

SUMMARY OF NANFA CONVENTION SPEAKERS AND PRESENTATIONS, JUNE 9, 2018

Jenny Kruckenberg

Inver Grove Heights, Minnesota

To begin the day, Johnathan Davis, co-host of the 2018 NANFA Convention, introduced Dr. Drew Van Horn, who welcomed us to Young Harris College. Dr. Van Horn talked about how the college, established in 1886, had been a four-year college, but was now offering Masters degrees as well. Its students generally come from within a 150-mile radius. As freshmen, the students take a seven-mile hike down a local mountain, and as seniors they scale the seven miles up the same mountain and try to sight a Black Bear. One of the most famous alumni is country singer Trisha Yearwood.

Co-host Michael Wolfe then stepped up to the podium and welcomed attendees to this year's NANFA convention and introduced Dr. Johnathan Davis of Young Harris College.

“CAN WE CONSERVE FISH THROUGH OUR OWN DIETARY CHOICES?”

The basic premise was that we are all making food choices on a daily basis. How could making some changes in our diet change land use and perceptions about fish diversity and native fishes?

Johnathan spoke about the resources used in choosing a “green” lifestyle, perhaps being a bit more of a vegetarian versus a meat eater. He talked about land use and correlation between raising livestock and the grains needed to feed the animals, feedlots and increased methane, a greenhouse

(a greenhouse gas released into our atmosphere), sediments, erosion, and fertilizers that enter local streams because of the crops raised. Also, the hormones given to the livestock, which have been contributing to hermaphroditic fishes and *E. coli* bacteria outbreaks due to poor water quality from excess waste. Scientists agree that climate change factors are putting stressors on fishes causing populations to change, decreasing species richness and diversity.

Johnathan talked a bit about eating organic, becoming a vegan versus a vegetarian and how it didn't really matter if it was raising a cow or raising a tomato, both could have detrimental effects on the land/water. He advocates knowing where your food comes from and that you consider having a “meatless Monday.” The question is: “how do we keep small farms going versus selling them off to large-scale corporations?” His answer was to buy local. Make sure you go see what practices the farmers are using. He said that being organic involves not using fertilizers, but may very well involve using pesticides. Finally, he talked about land conservancy and allocating money for farmland preservation and options for “rent to buy” farmland.

“XENISMA FISHES OF ALABAMA”

Next up was Dr. Joe Scanlan, retired ophthalmologist and a member of the American Killifish Association since 1974. Joe began by defining *Xenisma* as a sub-genus of the genus *Fundulus*, commonly called “studfish.”

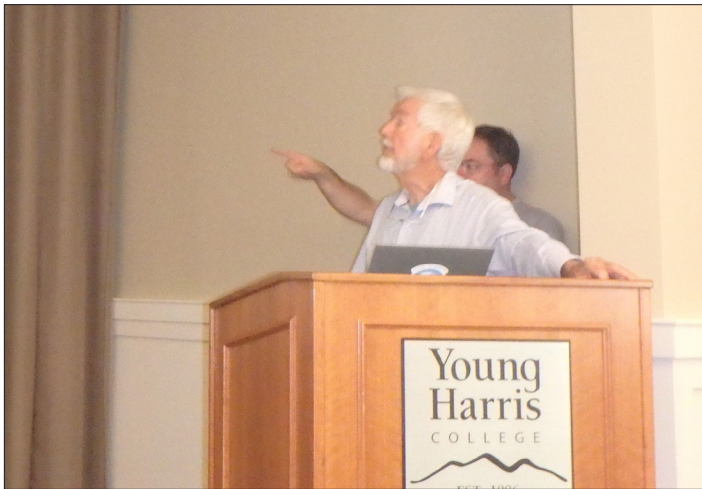


The attentive audience.

Photos by the author unless otherwise indicated.



Co-host Johnathan Davis.



Joe Scanlan.

