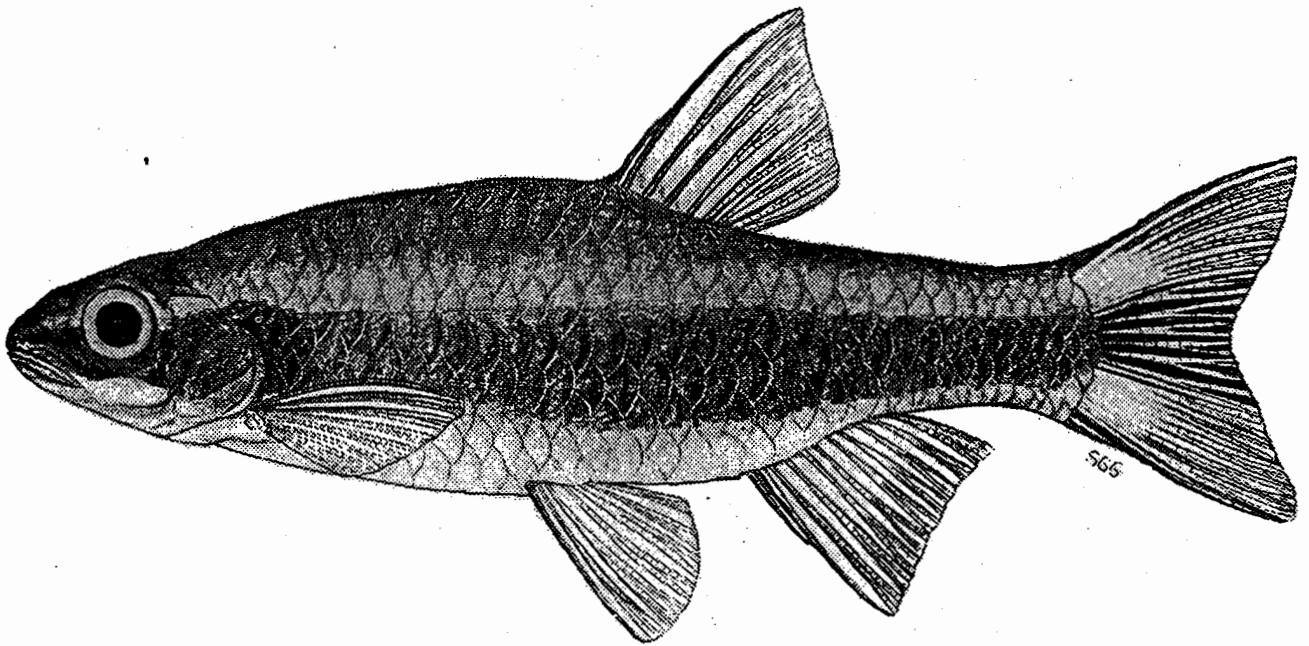


JOINT MEETING OF THE TENNESSEE AND MISSISSIPPI
CHAPTERS OF THE AMERICAN FISHERIES SOCIETY

JANUARY 31 - FEBRUARY 2, 1996



Flagfin shiner, *Pteronotropis signipinnis*
Line drawing courtesy of Neil Douglas

Wednesday, January 31, 1996

8:00-12:00 Tennessee Chapter Committee Meetings

Physiology Session

Moderator: Dr. K. Jack Killgore

- 1:00 A review of sound production in North American freshwater fishes, with a discussion of current studies with Cyprinella. Carol E. Johnston, USDA Forest Service, Forest Hydrology Laboratory, Oxford, MS.
- 1:15 Factors affecting electrofishing efficiency for fishes of the southeastern United States. Billy Justus and Al Gibson, Mississippi Department of Environmental Quality, Pearl, MS.
- 1:30 Genetic inventory and classification of southern Appalachian brook trout populations. Leslie R. Saidak, Stanley Z. Guffey, Gary F. McCracken, Richard J. Strange, and Frank J. Kriegler, University of Tennessee and Charles R. Parker, National Biological Service.
- 1:45 Effects of fluctuating temperature regimes on rainbow trout, Onchyrhynchus mykiss, stamina. Stacy M. Xenakis, Tennessee Cooperative Fishery Research Unit, Cookeville, TN.
- 2:00 Seasonal changes in swimming performance of smallmouth buffalo, Ictiobus bubalus. Reid Adams and Glenn R. Parsons, Department of Biology, University of Mississippi, Oxford, MS.
- 2:15 Relation between habitat use and swimming performance of the cypress darter, Etheostoma proeliare. K. Jack Killgore and Jan Jeffrey Hoover, Waterways Experiment Station, Vicksburg, MS and Gary L. Miller, Department of Biology, University of Mississippi, Oxford, MS.
- 2:30 Break
- 2:45 Swimming performance of young-of-year gulf sturgeon. Tracy J. Smiley, K. Jack Killgore, and Matthew D. Chan, Waterways Experiment Station, Vicksburg, MS.
- 3:00 An experimental evaluation of effects of water flow on foraging success of bluntface shiners, Cyprinella camura, Sherry L. Harrel and Eric D. Dibble, Waterways Experiment Station, Vicksburg, MS.
- 3:15 Velocity preferences of young-of-year gulf sturgeon, Acipenser oxyrinchus desotoi. Matthew D. Chan, Eric D. Dibble, and K. Jack Killgore. Waterways Experiment Station, Vicksburg, MS.
- 3:30 Mercury contamination in Mississippi waters. Henry Folmar, Mississippi Department of Environmental Quality, Pearl, MS.

Natural History Session

Moderator: Dr. Eric Dibble

- 1:00 Status of gulf sturgeon, Acipenser oxyrinchus desotoi, in Pearl River, Louisiana. James V. Morrow, Jr, K. Jack Killgore, and James P. Kirk, Waterways Experiment Station, Vicksburg, MS and Howard E. Rogillo, Louisiana Department of Wildlife and Fisheries, LaCome, LA.
- 1:15 Current status of the gulf sturgeon, Acipenser oxyrinchus desotoi, in the Pascagoula River, Mississippi. Michael Murphy, John Skains, Frank Paroka, Scott Searcy, and Gregory Crochet, Gulf Coast Community College, Long Beach, MS.
- 1:30 Ichthyofauna of wetland habitats created by installation of drop pipes. P. C. Smiley, Jr., S. S. Knight, and C. M. Cooper, USDA, National Sedimentation Laboratory, Oxford, MS.

1:45 Notes on the distribution and life history of the northern madtom, Noturus stigmosus. Glenn R. Parsons, Department of Biology, University of Mississippi, Oxford, MS.

2:00 Life history aspects of the bluenose shiner, Pteronotropis welaka. Charles L. Knight, Mississippi Museum of Natural Science, Jackson, MS and Carol E. Johnston, USDA Forest Service, Oxford, MS.

2:15 Diel feeding patterns of three coastal sunfish species. K. Felder, C. Rakocinski, and R. Heard, Gulf Coast Research Laboratory, Ocean Springs, MS.

2:30 Break

2:45 Rostrum morphology of paddlefish, Polyodon spathula, from the Mississippi delta. Steven G. George, Jan Jeffrey Hoover, and K. Jack Killgore, Waterways Experiment Station, Vicksburg, MS.

3:00 Recent records of two Asian carps in the lower Mississippi basin. Neil H. Douglas, Museum of Zoology, Department of Biology, Northeast Louisiana University, Monroe, LA, Steven G. George, Jan Jeffrey Hoover, K. Jack Killgore, Waterways Experiment Station, Vicksburg, MS, and William T. Slack, Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, MS.

4:00-6:00 Business Meetings for the Tennessee and Mississippi Chapters

6:00 Social Mixer

Thursday, February 1, 1996

Fisheries/Aquaculture I Session

Moderator: Dr. Frank Bulow

8:00 Vocational education- Aquaculture's new frontier. Michael Murphy, Gulf Coast Community College, Long Beach, MS.

8:15 Modeling the effects of satiation feeding on water quality and successive feed consumption in fish culture ponds. John B. Taylor, Department of Fisheries and Wildlife, Mississippi State University, MS.

8:30 Relevancy of hybrid striped bass nutritional requirements and feedstuff digestibility values. H. Randal Robinette and John B. Taylor, Department of Wildlife and Fisheries, Mississippi State University, MS.

8:45 An inexpensive recirculating aquaculture system with multiple use capabilities. Donnie Scurlock and S. Bradford Cook, Department of Biology, Tennessee Technological University, Cookeville, TN.

9:00 Kentucky Reservoir commercial mussel harvester survey. Don Hubbs, Tennessee Wildlife Resources Agency, Camden, TN.

9:15 An overview of TVA's reservoir benthic macroinvertebrate community assessment techniques. Amy Wales, Tennessee Valley Authority, Chattanooga, TN.

9:30 Southern walleye restoration program. Bubba Hubbard, Mississippi Department of Wildlife, Fisheries, and Parks, Jackson, MS.

9:45 Break

10:00 The southern walleye, its status and conservation. Ron Larson, USFWS, Jackson, MS.

10:15 Comparative survival of trout stocked in different seasons in a Tennessee tailwater. Douglas A. Besler and Phillip W. Bettoli, Tennessee Cooperative Fishery Research Unit, Cookeville, TN.

10:30 Short-term mortality and injury of rainbow trout caused by three-phase AC electrofishing in a southern Appalachian stream. James W. Habera and Richard J. Strange, Department of Forestry, Wildlife, and Fisheries, University of Tennessee, Knoxville, TN, and Bart D. Carter, Tennessee Wildlife Resources Agency, Talbott, TN, and Stephen E. Moore, National Park Service, Gatlinburg, TN.

10:45 Characteristics of a riverine walleye fishery. Judd Cornell and Chris O'Bara, Tennessee Technological University, Cookeville, TN.

11:00 Channel catfish stock characteristics in channelized and non-channelized reaches of the Yockanookany River, MS. John R. Jackson, Joseph Flotemersch, and Donald C. Jackson, Department of Wildlife and Fisheries, Mississippi State University, MS.

11:15 Who participates in Mississippi angler studies. J. T. Forbes, Department of Sociology, G. S. Bray, Department of Wildlife and Fisheries, and H. L. Schramm, Mississippi Cooperative Fish and Wildlife Unit, Mississippi State, MS.

11:30 Additive versus compensatory mortality: a review of the evidence for largemouth bass, white crappie, black crappie, and northern pike fisheries. Mike Allen and L. E. Miranda, Mississippi Cooperative Fish and Wildlife Unit, Mississippi State, MS.

Ecology I Session

Moderator: Mr. Joe Cathey

8:00 Predatory responses of largemouth bass, Micropterus salmoides, to aposematic and cryptic hatchling turtles. Carol A. Britson, Department of Biology, University of Memphis, Memphis, TN.

8:15 Factors affecting competition between brook char and rainbow trout in southern Appalachian streams: implications of an individual-based model. M. E. Clark and K. A. Rose, University of Tennessee, Knoxville, TN and Oak Ridge National Laboratory, Oak Ridge, TN.

8:30 Distribution of the redeye bass, Micropterus coosae, in Tennessee, and its hybridization with other Micropterus species. James C. Pipas and Frank J. Bulow, Department of Biology, Tennessee Technological University, Cookeville, TN.

8:45 Habitat choice of the bluespotted sunfish, Enneacanthus gloriosus: the role of plant architecture. G. J. Crego, G. L. Fulling, and M. S. Peterson, Gulf Coast Research Laboratory, Ocean Springs, MS.

9:00 Colonization of artificial seagrass by juvenile crabs and fishes as a function of shoot density. Hale G. Switzer, Gulf Coast Research Laboratory, Ocean Springs, MS and Chet F. Rakocinski, Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, MS.

9:15 A patch-model to determine quality of fish habitat in aquatic plants. Eric D. Dibble and Sherry L. Harrel, Waterways Experiment Station, Vicksburg, MS, and Sean Meegan, Wisconsin Department of Natural Resources, Monona, WI.

9:30 Movement patterns of fishes in two Ouachita Highlands streams. Elizabeth B. Smithson and Carol E. Johnston, USDA Forest Service, Forest Hydrology Laboratory, and University of Mississippi, Oxford, MS.

9:45 Break

10:00 Biotic Index for cold tailwaters. Ed Scott, Tennessee Valley Authority, Norris, TN.

Fisheries/Aquaculture II Session

Moderator: Mr. James V. Morrow, Jr.

1:00 Sports fishery restoration of oxbow lakes in the Mississippi Delta MSEA Project. Scott S. Knight and C. M. Cooper, USDA National Sedimentation Laboratory, Oxford, MS.

1:15 Low density stocking of advanced Florida largemouth bass fingerlings into Pelahatchie Bay, Ross Barnett Reservoir. Tom Holman, Mississippi Department of Wildlife, Fisheries, and Parks, Turcotte Laboratory, Canton, MS.

1:30 Dynamics of young-of-year largemouth bass populations in a Tennessee reservoir. Lawrence G. Dorsey, Phillip W. Bettoli, and Steve Sammons, Tennessee Cooperative Fishery Research Unit, Cookeville, TN.

1:45 Assessment of largemouth bass populations in Tennessee River reservoirs using catch depletion techniques. Donny Lowry, Tennessee Valley Authority, Muscle Shoals, AL.

