

NOAA Restore Marsh Food Web Project Advisory Meeting

Linking Community and Food-Web Approaches to Restoration: An Ecological Assessment of Created and Natural Marshes Influenced by a River Diversion



Mon. Oct. 15th, 2015 - 12:00 – 2:30 CDT

Join from your computer, tablet or smartphone.

<https://global.gotomeeting.com/join/224394229>

You can also dial in using your phone.

United States: +1 (571) 317-3122

Access Code: 224-394-229

Agenda:

- 12:00 - 12:05 pm: Welcome and introductions – Mike Polito
- 12:05 – 12:10 pm: Brief overview of project goals & recent field work – Mike Polito
- 12:10 – 12:15 pm: Data Management – Nancy Rabalais, Wendy Morrison, & Jason Weick
- 12:15 – 12:30 pm: PI Reports (~3 mins each)
 - Hydrology & Elevation Mapping – Erick Swenson
 - Primary Producers & Nutrients – Brian Roberts
 - Bacteria, Archaea, Fungi – Annette Engel
 - Infauna – Nancy Rabalais
 - Macroinvertebrates & Litterbag Sampling – Mike Polito
- 12:30 – 12:40 pm: Questions/Feedback from Advisors
- 12:40 – 12:55 pm: PI Reports (~3 mins each)
 - Suction & Trawl Sampling – Charlie Martin
 - Minnow Traps – Paola Lopez-Duarte & Jill Olin
 - Insects – Linda Hooper-bui
 - Biomarkers – Mike Polito, Jill Olin, & Paola Lopez-Duarte
 - Food-web Modeling – Olaf Jensen
- 12:55 – 1:05 pm: Questions/Feedback from Advisors
- 1:05 – 1:10 pm: Timeline, updates, and FY2019 goals – Mike Polito
- 1:10 – 1:35 pm: Summary input from Advisory Board members (~5 mins each)
 - Pat Williams – NOAA
 - Kevin Roy – USFWS
 - Sharon Osowski – EPA
 - Stuart Brown - CPRA
 - Robert Spears - Plaquemines Parish
- 1:35 – 1:45 pm: Summary Input from NOAA Restore Team
- 1:45 – 1:50 pm: Open discussion
- 1:50 – 2:00 pm: Wrap up and next steps – Mike Polito



Meeting Goals:

1. Introduce new project participants
2. Summarize our research efforts and accomplishments
3. Review our objectives for the upcoming project year
4. Have our Advisory Board member ask questions and provide insights into the project's design and ultimate applications



Principle Investigators :

Michael J. Polito, Louisiana State University, Department of Oceanography and Coastal Sciences, 1239 Energy, Coast & Environment Building, Baton Rouge, LA 70803, 225-578-9403, mpolito@lsu.edu

Annette S. Engel, University of Tennessee-Knoxville, Department of Earth and Planetary Sciences, 1412 Circle Drive, Knoxville, TN 37996, 865-974-0402, aengel1@utk.edu

Linda M. Hooper-Bui, Louisiana State University, Department of Environmental Sciences, 1249 Energy, Coast & Environment Building, Baton Rouge, LA 70803, 225-578-5427, Lindabui@lsu.edu

Olaf P. Jensen, Department of Marine & Coastal Sciences, Rutgers University, 71 Dudley Rd., New Brunswick, NJ 08901, 410-812-4842; olaf.p.jensen@gmail.com

Paola Lopez-Duarte, Rutgers University Marine Field Station, 800 c/o 132 Great Bay Blvd, Tuckerton, NJ 08087, 609-296-5260 lopez-duarte@rutgers.edu

Charles W. Martin, Nature Coast Biological Station, University of Florida, P.O. Box 878, Cedar Key, FL, 32625, 256-504-1432, martin.charles.w@gmail.com

Jill A. Olin, Great Lakes Research Center, Michigan Technological University, 1400 Townsend Drive, Houghton, MI 49931, 906-487-1121, jaolin@mtu.edu

Nancy N. Rabalais, Louisiana Universities Marine Consortium & Louisiana State University, Department of Oceanography & Coastal Sciences, 3161 Energy, Coast & Environment Building, Baton Rouge, LA 70803, 985-851-2836, nrabalais@lumcon.edu

Brian J. Roberts, Louisiana Universities Marine Consortium, 8124 Highway 56, Chauvin, LA 70344, 985-851-2821, broberts@lumcon.edu

Erick Swenson, Louisiana State University, Department of Oceanography & Coastal Sciences, 1129 Energy, Coast & Environment Building, Baton Rouge, LA 70803, 225-578-2730, eswenson@lsu.edu

Project Advisory Board Members:

Stuart Brown, Coastal Protection and Restoration Authority, 150 Terrace Ave., Baton Rouge, LA 70802, (225) 342-4736, stuart.brown@la.gov

Sharon Osowski, Marine, Coastal and Analysis Section (6WQ-EC), US EPA Region 6 , 1445 Ross Ave , Dallas, TX 75202, 214-665-7506, Osowski.Sharon@epa.gov

Kevin Roy, U.S. Fish and Wildlife Service, Louisiana Ecological Services Office, 646 Cajundome Blvd., Suite 400, Lafayette, LA 70506, (337) 291-3120, kevin_roy@fws.gov

Robert Spears, Plaquemines Parish Coastal Zone Management Office, 8056 Hwy 23, Suite 200, Belle Chasse, LA 70037, 504-297-5631 / 504-934-6155, rspears@ppgov.net

Pat Williams, NOAA's National Marine Fisheries Service, Habitat Conservation Division, c/o Louisiana State University, Military Science Building, Room 266, South Stadium Drive, Baton Rouge, LA 70803, (225)389-0508 ext 208, patrick.williams@noaa.gov

NOAA Restore Program Officers:

Frank Parker III, Associate Director, NOAA RESTORE Science Program,
NOAA/NOS/NCCOS, (301) 602-5577, frank.parker@noaa.gov

Melissa Carle, Monitoring and Planning Coordinator, Deepwater Horizon Restoration,
NOAA Restoration Center, 301-427-8679, melissa.carle@noaa.gov

Shannon Martin, Ecosystem Assessment Scientist, Cooperative Institute for Marine and
Atmospheric Studies, CIMAS/NOAA/OAR/AOML, 337-739-8292,
shannon.martin@noaa.gov



Brief Overview of Project

Project Goal: The primary goal of this research is guide future restoration effort by integrating community and food-webs approaches into management and restoration planning.

