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Gulf Estuarine Research Society Fall 2000 Meeting Abstracts

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GULF ESTUARINE RESEARCH SOCIETY

FALL 2000 MEETING

The Fall 2000 meeting of the Gulf Estuarine Research Society (GERS) was held at the Holiday Inn in Hammond, Louisiana on Monday and Tuesday, November 13 and 14, 2000. Local arrangements were organized by Denise J. Reed (University of New Orleans) and Robert W. Hastings (Southeastern Louisiana University) with significant support from Carolyn Woosley and Dr. Gary P. Shaffer. The Scientific Program was organized by Mark S. Peterson (The University of Southern Mississippi).

Monday, November 13	5:00-6:00 pm	GERS Registration Table
	5:00 pm	Posters set up in Veranda Room
	7:00 pm -until	GERS Reception at the Shaffer Home
Tuesday, November 14	7:30 am-12:00 pm	GERS Registration Table
	8:00 am	Coffee in Veranda Room
	8:30-10:00	Sessions
	10:00-10:30	Break and Poster Session
	10:30-11:30	Sessions
	11:30-1:00	Lunch
	1:00-4:30	Sessions
	2:30-3:00	Break and Poster Session
	3:00-4:00	Sessions
	4:30-5:30	Student Awards and Business Meeting

Underlined name indicates the presenter and an asterick [*] indicates a student presentation

Berger, C. and R. McAdory. US Army Engineer Research and Development Center, Waterways Experiment Station, Coastal and Hydraulics Laboratory, Tidal Hydraulics Branch, CEERD-HE-T, 3909 Halls Ferry Road, Vicksburg, Mississippi 39160. NUMERICAL MODELING OF CURRENTS, SALINITY AND SEDIMENTATION IN ESTUARIES. Estuaries have particular defining physical characteristics that require different modeling approaches than might be satisfactory for modeling nearby ocean waters or the rivers connected to the them. Stratified flow and flocculating sediments are two of these physical characteristics that result from the interplay of fresh and salt water in an estuary. Salinity and its movement is central to both of these characteristics. To model the hydrodynamics and the movement of salt in an estuary, especially in estuaries with areas of significant depth, and to enable the development of predictive modeling tools requires three dimensional techniques and physics dominated computer codes. In this presentation, we will present our approach to modeling estuaries to produce hydrodynamic and salinity results.

Beville, S.* and G.P. Shafer. Department of Biological Science, Southeastern Louisiana University, Hammond, Louisiana. FRESHWATER RIVER DIVERSIONS EFFECTS ON THE GROWTH AND ESTABLISHMENT OF (*Taxodium distichum* (L.) Rich.) IN A BALDCYPRESS-TUPELOGUM SWAMP IN SOUTHEASTERN LOUISIANA. The baldcypress-tupelogum swamps of Louisiana have been degraded in the past 100 years through natural and anthropogenic factors. Sediments and nutrients provided by a diversion would replenish wetlands by decreasing the amount of subsidence and erosion while enhancing ecosystem productivity. The focus of this study will be to evaluate the effects of a river diversion on a dwindling baldcypress swamp in southeast Louisiana compared to an area not influenced by the diversion. To examine the effects of this diversion on the wetland ecosystem, 400 baldcypress seedlings were planted in test plots at both sites testing the affects of fertilizer, herbicide, and herbivore protection on baldcypress growth factors between both sites. This study was scheduled to be conducted for one growing season, but due to drought and herbivory was concluded early. As a result, a second study was conducted in

spring 2000. In this second study three additional sites were chosen, two influenced by the river diversion and one not influenced by the diversion. The same parameters were measured on the growth factors of 70 seedlings ateach site. Results from the initial study suggest river diversions are beneficial to swamp systems; weed control using herbicide appears detrimental to seedlings as it lowers redox status and decreases substrate stability. However, both studies demonstrated the need for adequate exclusion devices as herbivory unequivocally explains low survival of seedlings during both studies.

Blackburn, B.R.[1*], C.A. Moncreiff[1], B.J. Viskup[2], J.D. Caldwell[1], T.A. Randall[1], and R.K. McCall[1]. [1]The University of Southern Mississippi, Institute of Marine Sciences, Gulf Coast Research Laboratory, 703 East Beach Drive, Ocean Springs, Mississippi 39564[2] Mississippi Department of Environmental Quality, Office of Pollution Control, South Regional Office, 3002-C Bienville Boulevard, Ocean Springs, Mississippi 39564. **ANTHROPOGENIC EFFECTS ON PHYTOPLANKTON COMMUNITY DYNAMICS IN THREE COASTAL MISSISSIPPI BAYOU SYSTEMS.** Phytoplankton community structure of three bayou systems in eastern Jackson County, Mississippi, was examined to determine if the effects of coastal development, specifically anthropogenic nutrient loadings and the degree of upland development of the bayou drainage basins, alter phytoplankton community structure. Bayou Casotte, a heavily industrialized area, was compared to two relatively unimpacted areas, Bangs and Graveline bayous. Two sampling sites were selected in each of the bayou systems in order to assess spatial trends in the effects of development along these systems. Nutrient, chlorophyll and phytoplankton samples were collected twice monthly from January through December of 1998 to observe seasonal changes as well as site specific differences. Average chlorophyll *a* and total cells/liter comparisons in Bayou Casotte were significantly higher (p=0.05) than in Bangs Bayou. There were no significant differences between Bayou Casotte and Graveline Bayou for either chlorophyll *a* or total cells/liter. Bayou Casotte was a predominantly bloom driven system, with lower overall species diversity for the study. Single day species percent compositions within the system were dramatically different in Bayou Casotte. The overall percent composition of the dominant phytoplankton taxonomic division within Bayou Casotte tended to be 20–50% higher than in the Graveline and Bangs systems. Percent composition of phytoplankton groups within these systems were relatively equal. Observed alterations in the phytoplankton community structure are believed to be a direct result of extreme nutrient loadings for the locations sampled.

