

PROGRAM AND ABSTRACTS
OF THE 36th ANNUAL MEETING OF THE
MISSISSIPPI CHAPTER OF THE
AMERICAN FISHERIES SOCIETY

TARA WILDLIFE
VICKSBURG, MISSISSIPPI
3 – 5 FEBRUARY 2010



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Dr. Stephen Ross, Curator Emeritus of Fishes, Museum of Southwestern Biology & Adjunct Professor of Biology, University of New Mexico

Donations For Student Raffle and Auction

American Fisheries Society, Academy Sports (Gulfport), Bass Pro Shops – (Pearl), B n M Crappie Poles (West Point), Eric Hoffmayer, Gulf Coast Research Laboratory (GCRL), GCRL's Striped Bass Restoration Program, GCRL's Center for Fisheries Research and Development, GCRL's Tripletail Tagging Program, Gulf States Marine Fisheries Commission, Harriet Perry, Jim Franks, Lauren Littleton, Michael Lowe, Mississippi Coastal Conservation Association, Mississippi Department of Marine Resources, Steve Curran, Susan Caranza, Walmart (Starkville).

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**MISSISSIPPI CHAPTER OF THE AMERICAN FISHERIES SOCIETY
PROGRAM OVERVIEW**

WEDNESDAY – 3 FEBRUARY 2010

- | | | |
|---------------------|--|--------------------------|
| 3:00 – 5:00 | MEETING REGISTRATION | Dining Hall |
| 5:00 – 6:00 | DINNER | Dining Hall |
| 6:00 – 6:15 | OPENING REMARKS | Conference Center |
| 6:15 – 8:00 | SESSION I: FISHING AND FISHERIES
Moderator: Krista Boysen | Conference Center |
| 6:15 – 6:30 | LONGLINE LIAISONS: COMPARISON OF THE 2008 & 2009 MISSISSIPPI SEAMAP INSHORE LONGLINE SURVEY. <u>Jill M. Hendon</u> and Eric R. Hoffmayer | |
| 6:30 – 6:45 | MISSISSIPPI'S FRESHWATER COMMERCIAL FISHERY IN 2008. <u>Garry Lucas</u> | |
| 6:45 – 7:00 | COMPARISON OF FISHERIES DATA PROGRAMS : MARINE RECREATIONAL FISHERIES STATISTICAL SURVEY (MRFSS) and FISHERIES RECOVERY REPORTS (FRRs). <u>Matt Hill</u> , Buck Buchanan, and Dale Diaz | |
| 7:00 – 7:15 | FEASIBILITY OF ASSESSING YOUNG-OF-YEAR GULF STURGEON BY TRAWLING. <u>James, P. Kirk</u> , W. Todd Slack, K. Jack Killgore, Steven G. George, Bradley R. Lewis, Jay A. Collins, and William E. Lancaster | |
| 7:15 – 7:30 | THE EFFECTS OF FISHING EFFORT ON CATCHABILITY OF LARGEMOUTH BASS. <u>Matthew Wegener*</u> , and Harold L. Schramm, Jr. | |
| 7:30 – 7:45 | RATIONALE FOR REMOVING THE CRAPPIE, POMOXIS SPP., 10-INCH MINIMUM LENGTH LIMIT AT OKATIBBEE RESERVOIR, MS. <u>Lawrence A. Bull</u> | |
| 7:45 – 8:00 | ALLIGATOR GAR, <i>ATRACTOSTEUS SPATULA</i>, AND THE MISSISSIPPI DEEP SEA FISHING RODEO. Dennis Riecke, Steven George, and <u>Todd Slack</u> | |
| 8:00 – 10:00 | SOCIAL | |

* indicates students competing for student award
Presenters are indicated by underlining

THURSDAY – 4 FEBRUARY 2010

- 6:30 – 7:45 BREAKFAST Dining Hall**
- 7:30 – 8:30 MEETING REGISTRATION Conference Center**
- 8:00 – 10:30 SESSION II: BIOLOGY/LIFE HISTORY**
Moderator: Glenn Parsons
- 8:00 – 8:15 **THE REPRODUCTIVE BIOLOGY OF THE ATLANTIC SHARPNOSE SHARK, *RHIZOPRIONODON TERRAENOVAE*, IN THE NORTH CENTRAL GULF OF MEXICO.** Madison A. Walker*, Eric R. Hoffmayer, Jill M. Hendon, and Travis G. Holland
- 8:15 – 8:30 **A DETAILED EXAMINATION OF THE FEEDING ECOLOGY OF THE ATLANTIC SHARPNOSE, BLACKTIP, AND BONNETHEAD SHARK FROM THE NORTH CENTRAL GULF OF MEXICO.** Matthew W. Cope*, Gary F. Gaston, Eric R. Hoffmayer, Jill M. Hendon, and Chris M. Butler.
- 8:30 – 8:45 **A COMPARISON OF AGE AND GROWTH ESTIMATION OF THE ATLANTIC SHARPNOSE SHARK, *RHIZOPRIONODON TERRAENOVAE*, IN THE NORTH CENTRAL GULF OF MEXICO.** Travis G. Holland*, Eric R. Hoffmayer, Jill M. Hendon, and Madison A. Walker
- 8:45 – 9:00 **FUNCTIONAL MORPHOLOGY OF THE HAMMERHEAD CEPHALOFOIL: DOES THE HEAD OF HAMMERHEAD SHARKS (*FAMILY, SPHYRNIDAE*) CONFER AN ADVANTAGE VIA HYDRODYNAMIC LIFT PRODUCTION?** Matthew Gaylord* and Glenn R. Parsons
- 9:00 – 9:15 **EARLY LIFE HISTORY AND RECRUITMENT OF DOLPHINFISH (*CORYPHAENA HIPPIURUS*) AND GREATER AMBERJACK (*SERIOLA DUMERILI*) TO PELAGIC *SARGASSUM* HABITAT IN THE NORTHCENTRAL GULF OF MEXICO.** Bruce H. Comyns, James S. Franks, and Eric R. Hoffmayer
- 9:15 – 9:30 **DO POSTLARVAL FISHES ASSOCIATED WITH *SARGASSUM* HABITAT GROW FASTER THAN POSTLARVAE COLLECTED IN OPEN WATER?** Jason Tilley*, Bruce Comyns, Eric R. Hoffmayer, Chet F. Rakocinski and Harriet M. Perry
- 9:30 – 9:45 **EARLY GROWTH OF THE THREE KINGFISH (*MENTICIRRHUS*) SPECIES FOUND IN COASTAL WATERS OF THE NORTHERN GULF OF MEXICO.** John Anderson, Bruce Comyns, Harriet Perry, and Chet Rakocinski.

9:45 – 10:00 **THE EFFECT OF THE IONIC COMPOSITION OF LOW SALINITY WATER ON THE GROWTH, DEVELOPMENT AND SURVIVAL OF CULTURED JUVENILE BLUE CRABS.** Dyan Gibson.

10:00 – 10:15 **USING PHYSIOLOGY TO HELP UNDERSTAND ECOLOGY: AN EXAMPLE OF LAKE STURGEON AND ENVIRONMENTAL CALCIUM.** Peter Allen, Dirk Weihrauch, Stephan J. Peake, and W. Gary Anderson

10:15 – 10:30 **GENETIC DIVERSITY IN LARGEMOUTH BASS POPULATIONS: DO POPULATIONS NEED TO BE REFRESHED?** Nick Peterson*, and J. Wesley Neal.

10:30 – 10:45 BREAK

10:45 – 12:15 SESSION III: INVASIVE SPECIES

Moderator: Jill Hendon

10:45 – 11:00 **BREACHING THE BARRIER: A RISK ASSESSMENT FOR SILVER CARP.** Larry Southern* and Jan J. Hoover.

11:00 – 11:15 **SCHOOLING BENEFITS OF BIGHEAD CARP.** Alan Katzenmeyer* and Jan J. Hoover

11:15 – 11:30 **SWIMMING SMARTER NOT HARDER: STATION HOLDING STRATEGIES OF GRASS CARP.** Audrey Harrison* and Jan Hoover

11:30 – 11:45 **TRYING TO STOP BIGHEAD AND SILVER CARP FROM INVADING THE GREAT LAKES.** Steven George and Kelly Baerwaldt

11:45 - 12:00 **MODEL-BASED PROJECTION OF NILE TILAPIA'S (*OREOCHROMIS NILOTICUS*) INVASIVE ABILITY: THE IMPORTANCE OF ESTUARINE SALT BRIDGES.** Michael R. Lowe*, Mark S. Peterson, Nancy J. Brown-Peterson, Pamela J. Schofield, and William T. Slack.

