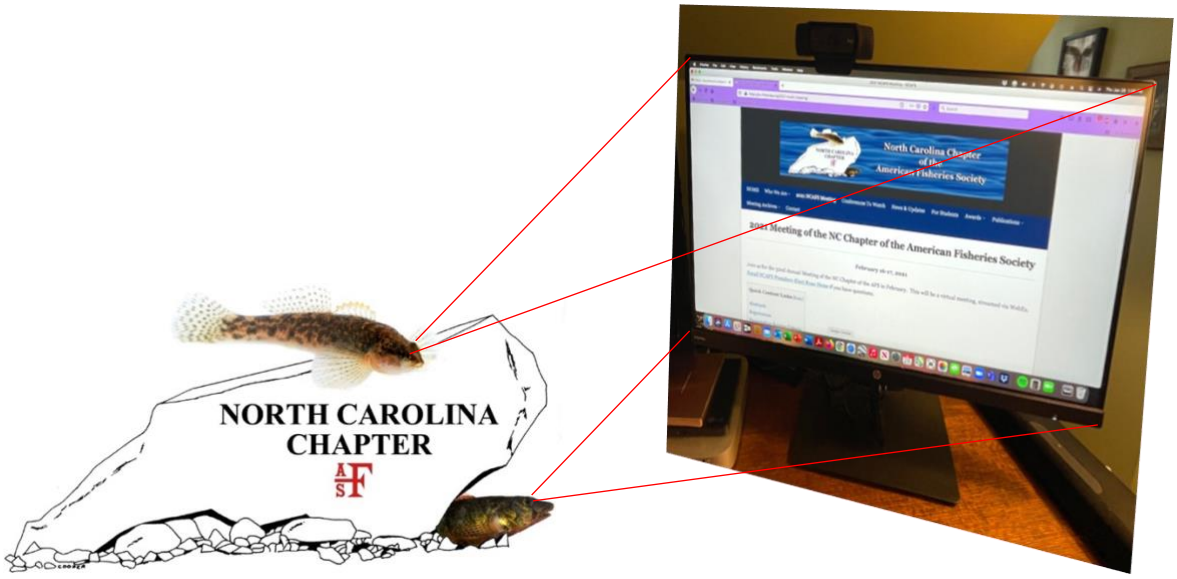
2021 Virtual Meeting of the North Carolina Chapter of the American Fisheries Society

Tuesday, February 16th – Wednesday, February 17th, 2021



We would like to thank Duke Energy for Hosting the 32nd Annual Meeting of the North Carolina Chapter of the American Fisheries Society

2020-2021 NC AFS Officers and Committees

OFFICERS

President: Ben Ricks
President Elect: Ryan Heise
Secretary/Treasurer: Kelsey Roberts (out-going)
Past President: Jake Rash

COMMITTEES

Awards
Co-Chairs: Greg Cope and Corey Oakley

Communications
Chair: Kyle Rachels
Members: Brena Jones - Webmaster, Vacant - Facebook Administrator
Newsletter Review Members: Brena Jones, Morgan Raley, and Bryn Tracy

Education and Outreach
Chair: Seth Mycko
Members: Jessica Baumann, Kevin Hining, Kyle Rachels, Jake Rash, Chris Wood, and David Yow

Environmental Concerns
Chair: Vacant
Members: Marla Chambers, Luke Etchison, Reid Garrett, Dylan Owensby, and Thomas Russ (TR)

Finance
Chair: Kelsey Roberts (out-going)
Members: Lawrence Dorsey and Joe Hightower

Nominations
Chair: Jake Rash

Mentoring Committee
Chair: Kevin Dockendorff
Members: Casey Grieshaber, TD Van Middlesworth, and Ben Ricks

2021 Annual Meeting
Chair: Ryan Heise
Members: Mike Abney, Matt McKinney, Bryn Tracy, and Nick Wahl

2021 Virtual Meeting of the North Carolina Chapter of the American Fisheries Society

Tuesday, February 16th – Wednesday, February 17th, 2021

Program-at-a-Glance*	
Tuesday, February 16th	
Time*	
0830 – 0845	Opening Comments, SFS Raffle Comments, Meeting Organization and TEAMS
0845 - 0945	Contributed Papers
0945 - 1000	Morning Break No. 1
1000 - 1050	Contributed Papers
1050 - 1105	Morning Break No. 2
1105 - 1205	Contributed Papers
1205 - 1210	Closing Comments for Day 1
Wednesday, February 17th	
Time*	
0800 - 0805	Opening Remarks for Day 2
0805 - 0900	Contributed Papers
0900 - 0915	Morning Break No. 1
0915 - 1030	Contributed Papers
1025 - 1030	Closing Comments for Day 2
1035 - 1045	Morning Break No. 2
1045 - 1215	Business Meeting

*Times are approximate

Tuesday, February 16th	
0830 - 0835	Opening Remarks Ben Ricks, NC AFS President
0835 - 0840	NCSU's SFS Raffle Linnea Andersen, NCSU SFS Former President
0840 - 0845	Meeting Organization and How TEAMS Will Work Ryan Heise, NC AFS President-Elect and Annual Meeting Chair
Session 1 – Patterns of Species Distributions Moderator – Ryan Heise, Duke Energy	
0845 - 0905 Full Presentation Professional	An Annotated Atlas of the Freshwater Fishes of North Carolina Bryn H. Tracy*, Fred C. Rohde, and Gabriela M. Hogue
0905 - 0925 Full Presentation Professional	Historical French Broad River: What We Lost, How We Lost It, and How to Get It Back Luke Etchison*and Dylan Owensby
0925 - 0945 Full Presentation Professional	Life History Theory Predicts Appalachian Mountain Stream Fish Assemblage Transformation During Historical Drought W. Keith Gibbs*, Eric W. Malone, Joshuah S. Perkin, Matthew Padgett, and Matthew Kulp
0945 - 1000	Break
Session 2- Fisheries Management – Part 1 Moderator – Nick Wahl, Duke Energy	
1000 - 1020 Full Presentation Professional	Winter Trout Stocking in Piedmont Impoundments and Changes in Angler Effort Casey A. Grieshaber* and Lawrence G. Dorsey
1020 - 1027 Lightning Presentation Professional	Lake Norman Hybrid Striped Bass Telemetry Study Lawrence G. Dorsey* and N. Corey Oakley
1027 – 1047 Full Presentation Professional	Lake Gaston Creel Survey 2019-2020 Zackary Xiong*, Lawrence Dorsey, and Kirk Rundle
1047 - 1102	Break
Session 3 – River Catfish Populations Moderator – Mike Abney, Duke Energy	
1102 - 1122 Full Presentation Professional	Trophic Ecology of Flathead Catfish in the Lower Cape Fear River Ecosystem David J. Belkoski* and Frederick S. Scharf
1122 - 1129 Lightning Presentation Student	Movement Ecology, Reproductive Dynamics, and Enhanced Prey Resolution for Non-native Catfishes in a North Carolina Coastal River Claire B. Pelletier* and Frederick S. Scharf
1129 – 1136 Lightning Presentation Professional	Assessment of Tar River Catfish Populations, 2020 Todd D. VanMiddlesworth* and Benjamin R. Ricks

