

1994 ANNUAL MEETING  
NORTH CAROLINA CHAPTER  
AMERICAN FISHERIES SOCIETY

PROGRAM

Duke University Marine Laboratory  
Pivers Island, Beaufort, North Carolina  
January 18-19, 1994

## ACKNOWLEDGEMENTS

The Program Committee for the 1994 Annual Meeting consisted of John Carmichael, Joseph Hightower, Wilson Laney (chair) and Scott Van Horn. The Program Committee wishes to express appreciation for those who responded positively to the call for papers and provided abstracts for consideration.

Local arrangements for the meeting were handled by the Arrangements Committee consisting of Liz Noble and Tom Jones. We appreciate the hard work they have done to arrange excellent facilities, meals and socials. Appreciation is also due to Bob Goldstein for arranging the fishing expedition on January 17th, and for the fine job he has done in editing, publishing and distributing the newsletter containing the meeting announcements and calls for papers.

We are extremely appreciative to Fish and Wildlife Associates, Inc., for their financial contribution in support of this year's meeting.

Last but by no means least, thanks are due to the Student Chapter for putting together another fine raffle event, and for arranging judges for the student paper competition.

Thank you for coming to this year's meeting and have a good time!

Frank McBride, President  
Wilson Laney, President-Elect

Final Agenda for 1994 Annual Meeting  
North Carolina Chapter - American Fisheries Society  
Duke University Marine Laboratory, Beaufort, NC  
January 18-19, 1994

**Tuesday**

1100-1300 Registration

(Lunch on your own, not covered in registration)

1300-1330 Welcome and Introductions

**Coastal Fisheries**

1330-1350 Bycatch Reduction Gear Development at UNC Sea Grant  
James D. Murray et al., NC Sea Grant College Program, Raleigh, NC

1350-1410 Characterization, Assessment, and Management of Deep Reef  
Resources from Cape Hatteras, NC to the Dry Tortugas, FL  
Roger Mays et al., SEFSC, NMFS, Beaufort, NC

1410-1430 Assessment of Striped Bass Spawning Stock in Roanoke River, North  
Carolina. Kent Nelson et al., DBIF, NCWRC, Greenville, NC

**Habitat and Life History**

1430-1450 Assessment of the North Carolina Wildlife Resources Commission  
Environmental Permit Review Program. Keith W. Ashley, DBIF,  
NCWRC, Elizabethtown, NC

1450-1510 Morphology of Gill Lamellar Epithelium in Brook Trout (*Salvelinus  
fontinalis*) from Soft Water and Hard Water Streams.  
Laura C. Gore, Western Carolina University, Cullowhee, NC \*

1510-1530 Break

**Freshwater Fisheries Management**

1530-1550 Fish Health Assessment of Catawba River Largemouth Bass  
B.K. Baker et al., Duke Power Company, Huntersville, NC

1550-1610 Evaluation of a 305-406 Millimeter Protected Slot Regulation for  
Largemouth Bass in Lake Sutton, North Carolina.  
Bennett Wynne, DBIF, NCWRC, Kinston, NC

1610-1630 Angler Diary Survey of Flathead Catfish in the Yadkin-Pee Dee River  
System, North Carolina. Marla J. Chambers, DBIF, NCWRC, Oakboro, NC

1630-1700 Hydroacoustic Assessment of Fish Distribution and Density in Nine  
Catawba River Reservoirs. Don Degan, Duke Power Company,  
Huntersville, NC

1700-1720 Fish Productivity and Aquatic Vegetation in Selected Duke Power  
Company Reservoirs. Steven R. Johnson et al., Duke Power Company,  
Huntersville, NC

1830-2200 Dinner (Clam bake)/Social at DUML

2000-2200 Optional Social/Tour at N.C. Maritime Museum, Beaufort, NC

Wednesday

0730-0800 Breakfast

Fish Telemetry/Distribution

0815-0835 An Assessment of Gulf Sturgeon in the Apalachicola River, Florida, Using Capture-Recapture Models. Katherine E. Potak et al., N.C. Cooperative Fish and Wildlife Research Unit, NCSU, Raleigh, NC \*

