NANFA 2019 CONVENTION IN MISSISSIPPI

Jen Kruckenberg

Inver Grove Heights, Minnesota

THURSDAY, MAY 30

That afternoon, Matt Wagner gave us a tour of the Mississippi Museum of Natural Science exhibits, both what the public sees and a behind-the-scenes tour with the assistance of Karen Dierolf, head aquarist. Additionally, Matt took us into the fish collection, which has everything from the tiny to the huge.

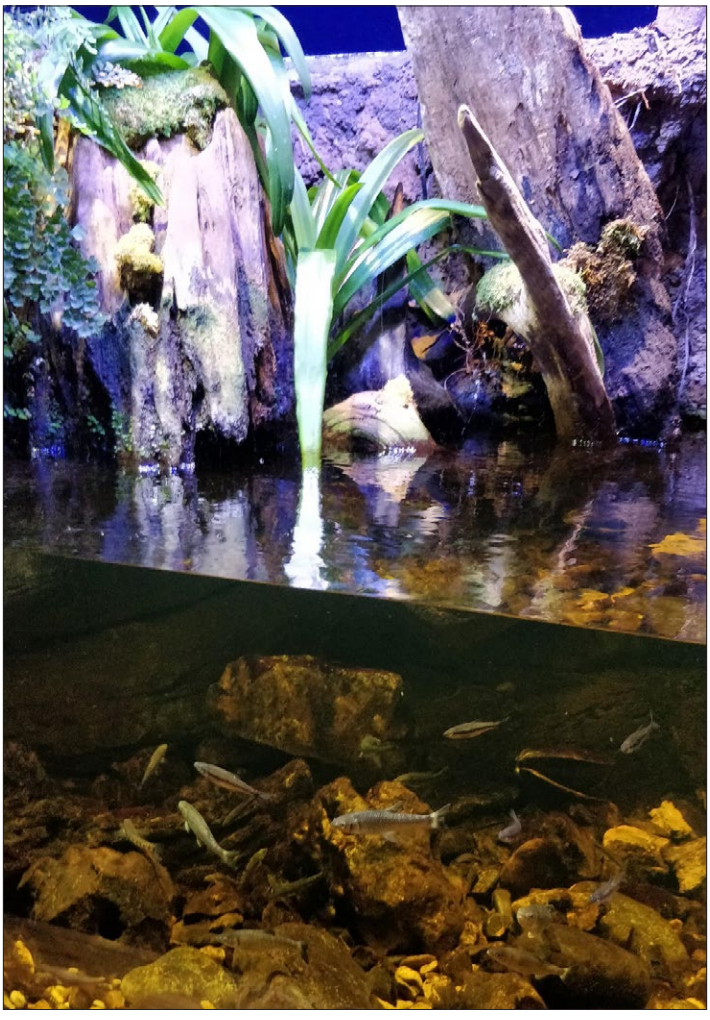
Paddlefish feeding. (Photo by Nicole Strauss)

Behind the scene with Karen. (Photo by Jen Kruckenberg)

SUMMARY OF CONVENTION SPEAKERS AND PRESENTATIONS, FRIDAY, MAY 31

Our host, **Matt Wagner**, welcomed us to Jackson, Mississippi, and began by going over some rules and regulations regarding collection activities in the State. Specifically, dip nets are not to be used and we are also not allowed to take any members of the Percidae family, including all darters. This had all been explained earlier on the NANFA website.

Next, Matt talked about a couple of species of Mississippi madtoms, the Piebald and Frecklebelly. He said the Piebald Madtom *Noturus gladiator* are caught primarily with a seine versus dip nets, minnow traps, or electrofishing, and only in the Wolf, Coldwater, and Hatchie watersheds. To get a great photo of them, bop them on the snout and their dorsal fin will pop up. They eat mostly caddisfly and dragonfly larvae. The Frecklebelly



Native fishes aquarium. (Photo by Josh Blaylock)

Madtom *N. munitus* is a smaller madtom; 80 mm is considered a "hoss." They are located in the Pearl and Tombigbee rivers. In 1999, 13 were caught at 8 of 53 sites. In 2018, 1200 were found at 44 of 51 sites. Matt always finds lots of juveniles in the Pearl River over embedded substrate. A common associate is the Rough Shiner *Notropis baileyi*, which has recently expanded its range into the Pearl River.

