



Mississippi & Louisiana Chapters
of the
American Fisheries Society



Joint Annual Meeting of the
Mississippi and Louisiana Chapters
of the American Fisheries Society

THE LOWER MISSISSIPPI RIVER BASIN



Abstracts and Meeting Program

Natchez, Mississippi
January 31–February 2, 2006

PROGRAM AND ABSTRACTS
OF
THE JOINT ANNUAL MEETING
OF THE
MISSISSIPPI AND LOUISIANA CHAPTERS OF THE
AMERICAN FISHERIES SOCIETY

EOLA HOTEL
NATCHEZ, MISSISSIPPI
31 JANUARY -2 FEBRUARY 2006



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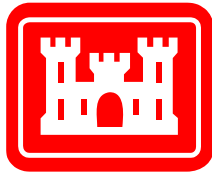
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SPECIAL THANKS TO SOUTHERN DIVISION OF THE AMERICAN FISHERIES SOCIETY FOR SUPPORTING THIS MEETING

DONATIONS TO LA STUDENT CLUBS FOR RAFFLE

The Chimes Restaurant
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PROVIDED SUPPORT FOR THE ANNUAL MEETING

LSU Coastal Fisheries Institute
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COVER ART ACKNOWLEDGEMENT: NATALIE TRAHAN, IAP, INC. AT NWRC, USGS

MEETING PHOTOGRAPHER: MICHAEL HARDEN

INVITED SPEAKERS

Don Jackson, Professor of Fisheries, Chair of the AFS Hurricane Relief Task Force, Department of Wildlife and Fisheries, MS State University, MS

Chris Piehler, Senior Environmental Scientist and Clean Waters Project Director, Louisiana Department of Environmental Quality, Baton Rouge, LA

Rex Caffey, Director of the Center for Natural Resource Economics and Policy, LSU AgCenter and Louisiana Sea Grant College Program

Lower Mississippi River Symposium Speakers

BANQUET SPEAKER

Jim Barnett, Director of the Division of Historic Properties for the Mississippi Department of Archives and History, Natchez, MS.

SPECIAL GUESTS

Pat Mazik, Unit Leader, West Virginia Cooperative Fish and Wildlife Research Unit, President of the Southern Division American Fisheries Society, Morgantown, WV

Robert L. Curry, President Elect of the Southern Division American Fisheries Society, North Carolina Wildlife Resources Commission, Raleigh, NC

PROGRAM OVERVIEW

TUESDAY – 31 JANUARY 2006

<u>ACTIVITY</u>	<u>TIME</u>	<u>ROOM</u>
MEETING REGISTRATION	12:00 - 12:45	LOBBY
LOWER MS RIVER SYMPOSIUM		
SESSION I	1:00 - 2:45	ESPLANADE /MARQUIS
BREAK	2:45 - 3:00	
SESSION II	3:00 - 4:30	ESPLANADE /MARQUIS
MEETING REGISTRATION	5:00 - 5:45	LOBBY
POSTER SESSION I	5:30 - 6:00	
SOCIAL	6:00 - 8:00	COURT YARD/RAISED LOBBY

WEDNESDAY – 1 FEBRUARY 2006

<u>ACTIVITY</u>	<u>TIME</u>	<u>ROOM</u>
MEETING REGISTRATION	7:30 - 8:00	LOBBY
AFS JOINT ANNUAL MEETING		
SESSION IA	8:00 - 10:00	MARQUIS
SESSION IB	8:00 - 10:00	ESPLANADE
BREAK	10:00 - 10:15	
SESSION IIA	10:15 - 12:00	MARQUIS
SESSION IIB	10:15 - 12:00	ESPLANADE
LUNCH	12:00 - 1:00	
SESSION III, HURRICANE	1:00 - 2:15	ESPLANADE/MARQUIS
BREAK	2:15 - 2:30	
SESSION IV, HURRICANE	2:30 - 3:45	ESPLANADE/MARQUIS
SESSION V	4:00 - 5:15	ESPLANADE/MARQUIS
POSTER SESSION II	5:30 - 6:00	
BANQUET	6:30	PROMENADE

THURSDAY – 2 FEBRUARY 2006

<u>ACTIVITY</u>	<u>TIME</u>	<u>ROOM</u>
MEETING REGISTRATION	7:30 - 8:00	LOBBY
SESSION VI	8:00 - 9:30	ESPLANADE/MARQUIS
BREAK	9:30 - 9:45	
SESSION VII	9:45 - 10:45	ESPLANADE/MARQUIS
BREAK(coffee only)	10:45-11:00	
BUSINESS MEETING	11:00	LA – MARQUIS MS - ESPLANADE

MEETING AGENDA

TUESDAY - 31 JANUARY 2006

12:00 -1:00 MEETING REGISTRATION

LOWER MISSISSIPPI RIVER SYMPOSIUM

SESSION I : MODERATOR – JACK KILLGORE, CORPS OF ENGINEERS - ERDC

1:00 – 1:15 OPENING REMARKS AND GENERAL WELCOME: JACK KILLGORE, MS AFS AND GLENN THOMAS, LA AFS

1:15 – 1:45 GEOMORPHOLOGY OF THE LOWER MISSISSIPPI RIVER. David Biedenbarn, Engineer Research and Development Center, Coastal and Hydraulic Laboratory, Vicksburg, MS.

1:45 – 2:15 THE LOWER MISSISSIPPI RIVER CHANNEL IMPROVEMENT PROJECT. Steve Ellis, Mississippi Valley Division, U.S. Army Corps of Engineers, Vicksburg, MS.

2:15 – 2:45 STATUS AND MANAGEMENT OF MISSISSIPPI RIVER FISHERIES. Hal Schramm, USGS Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State University.

2:45 - 3:00 BREAK

SESSION II: MODERATOR - GLENN THOMAS, LOUISIANA STATE UNIVERSITY AGCENTER

3:00 - 3:30 LOUISIANA’S BIG RIVER MONITORING PROGRAM. Bobby Reed, Mike Wood, Mike Ewing, Mark Lawson, Eric Shanks and Howard Rogillio, Louisiana Department of Wildlife and Fisheries

3:30 – 4:00 BIRDS AS AMBASSADORS FOR MISSISSIPPI RIVER CONSERVATION. Bruce Reid and Dr. Tom Pullen.

4:00 – 4:30 CONSERVATION: THE OTHER ECONOMY. Ron Nassar, Robert Delaney, and Angela Moore; Lower Mississippi River Conservation Committee.

5:00 – 5:45 REGISTRATION

5:30 -6:00 POSTER SESSION I

6:00 – 8:00 SOCIAL – COURTYARD/RAISED LOBBY

WEDNESDAY, 1 FEBRUARY 2006

MS AND LA TECHNICAL MEETING SESSIONS

7:30 – 8:00 MEETING REGISTRATION

SESSION 1A: MODERATOR – ERIC DIBBLE, MISSISSIPPI STATE UNIVERSITY
UNDERLINED TIME SLOT INDICATES PARTICIPATION IN THE BEST STUDENT PAPER COMPETITION. AN * NEXT TO THE NAME INDICATES THE MISSISSIPPI STUDENT. TWO ** NEXT TO THE NAME INDICATES THE LOUISIANA STUDENT.

8:00 – 8:15 BIOLOGY AND NATURAL HISTORY OF THE BLACK CARP. Nathaniel C. Hodgins* and Dr. Harold Schramm.

8:15 – 8:30 BOWER CHARACTERISTICS AND DISTRIBUTION ALONG A THERMAL GRADIENT OF INVASIVE MOUTHBROODING NILE TILAPIA, *OREOCHROMIS NILOTICUS*, IN COASTAL MISSISSIPPI. Jennifer L. McDonald*, Mark S. Peterson, and William T. Slack.

8:30 – 8:45 THE EFFECTS OF NON-NATIVE MACROPHYTE INVASION ON JUVENILE LARGEMOUTH BASS. Alexander J. Perret* and Eric D. Dibble.

8:45 – 9:00 HABITAT VARIABILITY OF THE ALABAMA SHAD WITHIN THE PASCAGOULA BASIN. Paul Mickle*, Susie Adams, Jake Schaefer, and Brian Kreiser.

9:00 – 9:15 EFFECTS OF FOOD AVAILABILITY ON NUTRITIONAL CONDITION AND GROWTH OF NAKED GOBY, *GOBIOSOMA BOSCH*. Michelle C. Satterwhite**, Donald M. Baltz, Edward J. Chesney, and Timothy P. Foster

9:15 – 9:30 MEASUREMENT OF NUTRIENT AVAILABILITY IN FEEDSTUFFS FOR FLORIDA POMPAÑO. Craig Gothreaux**, Robert C. Reigh, Millie B. Williams, and Edward J. Chesney.

9:30 – 9:45 THE EFFECT OF TROPICAL STORM CINDY ON FISH AND INVERTEBRATE COMMUNITIES OF A SUBMERGED AQUATIC VEGETATION MEADOW IN BILOXI MARSH, LOUISIANA. Jamie L. Maiaro**, and Donald M. Baltz.

9:45 – 10:00 COMMUNITY STRUCTURE AND GRADIENTS OF ANTHROPOGENIC STRESS: DEVELOPING AN ESTUARINE INDEX OF BIOTIC INTEGRITY IN BARATARIA BAY, LOUISIANA. Agatha-Marie F. Roth**, Jamie L. Maiaro, and Donald M. Baltz.

SESSION IB: MODERATOR – QUENTON FONTENOT, NICHOLLS STATE UNIVERSITY

- 8:00 – 8:15** **THE USE OF A LOW-WATER REFUGE IN THE ATCHAFALAYA RIVER BASIN BY ADULT SPOTTED GAR *LEPISOSTEUS OCOLATUS*.** Christopher Bonvillain**, Quenton Fontenot, Allyse Ferrara, and Perry Boudreaux.
- 8:15 – 8:30** **EFFECTIVENESS OF THREE POST-HARVEST TREATMENTS IN THE REDUCTION OF *VIBRIO VULNIFICUS* AND *V. PARAHAEMOLYTICUS* IN *CRASSOSTREA VIRGINICA*.** Kevin Melody ** and Dr. John Supan.
- 8:30 – 8:45** **SPORT FISH UTILIZATION OF AN INSHORE ARTIFICIAL OYSTER REEF IN BARRATARIA BAY, LOUISIANA.** Kirsten Simonsen**, and James H. Cowan.
- 8:45 – 9:00** **DESIGN AND TESTING OF IMPROVED PROCESS CONTROL SYSTEM FOR TIME-TEMPERATURE STUDIES WITH EASTERN OYSTERS *CRASSOSTREA VIRGINICA*.** Milton Saidu**, Steven Hall, and Terrence Tiersch.
- 9:00 – 9:15** **SWIMMING PERFORMANCE OF WHITE STURGEON: TRAINING AND THE RISK OF ENTRAINMENT.** Krista Varble*, and Jan Hoover.
- 9:15 – 9:30** **HARASSING THE HACKLEBACKS: ENVIRONMENTAL NOISE AND THE BEHAVIORAL RESPONSES OF PALLID STURGEON.** Joseph Beard*, and Jan Hoover.
- 9:30 – 9:45** **MOVEMENT OF FOUR RARE MINNOW SPECIES IN A MINNESOTA LAKE.** Mike Habrat*, Eric Dibble, and Ray Valley.
- 9:45 – 10:00** **NORTH MISSISSIPPI FISH HATCHERY.** Justin Wilkens.
- 10:00 -10:15** **BREAK**

SESSION IIA: MODERATOR – MEGAN ELLIS, MISSISSIPPI DEPARTMENT OF WILDLIFE, FISHERIES AND PARKS

- 10:15 –10:30** **ENVIRONMENTAL RELATIONSHIPS TO WADEABLE STREAM FISHERIES RESOURCES IN MISSISSIPPI.** Brian Alford*.
- 10:30 – 10:45** **HETEROGENEOUS VS. HOMOGENEOUS AQUATIC HABITAT INDUCED BY THE INVASIVE *HYDRILLA VERTICILLATA*: IMPLICATIONS FOR MACROINVERTEBRATE COLONIZATION AND BLUEGILL FORAGING EFFICIENCY.** Heather Theel *, and Eric D. Dibble.
- 10:45 – 11:00** **HABITAT USE BY NEKTON ALONG A STREAM-ORDER GRADIENT IN A LOUISIANA ESTUARY.** Pablo Granados-Dieseldorff**, and Donald M. Baltz.

