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Aguirre, W.E.* Department of Biological Sciences, Gulf Coast Research Laboratory, Institute of Marine Sciences, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564. **SCIAENID OTOLITH MORPHOLOGY: PRELIMINARY OBSERVATIONS ON THE RELATIONSHIP BETWEEN BODY FORM AND OTOLITH SHAPE.** Members of the family Sciaenidae (Teleostei: Perciformes) typically possess large otoliths which vary greatly in shape among genera and even among species of the same genus. To determine if there is a relationship between body form and otolith shape within this family, otolith length, otolith height, standard length, head length, body depth, and head depth were measured in over 400 specimens corresponding to nine genera and fifteen species from the Gulf of Mexico, the Atlantic coast of the United States, and the Eastern Tropical Pacific. Generally, both body depth and head depth are acceptable indicators of otolith height. Sciaenids with deeper bodies and deeper heads typically have otoliths of greater height. Moreover, in cases where body depth is similar, species with deeper heads have otoliths of greater height. However, this relationship does not hold true in some sciaenids. Head and body depth are poor indicators of otolith height in species with reduced otoliths such as *Menticirrhus americanus* as well as in species with highly modified otoliths such as *Elattarchus archidium* and other members of the *Stellifer* group.

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, MS 39564, and [2]Mississippi Department of Environmental Quality, Office of Pollution Control, South Regional Office, 3002-C Bienville Boulevard, Ocean Springs, MS 39564. **ANTHROPOGENIC EFFECTS ON PHYTOPLANKTON COMMUNITY DYNAMICS IN THREE COASTAL MISSISSIPPI BAYOU SYSTEMS.** A twelve-month study was undertaken from January to December 1998 in order to assess the effects of coastal development on the phytoplankton community structure of three bayous in eastern Jackson County, Mississippi. The goal of this study was to determine if phytoplankton community structure changes with the degree of upland development of the bayou drainage basins. Bayou Casotte, a heavily developed area, was compared to two relatively unimpacted areas, Bangs and Graveline Bayous. Two sites were selected in each of the bayou systems in order to monitor spatial trends in the effects of development along these systems. Nutrient, chlorophyll and phytoplankton samples were collected twice monthly over one year to observe seasonal changes as well as site differences. The first quarter of measurements revealed relatively low concentrations of chlorophyll and low species diversity at all sites, which can be attributed to higher than normal rainfall events for late winter and early spring months. In late spring, rainfall levels returned to normal after which all sites exhibited increases in both concentrations of chlorophyll and phytoplankton species diversity through the summer until the advent of Hurricane Georges in late September. After the hurricane, chlorophyll concentration and number of species present dramatically declined at all sites except for the sites located within the Bayou Casotte drainage. Initial analysis of the sites revealed that the phytoplankton community associated with Bayou Casotte is largely a bloom-driven system exhibiting high chlorophyll concentrations and lowered species diversities. This is attributed to high levels of available nutrients within the system. Late fall and early winter sample analysis have shown a gradual increase in the diversity of the phytoplankton communities associated with Graveline and Bangs Bayous. Unusual weather patterns and major weather events encountered underscored the need for extended sampling periods to provide accurate baseline analysis for any given community.

Childers, D. L., D.M. Iwaniec, F.M. Parker, D. Rondeau. Wetland Ecosystems Ecology Lab, Southeast Environmental Research Program & Department of Biological Sciences, Florida International University, Miami, FL 33199 and C. Madden, Everglades Systems Research Division, South Florida Water Management District, West Palm Beach, FL 33416. **HOW FRESHWATER EVERGLADES WETLANDS MEDIATE THE QUALITY OF RECENTLY ENHANCED WATER INFLOWS TO THE FLORIDA BAY ESTUARY.** As part of ongoing Everglades restoration efforts, water inputs have been increased to the freshwater-estuarine system of the Southern Everglades. In one project, a levee was removed from along a major drainage canal in 1997, increasing sheetflow through freshwater wetlands to Florida Bay. We have been sampling a number of ecosystem parameters in these wetlands since Fall 1997, in order to quantify 1) the effects of increased canal inflows on the freshwater marshes, and 2) the effects of these marshes on the quality of new water reaching the Florida Bay estuary. We have sampled two wetland transects oriented from the canal and parallel to overland flow; the transects are approximately 15 km apart. Along each transect we sample waterborne nutrient concentrations, periphyton and macrophyte dynamics, and soil processes. We quantify large-scale marsh effects on water chemistry with continuous sampling at stations along both