Translation to Management:

- Compare with community and species level models commonly used by CWPPRA to evaluate marsh restoration projects.
- Identify the insights managers can gain from metrics of food web structure that can help interpret and refine current models and practices.



Brief Overview of Project

Three Specific Objectives:

1. To examine species composition, relative abundances, and food web structure at created vs. natural marshes.
2. To examine species composition, relative abundances, and food web structure in natural marshes along a salinity gradient.
3. To use the above field data to develop and test an ecosystem model that will be used to predict the outcome of habitat restoration efforts on marsh food web structure, function and resilience.

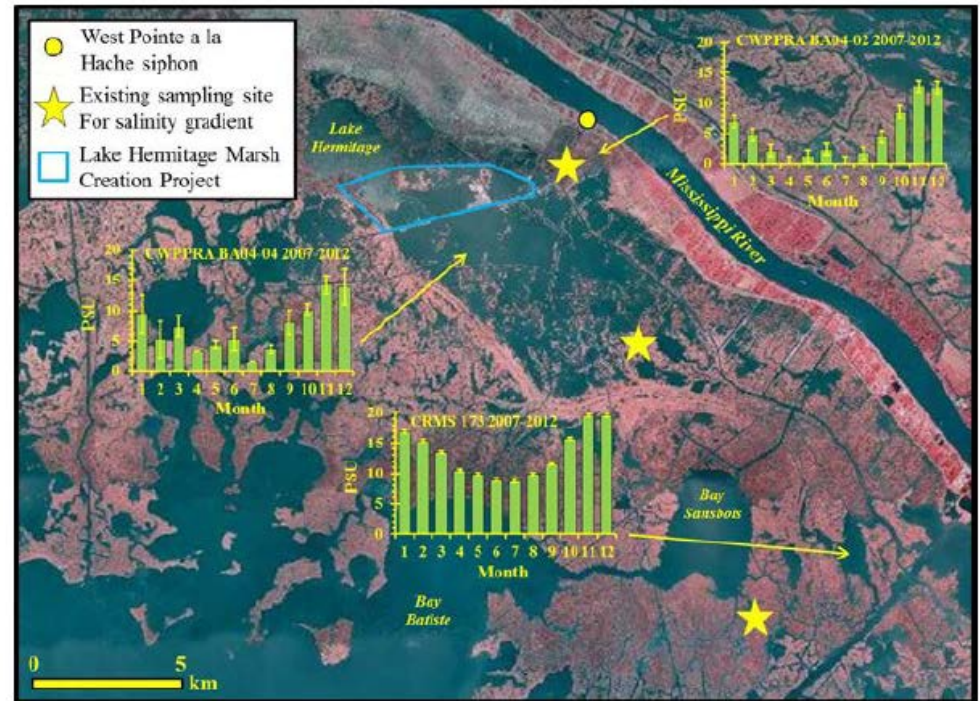


Brief Overview of Study Design

Study Area: West Point a la Hache area and Lake Hermitage Marsh Creation Project within Barataria Bay, in Plaquemines Parish, Louisiana.

Study Design: Sample two created marsh sites and one natural site at the Lake Hermitage Marsh Creation Project and three natural marsh sites at varying distances from the WPH siphon over a three year period:

- Spring 2018 (Siphon off)
- Spring 2019 (Siphon recently on)
- Spring 2020 (Siphon on)



