

# Qualitative Analysis of Algal Blooms in Lake Pontchartrain using Remote Sensing

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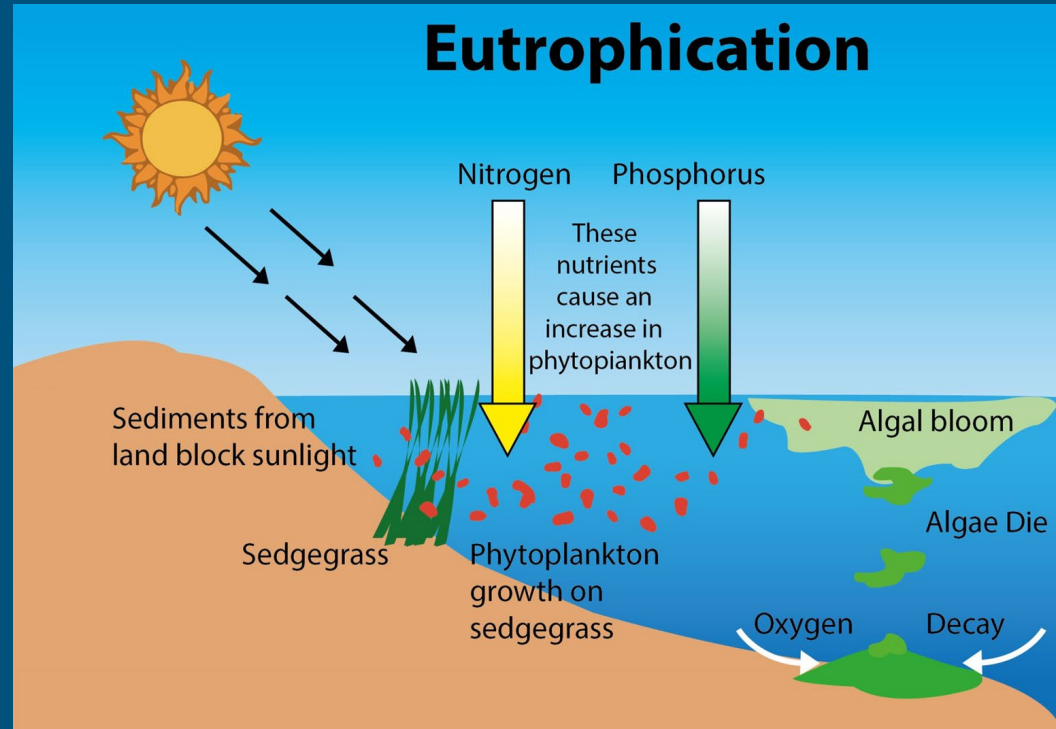
# Background

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- Lake Pontchartrain
  - Located in New Orleans, Louisiana
  - The Mississippi River is a tributary and is connected through the Bonnie Carraway Spillway(BCS)
  - Second largest brackish estuary in the United States
  - Has a delicate aquatic ecosystem
- During major flood events the BCS is opened to divert water and help control flooding in New Orleans.
- Diverted water from the Mississippi River brings major changes in water quality, including but not limited to:
  - Eutrophication
  - Excess Organic Matter
  - Excess Sediments

# Environmental Impacts of Algal Blooms

- Eutrophication, excess organic matter and excess sediments can lead to algal blooms leading to
  - low dissolved oxygen(DO)
  - hypoxia events
  - Potential harm to humans depending on the species of algae
- Low DO levels lead to the inability to support a thriving aquatic ecosystem



