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ABSTRACTS OF PAPERS
PRESENTED AT THE

1994

ANNUAL MEETING



American Fisheries Society

LOUISIANA AND MISSISSIPPI
CHAPTERS



FEBRUARY 10 - 11, 1994
RAMADA HILLTOP HOTEL
NATCHEZ, MISSISSIPPI

- 3:06 - 3:18 PRIMITIVE FISH FACING AN UNCERTAIN FUTURE: PADDLEFISH STRANDED IN FLOODPLAIN PONDS. Steven George, Sherry Harrel, Neil Douglas, and Jan Hoover.
- 3:18 - 3:30 OVERWINTER ABUNDANCE, SIZE, AND DIET OF JUVENILE LARGEMOUTH BASS RELATIVE TO AQUATIC MACROPHYTES IN ALICEVILLE LAKE, ALABAMA-MISSISSIPPI. L. Pugh and L. Miranda.
- 3:30 - 3:45 BREAK
- STUDENT SESSION CONT. Moderator - Mike Murphy
- 3:45 - 3:57 CRAPPIE MORTALITY AND GROWTH: IMPLICATIONS FOR HARVEST RESTRICTIONS. Mike Allen, Raphael Brock, and L. Miranda.
- 3:57 - 4:09 DETECTION OF THE EFFECT OF SCUBA DIVERS ON FISH DENSITY AND TARGET STRENGTH UTILIZING STATIONARY DUAL BEAM HYDROACOUSTICS. David Stanley and Charles Wilson.
- 4:09 - 4:21 HOOP AND MESH SIZE INFLUENCES ON HOOP NET CATCHES OF BUFFALOFISHES (CATOSTOMIDAE) AND CATFISHES (ICTALURIDAE) IN THE UPPER YAZOO RIVER BASIN OF NORTHCENTRAL MISSISSIPPI. Mark Stopha and Donald Jackson.
- 4:21 - 4:33 SALINITY TOLERANCE AND OSMOREGULATION OF JUVENILE COASTAL LARGEMOUTH BASS, *MICROPTERUS SALMOIDES*. Gregorius Susanto and Mark Peterson.
- 4:33 - 4:45 ACTIVATION OF CHANNEL CATFISH SPERM. Mark Bates and Terrence Tiersch.
- 5:15 - 5:20 PRESENTATION OF STUDENT AWARDS.
- 7:00 - ? SOCIAL AND CATFISH DINNER (HOTEL). Guest Speaker - Carlos Fetterolf (immediate past president AFS).

11 February 1994

- 8:00 - 11:30am REGISTRATION
- 8:30 - 10:30 CHAPTER BUSINESS MEETINGS - LCAFS and MCAFS
- REGULAR SESSION: Moderator - Mike Murphy
- 10:30 - 10:45 REPRODUCTIVE BIOLOGY OF RED DRUM *SCIAENOPS OCELLATUS* FROM THE NERITIC WATERS OF THE NORTHERN GULF OF MEXICO. David Nieland and Charles Wilson.
- 10:45 - 11:00 CHRONOLOGY AND COMPOSITION OF LARVAL FISHES OF THE STEELE BAYOU SYSTEM, MISSISSIPPI. Jack Killgore and Jan Hoover.
- 11:00 - 11:15 ALLOCATION OF FISH STOCKS USING A SIMPLE ECONOMIC MODEL: CASE STUDY OF RED DRUM, *SCIAENOPS OCELLATUS*. Trellis Green.

11:15 - 11:30 SIZE-DEPENDENT SPAWNING AND EGG QUALITY OF RED SNAPPER, *LUTJANUS CAMPECHANUS*. Edward Chesney and Richard San Filippo.

11:30 - 1:00pm LUNCH (on your own).

REGULAR SESSION CONT.: Moderator - Jim Hanifen

1:00 - 1:15 FISH SPECIES COMPOSITION OF BLUFFLINE STREAMS OF NORTHERN MISSISSIPPI. S.S. Knight, F.D. Shields, and C.M. Cooper.

1:15 - 1:30 FISHES OF THE BIG SUNFLOWER RIVER, I: ICHTHYOFAUNA AND LONG-TERM CHANGES. Neil Douglas, Jan Hoover, and Jack Killgore.

1:30 - 1:45 FISHES OF THE BIG SUNFLOWER RIVER, II: FISH-HABITAT RELATIONSHIPS. Jan Hoover and Jack Killgore.

1:45 - 2:00 AN EXPERIMENTAL TEST OF THE EFFECTS THAT AQUATIC PLANTS HAVE ON FORAGING LARGEMOUTH BASS (*MICROPTERUS SALMOIDES*). Eric Dibble.

2:00 - 2:15 COLLECTION, AGE AND GROWTH OF GRASS CARP (*CTENOPHARYNGODON IDELLA*) IN LARGE WATER BODIES - AN UPDATE. James Kirk, James Morrow, and Jack Killgore.

2:15 - 2:30 IDENTIFICATION, DISTRIBUTION AND LIFE HISTORY OF LESSER AMBERJACK, *SERIOLA FASCIATA*. Bruce Thompson and Laurel Brown.

2:30 - 2:45 DOCUMENTATION AND EVALUATION OF RARE AND ENDANGERED FRESHWATER FISHES IN LOUISIANA. Bruce Thompson and Robert Cashner.

2:45 - 3:00 CAN MARICULTURE HARM THE GOOSE THAT LAYS GOLDEN EGGS? William Herke.