transects (on either tri-hourly or bi-daily time scales), and we quantify immediate responses using throughflow flumes constructed at the canal-wetland interface. Nutrient concentrations more than doubled immediately after levee removal (Fall 1997), from about 0.2 to 0.4 μM TP and from about 45 to 140 μM TN. However, the sawgrass marsh rapidly took up this nutrient load. By Summer 1998, however, these canal nutrient loads had decreased considerably, suggesting a short-term construction-related phenomenon. Our flumes enclose a periphyton-dominated zone at the canal edge as well as the sawgrass marsh. 1998 flume sampling showed ammonium and DOC uptake, and TOC release, by both zones. The periphyton zone imported TN, while nitrate-nitrite flux was dominated by marsh dynamics. We are also quantifying periphyton dynamics with whole system metabolism data from hydrolabs deployed in the periphyton zone, and from short-term productivity incubation experiments. The latter experiments have shown a significant water source effect on periphyton taken from the marsh far from canal influences. Along one transect, the periphyton showed a heterotrophic response while along the other it showed an autotrophic response. Additionally, we are quantifying sawgrass productivity and soil processes as long-term indicators of water quality impacts. We have not yet observed any changes in either since levee removal increased sheetflow. Our research will continue to quantify how freshwater wetlands of the Southern Everglades are mediating the quantity and quality of additional water inflow to the Florida Bay estuary, in response to Everglades restoration efforts.

Davis, Stephen E. III* and D. L. Childers, Department of Biological Sciences and Southeast Environmental Research Program, Florida International University, University Park, Miami, FL. **THE RELEASE OF CARBON, NITROGEN, AND PHOSPHORUS VIA LEAF LEACHING IN AN OLIGOTROPHIC MANGROVE WETLAND OF THE SOUTHERN EVERGLADES—AN EXPERIMENT TESTING THE EFFECTS OF SALINITY AND SEASON.** A two-factor leaf leaching experiment was conducted in May 1998 (dry season) and again in November 1998 (wet season) using nearly-senesced leaves from an oligotrophic, dwarf red mangrove wetland (*Rhizophora mangle* L.) in the southeast Everglades. The purposes of the experiment were: 1) to determine the influence of salinity and season on rates of materials leaching from the leaf litter; 2) to determine the relative importance of biotic vs. abiotic processes in the early stages of leaf decomposition; and 3) to assess the significance of leaching in the rapid recycling of carbon (C), nitrogen (N), and phosphorus (P). Fresh, yellow leaves were incubated in waters of different salinity (0, 16, and 32‰) with or without sodium azide (toxin) under ambient temperature and lighting. Each treatment combination was triplicated. Bottles were sacrificed after 1, 2, 5, 10, and 21 days and water samples were collected and analyzed for organic carbon (OC), total N, and total P content. Leaves from each bottle were dried, weighed, and analyzed for the same nutrient parameters. Preliminary data (May 98 P data only) revealed no significant effect of salinity on mass loss from leaves over time, but salinity did appear to significantly affect P leaching into the water (16‰ > 32‰ > 0‰). This pattern was also reflected in the change in %P of the leaves over time. Leaf %P content ranged from 0.016-0.03% in the calibration leaves (pre-treatment) to 0.004-0.038% in the study leaves (post-treatment). P concentrations in the water increased by an order of magnitude (0.2-2 μM) in less than 5 days and the organic carbon content of the water had increased by two orders of magnitude (1-100 mM) by the conclusion of the May 98 study. Using litterfall and litter decomposition data from a different study conducted in the same area, we hope to determine the large-scale significance of leaching by modeling litter dynamics in this nutrient-poor environment. Preliminary evidence from our study suggests that; 1) salinity seems to have an effect on rates of P leaching from dwarf red mangrove leaf litter; and 2) leaching may be an important mechanism in the rapid turnover of phosphorus in this oligotrophic system.

