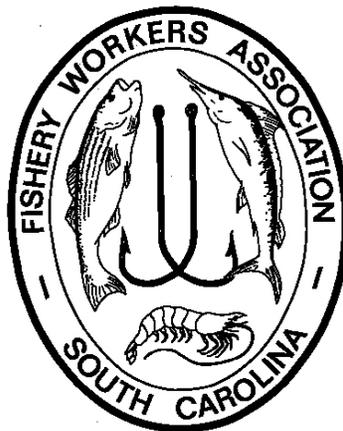


2007 JOINT MEETING
AMERICAN FISHERIES SOCIETY,
SOUTH CAROLINA AND GEORGIA CHAPTERS
AND
SOUTH CAROLINA FISHERY WORKERS ASSOCIATION

JANUARY 23 - 25, 2007



OCEAN PLAZA BEACH RESORT
TYBEE ISLAND - GEORGIA

AVAILABLE ABSTRACTS

Don Dennerline^{*1}, Jim Peterson, and Don Degan²

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²Aquacoustics

"Looking Forward and Backward at the "Crosswalk."

Abstract

Sampling techniques and survey designs are constantly changing over time to in an effort to reduce bias or improve precision or as a result of agencies moving to new standardized sampling procedures. Thus, a continual challenge facing biologists and researchers is understanding how to adapt to these kinds of changes. For example, if a researcher has ten years of data collected a certain way but a new sampling method is developed that can provide better (e.g. more precise) estimates, what should he or she do? Common paradigms might be to stick with old methods to ensure long-term comparisons (foregoing the benefits offered by the new techniques) or to naively implement the new method and not account for the differences in sampling methods. An alternative, however, is to develop ways to "cross-walk" between the methods which, if done correctly, allows incorporation of novel techniques without sacrificing the utility of the long-term data record.

We demonstrate how to perform such a "cross-walk" using two mobile hydroacoustic survey designs used for long-term fisheries studies in J. Strom Thurmond Reservoir (GA/SC). The initial protocol used permanent, fixed transects and collected "down-looking" (from 2 m depth to bottom) samples only. Because researchers believed large numbers of surface dwelling fishes (primarily threadfin shad) were not being counted in some months, a second protocol was implemented which used a continuous "roving" survey and collected both down-looking and side-looking (surface to 2m depth) samples. Because the roving method included side-looking sampling and was much quicker to collect, researchers proposed switching to this method. However, all agencies involved expressed some concerns in regard to ensuring the overall integrity of the long-term data record. Consequently, both protocols were retained to provide the data needed to develop of a "cross-walk" between the two datasets.

The overall goal of this project was to evaluate the relationships between transect surveys and roving surveys and the relative precision of both survey methods. Our goal was not to determine if the methods provide the same estimates. In fact, we expected them to be different because the roving surveys included the side-looking capability and the transect surveys did not. The specific objectives were to: model empirical estimates of fish densities derived from the two survey methods to provide a way to "cross-walk" data from one method to the other; to compare the precision of estimates derived from the two methods, and to determine if modifications, such as additional spatial stratification or allocation of effort, would improve estimates derived from the roving surveys. The methods presented should have broad appeal to anyone working with long-term datasets.

Jill A. Olin

Univ. of Georgia, Warnell School of Forestry and Natural Resources.

"Does Freshwater Influence the Feeding Ecology of Estuarine-Dependent Sharks?"