- 11:00 -11:15** **ACUTE AMMONIA TOXICITY AND CHLORIDE INHIBITION OF NITRITE UPTAKE IN NON-TELEOST ACTINOPTERYGIAN FISHES.** Perry Boudreaux**, Allyse Ferrara, and Quenton Fontenot.
- 11:15 – 11:30** **PRELIMINARY ASSESSMENT OF LIFE HISTORY CHARACTERISTICS OF BOWFIN IN SOUTHEASTERN LOUISIANA.** Johnathan G. Davis**, Allyse M. Ferrara, and Quenton C. Fontenot.
- 11:30 – 11:45** **MICROSATELLITE VARIATION OF BLUE CATFISH (*ICTALURUS FURCATUS*) WITHIN AND AMONG THE LAKE PONTCHARTRAIN AND MISSISSIPPI RIVER BASINS.** Lisa Cordes** and Dr. Kyle Piller.
- 11:45 – 12:00** **SPERM SUSPENSION PROFILING IN AQUARIUM FISHES: MAXIMIZING RESULTS USING MINIMAL VOLUMES.** Wesley M. Burnside**, Huiping Yang, Amy M. Guitreau, and Terrence R. Tiersch.
- SESSION IIB: MODERATOR – TERRENCE TIERSCH, LOUISIANA STATE UNIVERSITY**
- 10:15 – 10:30** **WILLINGNESS-TO-PAY FOR SPECIFIC GENETIC ATTRIBUTES IN AQUACULTURE GROW-OUT PRODUCTION.** Brian Boever**, R. Wes Harrison, and Terrence R. Tiersch.
- 10:30 – 10:45** **AQUACULTURE PARKS IN THE COASTAL ZONE: A REVIEW OF LEGAL AND POLICY ISSUES IN THE GULF OF MEXICO STATE WATERS.** Vanessa Maxwell**, and John Supan.
- 10:45 – 11:00** **HOW TO GET WORKERS AT FISH-REARING FACILITIES TO CONSISTENTLY USE DISEASE PREVENTION AND CONTROL MEASURES (BIOSECURITY).** Julie Delabbio, B. R. Murphy, and G. R. Johnson.
- 11:00 – 11:15** **EFFECT OF OSMOTIC IMMOBILIZATION ON SPERM CRYOPRESERVATION AND ARTIFICIAL INSEMINATION OF A VIVIPAROUS FISH, THE GREEN SWORDTAIL *XIPHOPHORUS HELLERI*.** Huiping Yang, Leona Hazlewood, Ronald B. Walter, and Terrence R. Tiersch.
- 11:15 – 11:30** **PRELIMINARY RESULTS ON CRYOPRESERVATION OF ALLIGATOR GAR (*TRACTOSTEUS SPATULA*) SPERM.** Jaclyn Zelko, William Wayman, Carlos Echevarria, and Richard Campbell.
- 11:30 – 11:45** **FISH ASSEMBLAGES IN OXBOW LAKES RELATIVE TO CONNECTIVITY WITH THE MISSISSIPPI RIVER.** L.E. Miranda.
- 12:00 – 1:00** **LUNCH (NOT PROVIDED)**

HURRICANE SESSION III: MODERATOR – JIM FRANKS, GULF COAST RESEARCH LAB

- 1:00 – 1:15** **UPDATE ON AFS HURRICANE RELIEF TASK FORCE.** Don Jackson.
- 1:15 – 1:30** **IMPACTS OF HURRICANE KATRINA ON LOUISIANA SEAFOOD.** Chris M. Piehler.
- 1:30 – 1:45** **FISHERIES IMPACTS OF HURRICANE KATRINA AND RITA.** Rex Caffey.
- 1:45 – 2:00** **HURRICANE KATRINA AND FISHERIES RESOURCES ON THE MISSISSIPPI GULF COAST.** Harriet Perry, James Franks, Barbara Viskup, and Mike Buchanan.
- 2:00 – 2:15** **HURRICANE IMPACTS TO COASTAL FRESHWATER FISHERIES AND THEIR HABITATS IN SOUTHWEST LOUISIANA.** Bobby Reed, Eric Shanks, and Paul Smith.
- 2:15 – 2:30** **BREAK**

HURRICANE SESSION IV: MODERATOR – JILL JENKINS, NATIONAL WETLANDS RESEARCH CENTER, USGS

- 2:30 – 2:45** **THE LOUISIANA OYSTER RECOVERY PLAN: A RESPONSE TO HURRICANES KATRINA AND RITA.** John Supan and Mike Voisin.
- 2:45 – 3:00** **BACTERIOLOGICAL AND WATER-QUALITY DATA COLLECTED AT COASTAL MISSISSIPPI SITES FOLLOWING HURRICANE KATRINA, SEPTEMBER-OCTOBER 2005.** Richard A. Rebich.
- 3:00 – 3:15** **EFFECTS OF HURRICANE RITA ON FISH ASSEMBLAGES IN THE YAZOO BASIN.** Catherine E. Murphy, K. Jack Killgore, Jan Jeffrey Hoover, and Steven G. George.
- 3:15 – 3:30** **WATER QUALITY, MONITORING AND FISH KILL INVESTIGATIONS IN MISSISSIPPI FOLLOWING HURRICANE KATRINA: INITIAL RESPONSE.** Barbara Viskup.
- 3:30 – 3:45** **COOPERATIVE STATE AND FEDERAL ENVIRONMENTAL MONITORING IN MISSISSIPPI FOLLOWING HURRICANE KATRINA.** Henry Folmar, Bill Cosgrove, Danny France, Virginia Engle, and Robert Dickey.
- 3:45 – 4:00** **KATRINA SURGE , OCEANOGRAPHY ASPECTS RELATED TO MARINE RESOURCES.** Don Johnson.

4:00 – 4:15 BREAK

SESSION V: MODERATOR – NEIL DOUGLAS, UNIVERSITY OF LOUISIANA AT MONROE

4:15 – 4:30 EVALUATION OF SLUDGE CARBON:NITROGEN RATIOS ON SEQUENCING BATCH REACTOR TREATMENT OF WASTEWATER TAKEN FROM AN INTENSIVE RECIRCULATING SHRIMP CULTURE SYSTEM. Quenton Fontenot, Chris Bonvillain, and Ramaraj Boopathy.

4:30 – 4:45 CONSERVATION OF PALLID STURGEON, AN ANCIENT MISSISSIPPI RIVER FISH. Jan Dean.

4:45 – 5:00 COOPERATIVE GULF STURGEON STUDIES IN THE MISSISSIPPI RIVER GULF OUTLET: A PROGRESS REPORT FOR 2005. Phil Kirk, Jay Collins, H. E. Rogillio, R. Tim Ruth, and Elizabeth H. Behrens.

5:00 – 5:15 OCCURRENCE OF LAKE STURGEON (*ACIPENSER FULVESCENS*) IN THE MIDDLE MISSISSIPPI RIVER. Steven G. George, and Jack Killgore.

5:30 – 6:00 POSTER SESSION II

6:30 BANQUET – PROMENADE ROOM

THURSDAY, 2 FEBRUARY 2006

7:30 – 8:00 MEETING REGISTRATION

SESSION VI: MODERATOR – MARK KONIKOFF, UNIVERSITY OF LOUISIANA AT LAFAYETTE

8:00 – 8:15 CHALLENGES IN ARTIFICIAL PROPAGATION OF TRIPLETAIL *LOBOTES SURINAMENSIS*. Jim Franks, Jason Lemus, Cheng-Sheng Lee, Drew Hildebrandt, E. Hoffmayer, and John Ogle.

8:15 – 8:30 EXPLORING LINKS BETWEEN MERCURY, THE COASTAL ENVIRONMENT, AND HUMAN HEALTH IN COASTAL LOUISIANA. Edward Chesney, Rebecca Lincoln, James Shine, Donna J. Vorhees, Philippe Grandjean, Nancy N. Rabalais, Michael S. Bank, and David B. Senn.

8:30 – 8:45 SEASONAL MOVEMENTS AND MIGRATORY PATTERNS OF TRIPLETAIL, *LOBOTES SURINAMENSIS*, IN COASTAL WATERS OF THE SOUTHEASTERN UNITED STATES: PRELIMINARY RESULTS. J. Read Hendon, and James S. Franks.

8:45 – 9:00 **EVALUATING THE FEASIBILITY OF PLANTING AQUATIC PLANTS IN SHALLOW MISSISSIPPI LAKES.** Eric Dibble, and P. C. Smiley Jr.

9:00 – 9:15 **WHO'S GOT THE FATTER FISH: A NEW METHOD FOR COMPARING LENGTH-WEIGHT RELATIONSHIPS WITH A PADDLEFISH EXAMPLE.** Richard Condrey, Nicole Smith, and Bobby Reed.

9:15 – 9:30 **BREAK**

SESSION VII: MODERATOR – GARRY LUCAS, MISSISSIPPI DEPARTMENT OF WILDLIFE, FISHERIES AND PARKS

9:30 – 9:45 **SHORT-TERM MOVEMENT PATTERNS OF YOUNG BULL SHARKS (*CARCHARHINUS LEUCAS*) IN DAVIS BAYOU, MISSISSIPPI, WITH NOTES ON THE EFFECTS OF HURRICANE KATRINA.** Eric Hoffmayer, and Gary J. Gray.

9:45 – 10:00 **BASS TOURNAMENTS REVISITED.** Larry Pugh.

10:00 – 10:15 **SUPPLEMENTING STANDARDIZED SAMPLING DATA WITH FISHING TOURNAMENT DATA COLLECTED FROM INTERNET WEBSITES.** David S. Hickman.

10:15 – 10:30 **RESULTS OF AN ONLINE SURVEY OF BOWFISHER ATTITUDES AND TRIP CHARACTERISTICS.** Allyse Ferrara, Quenton Fontenot, and Mark Ellenberg.

10:30 – 10:45 **BREAK (COFFEE ONLY)**

10:45 **BUSINESS MEETINGS OF LA (MARQUIS ROOM) AND MS (ESPLANADE ROOM) CHAPTERS**

POSTER PRESENTATIONS

REPRODUCTIVE PATTERNS OF TOURNAMENT-CAPTURED FEMALE BLUE MARLIN FROM THE NORTHERN GULF OF MEXICO. Nancy J. Brown-Peterson, James S. Franks, and Bruce H. Comyns.

PRELIMINARY ASSESSMENTS OF AGE AND GROWTH OF SHEEPSHEAD *ARCHOSARGUS PROBATOCEPHALUS* FROM MISSISSIPPI COASTAL WATERS. William Dempster, Jason Tilley, Gary Gray, and James Warren.

LAKE WASHINGTON STAKEHOLDERS MEETING PRESENTATION ON FISH MANAGEMENT. Garry Lucas.

CONTRASTING NEKTON DENSITIES AMONG SPARTINA MARSH-EDGE SITES IDENTIFIED AS HEALTHY OR AT RISK. Stephanie Cogburn, Donald M. Baltz, and DeWitt H. Braud.

PALLID STURGEON IN THE LOWER MISSISSIPPI RIVER: ISSUES AND ANSWERS. Jack Killgore, Jan Jeffrey Hoover, Catherine E. Murphy, Steven G. George, Bradley R. Lewis, William E. Lancaster, James P. Kirk, and Jay A. Collins.

DETERMINING THE IMPORTANCE OF REGIONAL NURSERY HABITAT FOR JUVENILE SPECKLED TROUT IN THE NORTHERN GULF OF MEXICO USING OTOLITH MICROCHEMICAL ANALYSES. Paul Grammer, B. H. Comyns, C. F. Rakocinski, , M.S. Peterson, and A. M. Shiller.

ORAL PRESENTATIONS

ENVIRONMENTAL RELATIONSHIPS TO WADEABLE STREAM FISHERIES RESOURCES IN MISSISSIPPI

Brian Alford, Mississippi State University, Department of Wildlife and Fisheries, Box 9690, Mississippi State, MS 39762, jba81@msstate.edu

Wadeable streams in Mississippi do not garner the attention of most anglers and fisheries managers, yet they can provide quality fishing opportunities for largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), and sunfishes (*Lepomis spp.*). The primary objective of my research was to relate environmental features of wadeable stream ecosystems to fish stock characteristics in Mississippi. Multiple linear regression analysis ($\alpha=0.10$) showed that relative abundances (number of fish/angler-hour and percent composition) of largemouth bass and longear sunfish were significantly related to water chemistry characteristics (alkalinity, ammonia-nitrogen, and turbidity), riparian characteristics (human disturbance score and legacy tree size), percent watershed hardwoods, channel characteristics (percent sand and fine substrates and median wetted width) and percent invertebrate sprawlers. Mean length at age 1 of these species were significantly related to total phosphorus concentration, riparian shrub and grass density, percent watershed conifers, percent of small woody debris inputs, and percent invertebrate burrowers. On average, moderately disturbed wadeable stream ecosystems supported the greatest abundances and fastest growth rates of young largemouth bass and longear sunfish in Mississippi. Ecosystems with developed watersheds yet minimally impacted riparian zones (>30 m wide) increase productivity and minimize sedimentation, thus allowing sufficient levels of runoff (alkalinity and phosphorus) and providing small woody debris for juvenile fish and benthic macroinvertebrate habitat.

