



AMERICAN FISHERIES SOCIETY

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Fall 2017 NEWSLETTER

President's Message

Well, autumn is upon us and we see the changing of the season. This is my favorite time of year as fish increase activity, temperatures cool, and sunsets are majestic. While working for the NC Wildlife Resources Commission one of our main jobs is interacting with the public on many levels. We are often asked questions while on the water, at events, or while giving presentations. Our job as biologists is to educate the public about what we do and the status of critters and their habitats. I would implore our membership to keep educating the public of the work we are accomplishing. I have found that through sound science and patience many of our constituents begin to understand the results and see the need for continued conservation. I would also encourage each one of you to listen to our constituents as well. Don't be dismissive of their viewpoint. I have found that they often have insight that we as biologists don't have. Together, biologists and the public need to work together to continue conserving our aquatic natural resources.

I want to encourage all of you to think about attending the SDAFS meeting in Puerto Rico. Some of our very own chapter members are playing a large part (Tom Kwak and Gus Engman) in making this meeting a success. As all of you know, Puerto Rico and the US Virgin Islands were devastated by Hurricane Maria. I encourage all of you to think about making donations that will directly help our neighbors in the Caribbean. Your attendance at the meeting would greatly encourage our fellow biologists in Puerto Rico. Your EXCOM will approve a donation to the Puerto Rico Chapter to help with costs for this meeting. Call for papers is open now! Our prayers are with you, Puerto Rico. Finally, our annual chapter meeting will be in Morganton, NC, Feb. 20-22, 2018. I hope to see you all there! Look for more information coming soon.

Happy fall y'all!

M. Corey Oakly

Submitted by Corey Oakley, NCAFS President

Save the Date - 2018 NCAFS Annual Meeting!

The 2018 Meeting of the NC Chapter of the American Fisheries Society will be held February 20–22, 2018 at the <u>Morganton Community House</u>, in Morganton, NC. Accommodations available at the <u>Hampton Inn</u> of Morganton. Note, the Hampton Inn is currently undergoing renovations, but will be re-opened prior to the meeting date.



Morganton Community House, location of the 2018 NCAFS Annual Meeting.

Events include:

Feb. 20: Evening Social Feb. 21: Climate Change Workshop and Annual Meeting Presentations Feb. 22: Continued Presentations and Business Meeting

Celebrating Joe Hightower's Career

Joe Hightower formally retired from a 30-year career as a USGS Scientist at the NC Cooperative Fish and Wildlife Research Unit and Professor of Applied Ecology at NC State University in December 2014. But he continued to teach and mentor students for an extended time after retiring (i.e., not retiring). While Joe remains active in the fisheries field, he has wound down his academic and scientific activities enough to where he now might really be retired!



What a way to celebrate a fisheries career! Joe Hightower's students, colleagues, and friends gathered at the Tampa AFS Meeting to share stories, food, and drink in honor of his successful career.

Joe's productive and successful career was celebrated at the 2017 AFS Parent Society meeting in Tampa, Florida, during August in two ways. First, Joe's students and colleagues organized a special symposium: "*Using Electronic Tags to Estimate Vital Rates in Fishes*", that honored Joe's pioneering achievements. And Joe led the symposium with a plenary presentation on study designs using the approach. Secondly, Joe was honored at an evening reception and roast at the Marriott Hotel. Many current and former students, colleagues, and friends joined the fun and shared refreshments and stories from the field, classroom, and life with Joe. What a great way to recognize the important impact Joe has had on our science and the people he's influenced over the years. Congratulations, Joe!

Special thanks to Julie Harris, Jeff Buckel, and Brendan Runde for organizing the reception, and to the Center for Marine Sciences and Technology, Department of Applied Ecology, and NC Cooperative Fish and Wildlife Research Unit at NC State University for funding.

Submitted by Tom Kwak and Jeff Buckel, NC State University

Congratulations to Fritz Rohde! – Recipient of the North Carolina Wildlife Federation's 54th Annual Governor's Conservation Achievement Award for Natural Resources Scientist of the Year



Fritz Rohde beside the fish passage structure at Lock and Dam No. 1 on the Cape Fear River.

"As a fish biologist for the National Marine Fisheries Service, Rohde is a staunch defender of freshwater, estuarine, and marine resources. He is known for his work on Cape Fear River fish passage and the Roanoke River fish restoration plan. Currently serving as president of the North American Native Fishes Association, Rohde's many publications and volunteer work well describe the uncommon breadth of his contributions to fish resources". For the full list of all this year's recipients, visit: http://ncwf.org/54th-annual-governors-conservation-achievement-award-winners/

NCAFS Treasurer's Report as of 10/1/2017

- 1. Robust Redhorse Conservation Committee \$12,410.88;
 - Balance after 2017 RRCC Annual Meeting will be \$7,833.03
- 2. NCAFS checking \$5,321.18;
- 3. NCAFS PayPal -\$16.18;
- 4. NCAFS Edward D. Jones Account 1 (Ichthus Fund) \$31,352.28;
- 5. NCAFS Edward D. Jones Account 2 \$46,581.23.

Stephen Parker and Steven Lombardo received \$400 each (from the Ichthus Fund) for

winning the 2017 NCAFS Student Travel Award (see article on page 6). Congratulations to both students! NCAFS received a \$156 rebate from AFS from annual dues, and spent \$150 from the checking account to renew the AFS General Liability Insurance Policy.



Submitted by Kelsey Lincoln, NCAFS Secretary/Treasurer

Important Information About NCAFS Dues

It is that time of year to renew your membership for NCAFS (or join if you are a new member). As many of you are aware, we voted as a chapter at the 2017 Annual Business Meeting to change the annual dues from \$7.00 to \$15.00 beginning September 1, 2017. The membership fee for NCAFS had not been changed in quite some time and this small increase will have a large impact on the financial security of our chapter and will allow us to continue fund student travel, assist chapters on a national scale, and help with small projects across the state.

You can renew your membership through the AFS website, at our annual meeting, or anytime via the NCAFS website with PayPal (mailed payments also accepted). Payments for the 2018 calendar year will be accepted September 1, 2017 through August 31, 2018.