2:00 Juvenile largemouth bass food habits in Sale Creek embayment, Chickamuaga Reservoir. Scott Loftis, Mike Eggleton, and Chris O'Bara, Tennessee Technological University, Cookeville, TN.

2:15 Influences of reservoir water levels on juvenile centrarchid populations. Mike Eggleton, Chris O'Bara, Scott Loftis, and Charles Drumright, Tennessee Technological University, Cookeville, TN.

2:30 Break

2:45 Size selectivity of angling in crappie fisheries. Brian S. Dorr, L. E. Miranda, and Mike S. Allen, Mississippi Cooperative Fish and Wildlife Unit, Mississippi State, MS.

3:00 Efficiency and selectivity of three trap net types for sampling crappies. L. C. Isaak, and L. E. Miranda, Mississippi Cooperative Fish and Wildlife Unit, Mississippi State, MS.

3:15 Early detection of crappie year class strength using neuston net sampling: implications for management. Steve M. Sammons and Phillip W. Bettoli, Tennessee Cooperative Fishery Research Unit, Cookeville, TN.

3:30 Relative abundance of fishes in mainchannel and secondary channel habitats in the lower Mississippi River. M. T. Driscoll, H. L. Schramm, Jr, and L. L. Pugh, Mississippi Cooperative Fish and Wildlife Unit, Mississippi State, MS.

3:45 Effectiveness of hoopnetting and electrofishing in the lower Mississippi River. L. L. Pugh, H. L. Schramm, Jr., and M. T. Driscoll, Mississippi Cooperative Fish and Wildlife Unit, Mississippi State, MS.

Saltwater Symposium

Moderator: Dr. Mark Peterson

1:00 Settlement indices of blue crab megalopae and abundance of early crab instars in shoreline habitats: relationship of seasonal periodicity to management of the resource. Harriet M. Perry, Christine Trigg, James Warren, and Marjorie Williams, Gulf Coast Research Laboratory, Ocean Springs, MS.

1:15 Shrimp management in Mississippi: papal bull to politics. Tom Van Devender, Mississippi Department of Marine Resources, Biloxi, MS.

1:30 Patterns and abundance in the ichthyoplankton in the Gulf of Mexico. Joanne Lyczkowsi-Schultz,

National Marine Fisheries Service, Pascagoula, MS.

1:45 Use of larval fish data to assess stock sizes and further our understanding of recruitment variability. Bruce Comyns and Pamela Scott, Gulf Coast Research Laboratory, Ocean Springs, MS.

2:00 Age and growth of spotted seatrout, Cynoscion nebulosus, from Mississippi's coastal waters. Michael B. Moxey and James R. Warren, Gulf Coast Research Laboratory, Ocean Springs, MS.

2:15 Food of juvenile cobia, Rachycentron canadum, from the northern Gulf of Mexico. James S. Franks and James R. Warren, Gulf Coast Research Laboratory, Ocean Springs, MS.

2:30 Break

2:45 Determining maturity schedule using gross observations of gonads in spotted seatrout, Cynoscion nebulosus, from Mississippi's coastal waters. R. Russell and J. Warren, Gulf Coast Research Laboratory, Ocean Springs, MS.

3:00 Population age structure dynamics of red drum, Sciaenops ocellatus, from Mississippi Sound in response to changes in management regulations. B. Randall and J. Warren, Gulf Coast Research Laboratory, Ocean Springs, MS.

3:15 Estimates of spawning potential ratio (SPR) of the inshore stock of striped mullet, Mugil cephalus, utilized by the "roe mullet" industry. J. Warren, Gulf Coast Research Laboratory, Ocean Springs, MS.

3:30 Long-term trends in abundance of selected juvenile sciaenids from Mississippi's coastal waters. S. J. VanderKooy, J. Warren, M. S. Peterson, and H. Al-Shaqsy. Gulf Coast Research Laboratory, Ocean Springs, MS.

3:45 Comparison of relative fishing powers of research vessels *Pelican* and *Tommy Munro*. Gillmore Pellegrin, Jr. and Nathaniel Sanders, Jr., National Marine Fisheries Service, Pascagoula, MS and Richard Waller, Gulf Coast Research Laboratory, Ocean Springs, MS, and Ralph Allem, Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA.

4:00 Gulf Coast Research Laboratory's gulf race striped bass restoration program. Larry C. Nicholson, Gulf Coast Research Laboratory, Ocean Springs, MS.

4:15 Southeast area monitoring and assessment program: a fishery-independent program for collection of management related data. Richard Waller, Harriet Perry, and Bruce Comyns, Gulf Coast Research Laboratory, Ocean Springs, MS.

Social Mixer 6:00

Banquet 7:00

Friday, February 2, 1996

Reservoir Aging Symposium

Moderator: Mr. Tom Swor

8:00-11:00 Implications of Aging Reservoirs on Fisheries Management : three speakers and a panel discussion.

Ecology II Session Moderator: Dr. Neil Douglas

8:00 Use of biological information to target water quality improvement efforts on a watershed basis. Ellen Hammond, Wheeler/Elk River Action Team, Tennessee Valley Authority, Chattanooga, TN.

8:15 Modifications to the index of biotic integrity as an ecological health indicator for Tennessee Valley streams. Robert Wallus, Tennessee Valley Authority, Chattanooga, TN.

8:30 Mining impacts and restoration of fisheries in the coal fields of Tennessee. Robert Liddle, Office of Surface Mining, Knoxville, TN.

8:45 Summer habitat of inland silversides, Menidia beryllina, and young-of-year sunfishes, Lepomis spp., in oxbow lakes of the Mississippi Delta. Jan Jeffrey Hoover, K. Jack Killgore, and Steven G. George, Waterways Experiment Station, Vicksburg, MS.

9:00 TVA's sampling protocol for IBI in Tennessee Valley streams. Charles Saylor, Tennessee Valley Authority, Norris, TN.

9:15 Management of the fishery of Eagle lake. Garry Lucas, Mississippi Department of Wildlife, Fisheries, and Parks, Cleveland, MS.

9:30 Break

9:45 A watershed approach to assessing brook trout, Salvelinus fontinalis, distribution in the Hiwassee River watershed. Gary G. Williams, Tennessee Valley Authority, Norris, TN.

10:00 Community structure of fishes in three north-central Mississippi streams. Kimberly B. Damon and Carol E. Johnston, USDA Forest Service, Forest Hydrology Laboratory, Oxford, MS.

10:15 Shoreline aquatic habitat index, a method to quantify response of aquatic habitat quality to adjacent land uses. Gary D. Hickman, Tennessee Valley Authority, Norris TN.

10:30 Age structure and the effects of spring discharges on sauger populations of the Tennessee River. Phillip W. Bettoli, Tennessee Cooperative Fishery Research Unit, Cookeville, TN.

A review of sound production in North American freshwater fishes, with a discussion of current studies with Cyprinella

Carol E. Johnston

USDA Forest Service, Forest Hydrology Laboratory, Oxford, MS

Acoustic signals have been described for numerous species of both marine and freshwater fishes. Most of these studies do not investigate the biological significance of these sounds, but studies that have suggest that sounds are produced under specific behavioral contexts and can be species-specific. Investigations also suggest that alteration of the physical habitat can alter the characteristics of the calls of aquatic animals. Among North American freshwater fishes, sound production has been reported in the Centrarchid genus Lepomis and the Cyprinid genus Cyprinella. Current studies are aimed at investigating sound production in several species of Cyprinella, in other Cyprinid fishes and in madtom catfishes (Noturus). Acoustic signals in these fishes could be important cues for mate choice and in aggressive encounters, and in degraded habitats alteration of these signals could contribute to the hybridization events common to Lepomis and Cyprinella.

Factors affecting electrofishing efficiency for fishes of the southeastern United States

Billy Justus and Al Gibson

Mississippi Department of Environmental Quality, Pearl, MS

Electrofishing has become the primary fish sampling method for MS DEQ. In 1995, we visited 60 sites for a total of 125 occasions, and collected over 300 composite samples for various contaminants. Sampling has been conducted at or near this rate since 1989. The gradient between the typically low conductivity of inland streams versus the typically high conductivity of estuaries has provided valuable information pertaining to the capabilities of electrofishing equipment being marketed, on both ends of the spectrum. Additionally, our efforts to document contaminant loading in a majority of MS water bodies has allowed our personnel to identify several factors which affect electrofishing efficiency and species-specific susceptibility. Some of those factors to be discussed include: water temperature, water conductivity, anode/cathode size, effects of seasonality on metabolism and depth preference, and manipulation of electrical settings to achieve proper voltage.

Genetic inventory and classification of southern Appalachian brook trout populations.

Leslie R. Saidak, Stanley Z. Guffey, Gary F. McCracken, Richard J. Strange, Frank J. Kriegler and Charles R. Parker¹

University of Tennessee, Knoxville, TN

¹National Biological Service, Knoxville, TN

Brook trout are the only salmonid native to the Southern Appalachian area. Populations in the region have declined substantially in this century because of man's activities. Attempts to curb this decline included extensive stocking with hatchery strains derived from northern populations. Molecular genetic analysis has demonstrated that native Southern Appalachian brook trout are genetically distinct from northern brook trout. Mean genetic similarities of about 0.9 are observed in comparisons of allozyme allele frequencies between native Southern Appalachian populations and hatchery strains used for stocking in the region. Effective efforts to manage and preserve native Southern Appalachian brook trout thus require a genetic inventory identifying each population as native Southern Appalachian, hatchery-derived, or hybrid. In this paper we report the results of allozyme analysis of 171 brook trout populations from the region: 95 from eastern Tennessee outside the Great Smoky Mountains National Park, 52 from the Great Smoky Mountains National Park (North Carolina/Tennessee), 12 from northwestern North Carolina, and 12 from South Carolina. Overall, 88 populations (51%) were classified as native Southern Appalachian, 17 (10%) were classified as pure hatchery-derived, and 66 (39%) were classified as hybrids. The Great Smoky Mountains National Park has the highest percentage of native populations; North and South Carolina have the lowest. In eastern Tennessee and South Carolina, hatchery-derived and hybrid populations cluster around hatcheries which previously maintained brook trout strains for stocking. These results indicate that in addition to severe loss of brook trout habitat since 1900, substantial erosion of native genetic diversity has also occurred. The results also underscore the importance of eliminating stocking with hatchery brook trout strains.

Effects of fluctuating temperature regimes on rainbow trout, Oncorhynchus mykiss, stamina

Stacy M. Xenakis and Phillip W. Bettoli

Tennessee Cooperative Fishery Research Unit, Cookeville, TN

The stamina of rainbow trout, Oncorhynchus mykiss, subjected to fluctuating thermal regimes was evaluated in a stamina tunnel. Twenty-five trout (150 mm TL) were placed into each of three separate 380 liter tanks. Prior to the experiment, trout were microtagged in one or more body locations to identify individual fish. Temperatures were manipulated in each tank to simulate temperature regimes present below Center Hill Dam, Tennessee. Temperature in the control tank remained constant at 12° C to simulate temperatures present during generation. Temperatures in other tanks simulated spring temperature regimes (12-17 ° C), and late summer/fall temperature regimes (12-22 ° C). At the end of weeks two and four, fish were individually placed into the stamina tunnel. After a habituation period of five minutes at 0.07m/w, the velocity was abruptly raised to 0.20 m/s within one minute. Exhaustion times were determined by repeated tail touches or impingement against the grid at the downstream end of the tunnel. Total lengths and weights were recorded at the end of the experiment. Differences in fish growth and time to exhaustion were examined using analysis of variance. Trout held in temperatures that fluctuated between 12 and 22 ° C grew the most (g/day) in terms of absolute, relative and instantaneous growth rates. The mean exhaustion time was also greatest for fish held at this temperature regime; however, neither growth nor mean exhaustion time was declared different ($p \leq 0.05$). Although differences in exhaustion time could not be declared statistically significant in the pilot study, future trials will hold fish longer under the same temperature regimes before testing.

Seasonal changes in swimming performance of smallmouth buffalo, Ictiobus bubalus.

Reid Adams and Glenn R. Parsons

Department of Biology, University of Mississippi, University, MS

While numerous studies have demonstrated how a fishes ability to swim may differ when acclimated to designated laboratory temperatures or photoperiods, few researchers have examined true seasonal effects. Here, we report critical swimming speeds and respiration rates of smallmouth buffalo maintained in the lab and tested under environmental conditions approximating those from which fish were collected (acclimatization). Buffalo were collected from the Coldwater River, Ms. during winter, spring, summer and fall when water temperatures averaged 10.0 ± 0.71 s.d., 21.3 ± 1.89 s.d., 27.3 ± 1.06 s.d., and 16.2 ± 2.1 s.d. degrees Celsius respectively. Critical swimming speeds and respiration rates were determined in the lab using a 945 liter Brett (1964) type swim tunnel/respirometer. As expected, measurements of active metabolic rates increased with swimming speed during each season, while estimated standard metabolic rates generally doubled with a 10 degree increase in water temperature. Statistical analysis revealed that season did have an effect on critical swimming speeds which were highest in spring and summer and lowest in fall. Interestingly, while tested under very similar water temperatures, spring and fall fish had very different swimming performances.

