



# 2013 Annual Meeting

Georgia Chapter of the American Fisheries Society

GEORGIA CHAPTER  
AMERICAN  
FISHERIES  
SOCIETY

January 22-24, 2013  
Jekyll Island, Georgia





## 2013 GA-AFS Annual Meeting Sponsors

### *Sustaining* (≥\$500)



### *Conserving* (\$250-\$500)

### *Protecting* (\$100-\$250)



### *Raffle/Silent Auction Contributors*

Capt. Bert Deener  
 Capt. Tim Barrett  
 Capt. Henry Cowen  
 Capt. Chris Scalley  
 Winge's Bait and Tackle  
 Greg Grimes (Aquatic Environmental Services)  
 Rebecca Brown

Tennessee Aquarium  
 Monster Bass Tackle  
 Dr. Steve Sammons  
 Satilla Marine  
 Ecological Solutions  
 Steven Patrick



## 2013 GA-AFS Annual Meeting Program

Tuesday, January 22, 2013		
11:00-1:00	Registration	
1:00-1:05	Welcome/Opening Comments	Tim Barrett
1:05-1:20	State of the State WRD	John Biagi
1:20-1:40	State of the state CRD	Pat Geer
1:40-2:00	Break	
2:00-2:20	Shifts in stable isotope signatures confirm parasitic relationship of freshwater mussel glochidia attached to host fish	Andrea Fritts, UGA*
2:20-2:40	Sources and effects of estrogens in the upper Conasauga River	Whitney Jacobs, UGA*
2:40-3:00	Spawning Migrations of Northern Pike into Tributaries of Green Bay in Lake Michigan, WI	Jeff Buckingham, Auburn*
3:00-3:20	Break	
3:20-3:40	Population Characteristics and Habitat Preferences of a State-Endangered Crayfish <i>Cambarus parrishi</i> in the upper Hiwassee River	Kacey Miller, Young Harris College*
3:40-4:00	Economic Value of Recreational Fishing on Lake Guntersville, Alabama	Chris McKee, Auburn*
4:00-4:20	Effects of Fin Ray Removal on the Swimming Ability of Subadult White Sturgeon	Phong Nguyen, UGA*
6:30	Oyster Roast Social	

\*Student presentation



## 2013 GA-AFS Annual Meeting Program

Wednesday, January 23, 2013		
8:10-8:30	Georgia Cooperative Angler Tagging Project	Donna McDowell, CRD
8:30-8:50	Abundance and diversity of sub-adult fishes in impounded South Carolina marshes: the effects of tidal exchange	Ben Carswell, Jeckyll Island Authority
8:50-9:10	Evidence of Striped Bass Spawning in the Chattahoochee River above West Point and Walter George Reservoirs, GA	Bill Davin, Berry College
9:10-9:30	The Mussel-Fish Relationship: A Potential New Twist in North America?	Jason Wisniewski, WRD
9:30-9:50	Brown trout growth in the Chattahoochee River below Buford Dam	Patrick O'Rourke, WRD
9:50-10:10	<b>Break</b>	
10:10-10:30	Utility of Minimum-Length Limits to Prevent Recruitment Overfishing while Considering Dynamic Angling Effort Patterns	Dr. Micheal Allen, University of Florida
10:30-10:50	Population dynamics and exploitation of shoal bas in the Lower Flint River, Georgia	Travis Ingram, WRD
10:50-11:10	Exploitation of shoal bass in the Flint River upstream of Lake Blackshear	Dr. Steve Sammons, Auburn
11:10-11:30	Evaluation of Multiple Harvest Restrictions for Shoal Bass on the Flint River Upstream of Lake Blackshear, Georgia.	Dr. Steve Sammons, Auburn
11:30-11:40	Petitioned listing of Georgia aquatic species	Dr. Brett Albanese, WRD
11:40-11:50	Bubba Bass	
11:50-1:00	Lunch	
1:00-1:30	GA-AFS Awards Ceremony	Tim Barrett
1:30-3:00	GA-AFS Business Meeting	
3:00-3:20	Using Mixed Models to Quantify Variability in Fish Populations	Dr. Brian Irwin, UGA
3:20-3:40	Control of Potentially Toxic Cyanobacteria using Chemicals or Fish	Dr. Gary Burtle, UGA
3:40-4:00	The Great White Hype	Dr. Carolyn Belcher, CRD
4:00-4:20	Flathead Catfish Removal on the Satilla River	Tim Bonvechio, WRD
6:00-8:00	Banquet	



## 2012 GA-AFS Annual Meeting Program

Thursday, January 24, 2013		
8:00-8:20	Nuclear evidence of population structure in Alabama Shad ( <i>Alosa alabamae</i> ) and its conservation and management implications.	Bryant Bowen, WRD
8:20-8:40	Optimizing a Standardized Sampling Program for Sport fish in the Tallapoosa River, Alabama	Dr. Steve Sammons
8:40-9:00	Georgia Stream Update	Paula Marcinek, WRD
9:00-9:20	Tripletail <i>Lobotes surinamensis</i> Habitat Utilization and Movement Study in Ossabaw Sound, Bryan County, Georgia	Chris Kalinowsky, CRD
9:20-9:40	Snails of the Sea: The Whelk Fishery in Georgia	Jim Page, CRD
9:40-10:00	<b>BREAK</b>	
10:00-11:00	Raffle and Silent Auction	
11:00-11:10	Closing Remarks	Tim Bonvechio
11:10	Adjourn	



# ABSTRACTS

GEORGIA CHAPTER  
AMERICAN  
FISHERIES  
SOCIETY





## SHIFTS IN STABLE ISOTOPE SIGNATURES CONFIRM PARASITIC RELATIONSHIP OF FRESHWATER MUSSEL GLOCHIDIA ATTACHED TO HOST FISH

Andrea K. Fritts<sup>1,3</sup>, Mark W. Fritts<sup>1,4</sup>, Scott A. Carleton<sup>2,5</sup> and Robert B. Bringolf<sup>1,6</sup>

