

Abstracts for 25th Annual Meeting of the Alabama Fisheries Association

Monday, February 23, 2009

Session 1 : History and Heritage of the Alabama Fisheries Association and Fisheries Science in Alabama

In the Beginning....The initiation of the Alabama Fisheries Association. Keynote Address.

Barry Smith, American Sport Fish and First AFA President.

Abstract. More than 25 years ago, a small group fisheries workers met to share ideas and concerns relating to the development of a state-wide organization that would act as a forum to share and disseminate current information on fisheries activities within Alabama. From this meeting, the organization that we currently know as the Alabama Fisheries Association (AFA) was spawned. Through excellent leadership and direction during the past 25 years, AFA has fulfilled its original goal of sharing current information among state, federal, university and private individuals. AFA has matured into a valuable organization that keeps its membership and interested public informed on issues relating to fisheries and aquatic resources.

Fisheries research at Auburn University.

E.W. Shell, retired Auburn University.

Abstract. Work on the management of Farm Ponds at Auburn grew out of the dismal results of construction, stocking and management of a fish pond for the enjoyment of a group of Alabama Polytechnic Institute faculty and local townspeople. The results were uniformly so poor that the decision was made to initiate research in the Experiment Station to improve the process. The first organized research, conducted in a campus greenhouse, was on the problem of how to increase the fertility of impounded Piedmont water. Later (1936), the laboratory results on phytoplankton production were extended to small, newly-constructed, earthen ponds, using fish production to evaluate fertilizer combinations. Concurrently with the pond fertilization work, experiments were conducted on the reproduction of bluegills in pond conditions. Later, different predator-prey combinations were evaluated in larger ponds. The "corner-stone" experiment which determined pond stocking procedures used in much of the United States, was conducted in a 1.4-acre pond in 1939. These results were evaluated in public-fishing experiments. In the mid-40's, Swingle began to develop an interest in the production of "food-fish," in ponds. Results of his first research on this subject were published in 1949. He conducted

relatively little research on recreational fishing thereafter. A decade later, he published the definitive paper on channel catfish production in ponds.

The Fisheries Section; before and during its first 20 years.

Rudy Schmittou, retired Auburn University.

Abstract. The Fisheries Section, Game and Fish Division, Alabama Department of Conservation, was organized in 1951 for the purpose of conducting needed freshwater fisheries research and to apply fish management techniques in such a way as to conserve and protect the natural fish populations and other aquatic organisms and to achieve the highest possible production and harvest of fish from the inland freshwaters of the state. Heretofore fisheries conservation had essentially been lacking or limited to private sportsmen clubs and narrowly specific responsibilities of the G&F Law Enforcement Section and the Parks Division. Timing of FS was good; the need was strong, the technology was at least theoretically available and a network of highly capable people was ready to assist. One may reasonably assume that by 1951 fish populations and fishing in most of Alabama's streams had reached an all-time low and declining. On the other hand relatively new river impoundments and private farm ponds had created new opportunities for FS. The ongoing fish research and teaching program at Alabama Polytechnic Institute had developed new understanding and technologies for managing pond and, theoretically, public water systems, and it was now graduating masters-degree fishery biologists capable of applying and testing the new technologies in all freshwater habitats in the state. The three essential ingredients of identified needs, applicable technologies and motivated, competent people came together on 5 January 1951 with the employment of I.B. Byrd as the first FS Chief Biologist. He was joined by Asst. Chief D.D. Moss a month later, and the two of them set out an ambitious objective to investigate and become thoroughly familiar the fishery conditions of every creek, river and lake in every county of Alabama. The 170-page report of that survey, published in December, 1952, received the first funding of the highly acclaimed Dingell-Johnson Act / Federal Aid in Fish Restoration. It was the first of numerous firsts and meritorious accomplishments for FS during the 20-year reporting period and beyond. With additional biologists, FS quickly became a recognized leader in public fishing lake and private fish pond construction and management, fish population surveys, public fishery education, campaign to raise and maintain water quality standards in public waters. FS was recognized also for its cooperation with a very broad spectrum of state and federal agencies and professionals, including those from within its own department and division to API (API became Auburn University in 1959) and USFWS, SFI, SCS (NRCS).

The Fisheries Section; the last 40 years, expanding our mission.

Joe Addison, AL Wildlife and Freshwater Fisheries.

No abstract available.

Ichthyology at The University of Alabama, 1947 to present.

Herbert Boschung, retired University of Alabama.

Abstract. What is Fisheries Biology (Fisheries Science)? What is Ichthyology?

This presentation will review the history of ichthyology at the University of Alabama from 1947 to present. The presentation will include brief remarks pertaining to earlier ichthyologists whose work contributed to the study of fishes in the state of Alabama, as well as at The University of Alabama. Discussion will center on four curators of the fish collection: Ralph Chermock, the founder (1947 to 1957), Herb Boschung (1957 to 1987), Richard Mayden (1987 to 2000), and Bernard Kahajda presently. Brief biographies will be included.

Other topics of this presentation:

Emphasis is on Collection building: *Raison d'être*? How, when, why? Major contributions.

A pictorial trip through the ichthyology facility at the University of Alabama.

Opportunities for graduate students.

Early development of the Black Warrior-Tombigbee Waterway.

Scott Mettee, AL Geological Survey.

Abstract. In their original state, most of Alabama's rivers were moderate to large meandering streams bordered by wide, hardwood floodplains that were routinely submerged by winter floods. Steamboats transported people, food, dry goods, and other commodities from the Port of Mobile to Tuscaloosa, Montgomery, Selma, Gadsden, and numerous smaller river communities along the way from January through April and they returned to Mobile carrying bales of cotton and firewood that were harvested the previous summer. Inland steamboat transportation was usually impossible during summer months because the rivers were too shallow and their channels were filled with logs and other debris. Everything changed in the mid-1800s when the U. S. War Department realized that the Black Warrior and Tombigbee Rivers were the only two rivers in North American that did not freeze during the winter months and the headwaters of the Black

Warrior River contained large coal and iron ore deposits, the primary components for manufacturing guns, ships, and other war supplies. This paper will present limited information concerning the original condition in the Black Warrior and Tombigbee Rivers, the construction of the original 17 locks and dams for Black Warrior-Tombigbee Waterway, and the ensuing development of commercial barge traffic along the waterway.