3:00 - 3:15 ECOLOGY OF SEAGRASS FISHES AND MACROINVERTEBRATES ON GUATEMALA'S ATLANTIC COAST. Alejandro Arrivillaga and Donald Baltz.

3:15 - 3:30 ACOUSTICAL SURVEY OF FISH DISTRIBUTION AND ABUNDANCE AROUND AN OIL-AND-GAS PRODUCTION PLATFORM ON LOUISIANA'S COASTAL SHELF. Curtis Morgan and Donald Baltz.

3:30 - 3:45 CLOSING REMARKS - LCAFS and MCAFS Presidents.

**ABSENCE OF CIRCADIAN PATTERNS IN OSMOLALITY, CHLORIDE ION
CONCENTRATION AND HEMATOCRIT IN THREE FRESHWATER FISH**

Jody L. Haynes (student Presentation), Tammy Holloway, Steven J. Vanderkooy, Janet Chapman, Keely Baca, Mark S. Peterson, Department of Biological Sciences, and John Jackson, Department of Wildlife and Fisheries, Mississippi State University, Mississippi State, MS 39762

Results and subsequent interpretation of research data depend upon good experimental design, regardless of whether the study is field or laboratory based. Because of this, we were interested in determining whether there were diel patterns (0800, 1200, 1600, 2000, 2400, 0400) in plasma osmolality, plasma Cl⁻ concentration and hematocrit, three widely-used physiological measures. We determined that there were no diel patterns ($p > 0.05$) in hematocrit, osmolality or Cl⁻ concentration in juvenile Lepomis macrochirus or Lepomis gulosus. There were also no diel patterns ($p > 0.05$) in hematocrit or Cl⁻ concentration for Micropterus salmoides; however, there were differences ($p < 0.05$) in osmolality between the 0800 and 2000 time point that may be related to daylight feeding schedules. Thus studies on osmoregulation of freshwater fish may not have the same experimental design problems as those involving estuarine fish.

AGE, GROWTH AND POPULATION STRUCTURE OF CYPRINELLACAMURA, THE BLUNTFACE SHINER, IN MORGANFORK CREEK, HOMOCHITTO RIVER DRAINAGE, MISSISSIPPI.

Mark D. Farr (student presentation), Department of Biology,
Northeast Louisiana University, Monroe, LA 71211

Bluntnose shiners were collected once or twice a month from February to November 1991 in Morganfork Creek, Franklin County, Mississippi. Examination of scales from 218 fish (19.5-78.7 mm SL) revealed the presence of Age-0, -1, and -2 year classes. By the second year of life, mean back-calculated length of males (43.0 mm) was greater than females (40.8 mm), but this difference was not significant ($F=1.12$, $p<0.294$). Overall, the number of adult males ($G=18.144$, $p=0.001$; G-test value adjusted with William's correction factor). More intraspecific studies which focus on spatial variation in age and growth are needed to help determine what factors influence the population biology of this and other species.

THE EFFECTS OF HYDROCORTISONE ON PROLIFERATIVE GILL DISEASE IN CHANNEL CATFISH

Willie H. Bingham, Jr.¹ (student presentation), Tsang Long Lin¹, Linda M. Pote¹, Clarence E. Watson², and Patrick D. Gerard², College of Veterinary Medicine¹ and Mississippi Agricultural & Forestry Experiment Station², Mississippi State University, Mississippi State, MS 39762.

Hydrocortisone (HC) treated and non-treated channel catfish (Ictalurus punctatus) fingerlings were exposed to mud from ponds experiencing outbreaks of Proliferative Gill Disease (PGD). Fish were randomly collected on 0, 1, 3, 5, 7, 14, 21, 28, 35, and 42 days post exposure. HC treated fish had significantly higher plasma cortisol levels ($p < 0.05$) and higher numbers of branchial Aurantiactinomyxon ictaluri ($p < 0.05$) than those in the non-treated groups. The granulomatous branchitis normally associated with PGD was significantly more severe in the non-treated group than in the cortisol treated group ($p < 0.05$). Results suggest that HC reduced the branchitis' severity, and increased the susceptibility of the HC treated fingerlings to A. ictaluri infection. However, HC did not stimulate further development of the PGD life cycle in channel catfish.

HANDLING AND STORAGE OF NILE TILAPIA SPERMATOZOA

William R. Wayman (student presentation) and Terrence R. Tiersch, School of Forestry, Wildlife, and Fisheries, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge, LA 70803

Methods for the handling and short-term storage of fish spermatozoa are important for selective breeding and research. The purpose of this study was to improve methods of handling and storage of sperm of Nile tilapia. Samples of sperm and blood were taken from six Nile tilapia, *Oreochromis niloticus*, anesthetized with MS-222. The osmolality of blood plasma was 331 ± 6 mOsm (mean \pm SD), a value not different from the osmolality of seminal plasma (321 ± 7 mOsm). Thus, solutions with an osmolality of >320 mOsm were chosen for the study of sperm storage. Storage in Hanks' balanced salt solution (325 mOsm) was evaluated in two different containers: 1.5- μ l microcentrifuge tubes and 35x10-mm petri dishes. Sperm in petri dishes remained motile for five days, while sperm in microcentrifuge tubes remained motile for four days. The osmolality of threshold (10% motility) and complete (100% motility) activation was determined for each sample. Solutions ranging from deionized water (8 mOsm) to full-strength HBSS (325 mOsm) were used for activation studies. The osmolality of threshold activation was 275 mOsm, and the osmolality of complete activation was 132 mOsm. Complete activation of sperm of Nile tilapia for fertilization trials or assessment of sperm quality, would seem dependent on the use of activating solutions with an osmolality of <130 mOsm.

