



## **Compiled Member Updates**

**April 2019**

### **State Agency Member Updates:**

- Alabama
- Arkansas
- Indiana
- Iowa
- Kansas
- Kentucky
- Missouri
- Mississippi
- Nebraska
- North Dakota
- Ohio
- Oklahoma
- South Dakota
- Tennessee
- Texas
- West Virginia

### **Federal Agency Member Updates:**

- U.S. Forest Service

Alabama – Submitted by Steve Rider, Alabama Department of Conservation and Natural Resources

The following species and/or taxa have been **proposed** to be added to the Alabama restricted species regulation (i.e., 220-2-.26: Restriction on Possession, Sale, Importation, and/or Release of Certain Animals and Fish).

- Any species of Snakehead fish (*Channa spp.*);
- Any species of Snakehead fish from the family Channidae;
- Zander (Sander lucioperca);
- European Perch (*Perca fluviatilis*);
- Eurasian Minnow (*Phoxinus phoxinus*);
- Wels Catfish (*Silurus glanis*);
- Prussian Carp (*Carassius gibelio*);
- Crucian Carp (*Carassius carassius*);
- Any species of eel from the family of Anguillidae not native to Alabama;
- Amur Sleeper (*Perccottus glenii*);

The following regulations have also been **proposed**; public comment will be sought before approval.

**220-2-.164 Wild Baitfish Regulation**

Within the jurisdiction of the Alabama Division of Wildlife and Freshwater Fisheries, it shall be unlawful to transport any live baitfish, having been caught or harvested from streams, rivers, lakes, or public reservoirs in Alabama, away from the waters in which they are caught. For the purposes of this regulation, baitfish are defined as any non-game species of fish or crayfish (Superfamily Astacoidea) that are legal to use as bait for recreational or commercial fishing in Alabama.

This regulation does not prohibit the possession or the use of live baitfish on or within the waters from which they have been caught or harvested. Nor does it prohibit the possession or the use of live baitfish originating for commercial baitfish producers and bait shops.

For purposes of this regulation, refer to 220-2-.42(1) for a description of the Alabama Division of Wildlife and Freshwater Fisheries jurisdictional line.

**220-2-.163 Restrictions on Certain Species of Asian Carp**

No person, firm, corporation, partnership, or association shall possess, sell, offer for sale, release, or cause to be distributed within the State of Alabama any live fish of the genus *Hypophthalmichthys spp.* (silver carp, bighead carp, largescale silver carp) except for holders of valid commercial fishing licenses engaged in harvesting individuals of these species from the public waters of Alabama for sale to licensed fish dealers and/or processors and aquaculture producers holding a valid written permit issued by the Commissioner of Conservation and Natural Resources.

## **Asian Carp**

- A total of \$600,000 was added to the FY2019 USFWS budget for Asian carp control and management efforts in the Tennessee and Cumberland River Basins. The distribution of that funding between the state fisheries agencies of Kentucky, Tennessee, Alabama and Mississippi is being developed at this time.
- No Silver or Bighead carp have been reported from Wilson or Guntersville reservoirs.
- Several Silver Carp unconfirmed reports from Wheeler Reservoir in 2018, but none recently. Most recent unconfirmed report for Wheeler was back in August 2018, near the mouth of Flint Creek on eastern side of Decatur, AL.
- Most upriver Silver Carp confirmed report is still from Wheeler Reservoir on April 1, 2017, by a commercial fisher near Decatur, AL.
- A few angler reports from Pickwick Reservoir; the most recent report coming from a crappie angler catching a 25 pound Silver Carp in Indian Creek (near JP Coleman State Park) on February 6, 2019.
- Mississippi Department of Wildlife, Fisheries, and Parks and Tennessee Tech University have captured and tagged 30 more Silver Carp from Indian Creek and Panther Creek in Pickwick Reservoir during November and December 2018. Forty Silver Carp have now been implanted with sonic tags from Pickwick Reservoir.
- ADCNR fisheries biologists continue to monitor the acoustic array at Guntersville Lock and Dam for Silver Carp movement and passage. So far no tagged Silver Carp have been detected below or above the Guntersville Lock and Dam.
- Bighead Carp continue to be collected in low numbers in the Tombigbee and Alabama rivers during targeted sampling for other species.

Arkansas

MRBP ANS Member Update

July 2018 – March 2019

Arkansas Game and Fish Commission

Prepared by: Jimmy Barnett; ANS Coordinator

## **Zebra Mussel Monitoring**

Zebra Mussel monitoring is one priority for AGFC and the Arkansas ANS Task Force. To accomplish monitoring in the White River, substrate samplers were deployed at 25 river mile increments from the mouth upstream to the first dam at Batesville, AR ~ 293 miles and examined every 42 days during known spawning temperatures for Zebra Mussels. Since 1999, the only detection in this portion of the river occurred at and below the Arkansas Post Canal, ~ 10 river miles above the mouth and where the Arkansas and White rivers join. Currently, the White River is not used for barge traffic above this point and is no longer dredged and maintained for navigation. Our plans are to change to early detection monitoring on the White River starting with the 2019 season.

Three substrate samplers are deployed in the Arkansas River in pools 5, 6 and 7. The River is known to be positive for the presence of Zebra Mussel and has been since 1992. These samplers are used to evaluate spawning trends and sampling methods.

Monitoring of the lower Ouachita River enters its third year. There are few barges that utilize the river but it is also navigated by house boats. Zebra Mussels have not been detected in the Ouachita River.

Early detection for zebra mussels continues in large COE reservoirs. These includes; Bull Shoals lake, Norfolk Lake, Beaver Lake, Greer's Ferry Lake, Lake Ouachita, Lake DeGray and Lake Greeson. Two privately owned lakes that are heavily utilized by recreationists are also being monitored and include Lake Hamilton and Lake Catherine. The only detections made thus far are Bull Shoals Lake which has been positive since 2007.

Due to its close proximity to Bull Shoals Lake, an intensive monitoring protocol is being developed to document zebra mussel presence/absence for the lake. The reasoning is that the Norfolk Federal Trout hatchery uses water from Lake Norfolk as its source for trout propagation. A large concern is that this hatchery provides trout for Arkansas's world class and multi-million dollar trout fishery. The protocol will include intensive multi-layer random sampling of the lake in 2019.

### **Giant Salvinia**

Giant Salvinia was detected in Lake Erling in Southwest Arkansas in December 2018. Lake Erling is a 7000 acre, privately owned lake and is a popular fishing destination. AGFC is assisting the lake owners association in determining a possible eradication attempt. Signs have been designed and placed at access points notifying the public of Giant Salvinia presence and suggestions on decontamination procedures that could prevent the spreading of the fern. We continue efforts to eradicate Giant Salvinia from Smith Park Lake that was discovered in 2017. The lake is drained as much as possible and any Giant Salvinia found is being treated. An area survey will be conducted in late spring 2019 for any remaining sites with the plant.

### **Water Hyacinth**

Water Hyacinth currently prevents normal commercial navigation in the Lower Arkansas River. To address the issue, the USACOE released Water Hyacinth Weevils in nursery areas for Water Hyacinth in late 2018. They also included a budget line for chemical treatment in their FY2019 budget. Extreme cold winter temperatures during 2017-2018 helped with reducing the areal coverage of the plant in the navigation channel. The AGFC continues to treat other areas in state-owned water bodies as needed.

### **Asian Carp Detection**

Monitoring for the leading edge of Asian Carp invasion is continuing for most of the state. We are developing a comprehensive stream sampling plan for use in detecting their spread.