0835-0855 Summer Habitat of Striped Bass in Lake Norman. Scott Van Horn et al., DBIF, NCWRC, Durham, NC

0855-0915 Summer Distribution and Condition of Striped Bass within Albemarle Sound, North Carolina. Steven L. Haeseker et al., N.C. Cooperative Fish and Wildlife Research Unit, NCSU, Raleigh, NC \*

0915-0935 Status Surveys of North Carolina's Rare Freshwater Fishes. Fred C. Rhode, Division of Marine Fisheries, NCDEHNR, Wilmington, NC

0935-0955 Commercial Production of Tropical Ornamentals in North Carolina. William M. Lewis, Southern Illinois University, Carbondale, Faison, NC

1000-1010 Break

1010-1030 Address to the Chapter by Immediate Past Society President, Carlos M. Fetterolf, Jr.

1030-1200 Business Meeting

Determination of Quorum - Liz Noble

Secretary-Treasurer's Report - Liz Noble  
Reading of 1993 Minutes  
Financial Report

Committee Reports

Executive Committee - President's State of the Chapter  
Arrangements Committee - Liz Noble, Tom Jones  
Program Committee - Wilson Laney  
Newsletter Committee - Bob Goldstein  
Environmental Concerns Committee - Stephanie Godreau  
Nomination Committee - Scott Van Horn

Student Subunit Report - John Carmichael

Old Business - Frank McBride

New Business - Frank McBride

Installation of New President - Frank McBride

President's Comments - Frank McBride, Wilson Laney

Adjourn

1200-1300 Lunch at DURL (for those who paid)

\* Student presenter eligible for paper competition

## ABSTRACTS OF PRESENTED PAPERS

**TITLE:** Bycatch Reduction Gear Development at UNC Sea Grant

**PRESENTER(S):** James D. Murray, James Bahen, Robert Hines and Wayne Wescott,  
University of North Carolina Sea Grant College, Raleigh, NC

**ABSTRACT:** The University of North Carolina Sea Grant Marine Advisory Service Program has conducted several projects over the past three years to evaluate bycatch reduction devices (BRDs) for the reduction of finfish bycatch in the shrimp fishery. The kinds of BRDs evaluated include a funnel accelerator with diamond and square mesh escape holes (both with and without turtle excluder devices-TEDs), shrimp pounds, large mesh in the belly and wings of a shrimp trawl, skimmer trawls and skimmer trawls with fish eyes. The evaluations are in various stages of completion, but in general have followed the same pattern. The ideas for gear testing are usually developed either by or with the shrimping industry. Before proceeding, advice is solicited from a 13-member statewide Bycatch Advisory Board appointed for the purpose of assisting Sea Grant and the North Carolina Division of Marine Fisheries to gain input into BRD development decisions. Where feasible, the project is conducted on or with commercial shrimping vessels. The information is made available through Sea Grant education and communication channels using videos, print and/or workshops. In October, 1992 the State of North Carolina was the first state to impose mandatory BRD requirements for shrimp trawls. Although it is too early to be definitive, the lack of appreciable opposition to BRDs suggests the development process used was successful in enhancing industry acceptance of BRDs.

**TITLE:** Characterization, Assessment, and Management of Deep Reef Resources from Cape Hatteras, NC to the Dry Tortugas, Florida

**PRESENTER(S):** Roger Mays, R.O. Parker, Jr., and Gene R. Huntsman, NOAA, National Marine Fisheries Service, Southeastern Fisheries Science Center, Beaufort Laboratory, Beaufort, NC

**ABSTRACT:** Of the nineteen species of deep reef (>100m) fish important to fishing from Cape Hatteras, NC to the Dry Tortugas, FL, the snowy grouper, Epinephelus niveatus, and the tilefish, Lopholatilus chamaeleonticeps, provided the greatest landings, at 270,138 kg and 459,580 kg, respectively, for 1990. From 1980 to 1990 there was no trend in landings for snowy grouper but mean weight diminished from greater than 4 kg to 2.3 kg. Tilefish landings plummeted from 1,709,970 kg of large (mean weight=5.3 kg) fish in 1982 to 459,580 kg of smaller (mean weight=3.3 kg) fish in 1990. Equilibrium estimates of spawning stock biomass per recruit ratios (SSR) from 1990 landings (0.15 for snowy grouper and 0.21 for tilefish) were significantly less than the overfishing criterion (0.30) established by the South Atlantic Fishery Management Council. Reducing fishing pressure (F) on snowy grouper by 40 percent would raise the SSR to 0.30 and could be accomplished with quotas, with partial closure of fishing grounds, or a combination of both. Tilefish could also benefit from this type of management because the significant drop of SSR from 1988 (0.31) to 1990 without a significantly higher F resulted from an increased take of younger fish.