Session 2 : Watershed/Riverine

Gulf Sturgeon Investigations.

Frank Parauka, US Fish and Wildlife Service, Panama City.

Abstract. Gulf sturgeon spawning was documented in 2008 in the Apalachicola River with the collection of Gulf sturgeon eggs. We collected Gulf sturgeon eggs at three hard bottom sites in the Apalachicola River; two sites were previously confirmed spawning areas and one was a newly confirmed spawning area. We also documented a 41-day spawning period from April 4 to May 14, 2008.

We completed a two year Gulf sturgeon census on the Choctawhatchee River. We collected 1150 fish during the month long study in 2007 and 2008 of which 900 fish were first time captures. We estimated the population at 3,300 individuals, a 500 fish increase from the previous population study conducted in 2001.

The Pea River was floated from the dam located at Elba, Alabama downstream to the confluence with the Choctawhatchee River to determine potential threats to Gulf sturgeon spawning habitat. Fifty-five sites which included eroded banks, poor buffers, unpaved roads and cattle pastures with access to the river were identified as potential threats to Gulf sturgeon spawning habitat.

Genetic structure of the federally threatened Slackwater Darter, *Etheostoma boschungii*.

Brook L. Fluker, Bernard R. Kuhajda, and Phillip M. Harris, Department of Biological Sciences, Box 870345, The University of Alabama, Tuscaloosa, AL 35487-0345 (blfluker@bama.ua.edu; bkuhajda@bama.ua.edu; pharris@bama.ua.edu)

Abstract. The Slackwater Darter has a disjunct distribution throughout tributaries to the south bend of the Tennessee River, including Shoal, Cypress, and Swan creeks and the Flint River, and headwater streams of the Buffalo River system in the Duck River drainage. *Etheostoma boschungii* has precipitously declined in abundance throughout its range and there is reduced connectivity among breeding (spring seeps) and non-breeding (stream) habitats due to stream channel incision and road culvert construction. A captive breeding program has been initiated to maintain “Ark” populations, yet nothing is known about the genetic composition of this species throughout its range. Phylogenetic

relationships within *E. boschungii* based on nuclear S7 and mitochondrial ND2 DNA sequence data revealed two highly divergent clades to the east (Flint River and Swan Creek) and west (Cypress and Shoal creeks and Buffalo River) of the Elk River. Population level analyses suggest recent or ongoing gene flow among two populations that are found in distinct drainage systems (Shoal Creek and Buffalo River). All other population pairs showed a high degree of genetic differentiation suggesting long term isolation. These results will serve as a baseline to guide the ongoing propagation program and as a framework in which to investigate microsatellite based estimates of migration, gene flow, and population size.

Current Status of Freshwater Mussels in the North River System, Fayette and Tuscaloosa Counties, Alabama.

Stuart W. McGregor, E. Anne Wynn, and Patrick E. O'Neil, Biological Systems Section, Geological Survey of Alabama, Tuscaloosa

Abstract. During the spring and summer of 2008 mussel sampling in the North River system yielded 15 species, with 13 represented by live animals or fresh dead shells and two represented by weathered dead or relic shells only. Approximately 62 person-hours of time were expended sampling, with 34 hours at 14 main channel stations and 28 hours at 15 tributary stations. A cumulative total of 155 mussels either live, fresh dead, weathered dead, or relic were collected, including 139 (90%) represented by either live animals or fresh dead shells. A catch per unit effort (CPUE) of 2.2 mussels per hour was determined for species collected either live or fresh dead. Shallow bed sediment quality was also determined from one-time samples from four stations. No values were deemed to suggest an immediate concern to the health of the mussel population.

Survey for the Holiday Darter; Occurrence of *Etheostoma brevirostrum* along Shoal Creek, Talladega National Forest, Alabama.

Josh Turner* and Mark Meade, Jacksonville State University.

Abstract. Little is known about the populations of the recently described percid *E. brevirostrum* (Suttkus and Etnier, 1991) in Alabama. Historical studies in Alabama show the distribution of the holiday darter limited to the Choccolocco Creek system. Recent findings have reported the only remaining populations may be restricted to Shoal Creek (Johnston and Hartup, 2002). In this study, we seek to refine the known geographic range of the holiday darter in the Shoal Creek watershed and identify habitat variables associated with holiday darter occurrence.

Tuesday, February 24, 2009

Session 3 : Aquaculture

Review and Outlook for the Alabama Catfish Industry

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Abstract. The U.S. catfish industry has been on a contracting course during 2003 to 2007 but 2008 saw a small increase over 2007 levels. Production indicators for 2008 were down with the top four catfish producing states (AL, AR, LA, MS) having a decrease of 18,900 water production acres (-12.5%), down from the 2007 level of 132,500 acres. Associated with the acreage decline was a decline in the number of producers, down by 75 operations (-10.5%) from 2007 levels, to 638 operations. The 2008 average price received by producers was approximately 77.8 cents/lb, up 1.1 cents/lb from the 2007 annual average price. Producer's income in 2008 (\$401 million) was up \$21 million (+5.5%) from 2007, though 2006 to 2007 producer income was down \$70 million. In 2008 the 32% protein floating catfish feed price averaged \$388/ton, up \$99/ton or 34.2% over the 2007 average feed price. In July 2008 feed prices peaked at \$440/ton, but have dropped by 19% to \$355/ton in December. Imports of catfish products increased by 21% in 2008 and imported frozen catfish fillet sales now account for 49.8% of all U.S. sales of this product form. Industry consolidation, uncertain economic conditions, volatile commodity (feed) prices, and non-market pricing of farm level fish will make 2009 a difficult year for profits in the U.S. catfish industry.