Session 4 - Valuing Our Aquatic Resources Moderator – Mike Abney, Duke Energy	
1136 - 1156 Full Presentation Professional	Public Understanding of Nature's Influences on Water Quality, and Implications for Communicating about Ecosystem Services Jennifer M. Archambault*, Catherine E. LePrevost, W. Gregory Cope, and Jane L. Harrison
1156 - 1203 Lightning Presentation Professional	Mountain Stream Water Quality Baseline Quantified for Community Stewardship in Inaugural Citizen Science Studies William Seaman*, Ann Marie Traylor, and Jeffrey Muston
1203 - 1210	Closing Comments for Day 1 Ben Ricks and Ryan Heise
Wednesday, February 17th	
0800 - 0805	Opening Remarks Ben Ricks and Ryan Heise
Session 5 – Fisheries Management – Part 2 Moderator – Nick Wahl, Duke Energy	
0805 - 0812 Lightning Presentation Student	Locating Spawning Aggregations and Assessing Population Connectivity of Southern Flounder in the US South Atlantic using Pop-Up Satellite Tags Mason G. Collins*, Michael S. Loeffler, Anne L. Markwith, and Frederick S. Scharf
0812 - 0819 Lightning Presentation Student	Juvenile Fish Utilization of Strategic Habitat Areas (SHAs) in the Cape Fear River Estuary: Measuring Growth and Production to Assess Habitat Function Melinda S. Lambert*, Frederick S. Scharf, and Troy D. Alphin
0819 - 0826 Lightning Presentation Student	Elucidating Trophic and Habitat Partitioning of a Diverse Marine Predatory Community Jeffrey D. Plumlee*, Creed Branham, Savannah Ryburn, F. Joel Fodrie
0826 - 0833 Lightning Presentation Professional	Maximizing Predator Growth in a One Acre Virginia Farm Pond Jason Emmel
Session 6 – Using R to Manage and Analyze Our Data Moderator – Matt McKinney, Duke Energy	
0833 – 0853 Full Presentation Professional	"NCIFD": an R package for the NCWRC Inland Fisheries Division Powell Wheeler* and Kevin J. Dockendorf
0853 - 0900 Lightning Presentation Professional	NC TOWER as an Information Source for the NCAFS Mentoring Committee Kevin J. Dockendorf
0900 - 0915	Break

Session 7 – Imperiled Mussel, Fish, and Crayfish Species Moderator – Ryan Heise, Duke Energy	
0915 - 0922 Lightning Presentation Professional	Update on Augmentation and Monitoring Efforts for the Tar River Spinymussel, *Parvaspina steinstansana* Andrew R. Glen* and J. Michael Fisk II
0922 - 0942 Full Presentation Professional	Age, Growth and Sexual Dimorphism in the Dwarf Wedgemussel, *Alasmidonta heterodon* Michael Walter* and Andrew Glen
0942 - 0949 Lightning Presentation Professional	Macroinvertebrate Assemblage Assessments as a Measure of Site Quality for Federally Listed Freshwater Mussel Species Sierra B. Benfield
0949 – 1009 Full Presentation Professional	Roanoke Logperch Restoration in the Dan River, North Carolina T. R. Russ
1009 - 1016 Lightning Presentation Professional	Digging Deep: Surveying for Greensboro Burrowing Crayfish, *Cambarus catagius* Katharine DeVilbiss* and Brena Jones
1016 - 1023 Lightning Presentation Professional	Effects of Acidified Water on Embryonic Development, Hatchling Growth, and Survival of Juvenile and Adult *Planorbella magnifica* (Gastropoda:Pulmonata) Hans Lohmeyer*, Brena Jones, and Rachael Hoch
1023 - 1030	Closing Comments Ryan Heise and Ben Ricks
1030-1035	NCSU's SFS Raffle – Final Comments Linnea Andersen, NCSU SFS Former President
1035 - 1045	Break
1045 - 1215	Business Meeting Ben Ricks

*Presenting author

Public Understanding of Nature's Influences on Water Quality, and Implications for Communicating about Ecosystem Services

Jennifer M. Archambault[1]*, Catherine E. LePrevost[2], W. Gregory Cope[2], and Jane L. Harrison[3]
*Presenting

[1]US Fish and Wildlife Service, Ecological Services Field Office, Raleigh, NC
[2]Department of Applied Ecology, North Carolina State University, Raleigh, NC
[3]North Carolina Sea Grant, Raleigh, NC

Aquatic species are integral to ecosystem functioning and maintenance of water quality. The public, however, may not readily perceive many aquatic species and therefore may not realize species' relevance in regulating healthy waterways for human use and well-being. Because an understanding of community values is critical in promoting effective watershed management, it is imperative to discern how aquatic resources are valued by human communities. Social science research methods are increasingly employed to investigate public understanding and beliefs about conservation and natural resource issues. A first step in understanding community valuation of ecosystem services related to water quality is investigating perceptions of water quality's mediating factors. We engaged 57 residents of central and eastern North Carolina in six focused small group discussions, using a series of photographs of plants and animals to examine communities' beliefs about whether and how those flora and fauna relate to maintenance of water quality. Several prevailing themes emerged from the focus group discussions, including positive effects that flora and fauna have on water quality, dualistic "good and bad" or negative effects, flora and fauna as indicators of water quality, and balance in nature. Participants also expressed uncertainty at times, and we identified a number of misconceptions. Participants regularly relied on their prior experiences to explain their understanding of factors affecting water quality. Our findings show that people identified several effects that flora and fauna have on water quality, including ecosystem functions that provide essential ecosystem services (e.g., regulating services, such as water purification through filtering and cleaning). These findings suggest an encouraging congruence of public beliefs with expert science, offering some common ground, similar language, and opportunities for connecting with communities on important issues that highlight or threaten ecosystem functioning and the resulting ecosystem services that link environmental and human well-being.