# Methods

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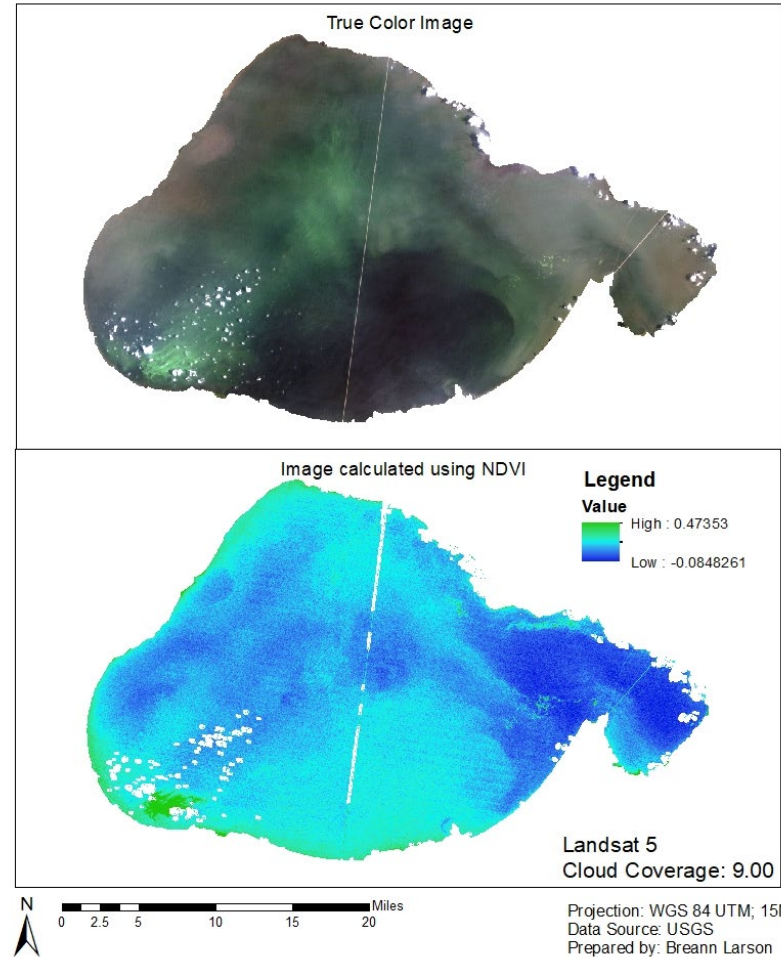
- Landsat 5 and 8 Data used and acquired through USGS
- Image reduced through clipping with Google Earth derived shapefile of Lake Pontchartrain
- Band Compilation performed using Red, Blue, Green and Near Infrared Bands
- Polygon of Lake Pontchartrain Causeway and I-10 was derived in ArcMap and then used to clip both from the image
- Images with cloud coverage were removed using the QA pixel band and Map Algebra
- Normalized Difference Vegetation Index(NDVI) performed to highlight areas of potential algal blooms

# Preliminary Results

# BCS Opening March 17th, 1997

- High NDVI values indicate potential algal blooms
- Low Cloud Coverage
- Both the true color image and the NDVI processed image indicate potential algal blooms
- USGS Data indicates algal bloom in June 1997