Caffrey, J.M.[1], T. Chapin[2], H. Jannasch[2] and J. Haskins[3]. [1]Center for Environmental Diagnostics and Bioremediation, University of West Florida, Pensacola, Florida, [2]Monterey Bay Aquarium Research Institute, Moss Landing, California, [3]Elkhorn Slough NERR, Watsonville, California. **USING AN IN-SITU NO3-ANALYZER TO MONITOR NO3-RUNOFF FROM AGRICULTURAL FIELDS IN ELKHORN SLOUGH CALIFORNIA.** The importance of nutrient inputs in regulating marine and estuarine productivity is widely recognized. To understand many of the processes operating within estuaries, nutrient concentrations and physical conditions need to be monitored at a temporal resolution capable of resolving events such as tides, episodic storms (including runoff events) and sporadic biological blooms. Being able to capture these events is of critical importance to develop an accurate picture of nutrient loading as well as understanding the interactions among physical processes, uptake, and regeneration of nutrients. An in-situ NO3- sensor has been deployed at Azevedo Pond in Elkhorn Slough since December 1999. Azevedo Pond is a small tidal pond surrounded by agricultural fields planted in strawberries and flowers. During December 1999, NO3- concentrations varied between 0–30 µm. NO3- concentrations varied with salinity (and temperature) where the highest NO3- concentrations coincided with warm, low salinity water. In January 2000, concentrations exceeded 450 µM following the first rains of the season. Concentrations gradually declined to 80 µM over the remaining 4 days of the deployment and slowly resumed the tidal signature pattern. Concentrations in March decreased throughout the month and showed a distinct tidal signature. During the summer months, concentrations ranged between the detection limits of 0.3 µM and 17 µM, with concentrations still showing a distinct tidal signature.

Cho, Hyun-Jung[*] and M.A. Poirrier, University of New Orleans. Department of Biological Sciences, 2000 Lakeshore Dr. New Orleans, Louisiana 70148. **RECENT INCREASES OF WIDGEON GRASS, *Ruppia maritima*, IN LAKE PONTCHARTRAIN.** Lake Pontchartrain submersed aquatic vegetation (SAV) has been in a state of decline since 1953. However, 1999 surveys have indicated an 18-fold increase in *Ruppia maritima* to levels

that rival historic populations**.** In 2000, surveys were conducted to determine lake-wide distribution and abundance. These data were compared with data from previous years (1996–1999) by three-way ANOVA with fixed variables of time period, study site, and depth. In 2000, north shore *Ruppia maritima* beds extended from west of Tchefuncte River to Pt du Chien, persisted to a depth of 1.8 m and covered about 1.3 km^2. In eastern Lake Pontchartrain, it occurred as scattered beds that extended from the Rigolets to South Point. On the south shore it occurred as shallow water patches from Lincoln Beach to the Jancke Canal, but was rare west of the canal. A large bed (*ca*. 0.8 hectare) was present near Lincoln Beach and a small bed was found in Jefferson Parish east of the Causeway. In spite of the increase in *Ruppia, Vallisneria americana* has continued to decline and in 2000 quantifiable beds (0.12 km^2) were only found on the north shore between Cane Bayou and Pt. du Chien. Although *Potamogeton perfoliatus* and *Najas guadalupensis* were present in past surveys, they were not found in 2000. The increase in *Ruppia* appears to be related to the increase in salinity and water clarity that has occurred since the passage of Hurricane Georges in 1998. The decline in *Vallisneria, Potamogeton* and *Najas* was probably caused by the salinity increase and competition with *Ruppia*. There was a decrease in *Vallisneria* (92%) and *Ruppia* (30%) from 1999 to 2000 in shallow water on the north shore due to aerial exposure during a low water period.