HARASSING THE HACKLEBACKS: ENVIRONMENTAL NOISE AND THE BEHAVIORAL RESPONSES OF PALLID STURGEON

Joseph Beard, University of Louisiana at Monroe & USACE, Engineer Research & Development Center – Waterways Experiment Station, Vicksburg, MS 39180,
Joseph.R.Beard@erdc.usace.army.mil

Jan Hoover, USACE, Engineer Research & Development Center – Waterways Experiment Station

Juvenile pallid sturgeon (*Scaphirhynchus albus*) are susceptible to entrainment by dredges based on their swimming performance, but their behavioral responses to environmental perturbations associated with dredging are unknown. We evaluated reactions of pallid sturgeon (167-196 mm TL) to the sounds of grinding gravel in a laboratory flume. An overhead camera took birds-eye photos at 5-min intervals during three separate stages: pre-treatment (ambient sounds), treatment (ambient sounds and generated noise), and post-treatment (ambient sounds). Position of each fish was determined relative to water velocities and other fish. Concurrent with photographs, direct observation of vertical position of each fish in the water column was made. In all stages of the experiment, sturgeon occupied water velocities randomly with most occurrences in the common water velocities (0-10 cm/s). Similarly, in all stages of the experiment, mean nearest-neighbor distance among fishes was comparable (approximately 48 cm). Vertical position of sturgeon, however, differed among stages. There were few observations of fish in the water column pre-treatment (< 35%), moderate numbers during noise production (42-60%), and variable numbers post-treatment (28-58%). Data suggest that pallid sturgeon respond to the sounds of churning substrates by rising in the water, a factor that might reduce risk of entrainment by bottom-sucking dredges.

WILLINGNESS-TO-PAY FOR SPECIFIC GENETIC ATTRIBUTES IN AQUACULTURE GROW-OUT PRODUCTION

Brian Boever, Louisiana State University, 5010 Mancuso Lane, Apartment 209, Baton Rouge, LA 70809, bboeve1@lsu.edu

R. Wes Harrison and **Terrence R. Tiersch**, Louisiana State University

The genetic make-up of fish stocks is an important factor in determining feeding efficiency and fish size in aquaculture production. This paper presents results from a national survey of aquaculture producers regarding their preferences for genetic improvement of fish stocks. Respondents include hatchery and grow-out operations from the catfish, hybrid striped bass, tilapia, trout, and salmon industries. Choice-based conjoint analysis is used to determine which genetic improvements are most important to grow-out producers and to estimate producers' willingness-to-pay for selected fish attributes. The attributes included in the conjoint choice model are growth rate, disease resistance, resistance to 10% lower dissolved oxygen levels, and a price premium. A conditional logit model will be used to estimate the part-worth valuations of the various attributes. These estimates will then be used to estimate the willingness-to-pay for each of the attributes. Fifty percent of respondents indicated that their farms have foodfish grow-out operations. Sixty percent of respondents reported that their major product was either channel catfish or rainbow trout. Results also showed that producers were willing to pay more for increased growth rate than any other attribute. The results will enable the hatcheries to provide grow-out producers with their most desirable fingerling stocks.

THE USE OF A LOW-WATER REFUGE IN THE ATCHAFALAYA RIVER BASIN BY ADULT SPOTTED GAR (*LEPISOSTEUS OCULATUS*)

Christopher Bonvillain, Nicholls State University, Thibodaux, LA 70310
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Quenton Fontenot, Allyse Ferrara, and Perry Boudreaux, Nicholls State University

As annual flood waters in the Atchafalaya River Basin (ARB) recede, low-water refuges become important to fishes in backwater areas. However, several backwater areas are filling in with sediment, removing important low-water habitats for fish during low water periods. Fish year class strength in the ARB may be strongly influenced by fall low-water levels. The purpose of this study is to quantify the use of low water refuge for adult spotted gar (*Lepisosteus oculatus*), in an interior lake of the ARB. The relative density of adult spotted gar were quantified throughout the annual flood pulse. Spotted gar were sampled bimonthly using monofilament gill nets (38mm bar mesh) with a minimum of three replicates per sample. Nets were set between 0.25 and 1 hour. Catch per unit effort (CPUE) was determined by the number of spotted gar caught per net hour. Spotted gar density was greater during low-water periods. The population size of adult spotted gar will also be estimated during the low water period by a Peterson single census mark-recapture study. Water levels during Fall 2005 were one of the lowest on record. The results of this study demonstrate the importance of low water refuges in the ARB to fish.

ACUTE AMMONIA TOXICITY AND CHLORIDE INHIBITION OF NITRITE UPTAKE IN NON-TELEOST ACTINOPTERYGIAN FISHES

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We conducted a series of experiments to determine acute ammonia toxicity and if chloride inhibits environmental nitrite uptake for bowfin (*Amia calva*), spotted gar (*Lepisosteus oculatus*), alligator gar (*Atractosteus spatula*) and paddlefish (*Polyodon spathula*). Spotted gar, alligator gar, and paddlefish were exposed to various concentrations of ammonia-N as ammonia chloride for 96 hrs. The 96-hour total ammonia-N LC50 for spotted gar, alligator gar, and paddlefish was 35 ± 6.12 , 135 ± 15 , and 15.7 ± 2.25 mg/L, respectively. To determine if bowfin, spotted gar, alligator gar, and paddlefish concentrate nitrite in their plasma, individuals were exposed to concentrations of 0, 1, 10, or 100 mg/L nitrite-N. Bowfin, spotted gar, and alligator gar were exposed for 72 hr and paddlefish were exposed for 24 hr. After exposure, both species had plasma nitrite-N concentrations greater than environmental levels. Paddlefish, spotted gar, and alligator gar were then exposed to 1 mg/L nitrite-N and 20 mg/L chloride as calcium chloride for 24 hr. Chloride effectively prevented nitrite from being concentrated in paddlefish, spotted gar, and alligator gar plasma. It appears that the gill chloride uptake mechanism is an ancestral characteristic of teleost fishes.

SPERM SUSPENSION PROFILING IN AQUARIUM FISHES: MAXIMIZING RESULTS USING MINIMAL VOLUMES

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Zebrafish *Danio rerio* and other aquarium fishes have become research models for vertebrate development, physiology, and disease because of their high reproductive rates, short generation intervals, and ease of care and maintenance. Despite the constraints imposed by microliter sperm volumes, artificial spawning is commonly used to maintain valuable transgenic lines established for research, and cryopreservation has been used for long-term storage of sperm. By decreasing the volumes used for sperm analysis, more sample would remain for spawning or other experimentation. The goal of this study was to maximize the amount of data collectable from a minimal volume of sperm suspension by integrating various analyses. The objectives were to determine: 1) motility by microscopy; 2) cell concentration by spectrophotometry; 3) osmolality and pH by osmometry, and 4) membrane integrity and the sperm-to-somatic cell (1C/2C) ratio by flow cytometry. A total of 8 μL were required to determine percent motility (2 μL), sperm concentration (2 μL), pH and osmolality (2 μL), and membrane integrity and the 1C/2C ratio (2 μL). Thus, in a sperm suspension produced by crushing a 10-mg testis (and diluting by 25 times) yielding a total volume of 250 μL , 242 μL would remain after sample characterization. The sperm-suspension profile would allow comparison of quality among samples, selection of males to use for spawning, and provide additional data to support experimental results.

EXPLORING LINKS BETWEEN MERCURY, THE COASTAL ENVIRONMENT, AND HUMAN HEALTH IN COASTAL LOUISIANA

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Methyl mercury (MHg) is a potent human neurotoxin. Human exposure to MHg is primarily through seafood consumption. An interdisciplinary team is exploring the hypothesis that coastal eutrophication and hypoxia in the Gulf of Mexico play a role in controlling Hg methylation and biomagnification, and may impact human exposure to MHg via higher rates of accumulation in locally consumed seafood. The mercury in our coastal waters enters primarily via the Mississippi river drainage and atmospheric deposition. Research into mercury methylation suggests that coastal eutrophication and the resulting hypoxia may affect mercury methylation rates and subsequently bioaccumulation rates. The team is exploring region specific human exposure to MHg via an angler survey and voluntary hair samples from coastal Louisiana recreational fishermen. Year 1 findings related to recreational anglers' reported fish consumption and we evaluated their exposure to Hg as measured in hair samples. Initial findings showed a wide range of concentrations in hair samples with a small percentage of anglers having high levels of Hg. The team is also exploring risks for exposure by accumulating existing data on mercury in coastal fishes, collecting samples to fill holes in existing datasets and by evaluating distributional patterns of mercury in marine fishes targeted by Louisiana recreational fishermen.

WHO'S GOT THE FATTER FISH: A NEW METHOD FOR COMPARING LENGTH-WEIGHT RELATIONSHIPS WITH A PADDLEFISH EXAMPLE

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Length-weight (**L-W**) data/equations are cornerstones of fishery research and management. Generally weight has been found to vary as a power, **b**, of length in a fashion often expressed as

$$\mathbf{LW = a + b*LL, \quad (1)}$$

where **LW** and **LL** are the log 10 transformations of weight and length, **a** is the intercept, and **b** is the slope (e.g. Ricker 1975; Carlander 1977).

It is standard to compare L-W equations using only their slopes. Here we expect $b \approx 3$ if shape and specific gravity are constant. When $b > 3$ we expect a plumping with increasing length. When $b < 3$, we expect a thinning. And when $b < 2.5$ or $b > 3.5$ we expect errors (e.g. Ricker 1975, Carlander 1977).

We did not find this 'rule of thumb' to be valid when we reexamined 43 range-wide length-weight relationships for paddlefish. Rather we found that these 43 individual equations statistically collapsed into a single model that we approximate as

$$\mathbf{LW \approx 4.10 + \hat{b} (LL - 2.97)}$$

$$\mathbf{\text{where } \hat{b} = 3.13 \pm 3(0.35),}$$

MICROSATELLITE VARIATION OF BLUE CATFISH (*ICTALURUS FURCATUS*) WITHIN AND AMONG THE LAKE PONTCHARTRAIN AND MISSISSIPPI RIVER BASINS

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The Lake Pontchartrain Basin harbors a distinctive and every changing fish community. Due to environmental problems in the Lake Pontchartain Basin, a canal will soon be constructed to connect the Lake Pontchartain and Mississippi River basins. Although the influx of water is aimed at restoring the wetlands in the western portion of the basin (Lake Maurepas), it also may negatively impact the ichthyofauna of basin through homogenization of genetically distinctive stocks of fishes. Five high-resolution microsatellite markers were used to address genetic differentiation between Lake Pontchartain and Mississippi River basin fish populations of blue catfish (*Ictalurus furcatus*) prior to the homogenization of these faunas. Two-hundred fifty fish were genotyped from five populations distributed across these basins. Allele frequencies at each locus for each population were calculated and the data used to estimate the degree of genetic divergence among sampling locations by calculating fixation indices (F_{ST} values). Preliminary results suggest that there is a low level of genetic differentiation between basins ($F_{ST}=0.0039$), and also within basins (Lake Pontchartain basin $F_{ST}=0.001$ and Mississippi River $F_{ST}=0.014$), which is consistent with high levels of gene flow. The implications of these results and the potential impacts of freshwater diversions will be discussed.

PRELIMINARY ASSESSMENT OF LIFE HISTORY CHARACTERISTICS OF BOWFIN IN SOUTHEASTERN LOUISIANA

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Although bowfin support commercial and recreational fisheries in south Louisiana, the life history characteristics of this species are poorly understood. Both recreational and commercial fisheries for bowfin are regulated by minimum length regulations (406 mm TL recreational limit and 559 mm TL commercial limit) and a commercial net ban is in effect for parts of the state from December to February. Bowfin are harvested for meat and for roe (Cajun caviar). Bowfin will be collected bi-monthly from November 2005 to November 2006 using gill nets and hook and line. We are collecting age, growth, maturity, and fecundity data from bowfin captured in southeastern Louisiana. Because bowfin otoliths cannot be used for age determination, fish will be aged using gular plates. This information will be used to develop age-based population models for bowfin in southeast Louisiana.

