PROGRAM AND ABSTRACTS OF THE 35th ANNUAL MEETING OF THE MISSISSIPPI CHAPTER OF THE AMERICAN FISHERIES SOCIETY

IP CASINO and RESORT
BILOXI, MISSISSIPPI
11 – 13 FEBRUARY 2009

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Special thanks to: Glenn Miller, Steve Curran, Susan Baker and Cliff Hutt for assisting with program development and registration packets

Distinguished Guests

Dr. Don Jackson, President-Elect, American Fisheries Society
Dr. William Walker, Director of the Mississippi Department of Marine Resources
Dr. Lisa Desfosse, Director of the National Marine Fisheries Service, Southeast Science Center, Mississippi Laboratories

Banquet Speaker

Dr. Mark Peterson, Professor, Department of Coastal Sciences, The Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS

"Strengths & weaknesses of coastal landscapes: linked environmental mosaics, cumulative impacts & the link to our valuable natural/cultural resources"

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MISSISSIPPI CHAPTER OF THE AMERICAN FISHERIES SOCIETY
PROGRAM OVERVIEW

WEDNESDAY – 11 FEBRUARY 2009

ACTIVITY	TIME	ROOM
MEETING REGISTRATION/SOCIAL	6:00 – 8:00 pm	**Carnaval de Brasil**

THURDAY – 12 FEBRUARY 2009

ACTIVITY	TIME	ROOM
MEETING REGISTRATION	8:00 – 8:30	**Ballroom Foyer**
OPENING REMARKS	8:30 – 9:00	Meeting Room **B**
SESSION 1A	9:00 – 10:00	Meeting Room **B**
SESSION I B	9:00 – 10:00	Meeting Room **C**
BREAK	10:00 – 10:15	
SESSION II A	10:15 – 11:30	Meeting Room **B**
SESSION II B	10:15 – 11:30	Meeting Room **C**
LUNCH	11:30 – 1:00	
SESSION III	1:00 – 2:45	Meeting Room **B**
BREAK	2:45 – 3:15	
SESSION IV	3:15 – 5:00	Meeting Room **B**
STUDENT CAUCUS MEETING	5:00 – 6:00	Meeting Room **B**
BANQUET	7:00 – 10:00	Mirrored Hall (Off-site)

FRIDAY – 13 FEBRUARY 2009

ACTIVITY	TIME	ROOM
BUSINESS MEETING	8:30 – 11:00	Meeting Room **A**

MISSISSIPPI CHAPTER OF THE AMERICAN FISHERIES SOCIETY
PROGRAM

WEDNESDAY – 11 FEBRUARY 2009

6:00 – 8:00 MEETING REGISTRATION/SOCIAL **Carnaval de Brasil**

THURDAY – 12 FEBRUARY 2009

8:00 – 8:30 MEETING REGISTRATION **Ballroom Foyer**

8:30 – 9:00 OPENING REMARKS **Meeting Room B**
Dr. Kevin Hunt, MSAFS President
Dr. William Walker, Director, Mississippi Department of Marine Resources

9:00 – 10:00 SESSION 1A *(Moderator, Wes Neal)* **Meeting Room B**

9:00 – 9:15 **OCEANIC-ATMOSPHERIC MODES OF VARIABILITY AND THEIR EFFECT ON RIVER FLOW AND BLUE CRAB (*CALLINECTES SAPIDUS*) ABUNDANCE IN THE NORTHCENTRAL GULF OF MEXICO.** Guillermo Sanchez, Harriet Perry, and Patricia Biesiot

9:15 – 9:30 **POPULATION TRENDS OF BLUE CRABS IN MISSISSIPPI AND LOUISIANA FROM FISHERY-INDEPENDENT SURVEY DATA.** Harriet Perry, Ralf Riedel, Guillermo Sanchez, Harry Blanchet and Vince Guillory

9:30 – 9:45 **ASSESSING STOCKS OF THE MISSISSIPPI BLUE CRAB FISHERY.** Darcie J. Graham, John Anderson, Dyan Gibson, Harriet Perry, Guillermo Sanchez, Traci Floyd and Bill Richardson

9:45 – 10:00 **ARCHEOLOGICAL RECORDS OF FRESWATER MOLLUSKS (550 A.D.) FROM THE BOEUF RIVER IN NORTHEAST LOUISIANA.** Steven G. George

9:00 – 10:00 SESSION I B *(Moderator, Gary Gray)* **Meeting Room C**

9:00 – 9:15 **SUMMARY OF THE 2008 MISSISSIPPI SEAMAP INSHORE LONGLINE SHARK RESOURCE SURVEY.** Jill M. Hendon and Eric R. Hoffmayer

9:15 – 9:30 **JUVENILE TARPON (*MEGALOPS ATLANTICUS)* IN MISSISSIPPI COASTAL WATERS: SHORT-TERM EVENT OR LONG-TERM TREND?** Jim Franks, Gary Gray, Paul Grammer, James Ballard, and Michael Buchanan

9:30 – 9:45 **PATHWAYS FOR TRANSPORT OF LARVAL TARPON (*MEGALOPS ATLANTICUS)* INTO MISSISSIPPI COASTAL WATERS.** Donald R. Johnson and Jim S. Franks

9:45 – 10:00 **IDENTIFICATION AND CHARACTERIZATION OF SPOTTED SEATROUT SPAWNING HABITAT IN TWO MISSISSIPPI ESTUARIES UTILIZING PASSIVE ACOUSTICS.** Eric R. Hoffmayer, Jennifer A. McKinney, Jim S. Franks, Bruce H. Comyns, Susan K. Lowerre-Barbieri, Sarah L. Walters, and Joel W. Bickford

10:00 – 10:15 **BREAK**

10:15 – 11:30 SESSION II A *(Moderator, TBA)* **Meeting Room B**

10:15 – 10:30 **AGE AND SIZE AT SEXUAL MATURITY OF THE LITTLE SKATE (*LEUCORAJA ERINACEA*), FROM THE WESTERN GULF OF MAINE.** Angela M. Cicia, William B. Driggers III, G. Walter Ingram Jr., Jeff Kneebone, Paul C. W. Tsang, David M. Koester, and James A. Sulikowski

10:30 – 10:45 **THE EFFECT OF SALINITY ON THE BIOENERGETICS OF THE YOUNG-OF-THE-YEAR ATLANTIC STINGRAY (*DASYATIS SABINA*).** John P. Shelley, Eric R. Hoffmayer, Mark S. Peterson, and Bruce H. Comyns

10:45 – 11:00 **VARIABILITY IN THE REPRODUCTIVE CYCLE OF FINETOOTH SHARKS (*CARCHARHINUS ISODON)* IN THE NORTHERN GULF OF MEXICO.** William B. Driggers, and Eric R. Hoffmayer

11:00 – 11:15 **ASSESSING THE VALUE OF EXTERNAL MORPHOLOGICAL CHARACTERS IN IDENTIFYING TRIAKID SHARKS IN THE NORTHERN GULF OF MEXICO.** Lisa M. Jones, William B. Driggers, and Joseph M. Quattro

11:15 – 11:30 **FIELD ENDOSCOPY STUDIES OF STURGEON IN THE LOWER MISSISSIPPI RIVER.** K. A. Boysen, S. J. Hernandez-Divers, S. S. Boone, A.C. Camus, J. J. Hoover, K. J. Killgore, C. E. Murphy, and S. G. George

10:15 – 11:30 SESSION II B *(Moderator, TBA)* **Meeting Room C**

10:15 – 10:30 **TIME, TEMPERATURE AND DEPTH PROFILES FOR A LOGGERHEAD SEA TURTLE (*CARETTA CARETTA*) CAPTURED WITH A PELAGIC LONGLINE.** Mark A. Grace, John Watson and Dan Foster

10:30 – 10:45 **USE OF A MODIFIED BRETT SWIM TUNNEL TO EVALUATE SWIMMING PERFORMANCE OF ADULT SHOVELNOSE STURGEON.** Jay Collins, Krista Boysen, and Jan Jeffrey Hoover

10:45 – 11:00 **HYDRILLA MANAGEMENT IN RESERVOIRS: PERSPECTIVES FOR MISSISSIPPI.** James P. Kirk

11:00 – 11:15 **INFLUENCE OF SHORELINE MACROPHYTES ON THE ASSEMBLAGE OF FISHES IN MISSISSIPPI DELTA OXBOWS.** Matthew R. Spickard* and Eric D. Dibble

11:15 – 11:30 **SUBMERGED AQUATIC MACROPHYTE RE-VEGETATION EFFORTS FOR FISH HABITAT IN LITTLE BEAR CREEK RESERVOIR, ALABAMA.** Jonathan P. Fleming*, John D. Madsen, and Eric D. Dibble