12:00 – 1:15 LUNCH

1:15 – 4:45 SESSION IV: HABITAT I

Conference Center

Moderator: Larry Pugh

1:15 – 1:30 **THE RICHTON SALT DOME PROJECT: POTENTIAL IMPACTS TO COASTAL RESOURCES.** Harriet Perry and Don Johnson

1:30 – 1:45 **CRAPPIE, *POMOXIS* SPP., RECRUITMENT RELATIVE TO FLOODING IN NORTHERN MISSISSIPPI FLOOD-CONTROL RESERVOIRS.** Jonathon Dagele*, and Leandro E. Miranda

- 1:45 – 2:00 **FISH SPECIES RICHNESS IN OXBOW LAKES RELATIVE TO HYDROLOGIC CONNECTIVITY.** Dan Dembrowski*, and Leandro E. Miranda
- 2:00 – 2:15 **MODELING JUVENILE ALABAMA SHAD HABITAT USE.** Paul Mickle*, Jake Schaefer, Susan B. Adams, Brian R. Kreiser, and W. Todd Slack
- 2:15 – 2:30 **VARIABLES AFFECTING TRAWL CATCH RATES OF STURGEON IN THE LOWER MISSISSIPPI RIVER.** Nathan Kuntz*, Harold L. Schramm, Jr., and Patrick P. Mirick
- 2:30 – 2:45 **MOVEMENTS AND HABITAT USE OF PALLID STURGEON IN THE LOWER MISSISSIPPI AND ATCHAFALAYA RIVERS.** Jason R. Herrala* and Harold L. Schramm, Jr.
- 2:45 – 3:00 BREAK**
- 3:00 – 4:45 **SESSION V: Habitat II**
Moderator: Read Hendon
- 3:00 – 3:15 **IDENTIFYING MACROPHYTE HABITAT WITH DEDUCTIVE GIS MODELING: A TOOL FOR AQUATIC RESOURCE MANAGERS.** Jonathan Fleming*, John D. Madsen, and Eric D. Dibble
- 3:15 – 3:30 **BOTTOM-UP EFFECTS: INFLUENCE OF SEDIMENT NUTRIENTS AND BENTHIC MACRO-INVERTEBRATES IN RECREATIONAL FISHING PONDS.** Tyler J. Stubbs* and Robert Kröger
- 3:30 – 3:45 **RESTORATION OF GULF COAST STRAIN WALLEYE (*STIZOSTEDION VITREUM*) HABITAT ON MACKEYS CREEK.** Richard Campbell and Jason Olive
- 3:45 – 4:00 **A PASSIVE ACOUSTIC SURVEY OF MALE SPOTTED SEATROUT COURTSHIP SOUNDS IN MISSISSIPPI COASTAL WATERS: IDENTIFYING SPAWNING HABITAT.** Jennifer A. McKinney*, Eric R. Hoffmayer, James S. Franks, Bruce H. Comyns, Susan K. Lowerre-Barbieri, Sarah L. Walters, and Joel W. Bickford.
- 4:00 – 4:15 **ASSESSMENT OF ARTIFICIAL REEF DISTRIBUTION PATTERN INFLUENCES ON RELATIVE ABUNDANCE OF JUVENILE RED SNAPPER ALONG THE MISSISSIPPI GULF COAST.** Jason Brandt* and Donald C. Jackson

- 4:15 – 4:30 **YOUNG TARPON (*MEGALOPS ATLANTICUS*) IN MISSISSIPPI COASTAL WATERS: FOUR CONSECUTIVE YEARS OF DOCUMENTED OCCURRENCE.** Paul O. Grammer, James S. Franks, and Michael Buchanan
- 4:30 -4:45 **TRACKING LARGE PELAGIC SHARKS IN THE GULF OF MEXICO USING SATELLITE TECHNOLOGY.** Eric R. Hoffmayer, James S. Franks, William B. Driggers III, Mark A. Grace, Michael Lowe, and Jennifer McKinney
- 4:45 – 5:00 **VERTICAL MOVEMENTS AND TEMPERATURE PREFERENCES OF A SCALLOPED HAMMERHEAD SHARK (*SPHYRNA LEWINI*) IN THE NORTHERN GULF OF MEXICO INFERRED FROM POP-UP SATELLITE ARCHIVAL TAGGING.** James S. Franks, Eric R. Hoffmayer, and William B. Driggers III

5:00 – 6:30 POSTER PRESENTATIONS **Conference Center Lobby**

FEEDING-RELATED MORPHOMETRICS OF THE BLACKSTRIPE TOPMINNOW, *FUNDULUS NOTATUS*. Charles M. Champagne, Jake F. Schaefer, Brian R. Kreiser, Paul F. Mickle, Dave D. Duvernell

ACOUSTIC MAPPING OF NEARSHORE COASTAL WATERS: A COST-EFFECTIVE METHOD FOR DELINEATING BENTHIC HABITATS. J. Read Hendon

UTILIZING SIDE SCAN SONAR AS AN ARTIFICIAL REEF MANAGEMENT TOOL. Jimmy Sanders

EVALUATION OF A NEW PREPARATION TECHNIQUE FOR FLATHEAD CATFISH PECTORAL SPINES. Tyler J. Stubbs, Jeff Koch, and Randy Schultz

6:30 – 10:00 BANQUET **Dining Hall**

Speaker – Dr. Stephen Ross – “The Journey: A to Z (Academia to Zephyrs)”

FRIDAY – 5 FEBRUARY 2010

7:00 – 8:00 BREAKFAST **Dining Hall**

8:30 – 11:00 MS BUSINESS MEETING **Conference Center**

ORAL PRESENTATIONS

USING PHYSIOLOGY TO HELP UNDERSTAND ECOLOGY: AN EXAMPLE OF LAKE STURGEON AND ENVIRONMENTAL CALCIUM

Peter J. Allen, Department of Wildlife, Fisheries and Aquaculture, Mississippi State University, Mississippi State, MS 39762, pallen@cfr.msstate.edu

Dirk Weihrauch, Department of Biological Sciences, University of Manitoba, MB R3T 2N2
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Stephan J. Peake, Canadian Rivers Institute, University of New Brunswick, NB Canada

W. Gary Anderson, Department of Biological Sciences, University of Manitoba, MB R3T 2N2
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Physiology can be a very useful tool in understanding the ecology of fishes. Physiological tolerances and optimal conditions can provide predictive information for potential habitat preferences as well as required environment characteristics. Physiological tools are also highly useful for understanding life stage limitations, studying species that are difficult to sample in the field, and analyzing the effects of altered environmental conditions. As an example, juvenile lake sturgeon are a difficult to study species due to rarity and preferred habitats. In the relatively recent past, environmental conditions have changed dramatically in some of their occupied habitat, largely due to the alteration of surface water chemistry by acid rain. In impacted areas, water calcium concentrations have dropped precipitously although their impact on lake sturgeon is unknown. To examine this, laboratory experiments were conducted to test the effects of water calcium concentrations on calcium homeostasis, in terms of: flux rates, compensatory drinking rates, and tissue transporter expression. These laboratory studies were compared with wild lake sturgeon from two natural populations with different water calcium concentrations. Blood and urine were collected from fish from a range of reproductive stages, when calcium regulation would be expected to be strained due to internal demands. Results of these physiological studies will be related to the tolerances these fish have for low calcium concentrations and the ecology of this species.

EARLY GROWTH OF THE THREE KINGFISH (*MENTICIRRHUS*) SPECIES FOUND IN COASTAL WATERS OF THE NORTHERN GULF OF MEXICO

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Southern kingfish (*Menticirrhus americanus*), gulf kingfish (*M. littoralis*), and northern kingfish (*M. saxatilis*) are members of the drum family (Sciaenidae) and co-occur in the northern Gulf of Mexico. Although growth of other young sciaenids has been well documented, little is known about the growth of young kingfish species. This is the first study to use otoliths as a method for aging young kingfish species. Kingfish were collected by beam plankton trawl and seine along shoreline habitats in 2005 and 2006. Specific habitats included barrier island surf zones and grass beds, and mainland marsh-edges and sandy shorelines. A total of 194 kingfish (127 *M. americanus*, 54 *M. littoralis*, and 13 *M. saxatilis*) were aged to make growth comparisons using an analysis of covariance. Otolith age determinations of all three kingfish indicated accelerated growth with increasing size and warmer water temperatures. Growth rates for all three *Menticirrhus* species were similar, and ranged from approximately 0.7mm/day at 4-6mm SL to 1.9mm/day at 55-60mm SL. Seasonal comparisons of growth rates revealed size-at-age of both *M. americanus* and *M. littoralis* were significantly smaller in the spring than during the summer and fall, and growth in the summer and fall was similar. Inter-annual comparisons of *M. littoralis* revealed size-at-age of specimens collected in 2006 were greater than those collected in 2005. Habitat comparisons showed *Menticirrhus americanus* collected in 2005 from marsh-edges grew significantly faster than *M. americanus* collected along sandy shorelines.

ASSESSMENT OF ARTIFICIAL REEF DISTRIBUTION PATTERN INFLUENCES ON RELATIVE ABUNDANCE OF JUVENILE RED SNAPPER ALONG THE MISSISSIPPI GULF COAST.

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Donald C. Jackson, Department of Wildlife and Fisheries, Mississippi State University, Mail Stop 9690, Mississippi State, Mississippi 39762

Red snapper (*Lutjanus campechanus*) is an economically and ecologically important marine fish in the Gulf of Mexico, but its abundance has decreased 90% since the 1980s. Artificial reefs may aid in restoring red snapper stocks by providing foraging sites and refugia for juveniles. We initiated an experiment to determine effectiveness of different distributional patterns of artificial reefs in attracting and sustaining juvenile red snapper in the northern Gulf of Mexico. Between September 2007 and December 2008, we deployed fish traps on pyramid shaped artificial reef structures at reef site FH-13, 40 km south of Pascagoula, Mississippi. We evaluated two reef designs: (1) five closely-spaced pyramid units, and (2) five closely-spaced pyramids with two sets of two pyramids at 30.5, 61.0, and 91.5 m from the group of five pyramids. In 26 sampling trips, 927 red snapper were captured and 852 marked with t-bar anchor tags. Red snapper catch per unit effort (CPE: red snapper/trap soak hour) did not differ significantly among reef patterns. Environmental parameters (dissolved oxygen, salinity, and temperature) were not significantly correlated with red snapper CPE. Mean total length (TL) of red snapper differed significantly among reef patterns, with the largest mean total length occurring at the pattern with intermediate horizontal spacing (61.0 m). Thirty-one red snapper were recaptured, and 97% of recaptures occurred at original tagging locations. Mean growth rate of recaptured fish was 0.29 mm d^{-1} (TL). Although artificial reef configuration did not seem to affect red snapper abundance, results from this study indicate that juvenile red snapper are utilizing the pyramid structures and may benefit in terms of growth through the use of reef patterns with intermediate horizontal spacing.