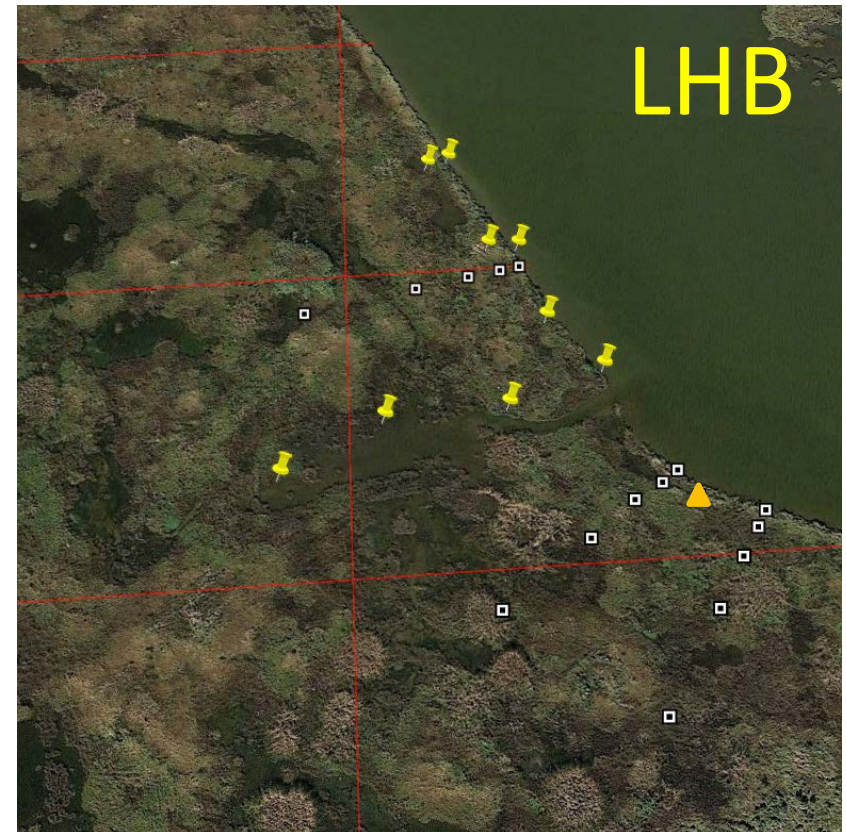
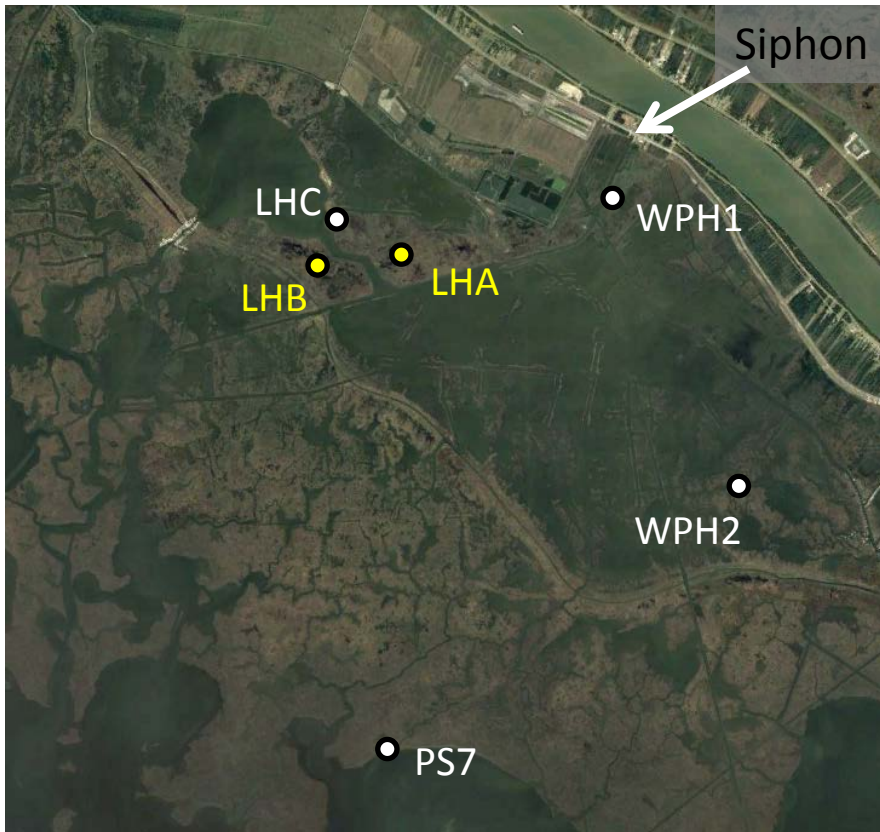
**** Additional Data:** Spring 2016 (siphon on) - Stable isotope data for four natural marsh sites at varying distances from the siphon.

Brief Overview of Recent Field Work

March 2018: Established sites and deployed water level / salinity recorders

May 2018: Project team conducted comprehensive sampling over ~10 days

July 2018: Measured marsh elevation, collected litter bags and ancillary data



Data Management

Nancy Rabalais, Wendy Morrison, Jason Weick – LSU / LUMCON

- Final Data Management Plan completed and submitted to NOAA
- Requests to PIs being prepared, for identification of initial project datasets
- Discussions underway for design and implementation of project website
- Discussions underway for sharing of PI data within RESTORE food web project

PI Reports

Brief summary of major research activities in 2018,
ongoing analyses and/or preliminary results (~3 mins each)