DIEL VARIATION IN FEEDING BY THREE CENTRARCHIDS FROM CHAUVIN BAYOU, LOUISIANA

Steven G. George (student presentation), U.S. Army Engineer Waterways Experiment Station, Northeast State University, Monroe, LA 71211

Diel comparisons of diet and feeding periodicity were conducted for bluegill (Lepomis macrochirus), largemouth bass (Micropterus salmoides), and black crappie (Pomoxis nigromaculatus) from Chauvin Bayou, Monroe, Louisiana. Collections were made every three hours during low water from 1300, 11 Oct 1991 to 1000, 12 Oct 1991. Stomach contents were identified to the lowest practical taxon, counted, measured, and categorized according to state of digestion. Similarities among fishes were substantial; diets were dominated by Corixidae (70% by volume) and each species fed during daylight hours. Bluegill and black crappie both fed secondarily on larval Diptera and shrimp, but bluegill fed intensively from 0700-1900, crappie from 0100-0700. Largemouth bass fed secondarily on fishes and shrimp, with peak feeding observed from 1900-2200. Typically food partitioning among morphologically disparate species is pronounced, different fish specializing on different foods. In Chauvin Bayou centrarchids, food partitioning was subtle, different fish having only slightly dissimilar diets, but feeding during different times of day.

ECOLOGY OF LARVAL NORTHERN PIKE (ESOX LUCIUS) IN NATURAL AND ARTIFICIAL WETLANDS.

James V. Morrow (student presentation), Gary L. Miller, and K. Jack Killgore, U.S. Army Engineer Waterways Experiment Station, University of Mississippi, Oxford, MS

Northern pike spawn over flooded terrestrial vegetation during high water. When anthropogenic disturbances degrade or eliminate these types of wetlands, mitigation is often required. Construction of artificial wetlands is one approach to compensate for wetland degradation. Artificial wetlands were constructed near Conesus Lake, New York to provide spawning habitat for northern pike. These wetlands and natural wetlands near Conesus Lake were sampled and compared during spring 1991 and 1992. Larval pike densities in the wetlands and the timing of migration from the wetlands were related to water temperature, hydraulic regime, and predation. Accepted dispersal theories can be used to explain patterns of larval pike migration from the wetlands. This information will be used to recommend optimum design specifications for northern pike spawning habitat.

PRELIMINARY STUDIES OF THE BUFFALO FISHERY (ICTIOBUS SPP.) IN THE LOWER OUACHITA DRAINAGE, LOUISIANA.

Sherry L. Harrel (student presentation) and Frank Pezold, Northeast Louisiana University, Monroe, LA 71211

Commercial fishermen report declining populations of smallmouth buffalo in the lower Ouachita River drainage. During Spring 1992, we inventoried local commercial catch of more than 500 buffalo: bigmouth, smallmouth, and black (listed in declining order of relative abundance). Based on multivariate analyses, heads of 3 species were distinguishable morphologically. Regression of total length with head length for subsamples of each species allowed total lengths to be estimated for all buffalo processed. Age was estimated from scales taken from the nape or prepelvic region. Most bigmouth buffalo were ≤ 52.2 cm TL, ≤ 5 years. Most smallmouth buffalo were ≤ 47.5 cm TL, ≤ 5 years. Declines in smallmouth buffalo populations could not be tested because there are no historical records of the fishery in this region. Subsequent monitoring of commercial catch, however, could provide sufficient data to confirm or refute perceived population trends.

GENETIC SCREENING OF LIVE CATFISH BY DNA ANALYSIS

Quiyang Zhang (student presentation), Terrence R. Tiersch, School of Forestry, Wildlife, and Fisheries, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, and Richard K. Cooper, Department of Veterinary Science, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge, LA 70803

Screening of large numbers of individuals by DNA analysis is useful for genetic improvement and study of fish. Standard methods for DNA isolation such as those using phenol and chloroform are slow, complicated and expensive. We evaluated boiling and microwave irradiation as methods for rapid isolation of DNA from barbel, adipose fin, and blood of channel catfish, *Ictalurus punctatus*. Compared with routine DNA isolation methods, these methods were fast (microwaving, 2-4 minutes; boiling, 10-18 minutes), easy, and inexpensive (~10¢ per fish). Samples of DNA isolated from barbel were of high purity (A_{260}/A_{280} ratios = 1.72-1.90) and were between 0.29 $\mu\text{g}/\mu\text{L}$ and 0.67 $\mu\text{g}/\mu\text{L}$ in concentration. Samples of DNA isolated from barbel, adipose fin and blood of small fish (2.9 ± 1.0 g), by either method, were used successfully for analysis by polymerase chain reaction (PCR). Samples isolated by boiling of barbel and blood of large fish (290 ± 43 g) also proved useful for PCR. These DNA isolation procedures would be useful for rapid genetic screening of channel catfish. Removal of the barbel for tissue collection enables direct marking of fish for individual identification after analysis.

PRIMITIVE FISH FACING AN UNCERTAIN FUTURE: PADDLEFISH STRANDED IN FLOODPLAIN PONDS.