Relation between habitat use and swimming performance of the cypress darter, Etheostoma proeliare

K. Jack Killgore¹, Gary L. Miller², and Jan Jeffrey Hoover¹

¹U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS

²University of Mississippi, Department of Biology, University, MS

We conducted field and laboratory studies of the cypress darter, a small fish that inhabits slackwater of lowland rivers. Water velocity utilization was determined from field surveys in the Cypress Bayou System, Northeast Texas. Darters were most often found in water velocities <5 cm/s; maximum velocity used was 33 cm/s. Utilization was proportional to the available velocities suggesting a lack of preference but approximating an ideal free distribution. Swimming performance was determined using a Blažka-type water tunnel. Darters remained on the bottom and did not swim at water velocities of 7 and 12 cm/s. Darters swam at higher velocities but time to fatigue occurred in less than 2 minutes at 19 cm/s and decreased to a few seconds at 36 cm/s, indicating that maximum swimming capability was reached. Thus, use of low velocity habitats by cypress darters may be attributed to their weak swimming ability.

Swimming performance of young-of-year gulf sturgeon

Tracy J. Smiley, K. Jack Killgore, and Matthew D. Chan

U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS

Gulf sturgeon, *Acipenser oxyrinchus desotoi*, a Federally threatened species, move from the Gulf of Mexico into freshwater rivers to spawn. Juveniles may remain in freshwater for several years, but young-of-year are rarely collected. We measured 30-min, critical swimming speed of hatchery-reared, young-of-year Gulf sturgeon (55-122 mm total length) in a modified Blazka-type water tunnel. Total length and critical swimming speed were highly correlated ($n=30$, $r^2=0.76$, $p<0.001$). All fish could swim at 5 cm/s during the prescribed time period of 30 minutes. Mean ($\pm 1SD$) critical swimming speed was 12.9 ± 6.3 cm/s; maximum was 26.0 cm/s. Fish always faced the current, but at higher water velocities exhibited erratic behaviors: swimming upside down, rapid thrusts of the caudal fin, circling the periphery of the tunnel. We believe young-of-year Gulf sturgeon have the capability to swim in low velocities (10-15 cm/s) and that swimming speeds rapidly increase with size. The demersal habits, body morphology, and swimming behaviors observed in the tunnel suggest that these fish utilize, or attempt to find, boundary layers in areas of higher velocity.

An experimental evaluation on effects of water flow on foraging success of bluntface shiners, Cyprinella camura

Sherry L. Harrel and Eric D. Dibble¹

U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS

¹ Geo-Marine, Inc., Baton Rouge, LA

Previous field studies suggest stream minnows (Cyprinidae) specialize on prey items in slow water, and as flow increases, more energy is utilized to maintain position in the water column. Therefore, prey selection becomes more generalized with increasing water flows. Few data are available to thoroughly test this hypothesis, because accurate evaluations of foraging behaviors in the field are difficult. Here, we conduct an experiment to investigate effects of water flow on foraging strategies of the bluntface shiner, Cyprinella camura. Rate of energy gained and selectivity of food items were measured in a Plexiglas flume at three flows: slow (mean 23.1 cm/s), intermediate (mean 34.8 cm/s), and fast (mean 53.5 cm/s). Fish were recorded in a foraging arena within the flume with a VHS-C video camera. Treatments were replicated twelve times. *Foraging rates* and *handling times* were measured with focal samples (10 minute durations); sample time represented 2 hours/treatment. Holling's disc equation was used to obtain the average rate of energy intake (R) and Jacob's selectivity index (D) was used to determine preference. Bluntface shiners preferred artificial food (food pellets) over natural food items (Trichoptera and Amphipods) across all three flow treatments. The ability to remain selective on one food type may suggest bluntface shiners are able to adapt to environmental changes of water flow.

Velocity preferences of YOY gulf sturgeon, Acipenser oxyrinchus desotoi

Matthew D. Chan, Eric D. Dibble¹, and K. Jack Killgore

¹ Geo-Marine, Inc., Baton Rouge, LA

U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS

Relatively little is known about the YOY habitat preferences of the federally threatened Gulf sturgeon, Acipenser oxyrinchus desotoi. We examined velocity preferences separately for individual sturgeon and groups under two flow treatments, 4-6 cm/s and 5-17 cm/s. Within a Ferguson flume, velocities for both treatments were measured on an astroturf reference grid placed on the bottom of the observational arena. Individuals or groups of sturgeon (3-5), average total length of 91.5 mm, were placed into the arena and acclimated for 20 min. prior to trials. Sturgeon were exposed to one treatment for 20 min. followed by the second treatment for another 20 min., alternating the treatment order in successive trials. Fish distributions were monitored with a video camera mounted over the flume and analyzed using scan samples (10 s intervals) collected five minutes into the video for five minutes. Jacob's selectivity index (D) compared available water velocities to velocities utilized. Individuals showed mixed preferences and avoidances at velocities of 5-7 cm/s, moderate preferences for 8-10 cm/s (D of 0.25 to 0.38), and moderate and strong avoidance of currents 13-17 cm/s (D of -0.42 to -1). Groups exhibited no well defined pattern of preferences or avoidances. Our data suggests that group dynamics dampen patterns of selection of individuals and that increasing water velocities to values greater than 12 cm/s will reduce availability of preferred habitat.

Mercury in fish in Mississippi

Henry Folmar, Billy Justus, and Al Gibson

Office of Pollution Control, Pearl, MS

In 1994 and the Spring of 1995, the Mississippi Office of Pollution Control, with assistance from the Mississippi Department of Wildlife, Fisheries, and Parks, conducted a statewide monitoring program for mercury in fish tissue. The results of this monitoring indicated elevated levels of mercury in eleven waterbodies widely scattered across the state. Average levels for some species exceeded the FDA Action Level of 1.0 ppm, and in May of 1995, fish consumption advisories were issued for four waterbodies in the state: Enid Reservoir, the Yockanookany River, Escatawpa River, and the Bogue Chitto River. The advisories apply to largemouth bass and catfish larger than 27 inches and recommend that children under 7 and women of childbearing age should limit their consumption of these fish to no more than one meal every two months. The general population should limit their consumption of these fish to no more than one meal every two weeks.

Status of gulf sturgeon, Acipenser oxyrinchus desotoi, in Pearl River, Louisiana

James V. Morrow Jr.¹, K. Jack Killgore¹, Howard E. Rogillo², James P. Kirk¹

¹U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS

²Louisiana Department of Wildlife and Fisheries, Lacombe, LA

We are conducting a study of Gulf sturgeon, Acipenser oxyrinchus desotoi, in the lower Pearl River system to determine population status related to potential impacts of proposed dredging in the West Pearl River. In 1995, 60 Gulf sturgeon ranging in size from 362 to 1283 mm total length were tagged by Louisiana Department of Wildlife and Fisheries (LDWF) and Waterways Experiment Station (WES) in a 21 km reach of the West Middle Pearl River. Population estimate in this reach was 138 based on Schnabel method of tag and recapture. Age, determined from sectioned pectoral fin rays, ranged from 2 to 9 years. Eight sturgeon were equipped with radio transmitters and tracked during August - October 1995. Most fish remained in deep holes (15-18 m) during summer. Juvenile and subadult sturgeon may be locally abundant, but adults are rarely collected. Monitoring will continue to evaluate annual movement patterns, population attributes, and spawning locations.

Current status of the gulf sturgeon, Acipenser oxyrinchus desotoi, in the Pascagoula River, Mississippi

Michael Murphy, John Skains, Frank Paroka, Scott Searcy, and Gregory Crochet

Mississippi Gulf Coast Community College, Long Beach, MS

A three year study to determine population, habitat, and spawning sites of the gulf sturgeon in the Pascagoula River was conducted in 1993, 1994, and 1995. Despite the fact the gulf sturgeon is the largest fish inhabiting freshwater in Mississippi, very little is known of it's life history in the state. Researchers collected anecdotal harvest evidence from sport and commercial fisherman and sonar mapped sections of the lower Pascagoula River searching for likely sturgeon habitat. Extensive sampling using a variety of stationary gill nets and drift nets was conducted. To date a total of 23 juvenile and sub adult gulf sturgeons have been captured, tagged, and released. No adult sturgeons have yet been captured, although one dead adult was found. Two juvenile sturgeons were radio tagged. One of these was later located from an aircraft in the lower reaches of the Leaf River. Research is a cooperative effort of the U.S. Fish and Wildlife Service--Panama City, Florida, Mississippi, Department of Wildlife, Fisheries and Parks, and Miss State University Coastal Research and Extension Center.

Ichthyofauna of wetland habitats created by installation of drop pipes

P.C. Smiley Jr., S.S. Knight, and C.M. Cooper

USDA, National Sedimentation Laboratory, Oxford, MS

Field-scale grade control structures, or drop pipes, have been utilized extensively to control gully erosion in the Demonstration Erosion Control project in the Yazoo Basin of Mississippi. A by-product of using this erosion control structure is creation of small riparian terrestrial and wetland habitats. As part of a survey of all major vertebrate classes utilizing these habitats, we found 2 intermittent riverine wetlands supporting fish populations. Fish data was collected from these sites for one year by seining, electroshocking, hoop netting, and observations. From these sites, total species richness was 5 from a total of 965 captures. In spring 1995, we sampled additional intermittent riverine wetland sites to determine percent of intermittent riverine wetlands supporting fish and additional assessment of species richness and relative abundance. We found 67% of intermittent riverine wetland sites sampled supported fish populations. Eleven species and 6338 captures were recorded in eight sites. The four most captured species were Lepomis cyanellus, Gambusia affinis, Notemigonus crysoleucas, and Lepomis macrochirus, in descending order. This data demonstrates this erosion control method is creating wetland habitats capable of supporting fish populations. Viewing drop pipes as a multipurpose tool and altering the design may result in creation of biologically superior habitats.

Notes on the distribution and life history of the Northern madtom, Noturus stigmosus

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The distribution and life history of N. stigmosus has been studied in the Wolf and Hatchie Rivers of north Mississippi since March 1988. This species occurs throughout the tributaries of the Mississippi River but is never very common. Since 1988, only 28 specimens have been collected. Although few specimens have been collected, important information concerning distribution and life history has been obtained. This study confirms the occurrence of the northern madtom in the Hatchie River drainage as reported by Rhode (1980) and provides new records of the species in the Wolf River drainage. Madtoms were collected from June to November at temperatures of 10-26°C, dissolved oxygen of 4.8 to 11 ppm, and current speeds of 30 to 48 cm/s. N. stigmosus were never collected in fast moving (<100 cm/s) "riffle" areas. The smallest specimens (40 to 58 cm TL) were always found in leaf litter. Limited growth and reproductive data has also been obtained.

Life history aspects of the bluenose shiner, Pteronotropis welaka

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Life history aspects of the bluenose shiner, Pteronotropis welaka, were investigated between May 1993 and June 1994 in a small tributary of the lower Pearl River in Marion County, Mississippi. Samples were taken monthly or biweekly to provide information about preferred habitat and reproductive biology. Except during peak spawning periods bluenose shiners were located in schools of >25 individuals in areas of sluggish flow (0 - 4 cm/sec.) near submerged vegetation. They were usually positioned in the mid and upper levels of the water column and often associated with other schooling cyprinids and atherinids. Based on gonadal condition, reproduction occurred between May and August and included two major spawning bouts. Mean egg diameter and fecundity ranged from 0.115 - 0.788 mm and 104 - 191 eggs/individual, respectively. During the spawning period adults were frequently observed in unvegetated areas and often oriented toward longear sunfish nests. Although spawning was not observed, bluenose shiners were hatched in the laboratory from eggs removed from sunfish nests at the study site. Length frequency data indicated that adults die after each reproductive season

Diel feeding patterns of three coastal sunfish species

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Sunfishes, Lepomis spp., serve as model ecological organisms, and thus have been the subject of numerous feeding studies in northern lake habitats; however, little is known about feeding patterns of Lepomis spp. from mesohaline environments. By feeding at different times and on different prey, three co-existing sunfish species in a coastal tidal marsh may be utilizing different resources. Differences were determined for stomach\ gut fullness and prey composition in three Lepomis spp. collected at six hr intervals over a 24 hr period. A total of 133 stomachs were analyzed including 53 L. punctatus, 60 L. microlophus, and 20 L. macrochirus. Generally for all species, the greatest percentage of empty stomachs occurred in the 0030-0100 hr collection; stomach volume increased in the 0615-0630 hr collection, and stomachs were fullest at 1300-1400 hrs. Chironomids represented a large portion of the diet in all three species. L. microlophus was the only species which substantially utilized molluscan prey. L. macrochirus generally selected more planktonic prey. This suggests there is less diel partitioning among species, and greater differences in prey selection. Feeding patterns of these estuarine sunfishes are similar to freshwater populations in general types of prey consumed, however differ in the taxa of those prey organisms.