Type: Full Presentation
Student or Professional? Professional
Contact: Jennifer M. Archambault, Ph.D.
Email: jennifer_archambault@fws.gov
Phone: 919-306-5107 (personal cell while on covid telework)

Keywords: aquatic vegetation; ecosystem services; fishes; focus groups; freshwater mussels; freshwater snails; public engagement; public perceptions; science communication; social science; water quality

Trophic Ecology of Flathead Catfish in the Lower Cape Fear River Ecosystem

David J. Belkoski[1]* and Frederick S. Scharf[2]
*Presenting

[1]North Carolina Wildlife Resources Commission, Raleigh, NC
[2]Department of Biology and Marine Biology, University of North Carolina at Wilmington, Wilmington, NC

The introduction of non-native catfishes has been identified as a major structuring force in central and southern US Atlantic coastal rivers. The Flathead Catfish, *Pylodictis olivaris,* is a large-bodied apex predator with established populations in several North Carolina coastal rivers. In 2017, we began an examination of Flathead trophic ecology and population demography in the lower Cape Fear River ecosystem to assess potential impacts on anadromous and native fish communities. Flathead Catfish were collected from the three major tributaries in the Cape Fear drainage using low-frequency electrofishing. Stomach contents and stable isotopes were used to analyze trophic position and feeding strategy. Over 1700 Flathead were collected across broad size (65 – 1120 mm TL) and age (1 – 25 years) ranges. Stomach contents indicate a strong dependence on fish (49% FO and 77% W) and macrocrustacean (58% FO) prey resources. Common fish prey consumed by Flathead Catfish included members of the families Ictaluridae, Gobiidae, and Achiridae, as well as *Lepomis* spp. Flathead Catfish in the Cape Fear River ecosystem demonstrated higher rates of omnivory, with delayed shifts to exclusive piscivory until ~ 800mm TL, compared to other introduced populations in Atlantic slope rivers. This likely reflects a diverse invertebrate prey community, with potentially limited fish prey availability in this ecosystem. Stable isotope analyses contributed evidence of higher trophic feeding by Flathead Catfish, beginning at small body sizes. Carbon and sulfur stable isotopes revealed a strong contribution of anadromous and marine signatures in the tissue of larger Flathead. North Carolina Wildlife Resources Commission's Catfish Management Plan currently separates the state into management units. The Cape Fear River tributaries fall within the Invasive Catfish Harvest Unit where no harvest is restricted.

Type: Full Presentation
Student or Professional? Professional
Contact: David Belkoski
Email: david.belkoski@ncwildlife.org
Phone: 910-580-2288

Keywords: Community ecology, fisheries management, invasive species, feeding ecology, stable isotopes

Macroinvertebrate Assemblage Assessments as a Measure of Site Quality for Federally Listed Freshwater Mussel Species

Sierra B. Benfield

North Carolina Wildlife Resources Commission, Inland Fisheries Division,
Aquatic Wildlife Diversity Program, Mebane, NC

Unionid mussels are among the most imperiled groups of organisms in the world. Understanding predictors of imperiled mussel presence is essential in locating wild populations and areas that are capable of supporting them. Episodic degraded water quality events can impact sensitive species and can go undetected, resulting in reaches with quality physical habitat but poor mussel diversity. Typical water quality measurements taken in the field are only a snapshot of current conditions and do not reflect long-term conditions. Biological assessments could provide a more complete measure, acting as a predictor of suitable habitat that may support broodstock or reintroduced populations of imperiled mussels. Mussels are active members of the benthic community, yet their interactions and associations with other members of the lotic system benthos are not fully understood and are in need of further research. The objectives of this study are to describe macroinvertebrate assemblages in sites that support rare mussels and sites that do not, and to determine if any association between groups of insects (feeding or taxonomic) and rare mussels exists. Benthic macroinvertebrate assemblages will be assessed at 10 sites: 5 of the best known sites for the Tar River Spinymussel, *Parvaspina steinstansana*, and 5 sites that have good physical habitat but *P. steinstansana* no longer occur. Collections will be taken with a Surber sampler, with six samples from the best mussel habitat and six from the best macroinvertebrate habitat. Sites will be compared based on calculated biotic indices and diversity measures. These measures will then be used to help determine threshold values that may indicate a site capable of supporting *P. steinstansana*, and later be used as a parameter in the development of models predicting occupancy and detection. This research will help gain a better understanding of the associations between macroinvertebrates and rare mussels, and help guide future augmentations and surveys.

Type: Lightning Presentation
Student or Professional? Professional
Contact: Sierra Benfield
Email: sierra.benfield@ncwildlife.org
Phone: 336-213-2343

Keywords: Unionida, macroinvertebrates, water quality, aquatic ecology, mussel conservation

Locating Spawning Aggregations and Assessing Population Connectivity of Southern Flounder in the US South Atlantic using Pop-Up Satellite Tags

Mason G. Collins[1]*, Michael S. Loeffler[2], Anne L. Markwith[3], and Frederick S. Scharf[1]
*Presenting

[1]Department of Biology and Marine Biology, University of North Carolina at Wilmington, Wilmington, NC
[2]North Carolina Division of Marine Fisheries, Elizabeth City, NC
[3]North Carolina Division of Marine Fisheries, Wilmington, NC

The Southern Flounder, *Paralichthys lethostigma,* is an economically important coastal fishery species the U.S South Atlantic and Gulf of Mexico. A recent population assessment indicates that the US South Atlantic stock is overfished. To inform management and recovery efforts, more refined information on spawning locations and ocean habitat use are needed to better define stock boundaries and estimate connectivity among estuaries within the basin. The goals of this study are to: 1) test a new method of tagging Southern Flounder using Pop-Up Satellite Tags (PSAT's), 2) identify the offshore locations of winter spawning areas, and 3) estimate the degree of connectivity among Southern Flounder populations originating from different estuarine nurseries throughout the US South Atlantic. Tagging efforts will be distributed across three years and multiple regions from North Carolina to Florida. Fish will be tagged during the fall pre-migration period with tags programmed to deploy during winter, spring, and summer to identify spawning areas and post-spawning movements. At present, 130 tagged fish were released during Oct and Nov 2020, and are scheduled to deploy during winter 2021 with release dates spread across the primary spawning period (Jan 15, Feb 1, and Feb 15). Identifying the locations of spawning aggregations will allow environmental needs for spawning to be determined as well as providing an opportunity to protect aggregation areas. Future tagging across multiple states will inform the degree of connectivity, helping to determine the appropriate spatial scale for management of the US South Atlantic population.

Type: Lightning Presentation
Student or Professional? Student
Contact: Mason G. Collins
Email: mgc6521@uncw.edu
Phone: 803-522-3498

Keywords: Southern Flounder, migration, movement, connectivity, spawning, satellite tagging

Digging Deep: Surveying for Greensboro Burrowing Crayfish (*Cambarus catagius*)

Katharine DeVilbiss* and Brena Jones
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division,
Aquatic Wildlife Diversity Program, Creedmoor, NC

The Greensboro Burrowing Crayfish, *Cambarus catagius,* Special Concern, is endemic to North Carolina, with a restricted geographic range in the piedmont portions of the Cape Fear and Yadkin Pee Dee river basins. Major research needs for this species include defining distribution as well as gaining a better understanding of its natural history and ecology. Prior to 2019, targeted surveys by the NCWRC were last performed in 1994. Subsequently, there was only one confirmed *C. catagius* occurrence in that 25-year period, which was in 2003. In March 2019 and May through November 2020, staff performed burrow pit digging surveys at 22 localities. Juvenile *C. catagius* were found in burrows at one site in a tributary of Abbotts Creek and two sites in an unnamed tributary of the West Fork Deep River. Additionally, in early 2020 a researcher at UNC-Greensboro discovered a *C. catagius* among leaf litter in a small ephemeral channel, invalidating the previous thought that the species didn't use flowing water habitat. These findings inform us that Greensboro Burrowing Crayfish are persisting and utilize a broader range of habitats than previously understood, although more research effort is needed to address the knowledge gaps for proper conservation. In the coming years, priority will be placed on additional surveys incorporating the entirety of this species' known geographic range.