RATIONALE FOR REMOVING THE CRAPPIE, *POMOXIS SPP.*, 10-INCH MINIMUM LENGTH LIMIT AT OKATIBBEE RESERVOIR, MS

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Okatibbee Reservoir is a 1,620 hectare reservoir located in Lauderdale County, MS. In 1993, a 254 mm (10-inch) minimum length limit was enacted to regulate crappie harvest. In 2009, we reviewed available data to evaluate the impact of the regulation on the crappie population and the fishery. The mean angler catch rate for harvested crappie was 1.5 fish/h prior to implementation of the length limit, and 1.2 fish/h after implementation. The angler catch rate of released crappie increased from 0.4 fish/h prior to the length limit to 1.3 fish after the length limit was in effect. High catch rates of released fish suggest that recruitment to catchable sizes has been adequate, and some harvestable sized fish are dying before they grow to legal size. Since 1998, the mean relative weight values of crappie \geq stock size (13 cm) collected during fall electrofishing have been below 80 every year except for one (2004). From 1991 to 1997 mean relative weight values were above 80 in four years and below 80 in three years. Growth of white crappie at Okatibbee is slow with some 4 year old fish being protected by the length limit. Removal of this regulation was recommended after this review.

EARLY LIFE HISTORY AND RECRUITMENT OF DOLPHINFISH (*CORYPHAENA HIPPURUS*) AND GREATER AMBERJACK (*SERIOLA DUMERILI*) TO PELAGIC *SARGASSUM* HABITAT IN THE NORTHCENTRAL GULF OF MEXICO

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This study focused on the recruitment of larval and juvenile common dolphinfish (dolphin) and greater amberjack (amberjack) to pelagic *Sargassum* habitat in the northcentral Gulf of Mexico (GOM), and the use of this habitat by the early life-stages of these two species. Collections were taken at small isolated clumps of *Sargassum*, adjacent to or underneath large aggregations of *Sargassum* located along frontal zones, and in open water with no *Sargassum*. We first developed taxonomic characters to identify larval greater amberjack, and illustrated a size-series of young juvenile and larval amberjack as small as 2.4 mm in length. Dolphin larvae were as abundant in open water control locations as they were near *Sargassum* habitat, whereas amberjack were statistically more abundant in collections at *Sargassum* habitat. Growth rates of dolphin larvae based on otolith analyses were faster near *Sargassum* habitat than in open water. This comparison could not be fully assessed for amberjack larvae because of the relatively few amberjack collected in open water. Dolphin larvae grew faster than larval amberjack, and these increased growth rates may have lowered predation mortality rates of dolphin larvae in open water environments. Amberjack collected at open water sites were relatively small (2.5-6.6 mm), suggesting that these young fish had not yet recruited to *Sargassum* habitat and that there was a higher mortality rate of amberjack larvae in open water than in the vicinity of *Sargassum* habitat. Only larger juvenile amberjack were collected at isolated clumps of *Sargassum*. These fish probably had been associated with larger accumulations of *Sargassum* that had become dispersed during rough seas. We originally thought that young amberjack larvae might utilize isolated clumps as a microhabitat until the clumps became advected to larger accumulations of *Sargassum*, but this is unlikely because no small larvae were found at isolated clumps. Our results suggest dolphin larvae that find *Sargassum* habitat grow quicker; however, their biological traits, including fast growth rates, allow them to survive better in the open water habitat compared to amberjack. Unlike dolphin, the survival of larval amberjack appears to be heavily influenced by the availability of *Sargassum* habitat.

A DETAILED EXAMINATION OF THE FEEDING ECOLOGY OF THE ATLANTIC SHARPNOSE, BLACKTIP, AND BONNETHEAD SHARK FROM THE NORTH CENTRAL GULF OF MEXICO

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Global shark populations continue to decline as a result of overfishing and habitat degradation, and these declines have been shown to significantly alter the trophic structure of the many marine ecosystems. In the northern Gulf of Mexico, the feeding ecology of many coastal shark species remains understudied., in particular, there is a lack of knowledge in the north central Gulf region. The Atlantic sharpnose, *Rhizoprionodon terraenovae*, blacktip, *Carcharhinus limbatus*, and bonnethead, *Sphyrna tiburo*, sharks were chosen for this study because they are common shark species found within the waters of the Mississippi Sound and near shore adjacent waters. Sharks were collected from 2005-2009 using gillnet and longline gear. In the laboratory, sharks were dissected and the stomach contents were stored in 95% ethanol. Each prey type was identified to the lowest possible taxa, counted, and weighed. Prey data was represented using five indices: percent number (%N), percent weight (%W), percent frequency of occurrence (%O), index of relative importance (IRI), and percent index of relative importance (%IRI) as a means of generally describing their diet. A total of 453 Atlantic sharpnose, 153 blacktip, and 27 bonnethead stomachs were analyzed in this study. The percentage of empty stomachs was significantly higher in the Atlantic sharpnose (67.1%) and blacktip (66.4%) sharks compared to the bonnethead sharks (0%) Atlantic sharpnose sharks were more opportunistic feeding on teleost fish (73.8%), crustacea (22.5%), and molluscs (3.4%) while the blacktips and bonnetheads exhibited selective diets, foraging on almost exclusively one prey category: fish (99.1%) for blacktips and crabs (100%) for bonnetheads.. The Atlantic sharpnose sharks fed primarily on various Penaeid shrimp, and the Sciaenid *Micropogonias undulatus*, whereas blacktips fed primarily on *M. undulatus* and Mugilid species. Bonnethead sharks exhibited a completely different feeding strategy by feeding almost exclusively on crustacea, primarily the blue crab, *Callinectes sapidus*. It is clear that the diet specialization of each species has allowed them to co-exist within the waters of the north central Gulf of Mexico.

CRAPPIE, *POMOXIS* SPP., RECRUITMENT RELATIVE TO FLOODING IN NORTHERN MISSISSIPPI FLOOD-CONTROL RESERVOIRS

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Crappies *Pomoxis* spp. evolved in river systems as floodplain specialists, thriving in backwaters and temporally inundated habitats, adeptly roaming in and out of these environments to exploit changing conditions. In reservoirs with fluctuating water levels, the amount of floodplain habitat available depends on timing and magnitude of water level rises. We assessed crappie recruitment in four flood-control reservoirs relative to floodplain inundation. Recruitment of young-of-the-year crappies in the reservoirs was indexed with samples taken with trap nets in late summer. Crappie recruitment in reservoirs with more flooded habitat at the onset of the spawning period (approximately March 1) was higher than in reservoirs with no or minimal flooding. Grenada Lake (3,330 ha over conservation pool) and Arkabutla Lake (922 ha over conservation pool) averaged 40 and 21 crappie per trap net, respectively. Conversely, Enid Lake (255 ha over conservation pool) and Sardis Lake (324 ha under conservation pool) averaged 7 and 6 crappie per trap net, respectively. The alteration of rule curves to include biologically significant flooding should be actively pursued as a management strategy for promoting crappie recruitment in reservoirs where substantial sections of the floodplain can be inundated.

FISH SPECIES RICHNESS IN OXBOW LAKES RELATIVE TO HYDROLOGIC CONNECTIVITY

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Oxbow lakes within the White and Yazoo river basins of Arkansas and Mississippi vary in their degree of connectivity to their respective parent rivers. Lakes within the Yazoo River Basin were historically connected to their parent rivers during seasonal inundation; however, many lakes are presently separated from their parent rivers by the levee system and may connect to the river only through water control structures or intermittent drainage channels. Alteration to the connectivity regime has ultimately resulted in the disruption of natural processes that structure fish assemblages and maintain aquatic biodiversity in the region. In order to design plans to preserve and restore the fish species richness and biodiversity in these oxbow lakes, this study examined the relationship between the level of connectivity and fish species richness in oxbow lakes within the Yazoo and White river basins. Fish community data were collected from 41 lakes in the Yazoo River Basin and 8 lakes in the White River Basin. Connectivity was measured in terms of the distance of the path of least resistance for the flow of water from each oxbow lake to its parent river. Preliminary results indicate that fish species richness tends to decrease as lakes experience higher degrees of disconnection. There was a reduction in the number of species by nearly 50% from the most connected lake to the least connected lake, asserting that lakes farther from their parent rivers may experience a lack of colonization or immigration events and an amplification of extinction events.

IDENTIFYING MACROPHYTE HABITAT WITH DEDUCTIVE GIS MODELING: A TOOL FOR AQUATIC RESOURCE MANAGERS

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Diverse native aquatic macrophytes serve a number of physical and biological functions in the aquatic environment and provide essential habitat for several fish species. In systems that lack submersed macrophytes due to age or disturbance, native macrophyte re-establishment can be used to revitalize the aquatic community. Planning re-establishment projects requires knowledge of the system along with the growth requirements of macrophytes. Prior studies have identified factors that are important for macrophyte colonization, persistence, and dispersal. However, deductive approaches to identify macrophyte habitat that are suitable for management application have not been developed. A potential solution to this problem is the incorporation of waterscape-wide variables into a Geographic Information System (GIS) and the use of spatial modeling techniques to identify suitable macrophyte habitat. This provides a scientifically based approach to macrophyte re-establishment planning to make efforts more efficient and to recognize potential coverage. Not only can these modeling techniques be used for re-establishment projects, the flexibility, scalability, and topological advantages of using a GIS to identify and visualize habitat make it a tool capable of integration with a number of other spatial ecological factors to improve the management of aquatic resources from plants to fish. Using Little Bear Creek Reservoir, Alabama as an example system, a GIS modeling process will be illustrated that can be applied to any system where the identification of macrophyte habitat is relevant to fisheries or aquatic plant management goals. Additionally, other potential uses of the model such as invasive species risk assessment and energetic implications for aquatic biota will be discussed.