**TITLE:** Assessment of Striped Bass Spawning Stock in Roanoke River, North Carolina

**PRESENTER(S):** Kent L. Nelson and James W. Kornegay, Division of Boating and Inland Fisheries, N.C. Wildlife Resources Commission, Raleigh, NC

**ABSTRACT:** A total 4,920 striped bass (*Morone saxatilis*) were collected from Roanoke River near Weldon, North Carolina by electrofishing during the spring of 1991 and 1992. Study objectives were to determine sex ratio and age composition of the Albemarle Sound/Roanoke River striped bass spawning stock. Differences in catch per unit effort (CPUE) between years, among year classes, and between sexes were analyzed. Male striped bass represented 83 and 87% of the sample during the two years. Nearly all male (99%) and female (91%) striped bass captured were ages 2 through 4. Ninety-six percent of the fish in 1991 and 89% in 1992 were from the 1988 and 1989 year classes. A greater proportion of striped bass, both male and female, migrated to the spawning grounds at age 3 than at age 2 and females did not migrate in equal proportions to males until at least age 4. Analysis of variance (ANOVA) of log-transformed CPUE data between 1991 and 1992 indicated that catch rates were significantly lower in 1992 for the 1982 through 1988 year classes. Mean CPUE for these year classes decreased by 54% (range: 23-79%) in 1992. The scarcity of older age classes on the spawning grounds suggests that fishing has affected survival. If the CPUE decline observed between 1991 and 1992 reflected annual mortality, then the mortality rate exceeded that targeted for restored, healthy striped bass populations. We recommend that fishing rates or other sources of mortality be reduced to sustain the recovery of the Albemarle Sound/Roanoke River population.

**TITLE:** Assessment of 'the North Carolina Wildlife Resources Commission Environmental Permit Review Program

**PRESENTER(S):** Keith W. Ashley, Division of Boating and Inland Fisheries, N.C. Wildlife Resources Commission, Raleigh, NC

**ABSTRACT:** The North Carolina Wildlife Resources Commission (NCWRC) Environmental Permit Review Program was evaluated. The objective was to classify and compare a sample of environmental permit reviews conducted in 1989 with permit disposition. A secondary objective was to assess the degree of incorporation of conditions attached to permits recommended by NCWRC personnel for approval with modification. One hundred and ten permit applications were reviewed. State and federal regulatory agencies, with few exceptions, denied fewer permit applications than were recommended for denial by the NCWRC. Survey data indicated 72% of NCWRC recommended conditions for avoiding, minimizing, or compensating for impacts to wetland areas are incorporated into permits.

**TITLE:** Morphology of Gill Lamellar Epithelium in Brook Trout (*Salvelinus fontinalis*) from Soft Water and Hard Water Streams

**PRESENTER(S):** Laura C. Gore, Western Carolina University, Cullowhee, NC

**ABSTRACT:** The structure of the gill lamellar epithelium of brook trout native to the soft water streams of western North Carolina and the hard water streams of Virginia were compared. Emphasis was placed on the distribution and morphology of chloride cells. Light microscopical techniques were used to determine if trout from soft water streams exhibited chloride cell proliferation similar to that described by Laurent and Perry (1991) for rainbow trout reared under experimental conditions. [Laurent, P., and Steve F. Perry. 1991. Environmental effects on fish gill morphology. *Physiology Zoology* 64:4-25]



