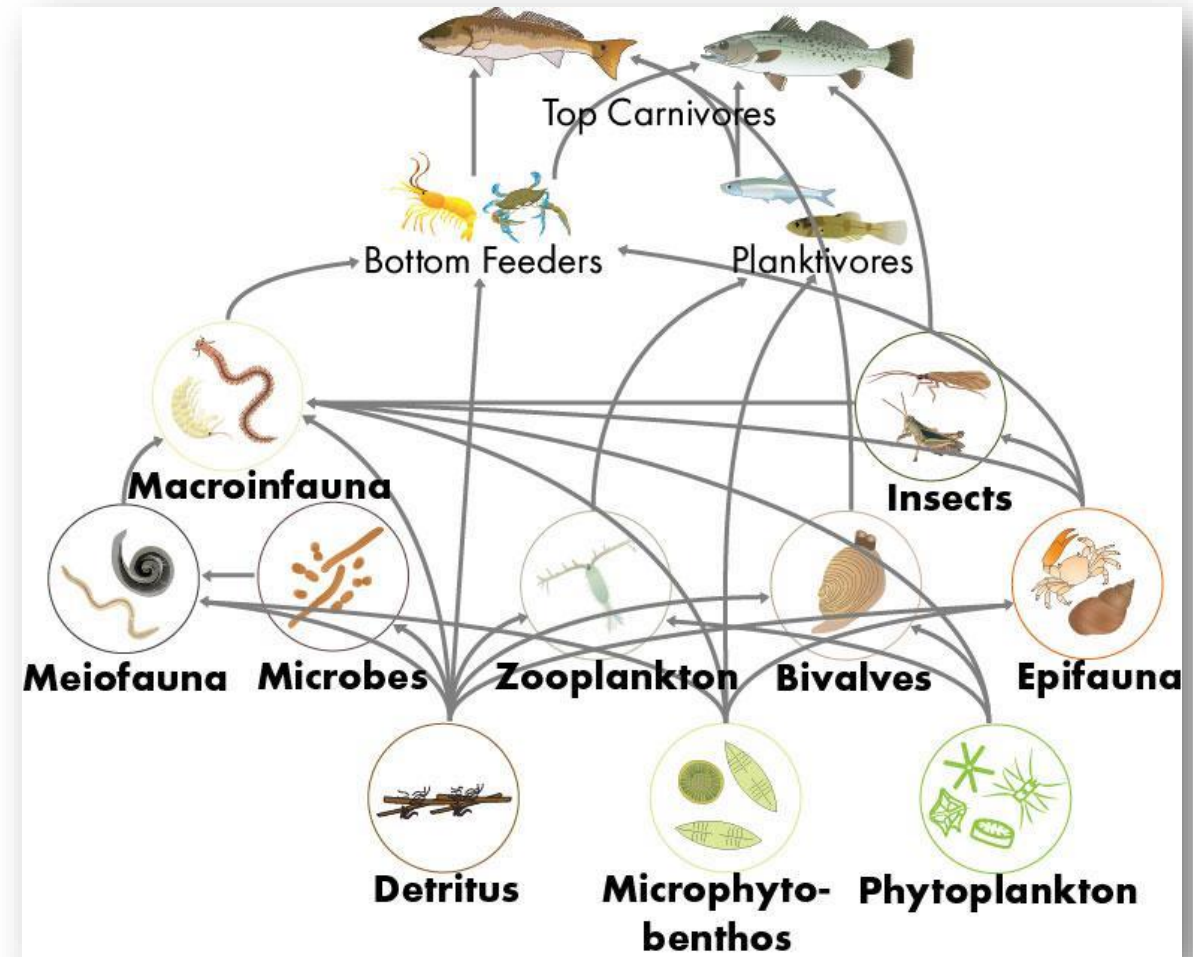


The **lower trophic level** project (PID 269)

Starting in Spring 2026...