CONSERVATION OF PALLID STURGEON, AN ANCIENT MISSISSIPPI RIVER FISH

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Pallid sturgeon (*Scaphirhynchus albus*) are the largest river sturgeon in North America. Described as a separate species of river sturgeon in 1905, they prefer turbid, free-flowing rivers and are native to the large rivers of the middle U.S., i.e. the Missouri and Mississippi. They are less abundant than the more widespread shovelnose sturgeon (*S. platorynchus*), and man-induced habitat changes -- dams and channelization -- over the past 60 years led to their being listed in 1990 as Endangered under the Endangered Species Act. These habitat changes resulted in modified river flows and water temperatures, decreases in turbidity and sediments, migration blocks and overall loss of habitat, especially for their reproduction and recruitment. Today, there are many entities working to study and to recover this important river species. There is a Pallid Sturgeon Recovery Team, three basin workgroups, committees, a Genetics Advisory Panel, federal and state fish hatcheries for propagation, fish health and fish nutrition personnel and a host of state, federal and university researchers devoting energy and resources to this effort. Besides direct habitat losses and modifications, other recovery issues, challenges and concerns are genetics of wild and hatchery broodstocks, accurate field identification, hybridization, sturgeon iridovirus, contaminants and commercial exploitation. Provided in this presentation is an overview of these concerns, what is being done to address them, and some future information needs.

HOW TO GET FARM PERSONNEL TO FAITHFULLY USE DISEASE PREVENTION AND CONTROL MEASURES ON SITE.

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It has been a long-held belief of fish culturists, that the failure of site workers to practice disease prevention and control measure (biosecurity), is due to lack of knowledge about these measures. However, our research indicates that lack of knowledge is just one of several factors which influence the use and consistent practice of biosecurity at a facility. Using grounded theory methodology, we investigated the process by which site workers learn about biosecurity. We found that the practice of biosecurity is a complex dynamic, and that it is influenced by peer pressure, management staff's position on biosecurity, as well as different personal characteristics of the individual worker, and his/her beliefs about biosecurity.

EVALUATING THE FEASIBILITY OF PLANTING AQUATIC PLANTS FOR HABITAT RESTORATION IN SHALLOW MISSISSIPPI LAKES

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Planting native aquatic plants is a technique used to restore vegetated habitat important to fish in lakes lacking aquatic plants. However, the feasibility of using this restoration technique in Mississippi lakes has not been evaluated. We conducted two enclosure experiments to evaluate the success of planting aquatic plants in a shallow Mississippi lake. We planted four emergent plant species in experiment 1 and four submersed plant species in experiment 2. Each experiment contained a control treatment in which no aquatic plants were planted. We measured physico-chemical characteristics of soil and water and monitored aquatic plants in each enclosure. No differences in mean soil and water parameters were observed among planting treatments in both experiments. The square-stem spike rush and arrowhead exhibited the greatest mean percent cover and the lowest probability of extinction in experiment 1. Additionally, the blunt spike rush and square-stem spike rush had the greatest mean stem density in experiment 1. Only mean percent cover differed among planting treatments in experiment 2, and the fragrant water lily exhibited a greater mean percent cover than the control. Our results suggest that the square-stem spike rush and fragrant water lily may be the best candidate species to plant in shallow Mississippi lakes when selecting a plant species for habitat restoration.

THE LOWER MISSISSIPPI RIVER CHANNEL IMPROVEMENT PROJECT

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This presentation provides an overview of the Corps of Engineers work on the Mississippi River by means of the Channel Improvement Project. The talk will briefly address authorities and relationships to the Mississippi River and Tributaries Project. Also included is a discussion and description of river training structures used in the Mississippi River as well as a short history of Mississippi River revetments with an emphasis on the current revetment construction method. Finally, we will discuss environmental aspects of the project.

RESULTS OF AN ONLINE SURVEY OF BOWFISHER ATTITUDES AND TRIP CHARACTERISTICS

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We created an online questionnaire to assess trip characteristics, attitudes and demographics of bowfishers with particular emphasis on individuals that target alligator gar (*Atractosteus spatula*). The survey was posted for 150 days (29 July through 15 December 2004) on the Bowfishing Association of America (BAA) webpage. Ninety-four bowfishers responded to the non-species specific portion of our questionnaire. Respondents were predominately male (N=93) with an average age of 34 years. An overwhelming 95% (N=89) of respondents supported the restocking of alligator gar in the species' historical range. An additional 19 questions were completed by the 43% of respondents that participated in trips targeting alligator gar. The majority of trips for alligator gar were taken from June through August (79%). Overall, trips targeting alligator gar were of longer duration (number of days) and were more expensive (US\$) than were trips that targeted other species. Respondents that targeted alligator gar generally supported daily creel limits (76%) for alligator gar. As a user group, bowfishers supported conservation and management efforts for alligator gar.

COOPERATIVE STATE AND FEDERAL ENVIRONMENTAL MONITORING IN MISSISSIPPI FOLLOWING HURRICANE KATRINA

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Hurricane Katrina came ashore on the Mississippi Coast on August 29, 2005. This unprecedented storm ravaged the coastal counties of Mississippi, leaving death, destruction and personal tragedy in its wake. The Mississippi Department of Environmental Quality has been actively involved in the clean up and recovery efforts along the coast since the day after the storm. After the initial response which focused on the rescue and relief efforts for the citizens, state and federal environmental agencies turned their attention to monitoring environmental damage left by the storm. The result was a cooperative effort by multiple agencies that produced intensive monitoring of water, sediment, fish and shellfish tissue and biota in Mississippi Sound and the associated estuaries. This presentation will summarize much of the monitoring conducted in Mississippi and provide some preliminary results, based on the data generated to date.

EVALUATION OF SLUDGE CARBON:NITROGEN RATIOS ON SEQUENCING BATCH REACTOR TREATMENT OF WASTEWATER TAKEN FROM AN INTENSIVE RECIRCULATING SHRIMP CULTURE SYSTEM

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A sequencing batch reactor (SBR) is a variation of the activated sludge biological treatment process, and uses multiple steps in the same tank in place of multiple tanks in a conventional treatment system. The SBR accomplishes equalization, aeration, and clarification in a timed sequence, in a single reactor basin through sequencing stages, which includes fill, react, settle, decant, and idle. Periods of aerobic and anaerobic conditions alternate during the react sequence to achieve nitrification and denitrification. To determine if SBR's ability to reduce nitrogen levels in sludge is affected by carbon:nitrogen (C:N) ratios, we manipulated the carbon levels in sludge from a high salinity (28 ppt) culture system. The C:N ratio of the original sludge was 5:1. We added molasses to the sludge to achieve 10:1, 20:1 and 30:1 treatments. SBR operation and sampling protocol was the same as described above. Total ammonia-N was significantly reduced at all C:N ratios, but the 5:1 and 10:1 reduced the total ammonia-N more than the 20:1 and 30:1 ratios. The 10:1 treatment was the best at removing nitrite-N and nitrate-N from the sludge. The SBR system has shown promising results and could be used as a viable wastewater treatment alternative in the shrimp industry.

CHALLENGES IN ARTIFICIAL PROPAGATION OF TRIPLETAIL LOBOTES SURINAMENSIS

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Tripletail (*Lobotes surinamensis*), a pelagic fish species found throughout tropical and subtropical regions, is a popular target species for sport fishers in the Gulf of Mexico. Preliminary laboratory rearing trials indicated impressive growth, from an average body weight of 12.7 g. to 1,012.5 g. in 210 days (Franks et al. 2001). The ability to propagate this species in the hatchery will help increase understanding of the life history of the species and provide seeds for potential aquaculture of the species. Wild caught fish were maintained under photothermal regulation in indoor 3.8-m diameter x 1.3-m deep circular tanks equipped with a recirculating water system. Adult fish (> 48.5 cm) were biopsied with a cannula to check for the presence of oocytes before hormonal treatment was administered. Carp pituitary homogenate, human chorionic gonadotropin, testosterone, 17-alpha methyltestosterone, and luteinizing hormone-releasing hormone analog were applied to complete oocyte maturation, and to induce ovulation and spawning. Spontaneous spawning was achieved, but fertilized eggs were not found. The investigators, however, were able to strip hydrated eggs from one female fish and artificially fertilize them with refrigerated sperm. Fertilized eggs hatched 20 to 21 hours after incubation. This report presents the first successful fertilized spawning of tripletail in the laboratory and discusses the challenges for induced spontaneous fertilized spawning.

OCCURRENCE OF LAKE STURGEON (*ACIPENSER FULVESCENS*) IN THE MIDDLE MISSISSIPPI RIVER

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Lake sturgeon (*Acipenser fulvescens*) were obtained as bycatch during a pallid sturgeon (*Scaphirhynchus albus*) study in the Middle Mississippi River (RM 956 -1153) between the mouths of the Ohio and Missouri Rivers. Historically, this species has declined in numbers throughout most of its range due to over harvesting and habitat degradation. State hatcheries have been stocking lake sturgeon into the Mississippi River and tributaries to augment recovery. During the period Dec 2002 - Mar 2004, twenty-eight specimens were collected, ranging in sizes from 663-1275 mm TL. All were caught on trotlines baited with worms. At least 10 specimens had coded wire tags indicating hatchery origin, although not all individuals were scanned during the study. Lake sturgeon were collected from a variety of habitats (dikes, gravel bars, channel border, tributary mouth) in depths ranging from 1.5-9.1 meters, velocity from 5-120 cm/sec, and water temperatures from 4-18 degrees Celsius. Lake sturgeon are designated as a threatened species in many states and by the AFS Endangered Species Committee. Our data indicates survival of hatchery-released fish and that biology of these infrequently seen fish can be investigated concurrently with that of river sturgeon (*Scaphirhynchus spp.*).

MEASUREMENT OF NUTRIENT AVAILABILITY IN FEEDSTUFFS FOR FLORIDA POMPANO

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Florida pompano (*Trachinotus carolinus*) aquaculture has been the subject of numerous research projects and commercial ventures since the 1960s, yet still has not developed as a viable commercial enterprise. One advance that will assist the development of commercial pompano production is knowledge of the nutrient availability in common feed ingredients in order to formulate nutritionally complete, cost-effective diets. This study was undertaken to measure the apparent digestibility of nutrients among a selection of common feed ingredients. We collected wild juvenile pompano from the surf zone. These pompano underwent quarantine for parasite removal, and were grown to a size (~50 g) suitable for digestibility trials. Digestibility trials were conducted by feeding a reference diet containing a marker and a series of test diets (containing 70% of the reference diet + 30% of the ingredient of interest) to duplicate groups of fish, then taking fecal samples by abdominal compression (Figure 2). The apparent digestibility of energy, protein, and amino acids in each ingredient was calculated based on differences between the energy content and chemical composition of the diet and the feces. Results will be presented, and the application of these data to diet formulation for pompano will be discussed.

HABITAT USE BY NEKTON ALONG A STREAM-ORDER GRADIENT IN A LOUISIANA ESTUARY

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We examined patterns of habitat use by fishes and macroinvertebrates in a tidal mesohaline subdrainage of Bay Batiste, Louisiana. Stratified monthly sampling along a stream-order gradient examined changes in community structure within the seemingly pristine system. Analyses were based on a microhabitat approach used to characterize gradients of water depth, temperature, DO, salinity, turbidity, bank slope, stream width and distance to mouth. From February through November 2004, 3757 individuals from 30 taxa were collected in 81 seine samples. Grass shrimp was the numerically dominant species (72.7%), followed by penaeid shrimp (13.4%), bay anchovy (1.7%) and inland silverside (1.7%). The 10 most frequently occurring species amounted to 95.7% of all individuals and were selected for further analyses. Spatial and seasonal differences in environmental variables and differences in habitat use among species were assessed by univariate ANOVAs. A factor analysis resolved 8 environmental variables into 4 orthogonal axes that simplified comparisons among species. Together, they explained 79.9% of the environmental variability. Factor one was interpreted as a spatial axis, Factor two as a morphological axis, Factor three as a seasonal axis, and Factor four as a salinity axis. Analyses detected the effects of stream-order and season on community structure.