### **Arkansas Task Force**

The Arkansas ANS Task Force held its third meeting in December 2018. A total of 22 attendees representing state and federal agencies, NGO's, and universities participated in the meeting. Updates were provided for ANS work that had been completed in 2018. The task force committees are beginning work on an operational guidance document for the task force.

### **Regulatory Actions**

A regulation prohibiting the transfer of live wild-caught baitfish went into effect on October 1, 2018. In addition, a regulation prohibiting the possession of live Silver, Bighead and Black carp went into effect on January 1, 2019.

Indiana – Submitted by Eric Fischer, Indiana Department of Natural Resources

Indiana Department of Natural Resources has continued to utilize state and Great Lakes Restoration Initiative funding this past season to combat two high priority Aquatic Invasive Plants. In August 2006, DNR biologists discovered hydrilla during routine sampling at Lake Manitou, an 809 acre lake located in northern Indiana. In response to this first discovery of hydrilla in the Midwest, IDNR implemented a rapid response plan that included initial quarantine of the lake to prevent its spread and an eradication program utilizing season-long herbicide application strategies. Along with an aggressive control effort in with the goal of eradication, IDNR implemented an adaptive surveillance program that included tuber sampling, aquatic vegetation sampling, and scuba diver visual surveys. Over a 12 year history that involved 10 years of season long herbicide applications and the last 5 consecutive years without hydrilla detection within the lake we have declared this project a successful eradication. The total cost for the project was \$2,950,000. While that number seems large it is a small price to pay to keep on of the world's worst invasive species out of Indiana waters.

Although the hydrilla eradication project and surveys will end this year we continue to fight the spread and growth of another Aquatic Invasive plant called Starry Stonewort in northeast Indiana. This macroalgae has proven very difficult to control and has continued to spread throughout the region, we continue to try different chemical prescriptions and work with many interested partners in exploring research opportunities and treatment designs in hopes of finding one that is effective at limiting the growth and success of this invasive aquatic plant.”

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The Aquatic Invasive Species Program (DNR–AIS) staff in 2018 consisted of 1 full-time Coordinator/Natural Resources Biologist, 1 full-time Natural Resources Technician, and 18 seasonal Natural Resources Aides (15 watercraft inspectors, 3 survey crew). Iowa Lakeside Laboratory interns assisted with watercraft inspections in Dickinson County in 2018.

Accomplishments in 2018 included the following:

- Conducted 7,045 watercraft inspections reaching 18,882 people
- Conducted 166 angler interviews on 26 trout streams
- Chemically treated invasive aquatic plants in 27 waterbodies
- Tested the use of Sonar as an under-the-ice treatment for curlyleaf pondweed
- Completed 104 full-lake vegetation surveys
- Surveyed vegetation at 201 access points on 76 lakes
- Surveyed adult zebra mussels in Bluebill Lake, Blue Pit, Center Lake, Clear Lake, Lake Cornelia, Lost Island Lake, Storm Lake, and the Spirit/Okoboji chain of lakes
- Placed zebra mussel veliger settlement samplers in lakes and reservoirs across the state
- Collected and analyzed 79 water samples from 42 lakes and rivers for zebra mussel veligers
- Surveyed Asian carp and/or bigmouth buffalo populations 6 times in interior and border rivers
- Leased 4 billboards with AIS prevention messages on interstate and state highways
- Ran 184,638 video ads targeting water recreation user groups
- Used geo-fencing to target 388,191 ads to visitors at high use boat ramps
- Ran 132 television ads about AIS and the Iowa AIS Law
- Appeared twice on a local television station morning show during the summer to discuss AIS in Iowa
- Displayed the “Clean, Drain, Dry” message during a weather page takeover of a local television station website over Memorial Day Weekend and in rotating banner ads on the website
- Targeted water recreationists with AIS prevention messages using boat ramp signs, print media, radio and television interviews, websites, social media, displays, and presentations
- Supported 23 partnerships and cooperative projects
- Cooperated with Iowa State University and Story County Conservation Board on an aquarium and pet rehoming event
- Purchased supplies for DNR Fisheries management stations and hatcheries to prevent the spread of AIS during operations

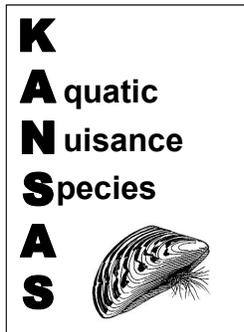
Four new infestations of Eurasian watermilfoil and five new infestations of brittle naiad were discovered in Iowa in 2018. Eurasian watermilfoil has been identified in 54 waterbodies, including private ponds, in Iowa since 1993, and brittle naiad has been identified in 63 waterbodies since 2003. Parrot feather and Brazilian waterweed were identified in one location each in 2017. Eradication of Brazilian waterweed appears to be successful. The area of the parrot feather infestation has been reduced significantly, and eradication efforts will continue in 2019.

The following lakes in Iowa have known infestations of zebra mussels: Bluebill Lake (2012), Blue Pit Lake (2016), Center Lake (2018), Clear Lake (2005), Lake Cornelia (2014), Lost Island Lake (2018), the Spirit/Okoboji chain of lakes (2012), and Storm Lake (2018). The new infestation at Center Lake was discovered from settlement sampler monitoring, and the new infestations at Storm Lake and Lost Island Lake were discovered from zebra mussel veliger monitoring.

Rusty crayfish were identified in Storm Lake in September 2018. This is the first documented population of rusty crayfish in an Iowa lake.

An Iowa State University study under the direction of Dr. Michael Weber and supported by the USFWS and DNR-AIS is evaluating 1) reproduction and recruitment patterns and 2) adult population characteristics and dynamics of Asian carp in the Mississippi, Des Moines, Skunk, Iowa, and Cedar Rivers and tributary confluence sites in Pools 14-20. Updates from the 2017 and 2018 sampling season follow.

- Asian carp larvae were collected in pools 18, 19, and 20 of the Mississippi River between May 18 and July 26, 2017. Mean Grass Carp densities across all sites were higher than Bighead and Silver Carp densities throughout 2017. No Age-0 Asian carp were caught within the major tributaries of the Mississippi River during 2017. Asian carp larval densities were generally higher upstream of the major tributaries than below the confluence at the Des Moines River but not at the Skunk and Iowa Rivers. Presence of larval Asian carp from 2017 coincided with both falling and rising discharge.
- Only adult Silver and Grass Carp were captured in 2017, whereas adult Silver, Grass, and Bighead Carp were captured in 2018 with boat electrofishing. Relative abundance of Silver Carp was higher than Grass or Bighead Carp in the Mississippi River during both years. Relative abundance tended to decrease with increasing latitude, but catch rates were higher below Lock and Dam 19 than above.
- On August 11, 2018, many juvenile Silver, Grass, and Bighead Carp were collected in a backwater of the Skunk River approximately 2 miles upstream of the confluence with the Mississippi River. This is only the second time that juvenile Bighead Carp have been observed above Lock and Dam 19.



# Kansas ANS Management Program

## *Report to the Mississippi River Basin Panel on ANS management*

**Submitted on: April 4, 2019**

**by: Chris Steffen, ANS Coordinator**

### ANS Program Summary

The Kansas Aquatic Nuisance Species Management Plan was approved by the ANSTF in May 2005. The goals of the plan are to prevent new introductions of ANS to Kansas, prevent dispersal of established populations of ANS, eradicate or control to minimize the adverse ecological, economic, social, and public health effects of ANS, educate all aquatic users of ANS risks, and to support ANS research in Kansas. The coordinated efforts contained within the plan are designed to protect residents of Kansas and the state's aquatic resources from the multitude of potential losses associated with ANS plants and animals.

