Analyzing the Impact of Environmental Disturbances on Oyster Reef Health in the Mississippi Sound Using NASA Earth Observations

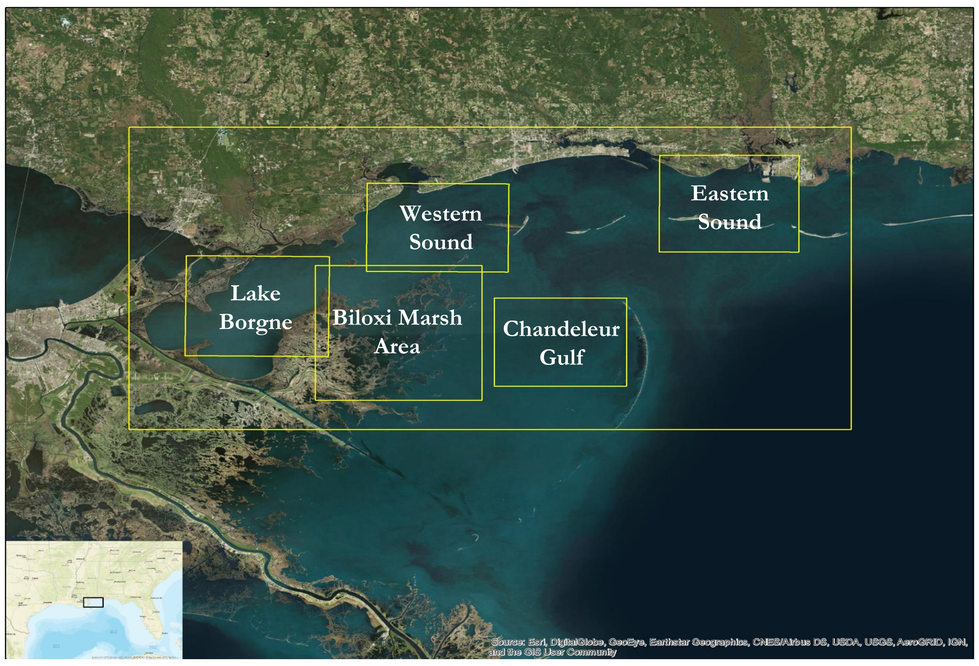
Abstract

Oysters are vital to the environmental health of the Mississippi Sound and a critical part of Mississippi's economy. Environmental disturbances, such as Hurricane Katrina, major flooding events, and the Bonnet Carré spillway openings, have caused oyster populations to decline and have negatively affected the water quality and economy of the Sound. Oysters purify water via filter feeding and a decline in their population could lead to increased levels of dissolved solids in the waterways. In collaboration with the Mississippi Department of Marine Resources (MDMR), the team focused on specific case studies of significant disturbances by combining data gathered in the Spring 2017 Term with data on the degradation of marshlands in the area. The team investigated the relationships between extreme weather events, turbidity, salinity, freshwater discharge and diversion, chlorophyll-a, and oyster reef health. These case studies will help inform MDMR about how these factors are interdependent and impact the overall health of the Sound. This information will assist the MDMR in making better-informed decisions in preparing for and managing ecological stressors.

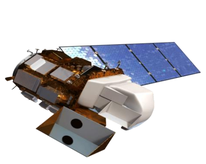
Objectives

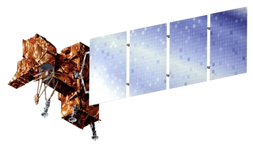
- **Analyze** the impact of environmental disturbances on oyster reefs in the Mississippi Sound
- **Develop** a timeline of water quality parameters for the marshes surrounding the Biloxi State Wildlife Management Area

Study Area



Earth Observations


Landsat 8 OLI & TIRS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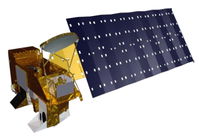
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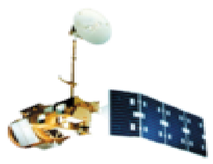
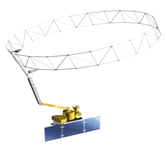

Landsat 5 TM


SMAP


Sentinel-2 MSI

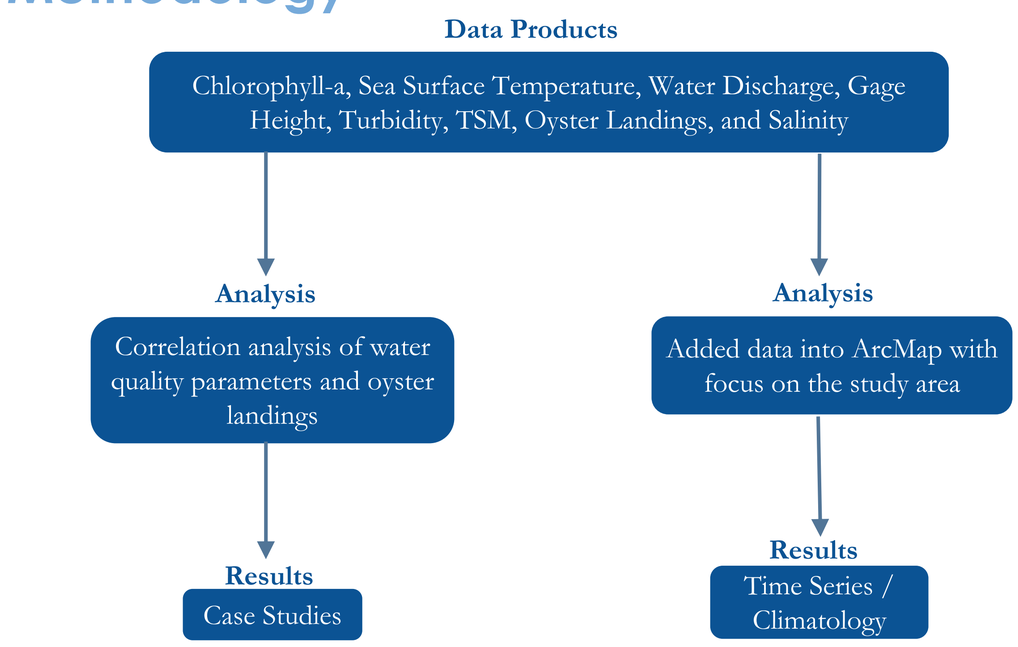
Team Members


Carter Grimm (Project Lead)