UPDATE ON NUTRITION RESEARCH WITH FLORIDA POMPANO *(Trachinotus carolinus)*

D. Allen Davis, Melanie Rhodes & Herbert Quintero
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Abstract. Fishery products are a primary source of dietary protein in many parts of the world, comprising as much as 20 percent of the world's protein supply. However, domestic production of wild-caught and cultured seafood has not been sufficient to meet increasing demand from American consumers. Today, about three-quarters of the seafood consumed in the U.S. is imported and much of that is a product of aquaculture. It is widely accepted that the growing demand for seafood worldwide will be satisfied by increased aquaculture production. The continuing transition from capture fisheries to marine fish farming will create an irrevocable shift in the method of seafood production. This transition will provide opportunities for U.S. aquaculture producers who are prepared to provide high quality, wholesome products produced in an environmentally responsible manner. To remain competitive in the global aquaculture market, U.S.

producers must increase production efficiency, improve processing methods, and develop globally effective marketing strategies. Current research is intended to assist the development of sustainable U.S. aquaculture through the development of cost-effective, plant-based diets for intensive production of Florida pompano (*Trachinotus carolinus*). Towards this goal, two growth trials were conducted with juvenile Florida Pompano (~7 g mean initial weight) and conducted over a 106 day culture period. Diets were formulated to have similar proximate analysis with 43% protein and 9% lipid. The first trial evaluated the systematic substitution of solvent extracted soybean meal (46.5, 36.0, 26.0 and 15.5%) with soy protein concentrate (0, 8, 16, and 24%) on an equal protein basis. The second experiment was designed to 1) confirming the response to the reduction of fish meal (30 vs 15%) and 2) look at possible nutrient restrictions (methionine and phosphorus) in low fishmeal high soy protein concentrate diets. Performance of diets evaluated as biomass gained (%) indicated a favorable perspective for inclusion of soy protein concentrates up to 24%. Based on current results phosphorus is a limiting nutrient but at this time methionine does not appear to be limiting. To date we have been able to reduce fishmeal levels from 30% of the diet to 15% of the diet using plant based proteins as the primary protein source.

2008 Production Results for Two Species of Bait Shrimp.

D. Allen Davis, Ph.D. and Jessica Jacquay, Dept. of Fisheries & Allied Aquacultures, Auburn University.

Abstract not available.

Demonstration of Recirculating Pond Raceway Systems for Competitive Commercial Fish Farming in Alabama-An Interim Report.

Travis Brown and Jesse Chappell, 203 Swingle Hall, Auburn University, Auburn Alabama 36849.

Abstract. Our in-pond system work in west Alabama (supported by ACES, AAES and the Alabama Catfish Producers Association) has focused on development and demonstration of technologies and management approaches which utilize existing earthen ponds to “move to the next level” in production efficiency and yield. Mean cost to produce a pound of fish on most farms now exceeds 75 cents per pound. Our objectives in the in-pond systems projects were to demonstrate and further develop systems, strategies and technologies which, if applied conscientiously, will improve farm efficiencies leading to sustainable and profitable business.

We deployed commercial scale, modified in-pond raceways in 2007-2008 on farms in west Alabama. The systems are a arrangement of in-pond raceways and partitioned aquaculture systems (PAS) pioneered by David Brune at Clemson University that use

confined animal production with harvest of manure waste and filter-feeding fish as grazers of planktonic biota stimulated by unutilized feed nutrients.

The primary system was developed and installed in a 6 acre earthen pond of an average depth of about 5.5 feet. Six production cells were constructed of concrete blocks on a reinforced concrete pad. Cell dimensions are 16 feet wide and 38 feet long. They are arranged side by side and share common walls. Each cell is equipped with a ½ HP water-mover (paddlewheel) at its upstream end which rotates at 0.7 to 1.5 RPM and allows exchange of water in a cell as frequently as once every 1-2 minutes. For additional life support, an aeration grid was installed just downstream from the water-mover. It is supplied with low pressure air from a 1.5 HP Sweetwater blower. Fish are confined in cells by use of two PVC coated steel mesh panels which extend across the width of each cell. The first is placed upstream adjacent to the aeration grid and the second, downstream about 8 feet from the end of the raceway. A timer regulated feeding system was installed in each cell and is supplied with feed in bulk via an overhead tube originating at the bulk feed storage tank. Just at the downstream-most point of the raceway cells, a recessed manure trap was installed at the furthest downstream point and at the end of the “quiescent zone”. The quiescent zone is designed to allow for settling of waste or other particles as they pass through the cells. The “Vee” shaped trap extends across width of the raceway cell and is effective in trapping and removal of a portion of the particle or solid waste. A baffle was fixed along the long axis of the pond to force water passing through the production cells to circulate around the pond and not take a path of least resistance and shortcut back to the intake channel.

A second but different system was installed at another farm in Greene county. This system consists of two floating cells of dimensions similar to the fixed system described above. The main difference is that the water is moved through the floating raceway by an air-lift devise attached directly to the upstream end of each unit. The air-lift functions to also aerate and mix incoming water. The air-lift devices are powered by 1.5 HP Sweetwater blowers. Water exchange is equally as good as the paddlewheel devises.

In the fixed systems, cells were originally stocked with 9-10,000 advanced juveniles at 80-200 grams in weight. We have also stocked cells with 28,000 stockers (250 lb/1000) we had initially planned to split into 2 cells and have observed excellent growth, survival and uniformity. Dissolved oxygen levels have remained satisfactory and stable (>1.5 mg/l and < 15.0 mg/l) in all cells. Ammonia and nitrite levels have remained well below stressful levels.

Results during 2008 have demonstrated mean survival across all cells above 91%) most approaching 95% but one cell of channel catfish was at 80%). Feed conversion efficiency (FCR) averaged 1.3:1 (range from 1.1- 1.6 to 1.0) and production per acre yield at 25,000 pounds. Energy use (aeration) was reduced by approximately 50% compared to conventionally aerated catfish production ponds in the area. From our observations to this point, we expect this type production strategy will be able to significantly and reliably improve annual yield per acre to above 30,000 pounds per acre, achieve survival rates above 90% and feed efficiencies routinely well below 1.5 to 1. We are currently working on a management and economic model which will be highly descriptive of the system, its management and production economics as we move forward with developing more experience with the approach. We expect that by gains made in survivorship, feed efficiency, management of disease and overall production, we will be

able to greatly increase yield, significantly reduce the unit cost of production, and thus substantially improve enterprise profitability.

