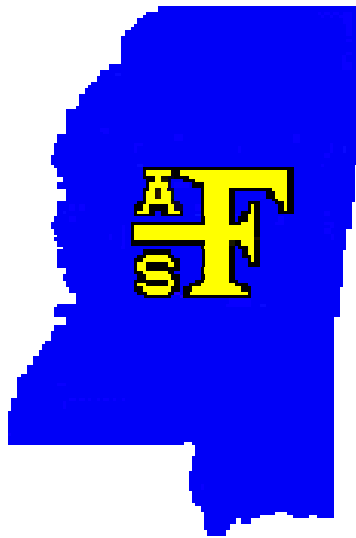


Mississippi Chapter  
of the  
American Fisheries Society

Proceedings  
of the  
33<sup>rd</sup> Annual Meeting



February 14-16, 2007  
Tara Wildlife  
Vicksburg, Mississippi

## **Program and Abstracts**

**33<sup>rd</sup> Annual Meeting  
Mississippi Chapter of the American Fisheries Society**



**Vicksburg, Mississippi  
February 14-16, 2007**



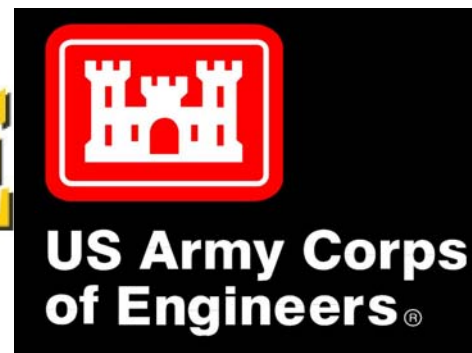
### **Mississippi Chapter Executive Committee**

**Jan J. Hoover, President  
Megan Ellis, President-Elect  
Jack Killgore, Past-President  
Jerry Brown, Secretary-Treasurer**

### **Distinguished Guest**

**Bob Curry, Past-President, Southern Division of the American Fisheries Society**

### **Sponsors**



## MEETING SCHEDULE

### WEDNESDAY, FEBRUARY 14

- 12:00–6:00 **ON-SITE REGISTRATION**  
1:00–5:00 **OUTDOOR EVENTS**  
5:00–6:00 **DINNER**  
6:00– 9:00 **WELCOME SOCIAL**

### THURSDAY, FEBRUARY 15

- 7:00–8:00 **BREAKFAST**
- 7:30–12:30 **ON-SITE REGISTRATION**
- 8:00–8:15 **WELCOME: MARK BOWEN AND JAN HOOVER**

***SESSION 1: MARINE RESOURCES  
MODERATED BY DON JACKSON***

- 8:15-8:30 LIFE HISTORY ASPECTS OF SHEEPSHEAD, *Archosargus probatocephalus*, IN MISSISSIPPI COASTAL WATERS  
Gary J. Gray, W. D. Dempster, J. D. Tilley, N. J. Brown Peterson, and E. R. Hoffmayer
- 8:30-8:45 RECENT OCCURRENCE OF YOUNG TARPON, *Megalops atlanticus*, IN MISSISSIPPI COASTAL WATERS  
Jim Franks and P. O. Grammer
- 8:45-9:00 SHIFTING BASELINES: ACCOMMODATING THE CREEPING DISAPPEARANCE OF NATURAL RESOURCES  
Harriet Perry, and R. Riedel
- 9:00-9:15 **TECHNIQUES TO DETERMINE THE EFFECTS OF GROWTH RATE AND SIZE-AT-AGE ON POTENTIAL RECRUITMENT SUCCESS OF THE BAY ANCHOVY, *Anchoa mitchilli*, IN THE NORTHCENTRAL GULF OF MEXICO**  
Student Award  
Candidate Presentation  
Paul O. Grammer, and B. H. Comyns
- 9:15-9:30 **THE EFFECTS OF RIVER DISCHARGE AND ENVIRONMENTAL FACTORS ON THE RED SNAPPER, PENAEID SHRIMP, AND LESSER BLUE CRAB IN THE NORTHERN GULF OF MEXICO**  
Student Award  
Candidate Presentation  
Adam G. Pollack and D. C. Jackson
- 9:30–10:00 **BREAK**

**SESSION 2: FRESHWATER FISH ECOLOGY  
MODERATED BY JIM FRANKS**

- 10:00-10:15 Student Award  
Candidate Presentation HYDRILLA'S ALTERING EFFECTS ON AQUATIC HABITAT  
COMPLEXITY AND FISH FORAGING BEHAVIOR  
Heather J. Theel and E. D. Dibble
- 10:15-10:30 Student Award  
Candidate Presentation FISH ASSEMBLAGE AND WATER QUALITY INDICATORS OF RIVER  
CONNECTIVITY IN OXBOW LAKES OF YAZOO RIVER BASIN  
Seiji Miyazono, N. Aycock, L. E. Miranda, C. Steffen, and T. Tietjen
- 10:30-10:45 Student Award  
Candidate Presentation ENVIRONMENTAL NOISE AND BEHAVIORAL RESPONSES OF  
STURGEON  
Joseph Beard and J. Hoover
- 10:45-11:00 Student Award  
Candidate Presentation A SPATIAL ANALYSIS OF AQUATIC HABITAT CHANGE IN THE  
TENNESSEE-TOMBIGBEE WATERWAY  
Amy B. Spencer and H. L. Schramm, Jr.
- 11:00-11:15 Student Award  
Candidate Presentation GROWTH OF BLACK CARP AT DIFFERENT TEMPERATURES  
Nathaniel C. Hodgins and H. L. Schramm, Jr.
- 11:15-11:30 RESTORATION OF DELTA STREAMS: A CASE HISTORY AND  
CONCEPTUAL MODEL  
Catherine E. Murphy, K. J. Killgore, J. J. Hoover, K. D. Parrish, D. R.  
Johnson, and K. Myers
- 11:30-12:30 **LUNCH**

**SESSION 3: EDIBLE, IMPERILED, AND INVASIVE SPECIES  
MODERATED BY DENNIS RIECKE**

- 12:30-12:45 THE EFFECTS OF HARVESTING AND HAULING ON THE BLOOD  
PHYSIOLOGY AND FILLET QUALITY OF FOOD SIZE CHANNEL  
CATFISH  
Rachel V. Beecham, C. D. Minchew, P. R. Pearson, B. W. Green, J. M. Kim,  
and S. B. Bailey
- 12:45-1:00 USE OF OXYTETRACYCLINE (OTC) TO VALIDATE ANNULAR BAND  
FORMATION IN SAGITTAL OTOLITHS FROM TRIPLETAIL, *Lobotes*  
*surinamensis*, CAUGHT FROM MISSISSIPPI COASTAL WATERS:  
PRELIMINARY WORK  
Jim Franks
- 1:00-1:15 OBSERVATIONS OF AN AGGREGATION OF WHALE SHARKS,  
*Rhincodon typus*, FEEDING ON FISH EGGS IN THE NORTH CENTRAL  
GULF OF MEXICO  
Eric R. Hoffmayer, J. S. Franks, W. B. Driggers III