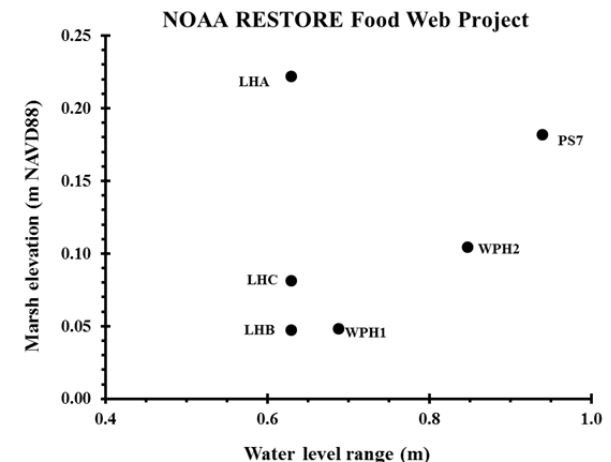
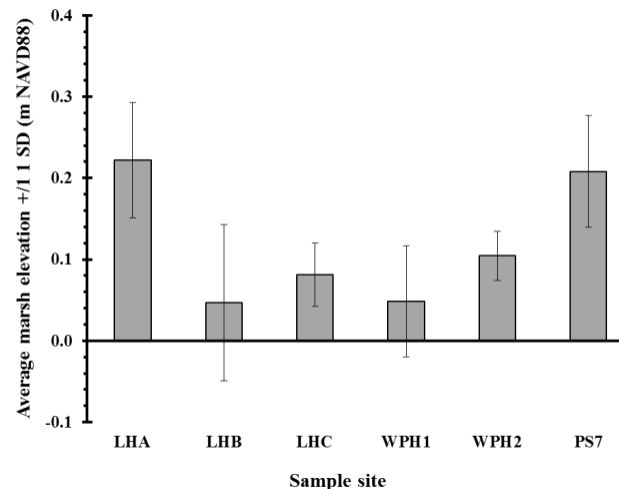
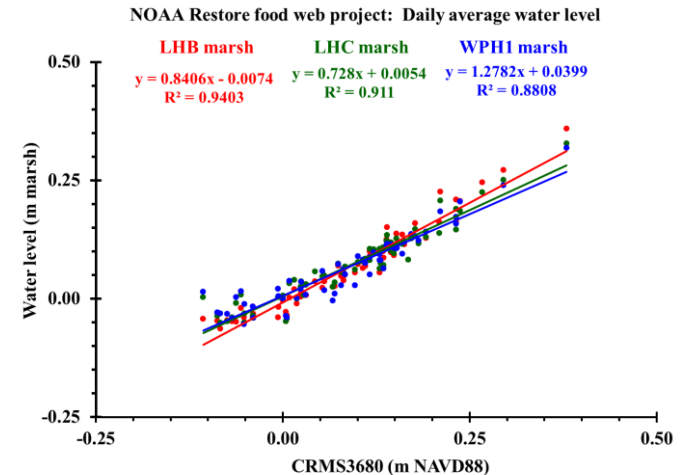
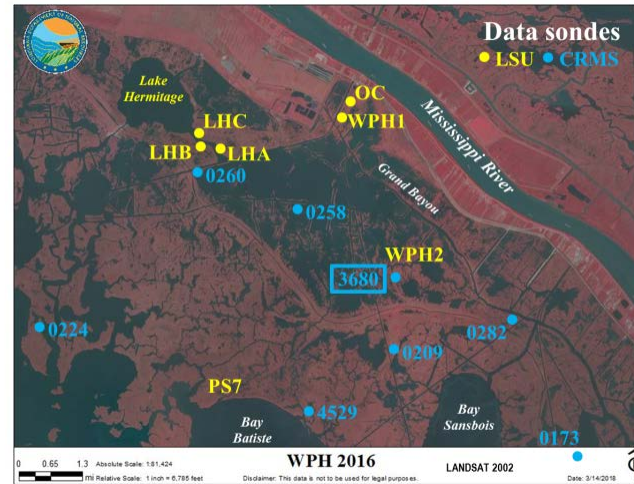
- Hydrology & Elevation Mapping – Erick Swenson
- Primary Producers & Nutrients – Brian Roberts
- Bacteria, Archaea, Fungi – Annette Engel
- Infauna – Nancy Rabalais
- Macroinvertebrates & Litterbag Sampling – Mike Polito



Hydrology & Elevation Mapping

Erick Swenson - LSU

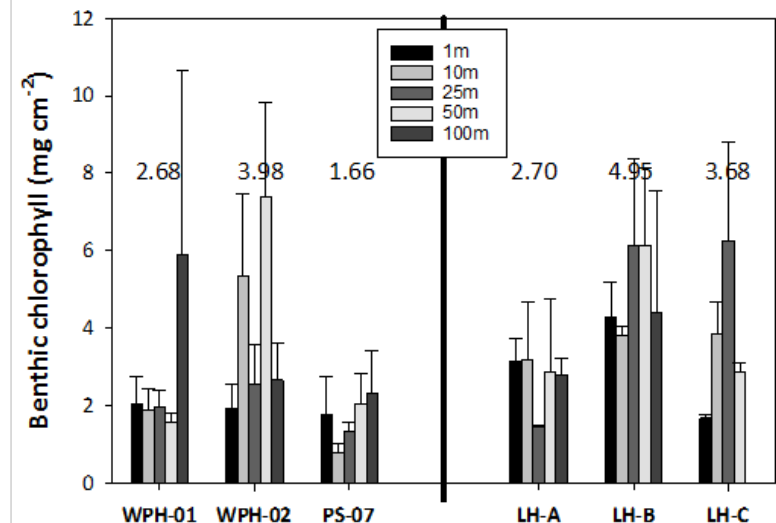
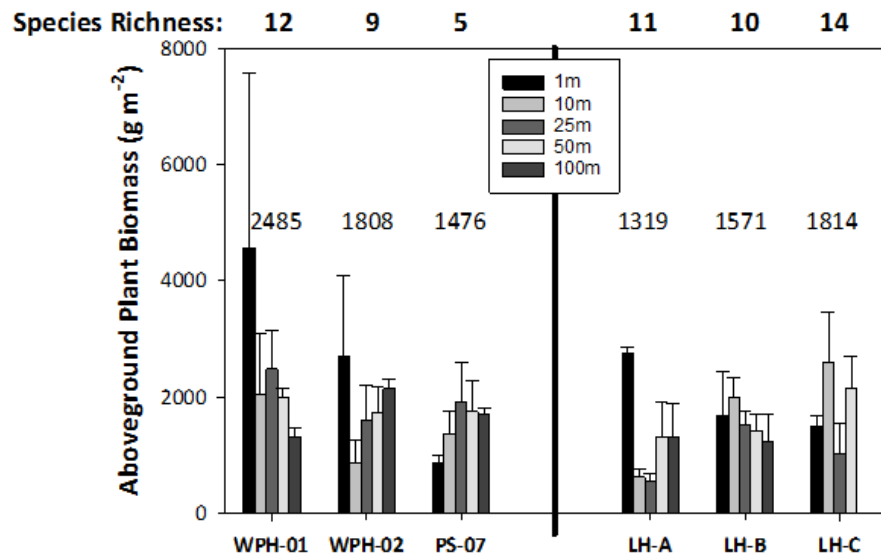
- Sondes installed at 3 marsh locations
- CRMS/LSU comparisons indicates we can calculate marsh flooding using the RTK survey data from June 2018
- Salinity variable among sites, will be may also be some errors in the salinity data (in progress)



Primary Producers and Nutrients

Brian Roberts - LUMCON

- 3 transects per site, 5 distances from edge (1,10,25,50,100m)
- Clip plot, sort by species, determine biomass & collect for biomarkers
- Benthic chlorophyll
- Surface soil cores for OM, C/N/P, BD, WC, porewater salinity, pH
- Water column chlorophyll



Microorganisms (Bacteria, Archaea, Fungi)

Annette Summers Engel - University of Tennessee

- Field work:
 - collected 48 soil + 8 water samples (expanded scope by adding one more 'control')
 - 1, 10, 100 m inland + 1 m offshore (expanded scope by adding more distances & core depths)
 - soil pH, conductivity, temperature, + grain size and organic C & water content (in lab)
- DNA extraction from all samples
- Currently preparing samples for DNA sequencing, lipid biomarkers, abundances
- Created marshes have less organic carbon content than natural marshes; expect differences in microbial communities

Engel et al. "Additional of microbial community composition in the evaluation of habitat suitability for tidal marsh restoration projects: A case study from the Lake Hermitage Marsh Creation Project, Plaquemines Parish, Louisiana" GOMOSES meeting, Feb. 2019, New Orleans, LA.