DeSalvo, J.[1*], S. Sanborn[2], and F. Jordan[1], [1]Department of Biological Sciences, Loyola University New Orleans, New Orleans, LA and [2]Department of Marine Science, Jacksonville University, Jacksonville, FL. **DISTRIBUTION AND HABITAT USE OF DAMSELFLY LARVAE IN THE ESTUARINE PORTION OF THE ST. JOHNS RIVER, FLORIDA.** Estuaries are characterized by gradients in salinity, habitat structure, and other environmental conditions. We examined how these environmental gradients affected a guild of larval damselflies (Insecta: Odonata) in the estuarine portion of the St. Johns River, Florida. Several species of *Enallagma* were found in this system and their relative abundance varied among oligohaline and tidal freshwater sites. Damselfly larvae were considerably more abundant in beds of submerged aquatic vegetation (SAV) than in adjacent sand flats. Behavioral experiments indicated that damselfly larvae preferred SAV over bare sand, that habitat preference did not differ between day and night, and that predation rates on damselfly larvae were considerably lower in tanks containing SAV than in tanks containing bare sand. Collectively, field and laboratory data indicate that the distribution of damselfly larvae is affected by factors operating

at both large (e.g., variation in osmotic conditions) and small spatial scales (e.g., variation in risk of predation between SAV and adjacent sand flats).

Escobar, E. and D. Hernández*. Instituto de Ciencias del Mar y Limnología, UNAM. **ENVIRONMENTAL FACTORS CONTROLLING THE DENSITY AND BIOMASS OF THE BENTHIC MACROFAUNA OF THE WESTERN GULF OF MEXICO.** The results of the study of the benthic community in the western Gulf of Mexico are herein described. Samples were obtained, along a depth gradient, from the shelf break to the abyssal plain during the SIGSBEE cruise onboard the R/V *Justo Siera* in June 1997. Dominant taxa were Annelida (32.20%), Nematoda (31.33%) and Arthopoda (27.98%) contributing more than 90% of the community density. Largest density (2,713 in m^{-2}) was recorded on the continental slope at 1,231 m depth, the lowest (794 ind m^{-2}) was recorded in the abyssal plain at 3,760 m depth. The largest biomass (0.093 gC m^{-2}) was recorded in the upper continental slope at 498 m depth; the lowest (0.008 gC m^{-2}) on the abyssal plain at 3,635 m. Both community parameters were defined by the chlorophyll maximum concentration in the water column, the oxygen content in the bottom and the organic matter content in surficial sediment, all of which were determined by the hydrodynamics in the gulf. A zonation scheme for the western Gulf of Mexico is proposed based on the multivariate analysis of the environmental parameters and was consistent with the earlier scheme described by Pequegnat (1983) for the northwestern gulf. Both density and biomass values in the area of study are consistent with the range of previous values for different regions of the Gulf of Mexico and tropical environments of the world ocean.

Fulling, G.L.[1,*] and M.S. Peterson[1,2]. Gulf Coast Research Laboratory[1] and Department of Coastal Sciences[2], Institute of Marine Sciences, The University of Southern Mississippi, Ocean Springs, MS. **ESTIMATION OF SMALL SCALE PATCHINESS OF ZOOPLANKTON AND AN ASSOCIATED PREDATOR, *ANCHOA MITCHILLI*.** Distribution of resources within an estuarine landscape often provide insight into the spatial distribution of mobile predators, with several studies showing an increase in predator density as resources increase. It is therefore logical to assume that a correlation between the distribution of predators and their resources should emerge across an estuarine landscape. This study was designed to determine the spatial and temporal patterns of zooplankton distribution and the effects of this resource heterogeneity on the distribution and growth of larval bay anchovy (*Anchoa mitchilli*). To achieve this goal, we have used a sampling technique commonly used in terrestrial systems (Quadrat-Variance techniques or "belt" transects) to estimate patch size of zooplankton in an aquatic ecosystem. Patch size of zooplankton and larval bay anchovy were estimated with the Two-Term-Local-Quadrat-Variance technique (TTLQV) and the Paired-Quadrat-Variance technique (PQV). Both techniques calculate the variance in organism density among sampling units (SU) and then plot these variances against block size (TTLQV) or the distance between SU's (PQV). We investigated zooplankton patchiness and resource heterogeneity along two separate 2 km transects on 8 separate dates, each transect contained 50 individual SU's (~ 40 m apart). Micro-zooplankton (nauplii) and larval bay anchovy were sampled simultaneously, using a 1.2 m net (20 cm opening, 35 μm mesh) nested within a 50 cm ring fitted with a 4 m net (333 μm mesh). Fifty circular oblique tows (surface-bottom-surface) of ~1.5 minute each were taken on four 2-day sampling trips (1 offshore, 1 onshore) between May and August 1998 in Mississippi Sound. Analysis of 100 of 748 samples (1 of 8 transects) indicates patch size of microzooplankton is ~320 m and larval bay anchovy is ~160 m. Initial results also show that larval bay anchovy density increases as density of prey increase ($r^2 = 0.51, p = 0.001, n = 50$). This correlation of predator and prey coupled with differences in patch sizes suggest that larval bay anchovy may be capable of "tracking" their prey through the estuarine landscape.