VERTICAL MOVEMENTS AND TEMPERATURE PREFERENCES OF A SCALLOPED HAMMERHEAD SHARK (*SPHYRNA LEWINI*) IN THE NORTHERN GULF OF MEXICO INFERRED FROM POP-UP SATELLITE ARCHIVAL TAGGING

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Despite the circumglobal distribution of the scalloped hammerhead shark (*Sphyrna lewini*), there is limited information on habitat preferences and fine-scale movement patterns for the species, particularly in the Gulf of Mexico (Gulf). A high-rate pop-up satellite archival tag (PSAT) (Microwave Telemetry, PTT-100 HR) attached to a 2.4 m TL, mature female scalloped hammerhead in the northern Gulf in June 2008 provided high resolution data on the shark's diel vertical movements and associated temperature preferences over a 27 day period. The shark spent 83% of daylight hours at depths and temperatures between 20-100 meters (m) and 25-28°C, respectively, with no deep dives. Conversely, 70% of night time hours was spent in surface/near-surface waters (0-50 m depth) at temperatures between 27-30°C, with multiple dives nightly exceeding 800 m (some approaching 1,000 m and temperatures less than 6.0°C). The purpose of the nightly oscillatory deep diving pattern is unknown but could represent resting, feeding, or mating behavior. These PSAT data represent the first such information acquired on *S. lewini* habitat and vertical movements in the Gulf.

FUNCTIONAL MORPHOLOGY OF THE HAMMERHEAD CEPHALOFOIL: DOES THE HEAD OF HAMMERHEAD SHARKS (*FAMILY, SPHYRNIDAE*) CONFER AN ADVANTAGE VIA HYDRODYNAMIC LIFT PRODUCTION?

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All extant hammerhead shark species are characterized by a unique head shape that is compressed dorsoventrally and expanded laterally to form an anterior cephalofoil (i.e., “head-wing”) with the eyes situated distally at each lateral end. Historically, there has been much biological conjecture regarding the adaptive significance of this structure. While progress has been made in furthering our understanding of sphyrnid functional morphology, a complete picture remains obscure. Proposed functions are numerous including: enhancement of electrosensory sensitivity, increased olfactory acuity, circumferential vision, and use as a prey-capturing device. None of these hypotheses are necessarily mutually exclusive and, in truth (as with any structure), there are likely multiple advantages to the organism. Another long-standing supposition is that the head morphology of sphyrnid sharks produces a hydrodynamic lift force which contributes to the shark’s ability to maintain vertical station in the water column (because they lack a swim bladder, sharks must rely on other mechanisms for buoyancy regulation). Indeed, the head does strongly resemble a wing in profile. Although often stated as fact, this hypothesis remains as-of-yet insufficiently tested (Dr. Steven Vogel, personal communication). I intend to assess this hypothesis both directly using computational fluid dynamics (CFD), and indirectly through confirmatory statistical analysis. I have produced plaster casts of all eight extant hammerhead species and those of three carcharhinid species for comparison. I have digitized these physical models using a FARO® laser scanner. Three-dimensional head models will be joined with generic, turbulence-reducing body shapes (e.g., conical) in order to limit the analysis to comparison of head morphologies alone. I will then conduct a CFD simulation to model fluid flow around these shapes. In this context, CFD involves the definition of a spatial zone of interest surrounding a body (termed the “far field”) in which flow is to be modeled. A polygonal grid is then superimposed upon the surface of that body wherein each polygon within the grid represents the face of a polyhedron bordering the object. A computer algorithm is used to subdivide the space bounded by the object’s surface and the far field into polyhedral parcels of some specified size. Fluid dynamic equations governing flow are then solved iteratively for each parcel of space (given a specific set of parameters dependent upon properties of the fluid, its speed, direction of motion, etc.). Post processing software then allows for visualization of flow and yields descriptive data (such as lift coefficient, drag coefficient, etc). In addition, I will use two-block partial least squares (2B-PLS) analysis to evaluate contribution of head-generated lift forces (as quantified by CFD) to covariance between the balanced, opposing anterior and posterior lift forces characteristic of sharks. A formative model will be constructed involving two latent variables (net-anterior and net-posterior lift), each comprised of a set of morphometric variables proportional to lift. A parameter estimate will be calculated and randomization tests will be used to determine model significance.

TRYING TO STOP BIGHEAD AND SILVER CARP FROM INVADING THE GREAT LAKES

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Bighead, *Hypophthalmichthys nobilis*, and silver carp, *Hypophthalmichthys molitrix*, currently infest the Mississippi River Basin and threaten other bodies of water. To restrict them from entering the Great Lakes via the Chicago Sanitary and Ship Canal, the US Army Corps of Engineers contracted with Smith-Root Inc. to construct an electrical barrier to prevent fish movement. The University of Notre Dame geneticists conducted DNA sampling and detected *Hypophthalmichthys sp.* DNA in the canal near the electrical barrier. Since maintenance work on the electrical barrier was scheduled, actions were taken to prevent passage of bighead and silver carp while the barrier was not operating. During December 3-5, 2009, representatives of numerous city, state and federal agencies collaborated in a fish eradication program on 9.2 kilometers (5.7 mile) of the Chicago Sanitary and Ship Canal using rotenone. At least 17,771 specimens, representing 35 species of fishes, were documented during the event. Fishes obtained from the rotenone treated reaches were processed at three fish disposal sites (Cargill, Lockport, Ruby). Overall, common carp, *Cyprinus carpio*, was the dominant species (n=7,094, 40%) but reached its greatest abundance in the middle reach at Lockport (n=4,079, 71%) and represented the majority of fish biomass. Emerald shiner, *Notropis atherinoides* (n=2,900, 16%) was the second dominant species reaching its greatest numbers in the upper reach at Cargill (n=2,672, 25%). Yellow bullhead, *Ameiurus natalis* (n=1,582, 9%), bluntnose minnow, *Pimephales notatus* (n=1,316, 7%) and goldfish, *Carassius auratus* (n=1,265, 7%) followed sequentially in abundance. Rare fishes represented by a single individual included bighead carp, *Hypophthalmichthys nobilis*, yellow perch, *Perca flavescens* and alewife, *Alosa pseudoharengus*.

THE EFFECT OF THE IONIC COMPOSITION OF LOW SALINITY WATER ON THE GROWTH, DEVELOPMENT AND SURVIVAL OF CULTURED JUVENILE BLUE CRABS

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Cost-effectiveness of blue crab aquaculture could be maximized by determining the minimum proportion of commercial sea salt to NaCl solution adequate for survival, and investigating if a mixed ion solution containing the major ions in sea salt could replace commercial sea salt for holding blue crabs in low salinity grow-out ponds. Cultured juvenile blue crabs were held for 77 days and monitored for survival, growth and development in low salinity water containing various compositions of ions. Crabs were isolated in separate containers and placed in 30-gallon aquaria containing 2ppt of ion solution. Temperature, ambient humidity, and nitrite levels were monitored daily. Molts were measured to determine growth, and molt increments were recorded to determine rate of development. The 1st part of the study compared ratios of NaCl to commercial sea salt (SS) in 5 treatments: 100% NaCl, 100% SS, 25:75 NaCl/SS, 50:50 NaCl/SS, and 75:25 NaCl/SS. The 2nd part of the study examined mixed ion treatments containing solutions of NaCl; NaCl and CaCl₂; and NaCl, MgCl₂, and CaCl₂, and NaCl, MgCl₂, CaCl₂, and KCl; and SS. The results of these experiments indicate that acceptable yields of cultured blue crabs (>50% survival) can be achieved in solutions of up to 50% NaCl mixed with commercial sea salt. Mixed ion solutions containing the 5 most abundant ions in seawater will continue to facilitate growth and development, but unacceptably high mortality will occur.

YOUNG TARPON (*MEGALOPS ATLANTICUS*) IN MISSISSIPPI COASTAL WATERS: FOUR CONSECUTIVE YEARS OF DOCUMENTED OCCURRENCE

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Juvenile tarpon ($n = 139$, 50.8 – 231.3 mm TL) were collected using cast net gear from two tidal sloughs in Jackson Co., MS during summer and fall 2006 – 2009. The majority ($n = 123$) of the specimens were released (43 tagged, none recaptured to date), and a few specimens were sacrificed for future otolith, stomach content, and DNA analysis. Three larger juveniles (726 - 838 mm FL; 17.4 - 24.7 kg TW), caught from Biloxi Back Bay in 2007, were sacrificed for biological examination, while a fourth large juvenile (577 mm FL) caught from Fort Bayou in 2009 was tagged-released at the site of capture. Anecdotal reports from local anglers of large juvenile tarpon being caught from Biloxi Back Bay and the lower Pascagoula River persisted during 2009. Research efforts conducted during 2009, including the initiation of an expanded field survey (years 2009 and 2010) to document the distribution of juvenile tarpon in the state's coastal waters, were supported by a grant from the Mississippi Department of Marine Resources, Mississippi Tidelands Trust Fund. A single tarpon leptocephalus larva collected at Belle Fontaine Beach (Jackson Co.) in October 2009 by fisheries personnel of the Gulf Coast Research Laboratory represented the second documented record of tarpon larvae from Mississippi coastal waters. Field research conducted during summer and fall 2010 will include sampling for tarpon larvae in tidal sloughs confluent with the Mississippi Sound. An overview of the tarpon research to date is provided along with field survey activities scheduled for year 2010.