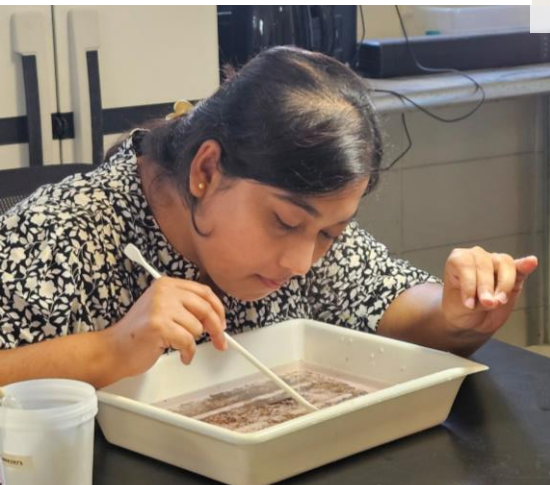
Four Seasons of $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, $\delta^{34}\text{S}$, and %CNS Stable Isotope Data Collection

- Zooplankton & Phytoplankton/POM
- Microphytobenthos
- Macroinfauna
- Surface Sediment Organic Matter
- C3/C4 Vegetation, SAV, and Epiphytic Macroalgae



The **lower trophic level** project (PID 269)

Work to process samples is just getting started!



Macroinfauna sample picking

Credit: TWI



Cirratulidae polychaete

Credit: TWI

Malinda Sutor (LSU) analyzing zooplankton using a FlowCam with students



Credit: TWI



Emily Lain (USGS) preparing microphytobenthos samples

Credit: Melissa Baustian



Extracting microphytobenthos on the lab bench

Credit: Melissa Baustian



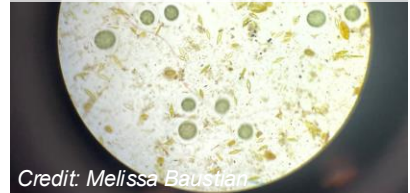
Bingqing Liu (ULL) analyzing samples for remote sensing at the HyperCoast Lab, School of Geosciences



Credit: Bingqing Liu

Credit: Bingqing Liu

Microphytobenthos diatoms under a microscope



Credit: Melissa Baustian



The **lower trophic level** project (PID 269)



A project of this magnitude and complexity requires special planning and coordination



9 project Principal Investigators
spanning Academic, Non-Profit, and
Federal organizations

Supported by the work of many
technicians, graduate students,
undergraduate students, and
volunteers

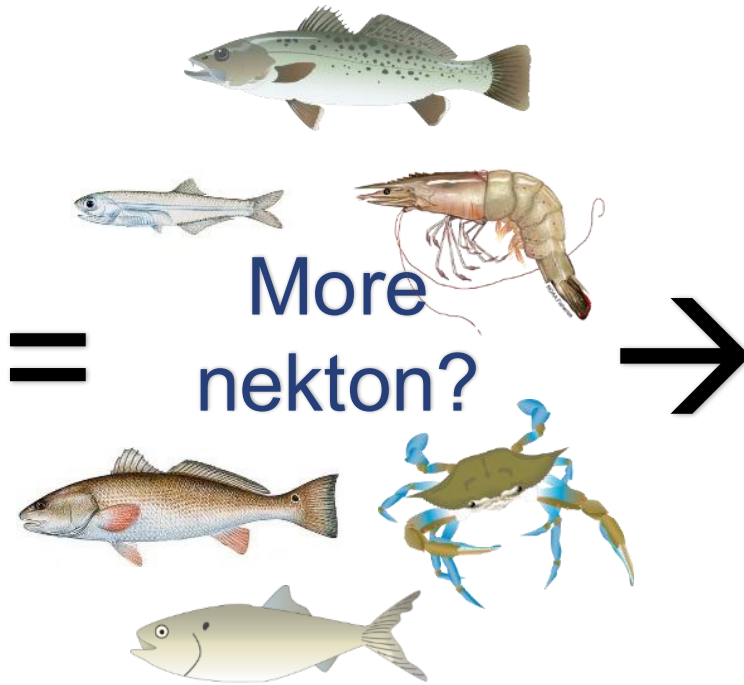


Spring seasonal field effort field team, April 2025. Left to right: Melissa Baustian (USGS), Emily Lain (USGS), Brenae Bergeron (USGS), Erin Kiskaddon (TWI), Emelia Marshall (TWI), Cassie Glaspie (LSU), Gina Woods (LSU)