- 1:15-1:30 GULF STURGEON, *Acipenser oxyrinchus desotoi*, USE OF THE MISSISSIPPI RIVER GULF OUTLET  
James P. Kirk, H. E. Rogillio, R. T. Ruth, and E. Behrens
- 1:30-1:45 MENU FOR THE RAREST FISH IN NORTH AMERICA: PREY OF THE ALABAMA STURGEON  
Steven G. George
- 1:45-2:00 FLOODPLAIN WETLANDS AS NURSERIES FOR SILVER CARP, *Hypophthalmichthys molitrix*: A CONCEPTUAL MODEL FOR USE IN MANAGING LOCAL POPULATIONS  
Krista Varble, K. J. Hoover, C. E. Murphy, S. George

2:00–2:30 **BREAK**

***SESSION 4: FRESHWATER AND MARINE ECOSYSTEMS  
MODERATED BY PHIL KIRK***

- 2:30-2:45 NOTCHING THE DIKE ON THE CHUTE OF ISLAND 63  
Garry Lucas, R. Nassar, and R. Garavelli
- 2:45-3:00 GRENADA LAKE ALLIANCE: AN ALTERNATIVE FISHERIES MANAGEMENT EDUCATION STRATEGY  
Keith Meals, A. Dunn, and W. D. Hubbard
- 3:00-3:15 FISHES OF MHOON BEND (RM685-689) OF THE MISSISSIPPI RIVER  
Steven G. George, K. J. Killgore
- 3:15-3:30 PROBABLISTIC SAMPLING TO ASSESS WATER QUALITY  
Todd Tietjen
- 3:30-3:45 EFFECTS OF HURRICANE KATRINA ON MISSISSIPPI'S ARTIFICIAL REEFS  
Kerwin J. Cuevas, J. Sanders, M. Buchanan

4:00 – 5:00 **POSTER SESSION**

A MODEL DESCRIBING THE ASSOCIATION BETWEEN LANDSCAPE-SCALE ENVIRONMENTAL CHARACTERISTICS AND ABUNDANCES OF CATCHABLE SPORT FISHES IN MISSISSIPPI WADEABLE STREAMS

Brian Alford

A LIQUID OXYGEN CALCULATOR FOR FASTED CHANNEL CATFISH  
Susan B. Bailey, R. V. Beecham, P. R. Pearson, C. D. Michew, and M. E. M. Flanagan

DISPERSION OF REEF FISH AROUND TWO ARTIFICIAL REEF HABITAT TYPES IN THE NORTHERN GULF OF MEXICO

Kerwin J. Cuevas, and M. V. Buchanan, W. S. Perret

MOVEMENTS OF COASTAL SHARK SPECIES IN THE NORTH CENTRAL GULF OF MEXICO BASED ON TAG-RECAPTURE DATA

William Dempster, E. R. Hoffmayer, G. R. Parson, and Gary Gray

CONTRIBUTIONS TO UNDERSTANDING LARVAL TUNA HABITAT IN THE GULF OF MEXICO: BLUEFIN (*Thunnus thynnus*), YELLOWFIN (*Thunnus albacares*), AND BLACKFIN (*Thunnus atlanticus*) TUNA

Eric R. Hoffmayer, R. S. Waller, J. S. Franks, B. H. Comyns, and J. R. Hendon

COMMUNITY EFFECTS OF LARGE-SCALE CHANGES IN PLANT COMPOSITION: IMPLICATIONS OF A WHOLE-LAKE HERBICIDE TREATMENT

E. E. (Katya) Kovalenko, E. D. Dibble, and J. G. Slade

DAILY GROWTH DIFFERENCES OF THE JUVENILE ALABAMA SHAD, *Alosa alabamae*, AND SKIPJACK HERRING, *Alosa chrysochloris*, IN RELATION TO MEAN DAILY RIVER FLOW WITHIN THE PASCAGOULA RIVER DRAINAGE, MS

Paul F. Mickle

MERCURY CONTENT OF LARGE PELAGIC FISHES FROM THE NORTHERN GULF OF MEXICO

Harriet Perry, H. Folmar, B. Viskup, E. Cotton, T. Lowrey, K. Powell, F. Mallette, and J. S. Franks

6:00 – 9:00 **BANQUET**

**FRIDAY, FEBRUARY 16**

7:00 – 8:00 **BREAKFAST**

8:00 – 9:00 **MS CHAPTER BUSINESS MEETING**

## ORAL PRESENTATIONS

### **LIFE HISTORY ASPECTS OF SHEEPSHEAD, *Archosargus probatocephalus*, IN MISSISSIPPI COASTAL WATERS**

**Gary J. Gray**, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564, [gary.gray@usm.edu](mailto:gary.gray@usm.edu)

**William D. Dempster**, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564

**Jason D. Tilley**, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564

**Nancy J. Brown-Peterson**, Department of Coastal Sciences, Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564

**Eric R. Hoffmayer**, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564

Sheepshead, *Archosargus probatocephalus*, occurs in coastal waters of the western Atlantic Ocean from Nova Scotia to Brazil, with the densest populations found in the Gulf of Mexico. Sheepshead support an important winter recreational and commercial fishery in Mississippi, yet the fishery is not managed. Consequently, research is being conducted on life history aspects of this species. During 2004-2006, 314 sheepshead were collected from the Mississippi Sound and adjacent waters using various gear represented by 137 males (218 – 509 mm, FL), 160 females (213 – 567 mm, FL). Otolith assessments provided estimated ages for 297 of the specimens, with males ranging from 0 to 11 years and females ranging from 1 to 12 years. Von Bertalanffy growth parameters were similar for males ( $k = 0.256$ ,  $L_{\max} = 486.5$  mm, FL) and females ( $k = 0.377$ ,  $L_{\max} = 440.0$  mm, FL). These values are comparable to other sheepshead age and growth studies in the south Atlantic and Gulf of Mexico. Males examined reached maturity during their first year, while females did not reach 100% sexual maturity until age-3. Peak GSI for females indicates that spawning occurs from February to April. Sheepshead exhibit asynchronous oocyte development and are batch spawners. Preliminary data suggest there is no relationship between fish size and egg number. Estimate of mean batch fecundity was  $219,100 \pm 38,700$  eggs/female (range = 144,010 to 363,321 eggs/female).