Abstract

Climate change is predicted to have significant effects on rainfall, perhaps leading to changes in freshwater flows, and altering salinity gradients in estuarine habitats. Juveniles of two estuarine-dependent elasmobranch species, the bull (*Carcharhinus leucas*) and bonnethead shark (*Sphyrna tiburo*) are suspected of having altered their habitat use in the Charlotte Harbor-Pine Island Sound Estuary, Florida, as a consequence of anthropogenic induced salinity changes. Salinity variations in this system, specifically the Caloosahatchee River, follow a seasonal pattern, resulting from water management practices. These practices transform the river from a low freshwater, well-mixed state (5ppt – 30+ppt) during the winter months to a high freshwater poorly-mixed state (0ppt – 18ppt) during the summer months. Conversely, the Myakka River is not subjected to water management practices and maintains a constant well-mixed state. Consequently, if increased freshwater flows reduce the salinity in portions of this estuary, high salinity-dependent elasmobranchs (i.e., bonnetheads) will be forced into sub-optimal habitats, potentially reducing their survivability, whereas freshwater tolerant elasmobranchs (i.e., bulls) may benefit. This system provides an excellent opportunity to assess the significance of water management practices on feeding ecology, habitat utilization, and population ecology of these species. Food web structure and function, is a critical first step in understanding these relationships and will be assessed through chemical tracer techniques and stomach content analysis. Stable N and C isotopes, of multiple tissues in the elasmobranchs and their prey species, will be analyzed for purposes of contrasting the two elasmobranchs and understanding carbon and nutrient flows within these food webs.

Alison Price* and James T. Peterson

University of Georgia, Georgia Cooperative Fish and Wildlife Research Unit

"An Evaluation of the Influence of Trapping Methods for Detecting Stream-Dwelling Fishes."

Abstract

Monitoring the presence and distribution of at risk fishes can provide useful information on population status and trends. This generally requires that samples be collected at several sample sites to ensure detection of changes in fish distribution. Under these circumstances, monitoring can be expensive and time consuming, particularly when crews are required to expend significant effort to detect rare or difficult to sample species at each sample unit. A potentially cost-effective alternative could be to sample fishes using a passive gear such as fish traps. Thus, we evaluated the efficacy of fish traps for detecting the presence of small-bodied stream-dwelling fishes. We developed three different traps designs and evaluated the influence of trap style, presence of bait, and habitat on fish detection probabilities using occupancy models. Trap type, presence of bait, and fish species influenced fish detection. In general, bullheads (*Ameiurus sp.*) and bluehead chub (*Nocomis leptcephalus*) were most susceptible to capture; the use of bait increased detection. Results will contribute to sampling protocol development in Upper Coosa River system.

Rebecca Fauver^{1,2}, Jim Peterson¹, Brad Konwick¹, Gregg Tomy³, Nargis Ismail³, David Higginbotham¹, Meredith Blount⁴, and Aaron Fisk⁵

"Perfluorinated Compounds in Georgia Waters: a Preliminary Analysis."

¹ Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA

² Presenter

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⁴ University of Texas-Austin, Austin, TX

⁵ Great Lakes Institute for Environmental Research, University of Windsor, Windsor, ON, Canada

Abstract

The Southeast is home to a range of ecologically diverse but threatened aquatic habitats; the Conasauga River in northwest Georgia, in particular, is home to 24 rare or endangered species. As population in the Southeast increases, land is transformed to urban and industrial areas, which inadvertently causes trace organic pollution in natural waterways. In particular, perfluorinated compounds (PFCs), highly recalcitrant compounds used in industrial applications as stain guards need to be assessed because they biomagnify in food webs and have unique toxicological properties but have never been measured in Georgia waters. To address this gap, we analyzed PFCs in water samples from small streams and ponds around Dalton, Georgia; from the Conasauga River near the wastewater land application site for Dalton; and in the Altamaha River. Levels of PFCs were very high in streams and ponds of the Dalton region (PFOA 50-300 ng/L and PFOS 15-120 ng/L) and the Conasauga River (PFOA 188-1,417 ng/L and PFOS 11-329 ng/L), in the same range as the highest ever measured in water at a non-spill location. PFC concentrations in the Altamaha River were much lower (PFOA ~3 ng/L and PFOS ~2.6 ng/L) but are higher than those measured in the mid Atlantic Ocean, suggesting the Altamaha River is a source of PFC contamination in estuaries. In light of these extreme PFC concentrations additional studies and an ecological risk assessment is warranted, particularly since PFCs are not considered in Georgia's fish consumption guidelines.

Jason Meador

Research Unit, Warnell School of Forestry and Natural Resources.

"An Evaluation of Estimators of Mussel Abundance in a Large Lowland River in the Southeastern U.S."