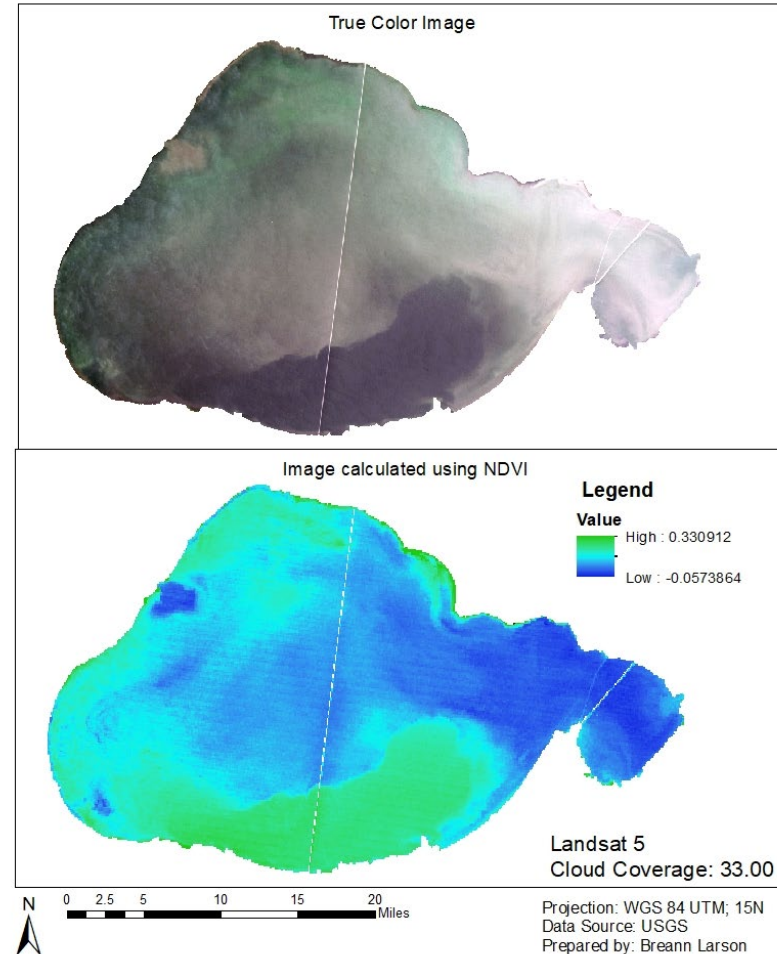
Lake Pontchartrain, Louisiana Acquired on July 15, 1997  
89 Days after BCS closing



# BCS Opening April 11th, 2008

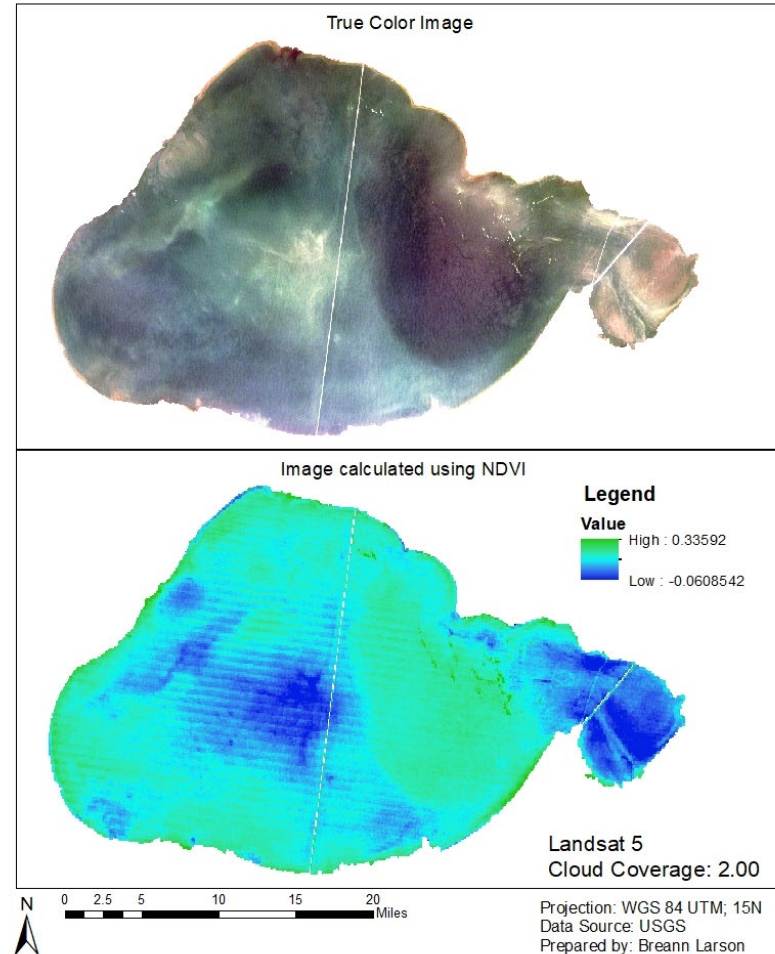
- High NDVI values indicate potential algal blooms
- Potential shadow of cloud near BCS opening causing higher NDVI values
- Both the true color image and the NDVI processed image indicate potential algal blooms in the South side of the lake