To renew membership/join through NCAFS website or annual meeting: This is the best option for this transition year. The NCAFS website will have the correct invoice or you can renew your membership online or at the Chapter meeting.

To renew membership/join through Parent Society AFS:

Due to a delay in the timing of changing our dues with the parent society, the invoice you have already received from AFS includes the old membership fee (\$7.00). Because of this, you can **a**) pay the \$7.00 online when you renew your AFS membership and send me a check/cash for the remaining \$8.00 (<u>click here for mailing address</u>) or give me the \$8.00 at the 2018 annual meeting, or **b**) call AFS and have them send you a corrected invoice for \$15 for NCAFS before you submit your money.

I hope this will not be too much of an inconvenience for anyone. Please email (<u>kelsey.lincoln@ncwildlife.org</u>) or call me (919-618-7945) if you have any questions.

Submitted by Kelsey Lincoln, NCAFS Secretary/Treasurer

2017 Student Travel Awards Presented

The NCAFS Chapter established a <u>Student</u> <u>Travel Award Program</u> in 2005 for the specific purpose of encouraging professional growth of students and maximizing participation of undergraduate and graduate students at the annual meeting of the American Fisheries Society. Monetary support is provided to qualifying students via a travel award of \$200 to \$400 to help defer the cost of meeting travel, registration, and accommodations. The 2017 awards were presented to two students for the 147th Annual Meeting of the American Fisheries Society held August 20-24 in Tampa, Florida.



The 2017 NCAFS Student Travel Award winners Stephen Parker (left) and Steven Lombardo (right) pictured with AFS President-Elect Steve McMullin (Photo Credit, Tom Kwak).

The 2017 award recipients were Steven Lombardo and Stephen Parker, both graduate students at NC State University. Steven Lombardo is advised by Dr. Jeff Buckel and Stephen Parker is advised by Dr. Jesse Fischer. They each received a cash award of \$400 from the Chapter's Ichthus Fund account, which was established specifically to foster student involvement. They each represented the Chapter admirably at the meeting and expressed their sincere gratitude to the Chapter for helping to make their attendance and participation possible.

Submitted by Greg Cope and John Crutchfield, NCAFS Awards Committee

A Rare Opportunity – 2017 Shad in the Classroom

Having the chance to dissect a fish (or any critter) is now quite rare in the classroom. That is what we hear from the teachers that participate in the Shad in the Classroom Program. Not only is it a rare experience for these school children, it is often considered the highlight of the year!

Thirty-three classrooms participated in 2017, with 12 of those new to the program this year. Four of the schools released larval fish and embryos in the Roanoke River basin, and the other 29 schools released in the Neuse River basin. Over 2,100 students participated in the program this year, and more than 1,300 students enjoyed river releases.

American Shad brood stock are collected by the NC Wildlife Resources Commission (NCWRC) and eggs are provided by the US Fish & Wildlife Service's Edenton National Fish Hatchery. Classes received their fertilized eggs in April and raised them for one week, while conducting multiple lessons based around the American Shad and ecology, exposing students to important science and math concepts (including learning about fish anatomy, morphology, and function). The Shad in the Classroom Program has been operating in North Carolina since 2009. Between 2013 and 2017,



Fish dissection and anatomy lesson at Cook Literacy Model School (photo by Brad Rhew)

approximately 12,000 students were reached through this program (prior to 2013, the numbers of students were not tracked).

The fish anatomy, morphology, and dissection lessons have become an important and highly appreciated part of the Shad in the Classroom Program. We are very thankful to the NCAFS Student Subunit and the NCWRC for generously providing their time and expertise to this aspect of the program. Eleven students, post-docs, researchers, and educators from NCAFS and NCWRC volunteered to conduct these lessons: Ani Popp,



Gus Engman's fish dissection and anatomy lesson at Brogden Middle School (photo by Christina Livingstone)

"Dissection - Absolutely one of the students' favorite activities. Due to many budget cuts over the years they usually do not have this type of opportunity."

"The dissection activity is something my students talk about for a long time. We have a wall of photographs in our classroom, and I see students looking at photos of previous dissections again and again. I don't think that students get opportunities to dissect anything in their science classes anymore, so this is a very valuable piece of the program." Bobby Cope, Casey Williams, Emilee Wooster, Gus Engman, Dr. Jesse Fischer, Kayelyn Simmons, Kevin Hining, Stephen Parker, Steven Lombardo, and Tiffany Penland. Because of these volunteers and the generosity of fish donations (over 320 fish - Thank you, Drs. Rich Noble, Phil Doerr, Jim Rice, and fellow anglers, First Fruits Farm, and the NCWRC's Armstrong Hatchery), we facilitated the dissection lecture for 16 classes (reaching 1,098 students). Although three fewer classrooms were accommodated than last year, there were 547 more students participating in dissections (almost double) this year. Emilee Wooster, Bobby Cope, and Tiffany Penland helped coordinate the NC State University graduate students for the anatomy-dissection lectures. We



Students holding aquatic macroinvertebrates at Ballentine Elementary (photo by Kathy Wall).

are very grateful to NCAFS and the NCWRC educators and for the fish donations, which led to the great success of this activity. <u>All teachers that could participate in this</u> class reported that the activity enhanced the learning experience for their students.

In addition, this year Tiffany Penland, NC State University graduate student, conducted an aquatic macroinvertebrate lesson for two schools and on location at the Roanoke River for three schools. Casey Williams, NCWRC, also conducted an aquatic macroinvertebrate lesson on the Eno River for one school.

Once again, Shad in the Classroom was a resounding success this year. Teachers and students provided positive feedback on all aspects of the program. We received invaluable assistance from partners and volunteers helping with deliveries of eggs, attendance at releases, and educational lectures. Working with this program is a positive experience for all involved. We are getting ready to gear up for next year and look forward to working with Chapter and NCSU SFS members again for the 2018 Shad in the Classroom Program!