**TITLE:** Fish Health Assessment of Catawba River Largemouth Bass

**PRESENTER(S):** B.K. Baker, D.J. Coughlan, D.G. Cloutman and W.M. Rash, Duke Power Company, Huntersville, NC

**ABSTRACT:** The Fish Health Assessment Index (FHA) autopsy-based survey quantifies the general health and condition of a fish population. The process uses a method developed by Ronald W. Goede, 1990, that was modified by Tennessee Valley Authority biologists into the FHA survey procedure. Public concerns over the health of the fishery and whether these fish are safe for human consumption lead us to look for more detailed information to support the FHA. The objectives were to develop baseline information on the health and condition of largemouth bass on Catawba River reservoirs from Lake James to Lake Wateree. Largemouth bass were collected at 26 sites during fall 1993 by electrofishing. Fish were processed in the field, and a HAI value calculated for 15 fish at each site. Supportive data were collected using the same fish. Eight of the 15 fish are being analyzed for parasite load and 10 of the 15 were brought back to the laboratory where tissue samples were processed for metals and organochlorides analysis. Index scores and correlations with physical and chemical parameters will be presented.

**TITLE:** Evaluation of a 305-406 Millimeter Protected Slot Regulation for Largemouth Bass in Lake Sutton, North Carolina

**PRESENTER(S):** Bennett Wynne, Division of Boating and Inland Fisheries, N.C. Wildlife Resources Commission, Raleigh, NC

**ABSTRACT:** A 305-406 mm protective slot and four fish daily creel limit, allowing harvest of two fish <305 mm, was placed on largemouth bass (Micropterus salmoides) in Lake Sutton during July 1989. The purpose of the regulation was to protect slot length bass and increase the angler catch rate for bass >400 mm. The objective of this investigation was to evaluate the regulation's effectiveness by comparing size distributions, proportional stock density (PSD) and relative stock density (RSD) 40 of fish captured by electrofishing and anglers, as well as angler catch rates of bass >400 mm, before and after the regulation change. Daytime spring shoreline electrofishing was conducted annually between 1988 and 1992. An angler diary program spanned 1986 to 1992. Post regulation PSD and RSD40 values of largemouth bass captured by electrofishing were significantly greater than 1988 and 1989 values. Length of angler caught bass also increased after the regulation change. PSD and RSD40 values from angler diaries were significantly greater after the slot limit in 1991 and 1992 than during 1986 and 1987. Slight increases in bass condition (Wr) and mean length at ages 1+, 2+ and 3+ were observed in 1991 and 1992, suggesting forage had not become limiting three years after the regulation change.

**TITLE:** Angler Diary Survey of Flathead Catfish in the Yadkin-Pee Dee River System, North Carolina

**PRESENTER(S):** Marla J. Chambers, Division of Boating and Inland Fisheries, N.C. Wildlife Resources Commission, Raleigh, NC

**ABSTRACT:** An angler diary survey of the flathead catfish (Pylodictis olivaris) sport fishery in the Yadkin-Pee Dee River system, North Carolina, was conducted (1989-1991) to examine the current fishery and provide a baseline for future comparisons. The objective of the study was to describe the quality of the fishery in terms of fish caught per hour (CPUE), size distribution, and condition (K) of the catch. Forty-four volunteer anglers were recruited to keep records of their fishing trips. Twenty cooperators reported 348 trips. Anglers fished

1,530 hours and caught 338 flathead catfish, a catch rate of 0.22 fish per hour. Eighty-seven percent of the fishing effort was directed at reservoirs, while tailraces received 10% and rivers received 3%. Participants were more successful, however, in tailraces (CPUE=0.54), than in reservoirs (CPUE=0.19) or rivers (CPUE=0.14). Total lengths of captured flatheads ranged from 152 to 1219 mm. Condition factors (K) averaged 1.32.