MOVEMENT OF FOUR RARE MINNOW SPECIES IN A MINNESOTA LAKE

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Aquatic macrophytes provide important habitat for many species ranging from macroinvertebrates to large piscivorous fish. The cumulative effects of shoreline development represent a serious threat to these aquatic habitats. Disturbances such as aquatic vegetation removal and pier construction are perhaps the most direct and immediate habitat alterations resulting from shoreline development. Unfortunately, understanding how these habitat alterations affect fish has always been a challenge. We examined the movement of four minnow species that are intolerant to disturbance in Square Lake, Minnesota, blacknose shiner *Notropis heterolepis*, blackchin shiner *Notropis heterodon*, banded killifish *Fundulus diaphanous*, and Iowa darter *Etheostoma exile*, from May-August 2005. Fish were collected using purse and bag seines throughout the littoral zone and marked using Visible Implant Elastomer (VIE), a fluorescent injectable material. Habitat metrics and biovolume via hydroacoustics were recorded at each capture/recapture location. Fifty-nine individuals were recaptured with distances moved ranging from 2 to 1520 meters and, mean distance moved (222 meters) did not differ significantly between species. Preliminary analysis indicates these species may use many microhabitat patches within the lake. The number of days between recaptures ranged from 0 to 71.

SEASONAL MOVEMENTS AND MIGRATORY PATTERNS OF TRIPLETAIL (*LOBOTES SURINAMENSIS*) IN COASTAL WATERS OF THE SOUTHEASTERN UNITED STATES: PRELIMINARY RESULTS

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Seasonal movements and migratory patterns of tripletail (*Lobotes surinamensis*) are poorly understood in coastal waters of the northern Gulf of Mexico and southeastern United States. Based on this need for data for management purposes, an angler-cooperative tag and release study was initiated in 2001. Through August 2005, a total of 978 tripletail have been tagged and released, and 90 of those fish (9.2%) have been reported as recaptured. Tagging of tripletail ranged from the Gulf coast of Texas to the Atlantic coast of Georgia. Presently, no size or bag limits are in effect for the tripletail fisheries in Mississippi, Louisiana and Texas waters, so participation in the program by anglers in these regions has been limited. Consequently, the majority of data obtained through this study has been provided by anglers along the Florida coasts, where the fishery is currently managed. Recapture data collected to date involve primarily short-term movements along the west-central coast of Florida, although a few long-distance migrations have been noted.

SUPPLEMENTING STANDARDIZED SAMPLING DATA WITH FISHING TOURNAMENT DATA COLLECTED FROM INTERNET WEBSITES

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Fisheries agencies often do not have the resources to sample each water body regularly. In addition, some water bodies can present problems to workers using standardized sampling techniques, such as electrofishing, because of depth, water quality, water level fluctuations, excessive cover, or other factors. Fishing tournament surveys can provide useful information for fisheries managers as well as tournament organizers, although conducting mail surveys or attending events can be time-consuming and expensive. I used internet websites to collect black bass (*Micropterus* spp.) tournament data for six Louisiana lakes during 2004–2005. Only data from organizations that consistently posted tournament results were used. Tournament data were compared with electrofishing data collected by the Louisiana Department of Wildlife and Fisheries. Tournaments on Turkey Creek Lake in Franklin Parish produced large first place weights (18.2 ± 1.3 lb [mean \pm SE]) and big fish weights (6.3 ± 0.3 lb) and had a large percentage of the field that weighed at least one fish 12 in total length (TL) or larger ($77.0 \pm 4.3\%$). In contrast, electrofishing catch rates on the lake were low: 15 to 33 fish ≥ 12 in TL per h; 9 to 15 fish ≥ 15 in TL per h; and 0 to 1 fish ≥ 20 in TL per h. I concluded fishing tournament websites can provide a quick and inexpensive means of collecting data to supplement standardized sampling techniques such as electrofishing

BIOLOGY AND NATURAL HISTORY OF THE BLACK CARP

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The black carp, *Mylopharyngodon piceus*, is native to China and Russia and belongs to a group collectively known as “Asian carps”. The “Asian carps” include the silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Hypophthalmichthys nobilis*), and the closely related grass carp (*Ctenopharyngodon idella*), all of which have been introduced and developed reproducing populations in the United States. The black carp is a specialized feeder that has molariform pharyngeal teeth which allow this species to crush and consume many types of mollusks. With the large size that these fish attain, upwards of 2 m and 80 kg, they can consume large quantities of mollusks. Black carp were introduced as a biological control agent in Louisiana, Mississippi and other catfish producing states to control snails that hosted a parasite *Bolbophorus*, found to infect channel catfish (*Ictalurus punctatus*). Escapement of this non-native molluscivore into natural waterways is a significant concern. Confirmed reports of black carp in U.S. have been made. With this species present in U.S. waterways it is important to understand the impact that it could potentially have on mollusks in North American lakes and rivers. My thesis project will develop a bioenergetics model for black carp that can be used to estimate consumption and growth.

SHORT-TERM MOVEMENT PATTERNS OF YOUNG BULL SHARKS (*CARCHARHINUS LEUCAS*) IN DAVIS BAYOU, MISSISSIPPI, WITH NOTES ON THE EFFECTS OF HURRICANE KATRINA.

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Young-of-the-year bull sharks (*Carcharhinus leucas*) are common inhabitants of the bays and bayou systems along the Mississippi coast. Acoustic telemetry was used to track the movements of five sharks in Davis Bayou, Mississippi. Sharks were manually tracked continuously for four to seven hour periods totaling 21.5 hours. Mean straight line swimming speed was $1.81 \pm 0.17 \text{ km h}^{-1}$, with a maximum observed swimming speed of 4.8 km h^{-1} . Sharks spent 98% of the time within Davis Bayou, with the majority of their movements within 10m of the coastline. Two sharks utilized small sloughs, which were not previously thought of as available habitat for this species, and one shark was observed resting on the bottom for nearly two hours, which is not characteristic of this species. As a result of Hurricane Katrina, young bull sharks were concentrated in the bayous systems along the Mississippi coast during the months of September and October. This concentration of sharks may have been the result of low dissolved oxygen levels in the rivers, which possibly reduced access to important habitat typically utilized by young bull sharks. By the end of October, dissolved oxygen levels increased in coastal rivers and the concentration of bull sharks diminished in the bayou systems.

COOPERATIVE GULF STURGEON STUDIES IN THE MISSISSIPPI RIVER GULF OUTLET: A PROGRESS REPORT FOR 2005

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Gulf sturgeon use of the Mississippi River Gulf Outlet (MRGO) was monitored during FY2005. The MRGO provides year-around navigation between the Mississippi River and the Gulf of Mexico and dredging is required to maintain suitable depths. There is a concern that dredging activities may impact Gulf sturgeon wintering in estuarine and marine habitats. A total of 50 Gulf sturgeon captured by netting in the Pearl and Bogue Chitto Rivers were telemetry tagged during summer months. Monthly telemetry tracking in the MRGO was started during October 2004. Starting in June 2005, inland disposal sites and other locations in the MRGO were sampled with 27.5-m experimental gill nets to determine the presence of juvenile Gulf sturgeon. One Gulf sturgeon was located in the MRGO on 19 January 2005 near marker 96 (29° 50.669N 089° 37.643W). This juvenile fish was captured and tagged on August 19, 2004 in the East Pearl River. No other fish were located by telemetry and no Gulf sturgeon were caught in experimental gill nets in and near the MRGO. One location of a tagged Gulf sturgeon was made out of 900 telemetry soundings suggesting that Gulf sturgeon from the Pearl River do not frequently use this shipping channel. Sampling during FY06 will provide more information about juvenile Gulf sturgeon use of the MRGO and surrounding disposal sites.

THE EFFECT OF TROPICAL STORM CINDY ON FISH AND INVERTEBRATE COMMUNITIES OF A SUBMERGED AQUATIC VEGETATION MEADOW IN BILOXI MARSH, LOUISIANA

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With the large numbers of hurricanes and tropical storms hitting Louisiana's coast in 2005, changes and habitat quality and fisheries can be expected. Submerged Aquatic Vegetation (SAV) provides an important nursery habitat that is important to many species and sensitive to environmental changes, including those caused by storms. Using a drop trap sampler, SAV meadows dominated by *Ruppia maritima* and nearby bare bottoms in Biloxi Marsh, LA were sampled approximately one month before and one month after Tropical Storm Cindy passed through the area. The habitats were altered as a result of the storm. Statistical analyses, including multidimensional scaling and MANOVA, indicate significant differences in fish, invertebrate and overall community structure over time. The overall SAV community structure shifted from being dominated by rainwater killifish and several crab species before the storm to a community dominated by naked gobies after the storm. Preliminary results also indicated significant differences in community structure between the two habitats. This area was also hit by Hurricane Katrina in August of 2005. A sampling effort will take place in May 2006 to assess Katrina's impacts on community structure.

AQUACULTURE PARKS IN THE COASTAL ZONE: A REVIEW OF LEGAL AND POLICY ISSUES IN THE GULF OF MEXICO STATE WATERS

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The goal of this study is to apply industrial park concepts to the permitting and development of water bottoms for mariculture use. The objectives were to identify: 1) the permits necessary, 2) the agencies involved, and 3) legislation necessary to allow for an aquaculture park to be developed in the Gulf States. In Florida, private aquaculture parks exist, but public aquaculture parks have not been developed. In Mississippi, there are regulations and plans for a public aquaculture park, but the project has not been funded. In Alabama, there are regulations permitting aquaculture, and no regulations that would prevent a park. In Texas, there are regulations that would hinder the development of a park, including limited waters that are approved shellfish growing waters. In Louisiana, a proposed park project has been in the permitting process for two years. The process has taken so long for approval due to the lack of existing regulations. Legislation was passed by the Louisiana State government that gave the Grand Isle Port Commission the jurisdiction over the water bottoms in the area the proposed aquaculture park.

BOWER CHARACTERISTICS AND DISTRIBUTION ALONG A THERMAL GRADIENT OF INVASIVE MOUTHBROODING NILE TILAPIA (*OREOCHROMIS NILOTICUS*) IN COASTAL MISSISSIPPI.

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In coastal Mississippi, Nile tilapia (*Oreochromis niloticus*) has been introduced via aquaculture practices. Warm-water effluents from aquaculture facilities along the Pascagoula system may provide ideal habitats, especially during winter. We examined reproductive behavior of invasive Nile tilapia at Plant Daniels cooling pond in Escatawpa, MS. We quantified 1) bower (nesting pits) density, 2) distribution along thermal gradients, 3) bower morphology, and 4) sediment composition. Monthly observations made in twelve sites associated with temperature probes categorized bowers by location, age (activity and debris cover), and morphology. Bowlers had a mean diameter of 0.76 m and depth of 0.83 m, coinciding with native environments. Active bowers did not occur on the “hot side” (18.5°C-43.9°C), but in middle (14.9°C-35.4°C) and colder (14.2°C-35.0°C) areas. Spatial distribution of bowers was uniform within each site but could be considered clumped within the pond. Bower density in active sites spanned from 0.0007 to 0.0026 bowers/m² and varied among pond areas. Sediment taken from both ends of sites ranged from muddy to silty fine sand, showed little variation between ends, and corresponded with sediment components in native environments. A better understanding of the impact of an invasive species will allow for wise management and hopefully prevent future introductions.

EFFECTIVENESS OF THREE POST-HARVEST TREATMENTS IN THE REDUCTION OF VIBRIO VULNIFICUS AND V. PARAHAEMOLYTICUS IN CRASSOSTREA VIRGINICA

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Every year millions of people are afflicted by food-borne pathogens. In particular, *Vibrio vulnificus* and *V. parahaemolyticus* are the major causes of sickness resulting from consumption of raw shellfish, especially oysters. Such afflictions resulting from *V. vulnificus* and *V. parahaemolyticus* infection include gastroenteritis and primary septicemia, which can be fatal in individuals with underlying conditions. It has been observed that these bacteria display greater numbers during summer months due to warm waters that facilitate their optimum growth. The goal of this research is to develop a methodology for reducing *V. vulnificus* and *V. parahaemolyticus* numbers in Gulf coast oysters by analyzing three post-harvest treatments, on-board icing, on-shore icing, and off-shore high salinity depuration, on freshly harvested oysters during summer months. Both cold temperature storage and salinities > 30 ppt have been shown to significantly reduce *V. vulnificus* and *V. parahaemolyticus* numbers in previous studies. This research is crucial in providing a safer seafood product for human consumption.

HABITAT VARIABILITY OF THE ALABAMA SHAD WITHIN THE PASCAGOULA BASIN

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Information about the life history of the Alabama Shad (*Alosa alabamae*) and its presence along the Gulf coast is limited. Although the species is not listed as endangered, declines in populations have raised concerns and projects are currently underway to conduct stock assessments within the rivers where they reproduce. The Pascagoula drainage is unique compared to other drainages in that it is the only undammed major waterway in the lower forty-eight states. First year Alabama Shad have been caught in summer holding areas within the Pascagoula Drainage. Habitat parameters were recorded when juvenile Alabama shad were present as well as absent. With lower temperature refugia being the largest determining parameter, a Discriminant Function Analysis produced a correct classification of presence/absence in microhabitats. After habitat parameters are adequately understood, protection of essential habitat may be suggested. Understanding the life stages of the Alabama Shad and its habitat use in the river will provide crucial information toward its conservation.