Session 4 : Water Quality/Aquatic Plants

Small Impoundment Complexes as a Possible Method to Increase Water Supply in Alabama

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Abstract. At some locations in Alabama, increasing the amount of surface water is the only option for adding to available water for use by municipalities, industry, and agriculture. Because of environmental concerns, there is limited opportunity for impounding major streams. There is, however, much overland flow from rural, upland watersheds that could be captured for use. Small impoundment complexes often have been used to capture and store overland flow for use in aquaculture. These impoundment complexes fill during periods of high rainfall and do not greatly impact downstream flow. Similar systems possibly could be used as an environmentally-responsible source of water for other purposes and provide income for rural land owners.

Bioassessments of Five Mile and Newfound Creeks: Evaluation of Stream Health Using Fish Communities.

Robert Angus^{1*}, Ken Marion¹, Scott Hofer², Bryan Arwood¹, Francesca Gross³, and Louis Viamonte¹

¹University of Alabama at Birmingham, Department of Biology, ²Stormwater Management Authority, ³CAWACO RC&D Council

Abstract. The Five Mile Creek watershed in northern Jefferson County has a history of severe impacts from urban runoff, industrial point discharges and acid mine drainage. In recent years, a number of organizations have formed with the intention of restoring and protecting Five Mile Creek and its watershed. In addition to creek restoration projects, the intention is to develop a series of parks and greenways along the entire 45.1 km length of Five Mile Creek. Since 2005, we have been conducting habitat assessments and fish bioassessments on Five Mile Creek, Newfound Creek (a tributary), and nearby rural reference sites. The objective is to provide data on the current status of fish populations in the watershed so that, in future, it will be possible to determine the extent to which restoration efforts have succeeded in improving the biological health of the aquatic ecosystems in the Five Mile Creek drainage system. Currently, sites in the Five Mile

Creek drainage have Index of Biotic Integrity (IBI) scores in the “Poor” to “Fair” range. Impairment appears to result primarily from poor water quality rather than habitat degradation as the habitat scores for the Five Mile Creek sites were similar to those of the reference streams.

Comprehensive Water Quality Assessment and Database Development

Teferi Tsegaye*, Wubishet Tadesse, Rufina Ward, Mezemir Wagaw, Leonard Williams, Karnita Garner, Paul Okweye, Allison Bohlman, Lorra Hill, and Dirk Spencer
Department of Plant and Soil Science, Alabama A&M University

Abstract. The water quality program at Alabama A&M University (AAMU) has progressively expanded in the last few years. A comprehensive water quality monitoring and modeling research was launched to evaluate the surface water bodies in northern Alabama. Field data collection was expanded in 2005 to evaluate five watersheds including Flint River, Flint Creek, Indian Creek, Huntsville Spring Branch, and the Sipsey Fork watersheds. Five thrust areas in these water quality evaluation efforts are bioassessment of macroinvertebrates as bioindicators, heavy metals, pesticides, nutrients, and source tracking for pathogens and non-pathogenic microorganisms. Furthermore, this comprehensive study evaluated the applicability of some of the most popular water quality modeling tools, namely, AQUATOX, BASINS, AnnAGNPS and SWAT models for some of the watersheds. This paper summarizes our results. Our ultimate goal is to establish and archive a comprehensive water quality database for north Alabama. The database eventually can be used by interested end-users, stakeholders and policy makers to assess the overall health of the aquatic ecosystem, determine pollution trends within or among water bodies, and identify specific problems in relation to land use and cover changes within these watersheds.

Water Quality and Harmful Algal Blooms in Coastal Alabama Waters

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Abstract. Harmful algal blooms in Mobile Bay and its sub-estuary, Weeks Bay, have been responsible for repeated fish-kills, either through nocturnal hypoxia or toxicity. The causative organisms are dinoflagellates, notably *Prorocentrum minimum* and *Karlodinium veneficum*, which bloom under conditions of low river discharge. Their

abundance varies with concentrations of nitrogen and phosphorus. Blooms of the diatom *Pseudo-nitzschia sp.* occur in littoral waters, with a hot-spot adjacent to Little Lagoon Pass. Although these have been toxic, there is no evidence for adverse effects of the toxin (domoic acid) on consumers. The conditions under which blooms occur are consistent with Grime's CSR model (1977) when temperature and river discharge are used as descriptors of habitat productivity and stability, respectively. Predictions of systematic variation in both with climate change, in concert with increasing anthropogenic nutrient loading, suggest that blooms are likely to become more common and/or more intense in the future.

Session 5: Contributing Papers

Fish Assemblages in Urban Streams near Talladega National Forest, AL.

Mark Meade and Josh Turner. Jacksonville State University.

Abstract. Talladega National Forest (TNF) is home to many imperiled fish species. In the forest area, most land use is for farming and/or logging. Fish populations around Talladega National Forest, however, may be impacted by urbanization. Particularly, Tallasseehatchee Creek, a tributary of the Ohatchee Creek watershed, meanders through and around an urban center, Jacksonville AL. Recently, fish assemblages were surveyed in Tallasseehatchee Creek and its tributaries (Little Tallahatchee Creek, Mill Creek/Frogtown Creek). In urban areas, fish assemblages are reduced, likely as a result of habitat loss and poor water quality. Noticeably missing are darter species in the urban areas. In rural areas, assemblages appear more stable. As urbanization continues in areas near Talladega National Forest (i.e., Oxford AL, Heflin AL, Jacksonville AL), knowledge on regional fish populations may be useful in preventing future loss of habitat and/or assemblages.