Lake Pontchartrain, Louisiana Acquired on July 13, 2008  
65 Days after BCS closing



# BCS Opening May 9th, 2011

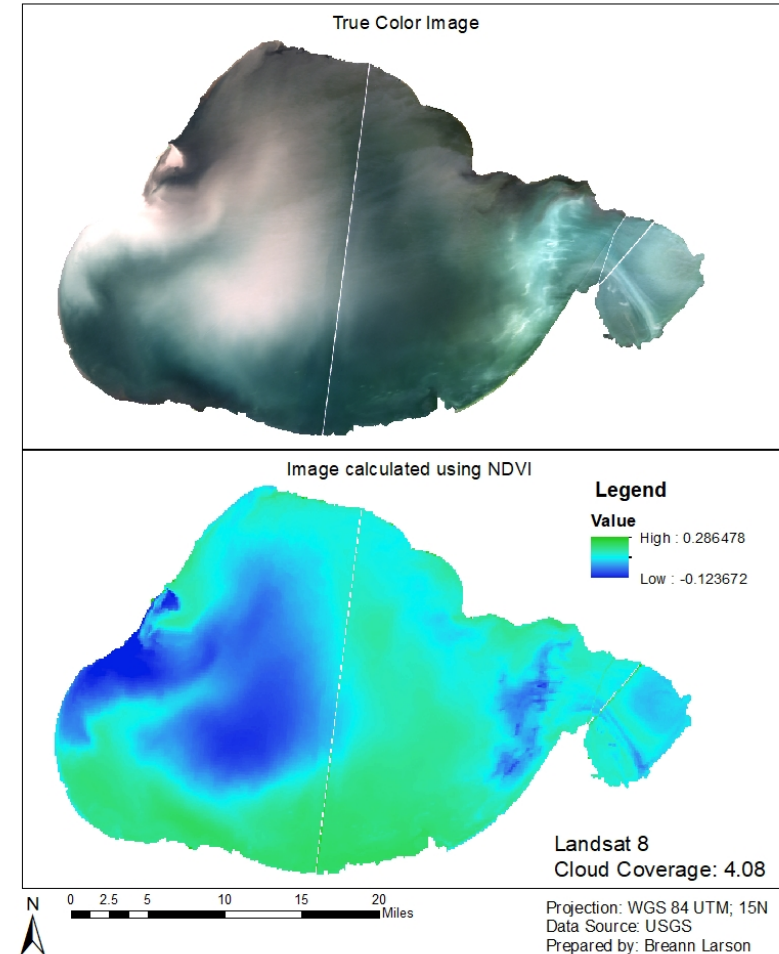
- High NDVI values indicate potential algal blooms
- Low cloud coverage