Benthic Infauna

Nancy Rabalais, Gina Woods, Wendy Morrison – LSU / LUMCON

- Gina Woods conducted field sampling from 5/20-5/23/2018.
- Five (5) replicates at 10 m and 50 m into the marsh, on the primary transect at all sites.
- Sieved and preserved.
- Ancillary grain size and TOC samples.



Macroinvertebrates & Litterbags

Michael Polito, Brian Roberts, López-Duarte – LSU / LUMCON / UNCC

- 1 transect per site, 5 distances from edge (1,10,25,50,100*m)
- 5 replicate *S. alterniflora* litter bags per distance deployed in May and retrieved in July (2 months)
- Macro-inverts being extracted & sorted
- *S. alterniflora* decomposition being measured



Poster of preliminary results to be presented at GOMOSEES by LSU undergraduate student

Questions and Feedback



LHB

PI Reports

Brief summary of major research activities in 2018,
ongoing analyses and/or preliminary results (~3 mins each)

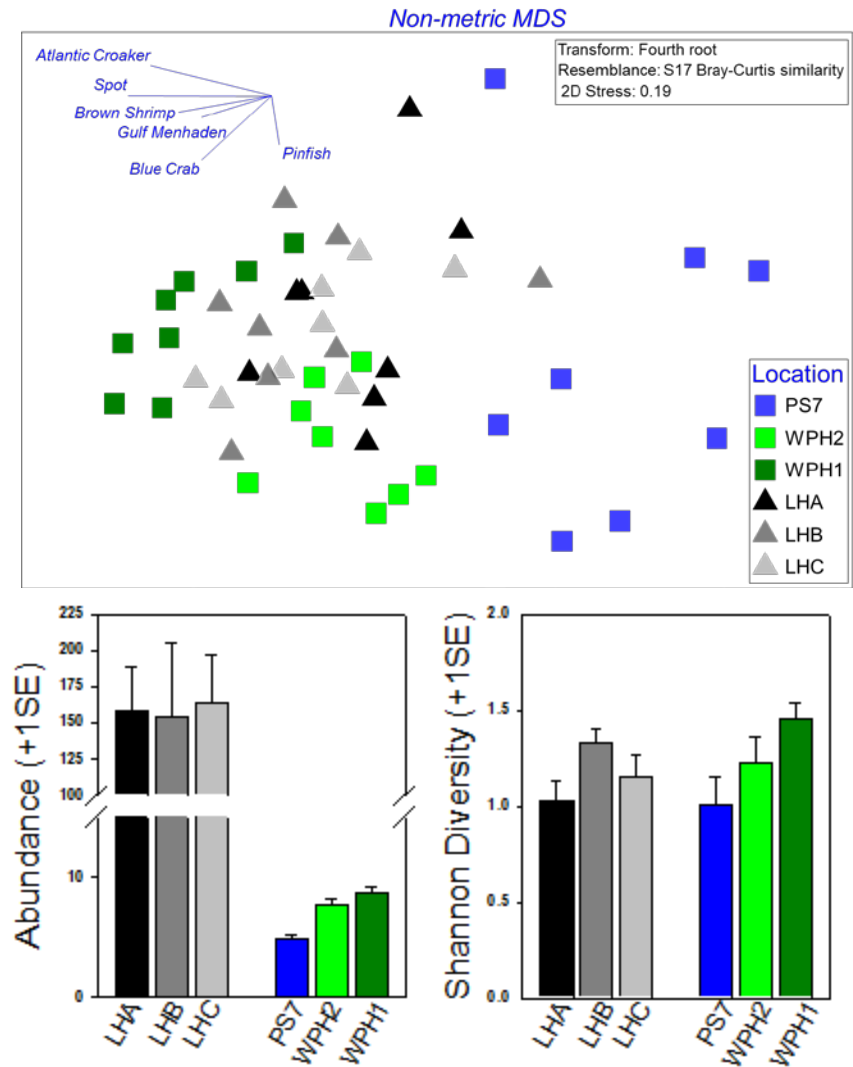
- Suction & Trawl Sampling – Charlie Martin
- Minnow Traps – Paola Lopez-Duarte & Jill Olin
- Insects – Linda Hooper-bui
- Biomarkers – Mike Polito, Jill Olin, & Paola Lopez-Duarte
- Food-web Modeling – Olaf Jensen



Trawl & Suction Sampling

Charlie Martin - University of Florida

- Trawls: n=8/site, 3 minutes
 - 31 species captured, 9784 total individuals
 - Community: LHA=LHB=LHC≠PS7≠WPH2≠WPH1
 - Abundance: LH > PS/WPH
- Suction: n=10/site
 - Sorting/ID still ongoing
 - Common species encountered during processing:
 - Amphipods (mostly *Corophium*)
 - Tanaids
 - Grass shrimp (*Palaemonetes* sp.)
 - Olive nerite snails (*Neritina* sp.)
 - Marsh periwinkles (*Littoraria irrorata*)
 - Mud crabs (Xanthidae)
 - Blue crab (*Callinectes sapidus*)
 - Isopoda
 - Insects/insect larvae (Chironomidae)