**TITLE:** Hydroacoustic Assessment of Fish Distribution and Density in Nine Catawba River Reservoirs

**PRESENTER(S):** Don Degan, Scientific Services Section, Duke Power Company, Huntersville, NC

**ABSTRACT:** We sampled nine Catawba River Reservoirs in July and August 1993 with a 120 kHz hydroacoustics system and a purse seine to determine limnetic fish densities, species composition, and spatial (both vertical and horizontal) distributions within the reservoirs. Acoustic data were processed by dual-beam and echo integration analysis. The total reflected voltages from echo integration were scaled with the mean back-scattered cross section from individual fish within each reservoir. Reservoir-wide estimates of fish density ranged from 2,571/ha in Fishing Creek to 38,504/ha in Lake Hickory. Vertical distribution of fish varied among reservoir, but in 6 of the 9 reservoirs the highest density of fish occurred at the least shallow sampling depth for the hydroacoustic equipment (1.5-2m). Highest fish densities in Lakes James and Hickory occurred at 3-4m, and 7-8m in Lake Norman. Fish densities were plotted with GIS to determine distribution patterns within each reservoir. Species composition from purse seining found greater than 99% of the limnetic fish population was threadfin (Dorosoma petenense) and gizzard shad (D. cepedianum), with threadfin the predominant species in all reservoirs. Length frequency distributions from purse seining indicates a close relationship between distributions of seined threadfin shad and acoustic size.

**TITLE:** Fish Productivity and Aquatic Vegetation in Selected Duke Power Company Reservoirs

**PRESENTER(S):** Steven R. Johnson, Kenneth L. Manuel, and Mary S. Rodriguez, Duke Power Company, Huntersville, NC

**ABSTRACT:** Aquatic vegetation can be an important factor in the success of reservoir fish communities. How important aquatic vegetation is in the production of reservoir fish has been debated heavily, particularly between multiple use reservoir managers and anglers. The purpose of this paper is to compare indicators of reservoir productivity (fish standing stock, sportfish harvest) in reservoirs without significant aquatic vegetation coverage to similar data from reservoirs where aquatic vegetation coverages have been considered significant. Reservoirs in the Duke Power system have aquatic vegetation coverages that have been historically less than 1% of the total surface area. Empirical modeling based on summer chlorophyll a values indicates that Duke Power Company reservoirs are producing fish standing stocks and sportfish harvests that are reasonable for the productivity of the body of water. Comparison to reservoirs where aquatic vegetation coverages range up to 30% of the total surface area, indicate that most of the reservoirs fall within the range of values predicted by chlorophyll a concentrations. These data analyses provided no evidence that fish standing stocks and sportfish harvest were enhanced by the presence of aquatic vegetation.



**TITLE:** An Assessment of Gulf Sturgeon in the Apalachicola River, Florida, Using Capture-Recapture Models

**PRESENTER(S):** K.E. Potak, J.E. Hightower, N.C. Cooperative Fish and Wildlife Research Unit, and K.H. Pollock, Department of Statistics, N.C. State University, Raleigh, NC

**ABSTRACT:** Gulf sturgeon, Acipenser oxyrinchus desotoi, were once abundant in coastal rivers of the eastern Gulf of Mexico, but have declined substantially due to habitat loss and overexploitation. However, despite being listed in 1991 as threatened under the Endangered Species Act, relatively little is known about population status in most rivers. We conducted an intensive capture-recapture experiment to assess the population of Gulf sturgeon at the Jim Woodruff Lock and Dam in the Apalachicola River, Florida. We also used radio telemetry to test the assumption that the population remained closed to immigration and emigration during sampling. Our results indicate that movement in and out of the sampling area occurred, so the population at the dam was not closed. Using simulations from the program CAPTURE, we found that capture-recapture models are quite sensitive to temporary emigration, and may yield highly inaccurate population estimates. We conclude that existing closed population models are not sufficient to assess Gulf sturgeon populations due to temporary emigration, and that future sampling designs need to incorporate this Gulf sturgeon movement.

**TITLE:** Summer Striped Bass Habitat Selection in Lake Norman

**PRESENTER(S):** Scott Van Horn, Division of Boating and Inland Fisheries, N.C. Wildlife Resources Commission, Raleigh, NC