- No new zebra mussel populations were detected in 2018. This is the first year without a new detection since 2005.
  - Previously, zebra mussels were discovered in El Dorado Reservoir in 2003; Winfield City Lake in December 2006; Cheney Reservoir, and Perry Reservoir in 2007; Marion Reservoir and Lake Afton in 2008; Milford and Wilson Reservoirs in 2009; Council Grove City Lake and John Redmond Reservoir in 2010; Council Grove, Melvern, and Kanopolis Reservoirs and Jeffery Energy Center Lakes (2) in 2011; Coffey County-Wolf Creek Lake and Chase County State Fishing Lake in 2012; lakes Shawnee and Wabaunsee and Clinton and Glen Elder (Waconda Lake) Reservoirs in 2013; Pomona Reservoir in 2014; Paola City Lake (Miola Lake) in 2015; Wellington City Lake in 2015; Hillsdale and Cedar Bluff Reservoirs in 2016; and Osage State Fishing Lake, Tuttle Creek Reservoir, and Geary State Fishing Lake in 2017.
  
- A KDWPT funded Asian Carp project on the Kansas River with UNL Masters student Jake Werner continues to make progress. The objectives of the project are to:
  1. Determine the origin and large-scale movements of invasive carps (i.e., black carp, grass carp, bighead carp, and silver carp) found throughout the lower Kansas River as water and otolith chemistry allow
  2. Attempt to identify invasive carp spawning aggregations, if and where they occur in the lower Kansas River, and relate potential recruitment events to climatic or hydrological variables

3. Identify presence and upstream extent of black carp
4. Determine flows required for successful upstream passage of Bowersock Dam
5. Compare body condition and abundance and of native fishes (e.g., bigmouth buffalo, gizzard shad) above and below Bowersock Dam (This objective has been dropped due to very low catch rates of gizzard shad and bigmouth buffalo).

Sampling in summer of 2018 was conducted on three sections of the Kansas River: segment one is between the confluence with the Missouri River and the WaterOne Coffey Dam, segment two is between the WaterOne Coffey Dam and Bowersock Dam, and segment three is between the Bowersock Dam and the Topeka Weir. Adult Silver, Bighead, and Grass carp were collected in segments one and two electrofishing and with the USFWS's electrified dozer trawl. No Asian Carp were sampled in segment 3. Otoliths were collected from adult Silver and Bighead carp for use in aging and for otolith microchemistry to determine natal origins. Sampling was conducted for juvenile Asian Carp using mini fyke nets and electrofishing. Juvenile Silver Carp were collected (and abundant) in segment one only; no other juvenile Asian Carp were captured in either of the other segments. Silver carp captured in segment 2 (above the Johnson County Weir to the Bowersock dam) tend to be larger than silver carp captured below the weir.

In addition to the field work, the following progress was made through the winter:

- 150 Silver carp lapilli otolith were ablated at Southern Illinois University – Carbondale and Sr, Ba, Mg, and Ca composition was analyzed. Sr:Ca and Ba:Ca ratios will be used to identify environment of origin.
  - Water chemistry sampling times and locations have been laid out to determine Sr, Ba, Mg, and Ca composition of the Kansas River, its tributaries, and the Missouri River above and below the confluence with the Kansas.
  - Environmental DNA samples have been filtered and DNA extraction and polymerase chain reaction (PCR) amplification methodology is being ironed out.
  - Analysis of population dynamics of silver carp within the Kansas River is underway.
  - Preparing for next field season. This next field season will be a combination of electrofishing and using a suit of passive gears, including mini-fyke nets, hoop nets, and trammel nets to try to sample all ages and species of Asian carp (silver, bighead, grass and black).
- A film segment on Aquatic Invaders for the Kansas PBS show *Sunflower Journeys* aired in December. Asian Carp and Zebra mussels were featured. A clip featuring fisheries technician Connor Ossowski getting hit by a “flying” Silver Carp attracted a lot of attention and can be viewed here: <https://www.facebook.com/SunflowerJourneys/videos/10160627076625235/>.
  - A major effort to assess the status and impact of Largemouth Bass Virus (LMBV) in the state was recently completed. Samples of 30-60 largemouth bass were collected from 35 waterbodies across the state in fall of 2017 and spring of 2018. Lakes selected included locations that are part of a largemouth bass age/growth research study, lakes with a past positive test for LMBV, lakes where the largemouth bass population had unexplainably declined, and reference “good” population lakes.

Otoliths were collected from the fish that were sacrificed for LMBV testing. LMBV has been detected in 10 new lakes due to this effort. That brings us to a total of 17 lakes that are positive for LMBV. Age/growth and mortality data was compared between LMBV-positive and LMBV-negative lakes. In Kansas, LMBV appears to have little impact on LMB populations: mortality rates were similar for LMBV-positive and LMBV-negative lakes; growth was slightly better in LMBV-positive lakes.

- KDWPPT continues to contribute funding, hatchery space, and employee time to WAFWA's YY Consortium. It is hoped that advancements in YY (Trojan male) technology will lead to opportunities for prevention, control or extermination of common carp, white perch and other invasive fishes. Idaho is having success using the technology on invasive Brook Trout.
- ANS staff conducted vegetation surveys (identified species and mapped bio-volume) at 20 lakes. 30 more lakes were scheduled for sampling, but drought prevented this from occurring.
- Kansas continues our participation in the *Don't Let it Loose* campaign. The program has been well received and very popular with pet shop owners. We are supplying additional bags as pet shops request them. We plan to continue purchasing bags in the future and revisiting the locations.
- Detection sampling for zebra mussel veligers was conducted at 106 Kansas waters last summer and fall. No new zebra mussel populations were found.
- Fish disease sampling was conducted at all four state fish hatchery facilities and 3 private fish farm locations. None of the fish tested showed signs of disease. In addition, hatchery staff were trained to conduct health sampling should a disease outbreak require immediate collection of samples.
- Inspections were conducted at 90 bait shops across the state. No invasive species were found at any of the bait shops. ANS literature was distributed to the bait shops during inspections.
- Outreach was continued through a campaign designed to utilize a variety of media outlets, including internet ads, radio ads, etc. Ads were redesigned, which led to a much more positive reception by the public.
- ANS literature and materials were distributed to KDWPPT offices, state parks, nature centers, baitshops, marinas and at educational events.
- ANS signage was maintained at ANS infested waters and prevention awareness signs were placed at uninfested lakes.
- Marbled Crayfish was added to our prohibited species list. Common Carp/koi were removed from our list of species that may be sold as bait.

Kentucky – Submitted by Andrew Stump & Jessica Morris, Kentucky Department of Fish and Wildlife Resources

The Aquatic Invasive Species program in Kentucky is housed within the Critical Species Investigations branch (CSI). KDFWR-CSI includes staff members at two locations and includes a full time Fisheries Program Coordinator (Paul Wilkes), 5 full time fisheries biologists (Christopher Hickey, Andrew Stump, Jessica Morris, Joshua Tompkins, and Matthew Combs), and 4 full time fisheries technicians. Other fisheries staff in KDFWR contribute their time to AIS projects on an as needed/available basis.

Accomplishments and findings to date in 2018 include the following:

**KDFWR Aquatic Nuisance Species Plan:**

The KDFWR Aquatic Nuisance Species Plan has not been updated since its introduction in 2008. Currently, the document is receiving updates to several sections including the Aquatic Nuisance Species list, Plan Objectives, and Existing Authorities and Programs. KDFWR employees plan to organize and lead further discussion on plan development while updating and reestablishing contact with Kentucky ANS Task Force members in 2019. In addition, we are currently working on a state early detection and rapid response (EDRR) system using geographical information systems (GIS) mapping technology and species specific priority rankings to guide future management efforts.