## RECENT OCCURRENCE OF YOUNG TARPON, *Megalops atlanticus*, IN MISSISSIPPI COASTAL WATERS

**Jim Franks**, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, P.O. Box 7000, Ocean Springs, Mississippi 39566, [jim.franks@usm.edu](mailto:jim.franks@usm.edu)

**Paul O. Grammer**, Department of Coastal Sciences, University of Southern Mississippi

Tarpon, *Megalops atlanticus*, are large, migratory, elopomorphic fish that frequent coastal and inshore waters of the tropical and subtropical western Atlantic Ocean, including the Gulf of Mexico (Gulf) and Caribbean Sea. During the late 1800's and early to mid-1900's, massive schools of large tarpon reportedly occurred in coastal Mississippi waters during summer months and supported a widely recognized sport fishery, including well publicized tarpon tournaments. The dramatic decline in the seasonal abundance of large tarpon in local waters, which apparently began in the 1950's, has not reversed and might be attributed, in part, to historic over-fishing throughout its Gulf and South Atlantic range, as well as loss of spawning and nursery habitat along the coasts of South Florida and Mexico. Currently, a small number of large tarpon are observed each summer in Mississippi waters south of Ship Island and are presumed to be members of a migratory group, diminutive by historic comparison, that seasonally moves from southern Gulf waters into the northern Gulf. Reports of young tarpon from Mississippi coastal waters are rare, however during Fall and early Winter of 2006, juveniles were reported from six coastal sites, including Mississippi Sound, Biloxi Bay, Fort Bayou, a tidal slough, and an abandoned fish culture pond. The geographic origin of the young specimens is unknown, but since tarpon are not reported to spawn in the northern Gulf, the known nursery grounds of South Florida and/or Mexico are the most likely source for the small juveniles (66 - 305 mm TL, >1 yr. old) recently documented from local waters. Regarding the recently caught large juveniles (600 mm TL, ~3 yrs. old), even though they were considerably smaller than the tarpon typically observed each summer south of Ship Island and are likely to young to depart southern Gulf nursery habitat and participate in tarpon summer migrations, were they in fact members of the summer migratory group that did not depart local waters during the return migration to southern Gulf waters in late Fall, or did they arrived in local waters during a previous year as larvae or early juveniles and managed to over-winter on the coast? Just how the young fish arrived in the northern Gulf and Mississippi waters is unknown and conjures speculation about ocean current transport mechanisms. The young specimens are discussed and potential research topics pertaining to tarpon in Mississippi coastal waters are suggested.

## **SHIFTING BASELINES: ACCOMMODATING THE CREEPING DISAPPEARANCE OF NATURAL RESOURCES**

**Harriet Perry**, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, P.O. Box 7000, Ocean Springs, Mississippi, 39564, [harriet.perry@usm.edu](mailto:harriet.perry@usm.edu)

**Ralf Riedel**, Center for Fisheries Research and Development, Gulf Coast Research Laboratory, The University of Southern Mississippi, P.O. Box 7000, Ocean Springs, Mississippi, 39564

Dr. Daniel Pauly, renowned fisheries biologist, noted that “each generation of scientists accepts as a baseline the stock size and species composition that occurred at the beginning of their careers and uses this to evaluate change”. If change happens slowly enough, it is generally not perceived within a single human generation. As a result, there is little public or scientific awareness of the magnitude of the change that has occurred over time or the implications for the future. Many scientists believe that we are heading toward ocean ecosystems dominated by microbes and gelatinous zooplankton. According to Dr. Jeremy Jackson of Scripps Institution of Oceanography, the major drivers of the new ocean are depleted apex predators, ocean warming and acidification, globalization of species, poisoned food webs, pollution, eutrophication, and finally, the “rise of slime”. Do these drivers exist in the Gulf of Mexico? If so, what does the future hold for this sea? This presentation will discuss these issues as they relate to the Gulf of Mexico.

## **TECHNIQUES TO DETERMINE THE EFFECTS OF GROWTH RATE AND SIZE-AT-AGE ON POTENTIAL RECRUITMENT SUCCESS OF THE BAY ANCHOVY, *Anchoa mitchilli*, IN THE NORTHCENTRAL GULF OF MEXICO**

**Paul O. Grammer\***, Department of Coastal Sciences, University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564, [paul.grammer@usm.edu](mailto:paul.grammer@usm.edu)

**Bruce H. Comyns**, Department of Coastal Sciences, University of Southern Mississippi, 703 East Beach Drive, Ocean Springs, MS 39564.

Because of the potential link between forage species year-class strength and variability in recruitment of important commercial and recreational fish species, the population dynamics and recruitment variability of key forage species has become a focus of study in recent years. The bay anchovy (*Anchoa mitchilli*) is a particularly important forage species that plays a crucial role in estuarine trophic dynamics throughout its range. With an understanding of the mechanisms that affect large-scale trends in mortality of such forage species, it will be possible to better predict how populations of commercially and recreationally valuable species will respond to fluctuations in population structure (i.e. availability, vulnerability) of the forage base. Cross-sectional and longitudinal otolith growth data are used to detect and characterize selective mortality in fish populations. Cross-sectional data are obtained from multiple age classes, collected at the same time. Longitudinal data are collected from individuals in the targeted group before and throughout the period when selective mechanisms may act. A longitudinal analysis will be used to look for evidence of selective mortality acting on a wild *A. mitchilli* population. Fish from three successively older age classes were collected from seven sampling locations along a 22.5 km transect along Biloxi Beach, MS. The youngest age class was collected on 29 July 2004, the middle on 19 August 2004, and the oldest on 9 September 2004. All fish included in the analysis will share similar birth dates. Cross-sectional data will also be obtained from fish collected on 19 August 2004. The cross-sectional analysis allows for a direct comparison of the two methodologies employed in this study over the same time period. A cross-sectional analysis will also be conducted using opportunistic samples taken at each of the seven collection locations along the 22.5 km transect on 25 August 2005. These data will allow for a comparison of inter-annual differences in the strength and/or occurrence of selective mechanisms acting on *A. mitchilli*. In order to investigate the size-selection mechanism of the growth-mortality hypothesis the otolith radius-at-age will be measured, representing a relative measure of fish size-at-age. Mean otolith radii-at-age measurements will be calculated and compared among the age classes. The growth rate mechanism of the growth-mortality hypothesis will be examined in the same manner, except using specific portions of the otolith radius representing specific periods of growth.

# **THE EFFECTS OF RIVER DISCHARGE AND ENVIRONMENTAL FACTORS ON THE RED SNAPPER, PENAEID SHRIMP, AND LESSER BLUE CRAB IN THE NORTHERN GULF OF MEXICO**

**Adam G. Pollack\***, Mississippi State University, Department of Wildlife and Fisheries, Box 9690, Mississippi State, MS 39762, [agp46@msstate.edu](mailto:agp46@msstate.edu)

**Donald C. Jackson**, Mississippi State University, Department of Wildlife and Fisheries, Box 9690, Mississippi State, MS 39762

The continental shelf waters of the northern Gulf of Mexico (nGOM) provide a vast fishery resource in terms of economic and recreational opportunities; however the dynamics that drive them are often overlooked or not fully understood. These shelf waters are home to some large commercial fisheries including red snapper (*Lutjanus campechanus*) and three species of penaeid shrimp: brown shrimp (*Penaeus aztecus*), white shrimp (*Penaeus setiferus*), and pink shrimp (*Penaeus duorarum*). Red snapper are a federally managed species whose landings in the nGOM represent 97% of its total landings. Total landings of penaeid shrimp in the nGOM represent over 90% of total landings. While no commercial industry exists for lesser blue crab (*Callinectes similus*), they are a predominant crab species on the National Marine Fisheries Service Summer and Fall Groundfish surveys. The purpose of this thesis research is to use data collected during the Summer and Fall Groundfish surveys to examine catch rates of red snapper, penaeid shrimp, and lesser blue crab with respect to environmental conditions on the continental shelf. In addition, we will attempt to correlate the discharge from the Mississippi River to environmental conditions on the surrounding shelf.