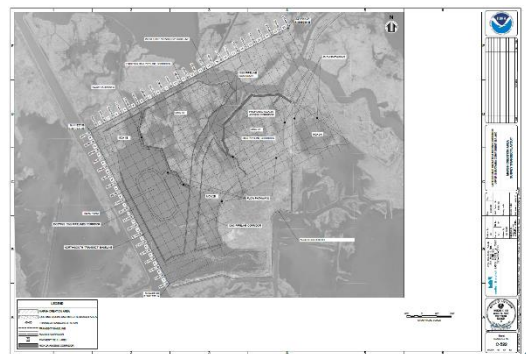


TRANSITION...HABITAT RESTORATION = MORE NEKTON(?)

The LA TIG needs *reference range* and *restoration target* values to assess marsh habitat restoration benefits and to inform future marsh restoration design to maximize productivity of fisheries species and their prey

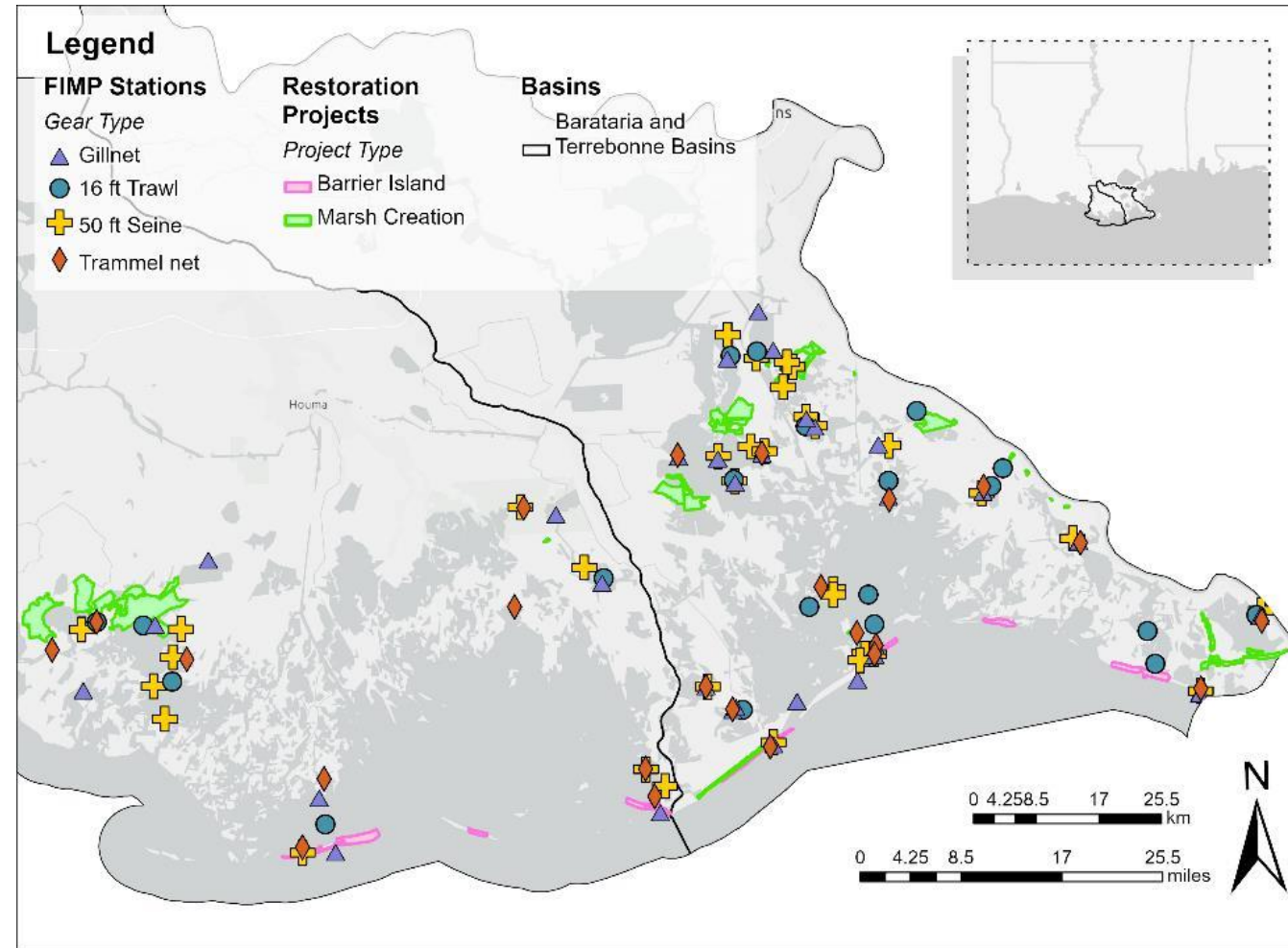


Planning and design of future marsh restoration projects



The **nektion** project (PID 299)

- Initial work investigated the influence of restoration in existing data
- Conducted by a large partnership led by NOAA which included collaborators from state, federal, university, & private organizations
- **17 years of FIMP data** (2005-2022) from 144 stations near **21 selected previously constructed marsh restoration sites** ranging in age post-build in Terrebonne and Barataria