Tiffany Penland lecture at Central Park School for Children (photo by Meg Millard)

Melissa Dowland, Megan Chesser, and I give a big thank you to all the many volunteers, particularly the NCAFS Chapter, the North Carolina Student Subunit, and the NCWRC! If you would like to be involved in the program next year, please contact Danielle at <u>danielle.pender@naturalsciences.org.</u>

Submitted by Danielle Pender, Shad in the Classroom Program Specialist NC Museum of Natural Science, Education Section

NCAFS Member Spotlights

Spotlight on Seth Mycko - Seth is a Clemson University alumnus where he received his B.S. (2013) and M.S. (2017) in Wildlife and Fisheries Biology. He was the founder and president of the Clemson student subunit from 2011-2013. Prior to graduate school and joining NCWRC in 2017 as the District 5 Assistant Fisheries Biologist, Seth worked for the SC Department of Natural Resources where he served as a technician on the state-wide stream assessment crew and the J. Strom Thurmond Reservoir Striped Bass telemetry project. He and his wife, Elizabeth, got married this past December and are currently living in Graham.



Spotlight on Tyler Parent - Tyler Parent was born and raised in southern California. From an early age, he had a keen interest in the natural world and would spend long afternoons in the backyard trying to capture and more closely examine anything that moved. He was also fortunately able to experience the uniquely high biodiversity found in the waters of the Santa Barbara Channel. This would serve as the early foundation for his now "obsession" with aquatic organisms. Through a combination of the opportunity for a Division 1 track and field experience, and the fact that the school offered a biology degree focused specifically on wildlife and fisheries biology, Tyler traveled to the opposite corner of the country to get his BS degree from the University of Vermont. While there, he conducted an undergraduate research project under Dr. J. Ellen Marsden focused on fragmentation of the Lake Champlain ecosystem.

His first post-college job was as a seasonal technician working for the Vermont Fish & Wildlife Department. As there was not enough work to take this position through the winter, a backup plan was executed. He worked for several months selling shoes and

stretchy clothing at a Nike store in Washington, DC to afford his massively overpriced 362 square foot apartment.

Just when he was beginning to lose hope of continued employment in his chosen field, a call from the Normandeau Associates office in Bedford, NH, materialized out of thin air. Tyler was presented with an opportunity for another seasonal position helping with a massive hydro relicensing effort at three projects on the Connecticut River. When this project came to a close, his only chance at full time employment with Normandeau was to relocate to Charlotte, NC, to help out at the company's new satellite office in the Southeast. There, the main client has been Duke Energy. Tyler has helped



ensure the smooth operation of a massive CWA Section 316(b) Impingement and Entrainment project at eight Duke Energy sites spread across North and South Carolina. Since arriving in the South, his newfound appreciation of vinegar-based barbecue sauce and humidity has allowed him to make the most of his, so far, two years in NC.

Spotlight on Riley Gallagher - Riley Gallagher grew up in Seattle, WA and received a B.S. in Aquatic Biology from the University of Montana (2013). He worked as a fly fishing guide as well as a research technician for multiple state agencies throughout the West. Riley joined the Buckel Lab as an M.S. candidate working to capture Cobia, implant transmitters, maintain a receiver array, and analyze fish movement data. His thesis project is designed to estimate the population structure of Cobia using acoustic telemetry and genetic data in coastal North Carolina and Virginia.



Distributional Status of Five Non-Indigenous Species in the Yadkin-Pee Dee River Drainage

Over the past 21.5 years as project leader of the North Carolina Division of Water Resources' <u>wadeable stream fish community assessment program</u>, I documented the occurrences and <u>distributions of the indigenous and nonindigenous freshwater species</u> throughout the state. Most of my work was with the basinwide assessment program, which evaluates a core group of long-term monitoring sites on a five -year rotating cycle. The Yadkin-Pee River drainage was the first basin I sampled in 1996 and <u>I sampled it</u> <u>every five years through 2016 for a total of five cycles</u>. During this time, I also became interested in trying to figure out what was indigenous and what was nonindigenous through historical and forensic ichthyology, not just in this drainage, but throughout the state (Tracy, et al. 2013). At chapter meetings since 1997 and in numerous newsletter articles (e.g. Tracy 2008, 2009, Tracy and Schneider 2009), I presented much of what I had learned about our state's ichthyo-fauna, especially on species encountered in the Yadkin-Pee Dee River drainage.

The Yadkin-Pee Dee River drainage in North Carolina is home to, per my count, 113 species of freshwater fish, tied with the Roanoke River drainage as being the most speciose (Tracy, et al. 2013). However, 34 species are nonindigenous and this is second to the Catawba River system in North Carolina. In this article, the focus is on five species -- Central Stoneroller, Mountain Redbelly Dace, Rosefin Shiner, Swallowtail Shiner, and Comely Shiner -- one of which was introduced more than 50 years ago and one as recently as the early 2000s. The distributional patterns and histories of dispersal of several of the 34-nonindigenous species overlap, suggesting similar modes of introductions. The most likely origins of many introductions of indigenous species into extralimital river drainages is through bait bucket releases (Fuller, et al. 1999; Jenkins and Burkhead 1994).

Databases queried for this article:

- North Carolina Division of Water Resources
- North Carolina Wildlife Resources Commission PAWS
- <u>North Carolina State Museum of Natural Sciences</u>
- <u>Global Biodiversity Information Facility</u>
- Duke Energy
- Appalachian State University
- FishNet2
- the Academy of Natural Sciences of Drexel University
- <u>USGS Nonindigenous Aquatic Species</u>

Data for each species are presented in an outline form. Photographs are reproduced courtesy of Dr. Robert E. Jenkins, Noel Burkhead, and Fritz Rohde *via* the <u>Southeastern</u> <u>Fishes Council</u>. Lastly, when in doubt, voucher your specimens (Tracy 2007)! You'll leave an easily identifiable trail for future forensic ichthyologists to follow.