Rostrum morphology of paddlefish, Polyodon spathula, from the Mississippi delta

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In 1905, a field study of Mississippi paddlefish documented variation in rostrum shape and suggested a correlation with habitat. Subsequent studies are unknown but we have observed variation in rostrum shape among individuals collected from the Big Sunflower River in 1994. We explored the possibility that this population consists of multiple "morphotypes" by analyzing 21 cranial measurements from 125 fish, 411-1009 mm eye-fork length (EFL). Skull width characters are closely correlated with fish size ($r^2 > 0.67$), length of rostrum less so ($r^2 = 0.48$). Rostrum growth rate decreases with age, indicated by decreased relative size: approximately 60% EFL in small fish to 30% EFL in large fish. Characters describing anterior expansion of the rostrum exhibit low correlations with fish size ($r^2 < 0.19$). Ratio of maximum anterior width of rostrum to minimum posterior width range from 1.10 in paddlefish with straight-sided rostra, to 1.90 in "spoonbills" with spatulate rostra. Morphometric data are continuously distributed, so discrete morphotypes and sexual dimorphism are not evident. Because paddlefish are large, mobile, and highly specialized, morphotypes may not occur within a population, despite apparent phenotypic plasticity of the species.

Recent records of two asian carps in the lower Mississippi basin

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Two exotic minnows reside in Louisiana and Mississippi waters. Bighead carp, Hypophthalmichthys nobilis, and silver carp, H. molitrix, native to southern and central China, are documented by 27 collections made 1980-1994. Records of bighead carp (19) occur principally in the Yazoo Drainage (13), notably the Big Sunflower River (9); additional records are from Ouachita-Red River (4) and Pascagoula Drainages (2). Records of silver carp (8) are all from the Ouachita and Red River Drainages. Voucher specimens range from 25-120 cm TL (0.3-29 kg) for bighead, and 19-93 cm TL (0.1-16 kg) for silver carp, but fish may attain greater sizes. Both species spawn in rising, fast-flowing, turbid rivers, and larvae migrate to adjacent slack water. We have collected larvae of this genus from a backwater outlet of the Black River, LA, using Plexiglas light-traps: 12 specimens in 1992 (a low water year), >1600 in 1994 (a high water year). Impacts of these planktivorous minnows on native fishes are unknown, but monitoring populations is advisable. Because of their size and pelagic habits, neither species is commonly collected with traditional fishing and sampling techniques. Occurrence may be documented, however, as bycatch of commercial fishermen, spawning success from samples of larval fish assemblages.

Vocational education--aquaculture's new frontier

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As aquaculture expands, diversifies, and becomes increasingly technical, the traditional on-the-job training method of preparing new workers is no longer adequate. A number of states now have vocational training programs at both the community college and high school level. A new program at Mississippi Gulf Coast Community College is now in place. Financed by special state appropriation, a new state-of-the-art facility has been constructed at Long Beach. Students learn culture methods for important aquaculture species through a combined academic and hands-on curriculum. Current enrollment is 49 high school and 6 post-secondary students.

Modeling the effect of satiation feeding on water quality and successive feed consumption in fish culture ponds

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Many fish culturists, in an attempt to maximize growth rates of fish, feed to satiation (as much feed as the fish will consume). Daily consumption under satiation feeding may vary greatly over successive days. I used state space times series statistical techniques to examine possible interrelationships between variation in daily feeding rate, dissolved oxygen, and water temperature in three channel catfish ponds. Models describing the autocorrelative patterns and interrelationships between feeding rate, dissolved oxygen, and water temperature were developed for data from the period 13 July 1994 - 12 October 1994. Daily feed amounts varied considerably, with coefficients of variation ranging from 40-50%. Morning dissolved oxygen was significantly negatively related to amount fed in the two previous days in one only pond. No significant relationships were observed with afternoon dissolved oxygen concentrations. Feeding rate from the previous day had a significantly negative relationship to feeding rate in only one pond. State space modeling of this data set did not consistently detect any interrelationships between feeding rate, dissolved oxygen, and water temperature. In the next year, data collection will be expanded to include other water quality and weather-related parameters in association with channel catfish and hybrid striped bass culture ponds.

Relevancy of hybrid striped bass nutritional requirements and feedstuff digestibility values

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Phase III hybrid striped bass (HSB) averaging 41-46 g were stocked at 8,225/ha into 9 0.05-ha earthen ponds 2 May 1994. Fish were fed to satiation twice daily in three replicate ponds using one of three feeds: A) a commercially available production feed; or one of two experimental feeds formulated using nutritional requirements and feedstuff digestibility values determined for either B) channel catfish (CCF) or C) HSB. After a 200-day culture period, mean weight gain of fish fed the commercial feed (618.6 g) or the feed formulated using HSB values (592.9 g) were both significantly ($P < 0.05$) greater than weight gain of fish fed feed formulated using CCF values (486.2 g). Survival did not differ significantly among the feeds, but was slightly lower than expected (74.3-78.0%). Yield was significantly greater in fish fed the commercial feed (4026 kg/ha) or the feed formulated using HSB values (3890 kg/ha) than for fish fed the feed formulated using CCF values (3411 kg/ha). Feed conversion did not differ ($P = 0.07$) among fish fed the three feeds (2.05 - 2.66). The results document the importance of basic research that define species-specific nutritional requirements and feedstuff digestibility values.

An inexpensive recirculating aquaculture system with multiple use capabilities

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A small-scale recirculating aquaculture system was constructed using flow-through aquaria, PVC pipe and fittings, two 32-gallon plastic trash cans, a 0.25 horsepower electric pump, flexible drain pipe, and lumber. One of the 32-gallon plastic trash cans was packed with flexible drain pipe as a filter media for use as a biofilter. The other 32-gallon trash can was used as a settling basin. The lumber was used to construct a stand to elevate the biofilter above the aquaria. Therefore, gravity was used to provide flow to the culture chambers. The culture chambers overflowed into the settling basin and water was then pumped back to the elevated biofilter. This system maintained suitable culture water by minimizing fluctuations in water quality variables including water temperature, dissolved oxygen, and ammonia. This system was used for feeding trial experiments and for holding fish to be used in Ichthyology and Fish Culture laboratories; however, it can be useful for other purposes. Total estimated cost of this system was approximately three-hundred dollars, making the system affordable to anyone interested in culturing fish, from the entrepreneur who wishes to over-winter pond cultured species to the researcher who conducts nutrition or growth studies.

Kentucky Reservoir commercial mussel harvester survey

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This survey was conducted to capture species composition, average individual mussel weight (AIW) and harvest rate data from the mussel harvesters working the Tennessee portion of Kentucky Reservoir. Musselers were interviewed in areas receiving the heaviest harvest pressure. Approximately sixty to ninety musselers were surveyed per year during 1992-94, total mussels creel ranged from 11,593 (1992) to 15,824 (1993). Each musseler's catch was grouped by species, divided into size categories, counted and weighed (dead mussels were omitted). Time spent musseling and location also were recorded. Data collected were analyzed to determine species composition, catch per unit of effort (CPUE), and average individual weight (AIW). Ebony shell, Fusconaia ebena, and threeridge, Amblema plicata plicata, ranked first and second in number and weight harvested each year. Ebony shell increased from 43% of the harvest by number and 37% by weight to 75% and 68% respectively between 1992 and 1994. Annual CPUE ranged from 25.76 pounds/hour in 1992 to 33.56 in 1994. AIW of all species combined dropped from 0.46 lbs. to 0.39 lbs. during the survey. Species specific AIWs decreased from 1992-93, then rebounded slightly in 1994. Decline in AIW reflects a shift in species composition and a reduced percentage of larger mussels of all species.

An overview of TVA's reservoir benthic macroinvertebrate community assessment techniques

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In 1990, TVA began sampling benthic macroinvertebrate communities on mainstem Tennessee River reservoirs as a part of its Vital Signs and Use Suitability Monitoring Program. The benthic community is one of six parameters used to measure the ecological health of TVA reservoirs. In 1995, changes in protocol were made to improve upon both timeliness and cost of benthic data collection. A brief history of TVA's reservoir benthic community assessment procedures will be given, as well as justification for the changes made, and an overview of the methodologies currently in use

Southern walleye restoration program

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A genetically unique strain of walleye that is indigenous to the Tombigbee drainage in Mississippi has been propagated and stocked using native broodstock in an effort to preserve the strain. Historically, southern walleye have been low in abundance, and habitats have recently been impacted by construction of the Tenn-Tom Waterway and tributary perturbations. A captive breeding program may be the only feasible method of preservation in Mississippi where the Tombigbee River is now open to immigration by Tennessee River walleye. Over 800,000 walleye have been stocked in the Tombigbee Drainage, mostly after 1990. Propagation techniques have had mixed success where rapid increases and fluctuation of spring temperatures appear to limit success at our North Mississippi hatchery. Reproduction is generally higher during mild winters (early maturation) and cold springs (higher fertilization rate). Only 0-3% hatch can be expected at water temperatures >60F and 40-60% has occurred at <54F. Plans are to design a new hatchery that incorporates the knowledge gained from these propagation efforts.

The southern walleye, its status and conservation

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The walleye, Stizostedion vitreum, is an important freshwater game fish whose native range extended from Georgia, west to Montana and north into arctic Canada. Because walleye have been widely introduced, native stocks have been difficult to ascertain. Those in Gulf Coast drainages being one example, and were the subject of this review. In eastern Gulf coast drainages, native walleye were historically found in the Escambia, Mobile, and Pearl River basins. Currently native walleye are only known from the Mobile Basin. Allozyme and mitochondrial-DNA analyses have demonstrated that this population is distinctive. Records of native walleye from the Alabama, Mobile, Cahaba, and lower Tombigbee drainages are few. Spawning runs have been identified from five areas: 1) the upper Tombigbee River (Buttahatchee River, Luxapalila Creek, and perhaps Bull Mountain Creek), 2) Coosa River (Mitchell Reservoir-Hatchet Creek), 3) Black Warrior River (North River), 4) Cahaba River (Oakmulgee Creek), and 5) the Tallapoosa River (below Thurlow Dam). There is no evidence of reproducing populations in the Alabama, Mobile, and lower Tombigbee drainages. There is no evidence that stocking of exotic walleye has yielded viable populations in Gulf drainages. Conservation related data needs include: 1) number and condition of spawning sites, 2) number and ages of fish using these sites, 3) feeding and rearing habitat needs, 4) additional genetic studies, 5) feasibility study of artificial population enhancement.

Comparative survival of trout stocked in different seasons in a Tennessee tailwater.

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In August 1993, Tims Ford Dam was retrofitted with an aeration system designed to increase dissolved oxygen to 6.0 mg/l and a minimum flow requirement of 2.30 m³/s was implemented. Presently, this tailwater on the Elk River in southern Tennessee annually receives 60,000 catchable (>200 mm TL) and 35,000 fingerling (<150 mm TL) rainbow trout, Oncorhynchus mykiss, and brown trout, Salmo trutta. The number of catchable trout currently stocked represents a 100% increase over previous years. In 1995, cohorts (N=4,000) of catchable rainbow trout were microtagged and stocked in April, July, and September. In April 1995, one cohort of brown trout was also microtagged and stocked. Survival was investigated by electrofishing and conducting a roving creel survey. Electrofishing catch per unit effort (CPUE) of brown trout declined exponentially ($R^2=0.92$) and CPUE approached zero within 200 days. The decline in CPUE for rainbow trout stocked in April and July was hyperbolic ($R^2=0.92$) and CPUE approached zero within 50-60 days. The CPUE of rainbow trout stocked in September declined exponentially ($R^2=0.99$) and CPUE also approached zero within 60 days. Few individuals from any cohort were present in the creel after 30 days post-stocking. Returns to the creel were less than 30% for all cohorts based on preliminary creel results and were less than the harvest rates before the dam was retrofitted. Poor survival and low returns to the creel may be the consequence of stocking too many trout in a system that cannot support them.

Short-term mortality and injury of rainbow trout caused by three-pass AC electrofishing in a southern Appalachian stream

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Short-term (7-d) mortality and injury rates were determined for 227 wild rainbow trout, *Oncorhynchus mykiss*, sampled by three-pass AC electrofishing (500 V) in a low-conductivity stream typical of the southern Appalachian mountains. An additional 67 rainbow trout were captured by angling and served as controls. Half of each group was handled (i.e., anesthetized, measured for total length and weight, adipose clipped, and sampled for scales) to simulate the effects of a typical handling regimen. The other half was not handled. All fish were held in a partitioned raceway adjacent to the study stream. Two mortalities occurred during sampling (1 %) and five others within 24 h after the completion of electrofishing. All controls survived. Thirteen electroshocked fish could not be accounted for after the 7-d observation period and were treated as sampling mortalities. Mortality rates were 9% overall, 10% for handled fish, 7% for unhandled fish, and 12, 9, and 4% for the first, second, and third passes, respectively. Mortality did not differ significantly between handled and unhandled fish or among electrofishing passes. Mortality rates for age-0 (<100 mm) and adult (100-234 mm) fish (20 and 6%, respectively) were significantly different. Seventy-six fish comprising all seven recovered mortalities, 57 survivors (including handled and unhandled fish from all passes), and 12 controls (handled and unhandled) were X-rayed and dissected to determine the incidence of spinal injuries and hemorrhages. Two electroshocked rainbow trout (3%) had spinal injuries and two others (3%) had hemorrhages along the spinal column but no spinal injuries; no injuries were detected among the seven mortalities or the controls. Based on these results and four years of data from a nearby monitoring station, we conclude that rainbow trout mortality and injury rates caused by three-pass depletion sampling with AC are tolerable. This conclusion is limited, however, to relatively small, short-lived fish inhabiting low-conductivity waters that characterize southern Appalachian streams.