Fisher, K.J.[A,*], E.A. Spalding[B,*] and M.W. Hester. Department of Biological Sciences, Southeastern Louisiana University, Hammond, Louisiana 70402. **WETLAND PLANT MESOCOSM INVESTIGATIONS: FLOTANT RESPONSE TO INCREASED SALINITY AND NUTRIENT LEVELS[A], AND COMPETITIVE ABILITY OF *Panicum Hemitomon, Sagittaria Lancifolia* AND *Spartina Patens* TO GLOBAL SEA LEVEL RISE SCENARIOS[B].** Louisiana's wetlands are being negatively impacted by high rates of relative sea-level rise (global sea-level rise plus subsidence). Increased salinity levels pose a significant stress to the growth and survival of fresh and intermediate marsh vegetation, whereas the effects of increased flooding are less clear. In these studies, we examined the effects of global sea-level rise scenarios (increased flooding and salinity levels) on *Panicum hemitomon*, *Sagittaria lancifolia, and Spartina patens*. Our previous studies indicate that increases in salinity appear to be detrimental to the overall health of attached *Panicum hemitomon* marsh, whereas some increase in flooding may actually result in greater growth. To assess the effects of increased salinity andnutrient load on *Panicum hemitomon* flotant (floating marsh), we initiated a mesocosm study consisting of a factorial design with two salinity levels (0 and 2.5‰) and low and moderate levels of nitrate and phosphate loading. Photosynthetic results to date indicate a negative salinity effect. A second mesocosm study consisting of a factorial design with four salinity levels (0, 2, 4, 6‰), three hydrologies (-10, 5, 20 cm flood), and four vegetative conditions (monospecific *Panicum hemitomon, Sagittaria lancifolia,* and *Spartina patens*, as well as a community composed of the three species) was instituted this summer. In this study, the effects of salinity, hydrology, vegetative condition, and their interactions on species' stress tolerance, growth response, productivity, and competitive ability are being assessed.

Franze, C.D.[*] and M.A. Poirrier. University of New Orleans, Department of Biological Sciences, 2000 Lakefront, New Orleans, Louisiana 70148. **CHANDELEUR ISLANDS SEAGRASSES: HURRICANE GEORGES DAMAGE AND RESTORATION EFFORTS.** The main chain of the Chandeleur Islands supports extensive seagrass meadows in the shallow waters along its western side. On September 28, 1998 Hurricane Georges hit the Chandeleur Islands and produced many deep channel cuts through the main island resulting in scouring and the formation of washover fans on seagrass habitat. Field studies that began in January 1999 were conducted to assess the damage. Seagrasses were absent in areas where washover fans formed large shallow deposits on top of the meadows and where extensive scouring was present. Dense stands of *Thalassia testudinum, Syringonium filiforme* and *Halodule wrightii* occurred in areas where the meadows were protected from channel cut deposits and scour energy. Seagrasses extended from the low tide zone to a depth of about two meters at approximately one mile offshore. *Ruppia maritima* was present near shoreline marshes and a few *Halophyla engelmani* plants were found at intermediate depths. *Thalassia* and *Syringonium* were the dominant species, but *Halodule* was often abundant in shallow water. *Thalassia* and *Syringonium* support the ecological and geological integrity of the Islands by stabilizing sediments and providing essential habitats for shellfish, finfish and waterfowl. Natural recovery of *Thalassia* is typically very slow. In February 2000, we began a project designed to restore seagrasses on non-vegetated washover fans produced by Hurricane Georges. Native seagrasses were transplanted at suitable depths using the "plug" method. As a component

of the project, volunteers were recruited and trained in transplanting procedures and monitoring methods. Volunteer efforts resulted in over 14,000 shoots being installed at five restoration sites. Transplant survival has been good. Very limited natural colonization by *Halodule* has occurred, but no widespread natural colonization by *Thalassia* or *Syringonium* has been observed.

Hale, J. and T.K. Frazer. University of Florida, Department of Fisheries and Aquatic Sciences, 7922 NW 71st Street, Gainesville, Florida 32653. **ABUNDANCE AND DISTRIBUTION OF SUBMERGED AQUATIC VEGETATION FROM AERIAL PHOTOGRAPHS: IMAGE ENHANCEMENT, CLASSIFICATION, AND GROUND TRUTHING.** Photointerpretation of aerial photographs is a common way to characterize land cover over broad geographic areas. Traditional mapping techniques involve a single (or few) experienced analysts tracing polygons around features or categories. An alternative, however, relies on image processing enhancements and classification algorithms to delineate features. While not necessarily appropriate for all applications, this alternative method may offer several potential advantages. First, spatial and thematic accuracy can be improved. Second, images canbe readily reclassified, as most of the processing time (including georeferencing) occurs before classification. We are classifying two sets of 9 x 9-inch 1:24 000-scale aerial photographs along the west coast of Florida, north of Tampa Bay, for abundance and distribution of submerged aquatic vegetation (SAV). We have adapted the well known and frequently used Braun-Blanquet sampling scheme to characterize benthic cover and provide ground truth information. This is a simple index which classifies SAV coverage within a 1-square meter quadrat into five categories: less than 5%, 5 – 25%, 25 – 50%, 50 – 75%, and 75 – 100%. This method provides a rapid and repeatable estimation of cover. A notable advantage to using ground truth data based on this popular index is the potential to use historical Braun-Blanquet data with historical aerial photographs. As with traditionally interpreted photographs, images classified from scanned photographs can be used in change detection; changes in location (spatial) and/or classification (thematic). Our next step is to describe SAV in this area in terms of habitat fragmentation using the Patch Per Unit metric and patch shape analysis using the Square Pixel metric.