11:30 – 1:00 LUNCH

1:00 – 2:45 SESSION III *(Moderator, Rich Fulford)* **Meeting Room B**

1:00 – 1:15 **THE INFLUENCE OF SERIAL ARRANGEMENT OF DAMS ON NUTRIENT AND SESTON: PRELIMINARY RESULTS.** Zarul H Hashim*

1:15 – 1:30 **EVALUATION OF ARTIFICIAL REEF DESIGN AND PLACEMENT FOR POST-HURRICANE KATRINA RESTORATION OF RED SNAPPER FISHERIES ALONG THE MISSISSIPPI GULF COAST.** Jason R. Brandt* and Donald C. Jackson

1:30 – 1:45 **EVALUATION OF INTERNAL TAG PERFORMANCE IN HATCHERY-REARED JUVENILE SPOTTED SEATROUT (*CYNOSCION NEBULOSUS)*.** Jonathan P. Wagner*, Reginald B. Blaylock, Jeffrey M. Lotz, and Mark S. Peterson

1:45 – 2:00 **RESCUE OF PALLID STURGEON ENTRAINED DURING OPERATION OF THE BONNET CARRE SPILLWAY.** Jack Killgore, Jan J. Hoover, Steven G. George, Krista A. Boysen, Bradley R. Lewis, Phil P. Kirk, Jay A. Collins, Tim Ruth, Richard E. Boe, and Chris G. Brantley

2:00 – 2:15 **AN ECONOMIC ANALYSIS OF THE RECREATIONAL FISHERIES IN SARDIS AND GRENADA LAKES.** Clifford Hutt*, Kevin Hunt, Susan Baker, Steve Grado, and Leandro Miranda

2:15 – 2:30 **THE EFFECTS OF FISHING EFFORT ON CATCHABILITY OF LARGEMOUTH BASS (*MICROPTERUS SALMOIDES).*** Matthew G. Wegener* and Harold L. Schramm

2:30 – 2:45 **A COMPARISION OF CATCH-RELATED ATTITUDES OF MISSISSIPPI CATFISH ANGLERS AND HAND GRABBLERS.** Susan F. Baker*, Kevin M. Hunt, Steve E. Miranda, and Stephen C. Grado

2:45 – 3:15 BREAK

3:15 – 5:00 SESSION IV *(Moderator, Chet Rakocinski)* **Meeting Room B**

3:15 – 3:30 **COHORT GROWTH DYNAMICS OF THE BAY ANCHOVY (*ANCHOA MITCHILLI)* IN THE NORTHCENTRAL GULF OF MEXICO.** Paul O. Grammer* and Bruce H. Comyns

3:30 – 3:45 **GROWTH RELATED CONSTRAINTS BASED ON CALORIC VALUES OF BLUEGILL DIETS BEFORE AND AFTER PLANT REMOVAL.** Krisan M. Webb* and Eric D. Dibble

3:45 – 4:00 **STOCK ASSESSMENT OF FLATHEAD CATFISH (*PYLODICTIS OLIVARIS)* IN THE PASCAGOULA RIVER FOLLOWING THE PASSAGE OF HURRICANE KATRINA.** Russell M. Barabe*, and Donald C. Jackson

4:00 – 4:15 **INTRODUCED PEACOCK BASS (*CICHLA KELBERI)*: DIRECT AND INDIRECT EFFECTS AND RECOGNITION BY NATIVE PREY.** Katya Kovalenko*, Eric D. Dibble, Angelo A. Agostinho, Geuza Cantanhêde, Rosemara Fugi, Fernando M. Pelicice, and Sidinei M. Thomaz

4:15 – 4:30 **QUANTIFYING REGIONAL DIFFERENCES IN SHARK ABUNDANCE AND DISTRIBUTION: A STEP TOWARDS ECOSYSTEM MANAGEMENT.** J. Marcus Drymon* and S. Powers

4:30 – 4:45 **INFLUENCE OF TURBIDITY ON FISH DISTRIBUTION, DIETS AND FORAGING EFFICIENCY.** Thad W. Huenemann* and Eric D. Dibble

4:45 – 5:00 **MOVEMENT AND HABITAT USE OF PALLID STURGEON IN THE ATCHAFALAYA RIVER SYSTEM.** William O. Dunn III* and Harold L. Schramm Jr.

8:00 – 5:00 POSTER PRESENTATIONS

SCIENCE THROUGH FISHING: COLLABORATIVE RESEARCH BETWEEN SCIENTISTS AND RESOURCE USERS. J. Read Hendon and James S. Franks

PROGRESS TOWARDS A VIABLE BLUE CRAB AQUACULTURE INDUSTRY IN MISSISSIPPI. Christine Trigg, Dyan Gibson, and Kirk Halstead

MARINE/ESTUARINE FAUNAL INVENTORY OF MISSISSIPPI COASTAL WATERS. Lisa Hendon, H. Perry, and D. Graham

5:00 – 6:00 STUDENT CAUCUS MEETING Meeting Room B

7:00 – 10:00 BANQUET (Mirrored Hall, 2600 Hwy 90, Ocean Springs)

FRIDAY – 13 FEBRUARY 2009

8:30 – 11:00 BUSINESS MEETING Meeting Room A

ORAL PRESENTATIONS

A COMPARISON OF CATCH-RELATED ATTITUDES OF MISSISSIPPI CATFISH ANGLERS AND HAND GRABBLERS

Susan F. Baker*, Department of Wildlife and Fisheries, Mississippi State University, Box 9690, Mississippi State, Mississippi, 39762, sfb48@msstate.edu

Kevin M. Hunt, Department of Wildlife and Fisheries, Mississippi State University

Leandro E. Miranda, U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit

Stephen C. Grado, Department of Forestry, Mississippi State University

Hand grabbling is a non-traditional form of fishing where the grabbler puts his or her hand in an underwater natural or artificial cavity and attempts to get a catfish to bite his or her hand, after which the fish is pulled out. Grabbling is controversial because the Mississippi grabbling season (May 1 to July 15) coincides with catfish spawning, spurring negative perceptions towards grabblers who are viewed as detrimental to catfish populations. Little is known about the catch-related attitudes of grabblers and whether they differ from traditional hook-and-line anglers to warrant these negative perceptions. The study objective was to document characteristics, participation patterns, species preferences, and catch-related attitudes of hand grabblers and test whether or not these attitudes were different from a sample of licensed Mississippi hook-and-line catfish anglers. To develop a sampling frame of hand grabblers, researchers at Mississippi State University relied on snowball sampling and various media outlets to attract participants. Eligible grabblers were mailed an 11-page, self-administered mail questionnaire. Researchers pulled a random sample of 1000 licensed Mississippi anglers who also were mailed an 11-page, self-administered mail questionnaire to compare with the non-random sample of grabblers. Differences in grabbler and catfish angler catch-related attitudes will be discussed.

STOCK ASSESSMENT OF FLATHEAD CATFISH (*PYLODICTIS OLIVARIS),* IN THE PASCAGOULA RIVER FOLLOWING THE PASSAGE OF HURRICANE KATRINA

Russell M. Barabe*, Mississippi State University, Department of Wildlife and Fisheries, Box 9690, Mississippi State, MS, 39762. rmb237@msstate.edu

Donald C. Jackson. Mississippi State University, Department of Wildlife and Fisheries

The passage of Hurricane Katrina in August 2005 led to hypoxic fish kills in the Pascagoula River in southeast Mississippi, impacting important recreational and commercial fisheries such as flathead catfish *Pylodictis olivaris*. We conducted a stock assessment on flathead catfish in the Pascagoula River to determine the status of this fishery following the hurricane. . We used low-frequency pulsed DC electrofishing from May through July 2007 and 2008 for fish collection. The 2007 sampling efforts resulted in the capture of 266 flathead catfish with an average TL of 285 mm (7.49). The 2008 sampling efforts resulted in the capture of 632 flathead catfish with an average TL of 283 mm (4.65). Growth rates of flathead catfish in the Pascagoula River were determined from segmented pectoral spines and back-calculated average length-at-age values. Growth displayed a linear pattern in 2007, where the oldest fish captured was age five. However, growth exhibited an asymptotic relationship in 2008, where the oldest fish captured was eight. Nonetheless, the overall growth pattern in 2008 was still linear. The catch per unit effort (CPUE) for stock-size flathead catfish (TL ≥350 mm) in 2007 and 2008 was 3.92 (0.58) and 7.02 (0.67) fish/hour, respectively. The CPUE of quality-size flathead catfish (TL ≥510 mm) in 2007 and 2008 was 0.87 (0.28) and 1.49 (0.29) fish/hour, respectively. By tracking cohort development, we found that strong year-classes hatched before the hurricane (2005) and after the hurricane (2006). These year-classes are responsible for the increases in abundance of stock- and quality-size individuals. These smaller, younger individuals far outnumbered the remnant populations of larger, older fish that survived the prolonged hypoxic event caused by Hurricane Katrina. Thus, the age and size structure of the flathead catfish population in the Pascagoula River is truncated. Several methods were used to calculate total annual mortality, and estimates ranged from 51-83% in 2007, to 49-65% in 2008. When compared to mortality estimates reported for other flathead catfish populations, these numbers seem high. We believe the truncated age structure is responsible for these results and we are currently looking for other ways to estimate mortality. Our assessment of the flathead catfish stocks in the Pascagoula River, and comparisons with variables reported for other flathead catfish populations, lead us to believe that the flathead catfish fishery in the Pascagoula River is responding well to the hurricane-induced fish kill. Although small, flathead catfish are abundant and exhibiting relatively fast growth rates and good condition factors.