Abstract:

Accurate population estimates are crucial for the development and facilitation of effective freshwater mussel conservation strategies. Mark-recapture designs are commonly used to estimate population parameters, but design-specific assumptions must be met to obtain reliable estimates. We evaluated the efficacy of various sampling designs and estimators for estimating the abundance of three mussel species in the Altamaha River in Georgia. We found count based indices were substantially biased by incomplete detection and temporary emigration into the substrate. Temporary emigration also affected estimates from traditional mark recapture designs. Pollock's robust design, which allows for relaxation for certain assumptions, was found to be the best estimator. Our results emphasize the importance for estimating detection and emigration of mussels rather than relying solely on raw count data or traditional capture recapture methods. We also believe that this design is well suited for freshwater mussels not specific to the Altamaha River, and encourage implementation of the design in other systems.

Craven, S.C. (speaker), Peterson, J.T.

Georgia Cooperative Fish and Wildlife Research Unit, Warnell School of Forestry and Natural Resources, University of Georgia, Athens

Freeman, M.C.

U.S. Geological Survey, Patuxent Wildlife Research Center, Institute of Ecology, University of Georgia, Athens

"An Evaluation of the Influence of Fish Life History Characteristics and Flow Regime on the Recruitment of Young-Of-Year Fishes in Regulated Rivers in the Southeast."

Abstract:

Modifications to the discharge and temperature (hydrothermal) regime in regulated rivers can negatively affect native stream fish communities. Spawning success of some species can be substantially decreased as a result of hydrothermal alterations. We hypothesize that life history characteristics determine the extent to which hydrothermal alteration affects fish reproductive success and recruitment. We evaluated the relative support for models representing hypothesized influences of streamflow and fish life history characteristics on recruitment of young-of-year fishes using existing datasets from two regulated rivers; the Tallapoosa River, AL and the Flint River, GA. Hierarchical linear models indicated relatively strong support for models relating recruitment to flow variability during critical spawning and rearing time periods and less support for the effects of minimum flows. There also was evidence that species with protracted spawning periods and generalized spawning requirements were less influenced the variation in the hydrothermal regime. Using these models, we plan to construct decision models that predict how native fishes are affected by river regulation according to their specific life-history traits.

Paul Schueller* and Douglas L. Peterson

University of Georgia

"Gonadal Maturity of Atlantic Sturgeon in the Altamaha River, Georgia."

Abstract

Research of Atlantic sturgeon within the Altamaha River, Georgia has been on-going for three years. This population had previously been subjected to commercial fishing pressure, until a federal ban in 1996. Use of gill nets has allowed for a mark-recapture study of the migratory portion of the Atlantic sturgeon population within the Altamaha River. Additionally, annual mortality rates of adult Atlantic sturgeon have been estimated based on ages derived from pectoral fin rays. In 2006, laparoscopic examination of migratory adults was also performed on captured individuals. Abundance of migratory adults has been found to range from about 240 to 390 individuals per year in the months of March through April. Annual mortality estimates ranged from 17% to 27% for the three field seasons. Most individuals encountered exhibited either stage one or stage two gonadal development. No individuals encountered were found to have advanced gonadal development (stage 4 or 5). The Altamaha River population may show effects of historic commercial fishing pressure through reduced abundance of older Atlantic sturgeon. Most individuals within the migratory portion of the population are younger adults, which are likely first time spawners. Gonadal maturity of captured individuals and previous telemetry data suggests that individuals entering the system in the late spring months may spawn in the fall. Additional sampling in early spring could reveal a separate spring spawning race. Multiple spawning cohorts within the same system may be a unique characteristic of southern populations of Atlantic sturgeon.

Colin P. Shea* and James T. Peterson

Research Unit, Warnell School of Forestry and Natural Resources

“An Evaluation of the Influence of Streamflows and Species Traits on Meta-Demographic Parameters of Stream-Dwelling Fishes.”