Hastings, R.W. Turtle Cove Environmental Research Station, Southeastern Louisiana University, Hammond, Louisiana. **EFFECTS OF DROUGHT-INDUCED SALINITY INCREASES IN THE UPPER LAKE PONTCHARTRAIN ESTUARY: VEGETATION.** Southeastern Louisiana has experienced a significant drought for two years, with annual rainfall amounts of 117 cm (46 inches) in 1999 and 58 cm (23 inches) in 2000, some 50–63 cm (20–25 inches) below normal (152 cm, 60 inches). This reduced level of rainfall and freshwater input to the upper Lake Pontchartrain estuary has resulted in dramatic salinity increases. Salinities in Pass Manchac during the period from mid-1980's to mid-1990's ranged from near fresh in winter and spring up to about 3–5‰ in late summer and fall. During most of 1999 and 2000, salinities remained considerably higher, generally ranging from 5–8‰ during all seasons. Marshes have experienced prolonged periods of excessive drying, but have also been flooded occasionally by these high-salinity waters. Obvious changes in marsh and aquatic vegetation have occurred. Some of these changes are documented in a series of comparative photographs illustrating several sites in the Manchac marshes. The dominant marsh plant bulltongue *(Sagittaria lancifolia*) is now less prolific and stressed. Deer pea (*Vigna luteola*) no longer overgrows the marsh in late summer. Wild rice (*Zizania aquatica*) has virtually disappeared. Several aquatic plants including duckweed (*Lemna minor*), fanwort (*Cabomba caroliniana*), and floating waterprimrose (*Ludwigia peploides*) are now rare; as are the usually prolific exotics: alligator weed (*Alternanthera philoxeroides*), Salvinia (*Salvinia minima*), and Eurasian watermilfoil (*Myriophyllum spicatum*). Plants more characteristic of upland areas such as groundselbush (*Baccharis halimifolia*), marsh elder (*Iva frutescens*), and southern water-hemp (*Amaranthus australis*) have invaded areas where they have previously been uncommon.

Hastings, R.W. Turtle Cove Environmental Research Station, Southeastern Louisiana University, Hammond, Louisiana. **EFFECTS OF DROUGHT-INDUCED SALINITY INCREASES IN THE UPPER LAKE PONTCHARTRAIN ESTUARY: FISHES.** Southeastern Louisiana has experienced a significant drought for two years, with annual rainfall amounts of 117 cm (46 inches) in 1999 and 58 cm (23 inches) in 2000, some 50–63 cm (20–25 inches) below normal (152 cm, 60 inches). This reduced level of rainfall and freshwater input to the upper Lake Pontchartrain estuary has resulted in dramatic salinity increases. Salinities in Lake Maurepas ranged from near zero to 2.5‰ in 1983-84 when a comprehensive survey of itsfish fauna was conducted. Salinities in 2000 have been

considerably higher, 5.0-7.5‰ during August-October. Trawling at seven stations sampled in 1983–1984 were also sampled in 2000, with the following results. Three species, all of which are marine (silver perch, *Bairdiella chrysoura;* spotted seatrout, *Cynoscion nebulosus;* and striped anchovy, *Anchoa hepsetus*) were collected in 2000, but not in 1983–1984. Bay anchovy (*Anchoa mitchilli*) and Atlantic croaker *(Micropogonias undulatus*) remained the dominant species, but the latter was much less numerous in 2000 than in 1983-84. Other marine species common in 1983–1984 were also reduced in abundance (Gulf menhaden, *Brevoortia patronus;* and sand seatrout, *Cynoscion arenarius*) or not collected at all in 2000 (spot, *Leiostomus xanthurus;* and hogchoker, *Trinectes maculatus*). Two species of freshwater catfish (blue catfish, *Ictalurus furcatus*; and channel catfish, *I. punctatus*) and freshwater drum (*Aplodinotus grunniens*) were also much less numerous in 2000.

Hoeppner, S.S.*, J.M. Willis G.P. Shaffer. Department of Biological Sciences, Southeastern Louisiana University, Hammond, Louisiana 70402. **PRELIMINARY FINDINGS OF THE FEASIBILITY STUDY OF A FRESHWATER DIVERSION INTO THE MAUREPAS SWAMP—PART I: PRIMARY PRODUCTIVITY OF TREES.** The wetlands south of Lake Maurepas have previously been identified as degraded swamp forests in need of restoration. A freshwater diversion has been proposed to bring a greater load of nutrients, sediments and freshwater into the system. To evaluate the potential effects of the proposed diversion, measures of the primary production of trees and the herbaceous undercover, soil subsidence levels, and various soil characteristics were taken at twenty characteristic study sites within the Lake Maurepas basin. This presentation focuses on the primary productivity of trees in the cypress-
tupelo swamp ecosystem. The measure of the primary production of trees was broken down into the two main components of litter fall and wood production. Soil characteristics examined included soil bulk density, interstitial salinity, pH, redox potential (Eh), soil nitrogen levels, and soil phosphorus levels. The most degraded sites chosen for this study exhibited the highest interstitial salinities measured and were found to have the lowest rates of primary productivity per study plot among all study sites. The most productive sites of this study were interior swamps and those affected by the Amite River Diversion Canal.