<sup>1</sup>University of Georgia, Warnell School of Forestry and Natural Resources, Athens, Georgia 30602

<sup>2</sup>U.S. Geological Survey, New Mexico Cooperative Fish and Wildlife Research Unit, New Mexico State University, Las Cruces, New Mexico 88003

<sup>3</sup>ac528@uga.edu

<sup>4</sup>mwfritts@illinois.edu

<sup>5</sup>carleton@nmsu.edu

<sup>6</sup>bringolf@uga.edu

### **Abstract**

Freshwater mussels (Bivalvia: Unionoidea) are characterized by complex lifecycles composed of multiple, distinct life-stages, including a larval stage referred to as a glochidium. The parasitic nature of larval freshwater mussels, specifically, the role that the fish hosts play in providing nutritional resources to the developing glochidia, is still uncertain. While previous work provided unique morphological descriptions of developing glochidia while they were transforming on fish hosts, earlier studies have not explicitly documented the flow of nutrition from the fish host to the juvenile mussel. Therefore, our objective was to evaluate the feasibility of using stable isotope analysis to quantitatively document nutrient flow between fish hosts and mussel glochidia. Glochidia were collected from nine adult *Lampsilis cardium* and used to inoculate largemouth bass (*Micropterus salmoides*, n=27) that produced juvenile mussels for the experiment. Adult mussel tissue samples, glochidia, transformed juvenile mussels, and fish gill tissues were analyzed for  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  ratios. We used a linear mixing model to estimate the fraction of juvenile mussel tissue derived from the host fish's tissue during attachment. Our analyses indicate a distinct shift in both C and N isotopic ratios from the glochidial stage to the juvenile stage during mussel attachment and development. Linear mixing model analysis indicated that 90.0% of the  $\delta^{13}\text{C}$  and 57.4% of the  $\delta^{15}\text{N}$  in juvenile tissues were obtained from the host fish. This work provides novel evidence that larval unionids are true parasites that derive nutrition from a host fish during their metamorphosis into the juvenile stage.



## Sources and effects of estrogens in the upper Conasauga River

Whitney Jacobs<sup>1</sup>, Peter Lasier<sup>2</sup>, Sayed Hassan<sup>3</sup> and Robert Bringolf<sup>1</sup>

<sup>1</sup>Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA

<sup>2</sup>USGS, Patuxent Wildlife Research Center, Athens, GA

<sup>3</sup>College of Agricultural and Environmental Sciences, University of Georgia, Athens, GA

### **Abstract**

Recently, populations of rare and endangered fish have been declining in the upper Conasauga River (UCR), a reach widely recognized for its high biodiversity. Agriculture, such as row crops, dairy, and poultry production, is the primary land-use activity in the watershed. In a preliminary contaminant survey we measured high concentrations of estrogens in sediments throughout the UCR watershed. In addition to estrogens from animal waste (livestock and dairy production), several pesticides, herbicides, and fungicides used for row crop production can also act as estrogens in the environment. Estrogens have been associated with endocrine disruption and reduced reproductive fitness in fish, amphibians, and other wildlife, raising questions about the role of elevated estrogens in the species declines in the UCR. Our goal is to determine source(s) of estrogens and their effects on fish in the UCR. Specific objectives are to: 1) determine the effects of estrogen exposure on native fish reproductive parameters such as egg production, fertilization rate, and development and hatching success of eggs, 2) determine incidence and severity of intersex in a survey of multiple species of fish in the UCR, 3) assess vitellogenin induction in caged fish to determine if estrogenic compounds are present in UCR water and identify sources of estrogen inputs, and 4) assess the estrogenic potency of UCR sediments by measuring vitellogenin induction in fish exposed to the sediment. Preliminary results of this ongoing work will be presented.

Author to contact: Whitney Jacobs/ Warnell School of Forestry/ University of Georgia/ 180 E Green Street/ Athens, Georgia 30602/ [wnjacobs@uga.edu](mailto:wnjacobs@uga.edu)/ (706) 254-7317



## **Spawning Migrations of Northern Pike into Tributaries of Green Bay in Lake Michigan, WI**

Buckingham, J., Auburn University.

Oele, D., McIntyre, P., Childress, E., University of Wisconsin-Madison.

Diebel, M., Wisconsin Department of Natural Resources.

### **Abstract**

Northern pike (*Esox lucius*) are a migratory species in Lake Michigan, Wisconsin with great ecological and economic significance. Understanding northern pike spawning migrations and habitat needs are of critical concern for the conservation and management of the species. Drastic changes in land use over the last century have threatened northern pike populations by reducing spawning habitat and severing connectivity of tributary watersheds. This study looked at potential barriers to northern pike migrations and investigated the use of otolith microchemistry to track fish from Green Bay in Lake Michigan to spawning locations within tributary watersheds. To determine if we could track individual fish migration, we sought to characterize the environmental chemistry of tributaries that flow into Green Bay using laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS). We collected otoliths from young-of-year (YOY) northern pike to characterize the environmental chemistry of the tributaries used by spawning adults. Discriminant function analysis (DFA) of the YOY otolith microchemistry data found the tributaries were chemically similar and often undistinguishable from each another, except for the Pensaukee River. YOY northern pike were assigned to their natal tributary with 72% reclassification success for the Pensaukee River. This tributary signature serves as a point of reference for testing whether adult northern pike show natal spawning site fidelity. The origin of the adult's otolith can be compared to the YOY otolith to determine if adult northern pike return to the same spawning location it was born. Preliminary results show that if natal homing exists, it is at a watershed scale, but not at a site scale. This study shows the potential for using otolith microchemistry to track the migration patterns for freshwater fish. The results have significant implications for restoring habitats and stocking strategies for northern pike.



