Characterizing energy sources to saltmarsh consumers along a salinity gradient

Jill A. Olin[1*], Paola Lopez-Duarte[2], Ken Able[3], Joel Fodrie[4], Olaf Jensen[3], Charles Martin[5], Mike Polito[6], Brian Roberts[7]

[1]Michigan Technological University, [2]University of North Carolina at Charlotte, [3]Rutgers University, [4]University of North Carolina at Chapel Hill, [5]University of Florida, [6]Louisiana State University, [7]Louisiana Universities Marine Consortium

***jaolin@mtu.edu**

DIVERSIONS – PULSE EVENTS

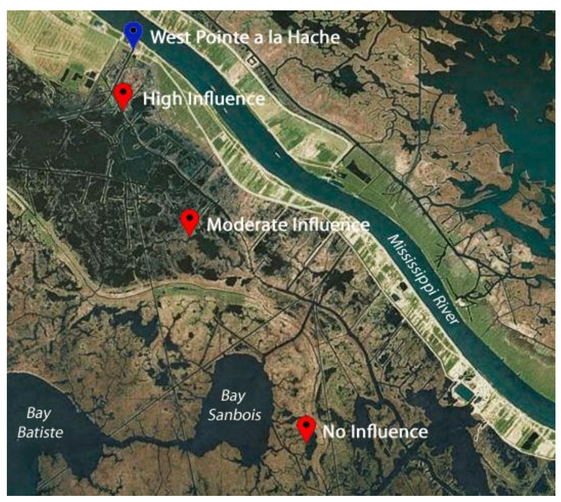
Saltmarshes are subject to a wide range of natural (e.g., herbivory, storms) and anthropogenic (e.g., oil spills, flow modifications) disturbances, all of which can affect ecosystem function. Efforts to restore ecosystem function by reintroducing tidal flow or otherwise restoring hydrologic patterns are being proposed to offset saltmarsh loss in Louisiana.

The construction of river diversions, such as the West Point a la Hache (WPH) siphon that reconnect the Mississippi River to adjacent estuaries to supply sediment and nutrients to downstream areas, has become core synergistic components of the Louisiana Coastal Master Plan.

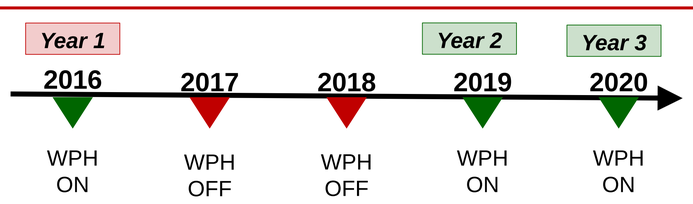
Questions remain however as to how river diversions and changes in freshwater flow dynamics influence the ecological trajectory, food web structure, and function of saltmarsh.

To understand how river diversions influence these processes, our **Objective** *is to identify and quantify the carbon use and pathways to nekton consumers experiencing different freshwater flow conditions.*

Saltmarshes at varying distances from the WPH siphon near Port Sulfur, Barataria Bay, Louisiana were chosen and represent a salinity gradient with high (3.3-5.4 psu), moderate (4.4-6.2 psu), and low (6.1- 11.0 psu) freshwater influence.



APPROACH



Producers and consumers were collected from three marshes in May 2016.

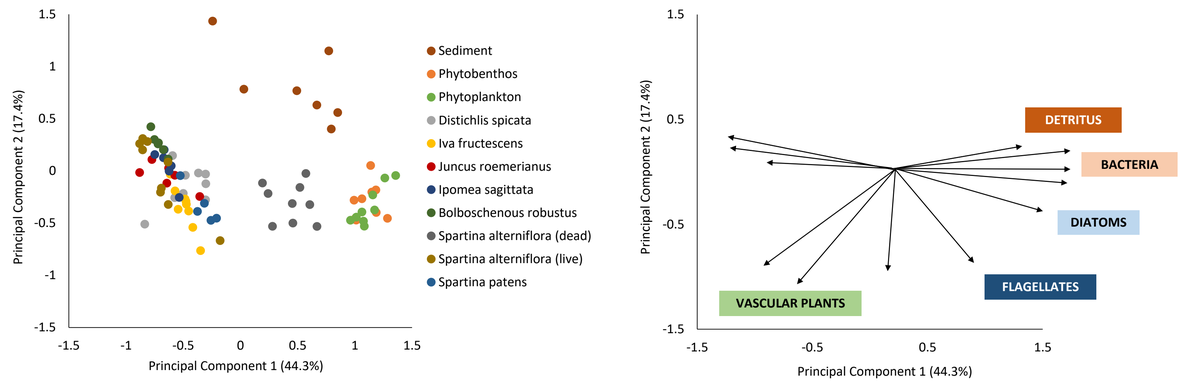
Fatty acid (FA) profiles were extracted from filtered samples and leaf tissues of primary producers and muscle tissues of consumers.

Representative FA biomarkers were used to characterize the contribution of the different basal carbon sources to aquatic consumers.