Gantzer, D.[1,2*], D. Badon[2], J. Eaglin[2], G. Hartzog[2], J. Popham[2], P. Richmond[2], T. Shelton[2], S. Vincent[2], and F. Jordan[1,2], [1]Department of Biological Sciences, Loyola University New Orleans, New Orleans, LA, 70118; [2]1998 Marine Ecology Course, Louisiana Universities Marine Consortium, Chavin, LA. **HABITAT USE, RISK OF PREDATION, AND DISTRIBUTION OF GRASS SHRIMP WITHIN A LOUISIANA SALT MARSH.** Coastal marshes of the northern Gulf of Mexico are mosaics of emergent vegetation, non-vegetated sand flats, and other aquatic habitats that provide a diversity of opportunities and risks for mobile estuarine organisms. We examined how grass shrimp (*Palaemonetes pugio*) used this mosaic during high tide by comparing their abundance in beds of cordgrass (*Spartina alterniflora*) and adjacent sand flats in Bay Champagne, Louisiana. Grass shrimp were considerably more abundant in cordgrass than in adjacent sand flats within this system. We then performed behavioral experiments to

determine if risk of predation could contribute to patterns of habitat use observed in Bay Champagne. In the absence of predatory pinfish (*Lagodon rhomboides*), grass shrimp used both vegetated and non-vegetated portions of experimental aquaria. However, grass shrimp significantly reduced their use of non-vegetated portions of experimental aquaria after the addition of predatory pinfish. We conclude that grass shrimp are not distributed randomly within coastal marshes such as Bay Champagne and that habitat use may in part reflect behavioral responses to potential predators.

Gaston, G.R., Department of Biology, University of Mississippi, Oxford, MS 38677. **BEHAVIORAL ECOLOGY OF A BIOLUMINESCENT CARIBBEAN POLYCHAETE.** Few benthic polychaetes have the notoriety of the bioluminescent "glowworm", *Odontosyllis luminosa*, which inhabits soft-sediment habitats of the Caribbean. A few nights after a full moon, apparently during most months of the year, a most unusual phenomenon occurs. The female worm leaves the sediments, swims toward the water surface, and releases a luminescent egg mass, causing a bright green glow near the water's surface. This glowing mass attracts the males, which also glow briefly. This tiny worm has a big glow, and viewing it is a favorite pastime in the Caribbean. Over 50 years ago investigators linked the bioluminescence of *Odontosyllis* with the mysterious lights described by Christopher Columbus in November 1492. The reproductive ecology of *O. luminosa* is part of a benthic-pelagic coupling study at South Water Caye, Belize, initiated in 1998. Coral-reef fishes leave their reefs at night to feed in turtlegrass beds nearby. One of the goals of this study was to determine whether swarming of benthic species plays an important role in coral-reef fish trophic ecology.

Henderson, C.* Texas A&M University at Galveston, Marine Laboratory, and National Marine Fisheries Service, Galveston, TX. **FACTORS AFFECTING THE COMMUNITY COMPOSITION OF EPIBENTHIC AND INFAUNAL INVERTEBRATES OF NEWLY PLANTED SEAGRASS BEDS.** Epibenthic and infaunal organisms represent an important link between macrofauna and the seagrass beds they utilize. Consequently, benthic organisms should be taken into account when assessing the structural and functional equivalency of planted beds in relation to natural seagrass beds. Three *Halodule wrightii* beds were planted during May 1994 in western Galveston Bay, Texas. The experimental design allowed for evaluation of the effects of relative water depth, planting density, and distance to edge on benthic community composition. Bare sand adjacent to the planted sites and a natural seagrass bed 15 km southwest of the planted sites were used for comparison. Monthly cores 10 cm (id) by 5 cm deep were taken over a 16 month period after beds were planted. Organisms were enumerated and identified to species when possible which yielded 164 species or taxonomic groups. Annelids (Classes Polychaeta and Oligochaeta) were the dominant organisms in both planted and natural beds and defined most of the trends observed in the final analysis. Although species richness and abundance within the planted seagrass beds increased relative to adjacent sands, epibenthic and infaunal community densities and species composition did not reflect those of the naturally occurring seagrass bed even after 16 months. Of the three seagrass planting densities (0.25, 0.50, 1.00 m centers), 0.25 m centers contained the highest numbers of individuals and species. Distance to the edge of the planted sites had no effect on benthic community composition. Numbers of individuals and species were negatively related to water depth. When water depth and planting density interactions were considered, shallow water with 0.25 m centers had the highest abundance of organisms, whereas deeper water with 1.00 m centers had the lowest (difference between shallow and deep = 15-20 cm). Given the best circumstances, it will probably take the benthic community of a planted seagrass bed at least 2-3 years to compare with that of a naturally occurring bed. Maturation of the planted seagrass, as well as the benthic community, could be enhanced with a suitable planting design which takes into account planting density and water depth.