Central Stoneroller, *Campostoma anomalum* (Rafinesque)

- 1. Habitat
 - a. Small to medium sized streams with clear, cool water, sometimes with rapid current (Burr 1980); lotic waters
- 2. Previous North Carolina Distributional Knowledge
 - a. No published records (e.g., Cope 1870 for Gobble Creek; Smith 1907, Bailey 1949, Tatum, et al. 1963) prior to Menhinick (1974)
 - b. No records shown on map (Burr 1980)
- 3. First Discovered and Earliest Records (Figure 1)
 - a. Bullhead Creek at SR 1739, Wilkes County, collected by Joseph Bailey and students on August 02, 1960, n = 1
 - b. Cody Creek at SR 1104, Surry County, collected by Robert E. Schmidt on March 13, 1979, n = unknown
- 4. Closest Possible Source Population(s) from which Species may have Originated
 - a. Dan River (Roanoke River drainage)
 - b. New River drainage
 - c. Watauga River (Holston/Tennessee River drainage)
 - d. Catawba River (Santee River drainage)
- 5. Current Distribution and Abundance (Figure 1)
 - a. Established (Shafland, et al. 2008)
 - b. One hundred eighteen collections between 1960 and 2016, with the number of specimens represented in each collection ranging from one to 184 (from a 600-ft. reach in Laurel Creek at SR 1508 in Watauga County, May 05, 1999)
 - c. Widely distributed by multiple introductions and/or natural dispersal into many of the upper Yadkin River system watersheds in Watauga, Caldwell, Wilkes, Surry, and Stokes counties
 - d. Found downstream as far as Forbush Creek in Yadkin County and Gobble Creek in Davidson County
 - e. Has not been collected from the East Prong Roaring River (Bullhead Creek) or from the entire Roaring River watershed since 1960, thus this introduction has most likely failed
- 6. Prediction of Future Distribution
 - a. Throughout upper and middle Yadkin River system where dispersal is not limited by large reservoirs and impassable dams (e.g. Northwest Filter Plant, Idols, Coolemee, and High Rock dams), reservoirs (High Rock), or poor water quality
- 7. Additional Comment(s)
 - a. The species or subspecies designation of the Central Stoneroller in the Yadkin-Pee Dee River drainage is uncertain because specimens from this drainage were not available for the most recent work published on this genus (Blum, et al. 2008).

USGS Nonindigenous Aquatic Species_web pages pertaining to the Central Stoneroller:

- 1. Collection info
- 2. Point map
- 3. Fact Sheet
- 4. Animated map



Figure 1. Distribution of the Central Stoneroller, Campostoma anomalum, in the Yadkin-Pee Dee River drainage in North Carolina. Red symbols denote the first known occurrences and red bars denote major dams.

Mountain Redbelly Dace, Chrosomus oreas Cope

- 1. Habitat
 - a. Typical of small, cool to warm, clear to often turbid, sandy to rocky streams (Starnes and Starnes 1980); lotic waters
- 2. Previous North Carolina Distributional Knowledge
 - a. No published records (e.g., Bailey 1949 or Tatum, et al. 1963) prior to Menhinick (1974)

- b. Single report from the upper Yadkin system (Pee Dee drainage), North Carolina, probably based on an introduction (Starnes and Starnes, 1980), but no localities shown on their map
- 3. First Discovered and Earliest Records (Figure 2)
 - a. Unnamed tributary to the Little Yadkin River at SR 1168 in Stokes County, collected by Stephen A. Bartone on November 07, 1970, n = 2
 - b. Ararat River at NC 103/89 in Surry County, collected by Joe Mickey and NCWRC staff on October 08, 1981, n = 1
- 4. Closest Possible Source Population(s) from which Species may have Originated
 - a. Dan River (Roanoke River drainage)
 - b. Non-indigenous populations in the New River drainage and the Watauga River system (Holston/Tennessee River drainage)
- 5. Current Distribution and Abundance (Figure 2)
 - a. Established (Shafland, et al. 2008)
 - b. Forty-four collections between 1970 and 2016 with the number of specimens represented in each collection ranging from one to 539 (from a 600-ft. reach in Pauls Creek at SR 2048 in Surry County, April 08, 2009)
 - c. Multiple introductions and natural dispersal into several of the upper Yadkin River system watersheds in Surry and Stokes counties, including the Little Yadkin, Ararat, and Fisher rivers
 - d. Disjunct populations in Mulberry Creek and East Prong Roaring River in Wilkes County
- 6. Prediction of Future Distribution
 - a. Upper and middle Yadkin River system where dispersal is not limited by dams (e.g. Kerr Scott, Kapps Mill, Northwest Filter Plant, Idols, Coolemee, and High Rock dams), reservoirs (High Rock), or poor water quality

USGS Nonindigenous Aquatic Species_web pages pertaining to the Mountain Redbelly Dace:

- 1. Collection Info
- 2. Point Map
- 3. Fact sheet
- 4. Animated Map



Figure 2. Distribution of the Mountain Redbelly Dace, Chrosomus oreas, in the Yadkin-Pee Dee River drainage in North Carolina. Red symbols denote the first known occurrences and red bar denotes a major dam.

Rosefin Shiner, Lythrurus ardens (Cope)

- 1. Habitat
 - a. Small to medium sized upland streams with moderate flow and usually gravel and rubble bottoms (Snelson 1980); lotic waters
- 2. Previous North Carolina Distributional Knowledge
 - a. No previously published records
 - b. No localities shown on map in Snelson (1980) or mentioned in Snelson (1990), Menhinick (1991), or Dimmick, et al. (1996)
 - c. Misidentified specimens listed in Fowler (1945, page 118); specimens were re-identified as *Notropis chiliticus* (n=7)
- 3. First Discovered and Earliest Records (Figure 3)
 - April 2001 from Muddy and Silas creeks, two tributaries to the Yadkin River in Forsyth County, collected by DWR staff, n = 3 and 12, respectively
- 4. Closest Possible Source Population (s) from which Species may have Originated
 - a. Dan River (Roanoke River drainage)

- 5. Current Distribution and Abundance (Figure 3)
 - a. Established (Shafland, et al. 2008)
 - b. Sixteen collections between 2001 and 2016 with the number of specimens represented in each collection ranging from one to 27 (from a 600-ft. reach in Silas Creek at SR 1137 in Forsyth County, April 24, 2002)
 - c. Known from only four tributaries to the Yadkin River and one tributary to the South Yadkin River in Forsyth and Rowan counties
- 6. Prediction of Future Distribution
 - Middle reaches of the Yadkin River system where dispersal is not limited by dams (e.g. Coolemee, Idols, and High Rock dams), reservoirs (High Rock), or poor water quality

USGS Nonindigenous Aquatic Species_web pages pertaining to the Rosefin Shiner:

- 1. <u>Collection Info</u>
- 2. Point Map
- 3. Fact Sheet
- 4. Animated Map



Figure 3. Distribution of the Rosefin Shiner, Lythrurus ardens, in the Yadkin-Pee Dee River drainage in North Carolina. Red symbols denote the first known occurrences and red bars denote major dams.