SWIMMING SMARTER NOT HARDER: STATION HOLDING STRATEGIES OF GRASS CARP

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Grass carp (*Ctenopharyngodon idella*), one of four Asian carps now common in the United States, are cultivated for biological control of aquatic plants. Stocking accounts for a substantial part of the extensive geographic range of this fish but juveniles may be capable of independent dispersal. We evaluated swimming performance of juvenile grass carp and compared it with that of 5 native species previously studied under near-identical conditions: paddlefish, white sturgeon, pallid sturgeon, bowfin, and Topeka shiner. Fifty grass carp, 56-100 mm TL, were tested in flow 45-85 cm/s at 18-22 C in a 100-liter Blazka swim tunnel. Only 62% of fish tested were positively rheotactic, orienting head-first into the flow of water, and an additional 8% swam poorly (endurance < two orders of magnitude than that of conspecifics tested at the same speed). Swim speeds of performers were comparatively high with sustained swimming (> 200 minutes) observed at velocities up to 60 cm/s, prolonged swimming (200 to 0.5 min) at speeds (up to 85 cm/s). Preliminary data suggest that burst swimming takes place at velocities ≥ 90 cm/s. Behavior was diverse consisting principally of high-energy free-swimming in the water column (81.2%), with occasional low-energy behaviors including hunkering (1.5%), tail-bracing (6.3%), and facial appression against vertical surfaces (11%). Data suggest that grass carp have low vagility (i.e., only 30% performance) when compared with that of native fishes (i.e., > 90% performance). However, the small number of grass carp that performed well exhibited higher sustained, prolonged, and burst speeds than those documented for the native fishes. Endurance at a wide range of speeds was associated with grass carp station-holding behaviors which are a combination of benthic station-holding techniques used by sturgeon with mid-water station-holding techniques used by shiners. Brief intervals of low-energy station-holding substantially increase endurance and swim speeds for sturgeon, shiners, and apparently, grass carp. Dispersal of small numbers of strategically-swimming grass carp, then, seems likely and may be an important mechanism for expansion and maintenance of geographic range in the United States.

LOGLINE LIAISONS: COMPARISON OF THE 2008 & 2009 MISSISSIPPI SEAMAP INSHORE LOGLINE SURVEY

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In 2008 an inshore longline survey was developed to monitor the seasonal abundance and distribution of many coastal species within three regions: the Mississippi Sound (MS), near offshore waters South of the Sound (SS), and the Chandeleur Sound (CS). Each month from March to October, three stations are randomly sampled from each study area. In 2009 a total of 1060 animals were caught during the eight month sampling period, of which 898 were sharks and rays, 112 were catfish, and 41 were red drum (*Sciaenops ocellatus*). This is a 21.8% increase in shark/ray catch per unit effort (CPUE) and a 45.9% decrease in red drum CPUE as compared to the previous year. Shark catches were again dominated by Atlantic sharpnose sharks (*Rhizoprionodon terraenovae*) (57.9%) and blacktip sharks (*Carcharhinus limbatus*) (24.6%), and ray catches were dominated by the Southern stingray (*Dasyatis americana*) (89.7%). The CPUE in the MS was significantly lower (6.82 fish 100 hook⁻¹ hr⁻¹) when compared to SS (7.53 fish 100 hook⁻¹ hr⁻¹) and the CS (11.29 fish 100 hook⁻¹ hr⁻¹) for 2009. This was a shift from 2008 when the CS had the lowest CPUE (5.61 fish 100 hook⁻¹ hr⁻¹), which was most likely the result of a prolonged anoxic event that occurred in that region last year. Several species exhibited site preferences including blacknose (*Carcharhinus acronotus*) which were only found SS, bonnethead (*Sphyrna tiburo*) and finetooth (*Carcharhinus isodon*) sharks which were only found in the MS and CS, and hardhead catfish which were only found in the MS. Additionally, an adult female nurse shark (*Ginglymostoma cirratum*), was caught in the MS north of Ship Island, which we believe is the first record for this species in this area.

MOVEMENTS AND HABITAT USE OF PALLID STURGEON IN THE LOWER MISSISSIPPI AND ATCHAFALAYA RIVERS

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Little is known about short-term (<72 hrs) movements and habitat preferences of pallid sturgeon *Scaphirhynchus albus*, which was listed as federally endangered in 1990. To learn more about these movements and habitat use and selection, we tracked adult pallid sturgeon surgically implanted with ultrasonic transmitters in the lower Mississippi and Atchafalaya rivers. Active tracking occurred monthly and an array of acoustic receivers was used to passively monitor short-term movements. Results to date indicate that pallid sturgeon moved long distances (up to 150 miles in the Atchafalaya River) during 1-2 year periods, but movement during 24-72-h time periods is usually less than 2 km. Pallid sturgeon in the lower Mississippi River were detected most often on the inside bends of the main channel (50% of all detections), and downstream island tips were used least often (3% of all relocations). Pallid sturgeon in the Atchafalaya were found most often in an engineered outflow channel (48% of all relocations) and least often in the outside bends of the main channel (1% of all relocations). Information provided by short-term movement rates and habitat preference of pallid sturgeon in two separate systems should provide information that can be directed toward habitat conservation and restoration efforts

COMPARISON OF FISHERIES DATA PROGRAMS : MARINE RECREATIONAL FISHERIES STATISTICAL SURVEY (MRFSS) and FISHERIES RECOVERY REPORTS (FRRs)

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Hurricane Katrina made landfall as a category three hurricane on August 29, 2005 causing catastrophic damage to coastal Mississippi. In the wake of this devastating storm the Mississippi Department of Marine Resources (MDMR) has been focused on the rebuilding and revitalization of our valuable marine habitats and fisheries. To help in this effort the MDMR designed a program to monitor fisheries recovery through a cooperative compensated reporting system with resident charterboat captains. The objectives of this program were to obtain by-catch, harvest, area fished, artificial reef use, and effort data from charterboat captains. The data collected from this program was then compared to the data collected from the ongoing MRFSS program. When compared, the effort estimates from the MRFSS program were very similar to the effort numbers turned in by the captains on the FRRs. Species and harvest information varied greatly between the programs. The FRRs reported three times as many species caught as the MRFSS program. Comparisons were made by season and yearly harvest for individual species. The data presented in this report covers the time period covering January 1, 2007 to December 31, 2007.

TRACKING LARGE PELAGIC SHARKS IN THE GULF OF MEXICO USING SATELLITE TECHNOLOGY

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Dusky (*Carcharhinus obscurus*) and silky (*C. falciformis*) shark are large pelagic species once common in the western north Atlantic Ocean; however, due to commercial exploitation their populations are in decline. Few data exist describing the essential habitats of these two species. Such information is imperative to understanding the behavior of these sharks so proper management practices can be implemented to aid in population recovery. The goal of this study was to use pop-up satellite archival tags (PSAT) to reveal movement patterns and habitat preferences of dusky and silky sharks in the northern Gulf of Mexico. During summer of 2008-2009, 17 sharks were tagged in the northern Gulf using PSATs: seven silky (1.3-1.8 m, TL) and 10 dusky (2.7-3.1 m, TL). All tags reported data, with deployment durations ranging from 14 to 124 days. The majority of the dusky sharks traveled relatively long distances (>200 km), while all silky sharks remained within 150 km of the initial tagging location. Dusky sharks spent the majority of their time between 21 and 100 meters, with occasional dives below 100 meters, whereas silky sharks spent 99% of their time in the top 50 meters of the water column. Water temperature ranges were relatively similar with dusky sharks preferring slightly cooler temperatures between 23 and 26°C and silky sharks preferring warmer temperatures between 26 and 29°C. One dusky and one silky shark moved to the southern Gulf of Mexico, which demonstrates the need for shared stock management of these imperiled species.

A COMPARISON OF AGE AND GROWTH ESTIMATION OF THE ATLANTIC SHARPNOSE SHARK, *RHIZOPRIONODON TERRAENOVAE*, IN THE NORTH CENTRAL GULF OF MEXICO

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The Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, is the most abundant shark species found within the shallow waters of the northern Gulf of Mexico. As a result, they dominate the commercial and recreational fishery landings for this region; however, recent stock assessments have shown that they are not considered overfished. It has recently been suggested that, due to density-dependent factors, the age and growth parameters for this species in the northern Gulf of Mexico have changed, resulting in a smaller size and younger age of maturity than was originally report from the 1970's. The objective of this study was to re-examine the age and growth parameters of this species to determine if any further changes are evident. From August 2008 to November 2009, Atlantic sharpnose sharks were collected in the north central Gulf of Mexico. A total of 245 sharks were collected, representing 170 males and 75 females. Males ranged in size from 42.6 to 101.9 cm and females ranged from 34.5 to 106.0 cm. Age was determined using vertebral ring age estimation and growth rates were analyzed using the von Bertalanffy growth equation. The von Bertalanffy growth parameters obtained from the 2008-09 data were $L_{\infty} = 97.7$ cm total length (TL), $k = 0.50 \text{ year}^{-1}$ and $t_0 = -1.70$ year for males, $L_{\infty} = 103.4$ cm TL, $k = 0.45 \text{ year}^{-1}$ and $t_0 = -1.57$ year for females, and $L_{\infty} = 100.4$ cm TL, $k = 0.46 \text{ year}^{-1}$ and $t_0 = -1.70$ year for both sexes combined. The oldest aged hard part was estimated at 8.5 years for females and 7.5 for males. Our results were similar to growth parameters that were originally estimated in the late 1970's, but differ from what was reported in 2002. This difference could be the result of several factors including differences in methodologies among studies. Future studies need to conform to standard methodology and analysis practices to avoid any inconsistencies, and allow for any changes in the growth parameters due to anthropologic or climate change regime shifts to be evident In the data.