Huner, B., J.V. Huner, and G. Faulkner. University of Southwestern Louisiana, Lafayette, Louisiana. **ENERGY CONSERVATION EFFICIENCY AND FISH BYCATCH OBSERVATIONS UTILIZING DIFFERENT TRAWL WEBBINGS IN NEARSHORE WATERS ALONG THE CENTRAL LOUISIANA COAST.** Paired 25 foot trawls constructed from knotless polyethylene, knotted polyethylene, undipped, knotted spectra, and conventional lightly dipped, knotted nylon webbings were compared to determine energy efficiency of the materials. Load cell readings showed significant improvement in energy efficiency for both knotless polyethylene and knotted spectra trawls. Because smaller trawl doors can be used to open and fish the two polyethylene and spectra trawls than the conventional nylon trawls, even greater energy efficiency can be achieved using trawls constructed from these materials. Although knotless polyethylene webbing costs twice as much as knotted polyethylene and knotted nylon, energy efficiencies are such that the material is cost effective and can be recommended for commercial use. Spectra webbing is very costly

but has many good points including strength and durability that need to be considered in making purchasing decisions. There was no obvious reduction in fish bycatch with any of the webbings although fouling was more apparent for the knotted nylon webbing. When commercial quantities of shrimp were present, various Bycatch Reduction Devices maintained fish:shrimp ratios of 1:1 and 2:1. [This project was funded by the Energy Division of the Louisiana Department of Natural Resources].

McCall, R.K.*, C.A. Moncreiff, T.A. Randall, J.D. Caldwell, and B.R. Blackburn. The University of Southern Mississippi, Institute of Marine Sciences, Gulf Coast Research Laboratory, Ocean Springs, MS 39566-7000.
SEAGRASS EPIPHYTES: CONTRIBUTIONS TO LOCAL CHLOROPHYLL *a* CONCENTRATION. Concentrations of water column chlorophyll *a* may be significantly amplified by suspension of benthic algae. Analogous enhancement by dislodged and suspended seagrass epiphytes is less well known. As part of a larger project, three replicate water samples were collected at each of eight sites to determine if water masses over seagrass beds exhibited higher chlorophyll *a* concentrations than water masses over nonvegetated areas. Sampling was conducted monthly for one year at four stations with two, one vegetated and one nonvegetated, sites per station. Based on a Mann-Whitney U-test, no significant differences in chlorophyll *a* were detected between site types ($P = 0.553$). Pearson's correlation analysis indicated that chlorophyll *a* was strongly correlated with turbidity, salinity, and temperature. This lack of difference in chlorophyll *a* concentration may demonstrate the importance of seagrass in diminishing the effect of wave action, hence reducing local turbulence. Concurrent identification of phytoplankton and epiphytic taxa may provide the resolution necessary to quantify the contribution of epiphytic taxa to local water column chlorophyll *a* and lead to a detectable difference between the algal composition of water masses over vegetated and nonvegetated substrata.

Miller-Way, T.[1] and R.R. Twilley[2]. [1]University of Mobile, Mobile, AL. and [2]University of Southwestern Louisiana, Lafayette, LA.
OXYGEN AND NUTRIENT METABOLISM OF A CARRIBEAN MANGROVE PROP ROOT COMMUNITY. Fringe mangrove communities are highly productive despite low nutrient concentrations in surrounding waters. As in coral reef communities, high rates of production may be maintained by intense rates of nutrient recycling. This study determined nutrient exchange and oxygen consumption rates for the dominant heterotrophic members of the mangrove prop root communities of Twin Cays, Belize. Rates were measured using closed system incubation techniques under in situ conditions. Water column nutrient concentrations were determined for sites near and far from prop root communities to corroborate microcosm results. Three of the 6 species examined (*Tedania ignis*, a sponge, *Distaplia corolla*, a tunicate, and the mangrove oyster, *Isognomon alatus*) were significant sources of NH_4 to surrounding waters (1.32-22.47 μmols gdry wt^{-1} hr^{-1}). In contrast, the sponges, *Ulosa rutzleri* and *Lissodendoryx isodictyalis* released no NH_4 but were a significant source of NO_3 to surrounding waters (0.15-14.78 μmols gdry wt^{-1} hr^{-1}), probably due to symbiotic associations with nitrifying bacteria. Stoichiometric ratios and transect data indicate that this "new" nitrogen is not lost from the system through denitrification. The sponge, *Tedania ignis*, was also a source of PO_4 to surrounding waters (0.06-0.21 μmols gdry wt^{-1} hr^{-1}). The anemone, *Aiptasia pallida*, was not a significant source or sink for oxygen or nutrients within the community but this pattern may be misleading due to the presence of zooxanthellae within its tissues. Considering their high weight specific rates and high biomass, sponges are responsible for most of the oxygen consumption of the mangrove prop root community. These data suggest that the prop root community may be a metabolic "hot spot" for nutrient regeneration and oxygen consumption within the fringe mangrove ecosystem.