FIELD ENDOSCOPY STUDIES OF STURGEON IN THE LOWER MISSISSIPPI RIVER

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S. J. Hernandez-Divers, S. S. Boone, and A.C. Camus, Zoological Medicine, Dept. of Small Animal Medicine and Surgery, College of Veterinary Medicine, Athens, GA 30602-7930

J. J. Hoover, K. J. Killgore, C. E. Murphy, and S. G. George, U.S. Army Engineer Research and Development Center, Vicksburg, MS

Data on reproduction are required for effective population modeling of sturgeon but are difficult to obtain for endangered or protected species due to prohibitions on destructive or potentially injurious sampling. Endoscopy, a minimally invasive and safe diagnostic technique traditionally used in veterinary and laboratory settings, was evaluated for use in four field studies of sturgeon in the Lower Mississippi River (RM 581-737), 07 March 2007 (Island 63, MS), 27 March 2007 (Memphis, TN), 29-31 Jan 2008 (Mhoon Bend, MS), and 04 March 2008 (Rosedale, MS). Two types of equipment were used: a general (eye piece-based) endoscope, and a video-based endoscope with video capabilities. Island 63 field trip studied eight shovelnose sturgeon (594-706 mm FL) with a general endoscope and confirmed correct gender by dissection of 38% (all female specimens). The second field trip to Memphis continued with the general endoscope and resulted in the correct gender identification of 29% (female and male specimens were equal) shovelnose sturgeon (510-764 mm FL). Using the video-based endoscope, protocols were established, personnel were trained, and surgical technique evaluated at Mhoon Bend. Twenty-five shovelnose sturgeon (363-733 mm FL), two pallid sturgeon (710, 720 mm FL), and one morphologically intermediate sturgeon (698 mm FL) were collected, anesthetized, insufflated, and examined telescopically, biopsied, and photographed prior to recovery and release. Shovelnose sturgeon sex ratio was near unity (male: female = 0.9: 1.0). Majority of males (60%) had medium to large, white or pink testes. Slightly more than a third of females (31%) had large yellow or black eggs. Two shovelnose sturgeon were transgender. Pallid sturgeon were both immature females. Subsequent histological analyses, instead of dissection, indicated that not only gender but gonadal stage assignment based on field observations was correct for > 90% of all individuals. The last field trip to Rosedale used the general endoscope from previous trips. Dissection of nine shovelnose sturgeon (458-685 mm FL) concluded 56% were completed correctly (three females and two males). Study demonstrated that endoscopy is an effective and practical field technique for establishing gender, reproductive condition, and gonadal anomalies. Repeated endoscopic sampling of a population can provide additional data on onset and duration of spawning season, chronology and duration of gonadal stages, and percentages of adults likely to spawn. Endoscopy can also be used to estimate fecundity and other parameters required for empirically based models of population viability.

EVALUATION OF ARTIFICIAL REEF DESIGN AND PLACEMENT FOR POST-HURRICANE KATRINA RESTORATION OF RED SNAPPER FISHERIES ALONG THE MISSISSIPPI GULF COAST

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Donald C. Jackson, Department of Wildlife and Fisheries, Mississippi State University

Red snapper, *Lutjanus campechanus*, represent one of the more economically important fisheries in the northern Gulf of Mexico, and as such, red snapper abundance has decreased by almost 90% in the past two decades. The use of artificial reefs could aid in the rehabilitation of red snapper stocks by providing refuge for juvenile red snapper and a place of foraging and recruitment. A program was initiated to determine the effectiveness of different placement and distribution patterns of artificial reefs in attracting and sustaining juvenile red snapper in the northern Gulf of Mexico. Between September 2007 and December 2008, fish traps were deployed on pyramid shaped artificial reef structures at reef site FH-13, 40 km south of Pascagoula, Mississippi. Two reef designs were tested. The first consisted of five closely spaced pyramid units and the second five closely spaced pyramids with two sets of two outliers at varying distances (100, 200, and 300 ft). To test the effect of different depths of artificial reef material on recruitment of juvenile red snapper to the structure and retention on the structure, reef site FH-13 was divided into three sections across depth strata determined to be pertinent for the study. In 26 sampling trips, 927 red snapper were captured and 852 tagged with t-bar anchor tags. The shallowest section, Section A (20-23 m deep), produced the highest CPUE (Mean= 2.11 red snapper/h; SE= 0.16) and the outlier 200 pattern produced the highest CPUE (Mean= 1.74 red snapper/h; SE=0.18) of the four sampled pattern types. A total of thirty one red snapper were recaptured (tag return rate 4%) with one fish recaptured at a different site from original tagging location. Mean growth rate of recaptured fish was 0.30 mm d^{-1} (FL). Results indicate that artificial reefs are effective at attracting and maintaining juvenile red snapper in the northern Gulf of Mexico, which could aid in the rehabilitation of red snapper stocks.

AGE AND SIZE AT SEXUAL MATURITY OF THE LITTLE SKATE (LEUCORAJA ERINACEA) FROM THE WESTERN GULF OF MAINE

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William B. Driggers III, and G. Walter Ingram Jr., National Marine Fisheries Service, Southeast Fisheries Science Center, Mississippi Laboratories

Jeff Kneebone and Paul C. W. Tsang, Department of Animal and Nutritional Sciences, University of New Hampshire, Durham, NH 03824

David M. Koester, Department of Anatomy, College of Osteopathic Medicine, University of New England

James A. Sulikowski, Marine Science Center, University of New England, 11 Hills Beach Rd, Biddeford, ME 04005

Due to the increased commercial value and declining biomass of the little skate, *Leucoraja erinacea*, obtaining life history information is critical to prevent overexploitation and ensure the sustainability of this resource. One particular life history parameter essential to the management process is the age and size at which a species reaches sexual maturity. Age and size at sexual maturity was determined for 162 male and 273 female little skates collected from the western Gulf of Maine. Sexual maturity was assigned based on three criteria: reproductive morphology, histology, and steroid hormone concentrations. Maturity ogives based on data from shell gland mass, maximum follicle size and circulating estradiol concentrations, suggest that 50% maturity in females occurs at age 9·5 years and 48 cm total length (L_T). Maturity ogives for males, based on clasper length, testes mass, circulating testosterone concentrations, and the proportion of mature spermatocysts in the testes, suggest 50% maturity occurs at 7·7 years and 46 cm L_T. Ages were estimated using vertebral band counts from skates ranging in size from 9·3 to 57 cm L_T. The index of average percent error and age-bias plots indicated our ageing methods were precise and nonbiased. To validate the annual periodicity of band formation, oxytetracycline was injected into 20 individuals held in captivity for 12 months. Results indicate that little skates exhibit characteristics that have made other elasmobranchs populations highly susceptible to overexploitation.

USE OF A MODIFIED BRETT SWIM TUNNEL TO EVALUATE SWIMMING PERFORMANCE OF ADULT SHOVELNOSE STURGEON

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Krista Boysen, and Jan Jeffrey Hoover, USACE Engineer Research and Development Center

A specially designed Brett swim tunnel was used to evaluate factors potentially influencing swimming performance of adult shovelnose sturgeon (*Scaphirhynchus platorynchus*). Tunnel is vertically-elliptical with a total water volume of 1359 liters and a working section of 0.6 by 1.8 m; flow is generated by a 5-horsepower electrical motor turning a 33 cm propeller and speed is controlled with a rheostat. We tested 12 fish collected Mar-Aug 2008 near Vicksburg, MS. For each trial, one of two inserts was placed in the working section to create a specific flow regime: a traditional cylindrical tube for rectilinear flow (equal flow throughout chamber), and a raised "false bottom" for boundary layer flow (i.e., reduced water velocity across substrate surface). Performance was measured as 15-minute critical swim speeds (i.e., maximum water velocity at which time-to-fatigue equals 15 minutes). Water temperatures fluctuated with ambient laboratory temperature and ranged from 20-25 C. Fish were 494-705 mm SL, 480-1447 g. Critical swim speeds in rectilinear flow were 89.3-112.6 cm/s, similar to values of 61.7-116 cm/s obtained for comparable-sized fish in a previous study, but in which water temperature was only 16 C. Critical swim speeds in boundary-layer flow were substantially higher: 129.5-170+ cm/s. There were no correlations between critical swim speeds and size of fish (length or weight), but for the fish tested in boundary-layer flow, there was a positive effect of temperature. At 20 C, critical swim speeds of those fish were <152 cm/s; at > 22 C, critical swim speeds were > 170+ cm/s. Data demonstrated the following: 1) size of adult sturgeon did not influence critical swim speeds; 2) temperature effects on swimming performance were more pronounced at higher temperature (> 20 C) and in boundary layer conditions.