Steven G. George (student presentation), Sherry Harrel, Neil H. Douglas, and Jan Jeffrey Hoover, U.S. Army Engineer Waterways Experiment Station, Northeast Louisiana University, Monroe, LA 71211

In summer 1993, shallow floodplain ponds formed by receding waters of the Ouachita River near West Monroe were inhabited by paddlefish (Polyodon spathula), a species endangered in Louisiana and of special concern nationwide. Desiccation of ponds was inevitable so rescue was undertaken by personnel from Northeast Louisiana University and the U.S. Army Engineer Waterways Experiment Station. Twenty subadult paddlefish (807-1013 mm TL) were collected by seining and released into the river. One pond contained 20 paddlefish, a second pond contained a single paddlefish that eluded capture. Paddlefish occurrence and habitat were characterized for each of four ponds so that ponds likely to contain paddlefish can be identified in future recovery efforts. Temperature, conductivity, pH, and fish species richness were comparable among ponds. Ponds containing paddlefish were characterized by high dissolved oxygen (≥ 8.0 ppm), little overhead canopy, little submersed cover. Ponds without paddlefish exhibited lower dissolved oxygen (3-6 ppm), well-developed canopy, and substantial submersed cover. Ouachita River paddlefish exploiting floodplain ponds may benefit from expanded feeding grounds but risk stranding and death if subsequent flooding is untimely.

OVERWINTER ABUNDANCE, SIZE, AND DIET OF JUVENILE LARGEMOUTH BASS RELATIVE TO AQUATIC MACROPHYTES IN ALICEVILLE LAKE, ALABAMA-MISSISSIPPI

L.L. Pugh (Student Presentation) and L.E. Miranda, Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State University, Mississippi State, MS 39762

We sampled young largemouth bass in 3 nonvegetated and 11 vegetated coves during Nov 1992 - Mar 1993. Mean catch/h was higher in vegetated coves (22.6 vs 9.7, $P < 0.01$); however, mean total length was higher in nonvegetated coves (155 vs 145 mm, $P < 0.01$). In vegetated coves 21% of the bass had empty stomachs, and 35% in nonvegetated coves. Of the bass with food in their stomach, in vegetated coves 78% ate invertebrates and 28% ate fish; conversely, in nonvegetated coves 23% ate invertebrates and 81% ate fish. Stomach fullness, computed as food weight/(fish weight-food weight) including empty stomachs, incorporated more invertebrates in vegetated versus nonvegetated areas (0.313 vs 0.009%, $P < 0.01$) and fewer fish (0.349 vs 0.800%, $P < 0.01$); however, vegetated and nonvegetated sites had similar total stomach fullness (0.662 vs 0.809%, $P = 0.53$). Aquatic vegetation improved abundance of young bass without substantially reducing size. Apparently, bass in vegetated areas sustained adequate growth by supplementing their fish diet with invertebrate food items. Our results suggest that presence of aquatic vegetation may enhance recruitment of age-0 largemouth bass to age 1.

CRAPPIE MORTALITY AND GROWTH: IMPLICATIONS FOR HARVEST RESTRICTIONS

Mike Allen (student presentation), Raphael Brock, and L. E. Miranda, Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State University, Mississippi State, MS, 39762

The use of harvest restrictions to manage crappies (*Pomoxis* spp.) has increased in recent years, but evidence on the potential success of regulations has been contradictory. We compiled estimates of crappies mortality and growth from the literature to simulate the effect of harvest restrictions on yield potential. Exploitation averaged 50% (range 20 - 84, $\bar{N} = 13$), conditional natural mortality averaged 55% (range 25 - 76, $\bar{N} = 12$), and total annual mortality averaged 77% (range 39 - 92, $\bar{N} = 22$), respectively. Growth to 8 inches averaged 2.6 years (range 1.9 - 7.2, $n = 49$). We used Beverton and Holts' equilibrium yield model to simulate yield of crappies under slow, moderate, and fast growth and various levels of conditional natural mortality and exploitation. Modelling indicated that harvest restrictions would likely increase yield of crappie ≥ 8 inches long as fish growth increased and natural mortality decreased; however, harvest restrictions would not increase yield when conditional natural mortality exceeded 20-30%, regardless of growth rate. A 10-inch minimum length limit provided higher yield than crappie harvested at 8 inches if growth was adequate and conditional mortality was less than 30-40%, but at higher rates of conditional natural mortality and slow growth, yield improved if crappie were harvested at 8 inches.

DETECTION OF THE EFFECT OF SCUBA DIVERS ON FISH DENSITY AND TARGET STRENGTH UTILIZING STATIONARY DUAL BEAM HYDROACOUSTICS.

David R. Stanley (student presentation) and Charles A. Wilson, Coastal Fisheries Institute, Center for Energy and Coastal Resources, Louisiana State University, Baton Rouge, LA 70803

The effect of the presence of SCUBA divers on fish density and target strength was examined at an oil and gas platform 80 km off the Louisiana coast during November 1991 and February, March, and June of 1992. Mean densities and fish target strengths declined significantly when divers were present for all sample periods. Densities dropped from 41.1 to 76.5% and target strength decreased by 0.5 to 9.1% depending on sampling period. Our results provide evidence that fish exhibit an avoidance behavior to SCUBA divers. Therefore the impact of SCUBA divers on density and size estimates from visual survey techniques should be determined as part of visual surveys.