SCHOOLING BENEFITS IN BIGHEAD CARP

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Schooling confers social advantages to individual fish and is presumed to provide hydrodynamic benefits, although these are difficult to quantify. We evaluated effects of schooling on swimming performance of juvenile bighead carp (*Hypophthalmichthys nobilis*). Fish lengths ranged from 32-76 mm TL and were tested at velocities tiered from 20-80 cm/s in a 100-liter Blazka swim tunnel with water temperature averaging 21-23 C. Eighty-seven trials were conducted with naïve individuals (N = 57), groups of three (N= 14), and groups of five (N = 17). Rheotaxis was high in individuals (89% of fish tested) but was absolute in groups (100% of groups tested). Swim speeds were moderate for individuals and substantially higher for groups: maximum sustained swimming (for ≥ 200 min) at 20 cm/s for individuals and 40 cm/s for groups, prolonged swimming (200 min to 0.5 min) at 25-50 and 25-70 cm/s, maximum burst swimming (< 0.5 min) at 65 and 80 cm/s, respectively. Group size was important at velocities > 45 cm/s; groups of five fish had substantially greater high prolonged and burst speeds compared to groups of three fish. Increased sustained, prolonged, and burst speeds in groups (especially larger groups) may be attributable to formations assumed by schooling carp. Distinctive diamond-shaped wedges of bighead carp were observed and this formation is believed to generate vortex streets along which flanking fish can swim at reduced energy rates. Because bighead carp are a schooling species, and because group size in nature is uncertain, estimates of swimming speed based on individual fish should be used with great caution when making management decisions (e.g., estimates of dispersal rates, evaluation of barriers, risk assessment).

**FEASIBILITY OF ASSESSING YOUNG-OF-YEAR GULF OF MEXICO STURGEON,
ACIPENSER OXYRINCHUS DESOTOI, BY TRAWLING**

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We tested the feasibility of sampling young-of-year Gulf of Mexico sturgeon, *Acipenser oxyrinchus desotoi*, in the Apalachicola River, Florida using modified balloon trawls (Missouri trawls) during January and June 2009. Three young-of-year sturgeon (57 to 120 mm fork length) were captured in the lower reaches of the system during June 2009. This method of assessment is labor intensive and may require > 15 river miles of trawling per capture. However, it now appears feasible, especially with familiarity with the river system, to sample young-of-year by trawling. Additionally, early life stages (i.e., ages 0 to 3) are likely vulnerable to this gear. If this is the case, a poorly understood segment of Gulf sturgeon life history can be explored.

VARIABLES AFFECTING TRAWL CATCH RATES OF STURGEON IN THE LOWER MISSISSIPPI RIVER.

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Few studies have assessed the affect abiotic variables have on catch rates of juvenile *Scaphirhynchus* spp. This study estimated which environmental variables may have affected catch rates in the lower Mississippi River. An otter trawl was used to capture juvenile *Scaphirhynchus* spp. from July to November 2009. Sampling occurred between river kilometers 898-933 on sand bars along inside river bends. Samples were taken on each sand bar at three longitudinal positions and three depth ranges (1-2, 3-4 and 5-6 m). Variables considered in data analysis include: water velocity, water temperature, depth, bend, river stage and 24 hour change in river stage. Regression tree analysis was used to estimate which variables had the greatest effect on catch rates. Preliminary results show that river stage was the most important factor affecting catch rates, followed by surface velocity and depth. The best model explained 39.6% of the variation in catch rates. Although preliminary analysis revealed that catch rates are primarily influenced by river stage, more sampling is needed to increase sample size and better assess the factors affecting catch rates of juvenile *Scaphirhynchus* spp. in the lower Mississippi River.

MODEL-BASED PROJECTION OF NILE TILAPIA'S (*OREOCHROMIS NILOTICUS*) INVASIVE ABILITY: THE IMPORTANCE OF ESTUARINE SALT BRIDGES

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It has been assumed that the accidental release of nonindigenous Nile tilapia, *Oreochromis niloticus*, would be inconsequential due to the species' presumed inability to tolerate winter conditions at temperate latitudes. However, Nile tilapia has an established population in the lower Pascagoula River, Mississippi, presumably as the result of escape from aquaculture facilities. Due to the established population's proximity to coastal habitats, it is imperative that we explore the role of estuarine waters in the dispersal of this invasive species. We used a two-tiered approach to this question. First, the habitat requirements, in salinity, for Nile tilapia in the summer and winter were rigorously assessed applying manipulative experiments. Survival, growth and gonad production of this species was quantified at eight salinities (0 to 70; increments of 10) at both summer (30° C) and winter (15° C) temperatures in a controlled, experimental setting. The results showed that Nile tilapia could survive in salinities up to 40 and both grew and reproduced in salinities as high as 30 in the summer. During the winter, survival was highest at a salinity of 10, growth was negative across all salinity treatments, and gonad production did not occur. Second, we developed logistic regression models based on the experimental results and then applied them to historical salinity data in order to derive probabilities of survival, growth, and reproduction during both seasons and project how Nile tilapia may use estuarine and freshwater habitats in coastal Mississippi. Projected results suggest that low salinity waters near the mouths of Bay St. Louis, Biloxi Bay, and Pascagoula River may provide suitable habitats for all facets of Nile tilapia life-cycle. Furthermore, coastal waters likely serve as a 'salt-bridge' where by established Nile tilapia populations can gain access to adjacent freshwater systems throughout Mississippi.

MISSISSIPPI'S FRESHWATER COMMERCIAL FISHERY IN 2008

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In 2008 the Legislature enacted a law that Commercial Fishing License holders must report their harvest and activities. Over 2 ½ million pounds of nongame gross fish and nonnative fish were estimated as being harvested in 2008 by persons with commercial fishing licenses. Buffalo fish led the harvest at 1½ million pounds. Commercial fishers harvested 205,800 blue and channel catfish that weighed 636,000 pounds, and 18,600 flathead catfish that weighed 153,000 pounds. Carp were prominent in the harvest with 210,000 pounds of common carp and 240,000 pounds of Asian carp, the latter mostly bighead carp. Also harvested were 42,000 pounds of gar, 33,000 pounds of freshwater drum, along with eel, bowfin, shad and minnows. Thirty six percent of the commercial fishers reported fishing hoop nets, while 31% reported fishing trotlines. Gill nets and trammel nets were fished by 20% of the commercial fishers, while 8% fished slat boxes. A substantial portion of the licensed participants are not relying on fishing as a significant source of income, with 35% or more not seeking any monetary compensation.. Many survey participants said that they fish for hobby, sell fish to help pay fishing expenses, or have a license to get fish for meals at social events. Seventy percent of the 2008 license holders had bought no more than 5 commercial fishing equipment tags .The fishery is dynamic as about half of those who purchased commercial fishing licenses in 2008 did not participate in 2009, yet new folks participating in the commercial fishery have kept participation between 680-720 people.

A PASSIVE ACOUSTIC SURVEY OF MALE SPOTTED SEATROUT COURTSHIP SOUNDS IN MISSISSIPPI COASTAL WATERS: IDENTIFYING SPAWNING HABITAT

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Spotted seatrout, *Cynoscion nebulosus*, is the most highly sought recreational fish species in Mississippi coastal waters. In order to effectively manage the species, knowledge of spawning activity and critical habitat are required. A passive acoustic survey was conducted to identify, characterize and map the locations of male spotted seatrout courtship activity in two Mississippi estuaries: Grand Bay, (a pristine bay within the National Estuarine Research Reserve) and Biloxi Bay, (a heavily impacted bay). A mobile acoustic survey, accompanied by water quality sampling and bottom type identification, was conducted from May to September 2008-2009 between the hours of 1800 - 0200. In addition to the mobile survey, long-term acoustic recording systems (LARS) were deployed in each bay, during 2009, to determine the diel and seasonal variability of spotted seatrout spawning activity. Male seatrout aggregations were identified at a far greater number of locations in Grand Bay (n=93), as compared with Biloxi Bay (n=24). Presence of spotted seatrout aggregations was associated with stations with increased salinities (mean: 23.5 ppt. \pm 0.4) and deeper waters (mean: 2.4 m. \pm 0.1). Spotted seatrout aggregation presence was also associated with the full moon phase. Analysis of the LARS data indicated that the duration of aggregation courtship calls ranged from 1.25 – 7.4 hours in Biloxi Bay (mean: 4.4 \pm 0.1) and 0.5 – 7.8 hours in Grand Bay (mean: 4.8 \pm 0.2). The duration of aggregation calls increased around the full moon phase in Grand Bay, but no such pattern was observed for Biloxi Bay. Although this study identified spawning habitat within these two estuaries, comparable research should be conducted within other Mississippi estuaries to develop an understanding of the components and areal extent of spotted seatrout spawning habitat coast-wide.

MODELING JUVENILE ALABAMA SHAD HABITAT USE

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In recent years the Alabama shad has seen dramatic declines and extirpations from native drainages. Habitat degradation and barriers to migration are considered contributing factors to range contraction that has left just the Pascagoula population in Mississippi. Understanding and protecting the habitats within the drainages that support Alabama shad is essential to preserving this threatened species. We collected fish habitat and physicochemical data in three dominant habitat types (sandbar, open channel and bank) from June to October 2004-2009 in the Pascagoula River basin. Models were then created from the data to identify important parameters that influenced Alabama shad presence. These models were then compared to presence/absence data from two Florida rivers in which juvenile Alabama shad have been collected. Understanding the recruitment needs of this species can provide important information in the management and conservation of this species.