Hunter, J.*, A. J. Nyman and T. C. Michot. University of Louisiana at Lafayette, Department of Biology, Lafayette, Louisiana 70504 and the National Wetlands Research Center Cajundome Blvd. Lafayette, Louisiana 70503. **THE EFFECTS OF MANAGEMENT AND SEASON ON SUBMERGED AQUATIC VEGETATION AT MARSH ISLAND, LOUISIANA.** Management often aims to increase submerged aquatic vegetation (SAV) and therefore support more waterfowl. It is important to understand the seasonal growth pattern of SAV in order to understand the effects of waterfowl herbivory or management on SAV. Therefore, I documented changes in SAV over time and among managed and unmanaged areas. I tested the hypothesis that SAV did not vary over time or among four areas (two which are managed by flap-gated variable-crest weirs). I documented water quality parameters (salinity, temperature, water level, turbidity and nutrients) and tested the hypothesis that these parameters did not differ among the areas. I tried to relate these water quality parameters to SAV abundance. Data collected from October 1998 to May 2000 indicated SAV were generally more abundant in managed areas than in unmanaged areas, percent cover and biomass represent different attributes of SAV abundance, and percent cover was more sensitivethan biomass when SAV abundance was low. After accounting for the effects of area and time, only water level and water phosphorus concentration were significantly related to SAV abundance.

McCall, R.K.* and C.A. Moncreiff. Institute of Marine Sciences, The University of Southern Mississippi, Ocean Springs, Mississippi 39566-7000. **DISTURBANCE-MEDIATED CONTRIBUTIONS TO PLANKTONIC CHLOROPHYLL A BY DISLODGED SEAGRASS EPIPHYTES: A MESOCOSM ANALYSIS.** Seagrasses occur throughout the temperate marine environment and representatives of all of the major algal groups utilize them as a spatially-stable substratum. Recent studies have demonstrated the importance of epiphytic algae as important sources of food for the fish and invertebrate grazers that inhabit seagrass beds. Disturbance events may dislodge epiphytes from the grass blades and suspend loose algal cells in the water column where they may be utilized as food by organisms located beyond the boundary of the seagrass bed. Researchers addressing phytoplankton primary production have frequently used chlorophyll *a* as a measure of algal biomass. A mesocosm experiment was conducted to determine whether planktonic concentrations of chlorophyll *a* subjected to disturbance events were significantly

different than chlorophyll *a* from a control group. Planktonic chlorophyll *a* differed significantly between the control and treatments of different disturbance regimes (Analysis of covariance, $p = 0.001$). Treatments consisting of both biotic and abiotic disturbances resulted in the highest concentrations of chlorophyll *a*.

Moncreiff, C.A., B.R. Blackburn, J.D. Caldwell, and N.M. Opel. The University of Southern Mississippi, Institute of Marine Sciences, Ocean Springs, MS 39566-7000. RECURRENT BLOOMS OF *Alexandrium Monilatum* IN MISSISSIPPI SOUND: A PATTERN FOR THE FUTURE? *Alexandrium monilatum* was first reported in water samples collected in Mississippi Sound in August 1979. Blooms occurred sporadically until 1998; since then, blooms of this dinoflagellate have been documented each summer. Degree and extent of bloom development has differed from year to year; however, a pattern now exists in bloom occurrence. *Alexandrium monilatum* is reported not to produce the saxitoxins associated with related *Alexandrium* species blooms in the northeast. However, mouse bioassays on extracts of *A. monilatum* collected during the 1998 bloom event resulted in deaths of mice receiving extracts intraperitoneally. Toxins associated with this dinoflagellate have not been characterized to date; samples of material from this year's bloom are being used to begin this process. Similar hydrologic conditions may have contributed to conditions conducive to the spread and development of this harmful algal species within Mississippi Sound each of the past three summers. Human impacts on the environment, such as increased levels of nutrients in coastal waters, may also be related to the observed increase in the number of blooms formed by this potentially harmful dinoflagellate species.