Historically, there were four *Xenisma* species in Alabama. *Fundulus albolineatus* was lost in Huntsville when the city channelized its stream. *Fundulus bifax* (Stippled Studfish) is found in the Tallapoosa River system and is highly threatened. *Fundulus stellifer* (Southern Studfish) is found in the Coosa and Alabama river systems, and *Fundulus catenatus* (Northern Studfish) is found in the Tennessee system. Most *F. bifax* are found in streams flowing into Hillabee Creek, which flows into Lake Martin, Alabama's first Treasure Lake, so declared because of its good water quality. Many years ago, Dave Koran told Dr. Joe that *F. bifax* seemed to be disappearing and wondered if Alabama's creeks were somehow being degraded. Dr. Joe called *bifax* the "canary of the Tallapoosa."

Joe also talked about catching these fishes. As a group, they are very elusive. They are extremely fast and if trapped will dive into the sandy bottom or seek out a rock, log, or leaf pile to avoid capture. Running rapidly while pulling the seine in shallow water gives the best result if the area is free of obstacles. These fishes are also great leapers and will jump out of the net or aquarium when captured. They are very nervous fishes and a not a great choice for the aquarium.

These fishes have a unique spawning behavior: both sexes grab and spit out mouthfuls of fine gravel substrate in order to clean it. This is observed for hours before spawning. Finally, the female plunges head first into the substrate and pulls out a mouthful, creating a pit. She then places her ovipositor over the pit. Seeing this, the male rushes to her, rolls her on her side, and with violent vibrations pushes her down over the pit, gravel flying as they spawn.

"MINNOW TUBERCLES: AN OVERVIEW AND A CLOSER LOOK"

Amanda Pinion, a graduate student at Texas A&M University, talked about what tubercles are made from: keratin, which forms a cap over the dermis. She showed close-up pictures of Bullhead Minnow (*Pimephales vigilax*), Red Shiner (*Cyprin-*

la lutrensis), and Topeka Shiner (*Notropis topeka*). Tubercles can form along the scale margins or along fin rays. Even in ancient Chinese literature, folks noticed tubercles on Koi. Tubercles are thought to be used for combat and to show sexual maturity on males. She said the tubercles on the heads of Shoal Chubs (*Macrhybopsis hyostoma*) show no sexual dimorphism, but they do on the fins: the fins of both males and females possess taste buds, but males also have conical tubercles on the pectoral fins.

Amanda also talked about differences between unculiferous and conical tubercles, and whether tubercles serve any hydrodynamic purposes. She's narrowing in on different minnow species using SEM (scanning electron microscopy).

"SAVING THE JEWEL LAKE SACRAMENTO PERCH"

Joshua Porter spoke about the Sacramento Perch (*Archoplates interruptus*), the only sunfish native west of the Rockies. Seventeen of the 28 known locations are in California, mainly in the East Bay Regional Park District. The Jewel Lake (a man-made lake in the Bay Area) population of Sacramento Perch is genetically diverse. Threats to these fish include Green Sunfish (*Lepomis cyanellus*), Bass (*Micropterus* spp.), otters, mergansers, drought, and sedimentation.

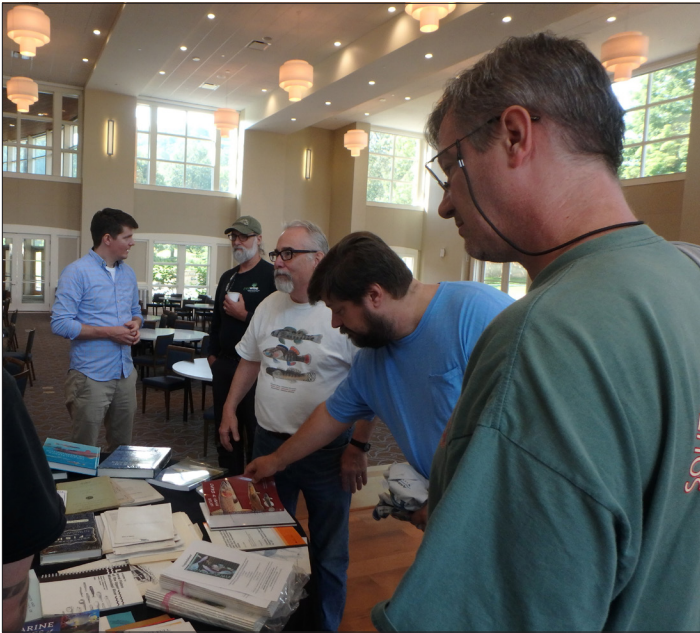
When drought began to impact Jewel Lake in 2013, the East Bay Regional Park District staff teamed up with other agencies to take action. They rescued 175 Sacramento Perch from Jewel Lake and took them to a donor pond within the Gray Lake Wildlife Refuge. Chris Miller was put in charge of housing future brood stock, feeding, and breeding. Some private landowners have also provided ponds to house young Sacramento Perch. The California Department of Fish and Wildlife is assisting with monitoring.