RESTORATION OF GULF COAST STRAIN WALLEYE (*STIZOSTEDION VITREUM*) HABITAT ON MACKEYS CREEK

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The Gulf Coast Strain (GCS) walleye, *Stizostedion vitreum*, is a distinct genetic strain of walleye endemic to rivers and streams of the Mobile River drainage in Alabama and Mississippi. These fish were widely distributed, if not abundant, throughout the Tombigbee River basin in northeast Mississippi, prior to the 1960's. Anthropogenic habitat alterations of streams such as channelization and gravel mining during the 20th century have caused a decline in native stocks. The construction of the Tennessee-Tombigbee Waterway (TTW) in the 1970's-1980's, which substantially altered the entire Upper Tombigbee River system, led to further significant alteration and/or destruction of GCS walleye habitat. Mackeys Creek is one of the two headwater streams that form the East Fork of the Tombigbee River, and is located in Tishomingo, Prentiss, and Itawamba counties in northeast Mississippi. GCS walleye were collected in this stream in samples from the 1960's through the 1980's. Although sampling efforts have been minimal since the 1980's, no GCS walleye have been collected in recent years. Mackeys Creek provides a unique opportunity to successfully restore fish habitat given that headwaters are minimal and almost the entire stream is located on public land. Funding acquired through the Southeastern Aquatic Resources Partnership (SARP) provided an opportunity for the U.S. Fish and Wildlife Service (USFWS) and the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) to partner to restore and/or improve GCS walleye habitat on this stream. Streambank and/or channel restoration was the first priority, followed by creating or enhancing existing spawning habitat in the stream. A site was selected where head cutting of the stream bed was believed to have ended, and the first phase of restoration was implemented at that location. A peak-stone dike was constructed to stabilize the bank, while modifications to the existing stream bed were undertaken in order to impede upstream movement of the head cut. Immediately upstream of this site modification, a gravel bed was installed to provide a fish spawning habitat. Additionally, an adjacent pond used for waterfowl management will be used as a nursery pond to raise advanced fingerling GCS walleye for restocking efforts. Fish population and habitat surveys were conducted prior to the project, and will be conducted periodically following completion.

THE RICHTON SALT DOME PROJECT: POTENTIAL IMPACTS TO COASTAL RESOURCES

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The U.S. Department of Energy (DOE) plans to construct an expansion site for the Strategic Petroleum Reserve site at Richton in Perry County, Mississippi. Following a series of public hearings on the project in March and April of 2008, the DOE responded with plans to release a Supplemental Environmental Impact Study (SEIS). The SEIS, scheduled for release in April 2009, has yet to be released, thus this presentation is based on the original EIS. The Richton Site is distinct relative to DOE's four existing Strategic Petroleum Reserve (SPR) sites located in other regions of the U.S., and these differences were not adequately addressed in the original EIS. Of current SPR sites, Richton represents the: 1) farthest from Gulf of Mexico (65 miles), 2) most geographically dispersed, 3) first to withdraw water from a freshwater river (Leaf River), and 4) first diffuser to be sited in a marine environment near a sound or barrier island. The physiography of the Mississippi Bight and circulation patterns within this region are unique. There are serious concerns that the Pascagoula River Basin will suffer as a result of the project's withdrawal of 50 million gallons of water per day for a period of five to six years in order to hollow out salt domes for petroleum storage concurrent with the daily diffusion of 42 million gallons of salt brine (236 ppt) waste at a discharge site south of Horn Island Pass, directly in line with the Pascagoula Ship Channel. Mississippi barrier island passes are key corridors for the transport of larvae and postlarvae of economically important fish and shellfish to and from the Mississippi Sound, and the effect of a "brine barrier" on these fragile life stages is unclear. The Pascagoula River is the largest unaltered, undammed river system in the U.S. and is considered a "Natural Treasure". There is concern that salt water intrusion resulting from the vast discharge of brine south of Horn Island Pass coupled with decreased freshwater flow may alter coastal ecosystems and impact rare, threatened, and endangered species (14 listed by the Mississippi Department of Marine Resources). Economic benefit to Mississippi is projected to be 10-20 permanent jobs on the Mississippi Coast with 100 permanent jobs in Richton.

GENETIC DIVERSITY IN LARGEMOUTH BASS POPULATIONS: DO POPULATIONS NEED TO BE REFRESHED?

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Little attention has been given the genetic makeup of fish populations following introduction, especially in small impoundments where the size of the founding population is generally low, and subsequent stockings are uncommon. Inbreeding depression occurs when reproduction is limited to a few related individuals, and can lead to an increase in homozygosity within the population. This can lead to decreased growth, increased mortality and reduced fitness. An extreme example of this can be found among populations of Florida largemouth bass in small reservoirs in Puerto Rico, which were originally established in 1957 from a small founder stock of around 30 fish imported from the U.S. Contemporary research with Florida largemouth bass in Puerto Rico reported inferior growth compared to populations throughout the southern United States. We hypothesize that growth bottlenecks are a result of low genetic diversity within reservoirs and an accumulation of 52+ years of inbreeding. Therefore, our objectives are to 1) use microsatellite heritage analysis to assess the degree of inbreeding in Puerto Rico, and 2) to compare growth and survival of inbred bass from Puerto Rico versus genetically more diverse bass from the southeastern U.S. This research may lead to improvements in management for genetic diversity through supplemental stocking in Puerto Rico, Mississippi, and elsewhere within their range.

ALLIGATOR GAR, *TRACTOSTEUS SPATULA*, AND THE MISSISSIPPI DEEP SEA FISHING RODEO

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Often considered a nuisance to both recreational and commercial fishermen, gar and other rough fish species were the target of eradication efforts throughout the southeast during the early 20th century. These efforts coupled with anthropogenic modifications of riverine systems resulted in a reduction in numbers and range contraction of species such as the Alligator gar. Currently little is known about the species and its status within Mississippi and information necessary to facilitate important conservation and management directives for this ecologically important species is needed. We were presented with a unique opportunity to gather useful life history data on Alligator gar based on fish landings at the Mississippi Deep Sea Fishing Rodeo held annually around the 4th of July holiday. Specimens were obtained and processed from 12 consecutive rodeos from 1998 through 2009 yielding a total of 102 individuals. The number of individuals per rodeo ranged 4-15 with an average of 8.5 reported per year. Processed gar ranged 89.80-219.40 cm total length (TL) with a mean size of 168.72 cm TL; nearly half of the reported landings (48%) ranged 165-185 cm TL. Based on length-age relationships determined for other populations, age estimates ranged 3-25+ years. Weight of processed Alligator gar ranged 3.36-60.80 kg (7.40-134.03 lbs) with an average weight of 26.82 kg (66.28 lbs). There was no direct relationship between total number of annual entries and rank order of the largest individual processed (i.e., record fish as first entry did not influence total number of subsequent entries). Angling was the primary method of capture and the majority of specimens were reported from nearby watersheds including Biloxi Bay, Pascagoula River, Jourdan River, Wolf River and Mississippi Sound. Areas fished for Alligator gar were targeted consistently across years and a “core” group of anglers participated in the annual event. The collaborative efforts from this annual event have also provided useful samples for other related Alligator gar studies (e.g., conservation genetics, diet, age and growth) by numerous institutions (e.g., USM, Auburn, SIU, USFWS, USACE-ERDC).

BREACHING THE BARRIER: A RISK ASSESSMENT FOR SILVER CARP

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Invasive Asian carp moving up the Mississippi River toward the Great Lakes are contained presently by electrical barriers in a Chicago canal that connects the two Basins. Carp outside the functional electrical fields, but in the immediate vicinity of barriers, could breach barriers if and when they go “off-line” during power failures or maintenance. We evaluate the magnitude of this risk for juvenile silver carp (*Hypophthalmichthys molitrix*). Fish were collected from the Mississippi floodplain, transferred to 2800-liter indoor mesocosms, and acclimated for 18 days. Swimming performance of 43 fish, 141-288 mm TL, was tested in a 1200-liter Brett-type swim tunnel at 35-143 cm/s. Fish were predominantly rheotactic (93% individuals tested) and strong swimmers. Sustained swimming (> 200 min) was observed up to 50 cm/s, prolonged swimming (200 – 0.5 min) up to 102 cm/s, and burst swimming (< 0.5 min) at 118 and 143 cm/s. Negative relationship between endurance and swim speeds ($R^2 = 0.72$, $p < 0.0001$, $df = 37$) was used to determine water velocities impassable by silver carp for distances of 1-50 m. Model indicated that for distances of 16 m and 40 m, corresponding to lengths of existing electrical barriers, containment of silver carp would occur at water velocities of > 80 and > 50 cm/s, respectively. For the period 17 Nov 2009 – 14 Jan 2010, however, water velocities of this magnitude were infrequent and of short duration. Had barriers gone off-line during this 60 day interval, probability would be > 95% that it would take place when barriers could be breached by silver carp in the vicinity. Risk of breaching off-line barriers may be managed in two ways: i) operation of barriers in series so that 1-2 barriers remain on line at all times; ii) performing maintenance on barriers during periods of high flow.

BOTTOM-UP EFFECTS: INFLUENCE OF SEDIMENT NUTRIENTS AND BENTHIC MACRO-INVERTEBRATES IN RECREATIONAL FISHING PONDS

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An experiment is currently being conducted in eight earthen recreational fishing ponds in northern Mississippi. The main aim of this study is to identify the bottom-up effects of sediment nutrient concentrations on benthic macro-invertebrate community compositions and density in recreational fishing ponds in the southeastern United States. The establishment of this relationship will help improve our understanding of trophic interactions and pathways in freshwater systems. The eight ponds will be sampled with the objectives of describing spatial and temporal distributions of sediment nutrients (phosphorus, carbon and nitrogen) and benthic macro-invertebrates, as well as estimating potential relationships between sediment nutrients and benthic macro-invertebrate characteristics. For these objectives it is predicted that sediment nutrient concentrations and benthic macro-invertebrate distributions will be positively correlated within the sampled ponds. Furthermore, seasonal changes in the relationships between sediment nutrients and benthic macro-invertebrates will be expected. Sediment and macro-invertebrates will be dual sampled with a Yabby pump and an Ekman dredge. This sampling strategy will be beneficial to compare the non-traditional Yabby pump against a traditional sediment and invertebrate sampling gear such as the Ekman dredge. A Yabby pump is a cylindrical suction pump with a volume of 1911.30 cm³ and has never been used for sediment or invertebrate sampling. The Ekman dredge has a volume of 3500.00 cm³ and is a commonly used sampling gear. Fishery managers could use this relationship to predict seasonal distributions and abundances of sediment nutrients and invertebrates in their systems to better manage their lakes and ponds. This study is also important in order to guide future studies of fertilization that aim to restore or enhance fish populations.