## **HYDRILLA'S ALTERING EFFECTS ON AQUATIC HABITAT COMPLEXITY AND FISH FORAGING BEHAVIOR**

**Heather J. Theel\***, Mississippi State University, Department of Wildlife and Fisheries, Box 9690, Mississippi State, MS 39762-9652, [hjh40@msstate.edu](mailto:hjh40@msstate.edu)

**Eric D. Dibble**, Mississippi State University, Department of Wildlife and Fisheries, Box 9690, Mississippi State, MS 39762-9652, USA

Aquatic plants mediate ecological processes in aquatic habitats, specifically predator-prey (bluegill (*Lepomis macrochirus*)-macroinvertebrate) interactions. Individual growth rates of many fish species are positively related to foraging success. Exotic invasive plant species, such as *Hydrilla verticillata*, may alter the available structure in aquatic habitat thus affecting foraging. We investigated the hypothesis that a shift from a native aquatic plant bed to an invasive plant bed would alter aquatic plant bed complexity and therefore alter bluegill foraging success. Experimental treatments included: (i) intermediate densities of native-mixed plants and (ii) 50% native, 50% hydrilla, (iii) hydrilla, (iv) high density of hydrilla. We observed a significant treatment effect on aquatic plant bed complexity and bluegill foraging behavior. Bluegill searched faster, exhibited 60% more mean bouts, and recognized 38% more food items in native mixed habitat versus a hydrilla dominated habitat. We suggest a hydrilla dominated habitat disrupts predator-prey interactions by directly altering native habitat complexity, thus decreasing predator foraging success and prey recognition.

## **FISH ASSEMBLAGE AND WATER QUALITY INDICATORS OF RIVER CONNECTIVITY IN OXBOW LAKES OF YAZOO RIVER BASIN**

**Seiji Miyazono\***, Department of Wildlife and Fisheries, Box 9690, Mississippi State University, Mississippi State, MS 39762, [sm598@msstate.edu](mailto:sm598@msstate.edu)

**Nathan Aycock, Leandro E. Miranda, Chris Steffen, and Todd Tietjen**, Department of Wildlife and Fisheries, Box 9690, Mississippi State University, Mississippi State, MS 39762

The Yazoo River Basin of Mississippi includes several rivers that drain an area heavily impacted by agricultural developments. The region includes hundreds of lakes created by the meandering of the rivers, possibly the largest concentration of fluvial lakes in North America. We sampled 17 oxbow lakes distributed over the lower half of the Yazoo River Basin to document water quality parameters and fish community composition in summer and fall 2006. These oxbow lakes were grouped according to level of connectivity to parent rivers and analyzed with multivariate statistics to find dissimilarities of the fish composition and water quality among the lake groups. The analyses showed that each lake group had a unique fish composition and physicochemical parameter pattern. Canonical correspondence analysis showed that the fish assemblage structure was also related to physicochemical parameters such as lake depth and dissolved oxygen. These results suggest that river connectivity is a useful indicator of fish assemblage and water quality of oxbow lakes and should be considered in future lake restoration strategies in the Yazoo River Basin.

## ENVIRONMENTAL NOISE AND BEHAVIORAL RESPONSES OF STURGEON

**Joseph Beard**\*, University of Louisiana at Monroe and U.S. Army Engineer Research and Development Center, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, [Joseph.A.Beard@erdc.usace.army.mil](mailto:Joseph.A.Beard@erdc.usace.army.mil)

**Jan Hoover** U.S. Army Engineer Research and Development Center, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199

Noise produced by a dredge and the way fish respond will influence the likelihood of entrainment, but specific behavioral responses of fishes to such noise are usually unknown. We evaluated effects of environmental noise on vertical position, preferred water velocity, and dispersion in four laboratory “populations” of juvenile sturgeon: 1) pallid sturgeon (*Scaphirhynchus albus*), 123-300 mm TL; 2) lake sturgeon (*Acipenser fulvescens*), 117-183 mm TL; 3) white sturgeon (*Acipenser transmontanus*), 102-145 mm TL; 4) white sturgeon, 105-139 mm TL, “trained” in continuously flowing water. For each population, three to six groups of 5-6 fish were tested once in a 122 by 244 cm (1600 liter) flume. Before, during, and following exposure to sounds of mixing gravel (20 db, 0.02-3.0 kHz), and at regular intervals, an observer recorded vertical position of each fish and an overhead camera recorded horizontal positions of all fish. Velocities occupied by fish were determined by superimposing a hydraulic map of the flume on each photo and establishing surrounding or proximal water velocity for each individual. Dispersion was determined by superimposing a 2-dimensional Cartesian grid on each photo and recording x-y coordinates for each individual. Velocity preferences were expressed as the differences between utilized and available water velocities, dispersion as the linear distance between a fish and its nearest neighbor. All populations of sturgeon, before exposure to noise, were predominantly benthic (> 70% of observations), preferentially occupied velocities of 0 cm/s, avoided velocities > 20 cm/s, and were moderately dispersed (mean nearest neighbor distances ranging from 43 cm/s to 49 cm/s). Effects of noise increased pelagic free-swimming by pallid sturgeon and reduced preferences for 5 cm/s flow by pallid sturgeon and by both naïve and trained white sturgeon. Trained white sturgeon, however, were significantly more likely to free-swim than untrained white sturgeon. Noise effects on lake sturgeon were not apparent. Active preference for slack water and avoidance of strong flow by all four populations throughout the experiment suggest that active selection for specific water velocities may safeguard juvenile sturgeon from entrainment by dredges. Nuances in behavior among the populations tested, however, suggest that noise-related risk may be lower for some taxa (e.g., pallid sturgeon) and fish with different habitat experiences (e.g., white sturgeon from flowing water).

## **A SPATIAL ANALYSIS OF AQUATIC HABITAT CHANGE IN THE TENNESSEE-TOMBIGBEE WATERWAY**

**Amy B. Spencer\***, Department of Wildlife and Fisheries, Mississippi State University, Box 9690, Mississippi State, Mississippi, 39762, [abs86@msstate.edu](mailto:abs86@msstate.edu)

**Harold L. Schramm, Jr.**, U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit, Box 9691, Mississippi State, Mississippi, 39762

The Tennessee-Tombigbee Waterway, completed and opened for navigation in 1985, required the construction of 10 locks and dams and numerous bendway cutoffs to create a navigation route that connected the Tennessee River with the Alabama River. The Waterway converted the Tombigbee River into a series of impoundments with expansive areas of aquatic habitat heavily used by anglers and other aquatic recreationists. Observations by fisheries biologists and reports from aquatic resource users indicate that the Waterway has undergone extensive sedimentation and subsequent changes in aquatic habitat over its 20 year life span. To quantify these changes in aquatic habitat, we used available aerial photography to measure changes in aquatic habitat areas in pools of the Waterway in Mississippi during 1985 to 2003. Total aquatic habitat area of the Mississippi reach of the Waterway decreased from 27,228 acres in 1985 to 25,903 acres in 2003, a loss of 5% of total aquatic habitat. Aliceville, Columbus, and Aberdeen pools experienced between 8 and 11% loss of total aquatic habitat whereas pools in the Canal Section experienced small increases in total aquatic habitat area. In terms of major habitat types identified, main channel habitat increased system wide by 6% in area whereas embayments, backwaters, and connected bendways experienced losses in habitat area between 5 and 44%. The importance of extrachannel habitats, such as bendways and backwaters, to fish and fisheries is well established. We recommend that relationships between important population variables and habitat changes should be assessed to evaluate impacts of these habitat changes on the fish assemblage. We recognize that pools within the Waterway have different spatial configurations of habitats that may produce pool specific effects of habitat change on fish population variables. We also recognize that assessment of the quality of these habitats may prove useful in developing future management strategies.