Abstract

Fishery biologists are increasingly recognizing the importance of considering the dynamic nature of streams when developing streamflow policies. Such approaches require information on how flow regimes influence species-specific demographic rates, which can be cost-prohibitive to collect. A more cost effective alternative could be the use of species traits to predict how species are likely to respond to changes in flow. To appraise the efficacy of this approach, we evaluated relative support for hypothesized relationships between species traits and the persistence, colonization, and recruitment of stream fishes in relation to seasonal stream flow conditions. We used 4 years of seasonal fish collection data from 23 streams in the lower Flint River Basin, Georgia. Using multi-state, multi-season occupancy models we modeled the meta-demographic rates of 42 species in relation to flow conditions and as a function of a several species-specific traits, including morphological, reproductive, and life-history characteristics. Modeling results suggested that meta-demographic rates were influenced by streamflows, particularly during short-term, low-flow periods. The results also suggested that small-bodied species with generalized life-history and reproductive characteristics were more resilient to flow variability than were large-bodied species with specialized reproductive and life-history characteristics. The results of this study will be applied to a regional study investigating how stream-dwelling fishes are likely to respond to changes in the flow regime.

Arnie Eversole*, Ryan Wenzel and Graham Nash

Clemson University, Department of Forestry and Natural Resources

"Procambarus acutus acutus Population Dynamics in a South Carolina Pond."

Abstract

Crayfish were quantitatively sampled from a permanently-flooded earthen pond from October 2004 through September 2006. Crayfish exhibited an annual cycle; young-of-the-year (YOY) crayfish emerged from burrows in the fall, grew rapidly through fall and spring, and reached sexual maturity and initiated burrowing activity in spring before assuming burrow residence for reproduction in the summer. Most adult crayfish emerging from burrows lived 12 -14 months, but in some cases, individuals survived as long as 20 – 22 months. Population density peaked in fall with the emergence of adults and YOY from burrows but decreased consistently thereafter until late summer when very few individuals were observed in the pond. In contrast, the standing crop biomass of the population increased from the time the crayfish emerged from burrows through spring before experiencing a decline. Adults emerging from burrows comprised a majority of the standing crop biomass, but as the YOY grew through the fall the crayfish biomass shifted in favor of the YOY individuals in the population. Adult biomass did not change after emerging from the burrows because of slowed growth. Annual production was 145.5 g/m²/yr the turnover ratio was 3.52 for the 2004-year class.

C. Shane Boring*¹, John M. Alderman², Jennifer M. Summerlin¹ and Joseph D. Alderman²

¹Kleinschmidt Associates, Energy and Water Resource Consultants ²Alderman Environmental Services, Inc.

"Freshwater Mussel Assemblages of the Lower Saluda and Congaree Rivers, Lake Murray, and Selected Tributaries in the Central Santee River Basin, South Carolina."

Abstract

More than 300 recognized species and subspecies of freshwater mussels are known from North America north of Mexico. Nearly 72% of these taxa are considered endangered, threatened, or of special concern to the scientific community. Of these, twenty-one species are listed as occurring or having historically occurred within the Santee-Cooper River Basin in South Carolina. During June through August 2006, timed surveys for freshwater mussels were performed at sixty-one sites in Lake Murray and selected tributaries, as well as the lower Saluda River, upper Congaree River, and the mouth of the Broad River downstream of Lake Murray Dam. Surveys documented fifteen freshwater mussel species as extant within the study area: *Elliptio complanata*, *E. icterina*, *E. angustata*, *E. fisheriana*, *E. producta*, *E. roanokensis*, *E. congareea*, *Uniomerus carolinianus*, *Utterbackia imbecillis*, *Pyganodon cataracta*, *Strophitus undulatus*, *Villosa delumbis*, *Lampsilis cariosa*, *L. splendida*, and *Toxolasma pullus*, six of which are considered federal species of concern by the U.S. Fish and Wildlife Service. Mussel assemblages for Lake Murray sites were dominated by backwater-adapted species, namely *Utterbackia imbecillis*, *Pyganodon cataracta*, and *Uniomerus carolinianus*, while abundance at study sites downstream of the Lake Murray Dam were dominated by species best adapted to lotic habitats, such as *Lampsilis cariosa* and various *Elliptio* species. While not highly quantitative in nature, this study documents the spatial occurrence of several mussel species in a portion of their historic ranges that has not been surveyed in recent history.

Steve M. Sammons

Auburn University, Department of Fisheries and Allied Aquacultures

“But Nary a Drop to Drink: Effects of Floods and Droughts on Growth of Sunfish in Georgia Rivers.”