HOOP AND MESH SIZE INFLUENCES ON HOOP NET CATCHES OF BUFFALOFISHES (CATOSTOMIDAE) AND CATFISHES (ICTALURIDAE) IN THE UPPER YAZOO RIVER BASIN OF NORTHCENTRAL MISSISSIPPI

Mark E. Stopha (student presentation) and Donald C. Jackson, Dept. of Wildlife and Fisheries, Mississippi State University, Mississippi State, MS 39762

Three hoop net configurations were fished simultaneously to compare hoop and mesh size influence on catches of five principal commercial species [bigmouth buffalo (*Ictiobus cyprinellus*), smallmouth buffalo (*Ictiobus bubalus*), blue catfish (*Ictalurus furcatus*), channel catfish (*Ictalurus punctatus*) and flathead catfish (*Pylodictis olivaris*)] in the upper Yazoo River basin. Nets fished were small standard (4.3-m long with 1.07-m diameter hoops and 3.81-cm bar mesh), small commercial (4.3-m long with 1.07-m diameter hoops and 7.62-cm bar mesh) and large commercial (5.03-m long with 1.52-m diameter hoops and 7.62-cm bar mesh) hoop nets. Channel catfish were caught only in the small hoop standard gear. Size selective bias was attributed to mesh size alone for flathead catfish, smallmouth buffalo, and bigmouth buffalo. Species specific hoop net efficiency varied by mesh size, hoop size, and water depth. Considerations for reduction of legal mesh size to increase catfish harvest are discussed.

**SALINITY TOLERANCE AND OSMOREGULATION OF JUVENILE COASTAL LARGEMOUTH BASS,
MICROPTERUS SALMOIDES**

Gregorius N. Susanto (student presentation) and Mark S. Peterson,
Department of Biological Sciences, Mississippi State University,
Mississippi State, MS 39762

Largemouth bass inhabit saline waters of the northern Gulf of Mexico and southeastern United States. These "saline" populations are shorter and more robust at a given age than upstream "freshwater" populations. Typical explanations for this phenomenon are environmental quality or lack of food. We have been examining survival and osmoregulation of juvenile largemouth bass (~40mm SL) exposed to salinity of 0, 4, 8, 12 and 16 ppt. Preliminary data indicate that survival decreased with longer exposure time and increasing salinity, with the highest survival in 0 - 12 ppt treatments after 48 hour exposure. The lowest survival was in 16 ppt. Osmoregulatory dysfunction in these salinities was examined with plasma osmotic pressure and hematocrit. We detected no significant different in osmotic pressure or hematocrit with changing salinity from 0 - 12 ppt and 16 ppt showed significantly increased plasma osmotic pressure and decreased hematocrit. These results deviate from those of Meador & Kelso (1990) on older fish from Louisiana and suggest that there is an ontogenetic aspect to salinity tolerance and osmoregulation in largemouth bass.

ACTIVATION OF CHANNEL CATFISH SPERM

Mark C. Bates (student presentation) and Terrence R. Tiersch, School of Forestry, Wildlife, and Fisheries, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge, LA 70803

While it is known that sperm of channel catfish, *Ictalurus punctatus*, can be stored in a buffer with an osmolality of about 300 mOsm, little is known about the details of sperm activation. The purpose of this study was to determine the relationship among osmotic pressure, sperm activation and motility. Motility (percentage of actively-swimming sperm) was estimated over a range of osmotic pressures measured directly with a vapor pressure osmometer. The osmotic pressure of threshold (218 ± 15 mOsm) and complete (132 ± 9 mOsm) activation was determined in diluted Hanks' balanced salt solution (HBSS). We found that osmotic pressures above 220 mOsm elicited minimal (<10%) activation, and concentrations below 130 mOsm elicited complete activation. Because HBSS contains a variety of ions known to influence cell function, we used sucrose solutions to provide an osmotic environment with minimal ionic influence for the testing of activation. The values for threshold (214 ± 1 mOsm) and complete (125 ± 2 mOsm) activation were consistent with those obtained with diluted HBSS. The role of particular ions in the activation of channel catfish sperm is unknown. We used calcium ionophore A23187 to increase movement of Ca^{++} across the cell membrane into sperm cells. Presence of the ionophore at concentrations of 10-30 mM had no effect on activation characteristics, suggesting that an increased level of intracellular calcium does not trigger activation. Reduction in osmotic pressure appears to play a major role in the activation of channel catfish sperm, although the mechanism remains unknown.

REPRODUCTIVE BIOLOGY OF RED DRUM *SCIAENOPS OCELLATUS* FROM THE NERITIC WATERS OF THE NORTHERN GULF OF MEXICO

David L. Nieland (presenter) and Charles A. Wilson, Coastal Fisheries Institute, Louisiana State University, Baton Rouge, LA 70803-7503.

The reproductive biology of red drum *Sciaenops ocellatus* in the northern Gulf of Mexico is described from examination of 3351 specimens sampled from March 1986 through September 1992. Female:male ratio of the spawning population, as manifested in purse seine collections, was essentially 1:1. Gonosomatic indices and ovarian histology demonstrated an 8-9 week spawning season from mid August to early October. Both sexes achieved >50% maturity at age 4; however, at 50% maturity males were somewhat smaller than females (660-670 mm vs. 690-700 mm, 3.4-3.5 kg vs. 4.0-4.1 kg). Simultaneous observations of oocytes in all stages of maturation throughout the spawning seasons confirmed group-synchronous oocyte maturation and multiple batch spawning. Batch fecundities of 51 females age 3-33 ranged from 0.16 million to 3.27 million ova per batch (mean = 1.54 million ova) and were positively correlated with fork length, gonad-free body weight, eviscerated body weight, and age. Seasonal spawning frequencies estimated from the proportion of mature females with postovulatory follicles varied widely from once every 3 d to once every 80 d. More plausible spawning frequencies (2-4 d) were obtained if proportions of females exhibiting oocyte yolk coalescence and oocyte hydration, indicative of imminent spawning, were included in estimates of this variable.