## GROWTH RATES OF BLACK CARP AT DIFFERENT TEMPERATURES

**Nathaniel C. Hodgins\***, Department of Wildlife and Fisheries, Box 9690,  
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**Harold L. Schramm Jr.**, U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife  
Research Unit, Mississippi State, MS 39762

Specific growth rates (SGR; % weight gain day<sup>-1</sup>) of two sizes of black carp (~150 and ~900g) were measured at 20, 25, and 30 C. Acclimated small and large black carp were held individually in 113 L flow-through aquaria for 30 and 40 days, respectively, and fed commercial fish feed (slow-sinking 40% crude protein pellets) at a frequency that was predetermined in preliminary feeding trials to maximize average daily ration for each size fish at each temperature. The mean SGR ± SE of small and large black carp at 20, 25 and 30 C were 0.23 ± 0.07 (*n*=5), 0.35 ± 0.07 (*n*=9), 0.84 ± 0.20 (*n*=5) and 0.42 ± 0.08 (*n*=5), 0.84 ± 0.09 (*n*=11), and 0.86 ± 0.08 (*n*=10) respectively. There was no significant size-temperature interaction. Large fish (mean SGR=0.77 ± 0.06) had a significantly ( $F_{1, 39}=7.36$ ;  $P<0.01$ ) greater SGR than small fish (mean SGR=0.45 ± 0.08), and SGR differed among temperatures ( $F_{2, 39}=10.97$ ;  $P<0.01$ ). Specific growth rates increased with temperature, but the trend was not linear and differed between fish sizes. After completion of the aquarium trials it was apparent that some of the small fish were losing weight. A raceway trial was conducted at 25 C for 30 days to test for social facilitation of feeding. Large (*n*=19) and small (*n*=17) black carp were combined in the raceway. Growth rates of small black carp were significantly ( $F_{1, 24}=20.18$ ;  $P<0.01$ ) higher in the raceway (mean SGR=1.20 ± 0.13) than in the aquaria (mean SGR=0.35 ± 0.07). Large black carp growth rates did not differ ( $F_{1, 28}=3.88$ ;  $P=0.06$ ) between raceway (mean SGR=0.63 ± 0.06) and aquaria (mean SGR= 0.78 ± 0.06). Specific growth rates may be suppressed for small black carp in aquarium trials.

## **RESTORATION OF DELTA STREAMS: A CASE HISTORY AND CONCEPTUAL MODEL**

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Low gradient streams in the alluvial valley between the Mississippi and Yazoo Rivers are characterized by low summer water levels, excessive sedimentation, and lack of instream structure. Fish assemblages in these streams are typically dominated by species that are tolerant of degraded habitat and water quality. Habitat restoration measures on the Upper Steele Bayou System (USBS) demonstrate the benefit to fish communities of ameliorating these primary stressors. Low crest weir construction, removal of soft sediments by dredging, bank stabilization, and installation of drop-pipes, all implemented on the USBS, have provided significant improvements to aquatic habitat and concomitant improvement to resident fish assemblages. Recent post-project habitat data and community metrics are compared to pre-project baseline data collected during 1990 and 1994, and indicate a shift in species composition from simple to more complex communities and from tolerant to more intolerant fish assemblages. Resiliency of the fish community was demonstrated by rapid recovery of fish assemblages at several locations following hurricane-related devastation. A conceptual model is presented illustrating the expected benefits of management practices on specific groups of fishes in delta streams.

## **THE EFFECTS OF HARVESTING AND HAULING ON THE BLOOD PHYSIOLOGY AND FILLET QUALITY OF FOOD SIZE CHANNEL CATFISH**

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Commercially produced food-size channel catfish harvested using routine procedures had significant elevations in plasma cortisol, glucose, and lactate compared to pre-harvest fish captured from open ponds. Blood samples were taken from ten fish in each of the two treatments (liquid oxygen and paddlewheel aerated holding socks) at three sampling periods (after-socking, pre-loading, and pre-unloading) during each of 10 harvest events. Water column temperatures averaged approximately 80°F during the study. Ten fillet samples were taken from fish held overnight in paddlewheel and liquid oxygen aerated socks during some harvest events. Mean plasma cortisol levels averaged 3.02 ng/mL before harvesting, 84.38 ng/mL immediately after-socking, 135.22 ng/mL after 18 h in the sock, and 128.54 ng/mL after 2-3 h on the truck. Mean plasma glucose levels averaged 34.7 mg/dL before harvesting, 95.41 mg/dL immediately after-socking, 134.53 mg/dL after 18 h in the sock, and 134.86 mg/dL after 2-3 h on the truck. Mean plasma lactate levels averaged 2.43 mmol/L before harvesting, 13.24 mmol/L immediately after-socking, 11.53 mmol/L after 18 h in the sock, and 7.88 mmol/L after 2-3 h on the truck. These results should not be considered maximal until additional studies are conducted with average water temperatures at their highest. There were significant changes within treatment over 7 days of refrigerated storage for fillet pH, color, and drip-loss; however, there were no consistent trends between treatments. Results from this study indicate that routine capture and hauling procedures are stressful to commercially produced food-size channel catfish under the conditions of this study and that using liquid oxygen for aerating fish in holding socks does not significantly improve fillet quality or reduce stress levels.

**USE OF OXYTETRACYCLINE (OTC) TO VALIDATE ANNULAR BAND FORMATION IN SAGITTAL OTOLITHS FROM TRIPLETAIL, *Lobotes surinamensis*, CAUGHT FROM MISSISSIPPI COASTAL WATERS: PRELIMINARY WORK**

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Thin-sectioned sagittal otoliths from 431 tripletail, *Lobotes surinamensis*, caught from Mississippi coastal waters were examined for their potential use in ageing the sample of fish. Fish ranged from 360 mm to 787 mm in total length (TL); males (N = 185) and females (N = 245) had mean lengths of 483 mm and 515 mm TL, respectively. Examinations using transmitted light revealed that otoliths from the majority of fish (N = 252) exhibited vague markings and un-interpretable opaque patterns, and only 175 otoliths (74 from males and 101 from females) were deemed 'border-line' readable (at best) for use in preliminary age estimations. In an effort to interpret features on thin-sections and ultimately validate annular band deposition, particularly since tripletail were not collected during all months of the year and marginal-increment analysis was not applicable, sixteen wild-caught tripletail were injected with oxytetracycline (OTC) to form a reference point in otoliths and held in captivity for periods ranging from one to five years. All but two fish treated with OTC had a relatively clear fluorescent mark in thin-sections of their otoliths. Examination of OTC-marked otoliths indicated that the position of the OTC mark in relation to the otolith margin and opaque features distal of the OTC mark should prove useful in forthcoming endeavors to age the sample of Mississippi tripletail. Preliminary findings are discussed.