Rachael Green

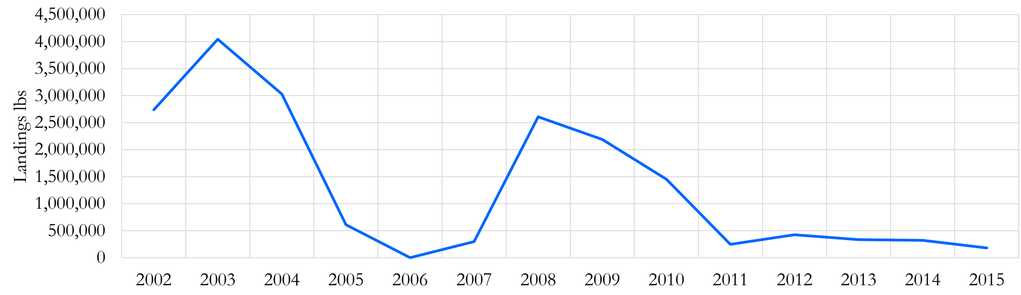

Hannah Russ

Methodology

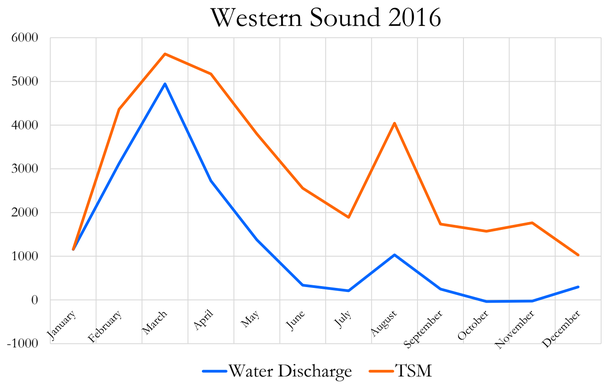


Results

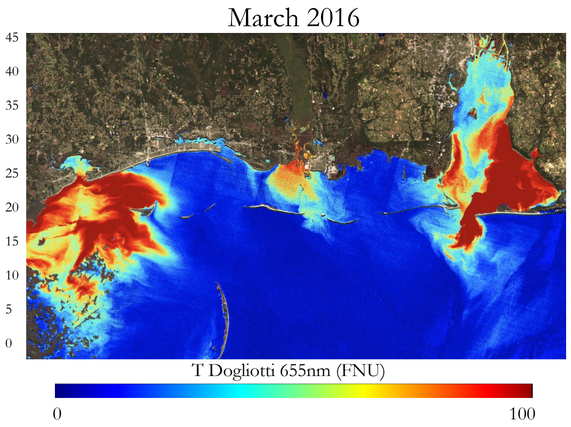
Annual Oyster Landings in the State of Mississippi 2002-2015



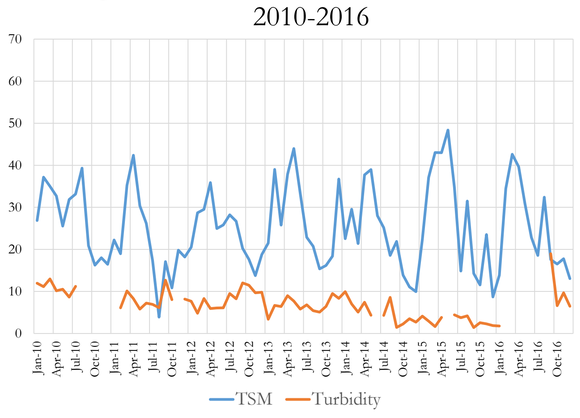
Water Discharge of the Pearl River vs TSM in the Western Sound 2016



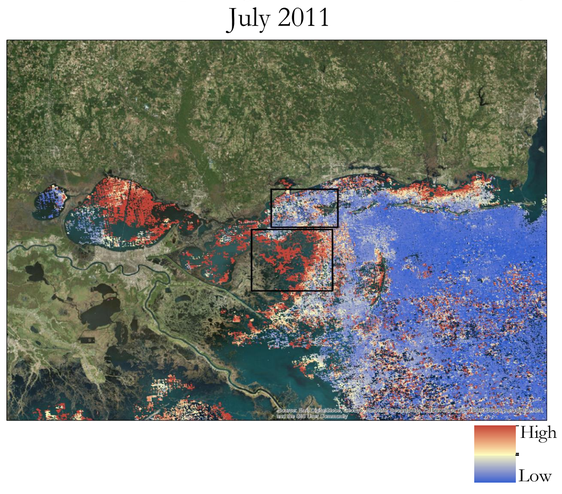
Turbidity Concentration After Flooding Event March 2016



Average TSM and Turbidity in the Western Sound 2010-2016



TSM After Opening of Bonnet Care Spillway July 2011



Conclusions

- There are some indications from remote sensing data that water flowing into the Western Sound is being diverted into the Louisiana marshlands.
- There are limitations in the availability of remote sensing data in marshlands and coastal regions.

Project Partners

Mississippi Department of Marine Resources

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Mississippi Sound Water Resources II

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