## Population Characteristics and Habitat Preferences of a State-Endangered Crayfish *Cambarus parrishi* in the upper Hiwassee River

Kacey Miller; Department of Biology, Young Harris College, Young Harris, Georgia 30582;  
[krmiller@yhc.edu](mailto:krmiller@yhc.edu)

Amber Johnson; Department of Biology, Young Harris College, Young Harris, Georgia 30582;  
[amjohnson@yhc.edu](mailto:amjohnson@yhc.edu)

Johnathan Davis; Department of Biology, Young Harris College, Young Harris, Georgia 30582;  
[jgdavis@yhc.edu](mailto:jgdavis@yhc.edu)

### **Abstract**

Crayfishes are important keystone species in headwater aquatic ecosystems that process organic material, increase nutrient availability and engineer complex benthic stream habitat. Conservation of crayfish diversity is linked to local fish abundance and diversity and downstream biodiversity as well. This study defined population characteristics and habitat preferences of a state-endangered, data-deficient crayfish species, *Cambarus parrishi* in the upper Hiwassee River watershed in northeast Georgia. Crayfish were collected at 7 sites in the watershed over one year by seining and hand collection, and multiple habitat parameters including substrate size, depth, water velocity, and stream roughness were measured at a microhabitat scale. Correlation analysis identified habitat variables associated with presence which were incorporated into logistic regression models. Length-frequencies were used to assign ages in order to examine growth rate and mortality. *C. parrishi* (n=46) were less abundant at all sites than *Cambarus bartoni*, and due to low incidences of capture, data on reproduction was limited. Crayfish older than 2 years of age were rare (n=6) in the sample with estimated annual mortality of 25%. *C. parrishi* presence was correlated to depth and strongly associated with shallow depths and slow water velocities.. This study will be improved by continued research and larger sample sizes but provides relevant data useful in reviewing the conservation status of the species. Crayfishes as a group are understudied, occupy an important role in headwater streams, and perhaps contribute to the success of headwater fish communities.



## **Economic Value of Recreational Fishing on Lake Guntersville, Alabama**

Christopher McKee; Department of Fisheries and Allied Aquacultures, Auburn University, Auburn, Alabama 36849; [cem0040@auburn.edu](mailto:cem0040@auburn.edu)

Terry Hanson; Department of Fisheries and Allied Aquacultures, Auburn University, Auburn, Alabama 36849; [hansontr@auburn.edu](mailto:hansontr@auburn.edu)

Steve Sammons; Department of Fisheries and Allied Aquacultures, Auburn University, Auburn, Alabama 36849; [sammosm@auburn.edu](mailto:sammosm@auburn.edu)

### **Abstract**

Recreational fishing in Alabama is a major source of revenue to communities surrounding popular fishing destinations as well as a source of tax revenue to local, state and regional governments. Statewide economic data on recreational angling allow fishery managers and administrators to recognize the broad impacts recreational fishing has to offer. However, more specific economic data on individual water bodies and targeted fish species are helpful to administrators and managers for proper characterization of the fisheries under their purview. We estimated the economic impact of recreational fishing expenditures and tax revenues generated for the four major recreational fisheries (black bass, crappie, catfish, and sunfish) at Lake Guntersville, Alabama to the local towns, counties, and State. We also estimated the recreational angling effort, catch, and harvest rates for each of the four major sport fisheries. Through October 2012 there have been 1.17 million hours of recreational angling effort by boat anglers and 142,300 hours of effort by bank anglers, which translates into over 200,000 angler fishing days and approximately \$13.4 million in direct related expenditures. Of this effort, 66% of anglers targeted black bass, 19% crappie, 6% sunfish, 3% catfish, and 5% were fishing for anything or other fish. Forty-two percent of the anglers that fished Guntersville were residents of the three counties surrounding the reservoir, 27% were nonlocal Alabama residents, 15% were from border-states, and 16% were from non-border states. Data collected during this project will be valuable to policymakers in justifying their management of recreational fisheries, resolving user conflicts, and aiding in promoting Lake Guntersville as a significant recreational fishery to the state.



## Effects of Fin Ray Removal on the Swimming Ability of Subadult White Sturgeon

Phong Nguyen and Douglas Peterson

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

### **Abstract**

Several populations of white sturgeon (*Acipenser transmontanus*) on the Pacific Coast of North America currently support important recreational fisheries; however; quantifiable age and growth data are needed to ensure effective management and hence, sustainability of the fishery. Although pectoral fin spines from harvested fish can provide some of these data, current fishery regulations prohibit harvest of adult fish. Methods for non-lethal sampling of pectoral fin rays have been used to obtain similar data from other sturgeon species; however, their effects on the swimming ability and long-term survival of white sturgeon have not been assessed. The objective of this study was to assess the effects of two different fin-spine sampling methods on the swimming performance and behavior of captive white sturgeon. In the first method (T1), only a small section (~2 cm) of the marginal pectoral spine was removed. In the second method (T2), the entire marginal pectoral spine was removed from the body integument using a small hacksaw and knife. Using a modified Brett-type swim chamber, we determined critical station-holding speed (CSHS) and swimming orientation to quantify significant differences in the swimming ability of sturgeon subjected to each fin spine sampling method. Our results showed that mean CSHS of controls, T1, T2 were 240 cm/s (29 cm/s), 239 cm/s  $\pm$  28 cm/s, and 233 cm/s  $\pm$  21 cm/s respectively, indicating that fin-spine sampling had no significant effect on swimming ability. The results of this study suggest that non-lethal sampling of fin spines from wild sturgeon is non-deleterious.