Nitrogen Stable Isotopes in Bivalve Shell Trace Wastewater Inputs from Watersheds to Estuaries

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Abstract. We tested the usefulness of $\delta^{15}\text{N}$ values in the organic matrix of whole shells from *Mercenaria mercenaria* as tracers of anthropogenic nitrogen inputs to coastal ecosystems. $\delta^{15}\text{N}$ values in shell from transplanted and native clams reflected %-wastewater contribution to estuaries, but were 2.3-2.5 ‰ lighter than $\delta^{15}\text{N}$ values in soft

tissues. Low and high stringency acidification methods were tested to define parameters for reliable $\delta^{15}\text{N}$ determination in shell. Accuracy of $\delta^{15}\text{N}$ values depended on recovering a sufficient quantity of organic N from shell ($\sim 70 \mu\text{g}$) and was not altered by acidification methods. Reliable $\delta^{15}\text{N}$ values were obtained with as little as 80 mg of shell and 100 μl of acid. When analyzed in individual shell growth bands in native adults, $\delta^{15}\text{N}$ values followed changes in N sources to coastal ecosystems across years. Results suggest $\delta^{15}\text{N}$ values in shell recorded spatial and temporal changes in N sources, showing an offset from soft tissues likely due to differences in N assimilation among tissues. This approach may be applied (in living bivalves or ancient middens) to trace N entry to coastal systems by allowing biogeochemical and biological data to be aligned for greater spatial and temporal accuracy.

Plight of the Pygmies: Coastal Plain Vicariance and Comparative Phylogeography of Ellassomatidae

Michael Sandel and Phillip M. Harris, Department of Biological Sciences, University of Alabama, Tuscaloosa

Abstract. Recent phylogeographic investigations of Gulf-Atlantic Coastal Plain taxa have revealed extensive population structure, especially within small-bodied freshwater fishes. The general model for Coastal Plain species, described in the early 1980's, predicts reciprocally monophyletic "eastern" and "western" clades which occupy primarily Atlantic or Gulf watersheds, respectively. A longitudinal zone of contact is present between the two clades, though this zone may vary in area and position along the coast. The goal of this study is to further develop the model with high-resolution markers and low-dispersal species, in order to reveal the process that accounts for concordant patterns of divergence in the Coastal Plain. Small-bodied, short-lived freshwater fishes, such as *Ellassoma*, exhibit a predictably complex population structure. Only such high-resolution patterns allow inferences of the mechanism that drives and maintains intraspecific variation in this system. This study compares intraspecific microsatellite polymorphism and cytochrome-*b* sequence variation among three widespread *Ellassoma* species. These data are analyzed using traditional phylogenetic and population genetic methods in order to test regional vicariance hypotheses. Results of this study support the general model of Coastal Plain phylogeography, but higher-resolution patterns elucidate a potential mechanism, explaining how the physiographic history of the region has shaped the evolutionary history of species.

Session 6 : Aquatic Biodiversity

The Role of Aquatic Biological Information in Managing Water Resources

Patrick E. O'Neil, Geological Survey of Alabama, Tuscaloosa, Alabama

Abstract. Sustainable water supplies in the future will be dependent on how well we manage water use and how we allocate water flows in three areas; economic flows, energy flows, and ecological flows. Ecological flows are defined as the amount of water needed in a water course to maintain health, natural ecosystems and ecosystem functions. Ecological flows are important to (1) sustain the natural functions of streams and rivers such as nutrient processing and sediment transport; (2) maintain healthy aquatic habitat structure and support good biological condition; (3) sustain aquatic biodiversity; and (4) support and sustain commercial and sport fisheries. Aquatic biological data will be critical for evaluating and monitoring the effectiveness of ecological flows in protecting and conserving habitat, species, and aquatic ecosystems. As the science of instream flows matures, there will be many research opportunities and needs including (1) defining flow-related life history requirements of aquatic species; (2) building a predictive hydrological foundation, particularly for ungaged streams; (3) developing size-appropriate biological community assessment techniques for large rivers and streams; (4) refining multi-metric assessment methodologies; (5) continuing to assess vulnerable populations with reference to a more variable hydrologic future; and (6) developing quantitative stimulus-response relationships between flow alteration and ecological and population responses.

The Desperate Dozen - the 12 Most Imperiled Freshwater Fishes in the Southeast

Bernard R. Kuhajda, Department of Biological Sciences, The University of Alabama, Tuscaloosa

Abstract. More than a quarter of 675 fishes found in southeastern waters are considered imperiled, and some are on the road to extinction. To raise awareness, the Southeastern Fishes Council (SFC), a nonprofit scientific organization dedicated to the study and conservation of freshwater and coastal fishes of the southeastern United States, created the Desperate Dozen, the 12 fish species most likely to become extinct in the Southeast. Five of these species are only found in Alabama, including the Alabama sturgeon (*Scaphirhynchus suttkusi*), Alabama cavefish (*Speoplatyrhinus poulsoni*), pygmy sculpin (*Cottus paulus*), vermilion darter (*Etheostoma chermocki*), and the spring pygmy sunfish (*Elassoma alabamae*). Another member of the Desperate Dozen, the chucky madtom (*Noturus crypticus*) may have inhabited Alabama waters in the past but is likely extirpated. The main threat for all of these species is their relatively restricted ranges, where one acute pollution or habitat destruction event could cause extinction. Those species occupying smaller habitats and ranges can greatly benefit from a watershed management plan that involves all public and private stakeholders in mitigating current conditions that contribute to habitat degradation and in planning for wise development in the future.

Development and Implementation of Freshwater Mollusk Recovery Efforts in Alabama

Paul D. Johnson, Michael L. Buntin and Todd Fobian, Alabama Department of Conservation and Natural Resources, Alabama Aquatic Biodiversity Center, Marion, Alabama.