Swallowtail Shiner, Notropis procne (Cope)

- 1. Habitat
 - a. Moderate to low gradient, clear to turbid small streams to large rivers, occupying pools and slow runs with sand, gravel, or rock bottom (Jenkins and Sorensen 1980); lotic waters
- 2. Previous North Carolina Distributional Knowledge
 - a. No published records prior to Tatum, et al. (1963)
 - b. Three collections from Davie (Cedar Creek) and Montgomery (Belford and Rocky creeks) counties reported in Fowler (1945, page 113) were made on August 27 and 29, 1940 by staff from Academy of Natural Sciences of Philadelphia. These collections, initially identified as *Notropis procne*, were re-identified as Whitemouth Shiner, *Notropis alborus* (ANSP Catalogue Numbers 75650, 75651, and 75654), a species not described until 1947 (Hubbs and Raney 1947).
 - c. Localized in the Pee Dee River drainage (Jenkins and Sorensen 1980) with six locales shown on their map. However, one of these locales, based upon a specimen (ANSP 2027) collected by Edward D. Cope in 1869 and identified by Henry W. Fowler as *Notropis procne,* was reidentified by Wayne C. Starnes as *Notropis alborus*. This locality, Yadkin River (most likely Gobble Creek) is outlined with a red triangle in Figure 4
- 3. First Discovered and Earliest Records (Figure 4)
 - a. Uwharrie River at US 64 in Randolph County, collected by Tatum, et al. (1963), July 1960, n = 22
 - b. South Potts Creek at US 70 in Davidson County, collected by Tatum, et al. (1963) July 1960, n = 20
- 4. Closest Possible Source Population (s) from which Species may have Originated a. Dan River (Roanoke River drainage)
 - b. Deep River system (Cape Fear River drainage)
- 5. Current Distribution and Abundance (Figure 4)
 - a. Established (Shafland, et al. 2008)
 - b. Thirty-one collections between 1960 and 2016 with the number of specimens represented in each collection ranging from one to 131 (from a 600-ft. reach in Uwharrie River at SR 1406 in Randolph County, June 20, 2011)
 - c. A disjunct population in the upper Little River watershed has not been detected since 1999, thus this introduction has most likely failed
 - d. Found in Abbotts Creek and Rocky and Uwharrie River watersheds along with Yadkin and Pee Dee River tributaries (Grants and Hitchcock creeks and Little River)

- e. Unvouchered specimens from Black Run, Coddle, and Dutch Buffalo creeks in Cabarrus County, Grants Creek in Rowan County, and Hitchcock Creek in Richmond County
- f. Uncertainty concerning the native vs. nonnative distribution of this species in the Yadkin-Pee Dee River drainage in North Carolina was expressed by Fuller, et al. (1999). If native, Swallowtail Shiner would be more widely distributed in suitable habitats throughout the middle and lower portions of the drainage in North Carolina. In South Carolina, Swallowtail Shiner is found at only a few localities in the Yadkin-Pee Dee River drainage, including the Thompson and Lynches creeks watersheds (Rohde, et al. 2009).
- 6. Prediction of Future Distribution
 - a. Uncertain because it does not seem to have widely dispersed in the middle and lower regions of the drainage where dispersal is not hindered by dams and their reservoirs (e.g., Coolemee, Tom-a-Lex, Yadkin-Pee Chain of Lakes) or poor water quality
- 7. Additional Comment(s)
 - a. Age 1 and young-of-year Spottail Shiner, *Notropis hudsonius*, can easily be confused with pale colored Swallowtail Shiner as can Whitemouth Shiner

USGS Nonindigenous Aquatic Species_web pages pertaining to the Swallowtail Shiner:

- 1. Collection Info
- 2. Point Map
- 3. Fact Sheet
- 4. Animated Map



Figure 4. Distribution of the Swallowtail Shiner, Notropis procne, in the Yadkin-Pee Dee River drainage in North Carolina. Red symbols denote the first known occurrence; red bars denote major dams, red dashed circles denote unvouchered specimens, and red dashed triangle denotes specimen collected by E. D. Cope in 1869 re-identified by W. C. Starnes in 2007 as Whitemouth Shiner, Notropis alborus.

Comely Shiner, Notropis amoenus (Abbott)

- 1. Habitat
 - Variable, but usually found schooling in mid-water in medium to largesized creeks and rivers; current variable from slow to quite fast (Snelson and Gilbert 1980); known from Blewett Falls Reservoir (four records from 1999 from cove rotenone sampling)
- 2. Previous North Carolina Distributional Knowledge
 - a. No published records (e.g., Tatum, et al. (1963), Snelson 1968, or Menhinick (1974)) prior to Menhinick (1991)
- 3. First Discovered and Earliest Records (Figure 5)