**Middle Ohio River Basin Projects:**

Asian carp population control measures and project evaluation are on-going collaborations with basin-state partners. In 2018, Kentucky participated in the removal of over 59,000 lbs of invasive carps from the Cannelton, McAlpine, Markland, Meldahl, Greenup, and RC Byrd pools. This marks more than 103,000 lbs of carp removed since the projects began in 2015. In addition, monitoring of the carp populations in this section of river has given us the resolution needed to make recommendations on where to apply contract fishing pressure, in an attempt to suppress upriver expansion.

The KDFWR also participated in telemetry and juvenile Asian carp projects aimed at understanding movement, habitat selection, and recruitment of fish along the ORB in the pools mentioned above. The KDFWR conducted larval tows and aided in receiver downloads and data analysis. This has led to a better understanding of Asian carp establishment and spawning extent in the Ohio River in addition to allowing removal crews to pinpoint locations and effective removal strategies for furthering population control.

**Asian Carp Contingency Planning:**

The need for a contingency plan has been recognized in previous documents (i.e. the Ohio River Asian Carp Control Strategy Framework) and recent ORB meetings concerning Asian carp management and control. KDFWR led the initiative to develop a draft plan in 2018 that mirrors the Illinois River Contingency Plan and has requested feedback from basin partners. The draft currently covers the known statuses of Bighead and Silver Carp species in the middle Ohio River and recognizes possible

responses to changes in status for those populations. The KDFWR intends to expand this to Black Carp and Grass Carp in future revisions and expects that a partial plan may be in effect by 2020.

#### Asian Carp and Scaled Rough Fish Harvest Program (ACHP)

KDFWR-CSI administers a harvest program for Asian carp species (silver carp, bighead carp, grass carp and black carp) that allows commercial fishers access to closed waters for the purpose of harvesting invasive carps. Within the program commercial fishers must request permission to fish and are only allowed to harvest Asian carp and other scaled “rough fish” (buffalo, gar, drum, common carp, etc.). Their harvest ratio of Asian carp to other rough fish must be 65:35 on a monthly basis.

- The Asian Carp Harvest Program has facilitated the harvest of 5.8 million pounds of Asian carp from Kentucky’s waters since the program began in 2013.
- 21 commercial fishers participated in the ACHP in 2018 on 918 fishing trips. On those trips commercial fishers reported harvest of 37,319lbs of bighead carp and 1,842,934lbs of silver carp.
- KDFWR monitors the commercial catch in Kentucky by compiling daily reports from commercial anglers as well as conducting ride-alongs with commercial fishermen fishing within the ACHP. In 2018 KDFWR has conducted 23 ride alongs with 11 different commercial fishers to collect data on harvest and bycatch.

#### Asian Carp Subsidy

KDFWR-CSI administers a subsidy for Asian carp (bighead, silver, grass, and black carp) harvested from Kentucky Lake (Tennessee River) and Lake Barkley (Cumberland River). The subsidy began in 2015 to be paid to commercial fishers at 5 cents per pound above what was paid by the processor. Through December 2018 KDFWR paid out \$50,439.10 in subsidy funds for 1,008,782 pounds of Asian carp harvested from Kentucky and Barkley lakes.

#### Western Kentucky Silver Carp Demographics

KDFWR-CSI partnered with Murray State University in 2016 to collect demographics data from silver carp harvested from Kentucky Lake.

- Analysis of this data revealed that silver carp in Kentucky Lake are larger than in other populations (Wabash, Illinois, Mississippi Rivers), have similar condition (L-W relationship) to other populations, grow very fast (triple in length between age-0 and age-1), have variable recruitment (not all age classes represented) and exhibit lower mortality rates when compared to populations with more commercial harvest (Illinois River). The current level of commercial harvest of silver carp in Kentucky Lake is not providing a sufficient level of control.

In 2017 KDFWR collected demographics data from silver carp harvested from Lake Barkley. Lake Barkley receives more pressure from commercial fishers which results in different population structure of silver carp in this system.

- Analysis of data revealed that silver carp in Lake Barkley grow faster than silver carp in Kentucky Lake (length at age relationship), are above average condition when compared to other

populations (relative weight), have a higher mortality rate than silver carp in Kentucky Lake, and gonadosomatic indices indicated that silver carp may have attempted to spawn in Lake Barkley in April of 2017. However, no young of year silver carp were observed in Lake Barkley in 2017.

In 2018 this study was continued on silver carp in both Kentucky and Barkley lakes. Analysis of data revealed that silver carp in Lake Barkley are growing faster than silver carp in Kentucky Lake, silver carp ages ranged from 2 – 11 years old in the lakes with age 3 silver carp being most abundant in both reservoirs. Annual mortality was estimated to be slightly higher for silver carp in Lake Barkley than in Kentucky Lake.

#### Estimating Relative Abundance of Asian Carp

In 2018 KDFWR began a three-pronged approach to estimate the relative abundance of Asian carp in Kentucky and Barkley lakes. The three prongs are standardized sampling with gill nets, a mark-recapture study, and in depth analysis of commercial harvest data. Standardized sampling began in July of 2018 and occurred again in October 2018. This sampling will be continued in subsequent years in the months of April, July, and October. The mark-recapture portion of this study began in September 2018 with a week-long tagging event in each lake. Tagging efforts resulted in 1292 silver carp being tagged in both lakes combined. To date, 5 tagged fish have been recaptured and reported through the commercial fishery. This project is in coordination with the Tennessee Wildlife Resources Agency, and the next tagging event will take place in Tennessee waters of Kentucky and Barkley lakes in fall of 2019.

#### Identifying Gear Types for Capturing Asian Carp

KDFWR-CSI began a project in 2017 to identify and test new gear types for capturing Asian carp in Kentucky Lake, Lake Barkley and their associated river systems. KDFWR worked with Two River Fisheries to test a net system used to harvest Asian carp in China, however, this gear was unsuccessful in capturing Asian carp in Lake Barkley. KDFWR has partnered with the USFWS for use of their Paupier Net system in Kentucky Lake and Lake Barkley on 4 occasions. The Paupier Net was successful in capturing Asian carp throughout all sampling periods. KDFWR-CSI fished experimental gill nets in Kentucky and Barkley lakes capturing 897 Asian carp. Electrofishing in the lower Cumberland River and Clarks River was used for Asian carp removal efforts resulting in the removal of 18,356 pounds of Asian carp. In June of 2018 KDFWR conducted its first bow fishing tournament for Asian carp only. Approximately 20,000 lbs of Asian carp were removed through this tournament. In October of 2018 KDFWR partnered with the USGS Columbia, MO office to test a Great Lakes Pound Net and a Merwin Net in Lake Barkley for capturing Asian carp. The two gears were fished for two consecutive weeks, capturing a total of 6 Asian carp. However, these gears may be more effective with baiting and KDFWR will continue working with the USGS to further test capture methods. In December of 2018 Two Rivers Fisheries built a trap net type system and deployed it in Lake Barkley under supervision from KDFWR. This gear was fished for one week and was unsuccessful in capturing Asian carp.