Angie Rodgers was up next to talk about the Lower Mississippi River Conservation Committee (LMRCC), which focuses on habitat restoration, long-term conservation planning, and nature-based economic development. The Mississippi River drains 41% of the United States. There are 27 locks and dams between St. Anthony Falls, in Minneapolis, MN, and St. Louis, MO. The upper Mississippi River above Clinton, IA has a lot of vegetation, islands and they do a lot of dredging to maintain a minimum navigation depth for tug boats. The 1986 Water Resources Development Act recognized that the Mississippi River was not only a commercially important navigation corridor but also a nationally significant ecosystem, and the Act authorized a restoration program that is funded up to 33 million dollars annually. This restoration program is specific to the Upper Mississippi River.

The middle Mississippi has no locks or dams but many levees. Instead, its restoration is about placement of dredged material and modifying wing and dike placement. Since 1988, much of the Middle Mississippi River restoration has been related to project mitigation.

Doug Carlson and his new friend. (Photo by Jen Kruckenberg)

Management of the Lower Mississippi River began in earnest after the historic flood of 1927, which was documented in the 1997 book called *Rising Tide* by John M. Barry. IN addition to building fllod control reservoirs and designating floodwyas, changes included significant reductions in the floodplain size by the construction of levees, in addition to building flood control reservoirs and designated floodways. Channel improvements included articulated concrete mats placed on the banks of the river and strategically placed dikes to help maintain a self-scouring navigation channel. There is less dredging needed as sediments tend to fill in near the dikes. LMRCC restoration has primarily been targeted at reopening secondary channels lost due to dike construction. These secondary channels benefit three endangered species in the lower Mississippi: the Pallid Sturgeon *Scaphirhynchus albus*, Least Tern *Sternula antillarum*, and Fat Pocketbook Mussel *Potamilus capax*. The LMRCC has been involved in 29 projects since 2006, improving flows to over 100 miles of habitat, and works closely with multiple agencies and partners in the six lower river states.

Paul Hartfield with the US Fish and Wildlife Service was up next to speak on Mississippi mussels. There are 87 species

Matt and his large Alligator Gar. (Photo by Konrad Schmidt)

Part of the Mississippi Fish Collection. (Photo by Jen Kruckenberg)

Madtom logo and madtom. (Photo by Casper Cox)

Bluenose Shiner (Photo by Josh Blaylock)

Phil Farrell microfishng. (Photo by Lawrence Kent)

in Mississippi. He talked about how mussels reproduce and how mussels are dependent on fishes to host their tiny offspring called glochidia. The glochidia attach to a fish host by attaching to the belly or fins of the fish (primitive mussels) or to the gills (more advance species).

Paul described the various tactics that mussels use to attract fish hosts. The Kidneyshell Mussel *Ptychobranchus fasciolaris* encloses its glochidia in a membranous capsule called a conglutinate, which mimics larval fish and larval blackfly larvae. The Triangular Kidneyshell *P. greenii* conglutinate attaches to clean rocks and can either resemble chironomid larvae or fish eggs. Mussel mantle mimicry can take on the appearance of a worm, a darter, a crayfish or a river shrimp, all meant to attract the host fish, which comes down to take a bite of the "critter" and as it does, the mussel shoots out the glochidia. Recently, a researcher found a "superconglutinate", a long, clear chord that is filled with glochidia at the tip, which looks like a fish. Probably the coolest mussel is the Snuffbox *Epioblasma triquetra*, which is a fish "snapper." It attracts a logperch and when the fish puts its head inside the mantle, it grabs the head of the logperch and releases its glochidia onto the fish's gills. Fortunately, the darter has a heavy-boned head and isn't hurt.

The fourth speaker was **Ken Sterling** from the USDA Forest Service; he talked about the Endemic Snubnose Darters of Northern Mississippi. There are currently four species of snubnose darter in Mississippi, but the endemic Yazoo Darter *Etheostoma raneyi* is currently being split into two species with the population in the Yocona River as the undescribed form. He explained that after a study was done, there are now five distinct Snubnose darters including one from the Little Tallahatchee River and one from the Yocona, which is a new one.

The Yazoo Darters are about a maximum of 65 mm standard length, which is fairly small. Their lifespan is about two years. In most stream samples, two females are found to every one male. The Yazoo darters are picky about the depth of the water they inhabit, preferring a depth around 22 cm and a high velocity flow. Many of the streams they occupy have a high sand content and are channelized. It's not easy to find their preferred habitat; streams with woody debris and a stabilized substrate are where you're most likely to find them.