Murrell, M.C. and F.J. Genthner. US EPA, Gulf Ecology Division, 1 Sabine Island Dr., Gulf Breeze, Florida 32561. email: murrell.michael@epa.gov. SEASONAL DOMINANCE OF CYANOBACTERIA IN PENSACOLA BAY, FLORIDA, USA A study was conducted during 1999–2000 in Pensacola Bay, Florida, USA to characterize the seasonal dynamics of nutrients, phytoplankton, and bacterioplankton. Monthly samples were collected from 5 sites spanning the salinity gradient. Abundances of non-heterocystous chroococcoid cyanobacteria (cf. *Synechococcus, Synechocystis*) became very high (3×10^6 ml^{-1}) during the summer months. Based on concomitant chlorophyll *a* analyis and microscopic cell counts, we estimated that cyanobacteria contain 1.75 fg chlorophyll *a* $cell^{-1}$. Using this calibration we estimated that cyanobacteria accounted for up to 5.25 ìg l^{-1} chlorophyll in the upper estuary and accounted for ca. 50% of the total chlorophyll (range 11-74%). Similarly, size fractionated bulk chlorophyll analysis showed that the <5 ìm phytoplankton often dominated the community (70-90%). Flow cytometric analysis of Bay samples from July through October 2000 revealed two distinct communities of cyanobacteria based on their fluorescence characteristics. One type was characterized by strong orange fluorescence under blue excitation (488 nm) suggesting cells rich in phycoerythrin (PE). The other type exhibited deep red fluorescence when excited with a red excitation (610 nm) suggesting cells rich in phycocyanin (PC). The distributional patterns clearly show that PC-rich cells dominated in the upper estuary, while the PE rich cells were more abundant in the lower estuary. In the near-freshwater tidal reach of the Escambia River, abundances were typically one or two orders of magnitude lower than in the nearby estuary suggesting that these are marine cyanobacteria. Ongoing studies are directed at better understanding the factors controlling their abundance and distributional patterns, including the potential roles of grazing and nutrient limitation.

Murrell, M.C., R.S. Stanley, E.M. Lores and D.A. Flemer. US EPA, Gulf Ecology Division, 1 Sabine Island Dr., Gulf Breeze, Florida 32561. email: murrell.michael@epa.gov. MICROZOOPLANKTON GRAZING AND NUTRIENT BIOASSAY STUDIES IN PENSACOLA BAY: THE ROLE OF TOP-DOWN AND BOTTOM-UP CONTROLS. To better understand the causes and consequences of nutrient over-enrichment (eutrophication) in Gulf of Mexico estuaries, we examined roles of grazing and nutrient limitation in Pensacola Bay. One consequence of eutrophication is altering the function of plankton food webs; the basis of the marine food chain. Such an alteration can have cascading effects on an ecosystem and result in multiple negative impacts including loss of habitat and loss of human resource use. Micro-
zooplankton grazing and nutrient limitation studies were conducted at 2 sites on 5 dates from December 1998 to September 1999. The grazing experiments examined the potential of top-down control on primary production, while the nutrient limitation experiments examined bottom-up controls. The grazing experiments measured changes in net phytoplankton growth in treatments with varying numbers of microzooplankton predators. Preliminary results

suggest that microzooplankton often exerted a significant control (46% to over100% of production) on phytoplankton growth. The nutrient limitation experiments measured the growth of phytoplankton in treatments with varying nutrient additions. Those results suggest that phosphorus may limit primary production at certain times of the year. Combining these results allows a means to evaluate the relative importance of top-down and bottom-up controls on primary production.

Nyman, J.A., J.D. Foret , G. Melancon , T.C. Michot , T.J. Schmidhauser*, A.K. Burcham*. *Department of Biology, University of Louisiana at Lafayette, Lafayette, Louisiana 70504, National Marine Fisheries Service, Lafayette, Louisiana 70504, Rockefeller Wildlife Refuge, LDWF, Grand Chenier Louisiana 70643, National Wetlands Research Center, USGS, Lafayette, Louisiana 70506. **PRELIMINARY STUDIES OFBROWN, BRACKISH MARSH.** Rapid dieback of ~50% of saline marsh in southeastern Louisiana garnered much attention. We show that large portions of brackish marsh at Rockefeller Refuge in southwestern Louisiana also experienced rapid dieback. Foret noted total dieback at 3 of 6 *Spartina patens* dominated sites between March and May, 1999. Michot estimated via aerial survey that ~30% of unmanaged *S. patens* marsh at the Refuge was brown in August 2000. In Oct. 2000, Melancon and Nyman visited Foret's sites and observed lower salinity (28‰ vs. 31‰) and higher pH (6.0 vs. 5.2) associated with healthy sites. Burcham and Schmidhauser isolated more fungal types from brown plants than green plants and observed more rapid fungal growth from brown spots than from green portions of leaves from brown plants. We plan to test if soil conditions likely to have occurred during the recent drought (high salinity, sulfides, and acidity) increased plant susceptibility to fungal infection.