#### Impacts of Asian Carp on Sport Fish in the Kentucky Lake and Lake Barkley Tailwaters

KDFWR initiated a project in 2015 to assess the impacts of high densities of Asian carp on tailwater fish communities as well as sport fishing effort and success in tailwaters. KDFWR-CSI conducts electrofishing

sampling in the tailwaters of Kentucky Lake and Lake Barkley on 3 occasions in the spring and fall. In 2018 sampling efforts produced 5,684 fish comprised of 53 species during 7.25 hours of effort. In Kentucky Tailwater the most abundant species captured during spring sampling was gizzard shad; and threadfin shad was the most abundant species captured in the fall. In Barkley Tailwater, longear sunfish were the most abundant species captured during spring sampling; and bluegill were the most abundant species captured in the fall. The most common sport fishes captured in both tailwaters were bluegill, largemouth bass, yellow bass, and smallmouth bass. In 2016 KDFWR-CSI conducted an access point creel survey in Kentucky Lake tailwaters and Lake Barkley tailwaters. Over 3,000 anglers were interviewed during the survey period. Most anglers were satisfied with the fisheries provided by the tailwaters. However, of those that were dissatisfied, anglers in Kentucky tailwaters cited Asian carp as the number one reason for their dissatisfaction; anglers in Barkley tailwaters cited Asian carp as the number two reason for their dissatisfaction. During the creel survey it was estimated that anglers caught over 25,000 Asian carp in Kentucky tailwaters and approximately 24,000 Asian carp in the Barkley tailwaters. This is a significant increase since the previous creel survey was conducted in both tailwaters. The creel survey is being conducted again in 2019.

#### Tracking Silver Carp Movement in Kentucky Lake

Beginning in 2016, KDFWR-CSI has funded Murray State University to conduct a silver carp tracking study in Kentucky Lake.

- 176 silver carp have been tagged in Kentucky Lake and the Lake Barkley tailwaters
- 24 stationary receivers have been deployed in Kentucky Lake, Lake Barkley and their tailwaters
- KDFWR-CSI conducts manual tracking trips on Kentucky Lake and Lake Barkley and downloads stationary receivers monthly

KDFWR-CSI is working closely with partner agencies (Murray State University, Tennessee Wildlife Resources Agency, Tennessee Technological University, Mississippi Department of Wildlife Fisheries and Parks, Alabama Department of Conservation and Natural Resources, United States Fish and Wildlife Service, United States Geological Survey, Tennessee Valley Authority, United States Army Corps of Engineers) to build an array of stationary telemetry receivers in the Tennessee and Cumberland Rivers to monitor upstream movement of silver carp, specifically passage through lock chambers.

#### Asian Carp Deterrent Testing at Lake Barkley Lock

KDFWR is partnering with several agencies (U. S. Fish and Wildlife Service, U. S. Geological Survey, University of Minnesota, Fish Guidance Systems, and U. S. Army Corp of Engineers) to conduct field testing of a Bio-Acoustic Fish Fence at the downstream approach to the Lake Barkley Lock chamber. A research team has been established and is currently developing a study plan for research to be conducted to determine the efficiency of the BAFF for deterring Asian carp movement. In 2017, KDFWR deployed stationary receivers and began tagging silver carp with acoustic transmitters in the Lake Barkley tailwaters in an effort to quantify upstream movement of silver carp through the lock chamber prior to construction of the BAFF system. KDFWR will continue to tag silver carp, other Asian carp species, and some native fish species to monitor movement through the lock chamber prior to and after

installation of the BAFF. The BAFF is scheduled to be deployed in June of 2019. KDFWR will continue to provide support to the research team throughout testing of this system. KDFWR also worked with neighboring state natural resource agencies to develop a strategic plan for Asian carp barriers in the Tennessee, Cumberland, and Ohio Rivers, for implementation once funding becomes available.

#### Incidental Black Carp Detections and Monitoring Efforts

In November of 2017 a commercial fisherman captured a black carp in Lake Barkley while targeting silver carp. This was the first reported capture of a black carp in the Cumberland River system, and the furthest upstream capture in the Ohio River Basin. In 2018 two more black carp have been captured in the Cumberland River system; one by a commercial fisher in Lake Barkley, and one by a bow fisher in the tailwaters of Barkley Dam. In addition, one black carp was captured by a commercial fisherman in Kentucky Lake, which was the first reported capture of a black carp in the Tennessee River system. In response to these captures, KDFWR partnered with the U. S. Fish and Wildlife Service to conduct targeted black carp sampling efforts. These efforts did not capture any additional black carp in the Tennessee or Cumberland River systems. All black carp reported captured to date in these river systems have been sexually mature, diploid adults, and have been sent to the appropriate USGS and USFWS laboratories for analysis. Additionally, KDFWR staff captured a young of year black carp in Gar Creek, a tributary of the Ohio River in Ballard County, Kentucky. This black carp was captured during routine sampling conducted by the Ichthyology branch staff of KDFWR, and was tentatively identified as a black carp by the state ichthyologist, Matt Thomas. The fish was sent to the USGS for further analysis and was confirmed to be a young of year black carp. This finding is significant as this is the first reported capture of a young of year black carp in the wild outside of the Dutchtown ditch, southeast of Cape Girardeau, Missouri.

## MISSOURI REPORT

Submitted by Kenda Flores and Joe McMullen

### **Creve Coeur Asian Carp Removal Project, January 29 – February 21, 2018**

#### *Problem*

- Around 2009, Asian carp (AC) began entering Creve Coeur Park Lake (St. Louis County) during large Missouri River floods and to a lesser extent from the Missouri River connection to the lake from Creve Coeur Creek.
- After each flood event, the AC population density increased affecting native fishes and lake users. Crappie fishing got much worse. Paddlers and rowers encountered jumping AC. AC fishkills cropped up as they overpopulated the lake.
- Traditional fish removal techniques attempted and failed to remove AC, 2015-16. Bow fishing deemed ineffectual. Commercial fishing permission denied.
- USFWS attempts with Paupier boats ineffectual.
- Two MDC/USFWS populations estimates made – average 59,000 AC

#### *Unified Method*

- Culmination of 18-month planning process involving MDC STL Region, MDC BRWFS, USGS, USFWS, STLCO Parks, ILDNR, and ILNHS.
  - Use Unified Method, with additional techniques (EF herding, acoustics, sonar)
  - Use of > 1.75 mile of netting
  - Add'l “forwarding the science” techniques including: eDNA and hydro-acoustic population estimates, radio telemetry to document fish movements, Iruka harvest net
  - Continual project for 21 days straight, 10-16 work days involving 20-35 people and 8-10 boats daily. Most staff and equipment came from Federal government. MDC staff from STL Region Fisheries and D&D, CE Region Fisheries, and BRWFS.

#### *Results*

- Removed 119.2 tons of Asian carp in 10 dumpsters. We estimated that to be about 47,000 fish 85% of the fish in the lake. Since remaining Asian carp cannot reproduce in the lake, we consider this a very successful result.
- By-catch of native species was extremely low, literally only hundreds of fish (mostly drum, gar, and buffalo). No bass and only about a dozen crappie were observed in our nets.
- Fish were disposed in landfill, per MDC WILDLIFE CODE. Regulation changes?
- Demonstrated Unified Method to be first successful tool to selectively remove AC, with minimal impact on native species. Could have potential for use by commercial fishermen. Regulation changes?
- Expect native fisheries to restore themselves, including improved crappie fishing within 3-5 years.
- Expect negative interactions with lake users to be greatly reduced.

- All nets, equipment, and supplies have been removed from the park. STL D&D restored the condition of the beach areas.
- Kevin Meneau had over 150 public inquiries and 40 media contacts (as far away as National Geographic TV) regarding this project.
- With respect to staff and costs, USGS/USFWS staff time easily dwarfed that of MDC and averaged at least 20 people/day for the entire project and use of 8 boats/day. Over 30 USGS/USFWS staff were present on the busiest days. Project costs were similar with USGS/USFWS expenditures greatly exceeding those from MDC. Fisheries material purchases and share of landfill/dumpster charges (~\$6000) were about \$7000

### **FY18 Annual Interim Report on the Collaborative Strategy for Deterrent Barrier Research, Design, Implementation and Assessment to Minimize the Spread of Asian Carps in the Upper Mississippi River**

#### *Project Highlights:*

Objective 4 - Quantify native and non-native fish passage at lock and dam 19, 15, and 14 as an assessment tool for the future testing of Asian carp deterrents.