Conservation Fisheries Inc. in Knoxville, TN, is raising a captive population of Yazoo Darter. They are happy to report that 83% have survived to the benthic, juvenile stage. Spawning ceased once temperatures reached >21° C for three days. They spawned them in 300-gallon aquaculture tubs. The pairs laid their eggs in nooks and crannies using pieces of wood twice as often as rocks.

Next up, was **Jake Schaffer** from the University of Southern Mississippi with a "Tale of Two Mississippi Darters, the Pearl and Bayou." Jake said the Bayou Darter *E. rubrum* has been well studied whereas the Pearl Darter *Percina aurora* has not.

The Bayou Darter is found only in the Bayou Pierre watershed in clean water with firm gravel and a pretty fast flow. They spawn in April and May. The indicator species analysis shows that Bayou Darters have the same preference for habitat as the Brighteye Darter *E. lynceum* and the Least Madtom *N. hildebrandi,* but if you find topminnows or minnows, you're NOT in Bayou Darter habitat.

The Pearl Darter was listed as Federally Threatened in October 2018. It is apparently extirpated in the Pearl River as it was last collected there in 1973. It is still in the mainstem Pascagoula River and

Tom Watson, master corn chef. (Photo by Fritz Rohde)

Banquet. (Photo by Jen Kruckenberg)

is found in higher abundances in the Leaf River and Chickasawhay River.

Pearl Darters inhabit sand bars or pools just behind sand bars. When you encounter *Ammocrypta* darters and Hogchokers (freshwater flounders) *Trinectes maculatus*, there is a good chance that you are going to find Pearl Darters as well.

Our sixth speaker was **Karen Dierolf** who discussed the MMNS (Mississippi Museum of Natural Science) Aquarium Husbandry Program. For those who were here yesterday (Thurs-

Mike Lucas and Bob Muller with auction items. (Photo by Jen Kruckenberg)

Some auction items. (Photo by Jen Kruckenberg)

day), two behind-the-scenes tours were given by Karen. A large portion of their annual operating budget is spent on food: they feed their fish and other residents a wide array of live and frozen foods as well as flakes and pellets, which they purchase in 25-lb bags.

Karen stressed throughout her talk the importance of GOOD WATER QUALITY. They work on the maintenance of plumbing and staying on top of water quality issues. To address the water quality, they utilize mechanical, chemical, and biological filtration. The mechanical filtration process involves passing the water through 800 pounds of sand located in large swimming pool filters. The chemical filtration is handled by large quantities (55-lb bags) of carbon that is changed out a couple times per year. For the biological aspect, they use Bioball towers, which filter out ammonia, nitrite, and nitrate. They use a protein skimmer to polish the water in the saltwater tanks.

They regularly test for dissolved oxygen and salinity. The salinity test is performed on the freshwater tanks as well as the saltwater tanks as they like to maintain the freshwater fishes at approximately 3% salinity. They will bump it up to 5% for two

Mike Berg fishing. (Photo by Konrad Schmidt)

Brighteye. (Photo by Casper Cox)

Highfin Carpsucker. (Photo by Casper Cox)

Redspotted Sunfish. (Photo by Zach Alley)

weeks if they are medicating the freshwater fishes. The Sound Tank is maintained at 25% salinity, which is not quite at ocean levels of 32%.

They use chillers on some tanks and a variety of lighting. LED is used for most tanks, but metal halide lamps are used on the reptiles as they need them for warmth.

They feed a lot of frozen foods: krill, mysis shrimp, bloodworms, silversides, squid, crab, and clams. Karen said they spend about $6,000 to $7,000 per year on frozen food, but the bulk of their annual budget, about $20,000, is spent on live foods. Many fishes they have on display, such as bass and others, just won't eat anything but live foods so they feed them Golden Shiners *Notemigonus crysoleucas*, worms, and crickets. The remaining foods consist of flakes, pellets, and gel foods. The gel foods are especially important if they are administering medications or vitamins to the fish. They can treat some diseases such as Columnaris and Ick, but for viruses, there's nothing they can do. Medications they use are Prazi and Nitrofurizone.

The collection methods they use to catch fishes that are put on display include seines and electrofishing. All staff members are scuba certified.