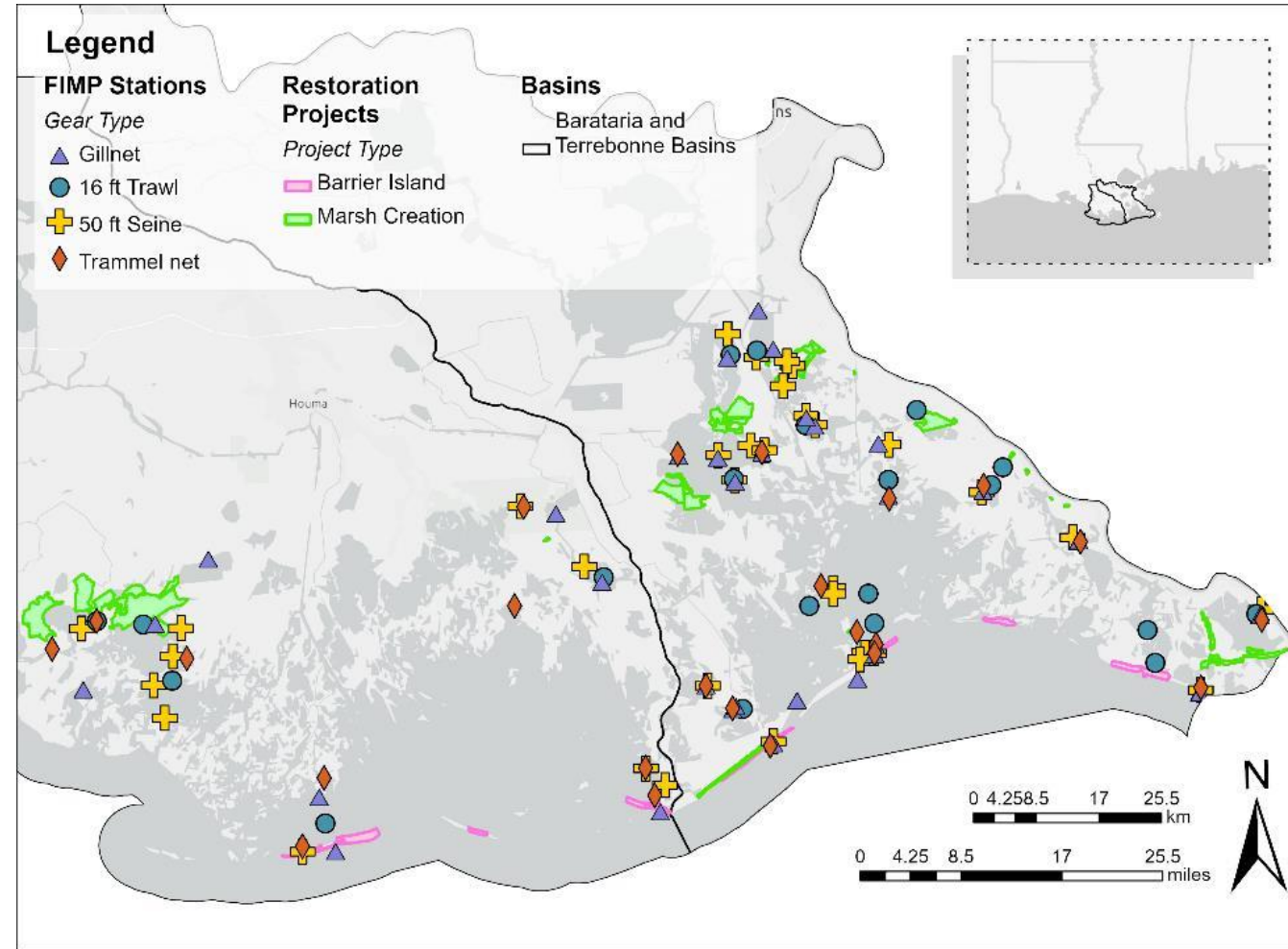


(Kiskaddon et al., *in prep*)



The **nektion** project (PID 299)

- **Generalized additive models** (GAMs) investigated potential drivers of nekton relative abundance and diversity in different FIMP gear types
- Restoration viewed as somewhat analogous to **ecological succession** after a disturbance - as this new marsh evolves, how is the community responding?
 - Restoration “effects” parameterized in models as **time since restoration** and **distance away from restoration**