Moncreiff, C.A., T.A. Randall, J.D. Caldwell, R.K. McCall, B.R. Blackburn, K.E. VanderKooy, and G.A. Criss. The University of Southern Mississippi, Institute of Marine Sciences, Gulf Coast Research Laboratory, Ocean Springs, MS 39566-7000.
SHORT-TERM EFFECTS OF HURRICANE GEORGES ON SEAGRASS POPULATIONS IN THE NORTH CHANDELEUR ISLANDS: PATTERNS AS A FUNCTION OF SAMPLING SCALE. Tropical storm events are an abiotic factor that have the potential to profoundly affect shallow water seagrass communities that occur along the shorelines of barrier islands in the northern Gulf of Mexico, as well as in other coastal areas. Degree of seagrass community disturbance is thought to be related to the strength and duration of individual storms, and can range from removal of loosely attached seagrass blades to burial of seagrasses and associated flora and fauna or complete removal of seagrasses and substrate. The authors were presented with the opportunity to assess the effects of a Category 2 hurricane on one of the northernmost extant populations of turtle grass (*Thalassia testudinium* Banks ex Konig) in the Gulf of Mexico with the passage of Hurricane Georges through the northeast Gulf

of Mexico. This storm made landfall on the Mississippi Gulf Coast on 28 September 1998, and "brushed" the eastern edge of the Chandeleur Islands over a period of 6 to 8 hours prior to landfall, though storm surge affected the region for over 30 hours. Sustained winds of 74 knots (85 mph) and 33-foot (10.1 m) seas were measured at a NOAA databuoy to the west of the site prior to loss of the buoy. Storm surges of 8.9 and 8.1 feet (2.72 and 2.47 m) were measured at sites to the east and north of the island chain on 27 and 28 September, respectively, with loss of the gage to the east of the site on 27 September. The northernmost section of the seagrass community located in this area, stretching along the northwest shoreline of the Chandeleur Islands, was sampled from 12-14 August 1998 as a component of an ongoing project focused on seagrass population status in the northeastern Gulf of Mexico. Sampling was centered near the eastern edge of the path of Hurricane Georges. One of the metrics employed in this study, the Braun-Blanquet sampling technique, is a non-destructive method of sampling which uses a visual assessment of seagrasses in a series of quadrats to measure seagrass coverage; scale is also a factor. Similar information was collected at three sampling scales (50, 200, and 500 meter hexagonal "patches") to determine if any differences in observations were localized or wide-spread. A total of 90 sets of observations were made in the study area, with 30 samples collected at each scale and four replicate observations per sampling station. A suite of abiotic factors with the potential to affect seagrasses (salinity, temperature, turbidity, water depth) were also measured. This series of observations was repeated at each sampling location on 5 November 1998 to determine if the passage of Hurricane Georges had any detectable impacts on the seagrass area under study. Patterns were observed in the shifting of substrates, loss of drift algae, loss of seagrass coverage, and the spread of manatee grass (*Syringodium filiforme* Kutz) to previously nonvegetated sites across all sampling scales, with no measurable loss of seagrass at the large sampling scale. Significant seagrass loss was observed at both the medium and small sampling scales. Sampling design and scale are thus demonstrated to be critical factors in accurately assessing the effects of large-scale environmental events on seagrass communities.