- a. Six localities from Richmond, Montgomery, and Anson counties plotted in Menhinick (1991), but voucher material could be found only from one site -- Rocky Creek at SR 1543 in Montgomery County, collected by Bill Palmer and NCSM staff on August 01, 1973, n = 33. This record was mentioned in (Snelson and Gilbert, 1980), but was not shown on their map.
- 4. Closest Possible Source Population(s) from which Species may have Originated a. Cape Fear River drainage
- 5. Current Distribution and Abundance (Figure 5)
 - a. Established (Shafland, et al. 2008)
 - b. 48 collections between 1973 and 2016 with the number of specimens represented in each collection ranging from 1 to 88 (Little River at SR 1519 in Montgomery County, September 09, 1995)
 - c. A disjunct population in the upper Uwharrie River has not been detected since 1992, thus this introduction has most likely failed
 - d. Populations existing in the Rocky River and Little River watersheds and from several sites along the mainstem of the Pee Dee River downstream from Lake Tillery and Blewett Falls Reservoir
 - e. Uncertainty concerning the native versus nonnative distribution of this species in the Yadkin-Pee Dee River drainage in North Carolina was expressed by Fuller, et al. (1999), believing that its native range extended into the Pee Dee River drainage in South Carolina. However, in South Carolina, the Comely Shiner is known from only two localities just downstream of the NC-SC state line on the Pee Dee River, near Cheraw, Chesterfield County (Rohde, et al. 2009).
- 6. Prediction of Future Distribution
 - a. Throughout the Rocky River watershed where suitable habitat and conditions exist
 - b. Further dispersal upstream in the Pee Dee River is blocked by Blewett Falls Dam
- 7. Additional comment(s)
 - a. Sandbar Shiner, *Notropis scepticus*, can easily be confused with Comely Shiner and any possible Comely Shiners collected should be closely examined or preserved for verification, especially from the Uwharrie River watershed where there is only one record from 1992.

USGS Nonindigenous Aquatic Species_web pages pertaining to the Comely Shiner:

- 1. <u>Collection Info</u>
- 2. Point Map
- 3. Fact Sheet
- 4. Animated Map



Figure 5. Distribution of the Comely Shiner, Notropis amoenus, in the Yadkin-Pee Dee River drainage in North Carolina. Red symbol denotes the first known occurrence and red bars denote major dams.

Literature Cited and Suggested References

- Bailey, J. R. 1949. Yadkin River survey report. Fish Division. North Carolina Wildlife Resources Commission. Raleigh, NC. 19 pp.
- Bartone, S. A. 1972. Recent capture of *Phoxinus oreas* (Pisces: Cyprinidae) from the Yadkin-Pee Dee River drainage, North Carolina. Journal of the Elisha Mitchell Scientific Society. 88: 28-29.
- Blum, M. J., Neely, D. A., Harris, P. M., and R. L. Mayden. 2008. Molecular systematics of the cyprinid genus *Campostoma* (Actinopterygii: Cypriniformes): disassociation between morphological and mitochondrial differentiation. Copeia. 2008 (2): 360-369.
- Bonner, W. R. 1983a. Survey and classification of state-managed trout streams. District Seven. Mountain Fisheries Investigations. Federal Aid in Fish Restoration Project F24-S. North Carolina Wildlife Resources Commission. Raleigh, NC. 110 pp.

- Bonner, W. R. 1983b. Survey and classification of state-managed trout streams.
 District Eight. Mountain Fisheries Investigations. Federal Aid in Fish Restoration
 Project F24-S. North Carolina Wildlife Resources Commission. Raleigh, NC.
 150 pp.
- Burr, B. M. 1980. *Campostoma anomalum* (Rafinesque), Stoneroller. p 143. Lee, D. S., Gilbert, C. R., Hocutt, C. H., Jenkins, R. E., McAllister, D. E., and J. R. Stauffer, Jr. eds. Atlas of North American freshwater fishes. North Carolina State Museum Natural History. Raleigh, NC. *i-x* + 854 pp.
- Cope, E. D. 1870. A partial synopsis of the fishes of the fresh waters of North Carolina. Proceedings of the American Philosophical Society. 11: 448-495.
- Dimmick, W. W., Fiorino, K. L. and B. M. Burr. 1996. Reevaluation of the *Lythrurus ardens* (Cypriniformes: Cyprinidae) complex with recognition of three evolutionary species. Copeia. 1996 (4): 813-823.
- Fowler, H. W. 1945. A study of the fishes of the southern Piedmont and Coastal Plain. Academy of Natural Sciences of Philadelphia. Monograph No. 7. 408 pp + 313 figures.
- Fuller, P. L., Nico, L. G., and J. D. Williams. 1999. Nonindigenous fishes introduced into inland waters of the United States. American Fisheries Society, Special Publication 27. Bethesda, MD. 613 pp.
- Hocutt, C. H., Jenkins, R. E., and J. R. Stauffer, Jr. 1986. Zoogeography of the fishes of the central Appalachians and central Atlantic Coastal Plain. Chapter 6. pp 161-211. Hocutt, C. H. and E. O. Wiley (eds). The zoogeography of North American freshwater fishes. Wiley and Sons, New York, NY.
- Hubbs, C. L. and E. C. Raney. 1947. *Notropis alborus*, a new cyprinid fish from North Carolina and Virginia. Occasional Papers of the Museum of Zoology. University of Michigan, Ann Arbor, MI. 498. 19 pages
- Jenkins, R. E. and N. M. Burkhead. 1994. Freshwater fishes of Virginia. American Fisheries Society. Bethesda, MD. 1080 pp.
- Jenkins, R. E. and D. S. Sorensen. 1980. Notropis procne (Cope), Swallowtail Shiner. p 298. Lee, D. S., Gilbert, C. R., Hocutt, C. H., Jenkins, R. E., McAllister, D. E., and J. R. Stauffer, Jr. eds. Atlas of North American freshwater fishes. North Carolina State Museum Natural History. Raleigh, NC. *i-x* + 854 pp.
- Jordan, D. S. 1889. Report of explorations made during the summer and autumn of 1888, in the Alleghany region of Virginia, North Carolina, and Tennessee, and in western Indiana, with an account of the fishes found in each of the river basins of those regions. U.S. Fish Commission Bulletin. 9: 97-173.
- Menhinick, E. F. 1991. The freshwater fishes of North Carolina. North Carolina Wildlife Resources Commission. Raleigh, NC. 227 pp.
- Menhinick, E. F. 1996. Studies of streams of the Uwharrie National Forest. Parts 1 and 2. Grant No. 11-544 to E. F. Menhinick, Department of Biology, University of North Carolina at Charlotte. U.S. Department of Agriculture, U. S. Forest Service. Uwharrie National Forest, Troy, NC. 172 pp.
- Menhinick, E. F., Burton, T. M., and J. R. Bailey. 1974. An annotated checklist of the freshwater fishes of North Carolina. Journal Elisha Mitchell Society. 90: 24-50.