**OBSERVATIONS OF AN AGGREGATION OF WHALE SHARKS, *Rhincodon typus*, FEEDING ON FISH EGGS IN THE NORTH CENTRAL GULF OF MEXICO**

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On 26 June 2006 an aggregation of 16 whale sharks was observed for a period of four hours in the north central Gulf of Mexico. The sharks remained within an area approximately 1.0 km<sup>2</sup> in size and continuously ram filter fed at the surface. Visual analysis of a plankton sample collected from the study site revealed the presence of copious amounts of fish eggs in early embryonic development and a minor amount of other zooplankton. A second plankton sample (control) collected approximately 3.5 km from the study site in an area where no whale sharks were present contained few eggs, however other zooplankton were similar to the study site sample in species composition and abundance. Due to the high abundance of fish eggs and relatively low abundance of other zooplankton at the study site, the lack of macroscopic prey observed in close proximity to shark mouths, and the absence of sharks in the control area, it was concluded that the whale sharks were feeding almost exclusively on recently spawned fish eggs.

## **GULF STURGEON, *Acipenser oxyrinchus desotoi*, USE OF THE MISSISSIPPI RIVER GULF OUTLET**

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The Mississippi River Gulf Outlet (MRGO) provides year-around navigation between the Mississippi River and the Gulf of Mexico. Dredging is periodically required to maintain navigation, which may impact Gulf sturgeon, *Acipenser oxyrinchus desotoi*. Consequently, Gulf sturgeon use of the Mississippi River Gulf Outlet (MRGO) and nearby disposal areas was monitored monthly from 2004 through 2006 using telemetry tracking. A total of 50, 40, and 20 Gulf sturgeon captured by netting and fitted with transmitters in the Pearl and Bogue Chitto Rivers were available for monitoring during the study period. One Gulf sturgeon was located in the MRGO on 19 January 2005 near marker 96 (29° .50.669N 089° .37.643W). Starting in June 2006, intensive gill netting of disposal sites was initiated as telemetry monitoring continued. No other fish were located by telemetry nor were any caught in experimental gill nets near inland disposal sites despite over 10,600 net meter hours of effort during 2006. Our study suggests that Gulf sturgeon infrequently use the MRGO and nearby disposal areas. However, care should still be exercised in channel maintenance activities since the Pearl River Gulf sturgeon population was apparently hard hit by Hurricane Katrina and the instantaneous rate of total mortality during 2006 was estimated at – 0.38. This rate of mortality, if accurate, is significantly greater than acceptable rates determined by published studies.

## **MENU FOR THE RAREST FISH IN NORTH AMERICA: PREY OF THE ALABAMA STURGEON**

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Environmental studies of the endangered Alabama sturgeon (*Scaphirhynchus suttkusi*) are prohibited by extreme rarity of the species. Few fish have been found during the past 10 years and empirical data on ecology are virtually non-existent. Information on food habits, however, can indicate habitat and mode of feeding. Stomachs were removed to identify and enumerate prey of the twelve known wild-caught specimens in the University of Alabama Ichthyological Collection. Stomach contents included sediments, vegetation, crustaceans, insects, and fish. Frequently eaten prey included: i) different taxa of midge larvae (Chironomidae) which typically inhabit sand; ii) flatheaded mayfly nymphs (Heptageniidae) which cling to stones; iii) net-spinning caddisfly larvae (Hydropsychidae) that inhabit crevices of rocks and woody debris. Prey also included perciform and non-perciform fishes. Data indicate that Alabama sturgeon, like pallid sturgeon elsewhere, feed as “browsers” on a firm, erosional substrates and as piscivores in the water column. Dietary clues to the feeding grounds and behavior of the Alabama sturgeon could be used to better-identify areas of likely occurrence for collection of future brood stock.

## **FLOODPLAIN WETLANDS AS NURSERIES FOR SILVER CARP, *Hypophthalmichthys molitrix*: A CONCEPTUAL MODEL FOR USE IN MANAGING LOCAL POPULATIONS**

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Silver carp, *Hypophthalmichthys molitrix*, were brought to Arkansas in 1973 to maintain algal blooms in catfish ponds. By 1980, silver carp were established in the Lower Mississippi River Basin due to flooding. Silver carp utilization and impacts in smaller water bodies are virtually unknown. Local silver carp populations in floodplain wetlands of the Mississippi River were monitored to describe habitat, population structure, relationships with other aquatic species, and hydrologic influences on movements. Study was conducted in three pools and one chute of the lower Mississippi River (river mile 440 to river mile 465) near Tara Wildlife. Fish were documented from one temporary pool and two semi-permanent pools, while Forest Home Chute was a permanent water body. Fishkills were documented in drying wetland pools with very high water temperatures (> 39 C) and turbidity (> 945 NTUs), low dissolved oxygen (< 2.65 mg/l) and observed predation by wood storks. In all wetlands, silver carp were represented by a single size-age cohort. In Forest Home Chute growth and development were rapid. Two year old fish weighed 4.54-10.06 kg and many had maturing gonads. Sex ratio of male-female was 0.73:1.00. Number of fish observed jumping varied seasonally and was apparently unrelated to changes in abundance. Evidence exists that silver carp are changing food webs in these wetlands. Paddlefish, the largest native zooplanktivore co-occurring with silver carp, were significantly underweight. Feces removed from the rectum of silver carp contained viable phytoplankton that can be rapidly cultivated into algal "blooms." A conceptual model is presented that identifies critical hydrologic events and habitats of silver carp and which may be used to identify structural and restorative measures that will reduce recruitment of silver carp into riverine systems.

## **NOTCHING THE DIKE IN THE CHUTE OF ISLAND 63**

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Dikes have been placed in the Mississippi River to manipulate the channel for navigation. These dikes created vast areas of slack back-water during moderate and low flow periods, but these backwater areas are filling with sediment. A major component of the Aquatic Resource Management Plan, of the Lower Mississippi River Conservation Committee is to reverse this trend in loss of aquatic habitat. A tool that can be used to flush out sediment in a dike field is to notch the dike. In November, 2006, a 300 foot wide, two-tiered 14-19 feet deep notch was placed in the lower dike in the chute of Island 63. This multi-agency supported project was funded by a grant from the Migratory Fish Passage Program, SE Region, US Fish & Wildlife Service. Placing a notch in the Island 63 dike presents an opportunity to evaluate the environmental changes associated with notching dikes and the location of the dike presents an ideal opportunity to promote a fishery in the chute.

## **GRENADA LAKE ALLIANCE: AN ALTERNATIVE FISHERIES MANAGEMENT EDUCATION STRATEGY**

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Public support of proposed crappie regulations for Grenada Lake differed widely from a survey conducted during roving creel sampling and at a public hearing in Grenada. Part of the problem was that traditional agency news releases failed to educate local anglers. An invited group of anglers, local business owners and governmental representatives was formed by MDWFP. Three presentations were made by MDWFP fisheries biologists and US Army Corps of Engineers hydrologists to explain the constraints of the system and past and future trends of the fishery and MDWFP. At the last meeting, the participants came to a consensus on a new set of crappie regulations that should meet agency management goals. Such alliances, with anglers subsequently educating other anglers, may prove more effective at achieving consensus and garnering public support for regulation changes than traditional news releases and public hearings.