Peterson, M.S., C.F. Rakocinski, B.H. Comyns, and G.L. Fulling. Fisheries Ecology Program, Department of Coastal Sciences, Institute of Marine Sciences, The University of Southern Mississippi, Ocean Springs, MS.
INFLUENCE OF TEMPERATURE AND SALINITY ON LABORATORY GROWTH OF JUVENILE *MUGIL* SP. AND IMPLICATIONS TO VARIABLE FIELD GROWTH. Mullet (Mugilidae) are distributed worldwide in temperate and tropical marine environments, are eurytolerant of variable conditions, are commercially exploited, and have been used as a model for marine stock enhancement. Given this eurytolerance and the apparent decline of mullet in the northern Gulf of Mexico, we were interested in quantifying the influence of temperature and salinity on growth as it relates to the determination of optimal field growth conditions. We grew young juvenile mullet in a randomized and interspersed 3x4 factorial design (20, 25 and 30°C and 3, 10, 17 and 24‰) with 9 replicates each (5 fish/replicate) over a 30 d period. Results from the laboratory experiments revealed significant temperature ($p < 0.001$) and salinity ($p = 0.019$) effects on growth, with no interaction term ($p = 0.964$). These data suggest optimal growth occurred at temperatures 25°C; and, within each temperature treatment, peak growth occurred at 17‰. To compare these results to growth in the field, modal shifts in length-distributions of recruiting cohorts of young juvenile mullet were considered in relation to continuous changes in ambient abiotic conditions monitored with Hydrolabs at two widely separated locations (45 km apart) along the Mississippi coast. Modal standard length change of young juvenile mullet over a 7 d period was 3.4 mm (0.486 mm/d) at the Marsh Point location and was 2.2 mm (0.314 mm/d) at the Henderson Point location over the same time period. This is a 35.4% difference in standard length over 7 d, which when coupled with the salinity and temperature data noted above, parallel and generally support the differences observed from the laboratory growth experiments.

Proffitt, C.E. U.S. Geological Survey/BRD, National Wetlands Research Center, Lafayette, LA.
PRELIMINARY ASSESSMENT OF HURRICANE MITCH DAMAGE IN HONDURAS. In late October and early November Hurricane Mitch battered Honduras and other Central American countries. As part of the aid package, a 7 person team was sent by USGS to evaluate landslides, flooding, and effects on natural biological resources. When it hit the Caribbean coast Bay Island of Guanaja, Mitch was a category 5 storm with winds up to 250 mph. Most of the island's forests were destroyed by windthrow, trunk shattering, and defoliation including upland pines and large tracts of mangroves. The only mainland coral reef at Tela was destroyed by waves and by extensive sedimentation from river runoff. At least 7 weeks after the storm, we observed that there were still massive sediment plumes extending from most north coast rivers. Origin of most of the sediment were the thousands of landslides and debris flows that occurred in the central and

southern portions of the country. These slides were caused mainly by the > 4 ft. of rainfall that fell in a 2 day period in that region of the country when Mitch arrived there as a marginal hurricane and later became a tropical storm. Flooding and downstream sedimentation was extensive on both north and south (Pacific) coasts. In the south, several rivers changed course, destroyed at least 500 ha of mangroves, caused extensive sediment deposits in subtidal and intertidal regions and shrimp farms, and may have affected salinity regimes in portions of the Gulf of Fonseca. Shrimp farm losses were near 100% and the degree of impact on natural shrimp populations is unknown. In the city of Choleteca at least two warehouses storing pesticides were washed away and as much as 1000 barrels of chemical product lost, possibly to the Gulf of Fonseca. Aerial surveys using BRD amphibious planes did not reveal many of the barrels. In most large river valleys, where most of the agriculture occurs, damage to crops and crop lands from flooding and sedimentation was extensive. Many fields were still flooded during our survey 7 weeks post storm.

Rakocinski, C.F., H.M. Perry, M.A. Abney, and K.M. Larsen. Gulf Coast Research Laboratory, Institute of Marine Sciences, The University of Southern Mississippi, Ocean Springs, MS 39566-7000. **SOFT-SEDIMENT RECRUITMENT DYNAMICS OF BLUE CRABS IN MISSISSIPPI SOUND.** Interannual variability in harvestable blue crab stocks leads to questions concerning whether year-class strength depends more on pre-settlement supply (larval recruitment) or post-settlement survival. In 1997, we initiated a sampling program to study blue crab recruitment dynamics, including post-settlement supply and loss. We focused on soft-sediment because it forms the largest share of potential habitat for benthic recruitment in Mississippi Sound, and is largely neglected in other crab recruitment studies. For six weeks in late summer, we employed suction sampling at two sites separated by about 7.5 km in eastern Mississippi Sound, where settlement collectors were also being maintained daily. Once per week densities of early crab stages were sampled at each site along four transects across three depths. From 156 suction samples representing 13 collections, a total of 1,269 *Callinectes sapidus* and 130 *Callinectes similis* ranging in carapace width between two and 28 mm was obtained. In soft-sediments, densities of early crabs typically varied between 0 and 15.3 m^2, and their spatial distribution was moderately clumped. However, densities reached as high as 180 m^2 in the presence of floating bryozoan mats, which provided increased habitat structure for small crabs. Despite an apparent high mortality rate in soft-sediment habitat, the effects of fish predation appeared to be relatively low when post-settlement crab densities were also moderately low. Fluctuations in total numbers of early crabs generally agreed between the two sites in direction, but differed irregularly in magnitude. Habitat-specific variation will be elucidated and the degree of coherence between numbers of crabs from suction samples and settlement collectors will be examined.