Type : Lightning Presentation
Student or Professional? Professional
Contact: Katharine DeVilbiss
Email: Katharine.DeVilbiss@ncwildlife.org
Phone: 919-218-3809

Keywords: Burrowing crayfish, endemic species, non-game aquatic wildlife, conservation

NC TOWER as an Information Source for the NCAFS Mentoring Committee

Kevin J. Dockendorf

North Carolina Wildlife Resources Commission, Inland Fisheries Division, Elizabeth City, NC

The NCAFS *ad hoc* Mentoring Committee was formed at the 2020 NCAFS Chapter meeting. “Who is our audience?” was one of the first questions asked within the committee. Online research into this important question led to the NC TOWER database. NC TOWER is a web-based delivery system providing aggregate information on students who attended public universities and community colleges in North Carolina. These data include programs of study and degrees obtained. The numbers of graduating Natural Resources and Conservation students with a B.S. degree increased from 286 graduates in 2003 to 644 graduates in 2019 whereas the numbers of students with M.S. degree or PhD over the same time series was 77 graduates in 2003 to 99 graduates in 2019. Career professionals recognize that the natural resource field is highly competitive. However, the relatively recent boom of graduates in this field provides insight that our current audience may be more extensive than prior years. As professionals and mentors, our awareness of the increasing number of graduates as compared to the available positions in this field is important when developing our mentorship program in the chapter.

Type: Lightning Presentation
Student or a Professional? Professional
Name: Kevin J. Dockendorf
Email: kevin.dockendorf@ncwildlife.org
Phone: 252-312-6122

Keywords: NC TOWER, Natural Resource graduates, mentoring, R programming

Lake Norman Hybrid Striped Bass Telemetry Study

Lawrence G. Dorsey* and N. Corey Oakley
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division, Raleigh, NC

In 2013, The North Carolina Wildlife Resources Commission (Commission) ended the Striped Bass, *Morone saxatilis*, stocking program at Lake Norman, NC and replaced them with hybrid Striped Bass *Morone saxatilis* x *Morone chrysops*. The main reason for this switch was the propensity for Striped Bass to die during summer months due to water quality conditions within the forebay of the reservoir. Since the switch to hybrid Striped Bass, only a small number of dead individuals have been collected during summer months within the area of the reservoir that was unfavorable to Striped Bass. In May of 2020, the Commission implanted telemetry tags in 50 hybrid Striped Bass. The goal of this project is to determine the habitat use of this species throughout the reservoir both from a longitudinal perspective as well as their vertical distribution in the water column. Active and passive telemetry techniques are being used to accomplish this goal. As of now, over 400,000 individual detections of these fish have been documented. Initial results indicate hybrid Striped Bass do not congregate in the dam forebay in summer months but appear to use other areas of the reservoir. This project will continue in 2021 with an additional 60 fish being implanted with transmitters and tracked into 2022.

Type: Lightning Presentation
Student or a Professional? Professional
Contact: Lawrence Dorsey
Email: lawrence.dorsey@ncwildlife.org
Phone: 336-290-0054

Keywords: hybrid Striped Bass, telemetry, habitat use

Maximizing Predator Growth in a One-Acre Virginia Farm Pond

Jason A. Emmel

Solitude Lake Management, Fisheries, Keswick, VA

Fisheries management in small ponds comes with a number of difficulties and limitations. A trade-off typically exists between the size and quantity of game fish, requiring frequent monitoring of the predator-to-prey ratio and a targeted harvesting strategy. Maintaining healthy and consistent water quality must also be a high priority in small systems. Our objective was to address these typical trade-offs and limitations to produce a robust fishery that displays both high density *and* large, fast-growing predators. In 2016, we began implementing an aggressive management plan in a 0.9-acre farm pond in central Virginia. Female Largemouth Bass and Hybrid Striped Bass were stocked, following a full Rotenone reset. Frequent stocking of live forage fish, in combination with a high-protein pellet diet, has produced impressive results in predator growth that are not typically seen in a small farm pond. Results collected biannually via boat electrofishing are presented here.

Type: Lightning
Student or Professional? Professional
Contact: Jason Emmel
Email: jemmel@solitudelake.com
Phone: 540-230-7016

Keywords: Farm pond management, Largemouth Bass, hybrid Striped Bass, predator-prey

Historical French Broad River: What We Lost, How We Lost It, and How to Get It Back

Luke Etchison*and Dylan Owensby
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division,
Aquatic Wildlife Diversity Program, Waynesville, NC

The French Broad River is considered one of the oldest rivers in the world. From its headwaters in North Carolina to where it joins the Holston River to create the Tennessee River in East Tennessee, the French Broad River is home to an exceptionally high amount of aquatic biodiversity. The recent publication, An Annotated Atlas of Freshwater Fishes of North Carolina (Tracy et al. 2020), documented ~76 indigenous fish species from historical and recent collection data from the North Carolina sections of the French Broad River Basin. However, anthropogenic alteration over the last few centuries in the French Broad River and its tributaries have led to extirpations and population declines for many of its known and unknown historical species. Currently, the French Broad River basin has the most imperiled fish species of any river basin in North Carolina (n=27), including the most indigenous species restricted to a single river basin in North Carolina (n=11). In order to recover habitat and aquatic ecosystems, it is essential to understand historical biodiversity, species distributions, and habitat availability. We will highlight known species, potential missing species, habitat loss, and restoration potential for a subset of fish species in the French Broad River.