Angler exploitation of a seasonal riverine walleye fishery

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A roving creel survey was conducted on the Clinch and Powell River arms of Norris Reservoir, Tennessee. Because little is known about the influence of angling on the spawning populations of walleye, Stizostedion vitreum, in the Upper Tennessee River, information was collected regarding angling characteristics. One hundred eighty-seven interviews were conducted during an 8 week survey period from February through April 1995. Estimated angling effort during this period was 40,794 hours, which represents approximately 40% of the effort lakewide for walleye. Angler catch and harvest rates were similar between rivers. The estimated number of walleye caught was 13,162 with 5,031 harvested. Approximately 16% of those harvested were gravid females. Mean lengths were 50.3 cm for females and 42.2 cm for males. Creel results indicate that as much as 50% of the total annual walleye harvest lakewide occurs in this 8 week window within these two river arms. Thus, protection of this habitat is critical for the continued success of the Norris Reservoir walleye fishery.

Channel catfish stock characteristics in channelized and non-channelized reaches of the Yockanookany River, Mississippi

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Channel catfish, Ictalurus punctatus, stock assessments were conducted utilizing experimental hoopnets (1.3 m long; 4 hoops with 0.51 m diameters; 2.54 cm bar mesh) in the Yockanookany River, Mississippi during the winter and spring seasons of 1994 and 1995. Total sampling effort was 80 net-nights (5 hoopnets/night). Comparisons were made between channelized and non-channelized reaches of a PCB fish health advisory section, where angling for consumptive purposes is assumed minimal. Mean daily catch per unit of effort (CPUE) was 1.5 kg/net-night (SE=1.0, N=8 nights) and 0.7 kg/net-night (SE=0.6, N=8 nights) in the channelized and non-channelized reaches, respectively. Channel catfish mean length was 319 mm (SE=4.5, N=200 fish) and 332 mm (SE=6.3, N=92 fish) in the channelized and non-channelized reaches, respectively. CPUE and mean length were not significantly different ($P>0.05$) between channelized and non-channelized reaches. In addition, length-frequency distributions and proportional stock densities were not significantly different ($P>0.05$) between channelized and non-channelized reaches. Although habitat characteristics of the channelized and non-channelized reaches differ, both support similar channel catfish stocks that are suitable for a recreational fishery in the Yockanookany River.

Who participates in Mississippi angler studies

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We conducted a telephone survey of 6,500 anglers in Mississippi to recruit participants for a statewide 5-year, longitudinal angler survey and a volunteer angler diary program. Of these 6,500 anglers, 4,393 anglers agreed to participate. Of the 4,393 anglers in the longitudinal survey, 1,153 agreed to participate in the volunteer diary program. Chi-square tests were conducted between the two dependent variables (survey and diary participation) and twelve independent variables to determine significant predictors of participation in each program. Significant variables were entered in logistic regression models for each dependant variable. Of the twelve variables tested, age began fishing, familiarity with the Sport Fish Restoration Fund, number of people in the household, number of dependants under 18, years of education completed, and employment status were significant for panel participation. These six variables correctly classified 86.9% of the total cases in the regression model. Variables that were not significant were gender, race, marital status, gross household income for 1993, purchasing a saltwater fishing stamp in 1993, and having a commercial fishing license. Age began fishing, familiarity with the Sport Fish Restoration Fund, and gender were significant for diary participation. These three variables correctly classified 56.8% of the total cases in the regression model.

*Presenter

Additive versus compensatory mortality: a review of the evidence for largemouth bass, white crappie, black crappie, and northern pike fisheries

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The compensatory mortality hypothesis postulates that a population's total mortality remains unchanged at low to intermediate exploitation rates because natural mortality decreases to compensate for reduced density, whereas the additive mortality hypothesis postulates that any increase in exploitation mortality results in a linear increase in total mortality. Fishing and natural mortality rates have generally been assumed to be additive rather than compensatory. We reviewed mortality estimates for largemouth bass, Micropterus salmoides, black crappie, Pomoxis nigromaculatus, white crappie, P. annularis, and northern pike, Esox lucius populations to identify evidence for compensatory or additive mortality. Annual total mortality (A , %) and exploitation (u , %) averaged 64 and 36 for largemouth bass, 75 and 48 for crappie species, and 52 and 11 for northern pike. For largemouth bass, A increased linearly with u suggesting additive mortality. For crappies, u did not seem to affect A at low to moderate u , but A increased with u as u increased beyond 40%, conforming to the compensatory mortality hypothesis. Northern pike mortality estimates revealed no relation between A and u , and highly variable A for a given u . Evidence from the literature suggests that mortality of northern pike may be compensatory for fish smaller than 40 cm total length, but additive for larger fish. Because compensatory natural mortality reduces the managers' ability to control A , we suggest that harvest regulations intended to reduce A show more promise for largemouth bass than for crappies or northern pike fisheries.

Predatory responses of largemouth bass, Micropterus salmoides, to aposematic and cryptic hatchling turtles.

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Prior research on the antipredator mechanisms of hatchling, freshwater turtles discovered a previously unknown defense associated with aposematic coloration. The defense usually associated with warning coloration is either chemical or morphological, and now behavioral mechanisms have been added to the list. Hatchling painted turtles, Chrysemys picta, and red-eared sliders, Trachemys scripta, are able to avoid being preyed upon by largemouth bass through the use of escape behaviors such as biting, clawing, etc., within the mouth and upper digestive tract of the bass upon being engulfed. Results for this research suggest that largemouth bass are associating the aposematic plastral colors of the hatchlings with the potentially damaging escape behavior. Two experiments were performed to answer the following questions regarding this phenomena: (1) Are there differences in the feeding responses of largemouth bass when presented with dead, anesthetized, and active aposematic and cryptic [e.g., common snapping turtles, Chelydra serpentina, hatchlings? and (2) Is the "memory" of past feeding experiences on aposematic hatchlings retained over seasons in largemouth bass? In the first experiment, there was a greater number of attacks on snapping turtles (after experience with a live snapping turtle hatchling) indicating that bass are unable to associate the cryptic appearance of the hatchling with past predation experiences. For the second experiment, it appears that largemouth bass do not retain the memory of past feeding experiences as evidenced by an increase in the initial attack rate from fall to spring testing. This result supports the validity of using wild-caught bass as "naive" predators in these experiments.

Factors affecting competition between brook char and rainbow trout in southern Appalachian streams: implications of an individual-based model.

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A spatially-explicit, individual-based model of brook char and rainbow trout resident in a high gradient stream was used to investigate five hypotheses concerning competitive exclusion of brook char by rainbow trout in the southern Appalachians. Model simulations were used to quantify the effects of (1) greater aggressiveness in rainbow trout, (2) latitudinal differences in stream temperatures, flows, and daylight, (3) year-class failures, (4) fecundity of brook char, and (5) reductions in spawning habitat on the population dynamics and competition between rainbow trout and brook char. Results indicated that frequent year-class failures and low fecundity of brook char favored rainbow trout, and could explain the higher brook char densities in the northern Appalachian region. Latitudinal differences in temperature and flow, and reductions in spawning habitat, provided less likely explanations of population trends in the Appalachians, and aggressiveness of juvenile and adult rainbow trout did not dramatically affect competition between the species.

Distribution of the redeye bass, Micropterus coosae, in Tennessee, and its hybridization with other Micropterus species.

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To enhance headwater stream fisheries, nonindigenous redeye bass were introduced into seventeen north central Tennessee streams during the mid 1950's to early 1960's. Initially, separation was present between the introduced redeye bass populations (upper stream reaches) and the indigenous Micropterus populations (M. dolomieu and/or M. punctulatus-lower stream reaches). As these redeye bass populations became established, however, they expanded their range into the middle stream reaches; this population expansion resulted in multispecies communities of Micropterus. These sympatric congeners can hybridize; meristics and biochemical genetic analyses have documented hybridization between redeye bass and smallmouth bass in Roaring River, TN. In the present study, three facets are addressed: habitat assessment as related to redeye population establishment, current redeye bass distribution, and hybridization between sympatric congeners. Habitat assessment includes total alkalinity, pH, conductivity, dissolved oxygen, substrate/cover, canopy cover, range of depth, and associated fish species. Current distribution has been determined via backpack electrofishing. Hybridization will be predicted by phenotypic appearance and meristics, and verified through starch gel electrophoresis.

Habitat choice of the bluespotted sunfish, Enneacanthus gloriosus: The role of plant architecture.

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In coastal Mississippi, bluespotted sunfish, Enneacanthus gloriosus, are typically found in sideponds dominated by architecturally complex submerged aquatic vegetation (SAV). It was hypothesized that bluespotted sunfish would choose more complex SAV (Myriophyllum aquaticum and Elodea canadensis) over less complex SAV (Vallisneria americana and Eleocharis sp.). When given a choice among these four species of SAV, a significantly greater ($P = 0.035$) percentage of bluespotted sunfish chose V. americana (mean = 65 %), a simple structured SAV, over the other three species (all means < 40 %). This finding contradicts our hypothesis and suggests other factors might control habitat choice. It is possible that the physico-chemical properties of these oxbow sideponds play a more important role in bluespotted sunfish habitat choice. The sideponds typically have a lower pH, are warmer, and have a slower water velocity than the adjacent main channel habitats. Previous studies have shown that members of the genus Enneacanthus show a greater affinity for lower pH than other members of the Centrarchidae. Recent studies in coastal Mississippi have also shown that bluespotted sunfish abundances decline from east to west in accordance with an increasing pH across those same drainages. It is possible that pH plays a major role in habitat selection in this species.

Colonization of artificial seagrass by juvenile crabs and fishes as a function of shoot density

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Seagrass provides important nursery habitat in shallow coastal waters. In Mississippi, seagrass habitat is mainly limited to patchy areas of shoal grass, Halodule wrightii, occurring along protected shorelines of barrier islands. Artificial seagrass mats (ASM's) of three blade densities were deployed in a random block design within an extensive 0.4 km stretch of shoal-grass habitat on the northern shore of Horn Island, in Mississippi Sound. We wanted to know whether the abundance and diversity of colonizing seagrass organisms are affected by blade density as well as how effectively our ASM's served as samplers of seagrass organisms. ASM's were colonized for several weeks (5-8) during late summer and early autumn 1995, before being recovered. A custom designed ASM retrieval net enabled us to completely sample all ASM associated organisms larger than 0.75 mm. Nine of the twelve original ASM's were successfully recovered. Associated organisms were sorted, identified, and enumerated. Several important fisheries species, including juvenile blue crabs and spotted seatrout, were associated with the ASM's. Here, we report on abundances of juvenile portunid crabs and fishes obtained with this method.

A patch-model to determine quality of fish habitat in aquatic plants

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A variety of aquatic plants typically grow in littoral zones of freshwater systems. Innate differences, i.e., plant architecture and stem density can influence prey availability and behaviors by foraging fishes inhabiting these habitats. We measured fish behavior in aquatic plant beds of a clear-water Wisconsin lake using underwater video cameras. Data were collected from eight different aquatic plant patches (1 m²) varying by plant type and density. All video data collected from the lake (duration of 8 hrs 58 min) were analyzed using focal-animal samples. A total of 1,319 fishes were recorded, representing approximately 4.5 hrs of focal samples. Foraging behaviors represented 35.19% of the sample. Fish *forage duration* (% time fishes were observed foraging) and *forage rates* (no. of fish observed foraging / sample) were determined within each plant patch. Based on assumptions of Charnov's patch model, foraging rates and durations were compared to evaluate habitat quality of aquatic plant beds. We hypothesize that increases in both foraging duration and rate indicate high patch value and these behaviors can be used to delineate the quality of fish habitat in aquatic plants.

Movement patterns of fishes in two Ouachita Highlands streams

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Although it is recognized that information about fish movement patterns could aid in understanding the community ecology of fishes, few studies have been conducted. Investigations using small, non-game stream fishes are especially rare, even though these fishes are numerically dominant in the United States. Existing information suggests that some species of stream fishes are relatively immobile, but a small component of populations may move long distances. Information about this potential polymorphism in behavior is difficult to obtain, in part because of the difficulties involved with individually tagging small fishes. Our objective is to investigate movement patterns of selected species of non-game fishes in two Ouachita Highlands streams using passive integrated transponder (PIT) tags when possible. Our recapture data will assess spatial and temporal movement patterns in our study species, which include longear and green sunfish, yellow bullhead, creek chub, pirate perch and blackspotted topminnow. Sex, weight and length is determined for all individuals marked. If population differences in movement patterns exist, we hope to identify the characteristics of the individuals comprising the different population components. This preliminary report presents data from May - December 1995, which encompasses the seasonal low-flow period.

Biotic index for cold tailwaters

Ed Scott

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Two benthic macroinvertebrate metrics and three trout population metrics are substituted for five Index of Biotic Integrity (IBI) fish metrics in development of a biotic index for cold tailwaters below certain Tennessee Valley Authority (TVA) storage dams. Modifications of other IBI metrics and scoring criteria are also used for assessing cold tailwater fish communities. The index is used to monitor biotic community trends associated with improvements in discharge water quality made possible by TVA's Reservoir Releases Improvement (RPI) program. Results of surveys below Norris, South Holston, Wilbur, and Chatuge dams will be presented.