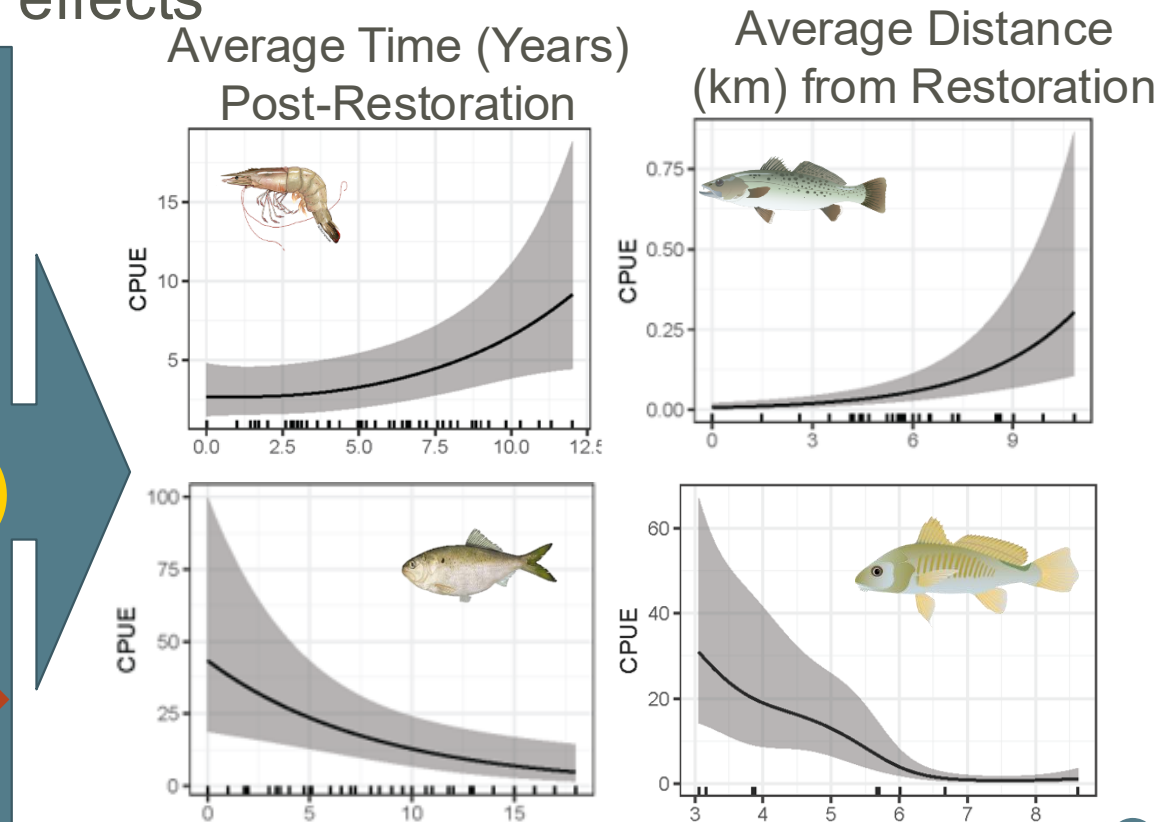