## Georgia Cooperative Angler Tagging Project

Donna McDowell

Georgia Department of Natural Resources, Coastal Resources Division, Brunswick, GA

### **Abstract**

Georgia Department of Natural Resources' Coastal Resources Division has supported a volunteer angler project since 1987. Originally, the project was designed to examine growth rates, migration and habitat preference of red drum, but over time it has evolved into a project that appeals to fishers who support catch and release. Currently, the participant pool is small and controllable, with participants ranging from the average recreational angler to charter boat captains. Focal species have varied across the time period, but have included recreationally important species such as spotted seatrout, red drum, sheepshead, tripletail, black drum and tarpon. To date, a few thousand fish have been tagged, the majority being red drum and tripletail. Information collected in the volunteer database provided the basis for investigating the Georgia-Florida migration of tripletail via a cooperative VEMCO study with researchers in Florida. Future plans for the project include investigating other species such as whiting and cobia, as well as obtaining meeting the certification standards being proposed Atlantic States Marine Fisheries Commission.

GEORGIA CHAPTER  
AMERICAN  
FISHERIES  
SOCIETY





## ABUNDANCE AND DIVERSITY OF SUB-ADULT FISHES IN IMPOUNDED SOUTH CAROLINA

### MARSHES: THE EFFECTS OF TIDAL EXCHANGE

Ben L. Carswell, Cecil A. Jennings, and James T. Peterson

#### **Abstract**

In coastal South Carolina, most impounded marshes are managed for waterfowl; fewer are managed for fishes. Tidal control is central to each strategy but raises concerns that nursery function could be impaired. This research examined the assemblage composition of fishes during early-life stages. I sampled two impoundments of each management type monthly in 2008 and 2009. I used light traps to collect 61,527 sub-adult fish representing 21 species and 16 families and push nets to collect 12,670 sub-adult fish representing 13 species and 11 families. The effective number of species detected at larval stage in “fish” impoundments (summer mean= $2.52 \pm 0.20$ , winter mean= $2.02 \pm 0.66$ ) was greater than in “waterfowl” impoundments (summer mean= $1.27 \pm 0.14$ , winter mean= $1.06 \pm 0.09$ ); C.I.=90%. Species richness did not differ between management types, but hierarchical linear models predicted differences in assemblage composition. These findings underscore the importance of frequent water exchange for maintaining diverse assemblages of early-life-stage fishes in marsh impoundments.

FISHERIES  
SOCIETY



## **Evidence of Striped Bass Spawning in the Chattahoochee River above West Point and Walter George Reservoirs, GA**

Warren Stiles<sup>1</sup>, Reid Popple<sup>1</sup>, Rob Weller<sup>2</sup>, Bill Davin<sup>1</sup>

<sup>1</sup>Dept. of Biology, Berry College

<sup>2</sup>Georgia Dept. of Natural Resources – Fisheries

### **Abstract**

Gulf-strain striped bass (*Morone saxatilis*) are an important game fish that has been stocked into main-stem reservoirs in the Chattahoochee River, GA. Naturally an anadromous species, successful spawning events in land-locked striped bass populations are rare and require long stretches of free flowing river. The Chattahoochee flows from northeast Georgia to Lake Seminole with many reservoirs along its length. The longest free-flowing stretch of the river is located between Morgan Falls Dam and West Point Reservoir (125km). Striped bass have been stocked into West Point Reservoir since 2005 and Walter George Reservoir since 1996 with the hope of natural reproduction. Eggs were sampled with a Wisconsin-style drift net at three points above West Point Reservoir and one point above George Reservoir. The harvested eggs were stained, identified and the striped bass eggs staged to provide an approximate spawning time. Of 447 eggs collected, 20% (N=86) are believed to be striped bass eggs. Striped Bass eggs were collected above both of the reservoirs, with the majority (N=72) coming from the Chattahoochee River above West Point Reservoir, however, the concentrations of eggs in the samples were low (0.02 to 0.8 eggs /m<sup>3</sup>). Due to low river velocities during the 2012 spawning period (less than the 0.3m/s needed to suspend the eggs and larval fish), it is unlikely that the 2012 spawning events on the Chattahoochee were successful.



## The Mussel-Fish Relationship: A Potential New Twist in North America?

**Jason M. Wisniewski\***

*Nongame Conservation Section, Wildlife Resources Division, Georgia Department of Natural Resources, Social Circle, Georgia 30025 USA*

**Katherine D. Bockrath and John P. Wares**

*Department of Genetics, University of Georgia, Athens, Georgia 30602 USA*

**Andrea K. Fritts**

*Warnell School of Forestry and Natural Resources, University of Georgia, Athens, Georgia 30602 USA*

**Matthew J. Hill**

*Nongame Conservation Section, Wildlife Resources Division, Georgia Department of Natural Resources, Social Circle, Georgia 30025 USA*

### **Abstract**

North American freshwater mussels are critically imperiled organisms that generally require fish hosts in order to complete their life cycle. Although numerous studies have focused on the parasitic relationship between mussels and fishes, fewer have examined benefits provided by mussels to other organisms. During sampling of Altamaha River, GA, we observed foreign eggs occurring within body cavities of native mussels across a 253 km reach of the river basin. Eggs were recovered from 6% of the 757 mussels examined among 7 sites. Foreign eggs were present in 17% and 18% of examined mussels at 2 sites. Using molecular techniques, eggs were identified as American shad (*Alosa sapidissima*). This discovery appears to be the first documented occurrence of native fish eggs in live North American mussels. Further research into the nature and mechanism of this symbiosis is warranted to assess whether this relationship is amensalistic, mutualistic, or commensalistic as American Shad and many freshwater mussels are species of conservation concern. A commensalistic or mutualistic relationship between these taxa may result in restoration activities affecting one species facilitating restoration of others.