DO POSTLARVAL FISHES ASSOCIATED WITH SARGASSUM HABITAT GROW FASTER THAN POSTLARVAE COLLECTED IN OPEN WATER?

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Two of the most abundant postlarval fishes commonly associated with *Sargassum* habitat during summer months in the northcentral Gulf of Mexico (GOM) are the blue runner (*Caranx crysos*) and bluntnose flyingfish (*Prognichthys occidentalis*). Growth rates of postlarvae of both species were studied to determine if fish that were associated with *Sargassum* habitat grew faster than fish collected in open water. Collections were taken with surface plankton nets in the northcentral GOM during summer months from 2000-2002. *Caranx crysos* (n=114) and *P. occidentalis* (n=118) were randomly selected from paired collections taken both adjacent to and approximately 1 nautical mile away from *Sargassum* habitat found at frontal zones. Fish were aged using daily otolith growth increments, and specific growth rate (SGR) was determined as the distance between the outer three daily growth increments divided by the otolith radius measured to the outermost increment. Only the three outer otolith growth increments were used because this likely reflected growth in the habitat where the fish were collected. To remove effects of standard length (SL) on SGR, comparisons were made using analysis of covariance (ANCOVA) with SL as the covariate. Postlarval *P. occidentalis* from two of the five paired collections sampled grew significantly faster when associated with a frontal zone and accompanying *Sargassum* than in open water. For *C. crysos*, when paired collections were analyzed, ANCOVA did not show any significant difference in SGR for postlarvae sampled from any of the four paired collections. However, when the data were pooled it was found that *C. crysos* collected at *Sargassum* habitat were growing significantly faster than *C. crysos* collected in open water. Even small changes in growth rates can have large cumulative effects on the survival of postlarvae by reducing the postlarval stage duration when natural mortality rates are high. It is known that *Sargassum* provides critical habitat in the pelagic environment, and the results of this study further substantiate this importance.

**THE REPRODUCTIVE BIOLOGY OF THE ATLANTIC SHARPNOSE SHARK,
RHIZOPRIONODON TERRAENOVAE, IN THE NORTH CENTRAL GULF OF MEXICO**

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Atlantic sharpnose shark, *Rhizoprionodon terraenovae*, is the most common shark species found in the waters of the Gulf of Mexico. Recent findings have suggested that several aspects of the reproductive biology of the Atlantic sharpnose shark may have changed when compared to the original work performed over 30 years ago. The objective of this study was to re-describe the reproductive biology of the Atlantic sharpnose shark from the north central Gulf of Mexico. Male and female sharks were collected from March to November in 2008 and 2009. A total of 136 males, ranging from 33.9 to 84.4 cm fork length, and 64 females, ranging from 42.5 to 88.5 cm fork length, were assessed during the sampling period. Testes measurements, clasper length, and presence of sperm was recorded for males, and ovary weight, oviducal width, and follicle diameter was recorded for females. All pups were measured and weighed. Enlarged, calcified, rotatable claspers and the presence of sperm revealed that 50% of the male population reached maturity at a median fork length of 63.3 cm. Developed oviducal glands and uteri showed that 50% of the female population reached maturity at a median fork length of 63.1 cm. Maximum fork length of embryos indicated that parturition occurs throughout May and June. Mean female gonado-somatic index (GSI) exhibited a peak in May and June, whereas male GSI exhibited a peak in May, suggesting a mating season from May to June. Interestingly, recently ovulated females were collected during the months of March, April, May, June, July, and September, suggesting a more protracted mating season, which corresponds with the fact that males had sperm present in the seminal vesicles in every month of the study. When compared to historic data collected in the late 1970's, many similarities were evident including size at maturity for both males and females, female GSI, and pup development. It also appears that male GSI may have shifted to earlier in the spring, and that the mating season may be more protracted than was originally thought, which may provide this species with a higher reproductive fitness. More work, especially with the female cycle, will need to be done to gain a more comprehensive understanding of their reproductive biology.

THE EFFECTS OF FISHING EFFORT ON CATCHABILITY OF LARGEMOUTH BASS

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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 evaluated the effect of fishing effort on catchability of adult largemouth bass *Micropterus salmoides* and determined if catchability increased after periods of no fishing. Eight 0.5-2.0 ha impoundments were 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). The effect of fishing effort was evaluated by comparing catch rates of largemouth bass populations fished continuously and populations with the fishing season interrupted by a period of no fishing. Catchability was negatively related to effort ($P < 0.05$) in five ponds using linear regression ($R^2 = 0.33-0.67$). Discontinuous linear regression results support that catch rate differed ($\alpha = 0.05$) from before and after a period of no fishing on four ponds.

POSTER PRESENTATIONS

FEEDING-RELATED MORPHOMETRICS OF THE BLACKSTRIPE TOPMINNOW, *FUNDULUS NOTATUS*

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The *Fundulus notatus* species complex consists of three described species: *F. notatus*, *F. olivaceus* and *F. eurizonus*. *F. notatus* and *F. olivaceus* have broad overlapping ranges with many populations being found both in and out of contact zones. Contact zones are generally found in mid reaches with *F. olivaceus* dominating headwaters and *F. notatus* larger rivers downstream. Both species share similar ecological niches so the mechanism allowing for stable coexistence in contact zones is unknown. The purpose of this study was to examine variability in feeding morphology of both species in sympatry and allopatry across three drainages. Both *Fundulus* were sampled in Pascagoula River, Pearl River and Neches River contact zones in the summer of 2008. As a control for plastic effects, both *Fundulus* were reared in sympatry and allopatry in common garden mesocosms. Fish were genotyped and feeding-related morphometrics were taken (standard length, body width, body depth, head length, head width, head depth, interorbital distance, preorbital length, orbit length, postorbital length, gape width, gape height, premaxillary + maxillary length and dentary length). Feeding-related morphometrics were analyzed to determine if there were ontogenetic shifts or sexual dimorphisms in allopatric and sympatric populations. Analyses were also conducted to determine if there were differences among species and sympatric/allopatric populations.

ACOUSTIC MAPPING OF NEARSHORE COASTAL WATERS: A COST-EFFECTIVE METHOD FOR DELINEATING BENTHIC HABITATS

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Acoustic technology has been utilized to map seabed characteristics for decades. Originally developed for military operations, the side scan sonar emits acoustic pulses and processes the resultant return intensities to identify features on the seafloor. Side scan sonar use has historically been confined to offshore continental shelf waters, but recent technological advances have enabled its use in shallow-water coastal areas. The purpose of this research is to acoustically map benthic habitats in a shallow Mississippi bay system to delineate submerged aquatic vegetation (SAV) and oyster shell complexes relative to bare sand/mud bottoms. An Imagenex Sportscan side scan sonar integrated with SonarWiz.Map mapping software and a WAAS-differentiated global positioning system (GPS) was used to acquire digital acoustic imagery and view those data in real-time via a laptop computer. Relative to most units used for mapping continental shelf features, the Sportscan is small, lightweight and inexpensive, and the integrated system including sonar, mapping software and GPS is cost-efficient at approximately \$15,000 USD. Initial results of mapping efforts show adequate detection of SAV and oyster habitats, as well as locations of marine debris such as derelict crab traps.

UTILIZING SIDE SCAN SONAR AS AN ARTIFICIAL REEF MANAGEMENT TOOL

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Artificial reefs generally occur over broad areas of water bottoms which presents a challenge for reef managers. These man-made habitats must be monitored to ensure compliance with U.S. Army Corps of Engineering permits and navigation clearance. Millions of dollars are spent on the development of reef material in Mississippi's permitted public reef sites and future artificial reef development will continue as funding becomes available. With this large financial investment in artificial reef construction, it is critical that artificial reef deployments be monitored and assessed for stability and durability to determine the optimum material type to be used, and the proper positioning of these materials. Side scan sonar can map large areas relatively quick. Images obtained from side scan can provide detailed information on latitude and longitude, orientation of reef material, relief of material, and footprint and scouring around the reef material. The artificial reef can be scanned over time to determine the degree of stability (movement or subsidence) and durability (degradation of reef material) of the reef. This tool is instrumental in obtaining information on reefs in the aftermath of a hurricane. Side scanning has allowed Mississippi reef managers to accurately measure the damage to artificial reefs and develop plans for rebuilding lost habitat. A total of 400 nautical miles of transects have been surveyed to date. These transects cover approximately 11,000 acres of permitted reef sites.

EVALUATION OF A NEW PREPARATION TECHNIQUE FOR FLATHEAD CATFISH PECTORAL SPINES

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We evaluated the precision and processing times of two methods used to prepare flathead catfish *Pylodictus olivaris* pectoral spines. The first method utilized a bench-mounted sander to remove the portion of the articulating process traditionally cut using a jeweler's or low-speed saws. Structures prepared with this method were compared to conventional sections of the basal recess of the pectoral spine. The two methods produced structures with equally precise age estimates; however, exact agreement between structures prepared using the two methods was only 41%. When age estimates of the two methods did not agree, basal recess sections were generally assigned older ages than articulating processes. Preparation time was similar, although readers noted that more effort was needed to age and manipulate articulating process samples under the microscope. In addition, both readers agreed that basal sections were generally more readable than articulating processes. If sanding of articulating processes is used as a spine preparation method, caution should be used to avoid sanding too far into the central portion of the process which contains annuli from early years of life.