"CRAWDADS, MUDBUGS, AND CRAWL- DE-BOTTOMS: AN INTRODUCTION TO GEORGIA CRAYFISHES"

Dr. Chris Skelton (and Dr. Brett Albanese) talked about crayfishes. Crayfishes are divided into three families: Astacidae and Cambaridae are in the northern hemisphere and Parastacidae are in the southern hemisphere. There are 669 species (692 including recognized subspecies) of crayfishes worldwide. They are still searching for more, especially in places like Irian Jaya (Papua) New Guinea. The largest, called the Tasmanian Lobster (*Astacopsis gouldi*), weighs 10 lbs!

North America has approximately 440 species in 14 genera. Southern states are the "epicenter" of American crayfish diversity, with about 350 species (about half the world's crayfishes). Georgia has 71 species; Tennessee and Alabama each have 90–100.

Next, the talk explored how crayfishes live. Not all live in streams. Some live on land but burrow down into the earth



Scott Smith, Chip Hildreth, Bob Muller, Mike Berg, and Phil Kukulski examining the auction books.



Issac Szabo and Josh Porter examining the art work.



Johnathan Davis and others looking over some of the auction books.



Chris Skelton.

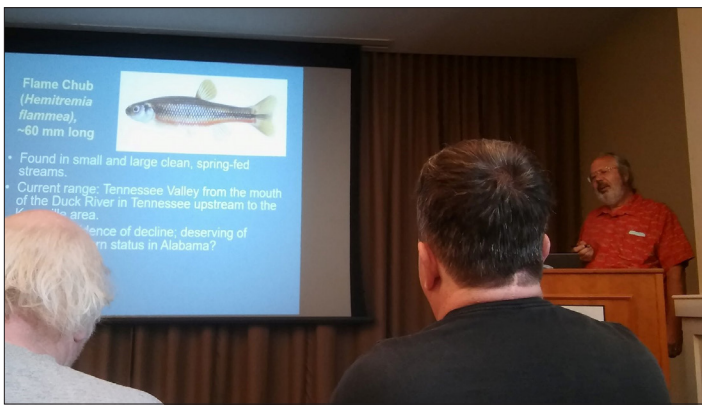
until they reach the water table, so those who study them search for their chimneys or burrow openings. Some crayfishes live in caves and, like cavefishes, are white in color and lack functioning eyes. Some crayfishes only have a single arm and no pinchers. Crayfish anatomy is also interesting. The males' intromittent organ is a modified swimmeret. The female has an annulus ventralis, which stores sperm, and oviducts. Prior to the release of eggs, the female develops glair or cement glands along her abdomen and tail fan. When the eggs are released, they attach to her underbody. The female is then said to be "in berry."

Threats to native crayfishes include restricted ranges and introductions of non-indigenous species. For example, the Red Swamp Crayfish (*Procambarus clarkii*), is considered a "food" crayfish and is served in many restaurants. They are native to some southern states and Mexico, but were released elsewhere and are now common all over, even in China. The Marble Crayfish (*Procambarus virginalis*) is thought to stem from a single female who cloned herself and is now common in the pet trade and is showing up everywhere.