Type: Full Presentation
Student or Professional? Professional
Contact: Luke Etchison
Email: Luke.Etchison@ncwildlife.org
Phone: 828-476-6137

Keywords: Historical fish species distribution, habitat availability, French Broad River

Life History Theory Predicts Appalachian Mountain Stream Fish Assemblage Transformation During Historical Drought

W. Keith Gibbs[1]*, Eric W. Malone[2], Joshuah S. Perkin[3], Matthew Padgett[2], and Matthew Kulp[4]
*Presenting

[1]Department of Geosciences and Natural Resources, Western Carolina University, Cullowhee, NC
[2]Department of Biology, Tennessee Technological University, Cookeville, TN
[3]Department of Ecology and Conservation Biology, Texas A&M University, College Station, TX
[4]Great Smoky Mountains National Park, National Park Service, Gatlinburg, TN

Understanding the ecological dimensions of drought is critical for predicting how humans and nature will be affected by the expected increased prevalence of drought in the future. We tested life-history-based predictions for fish assemblage responses to drought using retrospective analysis of long-term (1986-2003) fish surveys from two streams in Great Smoky Mountains National Park. We hypothesized that (1) fish assemblage composition would correlate with wet and dry hydrologic conditions as assemblages fluctuated within a loose equilibrium; and (2) life history traits of fishes would correlate with dry versus wet periods such that opportunistic life history strategists would dominate during drought. Results showed fish assemblage changes in Little River and Cataloochee Creek correlated with drought severity measured one year prior to fish surveys. Fish assemblages at all three sampling sites in Little River and two sites in Cataloochee Creek fluctuated within a loose equilibrium, while the remaining two sites in Cataloochee Creek indicated directional change. Life history traits for fishes in Cataloochee Creek correlated with one-year time lag fluctuations in drought caused by opportunistic species being dominant during drought and periodic/equilibrium species dominant during wet periods. Time series plots of fish abundances aggregated by life history strategy revealed dominance of opportunistic species emerged at the onset of a multi-year drought spanning 1998-2004, particularly for the two sites undergoing directional change. Our work provides empirical evidence for theoretical linkages between life history and environmental fluctuations and can ultimately be used to predict stream fish community response to future drought regimes.

Type: Full Presentation
Student or Professional? Professional
Contact: W. Keith Gibbs
Email: wgibbs@wcu.edu
Phone: 828-227-3817

Keywords: Life history theory, community ecology, hydrologic disturbance

Update on Augmentation and Monitoring Efforts for the Tar River Spinymussel, *Parvaspina steinstansana*

Andrew R. Glen* and J. Michael Fisk II
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division,
Aquatic Wildlife Diversity Program, Mebane, NC

The Tar River Spinymussel, *Parvaspina steinstansana* , is a highly imperiled federally endangered species restricted to the Tar and Neuse river basins in North Carolina. Beginning in 2007, the North Carolina Wildlife Resources Commission (NCWRC) partnered with the U.S. Fish and Wildlife Service and North Carolina State University to collect Tar River Spinymussels broodstock, develop propagation techniques, and ultimately augment remaining populations. To date the agency has stocked 39,743 individuals across 25 reaches in both the Tar and Neuse river basins. Poststocking evaluations performed between 2016 and 2020 have observed continued survival of augmented individuals, and between 2018-2020 gravidity was confirmed in stocked individuals in Little Fishing Creek. Average growth of recaptured individuals was found to vary by site (min = 1.06 mm; max = 8.78 mm; average = 2.94 mm) and by cohort (min = 2.28 mm; max = 6.99 mm; average = 3.36 mm). A site established on the mainstem of the Tar River in 2019 and the 2015 cohort propagated by the Marion Conservation Aquaculture Center have experienced the highest growth rates. Future benchmarks for continued success of the augmentation program include detection of wild recruitment from propagated individuals and the establishment of new wild recruiting populations.

Type: Lightning Presentation
Student or Professional? Professional
Contact: Andrew Glen
Email: Andrew.glen@ncwildlife.org
Phone: 919-724-7651

Keywords: Tar River Spinymussel, mussel propagation, endangered species

Winter Trout Stocking in Piedmont Impoundments and Changes in Angler Effort

Casey A. Grieshaber* and Lawrence G. Dorsey
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division, Raleigh, NC

Brook Trout, *Salvelinus* fontinalis, Brown Trout, *Salmo* trutta, and Rainbow Trout, *Oncorhynchus mykiss* have been stocked by the North Carolina Wildlife Resources Commission (Commission) into public mountain waters since the 1940's, but few trout fishing opportunities have existed in other regions or in small impoundments. In the winter of 2016, the Commission began to stock trout into publicly accessible small impoundments across the Mountain and Piedmont regions. While anecdotal reports have indicated that anglers are happy with the trout stockings little was done to quantify angler use. The goal of this project was to determine changes in angler effort when trout were stocked. Using camera trap photos and angler license fee data we were able to determine that a significant increase in angler participation occurred when trout were stocked. At Indian Camp Lake, a Sandhills Gameland impoundment in Richmond County, a camera trap was used in the winters of 2015–2016 and 2019–2020 to evaluate angler effort. A total of 8,557 camera trap photos were evaluated. Prior to initiation of the stocking program, total angler effort was approximately 180 hours during the winter months whereas after trout stocking began, the total angler effort was approximately 834 hours over the same period. At Frank Liske Park Pond in Cabarrus County, daily license sales were analyzed to determine changes in use. When comparing three years of license sales when no trout were stocked to three years with trout stockings, sales increased by over 250%. Based on license sales and evaluation of camera trap photos, it is apparent that trout stockings significantly increase angler effort at these impoundments during the winter months. These data, along with positive feedback from anglers across the state, indicate the success of the winter trout stocking program.

Type: Full Presentation
Student or a Professional? Professional
Contact: Casey A. Grieshaber
Email: casey.grieshaber@ncwildlife.org
Phone: 910-729-0872

Keywords: trout, Piedmont, angler use, trail camera

Juvenile Fish Utilization of Strategic Habitat Areas (SHAs) in the Cape Fear River Estuary: Measuring Growth and Production to Assess Habitat Function

Melinda S. Lambert*, Frederick S. Scharf, and Troy D. Alphin
*Presenting

Department of Biology and Marine Biology, University of North Carolina at Wilmington, Wilmington, NC

Measurements of juvenile fish production have been previously used to evaluate habitat quality and recruitment variability. The total biomass of juveniles recruiting to an adult fishery can be used to measure the contribution of juvenile and nursery habitats. Discrete regions within the Cape Fear River have been designated as strategic habitat areas (SHAs) based on the application of optimal arrangement models and corroboration with existing data to identify locations that could potentially provide excellent habitat functionality with low human alteration and activity. Estimates of the growth and production during the juvenile life stage for a target group of fish species will be used to quantify the role of SHA and non-SHA habitats in the Cape Fear River. Comparison using a paired site design should provide insights into the relative contributions of designated and undesignated habitats as well as the methodology behind their designations. Historical data from the North Carolina Division of Marine Fisheries estuarine trawl survey will be compared with data collected during a multi-habitat survey to evaluate changes in fish community structure, habitat associations, and timing of important life history events. Seasonal changes in the presence and absence of multiple fish will be used to track recruitment timing and ontogenetic changes in habitat preference throughout the juvenile life stage. Sampling will be conducted monthly at stratified random and fixed sites within three regions of the river (Upper, Middle, Lower). SHA habitats, as well as adjacent non-SHA habitats, will be sampled using multiple gears at multiple depths to measure fish growth and production.