- Transmitters were implanted into an additional 44 Bighead Carp, 47 Silver Carp, and 41 Paddlefish. To date 465 native and invasive fish have been tagged and 407 were active during the year of 2018. The smaller transmitters put in Walleye, Sauger, and American Eel are expired and some of the Lake Sturgeon and Asian carp tagged in this area prior to the study have also expired.
- During the three years of the study (2016-2018), 90 individual fish (some of those with multiple entrances) were detected in the lock chamber (for a total of 167 entrances), and 22 of those fish were detected on the receiver upstream of the chamber for a total of 27 passage events
- Of the 115 (46%) of Asian carp (Bighead, Silver, Hybrid Asian Carp, and Grass) that approached the lock chamber, 28 (14%) entered the lock chamber, and only 2 (1%) passed upstream into Pool 19
- Only Bighead Carp, Grass Carp, Bigmouth Buffalo, Paddlefish, Flathead Catfish, and Walleye were detected and assumed to have passed upstream into Pool 19.
- Two of the Paddlefish passage events were downstream back into Pool 20.
- Although 29 of 53 Lake Sturgeon (55%) were detected in or approaching the lock chamber, none were detected moving into Pool 19.
- Four fish (2 Bigmouth Buffalo, 1 Paddlefish, and 1 Grass Carp) were detected passing through the lock chamber into Pool 19, but then returned to Pool 20 without being detected by any of the receivers on the dam above or below.

#### **Black Carp:**

In 2018 MDC staff caught 72 YOY/Juvenile black carp near Cape Girardeau, MO ranging in size from 22 to 138 mm. Staff also caught 3 adults while sampling for the Paddlefish and Alligator Gar projects. One was a reproductive adult and was picked up by USGS researchers to be used in their study. Three adult black carp were collected and reported by commercial fishers on the Missouri River near Hermann, MO.

# 2018 Hydrilla Eradication Summary

One of the new projects that was tackled in 2018 was hydrilla monitoring in a large waterbody. By following the protocol that was developed for Lake Manitou near Rochester, Indiana (similar in size to Fellows Lake), a more strategic monitoring plan was developed and implemented. ESRI's Collector App was incorporated as the data collection mechanism. This took some effort on the front end to setup but greatly streamlined data collection in the field. These surveys or portions of them will be able to be replicated with comparable data effort from year to year.

The following are additional highlights from 2018:

## **Treatments and Monitoring:**

- Started the year with 34 known hydrilla sites in southwest Missouri. Two of these sites were already in the "monitoring-only" phase due to early detection.
- Treated the remaining 32 sites throughout the growing season which required conducting a total of 121 individual treatments. This was less than expected due to the dry summer.
- Stocked Grass Carp at eight sites and requested additional fish for select sites in 2019.
- City Utilities of Springfield (CU) evaluated 68 water samples for fluridone levels throughout the treatment season. This partnership ensured target fluridone rates were being maintained with the variable flow conditions at many of the sites and allowed us to adjust the treatment rates as needed (minimize product waste).
- By the end of the 2018 growing season, nine additional sites reached the criteria to go to "monitoring-only" in 2019 by having another year with no tubers or biomass detected.

## **Fellows Lake Highlights:**

With the 2017 hydrilla find in the upper end of the Little Sac Arm of Fellows Lake, intensified monitoring and inspection efforts continued:

- Department staff collected 50 more sediment samples from the known hydrilla area on May 10 and no tubers were detected. Since the detection of hydrilla, we have collected 150 sediment samples and still have not found a single tuber or turion.
- Treated the known stand area at Fellows Lake. In 2018, the water level was lower, so a total of four acres was treated on May 23 with 19.1 pounds of Sonar PR (30 ppb). Water levels continued to drop, leaving the majority of the area dry by mid-June. It remained that way for the remainder of the growing season. No additional treatments were needed.
- On June 18, 17 Department staff and working group members conducted intense plant biomass monitoring of the known stand and the surrounding area above the causeway on Farm Road 197. They used a combination of visual (snorkeling and heron-style) and 4-Rake Toss methods to search the area. Again, hydrilla was not detected. A total of 83 visual and rake toss collections were conducted in this area.
- Staff from the Department, CU, and Watershed Committee of the Ozarks (WCO) conducted intense inspection efforts on the rest of the lake on June 19. Again, multiple search methods were used including diving with a total of 270 sites surveyed. Hydrilla was not detected.

- Additional smaller scale search efforts were also conducted on July 17, August 2, and August 28. Hydrilla was not detected.
- Efforts from the five monitoring/inspection events:
  - A total of 452 sites surveyed:
    - Visual methods (snorkel, dive, and heron-style) were used to survey 39 lines totaling 1.49 miles.
    - A total 403, 4-Rake Toss surveys were conducted.
    - 10 visual (heron-style) spot surveys were taken where clarity allowed clear view of the substrate.

#### **Stockton Lake and Pomme de Terre Lake:**

- Corp of Engineers staff inspected public access points during the summer months. Hydrilla was not detected.
- MDC staff inspected the Aldrich area of Stockton Lake. They divided up a 667-acre portion of the lake into 10 sections and conducted a minimum of 4, 4-Rake Toss surveys in each section. Hydrilla was not detected nor were any other aquatic plants.

#### **Inspections:**

- Inspection numbers for the Aquatic Nuisance Strike Team were lower this year due to the concerted efforts at Fellows Lake and the Aldrich area on Stockton Lake. They completed 68 site inspections outside of the previously mentioned activities.
- External partners completed 85 additional inspections with Mitch Jackson and Stanton Raines leading the way by conducting 45 and 38 inspections, respectively, throughout the summer at the Corps of Engineers access areas at both Pomme de Terre and Stockton lakes.
- To date, 1,665 hydrilla inspections have been conducted statewide with most them being in southwest Missouri.

#### **Outreach:**

- Hosted two Hydrilla Identification Trainings for Stream Teams in Southwest Missouri. Only 11 members attended.
- Assisted with pond workshop which included aquatic plant ID, along with hydrilla, at Powell Gardens in Johnson County.
- Hosted a booth at the Springfield Lawn and Garden Show where we had information on hydrilla and other aquatic plants.
- Hosted an aquatic nuisance species display at River Jam.
- Developed a flyer on using native aquatic plants in backyard water gardens.

In summary, 2018 inspection efforts yielded **no new sites**. Several sites are being changed to “monitoring-only”. This means starting the 2019 treatment season there will be only 23 active treatment sites. Almost one-third of sites have made it to the next phase where they will be monitored for any signs of hydrilla at three different times during the growing season for the next five years. If a site stays hydrilla-free for the next five years, then it will be declared eradicated.

**Mississippi's Freshwater ANS Report for the  
Mississippi River Basin Panel on ANS  
April 2019 Meeting – Cadiz, Kentucky  
By  
Dennis Riecke  
Mississippi Department of Wildlife, Fisheries, & Parks**

**New Activities from July 2018 – March 2019**

**Aquatic Plant Control Activities**

Chemically treated about 604 acres of Cuban Bulrush (*Oxycaryum cubense*), Water Hyacinth (*Eichhornia crassipes*), Alligator weed (*Alternanthera philoxeroides*) and Giant Cutgrass (*Zizaniopsis miliacea*), in Ross Barnett Reservoir. The main plant treated (80%) was Water Hyacinth. We chemically treated (Harpoon + Diquat) 95 acres of Hydrilla (*Hydrilla verticillata*) and chemically treated 4 acres of Giant Salvinia (*Salvinia molesta*) in Pelahatchie Bay.