"ALABAMA SPRINGS, LAND USE, AND VULNERABLE FISHES"

Dr. Bruce Stallsmith (University of Alabama, Huntsville) began by explaining that the spring systems of northern Alabama are unique. Many fish species are endemic to or isolated in a specific spring. Some springs have been turned into bass fishing ponds or, in Tennessee, used in whiskey production.

Bruce talked about a 2017 bioblitz at the Walls of Jericho Spring, Hurricane Creek (Tennessee), a tributary of the Paint Rock River. They found Flame Chubs (*Hemitremia flammea*)—related to Creek Chub (*Semotilus atromaculatus*) but smaller—which had not been found in surveys for years and was thought to be extirpated. They also found Flame Chubs and Snubnose Darters (*Etheostoma simoterum*) in Acuff Springs, near Huntsville, Alabama.



Bruce Stallsmith (photo by Kara Million).

As Joe Scanlon mentioned in his talk, *Fundulus albolineatus* is extinct. They were last seen in Big Spring Park, Madison County, Alabama, from the spring to the canal. The Barrens Topminnow (*F. julisia*) is in a similar situation: though not yet extinct, it appears to be hanging on only in Bethel Spring, near Gurley, Alabama, where the water was considered to be of high quality until Giardia was found. They found several species: Blacknose Dace (*Rhinichthys atratulus*), Flame Chubs, Blackside (*Percina maculatus*), Snubnose, and Blackfin (*E. nigripinne*) darters.

“FISH AND AQUATIC CONSERVATION PROGRAM: WORKING WITH AT-RISK AND AQUATIC INVASIVE SPECIES”

Next up was Cindy Williams with the US Fish and Wildlife Service (USFWS). Georgia is in USFWS Region 4, the Southeast (my home in Minnesota is in Region 3). At-Risk species are those which are not yet listed as threatened or endangered, but which are potential candidates for listing. From 2016–2018, the number of At-Risk Species in Region 4 fell from 375 to 343. The number of species includes crayfishes and other species, not just fishes.

She talked about how the USFWS works with the Southeast Aquatic Resource Partnership to improve connectivity of streams and remove old dams. They have identified “priority” areas. Florida has a program called “Voting with Dollars” where a percentage of the sales price of a home goes directly to fighting invasive species.

Many people are concerned about invasive “Asian” carp. The USFWS wants to control them and there are efforts to work with commercial fishermen to harvest them. Another push is to control Didymo, so called “rock snot”, by educating anglers about the potential to move it from one body of water to another via their waders. Habitattitude.net encourages pet owners, restaurant owners, and schoolteachers to re-home or surrender unwanted pets rather than releasing them into the wild.

“AQUATIC WILDLIFE VIEWING—GETTING THE PUBLIC INVOLVED”

Next, we heard from Jim Herrig, who is retired from the US Department of Agriculture (USDA) Forest Service. He started by giving a brief history of how after WWII a Federal Fisheries Agency was created. The purpose was to grant hunting and fishing licenses to persons who wanted to take deer, turkey, and game fish. With the Endangered Species Act, non-game fishes (and other species) rose to a higher “status,” but there was no specific public funding. Still, people who were buying licenses were supporting non-game research.

Jim talked about how fish surveys used to be conducted. They commonly used explosives, such as M-80s, to collect and sample fishes. He said they used a detonator cord and jokingly called the result “the biggest fish fry.” Poisons were also used. Sodium cyanide tablets were used as late as 1990, followed by rotenone and antimycin. At some point, they decided they needed better methods of gathering data. The rod and reel worked great for some fishes, but not for smaller species. Seining worked well, but missed some of the benthic fishes, such as darters. Electrofishing—both with a backpack shocker or boat—worked. They also realized that snorkeling could be employed, and, especially when looking for endangered species, was the method that harassed the fish least.