VARIABILITY IN THE REPRODUCTIVE CYCLE OF FINETOOTH SHARKS (*CARCHARHINUS ISODON*) IN THE NORTHERN GULF OF MEXICO

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Eric R. Hoffmayer, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi

From 2005 through 2008, seven mature female finetooth sharks, *Carcharhinus isodon*, were collected in the central northern Gulf of Mexico, between April and June; a time coinciding with parturition and ovulation for the species. Five specimens displayed states of pregnancy and ovarian development consistent with a biennial reproductive cycle. Two individuals had near-term pups and vitellogenic oocytes; a condition indicative of an annual reproductive cycle. These observations are the first report of annual reproduction in finetooth sharks and represent the first documented case of intraspecific divergence in the reproductive cycles for any elasmobranch.

QUANTIFYING REGIONAL DIFFERENCES IN SHARK ABUNDANCE AND DISTRIBUTION: A STEP TOWARDS ECOSYSTEM MANAGEMENT

J. Marcus Drymon*, NOAA Fisheries Service, Southeast Fisheries Science Center, Mississippi Laboratories, PO Drawer 1207, Pascagoula, MS 29567 and University of South Alabama, Department of Marine Sciences, Fisheries Ecology Lab, Dauphin Island Sea Lab, marcus.drymon@noaa.gov

S. Powers, University of South Alabama, Department of Marine Sciences, Fisheries Ecology Lab, Dauphin Island Sea Lab.

A directive of the United States Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) is incorporation of ecosystem principles into future stock assessment. Ecopath/Ecosim routines are a common way to model such ecosystem effects, but rely on detailed biological data for model inputs. Modelers often lump sharks and other predatory fishes into a single group of apex predators, when in reality this apex predatory role is likely species and region specific. To investigate the trophic role of sharks in our region, monthly longline surveys were conducted to assess fine scale patterns of shark abundance and distribution in the northern Gulf of Mexico. This survey straddles an area where disjunctive shark abundances have historically been shown. Multivariate analysis of 2007 data indicate adjacent areas within the Gulf of Mexico Large Marine Ecosystem (LME) show differences in shark community structure as revealed by non-metric multi-dimensional scaling and ANOSIM routines. Consequences for region specific differences in trophic transfer and management issues are discussed.

MOVEMENT AND HABITAT USE OF PALLID STURGEON IN THE ATCHAFALAYA RIVER SYSTEM

William O. Dunn III*, Department of Wildlife and Fisheries, Mississippi State University, Post Office Box 9690, Mississippi State, Mississippi 39762, wd38@msstate.edu

Harold L. Schramm Jr., U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit

Pallid sturgeon *Scaphirhynchus albus* are an endangered species of riverine sturgeon. Little is known about their life history and habitat use. Eighteen pallid sturgeon 685-983 mm fork length captured downstream of water control structures separating the Mississippi River from the Atchafalaya River-Old River-Outflow Channel-Red River system (Atchafalaya River system, ARS) were implanted with sonic tags during 8 February-23 March 2007, and 16 pallid sturgeon 699-971 mm fork length were implanted during 16 November 2007-13 March 2008. Fish were actively tracked with mobile receivers and passively tracked with stationary sentinel receivers placed on bridges and other structures in the ARS. Five fish tagged in the first year moved downstream 31 to 96 miles in early summer and returned to near the tagging location during the following summer. Four other fish moved downstream during the same time but were not recorded after the following spring. Six fish tagged the second year moved downstream 29 to 114 miles during the same time as the previous year's fish. Our data suggest that pallid sturgeon migrate on an alternate-year pattern. Continued use of active tracking and a restored stationary sentinel system in the next year will likely confirm this.

SUBMERGED AQUATIC MACROPHYTE RE-VEGETATION EFFORTS FOR FISH HABITAT IN LITTLE BEAR CREEK RESERVOIR, ALABAMA

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Reestablishment of native aquatic plant communities is a technique that can be used to restore vegetated habitat important to fish with positive effects on water quality and other aquatic fauna. During 2007 we planted a variety of aquatic plant species in Little Bear Creek Reservoir in Northwest Alabama. Of the five species planted, American pondweed *Potamogeton nodosus* was the only species to show significant survival rates ($p < 0.05$). Several factors may have led to low survival of species other than American pondweed, chiefly low water levels in 2007. In 2008, we planted three species along a depth gradient. The depth of species planted had no effect on pooled species survival ($p < 0.05$) but species did have an effect, with American pondweed emerging as the most successful. As our work continues in this restoration effort, the results and methods of these trials will provide us with information that will aid in future native aquatic plant reestablishment in Little Bear Creek Reservoir. Additionally, we plan to incorporate our data into spatial models in a GIS and fish bioenergetics models to assess the potential effect that restoration has on bluegill *Lepomis macrochirus*.

JUVENILE TARPON (*MEGALOPS ATLANTICUS)* IN MISSISSIPPI COASTAL WATERS: SHORT-TERM EVENT OR LONG-TERM TREND?

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Adult tarpon (*Megalops atlanticus*) occur in Mississippi offshore waters from mid-summer to early-fall, presumably as part of a southern Gulf migratory group, however their biology and ecology in local waters is unknown. Since the Gulf tarpon stock is documented to spawn during April – July only off the coast of south Florida, Yucatan (Mexico), and north-central Mexico west of Yucatan, the northern Gulf is believed to represent an adult tarpon summer feeding ground. Prior to 2006, only ten juvenile tarpon (30.5 - 289.5 mm TL) were documented from Mississippi coastal waters; however, during 2006, 2007 and 2008, we opportunistically collected numerous juvenile tarpon (50.8 - 231.3 mm FL) from two tidal creeks in Jackson County. Some specimens were sacrificed for otolith, stomach content and DNA analysis, but the majority were measured and released (some tagged) or placed in aquaculture systems for observation and ultimate release. Additionally, in 2007 we examined three large juveniles (726 - 838 mm FL; 17.4 - 24.7 kg TW) caught from Biloxi Back Bay and received anecdotal accounts pertaining to similar size juveniles caught from the same area. During 2008, local anglers reported to us encounters with large juveniles (~5 - 10 kg TW) in Biloxi Back Bay and the lower Pascagoula River. Since the Mississippi coast is not a documented tarpon nursery area, the recent annual occurrences of the juveniles prompted a small-scale examination of their abundance, size, age, food resources, habitat, and possible point(s) of origin. An overview of preliminary findings is presented.

ARCHEOLOGICAL RECORDS OF FRESWATER MOLLUSKS (550 A.D.) FROM THE BOEUF RIVER IN NORTHEAST LOUISIANA

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In 1996, the Department of Geosciences at University of Louisiana at Monroe conducted an archeological dig in the middens of Landerneau Mounds (16CA87) on the Boeuf River to determine the food resource of the Native American. Many species of fishes and mammals were excavated along with freshwater mollusks. Nineteen species of freshwater mussels (Unionidae) and three species of aquatic snails were discovered. Dominant species identified from 2, 504 mussels valves were threeridge (*Amblema plicata)* 33%, pyramid pigtoe (*Pleurobema rubrum)* 20% and wabash pigtoe (*Fusconaia flava)* 14%. Numerically less abundant mussels found included: washboard (*Megalonaias nervosa)* 7.9%, pimpleback (*Quadrula pustulosa)* 5.3%, southern hickory nut (*Obovaria jacksoniana)* 4.9%, bankclimber (*Plectomerus dombeyanus)* 4.7%, mapleleaf (*Quadrula quadrula)* 4 %, spike (*Elliptio dilatata)* 2.6 %, and Louisiana fat mucket (*Lampsilis hydian*a) 1.2%. Rare mussel species represented by <1% were: western mapleleaf, (*Quadula apiculata),* threehorn wartyback. (*Obliquaria reflexa),* wartyback (*Quadrula nodulata),* lillliput (*Toxolasma spp),* yellow sandshell (*Lampilis teres),* bleufer (*Potamilus purpuratus),* pistolgrip (*Tritogonia verrucosa),* black sandshell (*Ligumia recta),* and round pearlyshell (*Glebula rotundata).* Aquatic snails found were pointed campeloma (*Campeloma decisum)* 50%, olive mystery snail (*Viviparus subpurpureus)* 25% and horn snail *Pleurocera canaliculatum* 25%. Recent mollusk surveys in the Boeuf River at three stations yielded a total of twenty species of native mussels, two species of aquatic snails and the exotic Asiatic clam, *Corbicula fluminea.* Threeridge (*Amblema plicata*) was the dominant mussel at two of the stations sampled and appeared to show no changes in its abundance since 550 A.D. Preliminary comparisons of long-term changes in all the other mollusks were apparent. Five species of mussels and a snail found at Landerneau Mounds were absent from recent mollusks survey. Changes in the mollusk assemblage are likely due to anthropogenic impacts to streams including channelization and deforestation resulting in greater sedimentation. The use of freshwater mollusks discarded by Native Americans not only provides records of their diet, but gives insight of the prehistoric mollusk assemblages.