FISH ASSEMBLAGES IN OXBOW LAKES RELATIVE TO CONNECTIVITY WITH THE MISSISSIPPI RIVER

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The alluvial valley of the Lower Mississippi River contains hundreds of fluvial lakes that are periodically connected to the river during high water, although the frequency, duration, and timing of the connections vary. To help design plans to restore and preserve fish assemblages in these alluvial lakes, this investigation tested whether predictable patterns in lake fish assemblages were linked to the level of connectivity with the river. Results suggested that connectivity played an important role in structuring fish assemblages and that it was correlated with variables such as lake size, depth, distance from the river, and age, which exhibit a continuum of predictable features as the river migrates away from abandoned channels. Annual floods homogenize the floodplain and promote connectivity to various degrees, allowing for fish exchanges between river and floodplain that directly affect fish assemblages. The major physical changes linked to reduced connectivity were loss of depth and area, which in turn affect a multiplicity of abiotic and biotic features that indirectly affect community structure. In advanced stages of disconnection, fish assemblages in oxbow lakes are expected to include largely species that thrive in turbid, shallow systems with few predators and low oxygen content. When the river flowed without artificial restraint, oxbow lakes were created at the rate of 13–15 per century. At present, no or few oxbow lakes are being formed, and as existing lakes age, they are becoming shallower, smaller, and progressively more disconnected from the river. Given that modifications to the Mississippi River appear to be irreversible, conservation of this resource requires maintenance of existing lakes at a wide range of aging phases that provide diverse habitats and harbor distinct species assemblages.

EFFECTS OF HURRICANE RITA ON FISH ASSEMBLAGES IN THE YAZOO BASIN

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Rainfall associated with Hurricane Rita caused unseasonable flooding, widespread hypoxia, and subsequent fish kills throughout the Yazoo Basin, Mississippi. Physical parameters in both large unregulated and small streams returned to within historical limits two months after the storm event. Impacts to fish faunal structure at seven sites on the Big Sunflower River and Upper Steele Bayou System were assessed by comparing seine samples taken two months after the flood with historical collections taken by the same method. Both species richness and abundance were negatively impacted by the flood event, most noticeably in the smaller streams. Numerical dominance shifted to more disturbance-tolerant species post-flood. Larger streams in the Yazoo Basin will likely recover more quickly than smaller streams because of greater species richness and abundance of surviving base populations capable of subsequent spawn, and the insulating effect in larger waterbodies on perturbations such as floods.

CONSERVATION – THE OTHER ECONOMY

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Because Federal programs at their best only serve as catalysts and tools for action, regional economic development efforts by the government in 1988 and 2000 have been largely unsuccessful in bringing prosperity to the Lower Mississippi Valley (Delta). The 219 county/parish area remains one of the United States' most economically distressed regions where poverty levels significantly exceed the national average and per capita income is approximately half the national average. However the Delta's nationally recognized historical, cultural, and natural resource assets, especially those associated with the Lower Mississippi River (LMR) offer the promise of sustainable economic development. The region's unique cultural perspective and the literature, art, architecture, food, folklife, and traditions that comprise its rich history are intensely felt and vividly remembered by visitors. Tourism that sustains or enhances the geographical character of the place being visited and is prompted by a desire to experience these local attributes has recently been designated as "geotourism". Studies conducted by the Travel Industry Association of America identified 55 million travelers as potential geotourists - those attracted by a destination's unique characteristics. Tourists surveyed expressed interests in value, multiple things to do when visiting an area, and a desire to visit locations that are not heavily populated. Although such features are abundant in the LMV and the number of tourists traversing the region will greatly increase with the construction of Interstate 69, they are relatively undeveloped and inaccessible; nor is the region "tourist-friendly" in terms of providing the amenities desired by travelers. Tourism, fishing, and wildlife-associated recreation in the six-state area currently account for an annual input of \$24.6 billion into the regional economy. A 2004 economic study of the 113 county-corridor surrounding the LMR reported that tourism was the largest non-manufacturing sector in the regional economy, contributing some \$13 billion annually and supporting more than 180,000 jobs. The LMR, with its associated communities and their distinctive culture, represents a largely untapped economic resource. The Lower Mississippi River Conservation Committee has formulated a landscape-scale plan to facilitate natural resource-based economic development focused on the LMR's 2.7 million-acre leveed floodplain. The organization's "Restoring America's Greatest River" plan has the potential to revitalize the regional economy by enhancing tourism; improving the quality of life, and; protecting and restoring the natural resources and the environment. Providing assistance to the six Delta states in formulating/implementing an economic development program based on restoration and sustainable use of the LMR's unique natural resources promises long-term benefits to the region while simultaneously ensuring restoration of its LMR-related natural resources.

THE EFFECTS OF NON-NATIVE MACROPHYTE INVASION ON JUVENILE LARGEMOUTH BASS

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Non-native macrophyte infestations in lakes and waterways of the United States in recent years have become a cause for concern. Research is needed to better understand the ecological impact on aquatic communities, and how a shift from native plants to invasive exotics affect aquatic habitat. Little is known about how fish habitat is impacted when a homogeneous plant bed replaces a heterogeneous bed of native vegetation. Changes in this structure within habitat can potentially impact growth, condition, and foraging ability of juvenile fish. We investigated the hypothesis that exotic invasive plants alter juvenile largemouth bass (*Micropterus salmoides*) growth, condition, and foraging ability when diverse native plant beds are overgrown by exotic plant growth. We conducted two experiments: 1) in ponds we measured for differences in largemouth bass growth and condition between treatments of diverse native plants (*Nymphaea odorata*, *Brasenia schreberi*, *Ceratophyllum demersum*, and *Potamogeton nodosus*) and invasive hydrilla (*Hydrilla verticillata*), and 2) in aquaria where foraging ability of juvenile largemouth bass was quantified at different stages of hydrilla invasion. Level of invasion was manipulated within the aquaria by increasing intervals (n=4) of introduced hydrilla (25% per treatment) from a 100% diverse native plant treatment to 100% hydrilla. We observed differences in the growth and condition of fish across pond treatments and foraging appeared to be altered within the aquaria experiment. These data provide insight into effects that invasive macrophytes have on largemouth bass habitat.

HURRICANE KATRINA AND FISHERIES RESOURCES ON THE MISSISSIPPI GULF COAST

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Hurricane Katrina dealt a devastating blow to the Gulf Coast with all segments of coastal fisheries severely impacted. Commercial harvesting and processing sectors suffered heavy loss of vessels and plant capacity, respectively. Most of the recreational fisheries infrastructure (bait, tackle shops, boats, repair and maintenance shops, etc.) were essentially destroyed. Loss of commercial and recreational fishing activities resulted in a catastrophic loss of income to the coastal economy. Impacts to biological resources varied with most expected to recover by the next annual "harvest" season. The oyster fishery, however, was decimated and restoration of productive reefs in the western Mississippi Sound is estimated to require two to three years. Areas of low dissolved oxygen following the storm event resulted in numerous fish kills in upper embayments and riverine habitats with deaths including the endangered Gulf sturgeon. To date, overall assessments of water quality showed few problems in coastal waters. Destruction of sewage treatment facilities and subsequent elevations of *Enterococcus* bacteria resulted in temporary advisories on seafood consumption, however, as these plants were brought back to capacity, water quality improved and advisories lifted.

IMPACTS OF HURRICANE KATRINA ON LOUISIANA SEAFOOD

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Category 4 Hurricane Katrina made landfall in Louisiana and Mississippi on August 29, 2005. The resulting damage was felt in a broad swath of the northern Gulf of Mexico coast. Initial concerns of “Toxic Soup” in the flooded New Orleans area progressed to concerns at the national level that fish consumption must be banned in the wake of the storm. A significant fish/shellfish sampling effort ensued cooperatively between the federal Food and Drug Administration and the Louisiana Department of Environmental Quality. Results of samples collected from Lakes Pontchartrain and Borgne from October 6 to November 9 indicated no need for fish consumption advisories due to Hurricane Katrina. Ancillary findings relative to fish/shellfish populations and habitat will be discussed.

BASS TOURNAMENTS REVISITED

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A program was initiated in 1998 to monitor black bass (*Micropterus spp.*) populations on the Tennessee-Tombigbee Waterway using bass tournament catch data. Objectives of the program are to collect tournament catch data to supplement agency monitoring, provide participating clubs with results from the program on an annual basis and encourage angler interaction and support for agency efforts. Statewide tournament data began being reported in 2002. Number of tournament reports received has increased each year; 43 tournaments were submitted in 1998 and 244 tournaments were included in 2005. Forty-five tournament organizations have provided data on 39 different lakes. Since 2002, an average of 211 tournaments per year has been submitted that included 39 anglers per event.

BACTERIOLOGICAL AND WATER-QUALITY DATA COLLECTED AT COASTAL MISSISSIPPI SITES FOLLOWING HURRICANE KATRINA, SEPTEMBER-OCTOBER 2005

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On August 29, 2005, Hurricane Katrina devastated coastal Mississippi with 150 mile-per-hour winds and a storm surge in excess of 20 feet. Disease transmission from contaminated water and contamination caused by chemical spills were major concerns. As part of a multi-agency response to the disaster, the U.S. Geological Survey (USGS) operated a bacteriological laboratory. Bacteriological samples were collected weekly at 31 estuarine tributary sites and 13 beach monitoring sites in coastal Mississippi counties for a period of 5 weeks beginning September 19, 2005. The USGS analyzed the samples primarily for *enterococci*. About 14 percent of the *enterococci* concentrations were less than the detection limit, and 81 percent were lower than current criteria. The USGS also collected 19 water-quality samples at 12 inland freshwater sites for a period of 2 weeks starting on September 19, 2005. Each sample was analyzed for multiple constituents including nutrients, major ions, trace metals, modern-use and polar pesticides, waste-water compounds, volatile organic compounds, and degradate organic compounds. Most detections were below current water-quality criteria for Mississippi streams. Overall, the results from the bacteriological and water-quality samples indicated no systemic contamination in the sampled streams in the aftermath of Hurricane Katrina.

LOUISIANA'S BIG RIVER FISHERIES SAMPLING PROGRAM

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The Inland Fisheries Division of the Louisiana Department of Wildlife & Fisheries initiated a statewide river sampling program in 2002. The purpose of the program was to provide 1) baseline data on fish population status and relative abundance 2) assess invasive aquatic species and, 3) begin a long term monitoring program to identify trends. River sampling occurred during the summer months June – September. Gear types being used for fish sampling include gill nets, hoop nets, haul seines and electrofishing. Since 2002, a total of 19 sampling stations have been established along the Mississippi River from the Arkansas state line to the Head-of-passes on the delta. Fifty three species of fish representing 17 families have been collected and identified to date. We used species diversity indices to describe species richness, and percent total numbers to report relative abundance. Clupeids and cyprinids were dominant in total numbers, while cyprinids and centrarchids were the most represented families.

HURRICANE IMPACTS TO COASTAL FRESHWATER FISHERIES AND THEIR HABITATS IN SOUTHWEST LOUISIANA

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Three coastal rivers and their associated freshwater environments were negatively impacted when Hurricane Rita came ashore on September 24, 2005. Cameron and Vermilion parishes were 90% inundated by an extensive storm surge exceeding some 12 feet at greatest depth and covering some 1 million acres of freshwater habitats. Extensive fish kills occurred throughout the region immediately following the hurricane, while aquatic and terrestrial plant dieoffs due to salt water intrusion. Water quality monitoring stations were established on three area rivers (Calcasieu, Mermentau, and Sabine) and in several freshwater marshes. Parameters being monitored include temperature, dissolved oxygen, pH, conductivity, salinity, appearance, smell, evidence of dead aquatic organisms, and signs of life. Stations will be monitored until pre-hurricane conditions return. Currently, recovery is being hindered due to the ongoing drought conditions along the gulf coast.

BIRDS AS AMBASSADORS FOR MISSISSIPPI RIVER CONSERVATION

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Birds are highly visible and greatly valued components of the natural world. The strong interest in birds of the Mississippi River was dramatically illustrated by the recent rediscovery of the Ivory-billed Woodpecker in eastern Arkansas, which became a global news event. Birdwatching, a form of nature tourism and environmental education, is the fastest growing form of outdoor recreation. Nationally, birders spend \$29.2 billion each year on their pastime. More than 300 species of birds are dependent on healthy habitats along the Mississippi River, particularly aquatic habitats that are also important for fish and other taxa. Stimulating more interest in birds and wildlife in general along the Mississippi -- and an understanding of their ecological needs -- will help promote a stewardship ethic for all species and habitats as well as promote sustainable economic development.