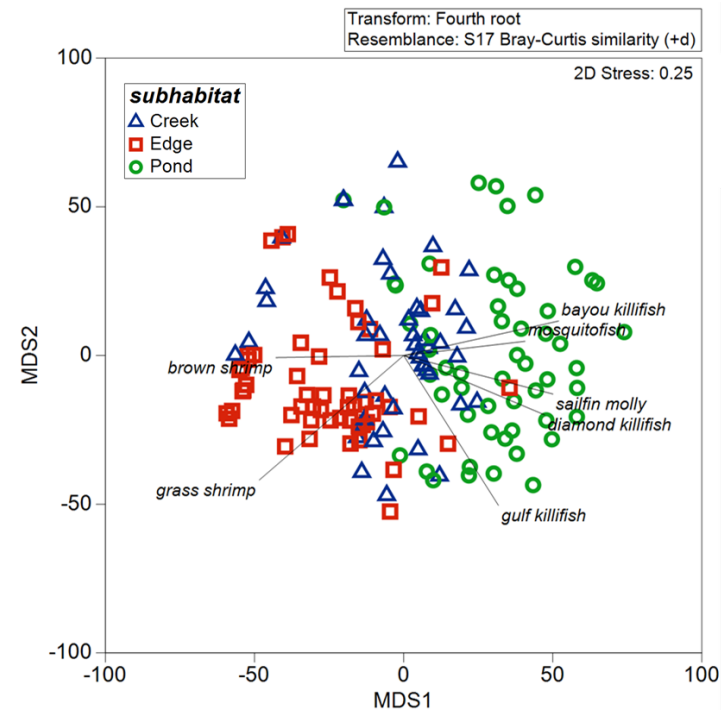


On-marsh nekton community

Paola López-Duarte & Jill Olin – UNCC / MTU

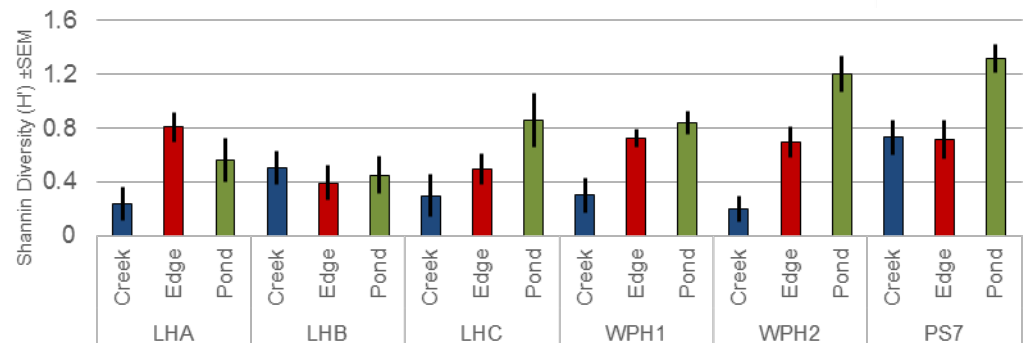
Minnow trap sampling

- 3 deployments x 1 hr x 6 sites x 3 sub-habitats: edge, creek, pond
- Nekton community varies among sub-habitats (ANOSIM, Global $R=0.333$, $p=0.001$)
- Species most highly correlated (Pearson's $r>0.4$) to the position of the points on the MDS plot are displayed as vectors.



Next step for this analysis

- Incorporate site-specific data (e.g., pond sizes, marsh height) to determine which drivers influence community structure in ponds, creeks, or edges, across sites



Terrestrial Insect Sampling

Linda Bui & Rachel Strecker – LSU

- Terrestrial insects sampled via sweep-netting on May 17-20, 24, 2018
 - Sites PS7, WPH2, WPH1, LHA, LHB, LHC
 - Sorting ongoing, 36 bag total
- Terrestrial insect emergence traps deployed May 17-24, 2018
 - Emerged insects collected on May 18th, 20th, and 24th.
 - Small volume collected, stored in freezer. Unprocessed. 18 bags total
- Environmental data collected at each site before each individual collection



Biomarkers

Mike Polito, Jill Olin, & Paola Lopez-Duarte – LSU/MTU/UNCC

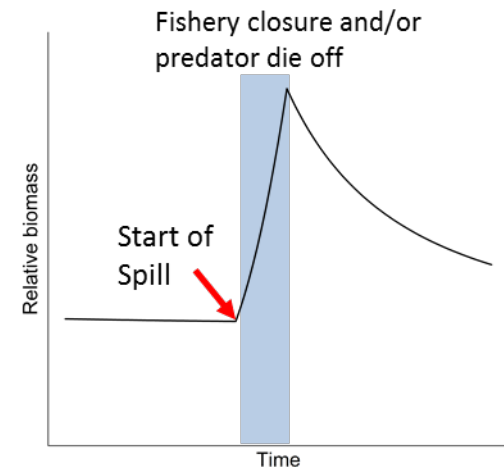
- Samples collected in May 2018
 - Muscle tissue: 42 fish & invert spp. (563 & counting)
 - Plants & SAV: 12 spp. 3+/site/species (~133 total)
 - Algae: 6/site (36 total)
 - Soil organic matter: 5/site (30 total)
 - Particulate organic matter: 6 site (36 total)
 - Benthic microalgae: 3/site (12 total)
- Stable isotope analysis (SIA) of May 2016 complete; May 2018 commencing
- Compound-specific (SIA) of May 2016 in progress
- Fish heads saved during dissections for otolith micro- chemical analysis
 - 80+ & counting



Food Web Modeling

Olaf Jensen – Rutgers

- Food web modeling workshop on January 11-13, 2018, in Tuckerton, NJ
- Why were marsh fish and inverts resilient to the DWH oil spill?
- **Ecopath with Ecosim** model used to assess effects of fishing moratorium vs. predator (e.g. seabird & marine mammals) mortality
- Fishery closure had strongest effect on food web resilience
- Builds framework for planned **Ecopath with Ecosim** modeling efforts of other factors (i.e. salinity) for NOAA Restore.