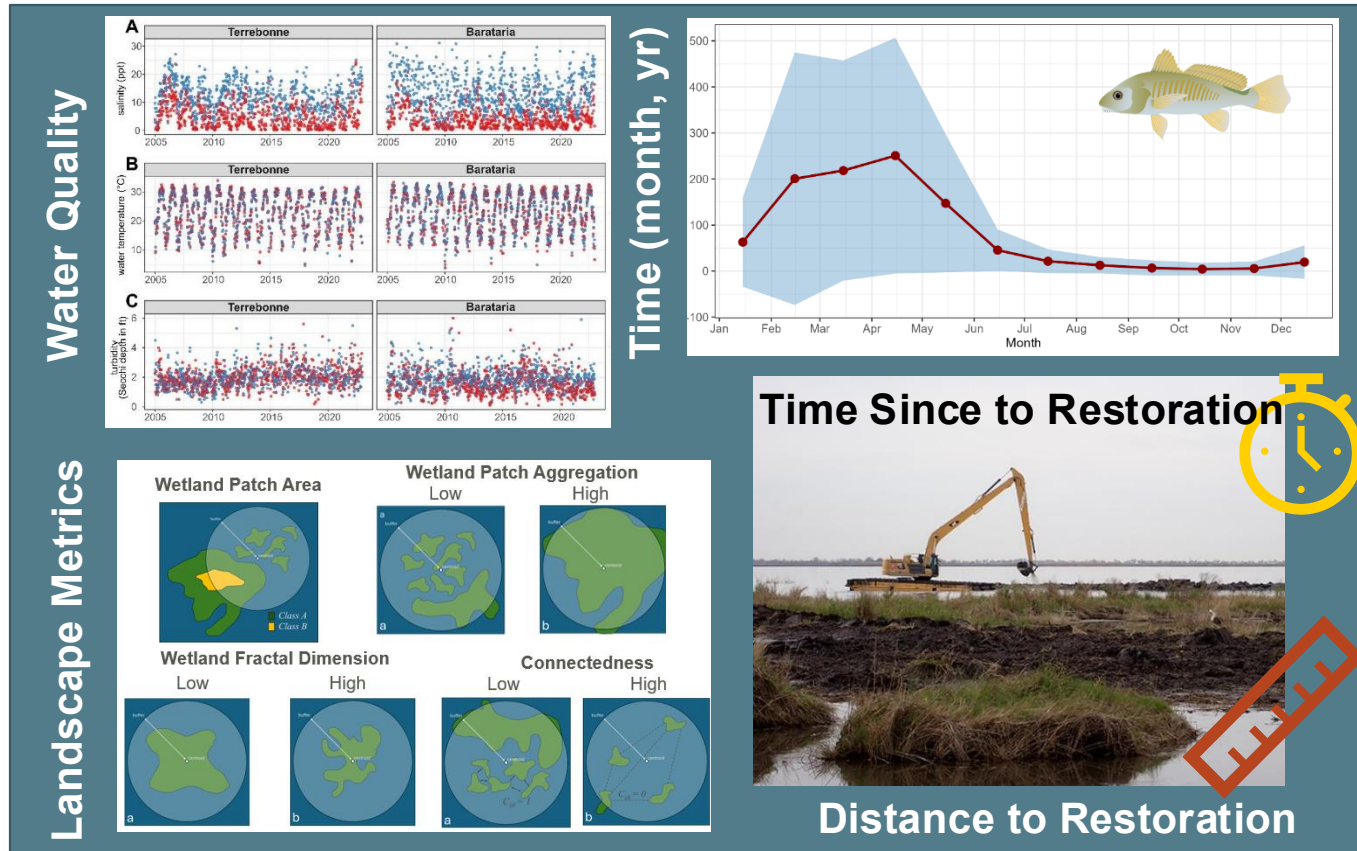