Abstract. In 2005 the Alabama Department of Conservation and Natural Resources (ADCNR) created the Alabama Aquatic Biodiversity Center (AABC) to address conservation needs of Alabama's rarest aquatic species. The first 3 years have focused on renovating and constructing new facilities to house the program. Once construction is complete in late 2009, operations will focus on propagation of freshwater mollusks, although initial recovery efforts have been underway for several years. Alabama is home to 80 federally listed or candidate aquatics, and contains the richest freshwater mollusk assemblage in the world. The AABC is also preparing to partner with several other federal, states, university, and private conservation groups to promote species conservation efforts in Alabama. The AABC's recovery efforts will be guided by several plans detailing the conservation related activities such as the controlled propagation, reintroduction and augmentation of freshwater mollusks. These plans represent the efforts of multiple federal and state natural resource agencies to coordinate and guide recovery efforts. To date plans have been drafted for the Mobile and Tennessee river basins and a plan for the eastern Gulf Drainages is under development.

Crayfish survey of Alabama: Year 1 progress report

J. Brett Smith, Stuart W. McGregor, E. Anne Wynn, Patrick E. O'Neil, and Cal C. Johnson Biological Systems Section, Geological Survey of Alabama, Tuscaloosa

Abstract. Based on a database search of Alabama crayfish records, areas of the state which have been poorly sampled were identified and collections in these streams were obtained. Approximately 200 new collections records were secured during fiscal year 2008, emphasizing areas of the state that have been overlooked in the past 20 years, regardless of how intensively they may have been sampled previously. About 50 percent of the newly obtained records were from the Mobile River Basin, and 25 percent each from the Tennessee River system and coastal drainages.

Movements, Behavior, and Habitat Use of Three Species of Black Bass in the Flint River, Georgia.

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Abstract. The Flint River in Georgia supports a unique black bass fishery composed of the endemic shoal bass *Micropterus cataractae*, and the native largemouth bass *M. salmoides*. Recently spotted bass *M. punctulatus* were introduced into this river and have

become abundant in certain reaches formerly dominated by shoal bass and largemouth bass. The objective of this study was to obtain information on the movements, habitat use, and behaviors of the three species within the system to aid biologists in making decisions about how to manage the fishery. Thirteen shoal bass, ten largemouth bass, and six spotted bass were implanted with radio transmitters in the Flint River and tracked approximately every 14-d from January 2008 to December 2008. Daily movement of all three species was greater in the spring than in summer, but no differences were evident among species. Diel movement was significantly greater in summer than in winter for all three species and it did not vary among species. Temperature, time of day, and discharge were all correlated with diel movements. Shoal bass preferred habitats with bedrock substrates and rocky cover, while spotted bass and largemouth bass preferred habitats with sandy substrates and woody debris. Shoal bass used areas with higher current velocities than both largemouth and spotted bass.

Session 7 : Reservoirs/Small Impoundments

Status of the 14-inch Minimum Length Limit, Shad, and Hydrilla at Lake Eufaula.

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Abstract. Lake Eufaula is important for the recreational and economic impact it has in Alabama. Numerous tournaments are hosted annually, and fishing and boating provide a major economic stimulus for the town of Eufaula. Therefore, the fishery must be evaluated on regular intervals to insure accurate management. A large sample of bass was collected in 2007 to evaluate the current 14 inch minimum length limit. Under the 14 inch minimum length limit, tournament activity has improved, and year-class fluctuations of bass have not been as sporadic as during the late 80's and early 90's. Exploitation of largemouth bass is essentially nil at Lake Eufaula, and a decrease in growth rates has been observed. Thus, although minimum length limits have the potential to increase the abundance of large bass, the low exploitation and decreased growth rates have negated the usefulness of minimum length limits. Shad density estimated from surface trawling from 1996 to 2007 was not correlated to year-class strength (age-1 catch the following spring) of bass. Hydrilla is spreading rapidly in Lake Eufaula, and the Army Corps of Engineers has implemented control measures to restrain the rapid expansion.

New Initiatives in Small Pond Sport Fish Management

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Abstract. Over the past 20 years, angler behavior and desires for quality fishing in small ponds has changed since the days of Homer Swingle at Auburn University years ago. In many instances, small pond owners are not interested in fish harvest or balance in largemouth bass and sunfish populations, but in catch-and-release bigger and large trophy size (> 8 lbs) largemouth bass. Lack of largemouth bass harvest and over reproduction of these fish causes stunting and is the primary problem facing many pond owners. Over the past five years, we have conducted small pond experiments in an attempt to produce populations of largemouth bass skewed towards larger individuals. Our approach varied among ponds, but including increasing the stocking rate and ratio of bluegill to largemouth bass in newly renovated ponds, adding forage species, and stocking all female largemouth bass. First year survival of stocked fingerling largemouth bass (100/acre) ranged from 39 to 57% and the bioenergetic consumptive demand for bluegill was extremely high and possibly out stripped production. Thus in newly renovated ponds, we recommend stocking largemouth bass at lower densities (about 50-75 fish/acre) and increasing bluegill stocking rates to achieve a 30-40:1 ratio of bluegill to largemouth bass. In addition, once a population is established, high removal rates of largemouth bass less than 10 inches is recommended instead of waiting until these fish are larger. In our ponds, it took threadfin shad about one year to become abundant after stocking which then resulted in higher largemouth bass relative weights and size structure indices. In recently constructed ponds or renovated ponds with isolated watersheds, stocking female largemouth bass (8-12 inches) at 10 to 20 fish per acre will quickly provide quality bass fishing for larger fish with some individuals reaching 5 lbs in about 2 years.