Chemically treated (Harpoon + Diquat) 2 acres of Hydrilla (*Hydrilla verticillata*) at JP Coleman Marina on Pickwick Lake.

Chemically treated Water Hyacinth (*Eichhornia crassipes*) at Lake Bogue Homa.

Chemically treated Giant Cutgrass (*Zizaniopsis miliacea*) and Common Salvinia (*Salvinia minima*) at Percy Quinn State Park Lake. C

To limit the spread of Giant Salvinia at Ross Barnett Reservoir containment booms were deployed and nets were placed in Pelahatchie Bay to prevent boating access in this area. In October 2018, all the boat ramps were closed and homeowners are prohibited from using their boats docked in this area.

**Other Activities**

Attended meetings (September 2018, January 2019, and March 2019) of the Mississippi Aquatic Invasive Species Council to guide implementation of the activities specified in the *Mississippi State Management Plan for Aquatic Invasive Species*.

Conducted 4 one acre rotenone sampling fish population assessments to assess the effect of Silver and Bighead carp on native fish density, biomass, and population composition.

Attended the First International Snakehead Symposium and the Mississippi River Basin Panel on ANS in July in Alexandria, VA.

Gave presentation on Mississippi ANS activities at MS-LA agency fish biologists meeting.

MDEQ personnel purchased and posted 50 more Northern Snakehead awareness and reporting signs along the Mississippi and Yazoo River boat ramps.

Updated and distributed the Asian Carp Buyer/Seller list. Provided information and issued special permits for the harvest of Asian Carp from Moon Lake. Coordinated incentive payments of 5 cents per pound from Moon Lake Improvement Club to Moon River Foods representative.

Completed live bait survey for MS River Basin Panel on ANS.

Completed ANS Survey sent by Stanford Univ. and UC Davis.

Printed more Northern Snakehead informational brochures.

Designed a Northern Snakehead and Bowfin identification and reporting adhesive fish measuring ruler.

Developed a Mississippi Aquatic Invasive Species Council informational brochure.

Set up the Mississippi Aquatic Invasive Species Council informational display at the 2019 Mississippi Water Resources Conference and the 2019 MS Chapter AFS Meeting.

Revised, printed and distributed a Stop Aquatic Hitchhikers in Mississippi informational brochure.

Reviewed and revised Lower Mississippi River Asian Carp Control Strategy document.

Edited two Snakehead Symposium manuscripts.

Submitted annual report for federal ANS grant.

Coordinated public awareness campaign (flyers, boat ramp signs, news releases) regarding preventing the spread of Giant Salvinia at Ross Barnett Reservoir with the Pearl River Valley Water Supply District.

Reported all Giant Salvinia occurrences to the USGS NAS database.

Did a radio show Mississippi PBS on aquatic invasive species.

Submitted funding requests to the USFWS to use federal ANS funds for:

- Contract fishing to remove Asian Carp from Pickwick Lake
- Invasive aquatic plant identification and treatment sheets.
- Invasive aquatic plant surveys of public waters.

Asian carp sampling in Pickwick Lake with Tennessee Tech U and USFWS. Tagged 30 Silver Carp with acoustic transmitters with TN Tech.

### **New Detections**

Giant Salvinia (*Salvinia molesta*) was found in Aliceville Lake and Lake Okhissa.

### **Ongoing Activities**

Asian Carp Telemetry Project on Pickwick and Tenn-Tom Waterway.

Continue to participate in the Mississippi Aquatic Invasive Species Council to guide implementation of the activities specified in the *Mississippi State Management Plan for Aquatic Invasive Species*.

Continued distributing “Stop Aquatic Hitchhiker” cards along with all initial boat registrations and boat renewal registration cards that are mailed out.

Continued printing The Stop Aquatic Hitchhiker logo and bullet list in the annual regulation guides --- *Mississippi Outdoor Digest*, (375,000 copies printed each year) and the *Digest of Mississippi Freshwater Commercial Fishing Laws and Regulations* (8,000 copies printed each year)..

Links to the Mississippi River Basin Panel on Aquatic Nuisance Species and the Gulf and South Atlantic Panel on Aquatic Invasive Species, Stop Aquatic Hitchhiker and Habitattitude websites are on the department website.

The Mississippi Museum of Natural Science has a permanent exhibit on exotic species.

### **Future Activities**

Continue surveying state lakes for aquatic invasive plants.

Develop management and control fact sheets on invasive aquatic plants.

Continue chemical treatments of Giant Salvinia at Ross Barnett Reservoir and survey reservoir for new occurrences.

Purchase aquatic herbicides and hire contractors to treat public and private waters infested by invasive plants.

Continue telemetry project for Asian Carp in TN River and Tenn - Tom Waterway. Continue to sample for Asian Carp in Pickwick, Divide Cut, and Bay Springs Lake.

Continue to monitor Giant Salvinia in Pickwick and the Tenn - Tom Waterway. Treat as needed in Pickwick.

Compose freshwater fishing bait regulations to specify what bait can be legally, sold, possessed, transported and used in Mississippi.

Seek approval of legislation required to initiate licensing of retail bait outlets selling live freshwater fishing bait.

Adopt a list of approved, restricted and prohibited species under the authority specified in MS Code 49-7-80 and as specified in the *Mississippi State Management Plan for Aquatic Invasive Species*. Amend list of approved, restricted and prohibited species as specified in the public notice that regulates aquaculture activities in Mississippi.

Establish an EDRR monitoring program comprised of state and federal personnel who sample aquatic species in Mississippi public waterways on a routine basis.

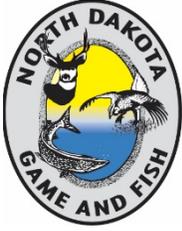
Submit backlog of reported nonnative species occurrences to ANS database.

Work on revisions to the *Mississippi State Management Plan for Aquatic Invasive Species*.

## Nebraska Update

Contact: Allison Zach Coordinator, Nebraska Invasive Species Program, Email: [azach3@unl.edu](mailto:azach3@unl.edu),  
Phone: (402) 472-3133, Website: <https://neinvasives.com/>

The Nebraska Game and Parks Commission will be employing 6 seasonal technicians conducting watercraft inspections at high risk waterbodies throughout the state this year. Technicians attend fishing tournaments and outreach events during the season. Boater surveys have been conducted in Nebraska since 2012 and the focus on the program is now to focus on watercraft inspections rather than gathering clean, drain dry behavior data from boaters. A CD3 unit (waterless clean, drain, dry unit) will be installed at Weigand marina (at Lewis and Clark lake near Yankton, SD) and open for free use to the public estimated in early May for installation. Waterbodies are sampled throughout the state for zebra and quagga mussels and water samples are sent to the Montana lab for analysis. A waterbody in Omaha, NE was drawn down in the fall of 2018 to freeze and eradicate a newly established zebra mussel population at Glenn Cunningham Lake. The lake will be left to naturally refill in 2019-2020 and will be regularly sampled for veligers. There are 4 zebra mussel positive waterbodies in Nebraska (Missouri River, Lewis & Clark Lake, Lake Yankton and Offutt Air Force Base Lake (Bellevue, NE). There are 2 suspect waterbodies in Nebraska including Carter Lake (on the Omaha/Iowa border) and Lake Zorinsky (in Omaha, NE which was drained in 2010/2011 to kill zebra mussels) (it will be delisted in June 2019 if no adults or veligers are found before then). A single water sample at each of these waterbodies were found to have zebra mussel larvae in 2017 and 2016 respectively. Quagga mussels have not been found in Nebraska.