## FISHES OF MHOON BEND (RM 685-689) OF THE MISSISSIPPI RIVER

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A fish survey was conducted from January – November 2006 in the Mississippi River at Mhoon Bend near Tunica, MS. Eighty-seven samples were taken from three reaches of the bendway (upper, middle and lower) using a ten foot Missouri trawl. Substrate composition varied among reaches ranging from cobble and gravel in the upper, gravel and sand in the middle, and a mixture of clay, sand and detritus in the lower. Bottom slope of channel border and distance to shore were similar in the upper and middle reaches, however, bottom slope was steeper and distances to shore was four times less in the lower reach. Water depth sampled and water quality were the same among reaches. A total of 4,507 specimens, representing 30 species of fishes, were collected. Channel catfish (*Ictalurus punctatus*), which were mostly young-of-the-year, was the numerically dominant species among all three reaches comprising 53 % of the total, but reaching its highest abundance in the upper reach (73%). Seven species of cyprinids (minnows) were collected representing 31% of the total; highest abundance was in the middle reach (41%). Less abundant and rare species differed among the reaches. Larval fishes (paddlefish, *Polyodon spathula*; stonecat *Noturus flavus*; pallid sturgeon, *Scaphirhynchus albus*; and shovelnose sturgeon *S. platyrhynchus*) were found in lower reach. Other species documented for the first time in the main channel of the lower Mississippi River were freckled madtom (*Noturus nocturnus*) collected in the lower reach and river darter (*Percina shumardi*) in the upper reach. Sicklefins (*Macrhybopsis meeki*), which have not been documented in the lower Mississippi for over two decades, were collected in the middle reach. This study has demonstrated the importance of bendways to rare and endangered fishes of the lower Mississippi River. Conservation and protection of bendways, particularly those with gravel bars in the upper reach, should be promoted as part of environmental stewardship goals in large river systems.

## **PROBABLISTIC SAMPLING TO ASSESS WATER QUALITY**

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Comprehensive sampling of water quality in regions with large numbers of aquatic systems can be extremely difficult given logistical and time constraints involved in sampling numerous, widespread and diverse bodies of water. One approach that attempts to overcome these difficulties is probability-based sampling. This sampling regime uses a random selection of lakes to be sampled in order to develop a statistically-based assessment of the water quality of an entire region. To test this approach, the water quality parameters temperature, dissolved oxygen, pH, specific conductance, in-vivo chlorophyll fluorescence and in-vivo phycocyanin were measured in >50 aquaculture ponds on the Mississippi State University campus weekly for 1 year. In this presentation, I will explore the variability encountered in these controlled systems in order to explore the level of confidence that can be obtained using different sample sizes.

## **EFFECTS OF HURRICANE KATRINA ON MISSISSIPPI'S ARTIFICIAL REEFS**

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Currently, Mississippi has fifteen permitted offshore reefs which encompass approximately 16,000 acres of water bottoms. These reefs range in size from 3 acres to 10,000 acres. To date, the material used for offshore reefs consists of concrete modules, concrete rubble, steel hull vessels, armored personnel carriers, oil and gas rig jackets and one oilrig living quarters. On August 29, 2005 Mississippi was hit by Hurricane Katrina. This was a powerful and deadly hurricane that carved a wide swath of catastrophic damage and inflicted large loss of life and property. The effects on Mississippi's artificial reefs were extensive. Mississippi Artificial Reef personnel have conducted side scan sonar surveys on 12 of the 17 offshore reefs. It is estimated that 80 to 90 percent of material deployments were scoured and buried and no longer function as reef habitat. Differences were found between water depths and material performance in the aftermath of the hurricane. The concrete rubble habitat was little affected in the shallow waters below 30 feet. In waters 50 to 75 feet many of the concrete rubble habitats deployments were completely buried. All steel hull vessel and armored personnel carriers surveyed were either scoured or moved to some degree. Mississippi reef managers are investigating materials of design that may be less susceptible to damage from tropical storm events.

## **POSTER PRESENTATIONS**

### **A MODEL DESCRIBING THE ASSOCIATION BETWEEN LANDSCAPE-SCALE ENVIRONMENTAL CHARACTERISTICS AND ABUNDANCES OF CATCHABLE SPORT FISHES IN MISSISSIPPI WADEABLE STREAMS**

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During summer 2004, we conducted the field sampling for Mississippi's part in the USEPA National Wadeable Streams Assessment (NWSA). We also sampled sport fisheries resources by angling on several occasions during this time period. Our objectives were to identify environmental relationships to sport fisheries abundances and create a valid, statewide model describing catchable-sized sport fisheries abundances with regard to environmental characteristics of Mississippi wadeable streams. We found that largemouth bass, spotted bass, longear sunfish and bluegill abundances were correlated with landscape-scale characteristics, including watershed area, land use, vegetative cover, and stream size. Consequently, we used a landscape-scale approach to generate comprehensive and parsimonious regression models for these sport fishes. Conceptually, we found that largemouth bass, total bass, longear sunfish and total sunfish abundances increased when watershed forest cover increased and elevation at the reach mid-point decreased. This model was validated with an independent dataset (Sign test;  $P > 0.05$ ), and the model correctly predicted the outcome (i.e., observed values were within 95% C.I. for predicted values) in 73% of the samples from the independent dataset. This model can be used as a rapid assessment tool to locate candidate sites for reach-scale management or restoration of sport fisheries in Mississippi wadeable streams.

## **A LIQUID OXYGEN CALCULATOR FOR FASTED CHANNEL CATFISH**

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Channel catfish (*Ictalurus punctatus*) are typically harvested by seining, and are then transferred to a grading net, where the catch is held overnight. Respiratory demands of a large, confined channel catfish biomass can exceed available dissolved oxygen, so supplemental aeration is provided. Channel catfish farmers in the southern United States commonly use tractor-powered paddlewheel aerators for this purpose. In 2002, a diffused oxygen system for aeration of grading nets was developed. Aeration is accomplished by allowing oxygen to change phase from liquid to gas, which is then diffused into the water column. Several versions of the original design are currently in service on Mississippi channel catfish farms. A 2004 field trial showed that liquid oxygen systems can provide adequate aeration for fasted channel catfish held in grading nets. Elements of the 2004 study were used to develop a mathematical model that computes an estimate of channel catfish oxygen consumption in cubic feet, with respect to time and biomass. Estimated oxygen consumption is also presented in equivalent gallons of liquid oxygen. This allows users of diffused oxygen aeration systems to provide for projected liquid oxygen needs, plus an emergency reserve. An informal benefit-cost analysis showing liquid oxygen expense and the ratio of liquid oxygen expense to gross revenue is included in model output. The LOX Calculator for Fasted Channel Catfish is available at:

<http://www.ars.usda.gov/services/software/download.htm?softwareid=149>

## **DISPERSION OF REEF FISH AROUND TWO ARTIFICIAL REEF HABITAT TYPES IN THE NORTHERN GULF OF MEXICO**

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The dispersion of reef fish was investigated between two types of commonly used material (Barge and Concrete Rubble) utilized for artificial reef habitat on Mississippi Fish Haven Two (FH-2). Fish traps were used to assess the dispersion around the habitat types. Six fish traps were used for each habitat, one on the material and five set out systematically at 20-meter distances away from the habitat types out to 100-meters on randomly selected cardinal compass points. Total catch shows a statistically significant difference between the habitat types. A total of 797 fish were caught (including recaptures). Five hundred and sixty three were caught on the concrete rubble habitat and 234 on the barge habitat. Traps fished on the concrete rubble, 20-meter, 40-meter, 80-meter and 100-meter distances caught greater numbers of fish than traps fished off the same distances from the Barge. Both red snapper and triggerfish catch show no statistically significant difference between the two habitat types. Red snapper show a statistically significant relationship between size vs. distance on both habitat types. Triggerfish show no statistically significant relationship between size vs. distance on both habitat types. Management implications on reef spacing and material performance are discussed.

## **MOVEMENTS OF COASTAL SHARK SPECIES IN THE NORTH CENTRAL GULF OF MEXICO BASED ON TAG-RECAPTURE DATA**

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Other than the suspected inshore and offshore movements of coastal sharks into the north central Gulf of Mexico in early spring and late fall, little is known about their movement patterns within this region. One objective of an ongoing study is to elucidate short and long-term movement patterns of coastal sharks within the north central Gulf of Mexico using tag-recapture techniques. To date, 2,156 coastal sharks representing nine species have been tagged in two previous shark studies (1998-2000, 2004-2006) in Mississippi coastal waters. The Atlantic sharpnose shark (n = 1,148) was the most abundant species tagged, followed by blacktip (n = 478), finetooth (n = 336), bull (n = 72), bonnethead (n = 46), blacknose (n = 35), spinner (n = 31), scalloped hammerhead (n = 6), and sandbar (n = 4). Eighteen sharks have been recaptured (0.008%) to date, representing Atlantic sharpnose (n = 14, 1.2 %), bull (n = 2, 2.8 %), blacknose (n = 1, 2.9 %), and bonnethead (n = 1, 2.2 %). The Atlantic sharpnose shark traveled the furthest (n = 110.3 miles) and was at liberty the longest (n = 598 days) of any species, however, the bonnethead shark obtained the highest rate of movement (n = 1.43 miles/day). Currently, our results are very limited, however, a cooperative tagging program with a selected group of fisher's will be implemented in 2007 to supplement the tagging efforts.

**CONTRIBUTIONS TO UNDERSTANDING LARVAL TUNA HABITAT IN THE GULF OF MEXICO: BLUEFIN (*Thunnus thynnus*), YELLOWFIN (*Thunnus albacares*), AND BLACKFIN (*Thunnus atlanticus*) TUNA**

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Information on larval tuna habitat in the Gulf of Mexico (GOM) is scant. Atlantic bluefin (*Thunnus thynnus*), yellowfin (*Thunnus albacares*) and blackfin (*Thunnus atlanticus*) tuna larvae were collected from 2000–2003 during an investigation of larval and juvenile fishes associated with pelagic *Sargassum* and oceanic frontal zones in the northern GOM and at the Loop Current boundary. Larvae were collected from surface waters by neuston net (505µm) and bongo net (333µm). Collections were taken only during day and only a few tuna larvae were collected shoreward of the 200m isobath. Tuna larvae (n = 286) occurred in 58% (n = 76) of total collections (n = 131). Bluefin larvae were collected only in May and early June (n = 56, size range 2.5 – 8.6 mm SL). Larvae of yellowfin tuna (n = 84, size range 2.3 – 6.9 mm SL) and blackfin tuna (n = 91, size range 2.2 – 9.4 mm SL) were present in northern GOM collections taken at pelagic *Sargassum* and frontal zones from May through September, indicating a protracted spawning season in the GOM for these species; none were taken in May 2003 Loop Current collections. *Thunnus spp.* larvae (n = 55, size range 2.6 - 6.2 mm SL) were collected from May through August. Tuna larvae were not taken in late fall and winter collections.

## **COMMUNITY EFFECTS OF LARGE-SCALE CHANGES IN PLANT COMPOSITION: IMPLICATIONS OF A WHOLE-LAKE HERBICIDE TREATMENT**

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Since macrophytes are important for community structure, it is natural to expect that changes in plant community may lead to cascading effects on invertebrates and fish. In ecosystems with a long history of invasion or a large-scale invasion that significantly changed native community, radical removal of exotics may lead to unpredictable secondary effects. This study was designed to evaluate the long-term effects of whole-lake herbicide eradication of invasive Eurasian watermilfoil on fish and macroinvertebrate community. Total fish biomass and largemouth bass relative weight did not change in response to the herbicide treatment. Significant year by treatment interaction was detected for the relative abundance of invertebrate prey. Implications for invasive plant management in lakes are discussed.

**DAILY GROWTH DIFFERENCES OF THE JUVENILE ALABAMA SHAD, *Alosa alabamae*, AND SKIPJACK HERRING, *Alosa chrysochloris*, IN RELATION TO MEAN DAILY RIVER FLOW WITHIN THE PASCAGOULA RIVER DRAINAGE, MS**

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It is known that daily ring width is related to growth rate and differences in ring widths may be used to compare growth differences. Daily growth rings of both the juvenile Alabama shad and skipjack herring revealed that rings were not uniform throughout the otolith. Growth and larger ring widths may be a direct result of disparate flow levels. After determining spawn date from the otolith, the age data was then overlaid with flow data to compare river flows with growth rate. More than twenty otoliths were analyzed in relation to ring width and compared with mean daily flow data. Flow differences may be a mechanism in relation of ring width differences (growth) within both species of fish. The flow differences and ring width relation is not fully understood, but this study may be used to address other species in rivers that are impounded and have altered flow levels.

## MERCURY CONTENT OF LARGE PELAGIC FISHES FROM THE NORTHERN GULF OF MEXICO

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The waters of the northern Gulf of Mexico (nGOM) support valuable recreational fisheries with many species retained for consumption. Evidence of the link between fish consumption and elevated levels of mercury in human tissue continues to accumulate. An investigation of mercury levels in large pelagic fishes from the nGOM was initiated in the summer of 2006. Blue marlin (*Makaira nigricans*), yellowfin tuna (*Thunnus albacares*), wahoo (*Acanthocybium solandri*) and dolphin (*Coryphaena hippurus*) were sampled at Mississippi docks during fishing tournaments. Fish tissue sampling protocols and analytical techniques (direct mercury analysis) followed those used in a synoptic survey of total mercury in recreational finfish conducted by the National Seafood Inspection Laboratory, NOAA Office of Sustainable Fisheries. Data collected during this study increased the sample size for large pelagic fishes from the Gulf of Mexico and augmented existing information on mercury content in fishes from the region. The results of sample analysis are reported.