Jim said people are unaware of what is below the surface, and that seeing a Conesauga Logperch (*Percina jenkinsi*) or a Blue Shiner (*Cyprinella caerulea*) every five years was something to behold. He mentioned Isaac Szabo’s photos and Casper Cox’s photo of a lamprey on a hog sucker as bringing this underwater life into view.

He believes snorkeling is especially important for targeting minorities and underprivileged kids, and for teaching youth the important ecological lesson of creating a buffer zone near the edge of a stream. He said the focus doesn’t always have to solely be on the fishes, but it is important to get people into the water and start programs where they pick up a rock from the water and see what’s attached to it.

“THE SOUTHEAST AQUATIC CONSERVATION STRATEGY”

Duncan Elkins from the University of Georgia, with co-authors from the Tennessee Aquarium Conservation Institute, started his talk by showing a fish diversity map, which showed how this area is not just a regional but a global hotspot of fish diversity. Pull up Georgia on the Nature Serve webpage and you will see its richness in fishes, mussels, crayfishes, and other species.

The goals are to identify areas of high biodiversity then use the data to prioritize areas and preserve habitat. The project’s unit of analysis is watersheds, described by USGS 8-digit Hydrologic Unit Codes (HUCs), which average about 700 square

miles in area. Observation of a species anywhere within a watershed causes the entire watershed to be scored positive for that species, a compromise he acknowledged was necessary to smooth out the uneven sampling of streams in the region.

The project used data from a variety of sources including MARIS (now defunct), GBIF, and Fishnet 2. He used a case to demonstrate the errors that creep into datasets: the Sickle Darter (*Percina williamsi*), which is closely related to *P. macrocephala*, appears in the upper Tennessee but also central Asia due to confusions of east and west longitude. They want to keep this one on their radar. He also talked about how the five so-called president darters (Obama, Clinton, Roosevelt, Carter, and Gore) were split out from one species, the Speckled Darter (*Etheostoma stigmaeum*), but museum records weren't necessarily corrected to reflect this change.

Back to the score system: they are looking at species richness, endemism, and imperilment. Each species receives a score in each of these areas and the scores are added to generate a score for the watershed. The "hot" areas include the Middle Tennessee (lower Duck River), Cumberland (South Fork Caney), Barren, Green, Conasauga, Etowah, Middle Coosa, Cahaba, Clinch, Powell, Pickwick, and Wheeler watersheds, and, of course, the areas draining into the main stem of the Tennessee River (as it is a karst system, many fishes only occur there, which really spikes its score).

The scores for richness, endemism, and imperilment are combined to produce numbers for certain bodies of water where convention field trips were scheduled. The Etowah River is the highest, the Coosawattee is ranked 23rd, and the upper Little Tennessee is lowest. The threat assessment includes livestock, row crops, impoundments/barriers, and urbanization. Go to www.southeastfreshwater.org for more information.

"NATIVE BASS DIVERSITY IN GEORGIA"

Dr. Bud Freeman started by explaining there is fantastic black bass (*Micropterus* spp.) diversity in this state, noting that temperate freshwater fishes of all kinds are rich in this area of Georgia. He asked "what are they, and how many are there?" He then listed them: Cahaba Bass (*M. cahabae*), Shoal Bass (*M. cataractae*), Chattahoochee Bass (*M. chattahoochee*), Redeye Bass, also called Coosa Bass (*M. coosae*), Smallmouth Bass (*M. dolomieu*), Alabama Bass (*M. henrici*), Suwannee Bass (*M. notius*), Spotted Bass (*M. punctulatus*), Largemouth Bass (*M. salmoides*), Florida Bass (*M. s. floridanus*), Tallapoosa Bass (*M. tallapoosae*), Guadalupe Bass (*M. treculii*), Warrior Bass (*M. warriorensis*), and three undescribed species: Altamaha, Bartrams, and Choctaw. He said that most bass will hybridize.

He cited a paper by Hubbs and Bailey from 1940 that recommended not stocking or introducing any bass that were not endemic/local/native. The Redeye, Alabama, Spotted,

and Largemouth Bass have all been stocked outside their native range.