**COMMUNITY STRUCTURE AND GRADIENTS OF ANTHROPOGENIC STRESS:
DEVELOPING AN ESTUARINE INDEX OF BIOTIC INTEGRITY IN BARATARIA BAY,
LOUISIANA**

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We conducted preliminary work to characterize the use of marsh-edge habitat by nektonic species in Barataria Bay, Louisiana. This middle bar bay, degraded by different human influences, contains few seemingly pristine patches of estuarine habitat. In an initial effort to develop an Index of Biotic Integrity (IBI) for this area, drop trap samples were collected monthly in 2005 for Spring (March through May) and Summer (June through August) at locations with three predetermined states of degradation. Fifteen temporal, spatial, and environmental or physiochemical variables were recorded at each sample site including; longitude, latitude, time of day, bottom visibility, maximum and minimum depth, turbidity, DO, temperature, salinity, distance to marsh edge, water velocity, marsh vegetation and substrate types. Surficial cores were also taken for pore-water Microtox toxicity assessments. All faunal and habitat data, grouped according to their degradation, were entered into PRIMER for non-parametric analyses using cluster, MDS, ANOSIM, and BIO-ENV. We also performed parametric analyses including ANOVA and BACI. Our drop trapping effort captured 4992 individuals contained within 38 taxa. Currently data show, the severely degraded locations are more dissimilar to the mild and moderately degraded locations. There was no significant effect of environmental degradation on species data.

DESIGN AND TESTING OF IMPROVED PROCESS CONTROL SYSTEM FOR TIME-TEMPERATURE STUDIES WITH EASTERN OYSTERS (*CRASSOSTREA VIRGINICA*)

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Time-temperature interactions are very important in growth and spawning of oysters and other aquatic organisms. This also affects feeding rates and ammonia production in aquatic systems. This process yields ammonia which impacts water quality. The objective of this project was to improve the design and chilling capacity of a time-temperature process control system for oyster biology and water quality studies. The system was designed to simulate both seasonal and fixed time-temperature regimes in eighteen, 250-liter tanks and at a faster rate than the previous system. A second system used thirty-six, 40-liter tanks for small scale lab studies. Preliminary testing of the system has shown chilling capacity as low as 50C. Eastern oyster (*Crassostrea virginica*) tend to tolerate a wide range of temperature variation from near freezing to 36°C. Improving chilling capacities enhanced further studies with the biology of these species. Nitrogen dynamics in the environment, at various time-temperature regimes may also be studied in these aquatic systems. Finally real time control of selected tanks based upon remote weather stations at various coastal locations has also been developed.

EFFECTS OF FOOD AVAILABILITY ON NUTRITIONAL CONDITION AND GROWTH OF NAKED GOBY (*GOBIOSOMA BOSCA*)

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The objective of this study was to use RNA:DNA ratios and somatic growth of naked goby (*Gobiosoma bosc*) to identify and measure physiological effects of sub-optimal feeding conditions. Wild *Gobiosoma bosc* eggs were collected using nest-traps constructed of PVC pipe. Eggs from several different nests collected in the field were hatched in the lab, yielding larvae that were randomly assigned to three feeding treatments in two replicate tanks per treatment. Goby larvae were fed diets of rotifers, *Brachionus plicatilis*, at densities of 20, 200, or 1200 per liter. Prey concentrations were measured every 8 hours and adjusted accordingly. The experiment consisted of two trials of 10 and 8 days duration, respectively. A total of 699 larvae were collected, with individuals (n=1 to 5 per tank) sampled each day for RNA:DNA analysis. An additional 1 to 4 individuals per tank were sampled for length-weight measurements daily. Preliminary results for the three treatments indicated a declining trend for growth in length with decreasing prey densities over time. We hypothesize that RNA:DNA ratios, dry weight measurements, and otolith growth will reflect this trend as well.

STATUS AND MANAGEMENT OF MISSISSIPPI RIVER FISHERIES

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The Mississippi River has been variously altered for navigation and flood control but supports a diverse and relatively productive fish assemblage. In the upper, impounded reach, commercial fish harvest has increased for most species since 1945. The upper reach provides an extensive and moderately used recreational fishery resource. Limited information for the lower, unimpounded reach of the Mississippi River indicates commercial harvest is increasing. Neither the commercial nor recreational fisheries appear to be overharvested; however, fisheries for sturgeon and paddlefish should be carefully monitored. Future fisheries production may be threatened by loss of aquatic habitat, altered spatial and temporal aspects of floodplain inundation, and nuisance species invasions. Water quality in most reaches has improved substantially from formerly severely degraded conditions. Navigation traffic affects fish survival and recruitment, and increases in navigation are forecast. Future conservation and management of the fisheries and aquatic resources of the Mississippi River will require substantial investment in effective assessment programs and achieving societal recognition of the diverse values of the resource.

SPORT FISH UTILIZATION OF AN INSHORE ARTIFICIAL OYSTER REEF IN BARRATARIA BAY, LOUISIANA

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The Sustainable Fisheries Act called for the conservation and protection of marine habitats and required the identification of Essential Fish Habitat (EFH), particularly for important commercial and recreational species. A majority of past work in the Gulf of Mexico to identify EFH has concentrated either on salt marsh habitat or on offshore natural reefs. Recently, inshore hard bottom substrates, including oyster reefs, are speculated to constitute EFH for commercially important species. Habitat loss, disease, overharvest of oysters, and the failure to replace shell have severely decreased the amount of high-relief oyster reefs available to finfish. The purpose of this project is to establish an artificial high-relief oyster reef in Barrataria Bay and monitor its usage by commercially and recreationally important finfish species, including spotted sea trout (*Cynoscion nebulosus*) and Atlantic croaker (*Micropogonias undulatus*). This study will compare the finfish and invertebrate communities on the Artificial Reef site to a mud bottom control site. Collections will be made using gill nets and a purse seine over both sites. We will also examine the site-specific trophic linkages by examining gut contents and performing stable isotope analysis of select species. To date, five sampling trips have been completed for three seasons, spring, summer and winter.

THE LOUISIANA OYSTER RECOVERY PLAN: A RESPONSE TO HURRICANES KATRINA AND RITA

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Hurricanes Katrina and Rita passed through major Louisiana oyster production areas, causing between 55-70% oyster mortality to the public grounds by scouring and overburden, with likely similar damage to private farms yet to be determined. Infrastructure and fleet damage to public agencies and the private sector was also severe.

The Louisiana Oyster Task Force is enacting a recovery plan to address five areas of need: (1) vessel and lock recovery; (2) harvest areas, (3) dock and unloading facilities, (4) processing plants, and (5) market development. This multi-faceted approach challenges all involved to new paradigms. Some of the components include:

- Refloating some 1,800 commercial fishing vessels aground by storm surges
- Develop oyster leasing for southwest Louisiana
- Develop an oyster crop insurance program
- Identify statewide strategic unloading facilities
- Install sewage pump-out stations at unloading facilities; investigate federal funding
- Debris removal from oyster harvest reefs and waterways
- Cultch placement on public and private oyster grounds
- Lift current moratorium on new oyster leases
- Rebuild the Sea Grant oyster hatchery on Grand Isle and initiate a Louisiana Oyster Seed Program focusing on genetically superior stocks
- Develop off-bottom culture in designated marine enterprise zones and/or aquaculture parks

HETEROGENEOUS VS. HOMOGENEOUS AQUATIC HABITAT INDUCED BY THE INVASIVE *HYDRILLA VERTICILLATA*: IMPLICATIONS FOR MACROINVERTEBRATE COLONIZATION AND BLUEGILL FORAGING EFFICIENCY.

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Aquatic plants contribute to the mediation of ecological interactions and processes in aquatic habitats, specifically predator-prey (bluegill-macroinvertebrate) interactions. Macroinvertebrate colonization is influenced by substrate heterogeneity, interstitial space, and surface complexity. High heterogeneous substrates often correlate with high macroinvertebrate abundance, density, and richness. Further, feeding and individual growth rates of many fish species are positively related to the abundance of macroinvertebrates. Exotic invasive plant species may provide habitat structurally different from habitat provided by native plants causing differences in structure for the macroinvertebrate community. Since macroinvertebrates provide a food base for young phytophilic fishes, changes in their density and abundance may significantly alter food web interactions. We investigated the hypothesis that a shift in a heterogeneous native aquatic plant bed to a homogenous invasive plant bed will alter aquatic habitat important to bluegill foraging and invertebrate colonization. Experiments were conducted at the pond and aquaria level. Within the pond experiments, 270 macroinvertebrate samples were collected representing 36 families, and 1575 minutes of bluegill foraging were recorded in aquaria. Preliminary results and analysis will be presented to illustrate how changes in vegetated habitat may impact the available structural heterogeneity in aquatic ecosystems important to macroinvertebrate colonization and bluegill foraging efficiency.

SWIMMING PERFORMANCE OF WHITE STURGEON: TRAINING AND THE RISK OF ENTRAINMENT

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Dredges sometimes entrain sturgeon and resource agencies are concerned about impacts to small (< 200 mm) individuals. We measured swimming performance of 67 juvenile white sturgeon and assessed their risk of entrainment. Fish were strongly rheotactic, but maximum sustained swimming speeds (maintained for 200 min), escape speeds (maintained for 1 minute), and burst speed (maintained for a few seconds) were greater in larger fish (> 83 mm TL). Fish in this size class exhibited sustained swimming at 40 cm/s, escape speeds of 42.7 cm/s, and maximum burst speed of 75 cm/s. For a dredge sucking water at a rate of 50 cm/s, these fish were at greater risk of entrainment than paddlefish and lake sturgeon, comparable or lower risk than pallid sturgeon. After training in a low-velocity (10 cm/s) watercourse for 3 weeks swimming performance of these fish improved substantially and risk of entrainment decreased. Sustained swimming was observed at 50 cm/s, escape speeds of 72.3 cm/s, and maximum burst speed of 80 cm/s. Results suggest: 1) swimming performance models based on untrained sturgeon provide environmentally conservative estimates of entrainment risk; 2) entrainment risk of hatchery-reared sturgeon stocked in rivers could be reduced by brief training periods in flowing water.

WATER QUALITY MONITORING AND FISH KILL INVESTIGATIONS IN MISSISSIPPI FOLLOWING HURRICANE KATRINA: INITIAL RESPONSE

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In the first few weeks after Hurricane Katrina, the Mississippi Department of Environmental Quality with support from the Gulf Coast Research Laboratory and the Mississippi Department of Marine Resources, monitored water quality and investigated fish kills. The initial water quality observed following Hurricane Katrina showed that the majority of the nutrient and metal data analyzed had non-detectable levels. Bacteria (*Enterococci*) displayed low levels at first with the levels increasing as time progressed. Following this storm many fish kills occurred throughout the state of Mississippi. It has been estimated that over 700,000,000 fish were killed including at least 18 endangered Sturgeon. Low dissolved oxygen in the rivers and streams was the cause of these kills.

NORTH MISSISSIPPI FISH HATCHERY

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Currently under construction, the North Mississippi Fish Hatchery will be the newest edition to our hatchery system. The new hatchery is located below Enid Lake dam in Yalobusha County. Phase I of construction will include 13 plastic lined ponds totaling 15 acres of water, an office, hatching/rearing house, shop, manager's residence, and a visitor center. The visitor center will be an educational and informative facility, promoting natural resources in Mississippi and will provide information concerning the department's management practices. Included in the visitor center is a 10,000 gallon aquarium that will be stocked with native freshwater fishes of Mississippi; a display room that will showcase informative displays having fish or aquatic related themes; and a multipurpose room for hosting meetings and presentations. A gift shop will be included at the visitor center and will offer a variety of nature related gifts. As a special treat for our visitors we will have a 1.3-acre fishing pond that will be used for holding special fishing events such as children's fishing rodeos. Phase II of construction will include an additional 11 1-acre and two 0.5-acre rearing ponds. The hatchery complex is scheduled to open in May 2006.

EFFECT OF OSMOTIC IMMOBILIZATION ON SPERM CRYOPRESERVATION AND ARTIFICIAL INSEMINATION OF A VIVIPAROUS FISH, THE GREEN SWORDTAIL (*XIPHOPHORUS HELLERI*)

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The goal of this study was to use osmotic pressure to inhibit the motility of sperm after collection from *Xiphophorus helleri*, and to test the effect of immobilization on refrigerated storage, cryopreservation, and artificial insemination. The objectives were to: (1) estimate the motility of sperm at different osmotic pressures, and determine an osmotic pressure suitable for immobilization; (2) cryopreserve the immobilized sperm, and estimate the motility after thawing with or without dilution; (3) compare motility of non-immobilized and immobilized sperm after thawing, centrifugation, and washing to remove cryoprotectant, and 4) test the fertility of cryopreserved non-immobilized and immobilized sperm by artificial insemination.