CHRONOLOGY AND COMPOSITION OF LARVAL FISHES OF THE STEELE BAYOU SYSTEM, MISSISSIPPI.

K. Jack Killgore (presenter) and Jan Jeffrey Hoover, US Army Engineer Waterways Experiment Station, Vicksburg, MS 39181

Spawning and rearing habitat of fishes was evaluated in the Upper Steele Bayou System during Spring 1991. Larval fishes were collected with light traps in habitats that retain water throughout the reproductive season: oxbow lakes on the floodplain and a pool behind a weir on Steele Bayou. Although agricultural fields are the dominant floodplain habitat, they were not sampled because duration of flooding is usually less than 3 days. Larval fish abundance was high in early April and gradually decreased in May. Only a few individuals were collected in June. Shad, carp, buffalo, and crappie dominated the larval fish assemblage at all locations. These species are characteristic of alluvial rivers in the lower Mississippi basin. Taxa conspicuously absent, or rare included shiners (excluding red shiners), topminnows, and darters. These groups are abundant in bottomland hardwoods of the region. However, high turbidity (and concomitant siltation), uniformly shallow water in the rivers, and short duration of flooding prohibit establishment of a more diverse fish assemblage.

ALLOCATION OF FISH STOCKS USING A SIMPLE ECONOMIC MODEL: CASE STUDY OF RED DRUM, SCIAENOPS OSCELLATUS.

Trellis G. Green, University of Southern Mississippi, Department of Economics and International Business, Hattiesburg, MS 39406

A simple economic model is applied to the allocation of open access fish stocks between commercial and recreational fisheries. A "balance scale" analogy is used. The goal is to familiarize biologists with efficiency concepts, such as net benefit, that pertain to optimum allocation. A model of the policy *tradeoff* between economic efficiency and equity objectives is very helpful in putting the allocation process in context. Net benefit is distinguished from economic impact, the use of which cannot guarantee the best use of a fishery. Empirical methods are applied to the red drum fishery in the Gulf of Mexico. Results support current policies that reallocate *wild* red drum toward the recreational sector. Finally, efficiency implications for public policy toward aquaculture development are outlined.

**SIZE-DEPENDENT SPAWNING AND EGG QUALITY OF RED SNAPPER,
*LUTJANUS CAMPECHANUS***

Edward J. Chesney (presenter) and Richard San Filippó, Louisiana Universities Marine Consortium, 8124 Hwy 56, Chauvin, LA 70344.

Adult red snapper ranging in size from 318-635 TL (12.5-25 in.) were captured by hook and line at weekly intervals during a period from the end of May through the middle of October. Fish were brought to the lab in a live tank, held overnight then sexed by catheterization. Individual females were injected with HCG (Human Chorionic Gonadotropin; 1.1 IU per gram body weight) and paired with two males injected with HCG (0.55 IU per gram). Fish were held at field temperatures and photoperiod in spawning tanks for up to 3 days or until they spawned. Spawned eggs were counted, a subsample measured and a sample frozen for lipid analysis. Spawning in the laboratory took place between 2300 and 0100 hours typically 30-36 hours after injection. Spawnability of red snapper was low in June and increased throughout the summer peaking in August and September. Overall spawnability was lowest for 2 yr old fish and increased significantly in 3 and 4 year old fish. Batch fecundities ranged from a few thousand eggs for a 13 inch fish to 255,000 for a 22 inch snapper. There were no discernable differences in egg size or quality related to female size or age for the three ageclasses tested.

FISH SPECIES COMPOSITION OF BLUFFLINE STREAMS OF NORTHERN MISSISSIPPI.

S. S. Knight (presenter), F. D. Shields, Jr., and C. M. Cooper, USDA Agricultural Research Service, National Sedimentation Laboratory, P.O. Box 1157, Oxford, MS, USA 38655

The loess bluffs along the Mississippi River alluvial plain comprise a unique physiographical region. Streams of this area often become deeply incised and suffer from physical instability, loss of stream habitat features such as pools, riffles, and woody debris, and lack stream-floodplain interaction. During the two year study 10,770 individuals representing 68 species were collected from 44 sites in 15 streams located in the bluffline hills. In streams impacted by channel incision, bluntface shiners, mosquito fish, bluegill, Yazoo shiners, and bluntnose minnows comprised more than 50% of the total catch. Bluegill, blackspotted topminnows, Yazoo shiners, bluntface shiners and creek chubs were the most abundant species in non-incised streams. Blacktail shiners and longear were collected more frequently in incised streams than in non-incised ones. Creek chubs were found more frequently in non-incised streams. Black bullhead catfish, black-sided darters, gulf darters and lake chub suckers were unique to non-incised streams.

FISHES OF THE BIG SUNFLOWER RIVER, I: ICHTHYOFAUNA AND LONG-TERM CHANGES.