Abstract

Otoliths from over 6,500 sunfish of 5 species were collected in 14 river sections from spring 2004 to fall 2005 by Georgia DNR biologists to describe age and growth characteristics of these populations. Otoliths were examined using an image analysis system and growth increments were calculated for each growth year, then compared to river flows. Most sunfish species, with the exception of redear sunfish, were characterized by short lifespans (< 8 years) and fast growth. Redbreast sunfish growth was slowest in the Piedmont regions of the Flint and Ocmulgee Rivers and fastest in the coastal plain rivers of southeast GA. Growth was intermediate between the coastal plain rivers of east-central and southwest GA. Bluegill growth followed similar patterns to redbreast sunfish. Annual river flow explained a significant amount of variation in growth of redbreast sunfish in all rivers, and flow during April to June explained the most variation in growth for 6 of 13 rivers examined. In all cases, growth increased greatly when flows were high. Bluegill growth was not as affected by flow; only 3 of 5 models were significant for any flow model, and none explained more than 10% of the variation in growth. Likewise, flow was not important in determining growth of redear sunfish in either population examined. However, summer flows did appear to have significant effects on growth of warmouth and fliers in the Suwannee River. This research demonstrates that river flows do have significant effects on growth rates of redbreast sunfish populations across the state and may have implications for the many water allocation issues currently being debated across the country.

Marcel J. Reichert, David M. Wyanski*, and Patrick J. Harris

South Carolina Department of Natural Resources,
Marine Resources Division, MARMAP

"Age, Growth, and Reproductive Biology of Gag (Mycteroperca microlepis) Off the Southeastern United States."

Abstract

Gag, *Mycteroperca microlepis*, were sampled primarily from commercial Atlantic snapper/grouper fishery off the southeastern U.S. from 1996 through 2005, in depths from 27–185m. Length and weight were measured for 2,119 specimens, while otoliths and gonads were removed from most. Results were compared with reanalyzed data from 1977-82 and 1994-95. Fish length ranged from 227 to 1,182mm TL with a maximum age of 25yr. Growth rates of younger ages increased between 1977-82 and 1994-95, but not between 1994-95 and 2004-05. Age and length of female gag at 50% maturity was 3.2yr and 680mm TL, an increase from 2.6yr and 620mm in 1994-95, following a decrease in size at maturity between 1977-82 and 1994-95. The percentage males and transitionals increased from 5.5% in 1994-95 to 8.2% now, still lower than 19.4% in 1977-82. Sex transition has occurred at progressively larger sizes and younger ages since 1977-82 (995 to 1,049mm and 11.7 to 9.7yr). Batch fecundity of 128,600 to 960,800 in 1996-2005 was similar to estimates from the Gulf of Mexico, but number of spawns was higher. The results of our study suggest that regulations introduced in 1997 may, in conjunction with other current management measures, be sufficient for a sustainable gag fishery.

POSTER PRESENTATIONS

Caroline Doksansky and Anthony Dodd

Geosyntec Consultants, Inc., Water and Natural Resources Practice
1255 Roberts Boulevard, NW, Suite 200
Kennesaw, Georgia 30144

Michael Abney and Scott Hendricks

Georgia Power Company
241 Ralph McGill Boulevard
Atlanta, Georgia 30308-3374

HYDROACOUSTIC ASSESSMENT OF FISH ABUNDANCE AND
DISTRIBUTION IN RELATION TO A THERMAL DISCHARGE TO SUPPORT
A 316(A) DEMONSTRATION AT GEORGIA POWER COMPANY'S PLANT
BRANCH, LAKE SINCLAIR, GEORGIA