Sports fishery restoration of oxbow lakes in the Mississippi Delta MSEA Project

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Management System Evaluation Areas (MSEA) are research projects designed to evaluate the effectiveness of farming systems in controlling offsite damages from agricultural pollutants. While most MSEA projects have been located in the Midwest, a Mississippi Delta MSEA Project was established in 1994 on three oxbow lake watersheds south of Greenwood and Indianola, MS. The Mississippi Delta MSEA Project will test three farming systems that vary in erosion control costs and methods. In addition to monitoring the effectiveness of the farming systems in controlling sediment, nutrient and pesticide pollution, this project will examine the ecological impact of these systems on the oxbow lakes. Preliminary water quality and fisheries surveys of these oxbows indicate historical agrichemical contamination and habitats that are severely sediment stressed. Following establishment of management practices designed to reduce sediment-laden runoff, each lake will be renovated using rotenone poisoning followed by stocking of largemouth bass and bluegill. Each watershed will be monitored for three years following stocking. This project will be one of the first to establish a link between farming system practices and the ecology of receiving waters.

Low density stocking of advanced Florida largemouth bass fingerlings into Pelahatchie Bay, Ross Barnett, Reservoir

Tom Holman

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Advanced Florida largemouth bass, (Micropterus salmoides floridanus, 180 mm mean total length) were stocked into a 2,500 acre embayment of Ross Barnett Reservoir at the rate of 2.4 per acre. The objectives were to produce a larger fish (or trophy) more quickly and to introduce the Florida allele into the population. One thousand fish were tagged with Hallprint internal anchor tags and released at two locations. Angler tag return information was used to monitor growth, survival, and dispersal from the stocking sites. Data indicates that Florida bass grew at a similar rate to the native stock, annual survival was estimated at about 0.41, and movement was more or less limited.

Dynamics of young-of-year largemouth bass populations in a Tennessee Reservoir

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Young of the year largemouth bass and were sampled from 1992-1995 in Normandy Reservoir, a flood and water supply reservoir in Tennessee. Samples were collected using hand-held electrofishing and cove rotenone techniques. Sagittal otoliths were used to estimate hatching dates. The magnitude of the spawn of largemouth bass was not related to spring water levels; however, largemouth bass hatched earlier when water levels reached full pool early in the spring. The early hatching of largemouth bass in 1994 resulted in a bimodal size distribution by mid-summer and higher survival for that year class through the first year of life. An examination of the abundance of each year-class at different life history stages suggested that a critical period existed in the recruitment process; year-class strength appeared to be fixed by late-summer of each cohorts first year of life. The variation in peak electrofishing catch rates was examined as a function of several habitat variables measured at each of 21 fixed electrofishing transects, the slope gradient at each site explained the most variation and was inversely related to catch.

Assessment of largemouth bass populations in Tennessee River reservoirs using catch depletion techniques

Donny Lowery

Tennessee Valley Authority, Muscle Shoals, AL

Catch depletion techniques were utilized to assess largemouth bass populations in six mainstem Tennessee River reservoirs. Density (no./acre), biomass (lbs./acre), length frequency, growth, health and condition factor information was obtained. The procedure was conducted during the pre-spawn period using intensive electrofishing efforts in blocked-off coves (5-8 acres). It provided information comparable to that of cove rotenone surveys but is essentially a non-invasive technique. Participation by sportfish anglers in these surveys contributed to positive public relations within the Tennessee Valley.

Food habits of juvenile largemouth bass, *Micropterus salmoides*, in Sale Creek embayment, Chickamauga Reservoir, Tennessee

C. Scott Loftis, Christopher J. O'Bara, and Michael A. Eggleton

Center for Management, Utilization and Protection of Water Resources, Tennessee Technological University, Cookeville, Tennessee

Food habits and diet shifts of juvenile largemouth bass, *Micropterus salmoides*, were examined during the summer of 1995. Fish were collected from littoral areas using standard backpack electrofishing techniques. Fish were sampled bi-weekly from late May through mid September. Two samples from each of three habitat types were collected. Forty-eight samples were taken at 8 sample periods. Juvenile largemouth bass utilized a diverse prey base which included fish, aquatic insect larvae, zooplankton, leeches, and detritus. Zooplankton comprised up to 90% by weight of the prey items consumed through May declining to < 35% thereafter. From mid June onward, fish comprised 63 to 95% of the diet by weight. Zooplanktivory was generally highest (up to 100%) in rock habitat after early June. Insectivory was highest (38 to 72%) in vegetated sample areas from early June to late July. Little or no trend in piscivory among habitat types was detected.

Interactions of water levels and juvenile fish population characteristics in Chickamauga Reservoir, Tennessee

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Center for the Management, Protection, and Utilization of Water Resources, Tennessee Technological University, Cookeville, TN

A long-term study to determine the effects of water level fluctuations on largemouth bass, Micropterus salmoides, recruitment has been ongoing since 1992 on Chickamauga Reservoir. Physical and biological data collected from two embayments have displayed annual variation. Spawning period (March 20-May 31) water level characteristics were similar in 1993 and 1994, and 1992 and 1995. Spawning period temperature profiles were similar in 1992 and 1994; 1993 was cooler than normal with 15°C not reached until late April; 1995 was warmer than normal with 15°C already reached by April 5. Nursery period (June 1-September 30) hydrological characteristics also varied annually providing a range of habitat complexity. First year growth patterns were similar in 1992 and 1994. However, age 0 largemouth bass exhibited significantly greater ($p < 0.05$) first year growth in 1993, with most attributed to late summer growth incurred in August and September. Growth in 1995 was greater in early summer (June-July), but was similar to other years by August. Mid-summer juvenile bass densities generally exhibited inverse relationships with estimated weekly survival and weekly instantaneous growth rates. Thus, observations were likely related to density-dependent mechanisms. Linear regression analyses yielded significant ($p < 0.05$) statistical relationships between black bass growth characteristics and spawning and nursery period hydrology. Lower first year growth was associated with higher summertime water levels. This is probably related to habitat complexity which increases in Chickamauga Reservoir with water levels. Interactions with prey species are also important. Significantly greater first year growth of juvenile largemouth and spotted bass in 1993 was also associated with a delayed threadfin shad spawn. Many researchers agree that year class strength is generally set early in the life for most fishes, with post-spawning survival and first year growth characteristics the most important in creating a strong year class. Understanding of how these factors interact on an annual basis and how/if they are related to year class strength will add resource managers in future black bass management endeavors.

Size selectivity of angling in crappie fisheries

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Black crappies, *Pomoxis nigromaculatis*, and white crappies, *P. annularis*, comprise approximately half the sportfish harvest in Mississippi, making exploitation an important factor operating in these fisheries. We examined tag return rates for more than 5,100 crappie tagged in several Mississippi lakes. Exploitation was size selective increasing with fish length, peaking at 11-12 inches and decreasing thereafter. Differences in length at peak vulnerability and maximum exploitation occurred among lakes and between species. Handling mortality during tagging did not appear to cause the size selective exploitation indicated by tag returns. We suspect that diet, habitat use, and prevalence of commercially available baits and lures interact to prompt differential catchability. The incorporation of differential exploitation by size into a population simulation model produced higher yield estimates than those generated using constant exploitation across size classes. Knowledge of size selective exploitation in crappie fisheries may allow for improvement of harvest restrictions and a better understanding of the effects of harvest restrictions.

Efficiency and selectivity of three trap net types for sampling crappies

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We compared the catch statistics of crappies *Pomoxis* spp. and costs associated with sampling derived from three trap net types in Mississippi Lakes. The trap nets evaluated included a standard fyke-type net that fishes on the bottom and has a 3X6-ft frames and a 50-ft lead; a modified fyke-type net that fishes on the bottom and has 8X8-ft frames and a 200-ft lead; and a modified fyke-type net that fishes on the surface and has 8X8 frames and a 200-ft lead. Preliminary results indicate that modified fyke-nets can often produce substantially higher catches facilitating monitoring efforts. Estimates of population statistics such as recruitment, length and age distributions, and mortality may sometimes differ among gears. Modified fyke-nets may also be more cost efficient than the standard fyke-net. Accuracy of the floating fyke-net in identifying population characteristics are being assessed by comparing its catch with that of known populations.

Early detection of crappie year class strength using neuston net sampling: implications for management

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Black crappie, Pomoxis nigromaculatus, and white crappies, P. annularis, were sampled from Normandy reservoir, TN, as part of a larger study attempting to quantify relationships between water level fluctuations and recruitment of sport fish species. Crappies were sampled using a variety of techniques, including neuston net tows, unbiased angling, cove sampling, and fall trapnetting. Due to basin morphology of Normandy reservoir and use of pelagic habitats by crappie, fall trapnetting did not sample crappies effectively, even in years where high abundance of these species was indicated by other sampling methods. By sampling crappies at different life history stages, we determined that year class strength of crappies was fixed at the larval stage, and was positively influenced by high water levels during the spawning season. Recruitment of crappies in Normandy reservoir followed a "boom or bust" pattern over the last six years. Cove samples were effective at monitoring the abundant 1994 year class of crappies (3217/ha at age 1+) for at least the first two growing seasons. Early detection of crappie year class strength using the neuston net may allow managers to predict poor year classes of crappie quickly, initiating remedial actions (such as supplemental stocking) in a more timely manner.

Relative abundance of fishes in main channel and secondary channel habitats in the lower Mississippi River

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The U.S. Army Corps of Engineers maintains a commercial navigation channel in the lower Mississippi River by managing water flow with rock wing dikes and bank paving (revetments). Revetments prevent the river from carving new channels in the alluvial plain. Wing dikes, by diverting flow, accelerate sedimentation of downstream secondary channels and loss of aquatic habitat. We compared the diversity and abundance of fishes in shallow sandbar and steep bank habitats at two main channel and four secondary channel locations in the lower Mississippi River by sampling with 0.6-m and 1.2-m diameter hoop nets and with 500V, 60pps and 1000V, 15pps electrofishing from August to December 1994. Forty-two species of fishes were collected; 32 species were collected from main channel locations and 38 species from secondary channel locations. Prevalent species at these locations were Dorosoma cepedianum, D. petenense, Ictiobus bubalus, Carpoides carpio, Ictalurus furcatus, I. punctatus, Pylodictis olivaris, Morone chrysops, Lepomis macrochirus, and Aplodinotus grunniens. Of the 52 comparisons of catch rate between channel types, one indicated a higher ($P < 0.10$) catch rate in secondary channel locations, whereas four indicated higher catch rates in main channel locations. Our results do not support a unique need to maintain secondary channel habitats. However, most catch rate comparisons between channel types indicated that the secondary channel locations provided habitat equivalent to that of main channel locations and, therefore, beneficial fishery habitat would be lost if sedimentation eliminated the secondary channels.

Effectiveness of hoopnetting and electrofishing in the lower Mississippi River

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Effective fish sampling methods have constrained acquisition of data necessary for fisheries management in large rivers. We compared the relative effectiveness of 61-cm and 122-cm diameter hoop nets with that of 500 V/60 pps and 1,000 V/15 pps DC electrofishing in the same habitats in the lower Mississippi River. Forty-two fish species were collected in 737 hoop net nights and 322, 5-min electrofishing transects. Two species were collected only with hoop nets, whereas 19 species were collected only with electrofishing. Using field personnel time as unit effort, electrofishing catch/effort exceeded hoop net catch/effort for most species in most samples. Few significant ($P \leq 0.10$) rank correlations for catch/effort of prevalent species and for proportional size structure of catch with hoop nets and electrofishing indicated differential species and size selectivity of the sampling gears. Electrofishing equipment costs were 11% less per sample than hoopnetting equipment costs, and electrofishing required 25% less person-time per sample than hoop net sampling. For three ictalurid species, mean hoop net catch rate was 0.23-0.31 fish/person-hr and sampling cost (exclusive of boat, travel, and personnel costs) was \$11.38-16.89 per fish. For the same fishes, mean electrofishing catch rate was 0.85-1.6 fish/person-hr and sampling cost was \$2.92-5.50 per fish. We found electrofishing provided a more thorough description of community composition, collected higher numbers of fish per unit of personnel effort, was more economical, and allowed faster completion of sampling than hoop net sampling.

Settlement indices of blue crab megalopae and abundance of early crab instars in shoreline habitats: relationship of seasonal periodicity to management of the resource

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In the Gulf of Mexico, blue crab, Callinectes sapidus larvae are exported from estuaries to the adjacent continental shelf waters where they molt and grow through the zoeal stages to the postlarval or megalopal stage. Re-invasion of the estuary occurs during the megalopal stage. Although seasonal periodicity of settlement has shown consistent trends over the five year period from 1991 through 1995, settlement events are episodic and the annual magnitude of settlement highly variable. Megalopae first appear on stationary shoreline collectors in May with consistent daily settlement beginning in July and extending through September. Although the spawning season of blue crabs in the Gulf of Mexico extends from March through November, there is a noticeable lack of megalopal settlement on collectors in the spring and early summer. While abundance of early crab instars (≥ 10.0 mm) more closely mirrors spawning activity in females, small juveniles are not evident in spring samples. The lack of megalopal settlement and reduced numbers of small juvenile crabs in spring samples may argue for a more conservative approach to management. The assumption that recruitment occurs over an extended time period with waves of modal groups entering the fishery may not be valid. Current data suggest that while recruitment may occur in all seasons, it is concentrated in late summer/early fall. The concept of yearclass as opposed to successions of modal groups may thus characterize the fishery in the Gulf as it does in the Chesapeake Bay.