Type: Lightning Presentation
Student or Professional? Student
Contact: Melinda Lambert
Email: msl5552@uncw.edu
Phone: 336-213-3730

Keywords: Production, biomass, juvenile fish, habitat association, strategic habitat areas

Effects of Acidified Water on Embryonic Development, Hatchling Growth, and Survival of Juvenile and Adult *Planorbella magnifica* (Gastropoda:Pulmonata)

Hans Lohmeyer[1]*, Brena Jones[2] and Rachael Hoch[1]
*Presenting

[1]North Carolina Wildlife Resources Commission, Division of Inland Fisheries, Marion, NC
[2]North Carolina Wildlife Resources Commission, Inland Fisheries Division,
Aquatic Wildlife Diversity Program, Creedmoor, NC

The freshwater gastropod, *Planorbella magnifica*, Magnificent Ramshorn, is a southeastern North Carolina endemic. It is a Candidate for federal listing and is state listed as Endangered. This species was historically found in four sites in the lower Cape Fear drainage. Their native ponds contained circumneutral pH levels between 6.8-7.5 due to the significant input of groundwater buffered by underlying limestone formations. *P. magnifica* is currently believed to be extirpated, with no current known wild populations, persisting only in captivity. *P. magnifica* was believed to be intolerant to pH levels outside of the 6.8-7.5 range. In order to test this tolerance range, I conducted two pH trials, testing the effects of acidified water on the development, growth, and survival of eggs and newly hatched *P. magnifica* and the tolerance thresholds of adults. Each trial contained a control treatment and three acidified pH treatments with three replicates per treatment, run for a minimum of 30 days. Both trials included a control of hatchery water (approx. 8.0 pH) and pH treatment levels of 7.0, 6.0 and 5.0. Because the adult trial initially showed no observable effects at these levels, the pH levels in that experiment were gradually decreased to 4.0, 3.5, and 3.0. During the hatchling trial, juveniles within the 5.0 pH treatment showed a significant decrease in average shell growth and an elevated amount of mortality when compared to the control. The adult test resulted in complete mortality below 4.0 pH. These results show hatchling development and survival is negatively affected between the range of 6.0-5.0 pH, while adults have a wider tolerance but cannot survive below pH 4.0. These experiments will help provide a more concise selection of habitat suitability for future re-introduction efforts.

Type: Lightning Presentation
Student or Professional? Professional
Contact: Hans Lohmeyer
Email: hans.lohmeyer@ncwildlife.org
Phone: 336-601-8071

Keywords: pH, acidification, Pulmonate, Magnificent Ramshorn, shell growth, embryonic development, freshwater gastropod

Movement Ecology, Reproductive Dynamics, and Enhanced Prey Resolution for Non-native Catfishes in a North Carolina Coastal River

Claire B. Pelletier* and Frederick S. Scharf
*Presenting

Department of Biology and Marine Biology, University of North Carolina at Wilmington, Wilmington, NC

Ranges of Blue and Flathead catfish in North Carolina were historically restricted to drainages in the western portion of the state. In the 1960's introductions of both species to Atlantic coastal rivers have led to numerous established non-native populations. To date, research to inform the impacts of these populations on native fauna has focused on estimates of spatial distribution, population demography, and trophic ecology. In the Cape Fear River, recent findings indicate the presence of broad age and size structures of each species, with relatively specialized food habits that demonstrate increased importance of fish prey resources for larger catfish. However, the impacts on native fishes is limited by the recovery of prey in advanced stages of digestion, making identification difficult. Additional areas of research also remain poorly understood, including seasonal movement patterns at fine and broad spatial scales within their introduced range, as well as quantitative estimates of reproductive output which depend on accurate schedules of maturity and the size dependence of egg production. The next phase of non-native catfish research in the Cape Fear River system will include the application of DNA barcoding to improve prey fish identification, passive and active tracking of telemetry-tagged individuals to identify broad seasonal movements and the extent of brackish water habitat use, and the use of histological approaches to estimate catfish maturity schedules and estimate fecundity. These efforts propose to build onto previous work and lead to an improved understanding of the role of non-native catfishes in the lower Cape Fear River ecosystem.

Type: Lightning Presentation
Student or Professional? Student
Contact: Claire Brinkley Pelletier
Email: pelletier.claire.b@gmail.com
Phone: 910-389-9106

Keywords: Fecundity, maturity schedules, non-native catfish, DNA-barcoding, prey identification, Atlantic coastal river.

Elucidating Trophic and Habitat Partitioning of a Diverse Marine Predatory Community

Jeffrey D. Plumlee[1,2]*, Creed Branham[1], Savannah Ryburn[2], F. Joel Fodrie[1,2]
*Presenting

[1] Institute of Marine Sciences, University of North Carolina at Chapel Hill, Morehead City, NC
[2] Environment, Ecology, and Energy Program, University of North Carolina at Chapel Hill, Chapel Hill, NC

For highly migratory predators, phenological similarities within coastal waters may result in competitive interactions that change during periods of high predator abundance and diversity. For species that use the estuary, this increased likelihood for competitive interaction may alter individual species habitat or trophic preferences from within the greater pool of available resources. Herein, we attempt to quantify the proportion of food resources derived from estuarine habitats to four species of coastal shark (Atlantic Sharpnose, Blacknose, Blacktip and Bonnethead sharks) found in North Carolina estuaries. We collected sharks (n = 87) from Back Sound and adjacently in Onslow Bay, NC using fisheries-independent survey methods (gillnet and longline) from May – September, 2020. The proportion of food resources were determined using carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), and sulfur ($\delta^{34}S$) bulk stable isotopes measured in multiple tissue types, as well as gut-contents taken individual sharks. Short-term metabolic turnover tissues (liver and blood plasma) were used in conjunction with long-term tissues (muscle and whole blood) to examine temporally-scaled estimations of trophic preferences. Preliminary results indicate both trophic and habitat partitioning. Blacknose and Blacktip sharks appear to have the highest proportion of spatial overlap, both being caught in deep (> 2m) channels within the estuary. While Bonnetheads appear to use shallow (< 2m) near-shore habitats, and Atlantic Sharpnose sharks were collected almost exclusively out of the estuary in Onslow Bay. Blacknose and Blacktip sharks differed in diets, with Blacktips consuming a predominately fish diet and Blacknose having a wider trophic breadth including crustacean prey. Bonnetheads had unique diets among the four species, which were comprised almost exclusively of blue crabs. Future analysis will focus on using time-integrated biomarkers ($\delta^{13}C$, $\delta^{15}N$, $\delta^{34}S$) to measure changes in this niche partitioning across season as well as the proportion of food resources integrated from specific estuarine habitats.