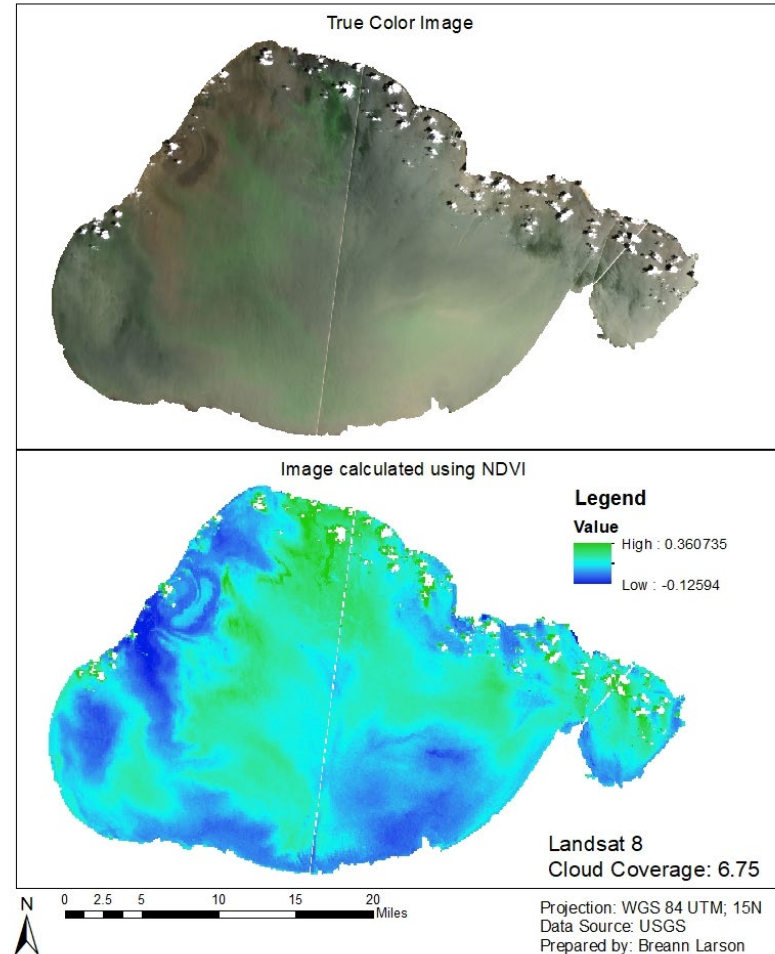
## BCS Opening June 10th, 2016

- High NDVI values indicate potential algal blooms
- Low Cloud Coverage
- Highest values near BCS opening



