



# COASTAL MARSH MONITORING

Gulf of Mexico Initiative

## Monitoring Coastal Marshes for Persistent Saltwater Intrusion

The coastal marshes of Louisiana have been disappearing at a rate of approximately 40 square miles a year for the last 30 to 40 years, making up 80 percent of the Nation's annual coastal wetland loss. By the year 2040, it is estimated that an additional 800,000 acres of wetlands will be lost, and in some areas of Louisiana, the shoreline will retreat as far inland as 33 miles.

The Coastal Marsh Monitoring project is an investigation into the use of remote sensing for the assessment of coastal marsh inundation, vegetative stress, and saltwater intrusion. The goal of this project is to provide resource managers with remote sensing products that provide regional data coverage of marshes being exposed to persistent saltwater intrusion, a major factor in the decline of marsh ecosystems.

The resulting increase in salinity from persistent flooding due to storm surges, subsidence, and lack of freshwater input can have both short- and long-term effects on marsh habitat species composition and resiliency. Over time, salinity intrusion results in the dieback of freshwater marsh species. The dieback is eventually followed by the conversion of fresh and intermediate marshes to open water and/or the succession by brackish or saline marsh grasses.

The project team is using data from such NASA sensors as MODIS (Moderate Resolution Imaging Spectroradiometer) and Hyperion to derive indicators of vegetative stress, inundation, and salinity.

For more information please contact the following at Stennis Space Center:

Ted Mason  
Phone: 228.688.2161  
Email: [Ted.J.Mason@nasa.gov](mailto:Ted.J.Mason@nasa.gov)

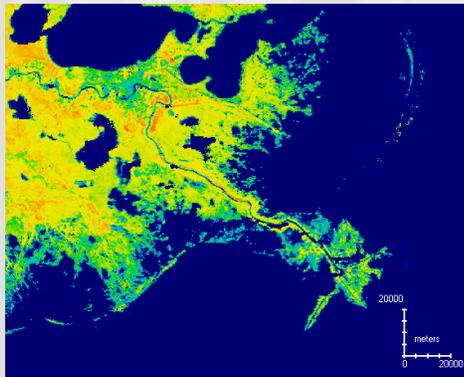
Craig Peterson  
Phone: 228.688.1984  
Email: [Craig.A.Peterson@nasa.gov](mailto:Craig.A.Peterson@nasa.gov)

[www.coastal.ssc.nasa.gov](http://www.coastal.ssc.nasa.gov)

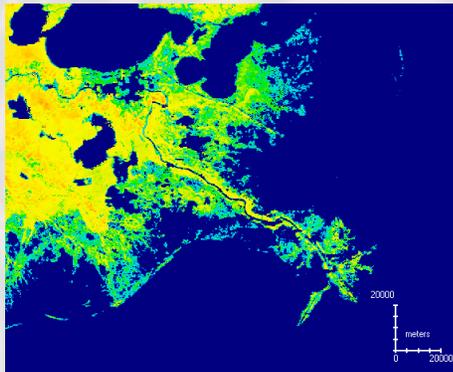
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After the storms Katrina and Rita in 2005, many fresh, intermediate and brackish marshes remained inundated by saltwater for extended periods of time. Storm surges pushed water inland much farther than the normal tidal flushing that occurs every day.

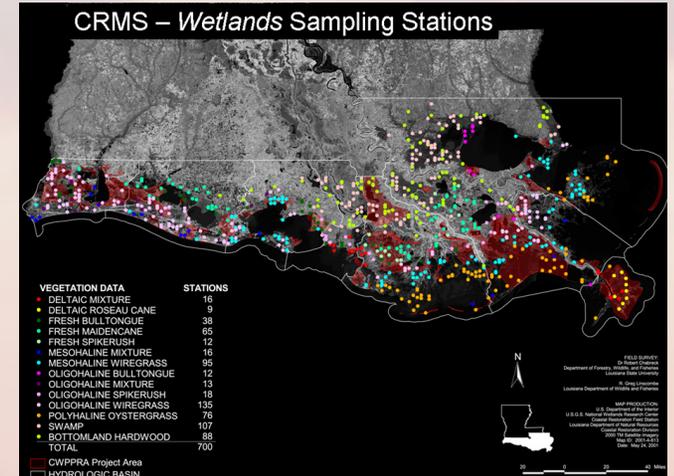
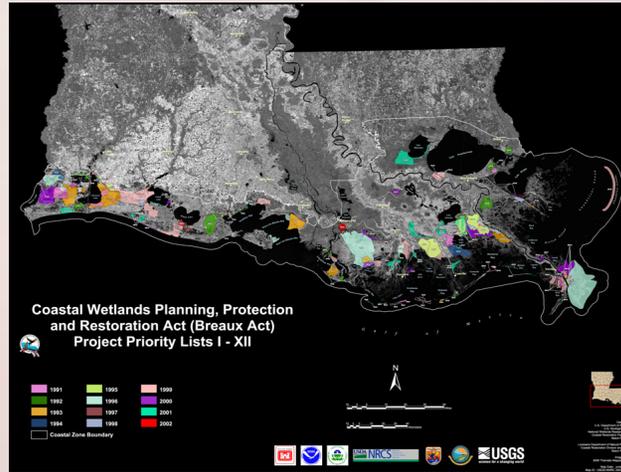
Hurricane damage can be assessed through the cumulative vegetation index derived from MODIS for the years 2004-2006. The normalized difference vegetation index (NDVI) is shown for southeast Louisiana. The red and yellow areas indicate the more vigorous or healthy vegetation, and the blue and green areas indicate stressed vegetation. The decline in healthy vegetation is particularly noticeable in areas to the east and south of New Orleans, LA.