Type: Lightning Presentation
Student or Professional? Student
Contact: Jeff Plumlee
Email: jplumlee@live.unc.edu
Phone: 765-532-8526

Keywords: Food webs, sharks, estuary, diet, stable isotopes

Roanoke Logperch Restoration in the Dan River, North Carolina

T. R. Russ

North Carolina Wildlife Resources Commission, Inland Fisheries Division,
Aquatic Wildlife Diversity Program, Morganton, NC

The Roanoke Logperch, *Percina rex*, is a large darter (<6.5 inches) originally known only from Virginia portions of the Roanoke and Chowan River Basins. In 1989, it was federally listed as endangered with only four known populations. Historically the best and most researched population has occurred in the Roanoke River near downtown Roanoke, VA and adjacent to Virginia Tech University. From the 1970s through the early 2000s, conservation of the Roanoke Logperch was primarily directed at Virginia populations in the Roanoke River. Over the last four decades countless grants, research projects, and graduate degrees have directed the science and understanding of this imperiled fish; however, a few unexpected events have helped guide the overall conservation of the Roanoke Logperch. In 2007, Duke Power Biologists captured the first individual from North Carolina; a single, juvenile specimen collected using boat shocking in the Dan River near Eden, NC. From 2007-2018, numerous individuals were collected by the NC Wildlife Resources Commission (Commission) from six different water bodies including the Mayo, Smith, and Dan Rivers in Rockingham County. In 2016, a population genetics study was initiated by the Commission and we found that the NC population was large but not as diverse as some of the older populations in Virginia. In 2018, the total population in NC occupied approximately 40 river miles, but upstream migration was prevented by dams: Mayo dam on the Mayo River, Spray Cotton dam on the Smith River, and Lindsey Bridge dam on the Dan River. Since 2015, the research and conservation of the Roanoke Logperch has shifted to North Carolina. In 2020, restoration of the Roanoke Logperch in North Carolina intensified: 50 river miles of optimal habitat in the Dan River were opened up by a dam removal, over 100 propagated juveniles were released to augment the current population, and additional funding was secured for more on-the-ground conservation.

Type: Full Presentation
Student or Professional? Professional
Contact: T.R. Russ
Email: thomas.russ@ncwildlife.org
Phone: 828-777-0495

Keywords: Roanoke Logperch, Dan River, restoration, conservation

Mountain Stream Water Quality Baseline Quantified for Community Stewardship in Inaugural Citizen Science Studies

William Seaman[1, 2]*, Ann Marie Traylor[3], and Jeffrey Muston[1, 4]
*Presenting

[1]Montreat Landcare Committee, Montreat, NC
[2]University of Florida, Gainesville, FL
[3]Environmental Quality Institute, Black Mountain, NC
[4]Sierra Nevada Brewing, Mills River, NC

This project developed a first-ever quantitative database for the chemistry of Flat Creek, Buncombe County, western North Carolina, a tributary of the upper Swannanoa River. The watershed is small, yet Flat Creek is inordinately valued as an environmental and cultural resource by Montreat residents and numerous visitors. As such eight local institutions worked together under Montreat Landcare Committee auspices to make Flat Creek stewardship a priority. Based on the presence of Eastern Brook Trout, *Salvelinus fontinalis,* and Eastern Hellbender, *Cryptobranchus alleganiensis*, and in consultation with N.C. Wildlife Resources Commission and Montreat College scientists, while lacking documentation we hypothesized that the waters of Flat Creek were of high environmental quality. An October 2019 pilot study of eight water quality indicators verified this and formed the basis for a funding request to the North Carolina Chapter of the American Fisheries Society (granted in part) to support the research reported here. Landcare assembled a volunteer “Stream Team” of citizen scientists and professionals to conduct sampling according to two plans: 1, five locations along Flat Creek were sampled seasonally in 2020 to assess water chemistry, with analysis by the Environmental Quality Institute, which provides such services across a regional network; 2, a community “swimming hole,” was sampled weekly for bacteria during the summer of 2020, with analysis done by MountainTrue, as part of an international swim guide program. Our conclusion is that Flat Creek is a healthy body of water in terms of its (1) physico-chemical constituents, including turbidity, suspended solids, orthophosphate, nitrates, ammonia, pH, alkalinity and conductivity, and also (2) bacteria levels, indicating habitat suitable for trout and waters safe for human recreation. Loading of sediment into the creek after heavy rainfall is a concern. This project built awareness and engagement of residents and visitors, and provides a baseline for Town watershed management.

Type: Lightning Presentation
Student or Professional? Professional
Contact: William Seaman
Email: seaman@ufl.edu
Phone: 828-669-3631

Keywords: Headwaters stream, water chemistry, bacteria, habitat quality, citizen science

An Annotated Atlas of the Freshwater Fishes of North Carolina

Bryn H. Tracy[1]*, Fred C. Rohde[2], and Gabriela M. Hogue[3]
*Presenting

[1]Apex, NC
[2]National Marine Fisheries Service, 101 Pivers Island Road, Beaufort, NC
[3]North Carolina Museum of Natural Sciences, 11 West Jones Street, Raleigh, NC.

The rich history of the study of fishes in North Carolina dates all the way back to 1682 when Thomas Ash wrote a general description of the fish fauna of “Carolina”, which referred to all of the coastal lands between Florida and Virginia. North Carolina’s first state-specific checklist of freshwater fish species was published in 1709 by John Lawson and subsequent checklists included: Brickell (1737), Cope (1870a), Jordan (1889a), Jordan and Evermann (1896-1900), Smith (1907), Jordan et al. (1930), Fowler (1945), Louder (1962), Ratledge et al. (1966), and Menhinick et al. (1974). In 1991, Menhinick published “*The Freshwater Fishes of North Carolina*”, which is still widely in use today. The increase in the availability of historical records in globally accessible databases and the surge of collections post-1991 made by federal and state resource agencies, and many others, made the timing perfect for the creation of an update of North Carolina’s freshwater fish species in an annotated atlas. Annotations for each species include a distributional map with type locality noted where appropriate, remarks concerning questionable records and misidentifications, extirpations, introductions and interbasin transfers, and imperilment status. Herein, we will discuss the process of determining the distribution of the 257 currently described and undescribed freshwater fish species within North Carolina.