"STATUS AND TRENDS OF SMALL FISHES IN THE UPPER COOSA RIVER SYSTEM IN GEORGIA"

Dr. Mary Freeman from the University of Georgia called the Coosa River, which runs from Mississippi to Alabama to Georgia, "America's Amazon."

They don't use M-80s to survey, only seines. They find Coosa Chub (*Macrhybopsis etnieri*), Coosa Madtom (*Noturus* sp. cf. *munitus*), Tricolor Shiner (*Cyprinella trichroistia*), and Amber Darter (*Percina antesella*), but in the Conasauga, all four are disappearing. They visit sites multiple times to ensure the accuracy of sampling and the sampling methods. They can't predict the probability of seeing these species next year. Mary talked about drought and declining populations, nutrient loading from algae, and if these species are shifting upstream because of climate change.

"PROTECTING THE NATIVE FISHES OF JOHNS CREEK, GEORGIA"

Kathy Reed represented Keep North Fulton Beautiful. She received NANFA's Gerald C. Corcoran Education Grant in 2013. Kathy explained how she converted a 240-gallon aquarium that was set up with non-native turtles at the Autrey Mill Nature Preserve by replacing the turtles with native fishes from Johns Creek, that runs through Johns Creek, a suburb of Atlanta. This is in the Chattahoochee drainage. With the great assistance and expertise of NANFA members such as Michael Wolfe, they set it up with top-feeders such as Southern Studfish (*Fundulus stellifer*) and bottom dwellers, such as Black-banded Darter (*Percina nigrofasciata*) and Tadpole Madtom (*Noturus gyrinus*). In the middle of the water column are Yellowfin Shiner (*Notropis lutipinnis*), Stoneroller (*Campestrum*



Mary Freeman.

sp.), and Bluehead Chub (*Nocomis leptoccephalus*). A Fluval filter provides plenty of flow to the tank which is 8 ft by 2 ft by 2 ft. A chiller is not needed.

Kathy's presentation dovetailed nicely into the next talk, which was given by Mary Winder. Mary is Program Director (just promoted to Executive Director) at the Autrey Mill Nature Preserve, and she took over some of the care of the tank Kathy and the others set up.

"EDUCATING WITH NATIVE FISH AMBASSADORS AND THE SUCCESS OF PARTNERSHIPS"

Mary Winder has a background in education, especially for those with special needs and art. She commented how the NANFA mission statement is very similar to the Autrey Mill mission statement. In the 1970s, the area was identified as unique, and in the 1980s, they deemed it worthy of protection from development. Subsequent governance called for volunteers, including volunteers to do aquarium maintenance.

There are many ways to involve visitors to the Preserve. Passive interpretation involves signs such as one for the Yellowfin Shiner, which gives a picture and description both on the tank in the Visitor Center, also near Johns Creek, Georgia. Then during active interpretation, they do something called Wonders of the Wetland (WOW). During Project WET, children take on the roles of parts of the ecosystem. Mary asked for a couple volunteers from the NANFA audience to help with a programing activity. The three took on the shape of a fish with an "angry" face. Tom Watson was part of this and the fish turned out to be a madtom catfish. They also play an "I spy" game, and do Gyo-taku, a Japanese method of creating fish prints that was originally done to document the lengths of fish.

There are 15–20 species of fishes in Johns Creek and Sals Creek. Watching the creeks has "spawned" activities such as Adopt a Stream where people do chemical monitoring and look for indicator species, including different caddisfly larvae.

Michael Wolfe spoke briefly on the pitfalls of having an aquarium in a public place, chiefly that someone has to maintain it. He credited Mary as key to making this work and thanked her (and the other volunteers) who help feed the fish, do water changes, check lighting, etc.

"GEORGIA'S FRESHWATER MUSSEL DIVERSITY"

Jason Wisniewski works for the Georgia Department of Natural Resources. He had originally aspired to be a trout biologist, then later a reservoir biologist. He now despises both trout and reservoirs, he said with a smile, as he has become a mussel guy.