Opel, N. M., W. Grater, C. A. Moncreiff, and J.D. Caldwell. The University of Southern Mississippi, Institute of Marine Sciences, Department of Coastal Sciences, 703 East Beach Drive, Ocean Springs, Mississippi 39566-7000. **A PRELIMINARY ASSESSMENT OF GENETIC VARIATION AMONG AND WITHIN POPULATIONS OF *Halodule wrightii* IN THE NORTHERN GULF OF MEXICO.** We began a preliminary assessment of the genetic structure of *Halodule wrightii* in the northern Gulf of Mexico using random amplified polymorphic DNA (RAPD-PCR) analysis. Like many seagrasses, *H. wrightii* depends primarily upon vegetative as opposed to sexual reproduction; therefore, *H. wrightii* populations could display low levels of genetic diversity, and may even consist of one individual clone. Other studies have suggested that populations with low genetic diversity may not adapt as fast as populations containing higher genetic variation. To assess genetic diversity, RAPD primers prepared by the University of British Columbia (UBC) were screened for the generation of bands with *H.wrightii* DNA. These bands indicated that the primer annealed to a number of sequences in the template DNA. We found that *H. wrightii* produced bands for 10 of 35 UBC primers examined. Additional UBC primers will be screened and polymorphic banding patterns established. In addition to RAPD-PCR analysis, direct DNA sequencing utilizing internal transcribed spacer (ITS) sequences may also be employed in order to determine the genetic composition of *H. wrightii* populations. Once the amount of genetic disparity among and within populations of *H. wrightii* is quantified, conservation measures can be evaluated. If some populations display low disparity, transplants from local donor beds could increase variation within these populations. By evaluating the genetic composition of *H. wrightii* populations, improved management options can be determined.

Parsons, A.C.*, J.M. Willis and G.P. Shaffer. Department of Biological Sciences, Southeastern Louisiana University, Hammond, Louisiana 70402. **PRELIMINARY FINDINGS OF THE FEASIBILITY STUDY OF A FRESHWATER DIVERSION INTO THE MAUREPAS SWAMP- PART II: HERBACEOUS SPECIES COMPOSITION.** In Louisiana, freshwater river diversions have been proposed as a tool for restoration of degraded wetlands. The wetlands associated with Lake Maurepas in southeastern Louisiana are an example of a degraded system that could benefit from this type of restoration. To investigate the potential benefits of a freshwater river diversion into Lake Maurepas, 20 sites were established within thesouthern Maurepas basin. Within a site, two 625 m^2 stations were randomly created, and within each station, four 4 m^2 plots were established. Two of these 4 m^2 plots were fertilized with time released fertilizer to mimic the nutrient input from a 2000 cfs diversion of the Mississippi River. Percent cover was recorded in all plots in the late Spring and in the Fall of 2000. In order to estimate herbaceous productivity, two clip plots were collected from all 160 plots in the late Spring and Fall of 2000. In addition to vegetation data, soil cores and bulk density cores were collected to determine such soil parameters as interstitial soil

salinity, sulfide, pH, percent soil moisture, and bulk density. Although some of the data have yet to be analyzed, some trends are apparent. As basal diameter of the forest canopy increases, percent cover decreases. Fertilized plots have doubled productivity compared to unfertilized plots; although there is no difference in the soil parameters between the plots. This strongly indicates that the assimilative capacity of the marsh has not been exceeded, and therefore, no algal blooms in Lake Maurepas would be expected from a 2000 cfs diversion. Our research suggests that a freshwater river diversion would be very beneficial to the wetlands of the Southern Maurepas. Without this freshwater river diversion, more than half of the existing wetlands are expected to degrade to open water in the next 5 decades.

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THE EFFECT OF PRECIPITATION ON ORGANIC CARBON COMPONENTS IN BAYOU TEXAR, FLORIDA. This study examined the relationship between precipitation and organic carbon in Bayou Texar, part of Florida's Pensacola Bay system in the northern Gulf of Mexico. Weekly samples were collected from five stations between March to June, 1999. Additionally, samples were taken before, during and after rain events throughout the sampling period using an autosampler. Particulate organic carbon (POC), dissolved organic carbon (DOC), chlorophyll (chl *a*), and nutrient (PO4-P, NOx-N, NH4-N) data were analyzed to examine the effects of storm water from rain events. During this study, rainfall and runoff from individual rain events replaced between 1–8% of the total bayou volume. Regression analysis was used to identify relationships between physical and chemical components in the system. Although pulses of POC, DOC, and nutrients can be detected in the bayou during rain events, results suggest that each component is quickly diluted. Overall, rainfall and runoff had no consistent measurable impacts on the carbon concentrations in Bayou Texar over daily to monthly temporal scales. Nutrient levels suggest that Bayou Texar was nutrient replete during the entire sampling period, implying that nutrient additions from rainfall and runoff did not stimulate phytoplankton growth. The distribution of NOx-N along the salinity gradient suggests nutrient enrichment from terrestrial sources, but storm water additions during the study period could not account for this enrichment. Increases in both POC and Chl *a* were strongly correlated with seasonal increase in surface temperatures and were also independent of storm events. Future studies will determine if the carbon cycle in Bayou Texar is seasonally driven over an annual scale period.