Shrimp management in Mississippi: papal bull to politics.

Tom Van Devender

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Three species of sub-tropical penaeid shrimps are harvested from Mississippi Sound and associated nearshore Gulf waters. Recreational, commercial and bait shrimpers all compete for the inshore resource and require differing regulations with some overlap in time and space. Harvest is based entirely on juveniles and sub-adults returning to the open Gulf to spawn. Basic shrimp life-history studies conducted in the estuaries over the past forty years have evolved into a monitoring/prediction program of postlarval abundance which in turn is used today by the state to manage shrimp season. Other trawl and seine catch data are utilized to manage through area closure and gear restrictions. Regulations have been refined to include not only the biological necessities of maintaining healthy shrimp stocks, but also consider important historical, cultural and economic factors.

Patterns and abundance in the ichthyoplankton in the Gulf of Mexico

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Preliminary data summaries are presented for snapper, king mackerel and spanish mackerel larvae collected in bongo net samples during SEAMAP Summer Shrimp/Groundfish Surveys from 1986 through 1993. Larvae of the mackerels can be identified to the species level, however, species identifications of snapper larvae is difficult and only recently has been made possible for specimens larger than 3.5 mm in length. Therefore, snapper data summaries given here are based on identification to the family level only. Precision of mean abundance estimates as indicated by the ratio of the standard error of the mean to the mean suggest that larval abundance for these three taxa could be of potential use in following trends in population levels.

Use of larval fish data to assess stock sizes and further our understanding of recruitment variability

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Indices of larval red drum abundance in the northcentral Gulf of Mexico have increased during the past seven years, and indicate that the offshore spawning stock of red drum in this area has also increased in size during this time period. Indices were developed for individual ichthyoplankton surveys conducted during September in coastal waters of western Louisiana, Mississippi and Alabama. Also found in these ichthyoplankton collections were larvae of red snapper and vermilion snapper, and although it is not currently possible to assess sizes of snapper stocks from abundances of these larvae, age/growth analyses of snapper larvae do further our understanding of factors that cause recruitment variability. Spatial differences in growth rates of vermilion snapper larvae, when coupled with relatively small changes in larval mortality rates, can cause order-of-magnitude differences in cumulative larval survival. Between-station comparisons of growth rates were not possible for larval red snapper because of a relatively small sample size.

Age and growth of spotted seatrout, Cynoscion nebulosus, from Mississippi's coastal waters

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Age and growth were estimated using sectioned sagittal otoliths from 808 spotted seatrout, Cynoscion nebulosus, collected from Mississippi Sound and adjacent coastal waters during 1992-1994. Marginal increment analysis indicated annulus formation occurred during January through May. The spawning season occurs during April through October. The average age of first increment formation was 8.5 months using the mean hatching date of July 1st and mean date of first annuli formation of March 15. The maximum observed age was 4 years for males and 5 years for females, which is lower than ages previously reported for other areas in the Gulf of Mexico. Females were generally larger than males although growth was highly variable. Back-calculated lengths at age using direct proportion methods revealed a more pronounced Rosa Lee's phenomena in males than females.

Food of juvenile cobia, Rachycentron canadum, from the northern Gulf of Mexico

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Stomachs of 49 juvenile cobia, Rachycentron canadum, 236 to 440 mm FL, collected during trawl surveys conducted in the northern Gulf of Mexico during 1993 and 1994 were examined. Eighty percent ($n=39$) of the stomachs contained food items representing 24 taxa. Stomach contents data were analyzed for percent numeric abundance, percent volume and percent frequency occurrence to quantitatively describe the diet. These values were combined to calculate an index of relative importance (*IRI*) for prey. The diet was comprised of three principal food categories: fish, crustaceans and cephalopods. Major prey were anchovies, shrimps, squids, and unidentified fish and shrimp remains, collectively accounting for 73.8% by volume, 84.2% by number and 94.7% *IRI* of the diet. Fishes and crustaceans occurred in 79.5% and 59.0% of the stomachs, respectively, and were present in approximately equal numbers and volumes. The slender squid, Loligo pealei, was dominate among identifiable prey based on %*V*, %*F* and *IRI* and was the second most important food item based on %*N*. Chi-square contingency table analysis and Fisher's exact test found a significant difference in frequency occurrence of crustaceans between two FL size groups of juveniles (236-337 mm; 338-440 mm) ($\chi^2=5.475$, $df=1$, $P<0.05$), however these tests found no differences for fish and cephalopods. The diet did not differ significantly between seasons or geographic areas. Stomach fullness (total prey weight/predator weight x 100) measured against time of capture as assigned to one of 6, 4-h time intervals found mean stomach fullness at highest levels during daytime intervals, however the difference between the means was not statistically significant (ANOVA, $F=5$, $P>0.05$). Stomach fullness measured simply against day and night showed a significant difference (ANOVA, $F=1$, $P<0.05$).

Determining maturity schedule using gross observations of gonads in spotted seatrout, Cynoscion nebulosus from Mississippi's coastal waters

R. Russell and J. Warren

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A maturity schedule for both sexes of spotted seatrout, Cynoscion nebulosus, was recorded for 701 fish taken from March, 1992 coastal waters. Maturity was coded by the estimated ratio of the ovary/testes volume to stomach cavity volume and by the observed gross morphology of the gonad. Maturing females were observed from April through August with running ripe fish observed in July. One male fish taken in April and one male fish taken in May were maturing. The observed maturity schedule corresponded well with reports from other Gulf states occurrence of postlarval spotted seatrout observed in samples taken from 1974-94 nearly mirrored the maturity schedule observed in this study after allowing for initial growth after spawning.

Population age structure dynamics of red drum, Sciaenops ocellatus, from Mississippi Sound in response to changes in management regulations.

B. Randall and J. Warren.

Gulf Coast Research Laboratory, Ocean Springs, MS

Red drum, Sciaenops ocellatus, have been monitored in Mississippi's coastal waters from 1987 through the present. Monthly sampling at fixed, selected sites have produced 3897 fish covering three year classes and ranging in length from 9 to 28+ inches. Most fish were less than two years of age. Two changes of the regulations for this fish in Mississippi occurred during the sampling period. Prior to July 1990 a 14 inch TL minimum size and 10 fish per day/3 day possession limit was in effect. From July 1990 through October 1994 the minimum size was change to 22 inches total length (TL) with a 3 fish per day bag limit. After October 1994 fish above 18 inches TL were legal and the 3 per day bag limit remained the same. A comparison of length/age groups present in the inshore population before and after the 22 minimum size limit was imposed indicated a strong shift toward an increase in relative numbers of larger fish. Data suggested that emigration of fish from the inshore waters to offshore begins at approximately 18 inches TL or 1 1/2 years of age. The current 18 inch minimum size should provide for at least 30 percent escapement of each year class to the offshore spawning stock.

Estimates of spawning potential ratio (SPR) of the inshore stock of striped mullet, Mugil cephalus, utilized by the "roe mullet" industry.

J. Warren

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Striped mullet stocks are harvested in Mississippi's inshore waters for the production of roe. This fresh product is shipped to oriental markets. The perceived reduction of inshore stocks and the harvesting of fish during the reproductive season has caused concern about the abundance of the population and whether the stock can sustain itself under the current level of utilization. The catch has been sampled yearly since 1990. From these samples the age distribution by sex has been determined and extrapolated to the total catch landed from Mississippi waters. Mortalities between ages was calculated using VPA analysis. A spawning stock biomass and spawning potential ratio (SPR) was estimated from these data. The SPR for striped mullet stocks taken from Mississippi waters indicates that the spawning stock is sufficient to sustain production at the present level of harvest.

Long-term trends in abundance of selected juvenile sciaenids from Mississippi's coastal waters.

S.J. VanderKooy, J. Warren, M.S. Peterson and H. Al-Shaqsy.

Gulf Coast Research Laboratory, Ocean Springs, MS

Many fish in the northern Gulf of Mexico are estuarine dependent during some part of their life history and require the estuarine habitat as a nursery ground. Monthly monitoring of fishes in Mississippi Sound for the last twenty-one years has allowed us to investigate factors that may have influenced the relative abundance of Atlantic croaker, spot, and white seatrout, the more abundant members of Sciaenidae found locally. Hydrologic conditions were related to the relative abundances of larvae and early juveniles (standard length < 20 mm) collected in beam plankton nets and fifty-foot seines during the species-specific period of peak abundance. Principle component analysis (PCA) was used search for and identify important annual differences and/or similarities in bottom temperature, salinity, and dissolved oxygen, and rainfall, and water depth which might relate to the calculated "index of relative abundance" and thus delineate long-term trends in abundance. Although PCA explained, on average for all species, 74 % of the variation in the six environmental variables, no overall pattern in abundance relative to the measured parameters was found. Other environmental/biological factors such as currents and spawning success are likely interacting with anthropogenic factors (commercial shrimping, industrial bottom-fishing, recreational fishing, and habitat destruction) to influence recruitment and the distributions we have observed the last two decades.

Comparison of relative fishing powers of research vessels *Pelican* and *Tommy Munro*

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Forty seven paired comparison tows were conducted between state research vessels *Pelican* (Louisiana) and *Tommy Munro* (Mississippi) in the northern Gulf of Mexico to investigate possible differences in catch rates between vessels. Identically constructed 12.2 meter (40-ft) shrimp trawls were used by each vessel in an attempt to remove all effects other than vessel differences. We used simple linear regression analyses on catch rates of twenty-nine taxa which comprised 90.0% of all organisms caught during the experiment. Dummy variables were used on log-transformed data, to develop one mathematical model to represent the relationship in catch rates between vessels of all 29 taxa analyzed. Our results indicated significant relationships ($\alpha=0.05$) between vessels for all taxa with eight indicating significant differences between vessels (bigeye searobin, *Prionotus longispinosus*; gulf butterfish, *Peprilus burti*; Atlantic cutlassfish, *Trichiurus lepturus*; striped and bay anchovies, *Anchoa hepsetus* and *mitchilli*; southern hake, *Urophycis floridanus*; dwarf sand perch, *Diplectrum bivittatum*; and least puffer, *Sphoeroides parvus*). We observed no clear pattern of either vessel consistently outfishing the other. Also, we observed contradictory results with respect to taxa occupying benthic and epibenthic habitats. Therefore, we concluded that there was no appreciable difference in overall fishing powers of research vessels *Pelican* and *Tommy Munro*.

Gulf Coast Research Laboratory's gulf race striped bass restoration program.

Larry C. Nicholson,

Gulf Coast Research Laboratory, Ocean Springs, MS

Striped bass, Morone saxatilis, are anadromous fish once common to rivers discharging into the northern Gulf of Mexico. Historically, the fish ranged from Suwannee River, FL to the Trinity River, Texas and they were an important recreational and commercial fishery along much of the northern Gulf of Mexico. Native Gulf striped bass populations began to decline in the late 1940's and early 1950's. With the exception of the Apalachicola-Chattahoochee-Flint (ACF) population in Florida, Georgia, and Alabama, Gulf race striped bass disappeared from the tributaries of the Northern Gulf of Mexico. The decline has been attributed to several factors, which include loss of habitat, blocked access to historical spawning areas and summer thermal refuges and water quality degradation. In some river systems over-exploitation was the major factor contributing to their demise. In the 1960's, Atlantic-origin striped bass were released into most Gulf coast tributaries, including the only system with a remnant population of Gulf Race striped bass. These fish were stocked as a first step to restore the species to its native range. The present day occurrence of striped bass in the five Gulf States is the direct results of the striped bass restoration program.

Southeast area monitoring and assessment program: a fishery-independent program for collection of management related data.

Richard Waller, Harriet Perry and Bruce Comyns

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The Southeast Area Monitoring and Assessment Program (SEAMAP) is a cooperative effort between the Southeastern States, including the Virgin Islands and Puerto Rico, and the National Marine Fisheries Service (NMFS). The program is split into four components (Gulf of Mexico, South Atlantic, Caribbean, and NMFS) and is respectively administrated by the Gulf States Marine Fisheries Commission (GSMFC), the Atlantic States Marine Fisheries Commission (ASMFC), and the Caribbean Fishery Management Council (CFMC). The program was conceived in 1981 by representatives from the five Gulf States and the NMFS. Data collection began in 1982 using established protocols as formulated by the founding group. These protocols are followed by all participants. The Program Objective is to provide fishery-independent monitoring and assessment information essential to the rational management of Gulf of Mexico fishery resources in both State and Federal waters in a coordinated and cost-effective manner. The data collected by all participants is stored in a centralized data base and is available to anyone upon request. Basic data collection cruises in the Gulf of Mexico include the Summer Shrimp/Groundfish Trawl Survey, the Fall Groundfish Trawl Survey, the Spring Plankton Survey, the Fall Plankton Survey, and the Trap/Video Reef Fish Survey. All surveys are collected Gulf-wide.