He said that about 74% of mussels in North America are unionoid bivalves and use fishes as hosts for their glochidia. The species count: Canada 53, Mexico 77, and the USA 298.

Georgia has an 182 species, an overwhelming number, especially compared to the western part of our nation, which



Autrey Mill Nature Preserve Corcoran Grant aquarium.

doesn't have a lot. Minnesota has 46. There are 110 species alone in the Cumberland drainage in Kentucky and Tennessee. In the Mobile basin in Georgia, there are 72 species, 32 of them endemic. Georgia holds 16% of the world's unionoid diversity.

Now Jason went into a history lesson, talking about how Episcopal ministers, such as Stephen Elliot, went professing the gospel up and down the railroad lines that often ran alongside the river and would collect mussel shells. Jason talked about a "charismatic mussel" called the Altamaha Spiny Mussel (endangered) (*Elliptio spinosa*). A trivia question: How does the spiny mussel grow its spine? It grows from the inside out, like the lava that spews out from the hollow tube inside a volcano.

"OUTCOME SHIFTS IN A CYPRINID NEST ASSOCIATION"

Sam Silknetter, a graduate student from Clemson University in South Carolina, began by outlining nest association, a reproductive interaction between nest-building minnows and other species who share the nest. He asked who benefits from this interaction and why do these relationships occur? He started by citing a local occurrence of the Bluehead Chub, which is the host in the interaction and also a keystone species, and the obligate nest associate, Yellowfin Shiner. The benefits to this nest association for the shiner include parental care and the provision of spawning substrate (aeration); chubs apparently benefit from brood dilution. That is, if the Bluehead Chub's eggs were the only ones on the nest and a predator ate some of them, then 100% of the eggs eaten were from the chub. But if the Bluehead Chub's nest is "diluted" with Yellowfin Shiner eggs, then the likelihood of chub eggs being consumed decreases. The more non-chub eggs that are laid on the nest, the better the chance that the nest-building chub will have a successful spawn.

Sam looked at creating an experimental design to test how the abundance of associates affected the benefits of brood di-



Tom Watson assists in demonstration. See page 30.

lution. He used three treatments in his experiment: a control with no associates, low density with 15 shiners/nest, and high density with 80 shiners/nest. He found that high density of shiners resulted in the most successful spawning (# of eggs) for the Bluehead Chub, indicating a mutually beneficial interaction. However, he also found that chubs spawning alone (control treatment) did better than with low densities of associates, making the low density treatment a parasitic interaction. He suggested that crayfishes and other invertebrates were the primary egg predators in the experiment. Question: Would more Yellowfin Shiner encourage predators if they were there for a longer period of time? Sam said that if the Bluehead Chub was not there constantly cleaning the mound, sediments would quickly fill in (within 8–10 hours) and choke any eggs on the mound.

“GROWTH PATTERNS OF TWO WISCONSIN DARTER SPECIES”

Noah Daun and Jason Lins, undergrads from the University of Wisconsin, Stevens Point, studied the Iowa Darter (*E. exile*) and the Johnny Darter (*E. nigrum*). They started by talking about being fish lovers in a club that was open to hobbyists and ichthyologists alike. The George C. Becker fish collection is housed at Stevens Point. They said that fire inspectors came in and looked at the preserved specimens kept in 70% ethanol and wanted the school to “dump them” because it was a fire hazard. Instead, they replaced the ethanol with 50% isopropyl alcohol.

Noah said they looked at weight, length, and sex of the preserved darters. For the Johnnys, they looked at 415 individuals in 49 lots from 16 counties. Noah showed a graph, which correlated points marking individual fish between weight and length. He pointed out that males tended to grow slightly longer, but also mentioned they had a larger number

of preserved male specimens to work with. They also looked at the month and the number of individuals collected. They noted changes in abundance as compared to the 1970s using Becker’s notes and vouchers.