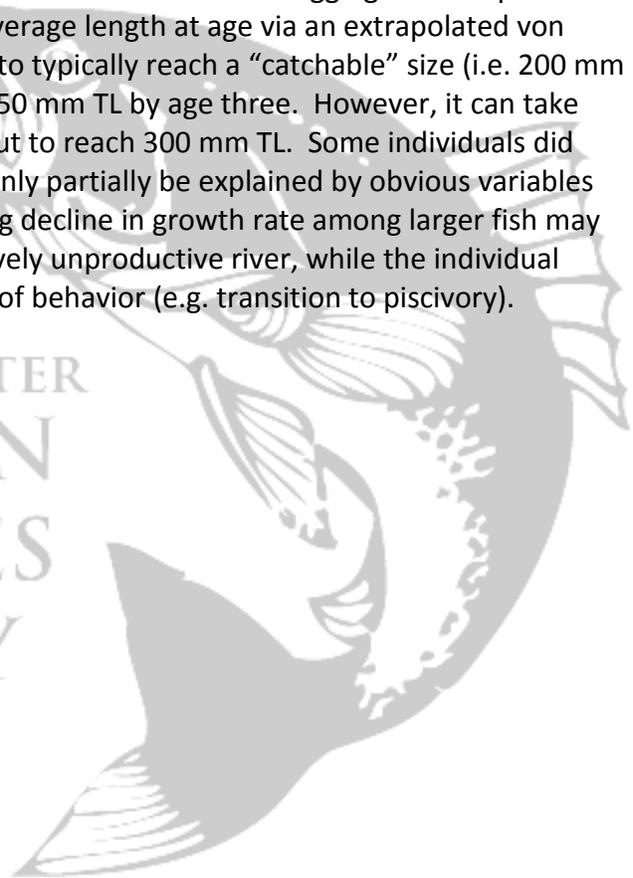
## **Brown trout growth in the Chattahoochee River below Buford Dam**

Patrick O'Rourke, Georgia Wildlife Resources Division

### **Abstract**

The Georgia Wildlife Resources Division (WRD) performed a tagging study from April 2011 to May 2012 to study the growth of wild brown trout in the Lanier Tailwater section of the Chattahoochee River. Sampling occurred monthly at four sites and fish were tagged through March 2012 for subsequent recapture. Growth increments between tagging and recapture events were calculated and used to estimate average length at age via an extrapolated von Bertalanffy growth curve. Brown trout appear to typically reach a “catchable” size (i.e. 200 mm TL) in slightly more than one year and reach ~250 mm TL by age three. However, it can take more than ten years for the average brown trout to reach 300 mm TL. Some individuals did display much faster growth rates which could only partially be explained by obvious variables such as seasonality, location, or size. The strong decline in growth rate among larger fish may be a result of sparse available forage in a relatively unproductive river, while the individual variability between similar fish may be a result of behavior (e.g. transition to piscivory).

GEORGIA CHAPTER  
AMERICAN  
FISHERIES  
SOCIETY





## Utility of Minimum-Length Limits to Prevent Recruitment Overfishing while Considering Dynamic Angling Effort Patterns

**Micheal S. Allen and Robert N. M. Ahrens**

Fisheries and Aquatic Sciences Program, School of Forest Resources and Conservation, The University of Florida, 7922 NW 71<sup>st</sup> Street, Gainesville, Florida 32653 [msal@ufl.edu](mailto:msal@ufl.edu); [rahrens@ufl.edu](mailto:rahrens@ufl.edu)

**Michael J. Hansen**

University of Wisconsin – Stevens Point, College of Natural Resources, 800 Reserve Street, Stevens Point, Wisconsin, 54481, USA

**Robert Arlinghaus**

Department of Biology and Ecology of Fishes, Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Müggelseedamm 310, 12587 Berlin, Germany

Inland Fisheries Management Laboratory, Department for Crop and Animal Sciences, Faculty of Agriculture and Horticulture, Humboldt-Universität zu Berlin, Philippstrasse 13, Haus 7, 10155 Berlin, Germany

### **Abstract**

Recruitment overfishing has been termed an ‘invisible’ problem in freshwater recreational fisheries, but examples show that recruitment overfishing can occur. This study developed an age-structured model to evaluate the benefits of minimum-length limits to prevent recruitment overfishing in black crappie *Pomoxis nigromaculatus* and walleye *Sander vitreus* fisheries in light of varying assumptions about how angling effort would respond to changes in fish abundance that occur due to stochastic recruitment. The simulations showed that length limits could generally prevent recruitment overfishing of black crappie and walleye, but larger length limits were required if angler effort showed weak responses to changes in fish abundance. This occurred because low angler effort responsiveness caused fishing mortality rates to potentially remain high when the stock abundance declined. By contrast, at high effort responsiveness anglers would leave the fishery after stock declines, therefore allowing recovery of stocks when stock abundance declined. Angler effort estimates for black crappie and walleye fisheries suggested that angler effort could be highly responsive for some cases and relatively stable in others, increasing the risk of recruitment overfishing in real fisheries. Recruitment overfishing should be considered seriously in freshwater recreational fisheries.



## **Title: Exploitation of Shoal Bass in the Flint River Upstream of Lake Blackshear, Georgia**

Steven M Sammons

Auburn University

### **Abstract**

The Flint River, Georgia, has historically supported a popular fishery for shoal bass *Micropterus cataractae*, but recently, anglers have noticed a lack of trophy-sized shoal bass in this river. Thus, a total of 376 shoal bass were tagged with internal anchor tags at 16 sites over a 208-km stretch of the Flint River from 2008-2011 to estimate exploitation of shoal bass. Catch of these fish was high, with uncertainties regarding the non-reporting rate by anglers, it is possible that half the harvestable-sized shoal bass in the river were caught by anglers in a given year. Harvest was moderate to high for a black bass species, with annual exploitation rates of all sizes of shoal bass varying from 0.156 to 0.265 across all years and non-reporting rates; mean annual exploitation rates were 0.218 and 0.249 at 20% and 30% non-reporting rates, respectively. Catch and harvest of 300-399 mm shoal bass were slightly higher, and catch and harvest of fish  $\geq 400$  mm were slightly lower, than overall catch and harvest rates. Percent of tagged fish that were caught and also harvested varied among sites along the river; fish were particularly likely to be harvested at three shoal areas suspected to be spawning areas, thus the apparent high rate of harvest observed in these areas may be of concern. Anglers using hand-powered craft in more remote areas appeared to be less interested in harvesting shoal bass, and some of these anglers specialized in pursuit of large or trophy fish. In contrast, anglers fishing out of motor boats tended to be more harvest-oriented and less interested in size of fish.