(Kiskaddon et al., *in prep*)



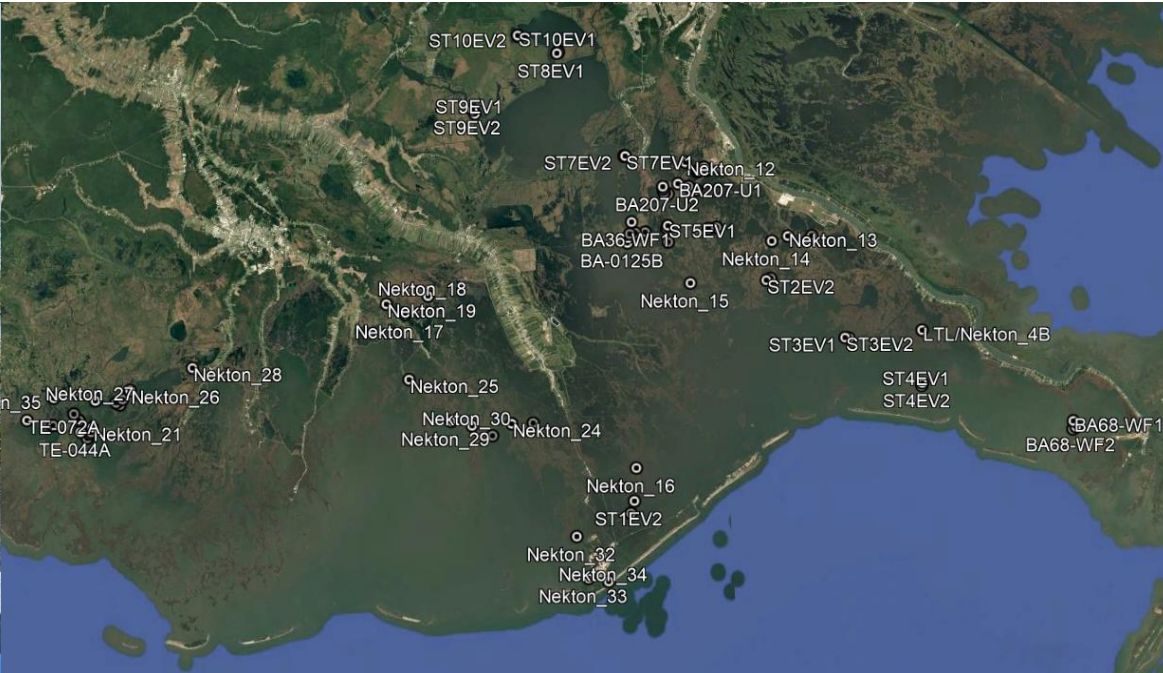
The **nekton** project (PID 299)