Neil H. Douglas (presenter) Department of Biology, Northeast Louisiana University, Monroe, LA 71211, Jan Jeffrey Hoover, and K. Jack Killgore, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS 39181

To evaluate possible long-term changes in fish assemblages of the Big Sunflower River, field survey data collected by Mississippi Department of Wildlife, Fisheries, and Parks in 1972 were compared with those collected by the U.S. Army Waterways Experiment Station in 1993. At two locations in 1972, 25 species were collected. Silvery and bullhead minnows, river carpsucker, and freckled madtom were present then, but were not recorded in 1993. Emerald and mimic shiners, yellow bullhead, tadpole madtom, and longear sunfish were common in 1972, uncommon in 1993. At corresponding locations in 1993, 40 species were collected. Paddlefish, speckled chub, ghost shiner, and buffalo were present, but were not recorded in 1972. Threadfin shad, mosquitofish, white crappie, and drum were common, but were uncommon in 1972. Species exhibiting changes in occurrence and abundance collectively have broad habitat requirements, suggesting that fish-habitat relationships in this system are complex and variable.

FISHES OF THE BIG SUNFLOWER RIVER, II: FISH-HABITAT RELATIONSHIPS.

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Field surveys of the Big Sunflower River were conducted April-August 1993. Twelve physical variables were significantly correlated with abundance of eight fish species, but multiple regressions for upstream sites (Kinlock, MS) were different than those for downstream sites (Anguilla, MS). Abundances of blacktail and ghost shiners were correlated with dissolved oxygen (positively), warmouth with bank indentations (positively), and freshwater drum with depth (negatively) at upstream and at downstream stations; correlations of abundance with other variables were not consistent among the two groups of stations. Emerald shiner, juvenile buffalo, channel catfish, and white crappie exhibited no similarity in habitat relationships at the upper and lower sites. Individual species of the Big Sunflower River exhibited microgeographic variation in responses to habitat, making system-wide descriptions of fish-habitat relationships difficult. An alternative approach is the development of relationships between fish diversity and physical habitat. This allows identification of environmental conditions characterizing habitat of fish assemblages. Regressions of Shannon diversity function (H') and physical habitat identified variables and correlations consistent with regressions of individual species and physical habitat.

AN EXPERIMENTAL TEST OF THE EFFECTS THAT AQUATIC PLANTS HAVE ON FORAGING LARGEMOUTH BASS (MICROPTERUS SALMOIDES)

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Structural complexity in aquatic habitats impact foraging efficiency of fishes. Aquatic plants differ in morphology, and little is known about how these differences effect foraging of fishes. Pond experiments were conducted to measure foraging differences of largemouth bass (Micropterus salmoides) between two macrophytic habitats. Two submersed plant species (Potamogeton sp., and Myriophyllum sp.) were cultured as treatments and replicated three times in pond enclosures. Identical numbers of small prey fishes were introduced and macroinvertebrates sampled to determine food availability. After a 5 day acclimation period for prey fishes, largemouth bass (with empty stomachs) were introduced into treatment enclosures and allowed to feed. Fish were retrieved 48 hrs later and stomach samples taken to evaluate diet. Significant differences in diet were noted between treatments, suggesting that aquatic plant type influenced foraging behavior of largemouth bass.

COLLECTION, AGE, AND GROWTH OF GRASS CARP (CTENOPHARYNGODON IDELLA) IN LARGE WATER BODIES - AN UPDATE

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Collection techniques, aging, and growth estimates of grass carp in large water bodies are being developed. Grass carp were not effectively collected using conventional techniques such as electrofishing or netting; tournament bow anglers proved to be both efficient and cost effective. Approximately 210 triploid grass carp were collected in Lakes Marion and Moultrie, South Carolina, and 43 grass carp of unknown ploidy were collected in Lake Guntersville, Alabama, during the last two years. Scales appear to be satisfactory for determining age and agreed well with sectioned utricular otoliths. Grass carp from Lakes Marion and Moultrie demonstrated greater growth than from those collected in Lake Guntersville. Future efforts will attempt to validate aging structures and increase sample size so that estimates of mortality and standing stocks of grass carp can be estimated in both systems.

**IDENTIFICATION, DISTRIBUTION AND LIFE HISTORY OF LESSER
AMBERJACK, *SERIOLA FASCIATA***

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Little information has been published on Lesser Amberjack, due to confusion with other species of *Seriola*. Lesser Amberjack is an appropriate common name, since it is the smallest member of the genus. Freshly-caught specimens show distinctive body and fin colors: head and body with violet-wine sheen; second dorsal fin with lemon-yellow wash except for tip of longest rays; lower caudal fin lobe lacking white; wide amber-yellow band along body. The species has a large eye and high gill raker count (>23). Distribution is also poorly known. It appears to be mainly a western Atlantic species, ranging from NE United States, through Bermuda, Cuba to the Antilles. There are scattered eastern Atlantic records. Its presence in the Gulf of Mexico appears to be centered off Louisiana. Our study is based on specimens taken from a developing "bandit-boat" offshore hook & line fishery. We have examined 250 specimens ranging from 313 to 613 mm FL for males and 282 to 676 mm FL for females. Empty body weight was 339 to 3,742 grams for males and 454 to 4,848 grams for females. Females averaged slightly longer and heavier than males (XF 408 vs XM 397 mm FL; XF 1,276 vs XM 1,167 grams body weight). Reproductive information is still incomplete, but a late summer-fall spawning season (Sept.-Nov.) is proposed based on the presence of hydrated oocytes and post-ovulatory follicles from ovary histology. Age estimations have been difficult for Lesser Amberjack, otolith cross-sections lack consistent increment patterns. Preliminary data, however, suggests that Lesser Amberjack is a short-lived species, perhaps living no more than a couple years.

