

Interactive Approach to Understanding the Causes of Salt Marsh Dieback: Coupled Hydrologic/Ecological Models of Marsh Dieback Processes

Sponsor: Scientific-Technical Committee of the Brataria-Terrebonne National Estuary Program and Louisiana Department of Natural Resources

Brief Description:

Background

Spartina alterniflora, also known as smooth cordgrass or oyster grass, dominates regularly flooded saline marshes along the Gulf of Mexico and the eastern United States coastline. This highly productive ecosystem provides critical habitat and nutrition for many avian, fish, and invertebrate species. In the spring of 2000, fishermen and scientists noticed that certain areas of coastal marsh in south Louisiana were turning brown (as shown in the picture below). While patchy areas of dieback have been noticed in the past, the size of the current dieback area is unprecedented. The areas most affected are the salt marshes between the Mississippi and Atchafalaya Rivers.



Since the initial site visits in the early summer, the area of the marsh dieback has increased, and little recovery has been noted in affected areas. Inspections of roots and rhizomes indicate that this event is not simply a dieback of aboveground plant material but can also result in death of belowground portions of the grass. The picture on the left shows dead and dying marsh as seen from an airplane. The dark green areas in the back are healthy black mangroves.

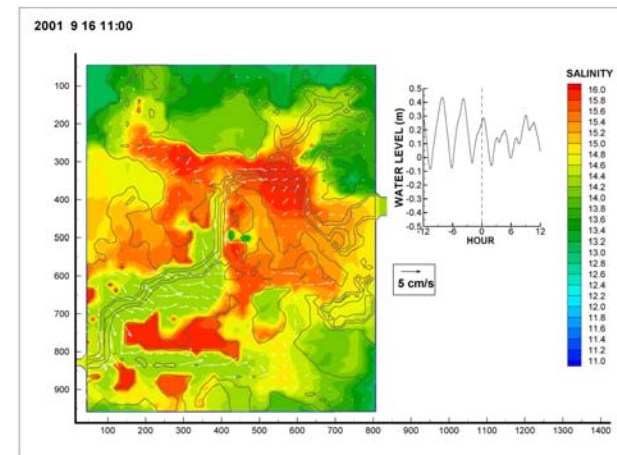
Brown Marsh Action

Although we currently do not know the cause of the marsh dieback, scientists believe it is related to a combination of stressors such as prolonged drought conditions and other unknown biological or environmental factors. A working group of resource managers and scientists has been established to address the problem of the marsh dieback. Field sites have been set up to test an array of biological, chemical, soil, and water parameters; satellite and aerial imagery is being acquired; and the Governor's Office is coordinating ongoing state and academic research efforts with federal efforts involving the CWPPRA Task Force and other coastal agencies and organizations.



Brown Marsh Response Effort

Congress has allocated approximately three million dollars for brown marsh research through the National Oceanic & Atmospheric Administration to the Louisiana Department of Natural Resources (LDNR). The Scientific-Technical Committee of the Barataria-Terrebonne National Estuary Program and LDNR awarded funding for tasks in five categories. Researchers will submit quarterly progress reports to document data collection efforts. Aerial and ground surveys of brown marsh areas have been conducted, and numerical modeling tools (such as shown in the figure to the right) are being used to understand the causes of this phenomenon.



Tasks:

Due to the wide spread impact of the Saltwater Marsh Dieback as depicted in the figure to the right, it was declared an emergency by Louisiana Governor Mike Foster in the form of Executive Proclamation #55-MJF-2000 issued on October 23, 2000. In response, Congress allocated approximately three million in funds through the National Atmospheric and Oceanic Administration to the Louisiana Department of Natural Resources (LDNR) to examine causes and effects of the Brown Marsh phenomenon. A Request for Proposals (PDF 56 KB) was issued by the Scientific-Technical Committee of the Barataria-Terrebonne National Estuary Program and LDNR, which awarded the funding for Brown Marsh research. The Projects are divided into 5 categories:

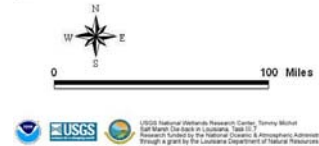
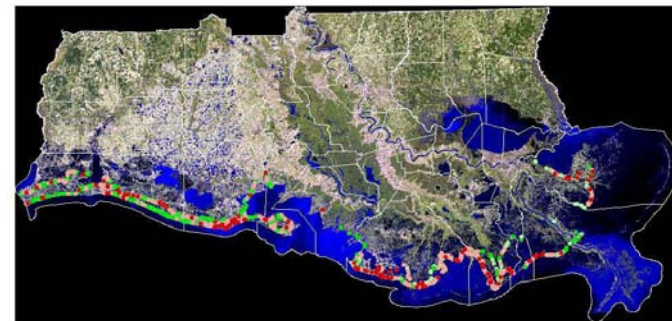
Task I. Status and Trends

These tasks include a variety of methods to track brown marsh spread/recovery: fixed wing transects, helicopter transects, aerial photography, and LANDSAT imagery. Fixed wing and helicopter surveys are key in locating and determining the extent of marsh dieback. Aerial photography is important to provide high-resolution imagery for studying marsh dieback in relation to adjacent wetland areas. Satellite imagery can be used to monitor large areas of wetlands across different salinity regimes.

Task II. Causes

The purpose of this effort is to determine the unique aspects of the 1999/2000 growing season that caused the spatial and temporal pattern of marsh dieback along coastal Louisiana during summer 2000. No single approach by itself can address the causes. What is needed is an integrated approach that uses a combination of controlled greenhouse and field studies, compilation and analysis of historical data sets of climatic and hydrologic data, modeling, and assessment of patterns of marsh recovery in the field. Modeling tools will facilitate understanding the interaction between surface and ground water (as shown in the figure below) and the link between such interaction and the Brown Marsh phenomenon.

**Aerial Survey of Saltmarsh Die-off in Coastal Louisiana
(Michot, T. Flight Lines August, 2000)**



USGS
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Task III. Synthesis and Data Management

Projects in this category will provide a consistent method of analysis for marsh dieback and nutria control data and provide a central location for the collection, integration, synthesis, and redistribution of marsh dieback and nutria control data.

Task IV. Nutria Control Program

The nutria control projects aims to eliminate damage to wetlands and establish and/or enhance markets resulting in increased price, harvest and control of nutria. Short-term objectives: 1). To compile, analyze, summarize data that will provide guidance in the development of a nutria control program and 2). Provide data to better explain to the public and decision-makers the consequences of this damage and the need for funding a nutria control program. This information will be essential in seeking funding for a comprehensive nutria control program.

Task V. Remediation

These projects were awarded on a non-competitive basis with the objective of identifying severely impacted areas and assessing potential for recovery using dredging and vegetative planting.