- **Small effects detected**, but were of similar magnitude to other factors known to influence estuarine species abundance/distribution
- **Species-specific differences** helped point us towards those that should be investigated further to determine restoration “effects”



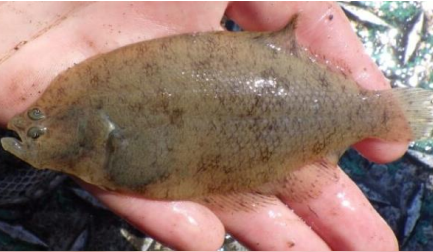
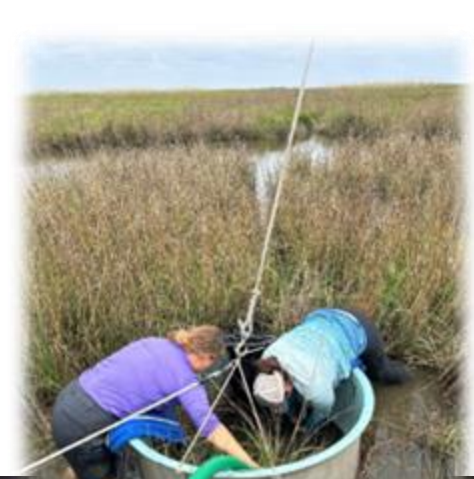
The **nekton** project (PID 299)

- Next, we developed a monitoring plan to collect new data more closely tied to restoration projects using **drop samplers**
- **3 marsh sub-habitats**: interior, marsh edge, open water
- **Sampling the full salinity range** of Terrebonne and Barataria Basins **seasonally** (4x annually) for 3 years



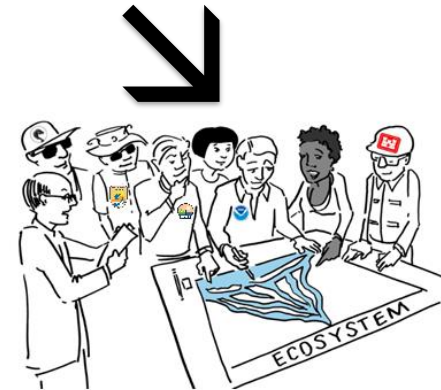
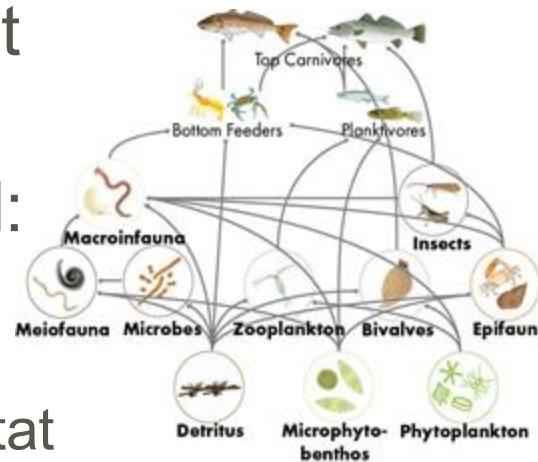
The **nekton** project (PID 299)

- Field operations began in April 2025 and will produce **thousands of data points** by 2027
- Sample processing is underway



SO WHAT?

- We are working to **unravel the biggest mysteries of our estuaries** which are the most challenging to measure
- We can then better understand **how energy flows** – from a microscopic diatom to the Speckled Trout that lands on your dinner plate
- Enabling us to better understand:
 - how restoration influences our **ecosystems**
 - how we can implement better habitat restoration projects aimed at **improving the fisheries value of restoration**





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THANK YOU

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