TIME, TEMPERATURE AND DEPTH PROFILES FOR A LOGGERHEAD SEA TURTLE (*CARETTA CARETTA*) CAPTURED WITH A PELAGIC LONGLINE.

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During a pelagic longline pilot study conducted by NOAA/NMFS SEFSC Mississippi Laboratories (MSL) along the U.S. Atlantic Ocean coast (NOAA Ship OREGON II OT-06-02-269), a loggerhead sea turtle (*Caretta caretta*) was captured with longline gear equipped with time-temperature-depth recorders (TDR) attached in proximity to the hooks. TDR data documented changes in hook depth and water temperature, and reflected the behavior of the loggerhead sea turtle (rates of descent and ascent, time at depth, time near surface). NOAA/NMFS sea turtle mortality mitigation recommendations for pelagic longline gear proved effective for the loggerhead sea turtle capture since there were successive ascents to surface, and the viability status was good after landing.

ASSESSING STOCKS OF THE MISSISSIPPI BLUE CRAB FISHERY

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Assessing the status of the blue crab stocks in Mississippi is difficult due to the lack of fishery-dependent information. A study of the fishery was initiated in the summer of 2005 to provide information on catch-per-unit-effort (CPUE), fishing effort, biological characterization of the catch, and disposition of the commercial harvest for the blue crab trap fishery. The initial study was severely compromised by Hurricane Katrina in August 2005. Using the same sampling methodology and protocols, a second study was initiated in May 2007. For the present study, each fisherman included additional traps equipped with a turtle excluder device (TED) in each funnel to determine the impact of the device on harvest. Catch-per-unit-effort was calculated as pounds per trap, standardized to a 24-hour trap soak time. Values of CPUE fluctuate depending on season, with highest values found during the summer months. Overall, Jackson County had the highest average CPUE, followed by Hancock and Harrison counties. Females typically dominated the catch in all counties. In general, females were more abundant in traps in the summer and early fall; males became more abundant in the colder months. During peak spawning months, ovigerous females can make up more than 60 percent of the catch. On average, female crabs were larger than males in all counties and ovigerous females were larger than non-ovigerous females. Average CPUE and sex composition were similar between standard and TED traps, thus the TED appears to have little impact on harvest.

COHORT GROWTH DYNAMICS OF THE BAY ANCHOVY (*ANCHOA MITCHILLI)* IN THE NORTHCENTRAL GULF OF MEXICO

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The link between forage species year-class strength and variability in recruitment of important piscivorous species has emphasized the importance of understanding the population dynamics and recruitment variability of key forage species. Bay anchovy, *Anchoa mitchilli*, is a critical trophic link in estuarine systems throughout its range. This thesis elucidates size- and growth-selective mechanisms acting to structure a population of *A. mitchilli* within the Mississippi Sound during the juvenile stage. Size-selective mortality was assessed by comparing otolith radius at age (assessing relative size-at-age) at the larval-juvenile transition and the juvenile-adult transition, while growth-selective mortality was assessed by comparing otolith growth experienced during the juvenile stage. It is important to note that size-selection and growth-selection are theoretically independent of and synergistic with one another. Comparisons of these otolith metrics were made between three age-classes of fish at the larval-juvenile (35 day), juvenile-adult (56 day) and 50 % maturity (77 day) stages of development. For selective mortality to occur there must be variability in size or growth and high mortality, both of which were found during this study. Results of ANOVA and planned contrast comparisons indicate that it was advantageous for bay anchovies to be larger at age until the juvenile-adult transition, after which there was evidence that larger fish may have suffered higher mortality (negative size-selection). A large piscivore, for example, might exhibit positive selection for larger anchovies because of their visibility and increased food value. These data indicate selective mechanisms affecting *A. mitchilli* likely change over the course of their life-history.

THE INFLUENCE OF SERIAL ARRANGEMENT OF DAMS ON NUTRIENT AND SESTON: PRELIMINARY RESULTS

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In impounded river systems, dams can disrupt upstream to downstream hydrology and fluvial processes. The influence of dams can be cumulative in systems having multiple dams in series such as the Tennessee-Tombigbee Waterway. These cumulative effects can significantly alter nutrient dynamics throughout the system and can affect fisheries in downstream reservoirs and river channels. The existing river-reservoir system in the Tennessee-Tombigbee Waterway (with a total of 10 lock and dam structures in series) thus, creates an opportunity for research on the influence of fragmentation and serial discontinuity. Together with nutrient and seston transport dynamics, the continuum of this system potentially has profound influences on downstream fisheries. Based on preliminary sampling which was conducted in June 2008 from Smithville reservoir to Columbus tailwater, conductivity was found to be significantly different ($p < 0.05$) between systems (Amory system, Aberdeen system and Columbus system) and sampling sites (reservoirs, channels and tailwaters). Ortho-phosphate and seston density were only found to be significantly different between sampling sites ($p>0.05$) whereas total phosphorus were not significantly different ($p> 0.05$) between systems and sampling sites. By including environmental, hydrology characteristics, and the influence of tributaries, together with energetics and fish assemblages studies in the next step, a holistic perspective on serial dams in terms of serial discontinuity and management can be established. Thus, managers of similar system could wisely manage the systems based on the trophic relationships and responses towards the environmental settings with regards to fisheries and aquatic ecosystem sustainability and conservation.

SUMMARY OF THE 2008 MISSISSIPPI SEAMAP INSHORE LONGLINE SHARK RESOURCE SURVEY

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The Gulf Coast Research Laboratory initiated a new fisheries independent survey to monitor coastal shark populations in the near shore waters of the north central Gulf of Mexico. The sampling protocol follows standard procedures established by NOAA Fisheries, Mississippi Laboratories. During 2008, sampling was conducted monthly from March to October. Sixty eight stations were sampled from three sampling areas: Mississippi Sound, south of the Mississippi Sound, Chandeleur Sound. A total of 861 animals were caught, of which 677 were sharks and rays, 102 were catfish, and 72 were red drum (*Sciaenops ocellatus*). Shark catches were dominated by Atlantic sharpnose sharks (*Rhizoprionodon terraenovae*) and blacktip sharks (*Carcharhinus limbatus*). Some species exhibited site preferences; such as tiger (*Galeocerdo cuvieri*) and blacknose sharks (*Carcharhinus acronotus*) which were only found south of the Mississippi Sound, and great hammerhead sharks (*Sphyrna mokarran*) which were only found in the eastern Mississippi Sound north of Petit Bois Island. Catch per unit effort (CPUE) was lowest in the Chandeleur Sound (5.84 fish 100 hook^{-1} hr^{-1}), and higher South of the Mississippi Sound (7.29 fish 100 hook^{-1} hr^{-1}) and in the Mississippi Sound (7.42 fish 100 hook^{-1} hr^{-1}). The low CPUE in the Chandeleur Sound may have been due to an anoxic zone that had developed in the study area as a result of the prolonged opening of the Bonnet Carre Spillway during April 2008.

IDENTIFICATION AND CHARACTERIZATION OF SPOTTED SEATROUT SPAWNING HABITAT IN TWO MISSISSIPPI ESTUARIES UTILIZING PASSIVE ACOUSTICS

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Spotted seatrout, *Cynoscion nebulosus*, is one of the most sought-after saltwater recreational fish species in the southeastern United States and inhabits estuarine and nearshore Gulf of Mexico waters from the west coast of Florida to the Gulf of Campeche. Due to overfished spotted seatrout populations, as well as habitat loss and degradation, it is critical to identify and map spotted seatrout spawning habitat in Mississippi coastal waters. Two Mississippi estuaries were selected for study: Grand Bay (a pristine bay included in the National Estuarine Research Reserve) and Biloxi Bay (a heavily impacted bay). A passive acoustic survey designed to monitor male spotted seatrout courtship sound production was conducted in both estuaries from May to September 2008 to describe the habitat and environmental conditions associated with spawning spotted seatrout. Sample locations within each bay system were selected based on a stratified-random grid system. To ensure representative sampling, stations were distributed as evenly as possible over the available substrata. Each station was sampled for spotted seatrout courtship sounds using a hydrophone and digital recorder. In addition, water depth, salinity, temperature, dissolved oxygen, tidal and lunar stages, and GPS position were documented. To date, male spotted seatrout courtship sounds were detected in both estuarine systems. Preliminary results indicate that more spotted seatrout are using Grand Bay compared to Biloxi Bay as spawning habitat, based on the increased frequency of spotted seatrout courtship sounds identified. Preliminary findings suggest preferred spotted seatrout spawning habitat in the two bays to be oyster beds, artificial reefs, seagrass beds, and in depths greater than two meters. Continuing research will better define critical spawning habitat.