- Mickey, J. H., Jr. 1981. Survey and evaluation of selected Smallmouth Bass and marginal Smallmouth Bass streams located in District Seven, North Carolina. Job 1. Field sampling. Job 2. Final report. Federal Aid in Fish Restoration Project F-24. North Carolina Wildlife Resources Commission. Raleigh, NC. 69 unnumbered pages.
- Shafland, P. L., Gestring, K. B., and M. S. Stanford et al. 2008. Categorizing introduced fishes collected from public waters. Southeastern naturalist. 7: 627-636.
- Smith, H. M. 1907. The fishes of North Carolina. Vol. II. North Carolina Geological Survey. Raleigh, NC. 453 pp.
- Snelson, F. F., Jr. 1968. Systematics of the cyprinid fish *Notropis amoenus*, with comments on the subgenus *Notropis*. Copeia. 1968 (4): 776-802.
- Snelson, F. F., Jr. 1980. Notropis ardens (Cope), Rosefin Shiner. p 228. Lee, D. S., Gilbert, C. R., Hocutt, C. H., Jenkins, R. E., McAllister, D. E., and J. R. Stauffer, Jr. eds. Atlas of North American freshwater fishes. North Carolina State Museum Natural History. Raleigh, NC. *i-x* + 854 pp.
- Snelson, F. F., Jr. 1990. Redescription, geographic variation, and subspecies of the minnow *Notropis ardens* (Pisces: Cyprinidae). Copeia. 1990 (4): 966-984.
- Snelson, F. F., Jr. and C. R. Gilbert. 1980. Notropis amoenus (Abbott), Comely Shiner.
 p 225. Lee, D. S., Gilbert, C. R., Hocutt, C. H., Jenkins, R. E., McAllister, D. E., and J. R. Stauffer, Jr. eds. Atlas of North American freshwater fishes. North Carolina State Museum Natural History. Raleigh, NC. *i-x* + 854 pp.
- Starnes, W. C. and L. B. Starnes. 1980. *Phoxinus oreas* (Cope), Mountain Redbelly Dace. p 339. Lee, D. S., Gilbert, C. R., Hocutt, C. H., Jenkins, R. E., McAllister, D. E., and J. R. Stauffer, Jr. eds. Atlas of North American freshwater fishes. North Carolina State Museum Natural History. Raleigh, NC. *i-x* + 854 pp.
- Tatum, B. L., Carnes, W. C., and F. Richardson. 1963. Survey and classification of the Yadkin River and tributaries, North Carolina. Final report. Federal Aid in Fish Restoration. Job I-B, Project F-14-R. North Carolina Wildlife Resources Commission. Raleigh, NC. (Appendix A and Appendix B). 144 pp.
- Tracy, B. H. 2007. The importance of voucher material. Newsletter of the North Carolina Chapter of the American Fisheries Society. March 2007. pages 6-7.
- Tracy, B. H. 2008. What are Piedmont and Coastal Plain species doing in the French Broad River basin? Newsletter of the North Carolina Chapter of the American Fisheries Society. March 2008. pages 5-9.
- Tracy, B. H. 2009. Bluehead Chub, *Nocomis leptocephalus* (Girard 1856), first species of freshwater fish scientifically described from North Carolina. Newsletter of the North Carolina Chapter of the American Fisheries Society. December 2009. pages 6-10.
- Tracy, B. H., Jenkins, R. E., and W. C. Starnes. 2013. History of fish investigations in the Yadkin-Pee Dee River drainage of North Carolina and Virginia with an analysis of nonindigenous species and invasion dynamics of three species of suckers (Catostomidae). Journal of the North Carolina Academy of Science. 129: 82-106.

Tracy, B. H. and P. Schneider. 2009. The Oriental Weatherfish in North Carolina. Newsletter of the North Carolina Chapter of the American Fisheries Society. December 2009. pages 5-6.

Submitted by Bryn H. Tracy, NC Division of Water Resources (retired)

Snorkeling Equipment a Big Hit at New River State Park - Thank you NCAFS!!!!

On behalf of New River State Park and NCWRC, we would like to thank NCAFS for their generous \$800 donation towards the purchase of snorkel equipment for the 2017 season. The New River State Park is tasked with protecting a highly diverse aquatic community and providing outreach to visitors about the river and its many species. The provision of snorkel equipment, coupled with warm summertime temperatures and the ease of river access at New River State Park, has and will continue to allow visitors to experience firsthand the unique organisms below the water surface.



One of the many uses of the snorkeling gear donated by NCAFS was the 2017 hellbender survey. This survey relies heavily on volunteers, who often do not have their own equipment.



The snorkeling equipment was utilized for a variety of programs and to provide visitors a chance to explore beneath the surface. While this was the first summer that the gear was used, it was put to good use! The equipment was used for Underwater Tours and Junior Ranger Programs, as well as for the annual Hellbender Survey at New River State Park. In addition, the equipment was checked out on several occasions by Park visitors for general underwater exploration. All told, the equipment was used for more than 30 programs, and by more than 300 individuals. This was all during the summer of 2017. Thank you again for the donation, and we promise to continue putting the materials to good use!

Submitted by Doug Blatny, New River State Park, and Kevin Hining, NCWRC

Good Work! – Recent Publications by NCAFS Members

The "Good Work!" newsletter section is designed to promote and share the great work that you do! The goal is to provide a way for members to share recent publications that they are involved in; including peer-reviewed articles, agency gray literature, dissertations, and theses.