Then they looked at lentic versus lotic comparisons in Iowa Darters. The study found no difference between the two types of systems as far as body shape was concerned, but there was a difference in gonosomatic index (GSI) in females: those in lentic systems had a statistically significant higher GSI than females in lotic systems. Male GSI were virtually the same. This was year two of the Iowa Darter study. Year one’s study was the same as the Johnny Darter study. Similar methods were used and the results led to the lentic versus lotic question.

“INDEX OF BIOTIC INTEGRITY (IBI): USING NATIVE FISH TO ASSESS WATER QUALITY”

Chad Kaiser of the Georgia Department of Natural Resources’ (GADNR) “stream team” discussed how they assess the streams in Georgia. They use 12 metrics that include chemical variables, biotic factors, flow regime, habitat structure, energy source, etc. Once the values are combined, it produces a biotic integrity score. Chad then talked about work he had done in South Dakota while at South Dakota State University. Almost all the land they looked at was devoted to crop production. While they carried in backpack shockers, they were mainly seining the survey sites. They went to 60 sites and sampled 40,000 fish, comprised of 41 species. They gave a higher score for having diversity, or benthic fish (like darters) versus just sunfish. They noticed that the sites that were the least disturbed had good scores and the sites that were most disturbed had bad scores.

BANQUET SPEAKER: BRETT ALBANESE

Dr. Brett Albanese (Georgia Dept. of Natural Resources) was our banquet speaker. His talk was titled “One Minnow, one Sucker and one Darter.” Brett began by mentioning the Georgia Biodiversity Data Portal and the Fishes of Georgia Photo Gallery. These endeavors have been funded through the sales of Give Wildlife a Chance license plates.

Brett introduced the subject matter: the one minnow is the Bluenose Shiner, the one sucker is the Sicklefin Redhorse and the one darter is the Goldline Darter.

The Bluenose Shiner (*Pteronotropis welaka*) is known from southwest Georgia, primarily from tributaries to the Flint River. Recognizing that the species had not been seen in the state since the 1970s, Georgia DNR completed a status survey for the species in 2004–2005 and were able to document three extant populations. The species is very difficult to detect, presumably because of its small population size and affinity for deep, densely vegetated habitats in soft-bot-

tomed streams. Bluenose Shiners are threatened by droughts and agricultural water withdrawal. Additional surveys and monitoring are needed.

The Sicklefin Redhorse (*Moxostoma* sp.) is currently an undescribed species that is conserved through a Candidate Conservation Agreement. The Georgia DNR has been very successful using fyke nets to catch Sicklefins. They use PIT tags and an antennae system to mark and track the fish. In 2016, they tagged and released 66 Sicklefins. In 2017, they only captured 7 of these fish using the fyke nets alone (10%). However, the use of the antenna system increased the number of fish detected to 46 (69% of the marked population), illustrating the value of this technology for population monitoring.

The Goldline Darter (*P. aurolineata*) is federally threatened. It is found in the Coosawattee River in Georgia, the damming of which inspired the movie *Deliverance*. The

Georgia DNR completed a status survey of the species in the late 2000s and documented a stable population in major tributary streams such as the Ellijay and Cartecay rivers. However, the species appears to be disappearing from the Talking Rock Creek system, which is isolated from other populations by a reservoir. NANFA participants were fortunate enough to capture and observe this species during a field trip led by Georgia DNR.

Brett stressed the importance of outreach events and gave a big shout out and thanks to NANFA members for doing what (we) can to educate the public about our native fishes. Brett said that often, state workers are just too busy.

After the Banquet came the Auction, with our illustrious Auctioneer Phil Nixon. Bob Mueller was recognized in NANFA's Breeder Award Program. Philip Kulkulski received a certificate for his work with the Bluenose Shiner.



Fritz Rohde and his Bluehead Chub, painted by Kelly McDonald.



Crocheted Bluehead Chub, convention mascot.



Co-host Michael Wolfe and his Bluehead Chub, painted by Lauren Porter.

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