INFLUENCE OF TURBIDITY ON FISH DISTRIBUTION, DIETS AND FORAGING EFFICIENCY

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Water turbidity levels have the capacity to influence fish communities and behavior. The Mississippi delta region is composed of a changing landscape, with much of the alteration due to increased agricultural practices. These landscape changes are directly related to turbidity fluctuations in Mississippi delta oxbow lakes and will likely affect fish distribution, diets, and foraging efficiency. Our objectives are to conduct field and laboratory experiments to investigate the potential effect of turbidity levels on largemouth bass *Micropterus salmoides* diet and distribution patterns in Wolf Lake near Yazoo City, MS. Our study began in October 2008 and is composed of lake-wide turbidity measurements and bass stomach content samples. The data we collect are being used to create continuous turbidity distribution maps to link with geo-referenced bass stomach content samples to determine if foraging preference is related to turbidity levels. Preliminary data gathered from our field and laboratory studies will be discussed to assess the potential of turbidity measurement as a metric for understanding bass foraging behavior in Mississippi Delta oxbow lakes.

AN ECONOMIC ANALYSIS OF THE RECREATIONAL FISHERIES IN SARDIS AND GRENADA LAKES

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Sardis and Grenada lakes are the most heavily used of four large flood-control reservoirs in north-central Mississippi. Recently termed the "Arc of Slabs" by In-Fisherman magazine, these reservoirs have been receiving an increased amount of effort from non-resident and non-local Mississippi anglers in recent years because of their notoriety as producers of large white and black crappies. This study was initiated to determine trip characteristics, trip expenditures and resultant economic impacts of anglers utilizing Sardis and Grenada lakes. Access point creel surveys were conducted over 12-month periods on each lake (March 2006 to February 2007 on Sardis Lake and March 2007 to February 2008 on Grenada Lake) to estimate the annual number of angling activity days on each lake, and recruit anglers to participate in a mail survey to collect detailed trip expenditure data for economic impact assessments (EIAs). EIAs were generated from a statewide model using Impact Analysis for Planning (IMPLAN) software to determine the economic impacts of resident and non-resident anglers to both local and state economies. Creel clerks recruited 436 (260 residents and 176 non-residents) anglers to participate in the EIA survey at Sardis Lake, and 481 (514 and 100) at Grenada Lake. Mail survey response rates were 78% and 74%, respectively, for each lake after adjusting for non-deliverables. Total daily expenditures for residents and non-resident fishing Sardis Lake were $161/angler/day and $157/angler/day, respectively. Activity days for state residents and non-residents to Sardis Lake were determined to be 54,168 and 37,643, respectively. On the state level the total economic impact of Sardis Lake fishing expenditures for the 2006/2007 season was $23.36 million (2007 dollars), supporting 283 full and part-time jobs. Total daily expenditures for residents and non-resident fishing in Grenada Lake were $182/angler/day and $119/angler/day, respectively. Activity days for state residents and non-residents to Grenada Lake were determined to be 37,289 and 8,747, respectively. On the state level the total economic impact of Grenada Lake fishing expenditures for the 2007/2008 season was $11.77 million (2007 dollars), supporting 192 full and part-time jobs. These numbers suggest that recreational fishing on these lakes makes a vital contribution to the economy of north-central Mississippi.

PATHWAYS FOR TRANSPORT OF LARVAL TARPON (*MEGALOPS ATLANTICUS)* INTO MISSISSIPPI COASTAL WATERS

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Since the mid-1950's, the presence of adult tarpon (*Megalops atlanticus*) in Mississippi coastal waters has been radically reduced, and prior to 2006, juvenile tarpon were rarely encountered in local waters. In the past few years, however, several juvenile tarpon were captured from shallow wetland environments of coastal Mississippi. It is not clear if there is localized, northern Gulf of Mexico (Gulf) spawning activity or if larvae are transported to the northern Gulf and into Mississippi waters from known tarpon spawning habitats in the southern Gulf.

In this study, we used mixed layer satellite tracked drifters along with archived data from numerical models and satellite thermal images to determine potential pathways from transport. Although passive advective pathways do exist from the Yucatan Peninsula and Campeche Banks, they are not persistent. We could not find pathways from Florida.

ASSESSING THE VALUE OF EXTERNAL MORPHOLOGICAL CHARACTERS IN IDENTIFYING TRIAKID SHARKS IN THE NORTHERN GULF OF MEXICO.

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Historically, two shark species within the genus *Mustelus* (Family Triakidae) have been reported to occur in the northern Gulf of Mexico: the smooth dogfish, *M. canis*, and the Florida smoothhound, *M. norrisi*. In a recent revision of the genus, a new species, *M. sinusmexicanus*, was described from specimens collected in the northwestern Gulf of Mexico. Overlapping morphological characters among the three species make accurate identifications based on the external morphology of these sharks difficult, if not impossible. Specimens of all three putative species were thoroughly dissected, identified and independently verified to examine the usefulness of currently accepted diagnostic characters. To validate identifications, DNA sequences were obtained from voucher specimens. Direct sequencing of the mitochondrial control region suggested the presence of only two of the putative species in our sampling area and the inclusion of *Mustelus* species not previously reported from the northern Gulf of Mexico.

RESCUE OF PALLID STURGEON ENTRAINED DURING OPERATION OF THE BONNET CARRE SPILLWAY

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The Bonnet Carré spillway was constructed in response to the 1927 flood to protect New Orleans. The spillway diverts water from the Mississippi River into a floodway that empties into Lake Pontchartrain to reduce flood stages downstream. The Corps opened the spillway for the first time in 11 years on April 11, 2008. Within nine days, a total of 160 bays were open diverting a maximum flow of 160,000 cfs from the Mississippi River. The structure was completely closed May 8, 2008, and was therefore operational for almost one month. Shortly after the Bonnet Carré spillway was open, the federally-endangered pallid sturgeon (*Scaphiryhnchus albus*) was captured in the Mississippi River near the structure, suggesting that this species could be entrained through the spillway into Lake Pontchartrain. The pallid sturgeon is a freshwater, riverine species and it was assumed that any individual entrained into Lake Pontchartrain would not survive in this brackish, lacustrine environment. Once the structure was closed, the Corps and Louisiana Department of Wildlife and Fisheries (LDWF) began sampling the floodway for sturgeon to evaluate entrainment. We surmised that the most likely location where sturgeon would be concentrated was in the upper end (closest to the structure) of Barbar canal, the primary distributary in the floodway. Water leaked through the structure maintaining flow in Barbar canal after closure. Within one hour of setting a gill net, the first pallid sturgeon was caught. Multiple gears were used over a five-week period in an attempt to capture pallid sturgeon, including electroshocking, gill nets, hoop nets, trotlines, trawling, and seining. A total of 14 pallid sturgeon were collected below the structure in Barbar canal over a 3-week period. In addition, 41 shovelnose sturgeon (*S. platorynchus*) were captured below the structure. All sturgeon were measured, tagged, and released back into the Mississippi River. Under Section 9 of the Endangered Species Act, it's unlawful to "harass, harm, wound, or kill" an endangered species. Therefore, the presence of pallid sturgeon below Bonnet Carré Spillway, assuming all were entrained from the Mississippi River, constitutes a "take" under the Act. Pursuant to Section 7 of the Act, an incidental take of an endangered species requires consultation with the U. S. Fish and Wildlife Service. The purpose of consultation is to determine specific actions that will reduce or eliminate incidental take during future operations of the spillway. This process is ongoing and will result in formal recommendations. However, the capture of sturgeon below the structure and relocation back to the Mississippi River demonstrates that a "rescue" effort can successfully minimize "take" of this federally endangered species entrained during operation of the Bonnet Carré Spillway.