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DOCUMENTATION AND EVALUATION OF RARE AND ENDANGERED FRESHWATER FISHES IN LOUISIANA

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Louisiana has a rich and varied fish fauna inhabiting its rivers, lakes, and swamps. Over 150 native species of freshwater fishes have been recorded from the state, but the total is most certainly higher. The major objective of this project is the development of a comprehensive list of Louisiana's freshwater fishes in need of protection or conservation due to their status as threatened, rare, or endangered. We have a working document listing 44 fishes under consideration, separated into categories of: 1) endangered - 6 species, 2) threatened - 12 species, 3) rare - 9 species, 4) special concern - 7 species, and 5) status undetermined/needing more information - 10 species. Louisiana's and Mississippi's freshwater fish fauna are closely tied, with approximately 155+ airmiles of the Mississippi River and 65 airmiles of the Pearl River forming common boundaries between the two states. In addition, 7 streams and rivers in southeastern Louisiana have significant headwaters in Mississippi. Examples of fishes that "share" the two states in critical portions of their range include Scaphirhynchus albus, Acipenser oxyrinchus, Percina cf. "copelandi", Macrhybopsis gelida & meeki, Noturus munitus, Etheostoma caeruleum, and Fundulus euryzonus. New, recent records of Notropis wickliffi in the Mississippi River in Louisiana strongly suggest that it is present in Mississippi and records from the two states should assist in assessing its true conservation status in the southern-most portion of its range. This work is being funded by Louisiana Water Resources Research Institute.

CAN MARICULTURE HARM THE GOOSE THAT LAYS GOLDEN EGGS?

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There are important similarities and differences between marsh management and mariculture. Although there has been virtually no research on the effects of mariculture on Louisiana's natural fisheries, the information we have gained in our marsh management research gives considerable insight into potential mariculture effects. Fisheries production is greatly reduced in areas under marsh management. Because mariculture over large areas of marsh (extensive mariculture) would require use of levees and water-control structures similar to those used for marsh management, extensive mariculture would also greatly reduce natural fisheries production. When large numbers of marine organisms are raised in a small, confined, area such as net pens, it is termed intensive mariculture. There has been no research done in Louisiana on the effects of intensive mariculture in the marsh on natural fisheries production. However, the International Council for the Exploration of the Sea has detailed the need for a great deal of such research, even in areas having much less potential for it to damage natural fisheries production and the environment. Unfortunately, little of this research has yet been accomplished.

ECOLOGY OF SEAGRASS FISHES AND MACROINVERTEBRATES ON GUATEMALA'S ATLANTIC COAST

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The objectives of this project is to assess the fishes and macroinvertebrate communities inhabiting seagrass beds on the Atlantic coast of Guatemala, stressing the importance of this seagrasses in terms of its faunal abundance and nursery value, compared with non-vegetated substrates. The study area is a shallow bay surrounded by mangroves in a relatively pristine area, which has extensive turtle grass meadows. We used a cylindrical drop sampler of 1.18 m², consisting of a metal skirt and plexiglass walls. Both vegetated and unvegetated substrates were sampled on December 14 to 17, 1993. A total of 28 samples were collected, including 14 on seagrass dominated bottom, and 14 on bare sand substrate. The abundance of fishes on vegetated sites proved to be significantly higher than on adjacent non-vegetated sites (70 vs. 3). The shrimp abundance was also significantly higher in seagrass sites (32 shrimp total) than in bare sand substrate (1 only). In the same manner, crab abundance, including hermit, and blue crabs was higher in seagrass (15) than on non-vegetated sites (6). Snails, was the only group more or less evenly distributed, being present in 12 of the seagrass samples and in 13 of the sand sites. The next step in our research will be to identify the species and correlate their abundances to environmental variables. We are planning two more collecting trips, to compare seasonal effects, i.e. rainy versus dry.

ACOUSTICAL SURVEY OF FISH DISTRIBUTION AND ABUNDANCE AROUND AN OIL-AND-GAS PRODUCTION PLATFORM ON LOUISIANA'S COASTAL SHELF

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In a mobile survey we used a fisheries acoustic system with a 120 kHz dual-beam transducer to characterize patterns in the distribution and abundance of fishes along transects around an oil-and-gas production platform. The platform, ST 135Q, is located in approximately 30 meters of water. A grid, with blocks that were 182 meters on a side was established around the platform and one-minute segments of transect data within blocks were processed by dual-beam and echo-integration techniques to describe the vertical distribution of single targets, their sizes, and number of individuals. The horizontal and vertical distribution of fishes was analyzed by grouping the blocks into four strata and dividing the water column into five meter intervals. Strata one included the platform, and strata two through four included blocks in successive layers around the platform. The overall density of fishes (individuals m³) differed significantly with depth (F-ratio = 2.61, d.f. = 7 and 167, $p < 0.014$) and fish density in the deepest interval was significantly higher (Tukey's test, $p < 0.05$) than the three shallowest intervals. The distribution of fish sizes differed significantly over the area surveyed (F-ratio = 24.63, d.f. = 17 and 665, $p < 0.0001$, $R^2 = 0.39$). Mean fish length in strata one was significantly greater than lengths in all other strata, and mean lengths in shallow depths were significantly greater than lengths in deeper intervals.