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SPATIAL VARIABILITY OF SOIL WATER PROPERTIES IN AN ESTUARINE OLIGOHALINE MARSH UNDER THE INFLUENCE OF MESOHALINE CONDITIONS. The spatial variability of soil salinity under the influence of drought was investigated on an estuarine marsh island in the Lake Pontchartrain Basin, Southeastern Louisiana, USA. Habitat changes during the last 100 years, after deforestation due to lumbering, indicate a trend towards increasing salinity and flooding. These wetlands historically received freshwater, sediment, and nutrients from the Mississippi River until the arrival of Europeans who closed its local distributary, Bayou Manchac, and have slowly eliminated periodic crevasses by maintaining mainline levees throughout the area. Marine inputs to the estuary have increased with the opening of the Mississippi River Gulf Outlet and Inner Harbor Navigation Channel. Reforestation efforts in the area have been unsuccessful. Over 100 dipwells were installed radially at 100-meter intervals, in eight compass directions over the entire 4 square-kilometer island. Soil salinity varied both spatially and temporally. Spatial variability may be attributable to variations in elevation, horizontal exchange with tidal slews, vertical exchange with surface water, and soil permeability. Data suggest that areas isolated from exchange accumulate more salts than areas afforded exchange. Temporal variability was attributed to variations in estuarine salinity and climatic factors. Data suggest that current low precipitation amounts are not sufficient to reduce soil salinity. It would be a mistake to attribute current trends and restoration failures to these hydrologic modifications alone; trends must be assessed within both the framework of historical system dynamics, current climatic conditions, and anthropogenic modifications.

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PROCESSED DRILL CUTTINGS AS PO-

TENTIAL SUBSTRATES FOR WETLAND CREATION: AN OVERVIEW OF SOUTHEASTERN LOUISIANA UNIVERSITY'S RESEARCH. Louisiana experiences one of the highest rates of wetland loss in the world, which is largely driven by the subsidence of deltaic sediments. To successfully create wetlands in much of coastal Louisiana, sediment must be added to counteract the effect of subsidence. Processed drill cuttings are a potential source of sediments that maybe used as wetland substrate. Three intensive mesocosm level studies conducted at Southeastern Louisiana University have examined the suitability of processed drill cuttings as a substrate for freshwater and saline wetland vegetation. All three studies were factorial designs (four substrates including two drill cuttings types: A and B, three hydrologies, and six species treatments) in which interstitial metal concentration, interstitial pH, soil redox, photosynthetic rate, and biomass partitioning data were collected. Plant tissue metal concentrations were also measured in the first and third year studies. Plants in drill cuttings A typically grew as well or better than plants in other substrates, including the control, throughout all studies. Under freshwater conditions, plants grown in drill cuttings B tended to be reduced in growth compared with plants grown in other substrates. This is likely a result of the alkaline pH drill cuttings B demonstrated under freshwater conditions (~10.0). However, under the three saline conditions of the third study, the pH of drill cuttings B was lowered to ~8.1, and photosynthesis was equal or higher than the control. Vegetative uptake ofmost metals was low for both the first and third year studies. Overall, these studies have demonstrated the capacity of processed drill cuttings as suitable substrates for plant growth under the correct environmental conditions. However, further refining of the processing technique may be required for processed drill cuttings to truly become a viable option for wetland creation.

Woodley, C.M.* and M.S. Peterson. Department of Coastal Sciences, Institute of Marine Sciences, The University of Southern Mississippi, Ocean Springs, Mississippi 39564. **CAN WE QUANTIFY INCREASED PREDATION STRESS DUE TO HABITAT LOSS?** Recent research has documented that fishes associated with submerged aquatic vegetation (SAV), shoals and other aquatic structure may benefit from improved feeding or reduced predation risk. The loss of these structurally complex habitats may increase individual stress levels of small fishes by the increased "perception" of predation threat. Studies have shown that stress, whether natural or anthropogenic, diverts metabolic energy away for normal activities (i.e., growth and reproduction). The objective of this study was to quantify responses associated with the "perception" of predation threat using metabolic rate, cortisol concentrations, behavior, and growth. We quantified individual weight-specific metabolic rate of the prey fish (longnose killifish, *Fundulus majalis-similis*) exposed to a predator (sand seatrout, *Cynoscion arenarius*) using flow-through respirometry. Three treatments (no habitat, artificial SAV, and a blind control) were randomly assigned to experimental respirometers around a central experimental arena where the predator was housed. The routine oxygen consumption of the longnose killifish (n = 8) was found to be significantly different among treatments ($F = 11.277$, $p = 0.00$). Bonferroni pairwise comparisons showed that the killifish routine oxygen consumption in the no habitat treatment was significantly higher than both the artificial SAV treatment ($p = 0.002$) and the control ($p = 0.001$). There was no significant difference in routine oxygen consumption between the artificial SAV treatment and the control ($p = 1.000$). We concluded that longnose killifish fully exposed to a predator have a greater routine oxygen consumption rate than the killifish partially exposed to a predator and the killifish that were not exposed to a predator. From these results, we can infer that the killifish fully exposed to a predator underwent an increase in metabolism due to perceived predation threat. In addition, these results suggest that SAV plays an important role in the mediation of prey-predator relations.