HYDRILLA MANAGEMENT IN RESERVOIRS: PERSPECTIVES FOR MISSISSIPPI

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Hydrilla, *Hydrilla verticillata*, infestations in Mississippi reservoirs present an array of management options ranging from doing nothing to aggressive elimination of the infestation. In this presentation, I share management experiences from nearby states that may be helpful to decision makers. Herbicide spot treatments providing reservoir access is minimalist approach employed on Lake Guntersville. The cost is still high (about a million dollars annually) and recent rulings by the U. S. Federal Court system (i.e., the Sixth and Ninth Districts) probably will make the use of registered herbicides in public waters more difficult. Similarly, management of hydrilla using large-scale herbicide applications, winter drawdown, and establishment of native vegetation (alone or in some combination) failed to control hydrilla in Lakes Conroe, Austin, Murray, Moultrie, and Marion. Management successes in a total of 10 reservoirs in North Carolina (n = 5), South Carolina (n = 3), and Texas (n = 2) depended on triploid grass carp, *Ctenopharyngodon idella*, as the primary management tool. Among these three states, the approach used in North Carolina has been the most promising: early intervention employing registered herbicides to suppress hydrilla infestations followed immediately by stocking triploid grass carp (at 15 to 20 fish per vegetated acre). It is feasible to initiate this approach against infestations less than 100 surface acres (reservoir wide) and stockings maintaining one fish per eight surface acres of the reservoir prevented hydrilla regrowth. Management of established, exponentially increasing hydrilla has been successful but expensive, controversial, and less predictable. Using triploid grass carp has the significant disadvantage of eliminating most palatable native aquatic vegetation. Several patents recently awarded to the United States Geological Service (USGS) at Mississippi State University and the Department of the Army which limit triploid grass carp life span offer the possibility of making the triploid grass carp a better management tool.

INTRODUCED PEACOCK BASS (*CICHLA KELBERI)*: DIRECT AND INDIRECT EFFECTS AND RECOGNITION BY NATIVE PREY

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Little is known about indirect behavioral effects of introduced predators despite the importance of indirect predator-prey interactions for community trophic structure. It has been proposed that prey are unable to recognize cues of truly novel predators, which would weaken indirect effects and lead to increased prey mortality. Indeed, prey naiveté is proposed as one of the reasons behind species extinctions after introduction of predatory fish; however, the underlying mechanism has not been tested explicitly. This study examined the naiveté hypothesis and assessed direct and indirect effects of a non-native predator using peacock bass (*Cichla kelberi*) in Paraná River, Brazil. A very diverse system with high native predator richness, Paraná River was nevertheless vulnerable to this introduced piscivore, which caused a great reduction in richness and abundance of native species. We tested whether lack of predator recognition could be responsible for prey species extinctions, whether peacock bass had indirect effects on its prey feeding activity, and, finally, whether these predator-prey interactions were modified by aquatic vegetation. Our results show that prey (*Hemigrammus marginatus*) responded to both visual and chemical cues of *C. kelberi* and displayed avoidance behaviors equal to or greater than those observed with a native predator, *Hoplias malabaricus*. A follow-up mesocosm study did not detect any differences in prey feeding activity with or without the peacock bass. There was a small but significant increase in prey survival in the presence of aquatic vegetation when compared to unvegetated controls. We discuss implications of these findings for fish biodiversity in the Everglades and the potential for mitigation of peacock bass effects by creating prey refugia and increasing environmental variability. This study also contributes to our limited understanding of the indirect effects of predators in the context of invasive species.

POPULATION TRENDS OF BLUE CRABS IN MISSISSIPPI AND LOUISIANA FROM FISHERY-INDEPENDENT SURVEY DATA

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Long-term, fishery-independent trawl data were used to examine trends in abundance for juvenile blue crabs in coastal waters of Mississippi and Louisiana. Analysis of data was facilitated by the use of standardized sampling methodologies and laboratory protocols. In Mississippi, there was no evidence of recruitment failure based on catches of early stage juveniles in seines and beam plankton nets. Additionally, catches of small, post-settlement crabs in trawls showed no indication of a decline in Louisiana. Decreasing trends in abundance of later-stage blue crabs in trawl survey data occurred in both states. Similarity of results from both states provides evidence that broad-scale environmental processes are operating to regulate population levels of larger juveniles. Juvenile blue crab abundance in the northern Gulf of Mexico has been correlated with long-term, climate-related hydrological regimes. High catches of juvenile crabs occurred during periods of increased river flow, low salinity, and a high frequency of southeast winds; these factors accounted for ~23% of the variability in catch. These conditions increase refuge availability and alter predator-prey dynamics. Lowest abundances have occurred over the last several years; a period characterized by an unfavorable climatic regime (low river flow, high salinity, and a low frequency of southeast winds). Unprecedented, recent changes in habitat associated with catastrophic storms and the cumulative effect of man-made alterations to coastal wetlands have also been shown to play a role; however, these changes have not been quantified.

OCEANIC-ATMOSPHERIC MODES OF VARIABILITY AND THEIR EFFECT ON RIVER FLOW AND BLUE CRAB (*CALLINECTES SAPIDUS*) ABUNDANCE IN THE NORTHCENTRAL GULF OF MEXICO

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Oceanic-atmospheric modes of variability occur on interdecadal, multidecadal, decadal, and interannual timescales, and their influence on climate around the world has been confirmed. The present study investigates Mississippi River and Pascagoula River flows in response to the influence of one or more of the four oceanic-atmospheric modes of variability: the Pacific Decadal Oscillation (PDO), the Atlantic Multidecadal Oscillation (AMO), the North Atlantic Oscillation (NAO), and the EL Nino Southern Oscillation (ENSO). These modes of variability are present in phases: PDO warm (PDOw) and cold (PDOc), AMO warm (AMOw) and cold (AMOc), NAO positive (NAOp) and negative (NAOn), and ENSO warm (ENSOw), neutral (ENSOn), and cold (ENSOc). High Mississippi River mean flow was associated with the PDOw, AMOc, and NAOp phases, with low river flow linked to their opposite phases. High Pascagoula River mean flow was related to the AMOc and NAOp phases, with low river flow linked to their opposite phases. Pascagoula River flow was significantly higher during the ENSOw than ENSOc events, within PDOw/AMOw/NAOp and n phase. Four long-term climatic phases (PDOc/AMOc/NAOn, PDOc/AMOc/NAOp, PDOw/AMOc/NAOp, and PDOw/AMOw/NAOp and NAOn) overlapped with four distinct periods of annual blue crab abundance that were identified using hierarchical agglomerative clustering and non-metric, non-parametric multi-dimensional scaling techniques. The following abundance periods were delineated: period I (1967-1970), period II (1971-1980), period III (1981-1998), and period IV (1999-2004). Period II and III were characterized by high numbers of crabs and increased river flow, whereas Period IV was distinguished by low numbers of crabs and decreased river flow. Years of lowest abundance (period IV) occurred at a time of unprecedented change in habitat associated with catastrophic storms, the cumulative consequences of man-made alterations to coastal wetlands, and an unfavorable climatic regime.

THE EFFECT OF SALINITY ON THE BIOENERGETICS OF THE YOUNG-OF-THE-YEAR ATLANTIC STINGRAY, *DASYATIS SABINA* (LESUER)

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The Atlantic stingray, *Dasyatis sabina*, is commonly found along coastal Mississippi where it inhabits a wide range of salinities. Due to its unique euryhaline abilities, *D. sabina* was used as a model to determine the influence of salinity on the elasmobranch bioenergetic model. It was hypothesized that when *D. sabina* was exposed to low salinity they would exhibit decreased growth rate, increased routine metabolic rate (RMR), and increased excretion rate compared to higher salinity. Young-of-the-year (YOY) *D. sabina* were collected using seine nets at Belle Fontaine Beach within the coastal waters of Mississippi and then acclimated to either a low salinity (6-8 psu) or high salinity (22-25 psu) treatment at 30°C. To construct bioenergetic models based on both salinity treatments, experiments were conducted to estimate RMR, excretion rate and growth rate. No significant effect of salinity was detected for RMR between treatments, which may have been due to small sample size because mean RMR was about 50% higher in the low salinity treatment. A significant difference in the amount of feces excreted was evident between salinity treatments, with less fecal material being collected from the low salinity treatment than the high salinity treatment even though the low salinity daily ration was significantly higher. Negative growth was observed in both salinity treatments and may be explained by multiple factors. The energy budgets for the two salinity treatments could be better refined by using a preferred temperature for feeding and digestion by *D. sabina*, while also making direct measurements of the entire metabolic scope, specific dynamic action (SDA), and total urea excretion.

INFLUENCE OF SHORELINE MACROPHYTES ON THE ASSEMBLAGE OF FISHES IN MISSISSIPPI DELTA OXBOW LAKES

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Mississippi delta oxbow lakes contain a diverse community emergent aquatic plant species that vary in abundance along the shorelines. These communities provide unique habitat components important to growth and survival of fishes. However, little is known about the relationship between this vegetated habitat and the presence of fishes found within the Delta oxbow lakes. We conducted a field study to investigate this relationship and assess the influence that the presences of different aquatic plant species have on the assemblage of fishes. Using boat-mounted electrofishing, we sampled adult and juvenile fishes at 18 vegetated shoreline habitats in six oxbow lakes. Sampling was conducted monthly during March-August 2008. Aquatic plant composition was determined at all sites, representing 14 different species. 1,863 adult fish comprising 24 species and 11 genera were collected. We discuss the relationship between the different aquatic plant communities and the fishes we measured in the six Mississippi Delta oxbow lakes.