Questions and Feedback



Project Timeline (FY19)

Task	Status	FY19-Q1			FY19-Q2			FY19-Q3			FY19-Q4		
		Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19
Milestone 1: Project Planning		-	-	-	-	-	-	-	-	-	-	-	-
Subaward/Contract Finalization	On Schedule												
Order Materials/Preparation for Field Sampling and Laboratory Processing	On Schedule												
Completion of Data Management Plan	With NOAA												
Identification of Project Datasets	Delayed												
Calls for Data (internal requests for datasets and updates)	On Schedule												
Submission of data and metadata to NOAA personnel	On Schedule												
Milestone 2: Salinity gradient (objective 1)		-	-	-	-	-	-	-	-	-	-	-	-
Hydroperiod Analyses, Primary Producers & Nutrients, Bacteria, Archaea, Fungi, Infauna, Macroinvertebrates, Insects, Fish & Nekton	On Schedule												
Milestone 3: Natural vs. restored (objective 2)		-	-	-	-	-	-	-	-	-	-	-	-
Hydroperiod Analyses, Primary Producers & Nutrients, Bacteria, Archaea, Fungi, Infauna, Macroinvertebrates, Insects, Fish & Nekton	On Schedule												
Milestone 4: Lab Processing		-	-	-	-	-	-	-	-	-	-	-	-
Species Composition/Abundance	On Schedule												
Tracers	On Schedule												
Milestone 5: Data Analysis		-	-	-	-	-	-	-	-	-	-	-	-
Objective 1: Data Analysis	On Schedule												
Objective 2: Data Analysis	On Schedule												
Objective 3: Model Development, Testing and Analysis	On Schedule												
Milestone 6: Project website		X											
Project website development & publication	Delayed												
Milestone 7: Reporting, Meetings, and Project Planning		-	-	-	-	-	-	-	-	-	-	-	-
Skype Consultations with Mgmt Advisory Board	On Schedule												
In Person Consultation with Mgmt Advisory Board	On Schedule												
Six Month Progress Report Preparation and Submission	On Schedule												
Manuscript Preparation and Submission	On Schedule												
Outreach/Presentation of Results	On Schedule												

FY19 Goals

Analyses

- QAQC and conduct preliminary analyses on May 2018 community composition data.
- Process, run, & QAQC May 2018 samples for SIA, and May 2016 samples for CSIA
- Parameterize preliminary EcoSim models

Data & Outreach

- Dataset identified and collected as the develop
- Implement website
- Present preliminary results at GoMOSES and other meetings.
- Ad hoc end user meetings and other outreach

Field work

- **Feb/March 2019** - Water level/salinity recorder maintenance
- **May 2019** – Primary field sampling trip (~10 days long)
- **July 2019** – Secondary field sampling trip (liter bags, elevation mapping)



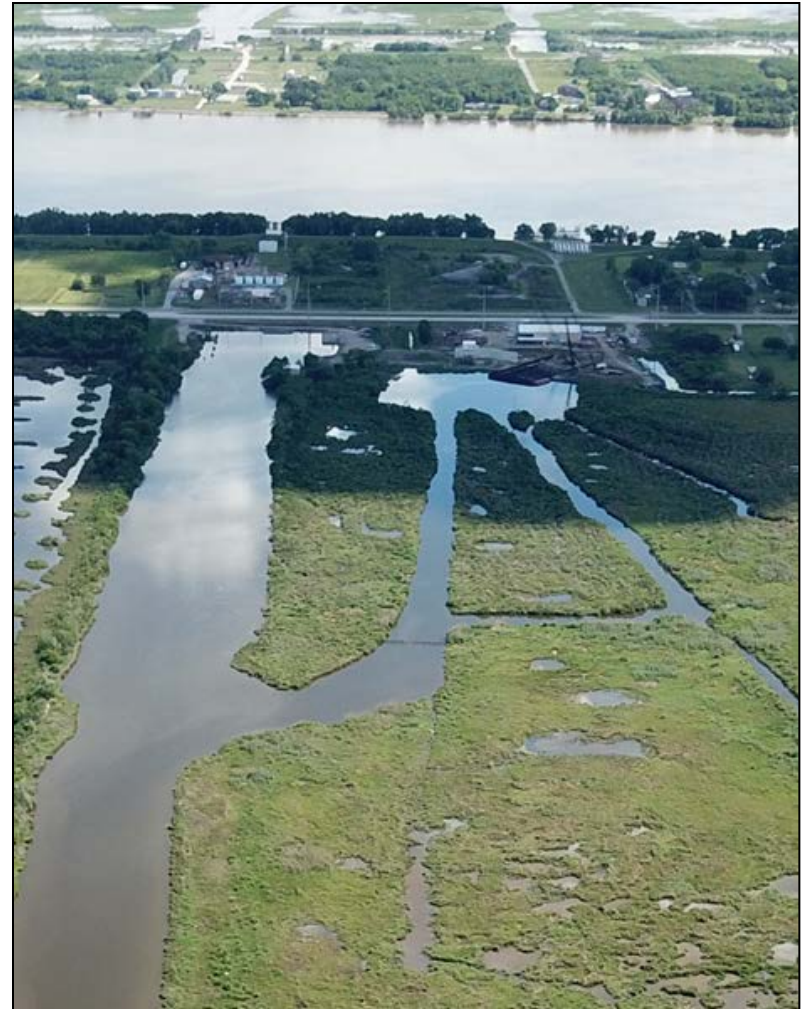
Siphon Update

Current plan

- *Spring 2016 (Siphon on)
- Spring 2018 (Siphon off)
- Spring 2019 (Siphon recently on)
- Spring 2020 (Siphon on)

Updated Construction Timeline:

- February/March the new siphon pipes installed
- March/April the site will be turn over to the parish for siphon operation



Input from Advisory Board members

1. What are the specific management needs your agency is hoping to have addressed as part of this project? Have they changes from our last meeting?
2. Have we sufficiently incorporated your management needs into our research plans, and if not how can we do a better job moving forward?
3. Are there any new activities or projects at your agency that are complementary to this project?

