

# Acute Salt Marsh Dieback in the Mississippi River Deltaic Plain: Survey of Multiple Sites in Barataria and Terrebonne Basins

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**Study Initiated:** August 2000

**Completion Date:** September 2001

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**Study Site Location(s):** Barataria and Terrebonne Basins, Mississippi River Deltaic Plain, Louisiana, USA

**Keywords:** *Avicennia*, Climate, *Juncus*, Plant tissue analysis, Salinity, *Spartina*, Soil chemistry, Toxins, Water chemistry

**Project Type:** Experimental

## **Project Outline:**

**Specific Aims:** assess condition of acute dieback areas in MRDP, potential causes, plant recovery, implications for restoration efforts and global change models

**Methodology:** aerial and ground surveys of plants and soils, historical records, known tolerance limits of salt marsh vegetation to environmental stress factors

## **Results to Date:**

Dieback areas ranged in size from ~300 m<sup>2</sup> to 5 km<sup>2</sup> in area with 50 to 100% mortality of plant shoots and rhizomes in affected zones. Co-occurring species such as *Avicennia germinans* (black mangrove) and *Juncus roemerianus* (black needlerush) were unaffected. Historical records indicated that precipitation, river discharge, and mean sea level were unusually low during the previous year. Although the cause of dieback is currently unknown, plant and soil characteristics were consistent with temporary soil desiccation that may have reduced water availability, increased soil salinity, and/or caused soil acidification (via pyrite oxidation) and increased uptake of toxic metals such as Fe or Al. Plant recovery fifteen months after dieback was variable (0 to 58 % live cover), but recovering plants were vigorous and indicated no long-lasting effects of the dieback agent.

## **Lessons Learned:**

These findings have relevance for global change models of coastal ecosystems that predict vegetation responses based primarily on long-term increases in sea level and submergence of marshes. Our results suggest that large-scale changes in coastal vegetation may occur over a relatively short

time span through climatic extremes acting in concert with sea-level fluctuations and pre-existing soil conditions.

### **Publications, reports, or web-accessible materials**

Karen L. McKee, Irving A. Mendelssohn, and Michael D. Materne. 2003. Salt marsh dieback in coastal Louisiana: survey of plant and soil conditions at 23 Sites in Barataria and Terrebonne Basins, June 2000-September 2001. Final Report to Louisiana Department of Natural Resources. 81 pp.

McKee, K.L., I.A. Mendelssohn, M.D. Materne. 2004. Acute salt marsh dieback in the Mississippi River deltaic plain: a drought-induced phenomenon? *Global Ecology and Biogeography* (in press).

McKee, K.L., I.A. Mendelssohn, M.D. Materne. Marsh Dieback: History, Potential Causes, & Current Evidence. Powerpoint presentation: [www.brownmarsh.net/data.htm](http://www.brownmarsh.net/data.htm)

McKee, K.L. Task I.6 Ground Assessment of Plant Recovery and Soil Conditions at Established Field Sites in Barataria and Terrebonne Basins. Data summary: [http://www.brownmarsh.net/data/I\\_6.htm](http://www.brownmarsh.net/data/I_6.htm)

Suggested citation: Georgia Coastal Research Council, 2004. Proceedings of the Marsh Dieback Workshop, held February 3-4, 2004, Savannah Georgia.