Up next was **Dan Schwarz** talking about the Private John Allen National Fish Hatchery, which has been in operation since 1902. It's located in Tupelo, MS (Elvis' birthplace). Over the years, they have raised 13 species. Today they raise Alligator Gar *Atractosteus spatula*, Paddlefish *Polyodon spathula*, Lake Sturgeon *Acipenser fulvescens*, Walleye *Sander vitreus*, and Striped Bass *Morone saxatilis*. They are also working on a Yazoo Darter restoration project. In Smith Creek, they replaced a small perched culvert with a bottomless, arched culvert. They propagated the darters in an open pole shed and put VIE tags into the Yazoo darters before they were released into Smith Creek. Post-stocking sampling has shown them surviving well in the creek.

Piebald Madtoms were successfully spawned in May 2019. Dan said they placed terra cotta pots upside down with a hole on the bottom edge. The madtoms laid their eggs inside the pots and would stack rocks near the hole to keep other fish out. All 300 eggs hatched and six days later, the fry lost their yoke sacks and started eating chopped-up blackworms and bloodworms.

Next up was **Chris Green** from Louisiana State University speaking on "Use of Historical Collections to Aid in Reproductive Assessment of Bluenose Shiner *Pteronotropis welaka*." The Bluenose Shiner occurs from Mississippi to Florida. There is strong sexual dimorphism tied to morphometric differentiation with males greater in every metric examined. Gonosomatic indices peaked in May and early June in material examined from the 1950s and 1960s. He then tried to induce volitional spawning at the South Regional Aquaculture Center. The trials included 1) injecting the fish with spawning

Derek and his snapping turtle. (Photo by Lawrence Kent)

A confused Michael Wolfe. (Photo by Casper Cox)

Lawrence and a Longear. (Photo by Lawrence Kent)

hormones (Ovaprim); 2) manipulating the temperature and photoperiod of darkness and light; 3) adding Bluegill *Lepomis macrochirus* and injecting hormones and adding sunfish milt; and 4) using outdoor pools with Longear Sunfish *L. megalotis*. Spawning only occurred in Trial 4. They will be trying new setups in 2020. Several NANFA members in the audience have been successful spawning Bluenose Shiner and shared their experiences with the speaker.

Next up was **Eric Hoffmayer** with NOAA'S Fisheries Service speaking about Whale Sharks *Rhincodon typus* in the Northern Gulf of Mexico. The Whale Shark is the largest fish in the ocean at 15 meters and up to 18 metric tons. All Whale Sharks live in temperate waters and encompass the globe. Like other sharks, Whale Sharks have teeth, but the teeth are "vestigial" (non-functioning). They filter feed on small crustaceans and use their gill rakers to filter the food. Despite having small eyes, they close their mouths and won't eat jellyfish. Very little is known about juvenile Whale Sharks between 3–9 feet. We do know males mature around 26 ft with females, a little larger. Also, they are livebearers and can have up to 300 embryos.

For years, whale sharks were harvested for their liver oil, which was used to waterproof things, and 1,000 to 1,200 were taken per year for their fins, which were marketed as "tofu" in China, India, and Taiwan. CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) lists Whale Sharks as "Vulnerable."

There are a dozen places worldwide with Whale Shark aggregations, ranging from small numbers (2–9) to large (from 10 to over 400). NOAA encourages citizen science participation and from 2003 to the present there have been 82 sightings in the Gulf of Mexico with 225 accounts of aggregations from 2–150 individuals. Sixty to seventy percent of the sightings are immature males. The best time to look for them in May to October. Many are seen at the Ewing Bank where they've counted almost a hundred (91) whale sharks.

Whale Sharks have interesting filter feeding techniques, which changes depending on the season, from horizontal in the summer months eating fish eggs to vertical in the fall where they use a suction method to draw prey into their mouths. This vertical method is often used in conjunction with tunas eating sardines, which are concentrated for spawning.

A little too deep. (Photo by Jen Kruckenberg)

Jenny, Matt, Nicky, and Bob. (Photo by Konrad Schmidt)

Tenmile Creek with Nicky, Joe, Nicole, and Mike. (Photo by Konrad Schmidt)

Tenmile Creek with Lawrence, Matt, and Derek (Photo by Konrad Schmidt)

Almost 50 Whale Sharks in the Northern Gulf have been tagged with satellite tags. There is movement into the Northern Gulf during warmer months and movement south during the cooler months. None have moved into the Caribbean. The longest tag lasted about a year, the shortest, only four days.