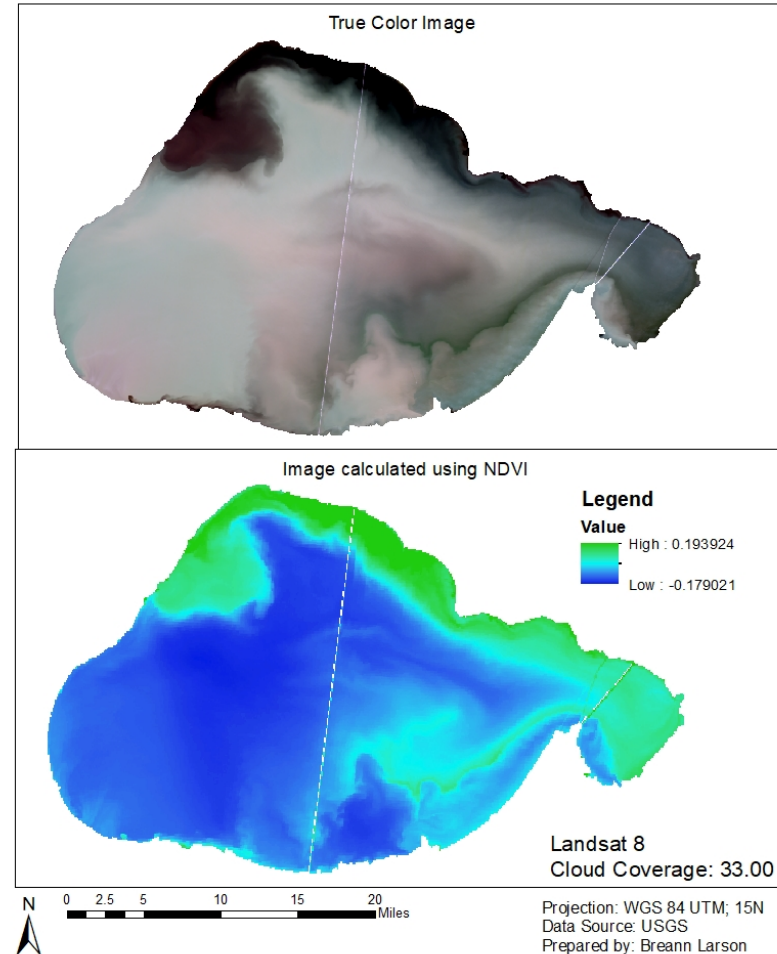
## BCS Opening March 8th, 2018

- High NDVI values indicate potential algal blooms
- Low Cloud Coverage
- Both the true color image and the NDVI processed image indicate potential algal blooms
- March 2018 Lake Pontchartrain Basin foundation warned residents of algal bloom



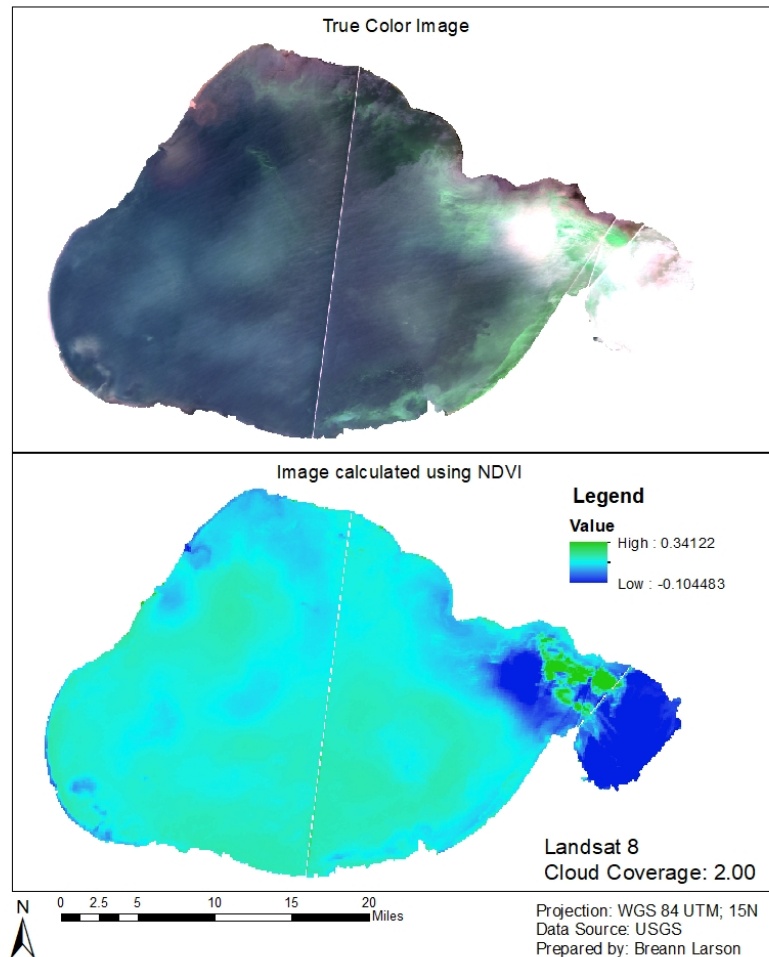
## BCS Opening February 27th, 2019

- High NDVI values indicate potential algal blooms
- Moderate Cloud Coverage
- BCS still open during image



## BCS Opening May 10th, 2019

- High NDVI values indicate potential algal blooms
- Large inflow of water due to two BCS openings one after another
- Both the true color image and the NDVI processed image indicate potential algal blooms
- Algal bloom present in the East side of the lake
- USGS Data and photos indicate algal bloom in June through August 2019



# BCS Opening April 10th, 2020

- High NDVI values indicate potential algal blooms
- Low Cloud Coverage
- Potential algal bloom near the North and the East side of the lake

Lake Pontchartrain, Louisiana Acquired on June 12, 2020  
34 Days after BCS closing