- Archambault J. M., S. T. Prochazka, W. G. Cope, D. Shea, and P. R. Lazaro. 2017. Polycyclic aromatic hydrocarbons in surface waters, sediments, and unionid mussels: relation to road crossings and implications for chronic mussel exposure. <u>Hydrobiologia</u>. DOI: 10.1007/s10750-017-3101-y
- Archambault J. M., C. M. Bergeron, W. G. Cope, P. R. Lazaro, J. A. Leonard, and D. Shea. 2017. Assessing toxicity of contaminants in riverine suspended sediments to freshwater mussels. <u>Environmental Toxicology and Chemistry 36(2): 395-407</u>.
- Asch, R. G., W. W. L. Cheung, and G. Reygondeau. 2017. Future marine ecosystem drivers, biodiversity, and fisheries maximum catch potential in Pacific Island Nations under climate change. Marine Policy <u>doi:10.1016/j.marpol.2017.08015</u>
- Checkley, D. M., R. G. Asch, and R. R. Rykaczewski. 2017. Climate, anchovy, and sardine. Annual Review in Marine Science 9: 469-493. <u>doi:10.1146/annurev-marine-122414-033819</u>.
- Lynch, A. J., R. G. Asch, W. W. L. Cheung, C. P. Paukert, R. R. Rykaczewski, and W. H. H. Sauer. 2017. Editorial. Impacts of climate change on marine and inland fishes and fisheries: looking back and moving forward. Reviews in Fish Biology and Fisheries 27(2): 293-296. doi:10.1007/s11160-017-9483-0.
- Singh, G. G., A. M. Cisneros-Montemayor, W. Swartz, W. Cheung, J. A. Guy, T. A. Kenny, C. J. McOwen, R. G. Asch, J. L. Geffert, C. C. C. Wabnitz, R. Sumaila, Q. Hanich, and Y. Ota. 2017. A rapid assessment of co-benefits and trade-offs among sustainable development goals. Marine Policy <u>doi:10.1016/j.marpol.2017.05.030</u>.
- Stock, C. A., J.G. John, R. R. Rykaczewski, R. G. Asch, W. W. L., Cheung, J. P. Dunne, K. D. Friedland, V. W. Y. Lam, J. L. Sarmiento, and R. A. Watson. 2017. Reconciling fisheries catch and ocean productivity. Proceedings of the National Academy of Sciences 114(8): E1441-E1449. doi:10.1073/pnas.1610238114.
- Tommasi, D., C. A. Stock, A. J. Hobday, R. Methot, I. C. Kaplan, P. J. Eveson, K. Holsman, T. J. Miller, S. Gaichas, M. Gehlen, A. Pershing, G. A. Vecchi, R. Msadek, T. Delworth, C. M. Eakin, M. A. Haltuch, R. Séférian, C. M. Spillman, J. R. Hartog, S. Siedlecki, J. F. Samhouri, B. Muhling, R. G. Asch, M. L. Pinsky, V.

S. Saba, S. B. Kapnick, C. F. Gaitan, R. R. Rykaczewski, M. A. Alexander, Y. Xue, K. V. Pegion, P. Lynch, M. R. Payne, T. Kristiansen, P. Lehodey, and F. E. Werner. 2017. Managing living marine resources in a dynamic environment: the role of seasonal to decadal climate forecasts. Progress in Oceanography 152: 15-49. <u>doi:10.1016/j.pocean.2016.12.011</u>.

Where are They Now? Keeping up with NC State University Fisheries Students

Brendan Runde

- Graduated in Aug 2017 (MS)
- Thesis: "Estimating and mitigating barotrauma in reef fishes"
- He is remaining at NC State University to pursue a PhD in Jeff Buckel's laboratory.

Tomas Ivasauskas

- Graduated in May 2017 (PhD)

- Dissertation: "Early life history of suckers (Catostomidae) in a southern Appalachian river system"

- He is currently working as a natural resources biologist at Maryland DNR (Monitoring and Non-tidal Assess Division).

<u>Ani Popp</u>

- Graduated in May 2017 (MS)
- Thesis: "Advancing the tools of freshwater mussel conservation: Determining the relative chemical sensitivity of *in vitro* and *in vivo* propagated juvenile mussels"
 She is now working for the NCWRC in the Aquatic Wildlife Diversity program's Central Region.

Gus Engman

- Graduated in May 2017 (PhD)

- Dissertation: "Amphidromous fish recruitment and its ecological role in Caribbean freshwater-marine ecotones"

- He is now a post-doctoral scholar at NC State University and is continuing to study the inland fishes of Puerto Rico.

Tiffany Penland

- Graduated in May 2017 (MS)

- Thesis: "Food web contaminant dynamics of a large Atlantic regulated river: implications for common and imperiled species"

- She is currently writing manuscripts for publication at NC State University and was recently hired by the Tennessee Wildlife Resources Agency as Wildlife Manager 1 (streams and river biologist) in the Fisheries Division of Region 1 (western TN).

Mary Cove (Henson)

- Graduated in May 2017 (MS)

- Thesis: "Assessing the influence of *Tilapia* on sport species in North Carolina reservoirs"

- She is now working as a partner in a hydroponic leafy greens company that's just getting off the ground. Visit their Facebook page:

https://www.facebook.com/BlueThumbGreenhouses/

Casey Grieshaber

- Graduated in December 2016 (MS)

Thesis: "Relation of fish intersex and survival to contaminants in a riverine system"
She is currently working as a post-masters research associate for Pacific Northwest National Lab in Richland, WA. Most of her time is spent working on projects tracking juvenile salmon through dams on the Columbia River.

Submitted by Tiffany Penland, NC State University

Call to Action!

If you want to contribute, have a story idea or would like us to include something in next quarter's newsletter, e-mail Kevin Hining <u>kevin.hining@ncwildlife.org</u> or give him a call at 336-213-9692. Also, if you want to become more involved with one of the many great NCAFS committees then please check the link below for information about each one, contacts, etc., <u>https://nc.fisheries.org/who-we-are/committees/</u>

Valuable Links

The <u>American Fisheries Society Home</u> <u>Page</u> offers a wealth of links to assist you in your fishy endeavors. Information on ordering



AFS books, annual meetings, chapter links and joining the AFS can be found there.

This and <u>archived NCAFS newsletters</u>, along with links, <u>chapter information</u>, and <u>upcoming meetings</u>, can be found on the <u>NCAFS website</u>.