**Title: Evaluation of Multiple Harvest Restrictions for Shoal Bass on the Flint River Upstream of Lake Blackshear, Georgia.**

Steven M Sammons

Auburn University

**Abstract**

The shoal bass *Micropterus cataractae* fishery in the Flint River is regulated with a 305-mm minimum length limit (MLL), but no formal evaluation has ever been conducted. Exploitation results were combined with growth and catch-curve data from another portion of this study and used in simulation models to assess the efficacy of the current 305 minimum-length limit (MLL), a 381-mm MLL, and a 356-432-mm slot limit to regulate the shoal bass population. In addition, the effect of a closed season on shoal bass harvest from April-June was examined in conjunction with both MLLs for a total of five harvest restriction scenarios examined. The area chosen for a simulated closed season was a 9.7-km reach encompassing a known spawning area for shoal bass that annually receives a high amount of directed effort and harvest during the spawning period. Results of modeling revealed that the current 305-mm minimum-length limit (MLL) may not be adequate to protect the size structure of the shoal bass population in the Flint River, given the current exploitation rates. Despite fast growth and moderate rates of natural mortality, biomass of  $\geq$  age-4 fish in the population was quickly depleted due to harvest. If maintenance of a trophy component in the Flint River is important to managers, then other size limits should be considered. Of the harvest restrictions examined, the 381-mm MLL provided the greatest benefits to size structure of the shoal bass population; however, the declines in number of fish harvested by anglers may prove to be unacceptable to segments of the angling public. The simulated closed season would have decreased exploitation rates of shoal bass 300-399 mm by 11% and shoal bass  $\geq$  400 mm by 21%. However, predicted effects of the closed area on the shoal bass population were minimal when compared to the effects on changing length limits. Based on the results of this study, a closed area for part of the year may not be worth the logistical issues associated with enforcement of this option.



## Using Mixed Models to Quantify Variability in Fish Populations

Brian J. Irwin<sup>1</sup>

And

Tyler Wagner<sup>2</sup>

<sup>1</sup> U.S. Geological Survey, Georgia Cooperative Fish & Wildlife Research Unit,  
University of Georgia, Athens, GA 30602, USA

E-mail: [irwin@uga.edu](mailto:irwin@uga.edu)

<sup>2</sup> U.S. Geological Survey, Pennsylvania Cooperative Fish & Wildlife Research Unit,  
Pennsylvania State University, University Park, PA 16802, USA

E-mail: [twagner@psu.edu](mailto:twagner@psu.edu)

Monitoring programs are widely used to provide essential information for the restoration and management of fish populations. It is generally assumed that these monitoring surveys produce representative data on how fish populations vary over space and time. For example, observed fish-population metrics may vary among repeated samples from a single location, from site to site within a lake, from lake to lake, and among sampling years. We will discuss the use of mixed models to partition variability into multiple spatial and temporal components. Models for estimating variance components have been applied to a wide variety of aquatic indices including water chemistry variables, measurements of species richness, stream habitat characteristics, metrics of fish growth, and catch-per-unit effort data. To date, most variance-components frameworks have been based on linear models that assume normally distributed error structures. However, assuming a normal distribution for observations of abundance is often not ideal because these counts are typically non-negative integers with high variances and low means, not to mention other issues that arise when log-transforming data such as how to treat zero observations during the analysis. We will use data collected by fishery-independent surveys to illustrate the idea of variance partitioning and discuss its relevance for monitoring programs. We will also describe the negative binomial distribution within the mixed-model framework as an alternative to log-transformation (e.g., an alternative assumption about the mean-variance relationship) that can be applied to discrete count data in a variance-partitioning context.



## Control of Potentially Toxic Cyanobacteria using Chemicals or Fish

Gary J. Burtle

University of Georgia

### **Abstract**

The most common toxic algae condition involves microcystin that can be produced by *Microcystis* or other cyanobacteria. However, some cattle problems have been associated with ponds that contain *Euglena* and euglenophycin, a toxin that can be produced by *Euglena*. A control method for reducing potential toxic algae populations was tested in one-quarter acre earthen ponds that were populated with different compositions of planktonic algae. An initial application of sodium percarbonate (9.25 mg/L) followed by an application of copper sulfate (0.25 mg/L) showed that planktonic algae have differential tolerance to these algicidal chemicals. Among cyanobacteria, *Microcystis* and *Rhabdoderma* were more vulnerable to the treatment at moderate than high phytoplankton bloom density. The low dose algicide treatment was apparently not toxic to the green algae, *Scenedesmus*. *Cylindrospermopsis*, *Aphanizomenon*, and *Aphanocapsa* numbers were reduced by the low dose algicide treatment at moderate and high phytoplankton bloom densities. This information can be considered when applying algicidal chemicals for partial control of phytoplankton blooms in order to selectively affect cyanobacteria but reduce risk of dissolved oxygen depletion by allowing a significant population of non-toxic algae to remain.