Abstract

This poster presents the application and findings of hydroacoustic surveys that were conducted reservoir-wide on Lake Sinclair by Geosyntec Consultants, Inc. on behalf of Georgia Power Company for the purpose of supporting a Clean Water Act Section 316(a) demonstration to obtain a thermal variance for the Plant Branch heated discharge. Plant Branch is an electric generating facility that withdraws water from Lake Sinclair, a 15,330-acre reservoir, for cooling purposes and discharges heated effluent to the lake. Hydroacoustic surveys were conducted reservoir-wide on Lake Sinclair to assess the abundance, distribution (vertical and longitudinal), and movement of limnetic (open water) fishes in response to the Plant Branch thermal discharge and cooling tower operation. Lake Sinclair was divided into a Primary Study Area (directly receiving the thermal discharge) and non-thermal reference area to provide relative comparisons in seasonal fishery dynamics. The vertical distribution of fish densities were further examined in the Primary Study Area embayment close to the plant thermal discharge to evaluate use of the vertical water column by fish during critical thermal conditions of summer. Results indicated that the spatial distribution of limnetic fishes within the Primary Study area and reference areas were seasonally comparable and that non-lethal conditions were exhibited for fish throughout embayment portion of the Primary Study Area, as well as elsewhere throughout the reservoir during the thermally critical conditions of summer.

Grossman, G.D., Petty, J.T., Wagner, C.M., Elkins, D., Hazelton, P. & R. Ratajczak, Jr.

D. B. Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA
30602

Population Dynamics of Brook Trout in Ball Creek, North Carolina, 1991-2003.

Abstract

We used information theoretic statistics (AIC) to assess the processes capable of explaining long-term (1992-2003) variation in the per capita rate of change of a lightly exploited brook trout populations in Ball Creek, NC. We used three pass electrofishing to sample a 100m long 3rd order site during spring and autumn 1991-2003, a period of extensive flow variation. Physical habitat availability varied significantly over both seasons and years. Both 0+ and adult abundance varied by an order of magnitude during the study. AIC analyses indicated that a single density-dependent model (out of 10 tested including both density dependent and density independent effects) that included adult density in both the current and previous year, was the only model capable of explaining variation in population per capita rate of change in this site. This model, which represents simple and delayed density dependence, had very high explanatory power (0.74 where 1.0 is complete explanation). Our data also indicated that high flows had a negative effect on 0+ recruitment ($r^2 = -0.54$), but no effect on adult abundance. Density-dependence is likely produced by interactions between 1+ and 0+ trout, because there was a highly significant negative nonlinear relationship ($r^2 = -0.62$), between 1+ abundance in spring and 0+ recruitment in spring. Mean adult size was positively related to “average flows” based on the Palmer Drought Stress Index.

Grossman, Gary D., Hill, Megan S., Elkins, D. & R. Ratajczak, Jr.

D. B. Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA
30602

Effects of stocked rainbow trout on non-game fish in Betty's Creek, GA.

Abstract

Over one million rainbow trout are introduced into North Georgia streams annually. We are using a replicated BACI (Before, After, Control, Impact) protocol to test for the effects of stocking trout on biodiversity and microhabitat selection of non-game fish in Betty's Creek, Georgia. Three years of data have been collected via snorkeling (microhabitat selection) and electrofishing (species richness and abundance). Flow variation during the study has been high. Species richness ranged from 7 to 15 species per sites and both richness and abundance differed both within (seasonally) and among sites. Habitat availability data indicated that the primary habitat gradient was a riffle-pool gradient with minor depth-substratum gradients also present. Species showed non-random microhabitat use; the majority of species were over-represented in deep areas dominated by a coarse substratum. Species typically were members of a water column or benthic guild. In Summer and Fall 2005 and 2006 trout were introduced into one of two Impact sites. Results indicate no strong impacts of trout on species richness or fish abundance but trout did produce shifts in microhabitat use by rosieside dace, warpaint shiners and gilt darters (inconsistent response). There were no microhabitat shifts observed in mottled sculpin or river chubs. Dace and shiners shifted away from microhabitats occupied by trout.

Timothy F. Bonvechio, Jason S. Mitchell, and Josh L. Duty

Georgia Department of Natural Resources, Wildlife Resources Division

"Fisheries Management on the Satilla River, Georgia"

Abstract

The Satilla River has historically been one of the premier sunfish fisheries in the state of Georgia, with redbreast sunfish (*Lepomis auritus*) being one of the most sought after species. During the mid-1990's, observed declines in the abundances of redbreast sunfish and bullhead catfishes (*Ameirus spp.*) coincided with the illegal introduction of the flathead catfish (*Pylodictis olivaris*).