Our tenth speaker was long-time NANFA member **Jan Hoover** from the US Army Corps of Engineers, who spoke on "Clash of the Titans: Asian Carp versus American Paddlefish."

Jan works at the US Army Engineer Research and Development Center (ERDC) in Vicksburg, MS. Since 2000, the Fish Ecology team there has been studying competition between native fishes and two species of Asian carp, i.e., Bighead Carp *Hypophthalmichthys nobilis* and Silver Carp *H. molitrix.* ERDC has also conducted various Paddlefish *Polyodon spathula* studies since 1993, both in the lab and field, and Jan shared some of the results.

Asian carp display little morphological variation while Paddlefish vary substantially with size and among populations. ERDC created a mobile swim tunnel where they tested the two groups. Juveniles of both species swim fast while the adults are relatively slow movers. They clocked Silver Carp going at a "burst speeds" of ten (or more) body lengths per second, however, catapulting out of the water. Vertical barriers are needed to control them. Paddlefish are a marvel of aquatic engineering. The rostrum is extremely strong and resilient; it bends but rarely shatters due to stellate "bones" that form a mesh, dispersing traumatic forces, and retaining structural integrity; the rostrum may also provide substantial hydrodynamic benefits. Paddlefish can move distances greater than 1,000 km, up to 9 km per day, but Asian carp movements are not well documented. Paddlefish only feed on zooplankton while carp feed on zooplankton, phytoplankton, and detritus. Carp mature at ages one and two while Paddlefish mature at four to five years. Bio-energetic and population modeling of carp impacts on Paddlefish reveals a 20–25% reduction in fecundity and 25% reduction in Paddlefish numbers over a 50-year period. Take home message: Paddlefish are at war with Asian Carp and losing!

Next up was **Todd Slack** also from ERDC speaking about the lower Mississippi River Pallid Sturgeon *Scaphirhynchus albus.* While numbers are low in the lower Mississippi River, it is better shape there than in the Missouri River. They surveyed the river from Venice, LA to St. Louis, MO using trotlines, trawls, and gill nets from 1997–2019. Over 10,000 Shovelnose Sturgeon *Scaphirhynchus platorynchus*, but only 300 Pallid Sturgeon, were encountered. One threat to their existence is entrainment

Strong River seine gang. (Photo by Casper Cox, who went chin deep to shoot this.)

Happy group. (Photo by Jen Kruckenberg)

Lawrence Kent and Brother Rogers. (Photo provided by Lawrence Kent)

in diversion structures such as the Bonnet Carré Spillway to Lake Pontchatrain, which helps relieve flooding in New Orleans. There are also entrainment issues at the Old River Complex. ERDC is also using Army Corp vessels to track sturgeon and Paddlefish movements. They have detected 53 unique tags from Keokuk, IA to Venice, LA. One Paddlefish travelled 944 river miles in a 265-day period.

Our last speaker was **Mike Andres**, University of Southern Mississippi, on Gulf Sturgeon *Acipenser oxyrinchus desotoi*. While the Gulf Sturgeon has been most heavily studied in the Suwannee River in Florida, which has the largest population, Mike focused on the Pascagoula River in Mississippi. Mississippi banned the harvest of Gulf Sturgeon in 1974, and it became listed as an Endangered Species in 1991.

Their maximum size is eight feet and 210 lbs. The males mature at six to nine years and can spawn every year once they mature, while the females mature at 8 to 12 years but will only spawn every two to four years. Eggs are harder to produce than sperm. Spawning occurs in March and April. Spawning areas in the Pascagoula River drainage are in the Bouie River some 155 river miles from the Gulf and in the Chickasawhay River 220 river miles from the Gulf. Prior to Hurricane Katrina, the estimated population size was 220 individuals; now it's at 145 individuals.

Gulf Sturgeon have a tendency to jump out of the water. This behavior actually took the life of one little girl in FL. There is speculation about why they jump. Some think it is for communication, but Mike is in the group that they do it to maintain their buoyancy because their swim bladder is connected to their mouth.

Since Mike is a parasite guy, he shared his last tidbit on how Gulf Sturgeon can harbor fish lice. Oooh…great way to end it!!

The evening meal was cooked by Martin Moore and his wife Kay and included fried catfish, red beans and rice, roasted corn ears, cornbread, beignets, and sweet tea. This was followed by a screening of Hidden Rivers.

SATURDAY AND SUNDAY, JUNE 1 AND 2

Great field trips with a fried catfish banquet Saturday night.