Sheridan, P. and T. Minello, National Marine Fisheries Service, Galveston, Texas. **USE OF DIFFERENT TYPES OF SEAGRASS BEDS BY FISHERY SPECIES AND OTHER ESTUARINE NEKTON IN LOWER LAGUNA MADRE, TEXAS.** Lower Laguna Madre is a euhaline estuary with extensive beds of seagrasses. Our objective was to compare nekton use of three dominant types of natural seagrass beds (*Halodule wrightii, Syringodium filiforme,* and *Thalassia testudinum*), mixed beds that had colonized deposits of dredged material, and recently deposited dredged material that had been transplanted or left bare (transplants failed, leaving non-vegetated mud). A 1 m^2 quantitative enclosure device was used to sample these different areas to depths of 1.4 m and to determine density (utilization) patterns in daylight hours during spring and fall of 1996 and 1997. Fish communities of vegetated and non-vegetated habitats were different, even though total densities often did not differ significantly. Total decapod densities were almost always higher in seagrass beds than on non-vegetated bottom. Dominant decapod species were found in all habitats during months they were present in the system, but most (9 of 12 species) were significantly more abundant within seagrass. Mean fish biomass was usually higher in seagrass than on non-vegetated bottom, but differences were not always significant. Shrimp and crab biomasses were usually significantly higher in seagrass habitats. The totalnumber of species recorded was also higher within seagrass habitats compared with non-vegetated bottom. Overall, newly deposited dredged material appears to support relatively few organisms, but once dredged material deposits re-vegetate, they support high densities and diversities of nekton typical of undisturbed seagrasses. Our study indicates, however, that positioning of dredged material deposits is critical if eventual re-vegetation is the goal. The nekton densities in Lower Laguna Madre seagrasses were generally lower than those observed in seagrass beds elsewhere in Texas. Nevertheless, inshore and offshore fisheries productivity for the region is among the highest along the Texas coast. The mechanism for maintaining system productivity resides in the 480 km^2 of seagrasses in Lower Laguna Madre.

Stunz, G.W.[1,*], T. Minello[2], and P. Levin[3]. [1]Texas A&M University, Dept. Wildlife and Fisheries Sciences. College Station, TX, [2]National Marine Fisheries Service, Galveston, TX, and [3]University of California, Institute of Marine Sciences, Santa Cruz, CA. **RECRUITMENT PATTERNS, GROWTH, AND PREDATION OF RED DRUM (*SCIAENOP OCELLATUS*) IN VARIOUS GALVESTON BAY HABITATS.** Seagrass beds are essential nursery habitats for many estuarine fishes, yet seagrass-dependent fishes may utilize different habitats when seagrass is absent. We examined patterns of habitat use by red drum in Galveston Bay, Texas, to determine how the absence of seagrass affects recruitment of a species known to use seagrass as nursery habitat. Surveys using an epibenthic sled and an enclosure sampler were taken from three potential nursery habitats: marsh edge, seagrass, and unvegetated bottom. Highest densities of red drum were observed in areas of seagrass. In areas absent of seagrass, the highest densities occurred along the marsh edge interface. Mesocosm experiments of habitat selection among marsh, oyster, seagrass, and unvegetated sand/mud showed distinct selection for highly structured habitats such as oyster reef, and the presence of a predator in a particular habitat could influence this habitat selection. Using field enclosures, differential growth rates were observed among various estuarine habitats. Growth rates were greatest in seagrass followed by marsh, unvegetated bottom, and oyster, respectively. Differences in both habitat availability and habitat preference associated with differential growth rates among habitats, suggest that marsh edge as opposed to seagrass beds could be functioning as essential recruitment habitat for red drum in Galveston Bay.