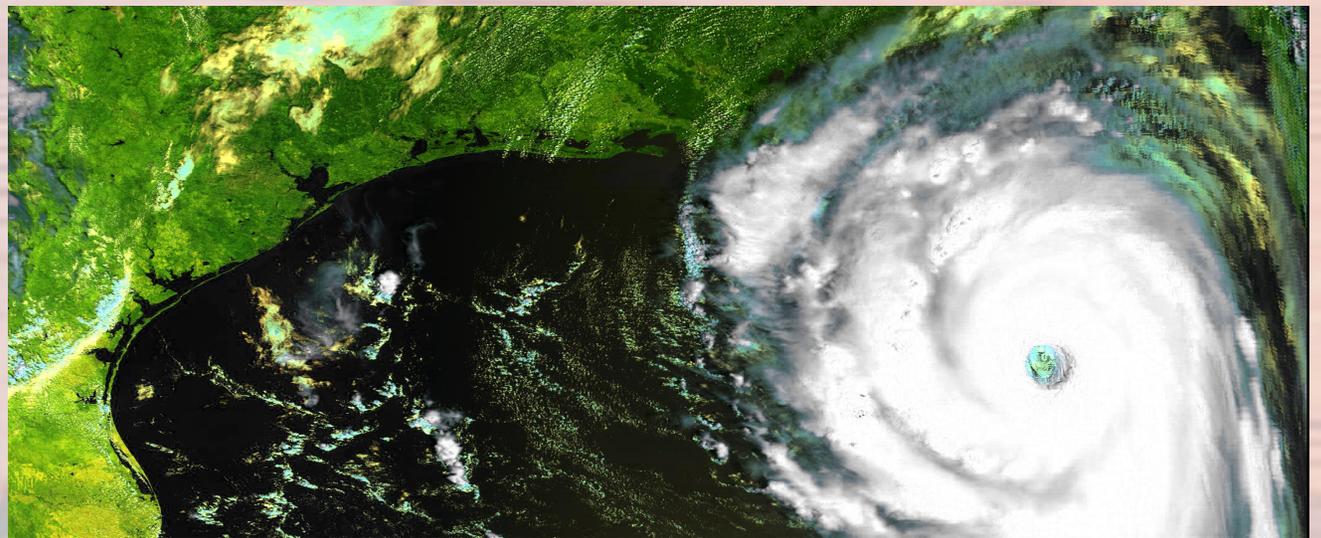
Cumulative NDVI Integral 2004



Cumulative NDVI Integral 2006



Resource managers are working to protect and restore the coastal marshes through the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) also known as the Breaux Act. The CWPPRA working group consists of Federal and State agencies who are addressing the coastal issues through a list of prioritized projects. The Coastwide Reference Monitoring System (CRMS), a joint endeavor by the U.S. Geological Survey (USGS) National Wetlands Research Center (NWRC) and the Louisiana Department of Natural Resources (LDNR), has established 390 wetlands sampling stations across the Louisiana coast.



Hurricanes Katrina (shown above) and Rita struck the Louisiana coast and adjacent states of Mississippi (August) and Texas (September), respectively, in 2005. Storm surges pushed water inland much farther than normally occurs with daily tidal flushing. Coastal marshes remained inundated with higher salinity storm surge for extended periods of time.