**ABSTRACT:** Lake Norman is a 13,516 ha cooling pond for 2 Duke Power Company electric generating facilities. Company studies have shown that cool oxygenated water required by large striped bass (>4500 g) is sometimes absent in mid-summer. The objectives of this study were to determine the summer temperature and dissolved oxygen conditions used by the lake's striped bass in 1992 and 1993. We tagged 29 striped bass (2300-7775 g) with temperature sensing radio tags (40-50 Mhz) in spring 1992. Ten of the tagged fish were obtained from a second large NC reservoir. We found 19 active fish and 5 immobile tags with a boat mounted yagi antenna from 8 July to 22 September. Tag frequency, tag temperature, location, and a water column temperature/dissolved oxygen profile were recorded with each tag encounter. Mean temperatures and associated dissolved oxygens were similar between smaller striped bass (<4500g) (21.7 C and 2.3 mg/l) and larger striped bass (>4500 g) (20.5 C and 2.8 mg/l) in early July when water temperatures were rising. This period was followed by about 3 weeks when very little water <26 C and >2.0 mg/l dissolved oxygen was present. Tag temperatures of small and large striped bass remained similar (26.1 and 26.7 C) but associated dissolved oxygen differed significantly (3.14 and 5.7 mg/l). There were no significant differences between small and large fish by tag temperature (26.0 and 26.1 C) or dissolved oxygen (4.4 and 5.7 mg/l) following the rapid mid-August cooling.

**TITLE:** Summer Distribution and Condition of Striped Bass within Albemarle Sound, North Carolina

**PRESENTER(S):** Steven L. Haeseker, John T. Carmichael and Joseph E. Hightower, N.C. Cooperative Fish and Wildlife Research Unit, Raleigh, NC

**ABSTRACT:** Sonic telemetry was used to determine the distribution of 36 adult striped bass during June-August, 1993. The entire Albemarle Sound and adjoining tributaries were searched manually by boat, looking for possible thermal refuges or congregation areas. In addition, automatic data logging receivers located at Oregon Inlet and Jamesville monitored passage from Albemarle Sound into the

Atlantic Ocean and Roanoke River, respectively. We found 44% of the males (4 of 9) and 74% of the females (20 of 27) within the sound. Although water temperatures rose to critical striped bass tolerance levels of 26-31 degrees C, dissolved oxygen remained above tolerance limits. To assess condition, we collected fish by electrofishing every three weeks at the Chowan River and Highway 32 Bridges. No changes in the length:weight ratio were detected, but larger fish displayed a greater frequency and severity of poor external condition.

**TITLE:** Status Surveys of North Carolina's Rare Freshwater Fishes

**PRESENTER(S):** Fred C. Rohde, Division of Marine Fisheries, N.C. Department of Environment, Health and Natural Resources, Wilmington, NC

**ABSTRACT:** Surveys have been conducted since 1988 on the state's nongame fishes with protected status, i.e., endangered, threatened, or special concern. The sandhills chub, Semotilus lumbee, and the pinewoods darter, Etheostoma mariae, are endemic to the Carolina Sandhills. The chub is known from 39 sites and the darter from 37. Threats are golf courses and the beaver. The stonecat, Noturus flavus, sharphead darter, Etheostoma acuticeps, and blotchside logperch, Percina burtoni, occur in North Carolina only in the upper Nolichucky River system. All are extremely localized. Threats include sedimentation and water pollution. Five state-listed fishes occur in the upper Dan River: cutlips minnow, Exocoelsum maxillina; bigeye jumprock, Scartomyzon ariommus; rustyside sucker, Thoburnia hamiltoni; orange-fin madtom, Noturus gilberti; and riverweed darter, Etheostoma podostemone. Only the bigeye jumprock and riverweed darter are in good shape.

**TITLE:** Commercial Production of Tropical Ornamentals in North Carolina

**PRESENTER(S):** William M. Lewis, Zoology Department, Southern Illinois University, Carbondale, IL

**ABSTRACT:** A hatchery facility consisting of eighty rectangular (9m x 18m and 12m x 24m) pools and four overwintering building containing one hundred and sixty (160) 850-liter tanks and thirty (30) 900-liter circular tanks for the production of 30 to 40 species of tropical ornamentals was evaluated. Tanks were supplied with recycled water incorporating biofiltration supplemented with a small amount of well water. The fishes involved included: rainbows, barbs, tetras, danios, plecos, gouramis and South American and African cichlids. Very few problems with dissolved oxygen or ammonia were encountered and the health of the fish species remained acceptable. Perhaps of greatest interest is the performance of biofiltration in making water re-use possible. Financially, the project demonstrated that such an operation could be profitable for the owner-operator.