Use of biological information to target water quality improvement efforts on a watershed basis

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TVA's Wheeler/Elk River Action Team (WERAT) is assigned to the 5000 square miles that drains into Wheeler Reservoir in northern Alabama; this includes the Elk River watershed. Our job is to support local water-quality improvement projects. To be most effective, we needed baseline information to help target our efforts and to provide to cooperators. Little biological information was available for the Interior Plateau. So, in 1994 and 1995, TVA personnel sampled aquatic communities at 170 sites, including 87 in Tennessee. IBI protocols were used for fish, and EPT was used to rate the benthic macroinvertebrate communities. The WERAT encouraged local stakeholders to volunteer on the sampling crews. The WERAT has used the biological information to support local initiatives in the Richland Creek, Flint Creek, and Paint Rock River drainages. This fiscal year, we will integrate our Elk River biological data with water chemistry and land use data to evaluate water quality issues in the Elk River watershed.

Modifications to the Index of Biotic Integrity as an ecological health indicator for Tennessee Valley streams

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The Index of Biotic Integrity (IBI), provides rapid low cost data for use in assessing the ecological condition of aquatic resources. Tennessee Valley Authority (TVA) is using IBI as it's principal tool to provide baseline data on the ecological health of watersheds in the Tennessee River drainage in support of it's environmental goal of cleaning up the Tennessee River. Scoring criteria for IBI metrics originally developed for midwestern streams are being modified to address the effects of parameters such as different ecoregions, stream drainage area, elevation, and gradient. These modifications in scoring criteria and in metric suites are the result of analyses of fish community data collected from over 700 stream sites in five ecoregions partially drained by the Tennessee River watershed.

Mining impacts and restoration of fisheries in the coal fields of Tennessee

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A summary of fisheries related activities conducted by the Office of Surface Mining Reclamation and Enforcement (OSM) will be presented. This will include results of a biological and hydrologic assessment of Little Yellow Creek and Little Clear Creek, an unmined and mined watershed on the Tennessee/Kentucky border. These streams contain the Blackside Dace which is on the T & E list. The activities of the OSM Appalachian Clean Streams Initiative will also be presented. This will include two projects where acid mine drainage is being mitigated by a consortium of State, Federal, local, and private groups in order to restore fisheries. The streams are Standifer Creek and Hogskin Creek of the North Chickamauga watershed in Sequatchie and Hamilton County and Bear Creek, a tributary of Big South Fork in Scott County. Finally, the status of ongoing investigations on the impacted threatened and endangered mussel species in the northern Tennessee coal fields will be discussed.

Summer habitat of inland silversides Menidia beryllina and young-of-year sunfishes Lepomis spp. in oxbow lakes of the Mississippi delta

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We concurrently surveyed physical habitat and fishes in Lakes Bolivar, Whittington, and Beulah (MS), in June 1995, and showed that mean lake depth was a useful predictor of surface fish abundance. At nine stations in each lake, we measured depth, temperature, conductivity, dissolved oxygen, pH, and turbidity; we sampled fishes using overnight sets of floating Plexiglas traps "baited" with chemical light sticks. Inland silverside and young-of-year sunfish comprised 73% and 22% of catch respectively. Abundances of both taxa were negatively correlated with mean cross-sectional lake depth and positively correlated with turbidity ($p < 0.01$), but sunfishes predominated at depths < 2 m, silversides at depths of 6 m. Relationships between mean lake depth and fish abundance were reflected in littoral fish assemblages; sunfishes predominated in Bolivar, the shallowest oxbow, silversides in Beulah, the oxbow of moderate depth. Concern exist for fisheries of Lake Whittington which experiences severe annual dewatering during low stages of the Mississippi River. We used regression equations to develop empirical indices of habitat quality for different lake depths, and to incrementally analyze benefits of a weir proposed for the outflow of Lake Whittington.

TVA's sampling protocol for IBI in Tennessee valley streams

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The Index of Biotic Integrity (IBI) provides an environmental assessment of a stream based on qualitative and quantitative data from fish sampled. Over the last nine years, the Tennessee Valley Authority (TVA) has developed an IBI sampling protocol to obtain sufficient data for the least amount of effort. A variety of sampling gears and techniques are used to deplete species from major habitat types, usually run, riffle, pool, and shoreline. Catch rate is quantified by area of stream sampled. The protocol has been used in streams of various sizes (drainage areas ranging from 2 - 5,000 square miles).

Management of the fishery of Eagle lake

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The management of the fishery of Eagle Lake is a multi-dimensional undertaking; involving fishery management, riparian vegetation maintenance, flood control project mitigation, recreational lake use, and lake-side development (to name a few). Eagle Lake is an oxbow lake on the protected side of the mainline Mississippi River Levee. During the 1950's and 1960's Eagle Lake had good fishing for bass, bluegill and crappie. The USFWS estimated that in 1968, 66,000 man-days were spent sport fishing Eagle lake. The Eagle Lake spring (March to June) fishery has of recent history been principally a white crappie fishery. In 1992, 75% of the interviewed fishermen listed crappie as their target species. In 1992, 1994 and 1995, anglers captured 51,000 crappie (that weighed 30,800 pounds) 29,200 crappie (that weighed 40,400 pounds), and 6,000 crappie (that weighed 7,400 pounds), respectively. Total spring harvest was 44,500 59,900, and 19,500 pounds of fish, respectively. The 1990 crappie year class are believed to have supported the crappie fisheries for the years 1992 through 1995. Fish population surveys undertaken in the late 1980's revealed a low stock of gamefish in Eagle Lake. In 1989, the most abundant game fish was yellow bass. The fish population was dominated by shad, buffalo, and drum. To improve the fishery, the MDWFP began an extensive 3 year LMB stocking program in 1990. But a population survey undertaken in summer 1991 found few young bass and very few yearling bass. The MDWFP modified it's management program in 1991 and began using the management action of fall drawdowns, which were undertaken in 1991, 1993, and 1995. The MDWPF developed a management plan for Eagle Lake with an objective to obtain good stocks of crappie, bream, and bass. Goals were established for the fish population to obtain in order to mark progress in reaching the management objective. The largemouth bass met the reproduction goals of 40 y-o-y per acre in 1992, 1993, and 1994. A 14 inch minimum length limit harvest restriction was established on the bass in 1993. The reproduction of Crappie met the reproduction goal of 40 y-o-y per acre in 1994. The 1994 spawn, at 170 y-o-y per acre, was the highest on record. Buffalo fish and yellow bass stocks are generally less than levels prior to 1991, but drum stocks have increased. The bluegill stock has not met the target goal of 40 pounds per acre, but a winter bream fishery has developed on Eagle Lake: The MDWFP estimates that anglers harvested 21,200 pounds of bluegills in February 1995. Redear sunfish, presumably from stocking by MDWFP, were found in the anglers harvest in 1993 and 1994, after having been expirated from the lake. Although threadfin shad biomass increased in 1992, the stock in 1993 and 1994 met the management goal of a biomass less than 25 pounds per acre.

A watershed approach to assessing brook trout, Salvelinus fontinalis, distribution in the Hiwassee River watershed

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A 3 month survey was conducted on 81 headwater trout streams in the 2,700 square mile Hiwassee River watershed during the summer of 1995 to assess brook trout distribution and biological health. Preliminary investigations indicated that naturally self sustained populations of brook trout in the Hiwassee River drainage system in Tennessee, Georgia, and North Carolina may be represented by a total of 14 remaining populations. Headwater trout streams were biologically assessed using biotic scoring criteria derived from the analysis of collected data and ranked with a numerical value computed from scoring metric using fish and benthic macroinvertebrate data collected during this survey.

Community structure of fishes in three North-Central Mississippi streams

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Habitat protection and restoration have become increasingly important as a means of maintaining biodiversity. Poor agricultural practices and channelization have degraded much of the land in Northern Mississippi and practically no stream systems have escaped perturbation. For many of these streams, restoration is the only mechanism for protection or enhancement of biodiversity. A project is underway to restore the channelized portion of Bagley Creek to its "historical" condition. The proposed study area is 2.6 km and is located adjacent to the Bagley Bottoms Waterfowl Management Area in the Holly Springs National Forest. Bagley Creek is a sand-bed alluvial channel which drains into the Little Tallahatchie River drainage. Pre-restoration baseline data on the fishes of Bagley Creek were collected during the summer and fall of 1995. Fishes taken from Bagley Creek were compared to fishes taken from two other streams that also drain into the Little Tallahatchie River Drainage- Lee Creek and Mitchell Creek. A portion of Lee Creek was channelized, and the stream is undergoing channel incision. Mitchell Creek has remained relatively undisturbed by man. Species richness, similarity indices, and species diversity for samples taken in each creek were determined using Margalef's index, Morisita's Index, and Shannon-Weiner Index, respectively. Spatial and temporal variations of fish community and population structure will be discussed.

Shoreline aquatic habitat index, a method to quantify response of aquatic habitat quality to adjacent land uses

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To determine impacts of development on shoreline aquatic habitat, a system was devised that was capable of distinguishing differences in habitat quality between areas adjacent to various land uses. Physical characteristics of shoreline aquatic habitat important to resident sport fish populations were captured in a series of seven integrative metrics addressing reproductive, nursery, and adult feeding requirements. Habitat Suitability Indices (US Fish and Wildlife Service), along with other sources of information (Etnier and Starnes 1993 and Robinson and Buchanan 1984) on the biology and habitat requirements of largemouth, spotted, and smallmouth bass; white and black crappie; bluegill; and redear sunfish were consulted to develop "reference" or "expected" conditions from a high quality environment. Individual metrics were scored through comparison of observed conditions with these reference conditions and assigned a corresponding value: good-5; fair-3; or poor-1. Scores for each metric were summed to obtain the Shoreline Aquatic Habitat Index (SAHI) value. The range of potential SAHI values (7 - 35) was trisected to provide some descriptor of habitat quality (poor 7 - 16, fair 17 - 26, and good 27 - 35). Application of the SAHI on TVA reservoirs revealed separation of shoreline aquatic habitat quality based on adjacent land use. These data - were used to determine potential impacts of increased development on shoreline aquatic habitat quality.

Age structure and the effects of spring discharges on sauger populations of the Tennessee River

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Historically, recruitment by sauger, Stizostedion canadense, in the Tennessee River is highly variable. However, a general decline in sauger populations in the Tennessee portions of the Tennessee River was apparent in the late 1980's. In order to monitor these fluctuations and to determine what factors were controlling year-class strength, sauger were collected each year during spawning migrations (January-May) from 1990-1995. Sampling was conducted using experimental gill nets in the tailwaters below five impoundments spanning over 600 km on the Tennessee River. Sagittal otoliths were extracted and examined to determine age (N = 2,004). Sauger older than age 3 were very rare (0 - 3 % of the total number collected each year) in the lower Tennessee River, where exploitation is high (30-50%). In the upper Tennessee River, where angling pressure is lower, sauger older than age 3 sometimes comprised a higher proportion of the population (0 -25% of total number collected each year). Spring discharges significantly affect sauger year-class strength. At Pickwick Dam, the most downstream site sampled, a strong negative relation existed between spring discharges (March-June) and age 1 catch rates one year later ($r^2 = 0.83$; $p = 0.01$). Conversely, in the upper reaches of the Tennessee River at Fort Loudoun Dam, a positive relation was evident ($r^2 = 0.78$; $p = 0.02$). These conflicting results may indicate that some optimum discharge exists on the Tennessee River and that flows excessively above or below this optimum may be detrimental in the establishment of year-classes in different reaches of this river system.

**PROGRESS REPORT ON THE
LOWER MISSISSIPPI RIVER CONSERVATION COMMITTEE**

(To be read by title)

by

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The idea to create an inter-agency committee to address cooperative management of the natural resources of the lower Mississippi River began simultaneously within the Mississippi Chapter of the American Fisheries Society and Region 4 of the U.S. Fish & Wildlife Service (USFWS). The Lower Mississippi River Conservation Committee (LMRCC) came into being in late summer of 1993. The LMRCC is beginning its third year of operation. The member agencies are the six "wildlife agencies" and five of the "environmental quality" agencies of the six states that border the lower Mississippi River (LMR). Several other agencies, including the USFWS and USACOE are cooperating members. The USFWS funds a position for a LMRCC Coordinator out of the USFWS office in Vicksburg. The mission of the LMRCC is to promote the protection, restoration, enhancement, understanding, awareness and sustainable use of the natural and environmental resources of the Lower Mississippi River, through coordinated and cooperative efforts involving research, planning, management, information sharing, public education and advocacy. The LMRCC has held two annual meetings, established technical committees, developed a list of objectives and goals for the LMRCC, developed and produced a newsletter, presented comment to projects, inventoried GPS systems, and prepared proceedings of annual meetings. The LMRCC has formed 3 technical section "subcommittees": Fisheries, Water Quality, and Red River. An ad hoc subcommittee on Wetlands Planning was formed to coordinate with the wetland recovery program(s) of the USFWS and USEPA. The LMRCC was a co-sponsor of the Gulf of Mexico Hypoxic Zone Management Conference that was held December 5 & 6, 1995, at Kenner, La. The Fisheries Technical Section (FTS) has developed a FTS Duty statement and a list of issues prioritized within five major categories: Habitat, Coordinated management, Species of Concern, Public Information, and Non-native Species. The Duty of the FTS is to Develop a comprehensive fisheries management strategy on the lower Mississippi River. Currently the FTS is in the initial stages of working on a striped bass management plan for the LMR, survey of the commercial fish harvest of the LMR, evaluation of fishing regulations on LMR border waters, and an overlay map of fish habitat on LMR and adjacent floodplain.