GEORGIA CHAPTER  
AMERICAN FISHERIES  
SOCIETY



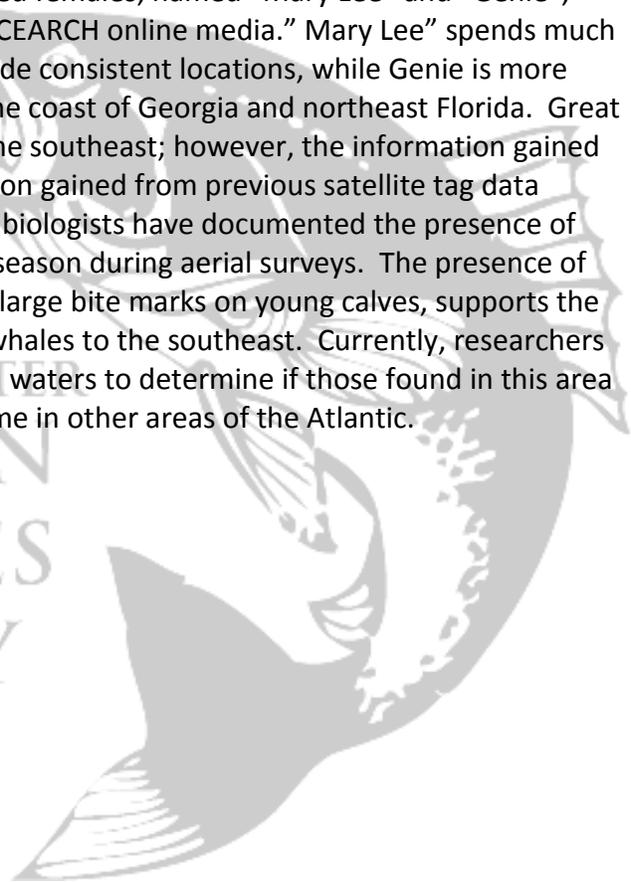
## The Great White Hype

Carolyn Belcher, GA Department of Natural Resources, Coastal Resources Division, Brunswick, GA

### **Abstract**

In September 2012, the non-profit group OCEARCH, in cooperation with Dr. Greg Skomal (Massachusetts Department of Marine Fisheries), placed locator tags in two great white sharks off the coast of Cape Cod, MA. These two tagged females, named “Mary Lee” and “Genie”, have been followed by the general public via OCEARCH online media.” Mary Lee” spends much of her time near enough to the surface to provide consistent locations, while Genie is more elusive. Both “girls” are currently located off the coast of Georgia and northeast Florida. Great whites are not considered resident species in the southeast; however, the information gained from the OCEARCH tags coupled with information gained from previous satellite tag data support a seasonal migration. Marine mammal biologists have documented the presence of sharks during the northern right whale calving season during aerial surveys. The presence of the great whites, coupled with the evidence of large bite marks on young calves, supports the hypothesis these sharks may be following the whales to the southeast. Currently, researchers hope to tag white sharks found in southeastern waters to determine if those found in this area return only to the northeast or if they spend time in other areas of the Atlantic.

GEORGIA CHAPTER  
AMERICAN  
FISHERIES  
SOCIETY





## Flathead Catfish Removal on the Satilla River

\*Timothy F. Bonvechio and Jason S. Mitchell

Georgia Department of Natural Resources, Wildlife Resources Division  
P.O. Box 2089, Waycross, Georgia 31502-2089, USA

### **Abstract**

The presence of illegally introduced flathead catfish (*Pylodictis olivaris*) was first observed in 1996. During the mid-2000's, observed declines in abundances of redbreast sunfish and bullhead catfishes (*Ameiurus spp.*) coincided with significant increases in the abundance of flathead catfish. In an effort to negate the impacts on native fish populations, existing Wildlife Resources Division (WRD) Waycross Fisheries staff began aggressive removals via electrofishing in 1996 as time allowed. Despite these removal efforts, the number and size of flathead catfish per hour of electrofishing had continued to increase since their introduction. In 2006, the Georgia legislature appropriated funding for three new positions. These personnel were assigned the task of reducing the flathead catfish population levels through direct removal while searching for a long-term population control. This new crew hit the river running in April 2007. Thankfully, in the past 6 years, (2007-2012), 109 volunteers supplied 976 volunteer hours towards the removal project. For the 2012 sampling season (May-October), the crew removed 2,861 flathead catfish totaling 3,557 pounds. Since the implementation of the full time flathead management program in 2007, more than 66,494 pounds of flathead catfish (26,091 fish) have been removed from the river in 6 years. The size structure of the flathead population has been affected with the average size fish removed dropping from 5.8 pounds in 2007, to 2.9 pounds in 2008, to 1.4 pounds in 2009, but slightly increased to 1.8 pounds in 2010 and 2.7 pounds in 2011, but dropped to 1.2lbs in 2012. Biomass per effort showed a similar trend and had also declined from 57.1 kg/hr in 2007, to 23.6 kg/hr in 2008, to 19.9 kg/hr in 2009, but increased to 31.1kg/hr in 2010 and then dropped in 2011 to 25.3 kg/hr, and further dropped in 2012 to 10.9 kg/hr. Maintenance control of flathead catfish in the Satilla River may be possible given our reported changes in the size structure and biomass of the population, but intensive harvest needs to be maintained to prevent the flathead population from rebuilding, especially during high water years, where strong recruitment has been demonstrated by the introduced flathead population.



**Nuclear evidence of population structure in Alabama Shad (*Alosa alabamae*) and its conservation and management implications.**

Bryant R. Bowen; Georgia Department of Natural Resources, Waycross, GA 31051;  
[Bryant.Bowen@dnr.state.ga.us](mailto:Bryant.Bowen@dnr.state.ga.us)

Joshua R. Ennen; <sup>2</sup>TN-SCORE, University of Tennessee, 2450 EJ Chapman SW Suite 201, Knoxville, TN 37996; [jennen81@gmail.com](mailto:jennen81@gmail.com)

Brian R Kreiser; The University of Southern Mississippi, Hattiesburg, MS 39406;  
[brian.kreiser@usm.edu](mailto:brian.kreiser@usm.edu)

Paul F. Mickle; USM Gulf Coast Research Lab, Ocean Springs, MS 39564; [paul.mickle@usm.edu](mailto:paul.mickle@usm.edu)

William T. Slack; USACE Environmental Laboratory, Vicksburg, MS 39180;  
[Todd.Slack@usace.army.mil](mailto:Todd.Slack@usace.army.mil)

Stephen T. Ross; University of New Mexico, Albuquerque, NM 8713; [stross@unm.edu](mailto:stross@unm.edu)

**Abstract**

Anthropogenic effects on the environment have caused population declines in many diadromous species. Some of these impacts include loss of essential habitat, migration barriers, and poor water quality resulting from degradation of the watershed. Our goal was to use microsatellite markers as ecological tools to explore the population structure and genetic diversity of Alabama shad throughout their existing range and establish some sort of baseline genetic data for conservation management decisions. Genetic techniques have proven to be useful tools in conservation biology by delimiting stock structure in other anadromous species such as salmon and sturgeon, as well as the closely related American shad. Population structure in Alabama shad (n=491) was estimated using 16 microsatellite loci designed for other *Alosa* spp. Our analyses detected shallow, but significant, population structure across the range at higher levels than previous allozyme and mtDNA restriction fragment length polymorphism analyses had revealed. These data should prove useful in informing future management decisions and provide the tools needed to monitor wild populations and guide future restoration programs if deemed necessary.