Understanding the Slow-Growth, High-Condition Paradox of Largemouth Bass in the Mobile-Tensaw River Delta, AL: Integrating Bioenergetics Modeling and Life-History Theory

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Abstract. Compared with freshwater populations, largemouth bass (*Micropterus salmoides*) found in Alabama's Mobile-Tensaw River Delta (MTRD) have slow growth, high condition, and low annual survival as in other coastal populations. We examined largemouth bass life history and growth patterns in the MTRD by determining their allocation of energy to somatic growth, reproduction, and mesenteric fat reserves seasonally at each life stage. Largemouth bass in the upstream region of the MTRD consumed mostly fish, whereas those downstream consumed higher proportions of energy-poor invertebrates (e.g., crabs and shrimp). Despite these diet differences, growth beyond age-1 did not differ between downstream and upstream. During most seasons largemouth bass had somatic energy densities 22% higher than those observed in freshwater populations and maintained high mesenteric fat reserves. High energetic

density and abundant fat reserves likely contribute to high body condition factors and may provide resources to compensate for periodic stressful salinity levels. Further, a portion of the population spawned as early as age-1, possibly as an adaptive strategy to overcome high mortality rates. Peaks of total ovarian energy during the spawning period occurred simultaneously with declines in somatic and fat reserve energy, suggesting that fat reserves are depleted and somatic tissue catabolized to meet the energetic demands for reproduction. Thus, somatic growth may be reduced in favor of allocating energy towards processes that enhance survival and reproduction, thereby increasing their lifetime fitness. Ultimately, our results will help fisheries managers determine the extent to which this important resource can be enhanced.

Privately-owned Small Impoundments of Central Alabama: A Survey and Evaluation of Management Techniques and Enhancements

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Abstract. Angling quality for largemouth bass *Micropterus salmoides* and sunfish *Lepomis spp.* in small impoundments relates to the management techniques used. While standard management techniques can provide quality fishing, many pond owners wish to produce larger/more abundant gamefish. We surveyed 159 randomly-selected private pond owners in 23 central Alabama counties by telephone regarding their pond management techniques and enhancements. Of those surveyed, 48% fertilized, 37% applied pellet feed, 13% stocked supplemental forage fish, and 10% reported no active management. Survey results were used to identify ponds for fish population assessments in fall 2007 (n = 31) and spring 2008 (n = 34). Ponds were selected that were managed with all possible combinations of the three most reported management enhancements including fertilization, pellet feeding, and threadfin shad *Dorosoma petenense* as supplemental forage or no active management. Sites were sampled using electrofishing and seining, and abiotic data were collected. Results indicated high variability of abundance, growth, and condition of largemouth bass and sunfish both among and within these management strategies. This information provides insight as to whether these techniques/enhancements can maintain high quality sportfish populations in small impoundments, allowing pond owners and managers to decide on their utility.

Washington County Lake: A Unique Stocking Strategy

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Abstract. Washington County Lake has a history of being a trophy bass lake. Bass fishing had greatly decreased in quality by 2002 due to improper stockings and bass crowding. A decision was made to renovate the lake in 2004, however due to the drought and an invasion of black crappie, Washington County Lake had to be renovated again in 2005. During the 2006 electrofishing survey it was discovered that Washington County Lake had not been stocked with bass and the bluegills had become stunted. This problem was corrected by stocking over 6,000 adult bass from the Alabama Wildlife & Freshwater Fisheries hatcheries and other state lakes. In 2006, routine seine samples of Washington County Lake monitored bluegill and bass reproduction and indicated that by 2008 these populations had reached a balanced condition. Electrofishing samples conducted from 2006 to 2008 also supported this observation. Once in balance, the fish populations became highly productive. Anglers harvested over 258 pounds of fish per acre in 2008. Angler success was especially evident with a 3.5 fold increase in permit sales, making Washington County Lake the highest used rural state lake in Alabama.

Wednesday, February 25, 2009

Session 8 : Marine/Mariculture

Assessing Shellfish Habitat in Alabama Using a Low-Cost Field Method

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Abstract. Site selection is key to the success of shellfish restoration, propagation and private culture. A low-cost quantitative method is presented that allows direct statistical comparisons of sites based on field deployment of juvenile shellfish. Juvenile shellfish are deployed at a known, standard size for ~60 days (typically July 1st to September 1st) in replicate fashion, allowing a comparison of relative growth and survival among sites. To illustrate the utility and limitations of this method, a case study is presented for assessment for shellfish farming conducted in Massachusetts (MA, USA) from 2003 to 2008. Growth and survival of oysters, *Crassostrea virginica*, and quahogs, *Mercenaria mercenaria*, were compared at 4 aquaculture sites (Wellfleet Harbor, Pleasant Bay, Brewster Flats, and Barnstable Harbor) over a 6 year period, noting trends and differences, including significant differences between oysters and quahogs. A tentative sampling scheme is outlined for the Alabama coastline and feedback invited on site selection and areas of interest. Other applications of this method, as well as limitations, are addressed.

The Role of *Perkinsus Marinus* Infection in Oyster Reef Restoration

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Abstract. Disease has been implicated in the decline of oyster reefs along the US east coast. Disease has been less devastating in the Gulf of Mexico though *Perkinsus marinus* is responsible for significant mortality in Eastern oysters. A two-year field study investigated the influence of *P. marinus* prevalence and infection intensity on oyster population dynamics and mortality rates at six harvested reefs and six unharvested reefs in Mobile Bay, Alabama. Oyster population size structure was analyzed from oysters collected semi-annually from five 1m² samples at each reef. Prevalence and infection intensity of *P. marinus* was determined by Ray's FTM whole-oyster analysis from 5 oysters collected from the same sample area. Mortality was monitored monthly in 3 replicate bags of 30 oysters deployed at each reef.

Unharvested reefs had higher densities of oysters in all size classes compared to harvested reefs. Shifts in size structure on both harvested and unharvested reefs were variously attributed to recruitment, harvesting, and mortality associated with disease and predation. Prevalence of *P. marinus* in the oyster population was not significantly different between reef types ($P > 0.05$) but infection intensity was significantly higher on unharvested reefs during four of the five sampling periods ($P \leq 0.0001$). Reef type had a significant effect ($P < 0.0001$) on the mortality rate of adult oysters attributed to *P. marinus*. Drought conditions during the study provided optimal salinity conditions for the predatory oyster drill, *Stramonita haemastoma*. Predation by oyster drills significantly impacted the oyster population structure on both reef types. In the absence of significant predation, oyster populations on unharvested reefs are sustained at high density levels with only the largest oysters succumbing to *P. marinus* infection. Harvesting of larger oysters may reduce *P. marinus* disease intensity but reduces available substrate for recruitment.