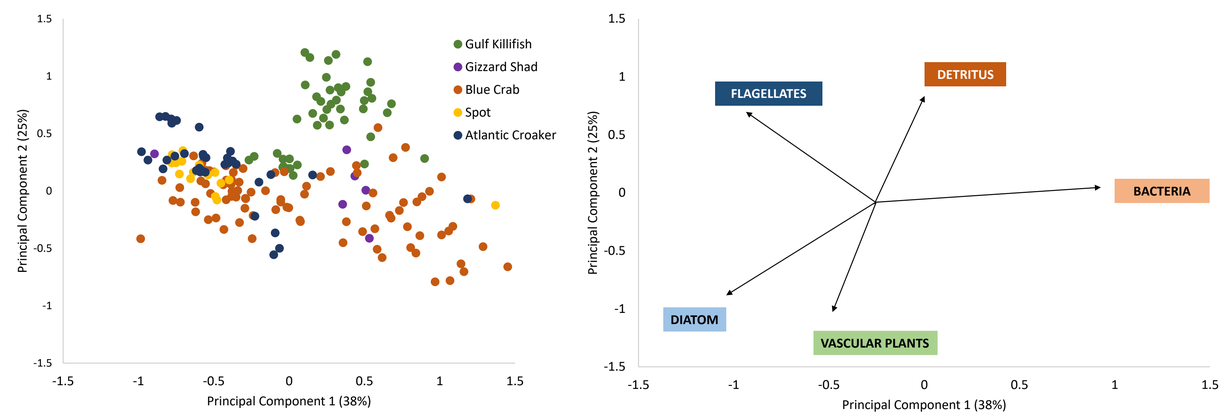
Production Source	FA Biomarker	Reference
Bacteria	14:0, 18:1n7	Jaschinski et al. 2008
Diatoms	16:1n7, 20:5n3	Dalsgaard et al. 2003, Kelly & Scheilbling 2012
Flagellates	22:6n3	Nelson et al. 2002
Detritus	18:0, 18:1n9	Søreide et al. 2008
Vascular Plants	18:2n6, 18:3n3	Richoux & Froneman 2008
Terrestrial Vegetation	22:0, 24:0	Budge & Parrish 1998

PRODUCTION TO CONSUMERS

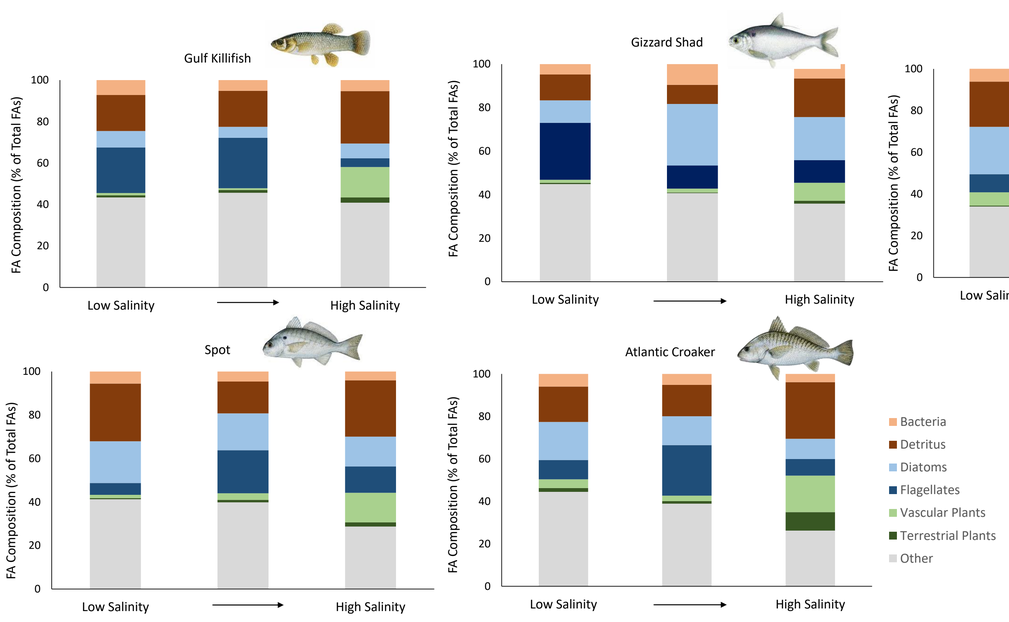
Primary producers. Primary production sources were *distinguished based on representative fatty acid biomarkers*. **Phytoplankton** and **Phytobenthos** differ from vascular plants based on greater contributions of diatom and bacterial groups.



Carbon contribution to saltmarsh consumers. Consumers *vary in their use of carbon resources*. **Gulf Killifish** associated with detrital biomarkers. **Atlantic Croaker** and **Spot** associated with flagellate and diatom biomarkers. In contrast, **Blue Crab** showed no clear biomarker associations.



Carbon use differs across the salinity gradient. All consumers *derive carbon from multiple sources, specifically detrital, benthic and pelagic* pathways. Consumers at *the low-influence, higher salinity site had greater contributions of carbon derived from vascular plants* relative to other sites.



CONCLUSIONS & NEXT STEPS

Marsh consumers have the capacity to use *different production resources across sites.*

Vascular/Terrestrial plants contribute a *greater proportion of carbon for 1º and 2º consumers at higher salinity sites*.

Measure of vascular plant *biomass* will be used to compare the availability of carbon as resources for consumers.

We will compare carbon flow derived from stable isotopes with nekton community abundance and composition during future periods of low (2018) and high freshwater (2019, 2020).

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