## Optimizing a Standardized Sampling Program for Sportfish in the Tallapoosa River, Alabama

Steven M. Sammons

Auburn University

### **Abstract**

An 80-km stretch of the Tallapoosa River, Alabama, was sampled to determine catch-per-effort (CPE) of Alabama Bass *Micropterus henshalli*, Redeye Bass *M. coosae*, and Redbreast Sunfish *Lepomis auritus*. Fish were sampled using boat electrofishing along the shoreline in four areas in spring (May), summer (July-August) and fall (October-November) in 2010 and 2011. Each collection consisted of 7, 1-h transects collected from four access points; however, to determine optimal transect length and number, fish were recorded as to whether they were caught during the first 10, 20, 30, 40, 50, or 60 minutes of electrofishing. Each collection was treated as independent, and sample mean CPE and variance was calculated for each time block in each collection (N=36); each of the 36 data points were estimated with 7 samples (i.e., the transects). The effect of sample duration and relative abundance on CPE variance was modeled using a multiple least-squares regression. Also, the number of samples and total sample durations required to achieve precision of 0.1 or 0.2 of the mean were determined. Mean CPE was independent of sample duration for all species; thus, may be estimated with any sample duration from 10-60 minutes. A precision of 0.1 of the mean CPE was unable to be achieved for any species at the empirical CPE and variance, thus a target precision of 0.2 was used for subsequent analyses. As expected, variance increased with CPE but generally decreased as sample duration increased; thus, a larger number of samples were required to maintain precision as sample duration decreased. However, total sample time was generally less when sample durations were small. Long-duration samples were only efficient for Alabama Bass when CPE was low and for Redbreast Sunfish when CPE was high, otherwise, small-duration samples were the most efficient sampling design for sportfish on the Tallapoosa River. Overall, the most efficient sampling scheme for the Tallapoosa River was dictated by Redeye Bass (the least abundant species), which required 40, 10-min transects to achieve the desired precision, with an estimated total sampling and processing time of 7.16 h. This was greater than those required for the other species; thus, this sample design should be adequate to estimate CPE of all three of these species with relatively high precision.



## Tripletail *Lobotes surinamensis* Habitat Utilization and Movement Study in Ossabaw Sound, Bryan County, Georgia

Chris Kalinowsky

Georgia Department of Natural Resources, Coastal Resources Division, Brunswick, GA

### **Abstract**

The recent increase in fishing pressure on tripletail in coastal Georgia has led to the need for better understanding of the biology of the species. Prior to this project little was known regarding key life-history data like habitat utilization, seasonal/temporal movements, spawning location, and long range migration. Tripletail were tagged and monitored using passive acoustic telemetry in attempt to answer some of these questions. The first three years of this study have shown that tripletail ( $n=41$ ) exhibit strong site fidelity to the sound in which they are tagged. Fish are typically present from late March through mid-November. Prior to this study, little was known regarding the residence time of tripletail in Georgia estuaries.

This study has been valuable in defining the long range migration patterns and overwintering behavior of tripletail. Fish tagged in Georgia have been detected in both Florida ( $n=22$ ) and South Carolina ( $n=2$ ). Most tagged fish, after leaving Georgia in late fall, head south and are detected on receivers ranging from Cape Canaveral, FL to Jupiter Inlet, FL during the winter. After a brief stay in this southern region, fish typically move back north along the Florida coast, briefly staging up around the Canaveral area from January to March before continuing on to Georgia waters. Based on the data produced by this study, there is now strong evidence that Georgia tripletail move south to overwinter in warmer waters off South Florida then return to Georgia in late Spring/Summer.



## Snails of the Sea: The Whelk Fishery in Georgia

James Page

Georgia Department of Natural Resources, Coastal Resources Division, Brunswick, GA

### **Abstract**

Whelks are a marine gastropod commonly found and harvested in Georgia's territorial waters. Four species of whelk are commonly captured in state waters: the knobbed whelk (*Busycon carica*), lightning whelk (*Busycon contrarium*), pear whelk (*Busycon spiratum*), and channeled whelk (*Busycotypus canaliculatus*). Recreationally, the harvest of these animals has occurred for hundreds of years, dating back to the early Native Americans. Commercially, the harvest of whelks in Georgia began in 1980 under an experimental contract and has continued to evolve. Throughout the 1980's and 1990's, the whelk fishery was Georgia's largest molluscan fishery. As interest in the fishery increased, the need for additional data on species encountered by the fishery became critical to fishery managers. In 1996, the Georgia Department of Natural Resources (GADNR) began placing observers on vessels to collect fishery-dependent data. The primary objectives of these efforts were: 1) to provide fishery managers a better understanding of fishery specifics; 2) inform scientists on the composition of species commonly seen in whelk trawls; and 3) allow for better approaches to managing the fishery. Results of data collection efforts have contributed to various management recommendations, including regulatory changes such as the requirement of turtle excluder devices (TEDs) prior to the 2000 whelk season. During 2011/12, observers collected data to address concerns expressed by whelk fishers about the potential impact of TEDs on whelk catches. Analysis of this data revealed TEDs did not appear to impact catches. Data collection efforts to address future concerns and examine management strategies will continue in the future.