Type: Full Presentation
Student or Professional? Professional
Contact: Bryn H. Tracy
Email: bryntracy12558@att.net
Phone: 919-518-3923

Keywords: North Carolina, Freshwater Fishes, Species Distributions

Assessment of Tar River Catfish Populations, 2020

Todd D. VanMiddlesworth* and Benjamin R. Ricks
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division, Greenville, NC

Historically, the Tar River contained several native catfish species including Brown Bullhead, *Ameiurus melas*, White Catfish, *Ameiurus catus*, and Yellow Bullhead, *Ameiurus natalis*. Non-native catfish species such as Channel Catfish *Ictalurus punctatus,* were introduced to the Tar River in the early 1900's and are now considered naturalized. Invasive species such as Flathead Catfish, *Pylodictis olivaris,* became established in the 1990's and Blue Catfish, *Ictalurus furcatus,* were first observed in summer 2010 catfish surveys in low abundances. Since Flathead Catfish introduction, they have expanded in distribution throughout the Tar River and are thriving. As a result, native catfish abundance has decreased due to Flathead Catfish predation on and competition with native catfish species. Additionally, Flathead Catfish are increasingly popular recreationally, resulting in a perception by some catfish angling groups that protective harvest limits are warranted. A Tar River catfish survey was conducted via boat electrofishing in summer 2020 to monitor the catfish population characteristics and evaluate current management measures. A total of 383 Flathead Catfish, 61 Channel Catfish, 10 White Catfish, and 3 Blue Catfish were collected from 55 sample sites. The results of this survey indicated low abundance of native catfish populations and a robust Flathead Catfish population. Future surveys should investigate current distributions of native catfish in the Tar River and continue to monitor effects of invasive catfish on resident fish communities to inform the research objectives in the 2019 NCWRC Catfish Management Plan.

Type: Lightning Presentation
Student or Professional? Professional
Contact: Todd D. (T.D.) VanMiddlesworth
Email: Todd.VanMiddlesworth@ncwildlife.org
Phone: 919-210-4320

Keywords: Tar River, Flathead Catfish, Channel Catfish, White Catfish, Blue Catfish, electrofishing

Age, Growth and Sexual Dimorphism in the Dwarf Wedgemussel, *Alasmidonta heterodon*

Michael Walter* and Andrew Glen
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division,
Aquatic Wildlife Diversity Program, Mebane, NC

The rivers of North America hold more species of Unionid freshwater mussels than any other on Earth. The Southeastern US is considered a biodiversity hotspot and that is especially true in North Carolina where nearly 60 species of freshwater mussel can still be found. The federally endangered Dwarf Wedgemussel, *Alasmidonta heterodon*, for example, historically ranged from the Petitcodiac River basin in New Brunswick, Canada to the Neuse River basin in North Carolina. However, habitat and water quality degradation due to anthropogenic processes have led to remnant populations and today they exist largely in only two river systems; the Delaware River basin in New York and the Tar River basin in North Carolina. The decline of these populations, and the growing effort to conserve them, highlights the need to study life history traits of the species while the opportunity still exists. In this study, we have utilized a collection of shell material from six creeks in the Tar River basin and one creek in the Neuse River basin to document sexually dimorphic traits of the Dwarf Wedgemussel and conduct an age and growth analysis for the species. 97 Dwarf Wedgemussel shells were sexed and measurements of length, width, height and internal volume were taken before externally aging the shell. The right valve of each mussel was then thin sectioned to 600 µm and wet sanded using 600 grit sandpaper. Internal annuli were counted under magnification and used to construct a von Bertalanffy growth model. Differences in internal shell volume and external measurement ratios were analyzed to quantify the degree to which male and female mussels differ in shape and size. This valuable life history information will aid our broodstock collection, propagation and population augmentation efforts as we continue to work towards the recovery of the Dwarf Wedgemussel in North Carolina.

Type: Full Presentation
Student or a Professional? Professional
Contact: Michael Walter
Email: michael.walter@ncwildlife.org
Phone: 984-227-3017

Keywords: Dwarf Wedgemussel, age and growth, thin sectioning, sexual dimorphism

"NCIFD": an R package for the NCWRC Inland Fisheries Division

A. Powell Wheeler[1]* and Kevin J. Dockendorf[2]
*Presenting Author

[1]North Carolina Wildlife Resources Commission, Inland Fisheries Division, Waynesville, NC
[2] North Carolina Wildlife Resources Commission, Inland Fisheries Division, Elizabeth City, NC

R is a powerful data analysis tool and its use is spreading among field biologists in the Inland Fisheries Division (IFD) of the North Carolina Wildlife Resources Commission. R's surging popularity is in part due to its package system which simplifies sharing functions and data. We are developing an R package, 'NCIFD', to improve data distribution and analysis inside the IFD. The IFD has several online databases that we use to store and retrieve data; however, many of these databases produce query results that are messy and difficult to use. The R package development process solves these problems by using scripts to clean-up or 'tidy' the data before saving it in the package. In addition, the scripts can also export data into CSV files to benefit non-R users. There are currently 16 datasets in NCIFD and these include information on North Carolina fishes and waterbodies, hatchery stocking records, on-going research projects, and other subjects. Our largest IFD database, BIODE, stores our general warmwater fisheries sampling data and is becoming too large for typical government-issued computers to manage all at once, even in R. To make this database more useful, we created a function 'cleanBIODE()', that reads the xlsx files from the database queries, cleans-up the data, and makes it available in the user's R session. The package contains 15 other functions that help with fisheries data, statistics, and other R tasks. Thus, NCIFD can provide an internal outlet for staff to publish and share the functions they develop.

Type: Full Presentation
Student or Professional? Professional
Contact: Powell Wheeler
Email: powell.wheeler@ncwildlife.org
Phone: 828-230-8739

Keywords: R, package, fisheries, data

Lake Gaston Creel Survey 2019-2020

Zackary Xiong*, Lawrence Dorsey, and Kirk Rundle
*Presenting

North Carolina Wildlife Resources Commission, Inland Fisheries Division, Raleigh, NC

A roving creel survey was conducted at Lake Gaston, NC from 1 December 2019 through 30 November 2020. The survey utilized a non-uniform probability design and surveys were conducted during 12 weekdays (Mon–Thur) and eight weekend days (Fri–Sun) per month. A total of 563 interviews were conducted over the 12-month period. Overall angling effort (angler*h) was highest during July and lowest in December. Angler effort was highest for black bass (*Micropterus* spp.) but generalist anglers expended the second most amount of effort over the course of the survey. Estimated catch for all black bass was higher than any other category and an estimated 11% of black bass caught were harvested. In contrast, an estimated 83% of the Black Crappie *Pomoxis nigromaculatus* caught during this survey were harvested. Angler satisfaction was positive with most anglers reporting either an excellent or good rating for their fishing trip. Most anglers interviewed did not oppose regulations on invasive Blue Catfish, *Ictalurus furcatus,* but opinions on invasive Alabama Bass, *Micropterus henshalli*, were mixed. Results from this study will be used to guide future management activities at Lake Gaston.

Type: Full Presentation
Student or a Professional? Professional
Contact: Lawrence Dorsey
Email: lawrence.dorsey@ncwildlife.org
Phone: 704-984-0600

Key Words: creel survey, black bass, Alabama Bass, Blue Catfish