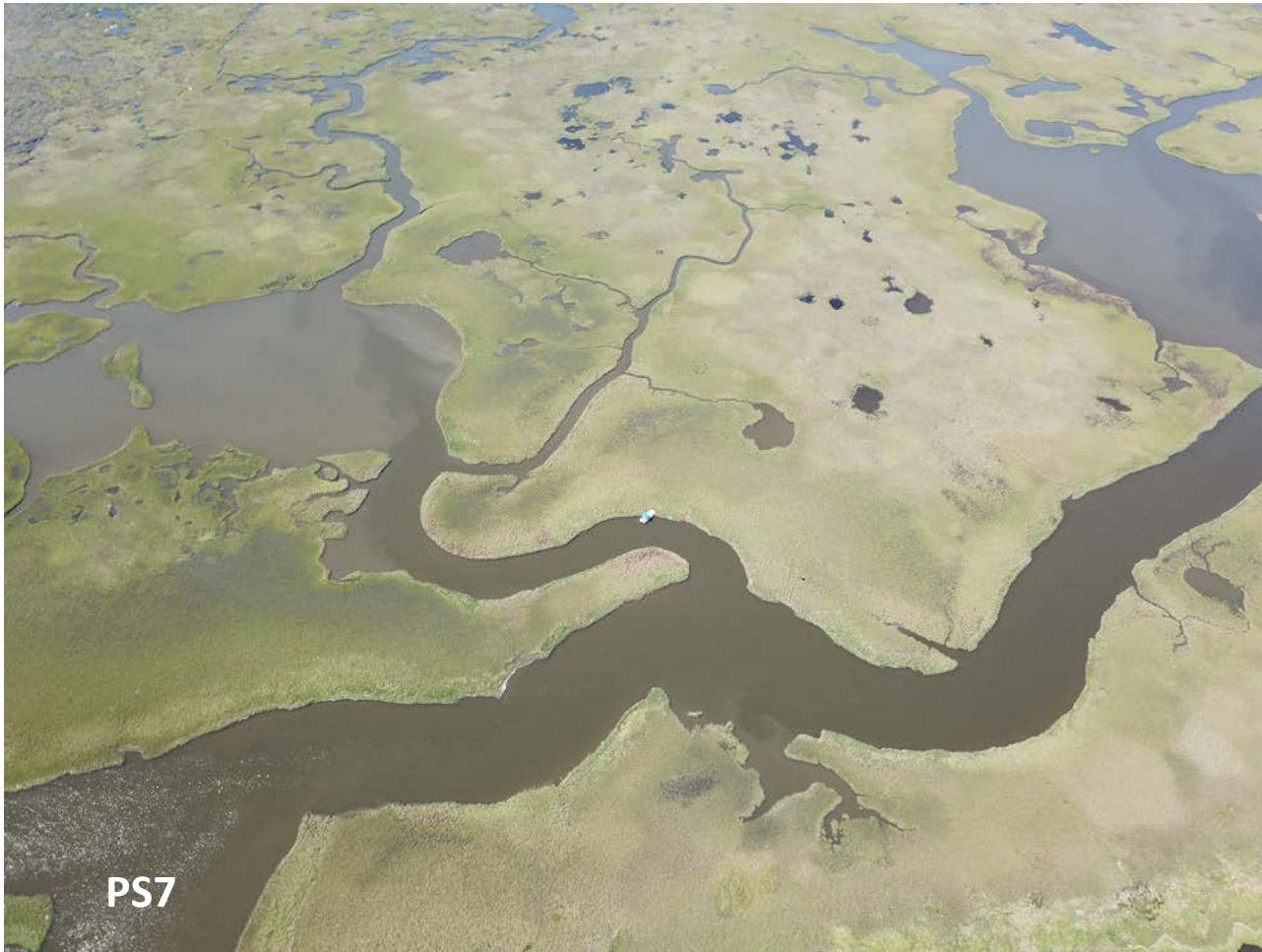


Input from NOAA Restore

1. What are the specific management needs your agency is hoping to have addressed as part of this project? Have they changes from our last meeting?
2. Have we sufficiently incorporated your management needs into our research plans, and if not how can we do a better job moving forward?
3. Are there any new activities or projects at your agency that are complementary to this project?



Open Discussion



PS7

Wrap-Up & Next Steps

- Database management & website implantation
- **GOMOSSES 2019 – New Orleans**
 - Session: *Bridging Recent Advances in Marsh Ecology with the Future of Gulf of Mexico Ecosystems*
 - All-hands “Site” Meeting – **Thursday Feb 7th 2-6pm**
- **Feb/March 2019** - Water level/salinity recorder maintenance
- **May 2019** – Primary field sampling trip (~10 days long)
- **July 2019** – Secondary field sampling trip (liter bags, elevation mapping)



Thank you!

Linking Community and Food-Web Approaches to Restoration: An Ecological Assessment of Created and Natural Marshes Influenced by a River Diversion



Mon. Oct. 15th, 2015 - 12:00 – 2:30 CDT

Join from your computer, tablet or smartphone.

<https://global.gotomeeting.com/join/224394229>

You can also dial in using your phone.

United States: +1 (571) 317-3122

Access Code: 224-394-229