EVALUATION OF INTERNAL TAG PERFORMANCE IN HATCHERY-REARED JUVENILE SPOTTED SEATROUT (*CYNOSCION NEBULOSUS*)

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Formed in 2004, the Seatrout Population Enhancement Cooperative (SPEC) has released ~47,000 opercular tagged juvenile (~100mm) spotted seatrout, *Cynoscion nebulosus*, into coastal Mississippi waters. To date, no adults from any tagging event have been recaptured and previous work has shown that retention rarely exceeds 75% in short-term laboratory settings. Stock enhancement programs must use proven species-specific tagging strategies to maintain the implicit assumption that stocked fish can be identified when recaptured. In this study, coded-wire tags placed into the operculum and dorsal region as well as visible implant elastomer (VIE) tags injected into jaw and caudal fin tissue were evaluated to assess the effect of tagging and handling on growth, mortality, and retention in juvenile (72-112mm) spotted seatrout. Dorsally placed coded-wire tags were retained more than opercular tags (30 days post-tagging), with retention percentages of 100% and 86.7% respectively. Both VIE tag locations were retained equally at 100% over the same 30 day period, despite pigmentation overlap and tag fragmentation affecting overall VIE tag quality. No growth effects from tag presence were observed, but repeated handling significantly affected initial growth in tagged and control treatments. The results show that dorsally placed coded-wire tags may be a better option for juvenile seatrout than the opercular coded-wire tags currently used by the SPEC program. Additionally, the VIE tag used in either body location would be a solid tagging technique for seatrout when external verification is desired.

GROWTH RELATED CONSTRAINTS BASED ON CALORIC VALUES OF BLUEGILL DIETS BEFORE AND AFTER PLANT REMOVAL

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The diets of bluegill sunfish (*Lepomis macrochirus*) change when plants, i.e., Eurasian watermilfoil (*Myriophyllum spicatum*) invade habitat suggesting that foraging tactics in these fish are altered and potentially may affect growth. We addressed this hypothesis by measuring for potential growth related constraints based on bluegill diets before and after the removal of watermilfoil in four Minnesota lakes. We used a multiple-regression technique to obtain the mean weight of prey per fish stomach and obtained caloric values from published literature to obtain the caloric contribution of each prey type consumed by bluegill. A bioenergetics model was used to predict the specific growth rate based on the mean prey energy density consumed by bluegill. Treatment lakes showed a similar trend in specific growth rates where as our reference lakes showed different trends. These data suggest that in treatment lakes, prey energy density was sufficient for body function maintenance, but may not have been sufficient for growth when milfoil was present. Trends of the specific growth rate and mean prey energy density may be due to the high overwintering biomass and rapid spring growth of the milfoil, reflecting its impacts on macroinvertebrate abundances. We found that the removal of milfoil from within our Minnesota study lakes did influence mean prey energy density consumed by bluegill that may have impacted growth.

THE EFFECTS OF FISHING EFFORT ON CATCHABILITY OF LARGEMOUTH BASS (*MICROPTERUS SALMOIDES)*

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The negative effect of fishing on the catchability of a population receiving intense angler effort has long been debated but not measured. This study will evaluate the effect of fishing effort on catchability of adult largemouth bass *Micropterus salmoides* and determine if catchability will increase after periods of no fishing. Eight 0.5-2.0 ha impoundments will be fished once a week at a rate of 0.4 angler hour per hectare per week during the spring-through-fall fishing season (May-October). We will evaluate the effect of fishing effort by comparing catch rates of largemouth bass populations fished continuously and populations with the fishing season interrupted by a period of no fishing. I predict that catch rate will decline with fishing effort in the ponds fished continuously from May-October and catch rate will increase when fishing resumes after a 2-month period of no fishing. If the results support this hypothesis, closure of fishing for brief periods of time may be an effective strategy for increasing catch rate in small impoundments located in the southeastern U.S.

POSTER PRESENTATIONS

MARINE/ESTUARINE FAUNAL INVENTORY OF MISSISSIPPI COASTAL WATERS

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Compilation of an inventory of marine/estuarine fauna of the State of Mississippi began in 2002 with funding from the Coastal Impact Assistance Program administered through the Mississippi Department of Environmental Quality. Determination of biodiversity and identification and assessment of the status of non-indigenous aquatic species are dependent upon baseline knowledge of the fauna within a geographic area. Mississippi is one of the first states to catalogue their coastal fauna and to provide a mechanism for storing, updating, and maintaining the inventory. This inventory is essential for scientist to correctly monitor and study the Gulf Coast region. The Marine/Estuarine Faunal Inventory is hosted on the website of the Mississippi Museum of Natural Science: www.msnaturalscience.org. The database can be downloaded or searched based on different queries. Parameters that define the boundaries of the inventory can be found on the website as well as contact information that encourages users to add and update species as they become available or taxonomic information changes. If you are working in marine waters of Mississippi, please visit the Museum site to see if you can contribute to the current database.

SCIENCE THROUGH FISHING: COLLABORATIVE RESEARCH BETWEEN SCIENTISTS AND RESOURCE USERS

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Often times, scientists do not take full advantage of the knowledge and wherewithal of the fishers and anglers who utilize the marine resources important to both groups. Because of their shared interests, it seems pertinent that scientific studies of fishery stocks and species of interest be coordinated with local and regional resource users for the benefit of both groups. For instance, the inclusion of fishers/anglers in the data collection process allows those user groups to gain a better understanding of the scientific methodologies that go into establishing regulatory plans. In turn, scientists are able to increase the efficiency of their research grant monies by reducing the vessel time, and subsequent maintenance, required for sample collection. In the end, the primary advantage of cooperation between scientists and user groups is an increased level of mutual trust and respect. Not only do scientists gain a better understanding of the successes, hardships and needs of the angler/fisher, but those resource users become more confident in the management strategies set forth at the local, regional and national levels. Our purpose is to highlight various aspects of cooperative research being conducted in the north-central Gulf of Mexico that may be applicable to other regions.

PROGRESS TOWARDS A VIABLE BLUE CRAB AQUACULTURE INDUSTRY IN MISSISSIPPI

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Verlee Breland, Richard Fulford, Cindy Gavins, Dyan Gibson, Darcie Graham, Kirk Halstead, Jeff Lotz, Mike Mavar, Larry Nicholson, John Ogle, Harriet Perry, Anthony Ryan, and Christine Trigg, Gulf Coast Research Laboratory / USM Aquaculture Team

Wayne Ferguson, Adam Jackson, Anthony Johnson, Joe Roach, David Rose, Mike Brainard and Joe Ziegler, Mississippi Department of Marine Resources – Pond Aquaculture

In 2002, a comprehensive research program for aquaculture of the blue crab (*Callinectes sapidus*) was initiated at the Gulf Coast Research Laboratory (GCRL). Challenges of blue crab aquaculture include development of methodologies to address their complex larval life history, lengthy developmental period, cannibalism (megalopae and juveniles), nutrition, and disease. Current aquaculture practices at the GCRL include three phases: hatchery/nursery (eggs to megalopae), initial grow-out in re-circulating seawater systems (megalopae to juveniles about 20 mm CW), and pond culture of larger juveniles (greater than 20 mm CW). In the hatchery/nursery phase, wild caught ovigerous females are held individually until they spawn. The newly-hatched zoeae are collected and transferred to 1400 L larval rearing tanks. Zoeae are stocked at 100 larvae per liter and reared through seven zoeal stages in these systems. Larvae are kept at ambient conditions (28 ppt salinity at 25ºC) for approximately 20 to 30 days until they molt to megalopae. The larval tanks are sampled daily to estimate survivorship and molt stage. Early zoeal stages are fed rotifers (*Brachionus rotundiformis*) and algae. *Artemia salina* nauplii and Cyclop-eeze and added for later stage zoeae. Temperature, salinity, ammonia, nitrite, and nitrate levels are monitored in the rearing tanks. The crabs are harvested over a two- to three-day period when the systems contain 50 percent megalopae. Percent survival in these systems has varied; approximately 30 percent survival to megalopae was a typical recovery rate. Harvested megalopae are transferred to juvenile grow-out systems at GCRL's Thad Chochran Marine Aquaculture Center (CMAC). Structure is added to the tanks to help reduce cannibalism. Daily feeding regimes included algae, *Artemia* nauplii and adults, Cyclop-eeze, and a variety of food pellets specially formulated to meet the nutritional requirements of crustaceans. Percent survival has been as high as 10 percent over a six-week developmental period from megalopae to juvenile crab. Cooperative studies with the Mississippi Department of Marine Resources (MDMR) are ongoing to test the feasibility and profitability of rearing juveniles in aquaculture ponds located at the MDMR Lyman Fish Hatchery north of Gulfport, MS. Pond culture would allow for greater fishery production of high-value soft crabs and bait crabs without increased fishing pressure on natural stocks.