Quantifying the Fisheries Benefits of Oyster Reef Restoration: A Tool For Promoting “Living-Shorelines?”

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Abstract. Shorelines at the interface of marine and terrestrial biomes are one of the most degraded and threatened habitats in the coastal zone because of their sensitivity to sea level rise, storms, and increased utilization by man. Previous efforts to protect shorelines have largely involved constructing bulkheads and seawalls. Both of these methods have been shown to cause vertical erosion down the barrier, subsequent loss of intertidal zone, and even increased erosion on adjacent properties. Recently, some restoration efforts have shifted towards biogenic reefs, or “living shorelines”. Beyond shoreline stabilization, living reefs may provide additional ecosystem services such as habitat for resident species of shellfish and finfish, providing feeding resources for transient fishes, and improved water quality via the filter-feeding bivalves. Currently, we are evaluating the fisheries benefits of multiple configurations and scales of breakwater oyster reef restoration projects in coastal Alabama. We hypothesized that over time the presence of eastern oyster *Crassostrea virginica* reefs could stabilize and possibly facilitate the expansion of shoreline marsh grass as well as provide habitat for additional fishes. Our preliminary results support our hypothesis that created oyster reefs will be utilized by transient fishes and provide substrate for oyster reef recruitment.

The Use of Ultrasonic Telemetry to Estimate Movement Patterns, Residency and Mortality of Red Snapper, *Lutjanus Campechanus*.

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Abstract. Site fidelity, emigration and mortality were estimated from telemetry for large (500 – 860 mm TL) red snapper *Lutjanus campechanus* (N = 92) from five artificial and one natural reef in the northeastern Gulf of Mexico. From Dec 2005 to 2008 we used arrays of five ultrasonic receivers at each site. Each array consisted of one receiver at the center with four receivers placed 1100 or 600 m north, south, east and west of the center site. As of Oct 2008, 21% were caught, 34% emigrated, 12% died, 29% are still present and 4% were uncertain. Preliminary estimates of total mortality (Z) ranged from 0.31 to 0.72, fishing mortality (F) from 0.18 to 0.37, and natural mortality (M) from 0.14 to 0.35. Median residence time was 479 d, and ranged from 1 to 783 d, with 62% of the fish resident for one year and 75% resident for 200 d. Some fish visited up to three sites (~7 km apart), and some returned after emigrating. Red snapper (N=6) tracked manually with surface operated receivers over continuous 24-h periods stayed near (~100 m) the

site. These mortality rates were similar to past estimates while residence time was longer than previous estimate.

Session 9 : Aquatic Education

Water Safety Education: It's not just for everybody else.

Sgt. Ronny Harris, AL Marine Police, Opelika, Alabama.

Abstract not available.

Creek Kids a New Outdoor Education Program

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Abstract. The “Creek Kids” program is a hands-on activity designed to develop children’s interest in watershed protection and stream ecology. Our goal will be to educate our audience about environmental awareness by emphasizing the importance of healthy water and the benefits created by healthy fish populations and habitat. We will work with middle schools onsite at Tannehill Historical State Park showing students the different pathways that pollution enters a stream and ways to lessen the effects of the pollutants. An EnviroScape Model will be used to get students involved. Students will also get into Tannehill streams for hands-on activities. Tools such as seines and observation tubes will be used. Water testing kits will be used to determine basic water chemistry. Organisms sampled from the water will be identified by the students using posters, magnifying lamps and microscopes. Lesson plans will be design to be age appropriate and in accordance to Alabama Course of Study.

Who Are Our Fishing Constituents and What Can We Do to Keep Them Fishing?

Doug Darr
Aquatic Education Coordinator
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Abstract. In response to falling license sales (from 522,990 resident freshwater annual licenses in 1987 to 234,744 in 2007), Alabama Wildlife and Freshwater Fisheries Division, AWWF, is trying to understand who our constituents are, how to keep them fishing, and how to recruit new anglers. Most license purchases are now electronic, so AWWF captures information about anglers in a usable format. The Division knows the

age, gender, ethnicity and address of most of its anglers. Knowledge of age, gender, and ethnicity helps us to communicate more effectively. In partnership with the Recreational Boating and Fishing Foundation, AWWF used anglers' addresses to determine our various constituents groups. This information was used during a direct mail campaign to remind people to go fishing.

Anglers and potential anglers need information about fishing, fish, and places to fish, so AWWF does that through a variety of venues. The AWWF provides engaging information to anglers and interested citizens through the Department Web site, www.OutdoorAlabama.com; community fishing events; hands-on fishing classes; casting classes at schools and other venues; aquatic resource education talks; display-days at boat shows and Earth Day celebrations; the Sportfishing Simulator use; and teaching potential instructors.

The most difficult part of the education process is evaluating our efforts. Not everyone in today's society will become an angler, but AWWF is committed to making aquatic resources a priority to Alabama's citizens.

Benefits of membership in the American Fisheries Society.

Don Jackson, Mississippi State University.

Abstract not available.

Poster Abstracts

Authors: Carol Johnston and Andrew Henderson

Title: Prioritization of habitat for conservation of *Etheostoma boschungii*

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Abstract. *Etheostoma boschungii* has a relatively widespread but disjunct distribution in the Tennessee River drainage, Alabama and Tennessee. *Etheostoma boschungii* has a complex life history, requiring specialized breeding and non-breeding habitats, and an unimpeded migration route between the two areas. Since 1974 when the species was described, it has undergone dramatic local extirpation. Our recent survey data, coupled with data from previous surveys, indicate three primary factors that are most likely responsible for the loss of this species from historical habitat: culverts, channel incision and impoundment or destruction of seepage areas. These factors account for the loss of *E. boschungii* from approximately 80% of historical breeding sites, and have accounted for severe degradation of habitat used in the non-breeding season. We identify high priority areas within the current distribution of the species for conservation measures.

Due to the fragile nature of the seepage areas use for breeding, and the immediacy of potential habitat destruction, we urge agencies to work with landowners to preserve seepage areas in the Upper Brier Fork and Cypress Creek systems.