Motility was determined when sperm were suspended in 11 different osmotic pressures (24–500 mOsmol/kg) of Hanks' balanced salt solution (HBSS). Motility was observed between 116 and 425 mOsmol/kg. Sperm were not motile when the osmolality was lower than 116 or higher than 425 mOsmol/kg. Motility of the immobilized (non-motile) sperm could be activated by changing the osmotic pressure to 291–316 mOsmol/kg, and motility of immobilized sperm from hypertonic HBSS (> 425 mOsmol/kg) was significantly higher than that from hypotonic HBSS (< 145 mOsmol/kg) after 48 h of storage. At an osmolality of 500 mOsmol/kg, HBSS was used as extender to maintain immobilized sperm during cryopreservation with glycerol as the cryoprotectant. High motility (~55%) was obtained in sperm after thawing when cryopreserved with 10–15% glycerol, but dilution of thawed sperm in fresh HBSS (1:4; V:V) was found to decrease the motility significantly. No difference was found in the motility of thawed sperm cryopreserved with 14% glycerol and extended in 310 or 500 mOsmol/kg HBSS. Washing by centrifugation prolonged the motility of thawed sperm from 24 to 72 h in HBSS at 310 and 500 mOsmol/kg. After artificial insemination with virgin females of *Xiphophorus maculatus*, motile and immobilized sperm after thawing each produced confirmed offspring. Also, thawed sperm with and without washing by centrifugation produced confirmed offspring. This study showed that sperm from *X. helleri* could be immobilized by use of specific osmotic pressures, and that the immobilization did not affect sperm motility after thawing. This study reports the first successful fertilization and offspring production by cryopreserved sperm in live-bearing fishes, and provides a practical protocol for application with these valuable fish.

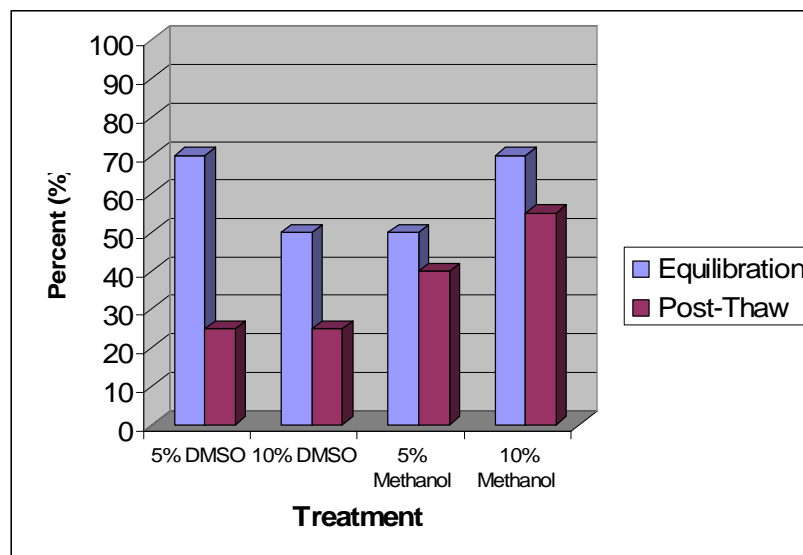
PRELIMINARY RESULTS ON CRYOPRESERVATION OF ALLIGATOR GAR (*TRACTOSTEUS SPATULA*) SPERM

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Alligator gar (*Atractosteus spatula*) is currently listed by Tennessee as a species in-need-of-management. The Tennessee Wildlife Resources Agency initiated an enhancement and restoration program in cooperation with the U. S. Fish & Wildlife Service, by stocking alligator gar within their historic range in the West Tennessee Mississippi River Basin to establish a sport fishery when population abundance and structure allows. Development of cryopreservation techniques of alligator gar sperm were undertaken to potentially alleviate the problem of obtaining ripe fish of both sexes at the same time. Sperm were collected from the only available male. Initial motility was 95%. The sperm were extended with modified Hanks' balanced salt solution (300 mOsmol/kg) at a ratio of 1:5 (v:v; sperm:extender). Dimethyl sulfoxide and methanol were evaluated as cryoprotectants at concentrations of 5% and 10%. Extended sperm were mixed with cryoprotectants and allowed to equilibrate for 4 minutes. Equilibration motility ranged from 50 to 70%. Ten 0.5-mL straws per treatment were frozen in the bottom of a dry shipping dewar. Cryopreserved sperm were stored for 48 days in liquid nitrogen, and then thawed by placing in a 40°C water bath for 8 seconds. Post-thaw motility ranged from 25 to 55% for the four treatments (Figure 1). Sperm cryopreserved with 10% methanol retained the highest post-thaw motility (55%).



POSTER PRESENTATIONS

REPRODUCTIVE PATTERNS OF TOURNAMENT-CAPTURED FEMALE BLUE MARLIN FROM THE NORTHERN GULF OF MEXICO

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Atlantic blue marlin (*Makaira nigricans*), occur seasonally in the northern Gulf of Mexico (nGOM), and are targeted by billfish tournaments during May through August throughout the region. There is little information on the biology of blue marlin in the nGOM; thus, marlin landed during tournaments provide a unique opportunity to gather data. We sampled 43 blue marlin from nGOM tournaments from 2000-2005 to determine reproductive patterns. All fish were females, and ranged from 254 to 351 cm lower jaw fork length and 119.1 to 478.8 kg. Gonadosomatic index (GSI) values were low in all fish, ranging from 0.39 to 1.05, and there was no difference in mean GSI values between May, June and July, with a dramatic increase in August. However, histological inspection showed ovarian recrudescence was evident in all fish captured during May, 83% of the females captured in June, 60% of the females captured in July and 66% of the females captured in August. Females in the early maturation ovarian class were captured most frequently during all months; 17% of females were in the mid maturation ovarian class in June while females in the late maturation class were found only in July and August. Some females in July and August were in the regression ovarian class, indicating the cessation of spawning. Thus, the available data indicate blue marlin spawn in July and August in the nGOM. Plankton collections are being taken in the nGOM to confirm the presence of blue marlin larvae, which would verify the spawning season.

CONTRASTING NEKTON DENSITIES AMONG SPARTINA MARSH-EDGE SITES IDENTIFIED AS HEALTHY OR AT RISK.

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Extensive coastal marsh loss due to natural and anthropogenic factors continues to plague Louisiana. Coastal wetlands serve as essential habitat for many estuarine-dependent fishes and macroinvertebrates and their degradation can negatively impact commercially important fisheries. Marsh degradation may initially lead to expansion of marsh edge allowing for increased flooded marsh access, but continued losses with ultimate conversion to open water may prove detrimental to edge-dependent species. Satellite remote sensing was used to identify spectral reflectance and spatial patterns of previously lost land across Barataria Basin, Louisiana. Based on historic comparisons to current conditions, Landsat Thematic Mapper satellite imagery was used to identify areas currently “at risk” of loss and neighboring apparently healthy areas. Our study will quantify nekton densities and community structure in “at risk” and healthy areas in close geographical proximity. We also intend to measure emergent vegetation in terms of stem densities, stem heights, chlorophyll content and sodium/potassium ratios to determine plant stress levels. We will examine the null hypotheses of no difference in nekton community structure or *Spartina* characteristics in contrasting areas. If “at risk” sites are indeed degrading, we expect an expansion of marsh edge with an increase in nekton abundance.

**PRELIMINARY ASSESSMENTS OF AGE AND GROWTH OF SHEEPSHEAD
(*ARCHOSARGUS PROBATOCEPHALUS*) FROM MISSISSIPPI COASTAL WATERS**

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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. In light of this, we currently are collecting life history data on this species to gain a better understanding of its biology for use in any future management decisions. During 2004-2005, 241 sheepshead (102 males, size range 94-560mm TL; 122 females, size range 86-558mm) were collected from the Mississippi Sound near the offshore barrier islands using various gear. Otolith assessments provide estimated ages for 161 of those specimens (71 males, 78 females). Males and females ranged from 0 to 7 and 1 to 11 years of age, respectively, with a maximum age of 7 for males and 11 for females. Size and age at first maturity were 293mm and 1 year for males and 353mm and 3 years for females.

DETERMINING THE IMPORTANCE OF REGIONAL NURSERY HABITAT FOR JUVENILE SPECKLED TROUT IN THE NORTHERN GULF OF MEXICO USING OTOLITH MICROCHEMICAL ANALYSES

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Important nursery source areas for juvenile spotted seatrout (*Cynoscion nebulosus*) have not been identified in Mississippi. The premise of our study was that if juveniles exposed to discharge from different watersheds can be distinguished by the elemental “fingerprint” of otoliths, then the inner portion of adult otoliths can be analyzed to determine where fish developed as juveniles. Juvenile *C. nebulosus* were collected during late-summer 2001 from shoreline habitat in coastal sub-regions bordering Mississippi Sound. Adult *C. nebulosus* were collected in 2002 and 2003 from the same sub-regions as juveniles. The inner portion of adult otoliths was extracted, and otolith cores were treated the same as juvenile otoliths. Based on a Canonical Discriminant Function Analysis (CDFFA), using the “Leave one out” classification procedure 93.5% of juveniles were correctly classified to their sub-region of origin. Subsequently, adult otolith data were analyzed to identify natal sub-regions utilized by adults as juveniles. Strongest site fidelity was inferred for adults collected in Grand Bay. This sub-region comprises an extensive area of nursery habitat for juveniles. Fish that ostensibly developed as juveniles in Grand Bay were also found across much of the Mississippi coastline, indicating this sub-region may be an important source area for *C. nebulosus*.

PALLID STURGEON IN THE LOWER MISSISSIPPI RIVER: ISSUES AND ANSWERS

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Jan Jeffrey Hoover, Catherine E. Murphy, Steven G. George, Bradley R. Lewis, William E. Lancaster, James P. Kirk and Jay A. Collins, U.S. Army Corps of Engineers, Engineer Research & Development Center

The pallid sturgeon (*Scaphirhynchus albus*), federally endangered since 1990, is an ancient and poorly understood species inhabiting the Missouri and Mississippi Rivers. Issues associated with the decline of the species include habitat loss, overharvest and hybridization with the sympatric and congeneric shovelnose sturgeon (*S. platorynchus*). We have been conducting studies since 1997 with the objectives of evaluating population biology, habitat, diet, morphology and swimming behavior of pallid sturgeon in the Lower Mississippi River (LMR). The ratio of pallid to shovelnose sturgeon in the LMR is approximately 1:20. Though similar in appearance, pallid and shovelnose sturgeon can be morphologically distinguished using multivariate analyses and examination of LMR populations suggests the two species have maintained reproductive isolation. The diet of pallid sturgeon varies by size class and season, but is dominated volumetrically by fishes, another factor that sets it apart from shovelnose sturgeon. Pallid sturgeon are usually collected in transitional habitat zones, often steeply sloping sandbars or tips of dikes with swift current, but have been found in most other riverine habitat types. With an annual mortality rate of 12% and wild young-of-year captures demonstrating recruitment, pallid sturgeon populations in the LMR appear to be more successful than their upper basin counterparts.

LAKE WASHINGTON STAKEHOLDERS MEETING PRESENTATION ON FISH MANAGEMENT

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The Mississippi Department of Environmental Quality has designated Lake Washington as a showcase project on nutrient reduction to control hypoxia in the Gulf of Mexico. Although nutrient reduction and water quality improvement are the focus of improvements to Lake Washington, a comprehensive Watershed Implementation Plan (WIP) is being developed that will address a variety of concerns the public has on lake issues. The Washington County Office of the NRCS is the sponsor for a 319 funded project that will guide implementation of the WIP. The MDWFP has drafted a Fishery Management Plan (FMP) for Lake Washington. The FMP is a guide to direct survey work and management of the fishery. The principle items in the FMP are a need to reduce stocks of catfish and shad; increase crappie and bass stocks by stocking and harvest regulation; monitor habitat; support watershed management efforts; and, manipulate fish stocks to effect water quality. A Stakeholders Meeting will be held in March to present the WIP to the public for review and comment. The FMP will also be presented at the Stakeholders Meeting using a Power Point presentation format. The FMP presentation is a continuous loop-running self-viewing presentation.