# North Dakota ANS Management Program

## *Report to the Mississippi River Basin Panel on ANS management for fiscal year 2019*

**Report submitted:** March 21, 2019

**Submitted by:** Jessica Howell, ANS Coordinator

### **Major Accomplishments and on-going works**

1. **Multi-media outreach campaign** – In 2018 we began implementation of a contract with a private company to fund a statewide, multi-media ANS I/E effort; completed multiple internal webcast, video, press releases, and website updates; and met with various user groups to present information about ANS. Our new contractor presented a positive message that focuses on current fishing opportunities in North Dakota to a regional audience, which was a newer approach for our outreach efforts.
2. **Seasonal boater surveys and voluntary inspections** – We contracted work of four seasonal employees to conduct voluntary boater surveys and inspections at high-use locations in ND. Over 1,100 surveys and inspections were conducted, and no ANS were found.
3. **Trainings** – We completed 5 statewide trainings in 2018 to 20 state, federal, and tribal staff that conduct routine work in North Dakota waters about ANS issues and specific ways to prevent the spread during their field activities. North Dakota Fisheries staff were also given a refresher in March 2019.
4. **ANS sampling** – We conducted regular monitoring of the Red River for zebra mussels; conducted early detection sampling on 180 non-infested waters for zebra mussels and other ANS; and conducted regular monitoring on the James River for silver carp.
5. **Coordination** – We hosted two ND AIS Committee meeting (held every spring and fall); met with various ND user groups and water advisory boards; and attended regional coordination meetings; and updated the ND ANS management plan. Through these efforts, the ND State Water Commission included language in their permits to require inspections on equipment last used outside of North Dakota or in a Class I ANS water.

Ohio – Submitted by John Navarro, Ohio Department of Natural Resources

- Continued control efforts of *Hydrilla* in the Ohio River basins.
- Continued to monitor for Bighead Carp and Silver Carp in Lake Erie and the Ohio and Muskingum Rivers using eDNA, routine sampling activities, and telemetry.
- Developed the *Lake Erie Grass Carp Response Strategy* to provide a road map for the next five years.
- Continue to investigate closure options for the four GLMRIS connections in Ohio at Little Killbuck Creek, Ohio Erie Canal, and Grand Lake St Marys. The USACE has initiated the closure of the Ohio Erie Canal connection; USACE is reviewing the preliminary closure designs at Little Killbuck Creek; and we are implementing the final phase for closing the connection at Grand Lake St Marys.
- Continue the surveillance of Ohio's bait and Grass Carp supply chain to determine if AIS, including Bighead and Silver Carp, are being transported through the bait trade.
- Continue an AIS outreach campaign through Wildlife Forever to target anglers moving bait. This outreach program includes billboards, print media, and items for distribution at events with the slogan "Trash Unused Bait".
- In partnership with Ohio Sea Grant, The Ohio State University, and ODNR Division of Wildlife, published and distributed the "*Ohio Field Guide to Aquatic Invasive Species*".
- Participated in the following groups: Great Lakes Panel, Mississippi River Basin Panel, Ohio Aquatic Invasive Species Committee, and Asian Carp Regional Coordinating Committee.
- Developed a risk assessment policy to screen potential new aquatic invasive species and will be adding New Zealand Mudsnail and Marbled Crayfish as Injurious species.

# Oklahoma ANS Management Program

Final Report to the U.S. Fish and Wildlife Service for  
January 1 2018 – December 31, 2018

Prepared by Curtis Tackett  
Aquatic Nuisance Species Coordinator  
Oklahoma Department of Wildlife Conservation

## Summary

The Oklahoma Department of Wildlife Conservation's (ODWC) Aquatic Nuisance Species (ANS) Program includes outreach, education, research, monitoring, and coordination on an interstate and basin level. ODWC has been closely involved with the Oklahoma Invasive Plant Council (OKIPC), the Mississippi River Basin Panel (MRBP), and the ANS Task Force to discuss new invasive species threats to southern waters, research opportunities for emerging ANS issues, and strategies for outreach to user groups. The ANS coordinator serves on the Outreach and Education committee for the MRBP and attended the annual coordination meeting via teleconference in July of 2018 as well as the corresponding Snakehead Symposium that was held in conjunction with the panel meeting. The ANS coordinator also serves as an active board member for the OKIPC. The OKIPC is a non-profit organization that serves as a clearinghouse for invasive plant information. Board member involvement includes attending quarterly board meetings/conference calls, assisting in making decisions for steering the council's outreach efforts, and helping with organizing and development of the annual meeting. The OKIPC held a business meeting February 2018 at the Oklahoma Natural Resources Conference (OKNRC) in Tulsa, OK and the ANS coordinator attended and provided an ANS update to the Board. The ANS coordinator attended various conference calls with the board throughout this reporting period and worked on various outreach efforts through the Council including fact sheets for the website and preparing materials for the upcoming National Invasive Species Awareness Week in 2019. The ANS coordinator will also be attending the OKNRC in Tulsa, OK during February 2019 to attend the OKIPC board meeting and assist with the invasive species presentation session and educational booth.

The ANS coordinator attended the ODWC Fisheries Division annual meeting during June 2018 and provided a statewide ANS update to all fisheries staff and administration that were in attendance. This included updates about the statewide invasive aquatic plant detection project funded through the State Wildlife Grants (SWG) program as well as updates on zebra mussel and Asian carp distributions throughout the state.

The ANS coordinator is continuing a partnership with Oklahoma State University (OSU) and Lake Carl Blackwell staff in regards to the treatment and management of Yellow Floating Heart (*Nymphoides peltata*) in Lake Carl Blackwell in Payne County. ODWC has purchased herbicide and application surfactant for OSU and contractors to apply to the plant in various coves during the summer months of 2018. The team

also applied a benthic mat on the stands of plants near the water intake structure during July/August to inhibit growth of these stands. The success of the benthic mat method is being monitored and applications are scheduled to continue during 2019. Treating this new “source population” in Lake Carl Blackwell is important to ensure that the plant does not spread to other nearby lakes and potentially have statewide impacts as the plant is easily spread by waterfowl and boaters.

As an early detection effort, ODWC in coordination with the Tishomingo USFWS Office continues to sample a list of Oklahoma Lakes where zebra mussels have not been detected. Lakes that were sampled during this time reporting period were Holdenville City, Konowa, Arbuckle, and Tenkiller Lakes. Samples were sent to the BOR lab in Denver for analysis and results. Results indicated no detections of zebra mussel veligers in these water bodies. All sample analysis records are kept in an online database housed by the BOR for multiple states. Discussions with the BOR revealed that they are currently sampling all BOR lakes within OK twice annually which will decrease the number of lakes that ODWC/USFWS will need to sample. No lakes were sampled during the fall of 2018 due to scheduling conflicts between field staff but we will be sampling a list of lakes during the spring months of 2019.

ODWC's fisheries division also maintains a Hazard Analysis and Critical Control Points (HACCP) program to ensure that all watercraft and sampling gear are decontaminated. Each fisheries regional office has a heated pressure washer and approved chemicals to treat their equipment before entering a new body of water. This program has been broadened to other divisions within the wildlife department as well as other state and federal agencies and universities.

## **Major Accomplishments**

### **1A Coordinate ANS Management Programs**

The ANS coordinator brings together other state and federal agencies within Oklahoma and also on an interstate level to coordinate meetings with stakeholders, user groups and the general public. The ANS program relies solely on securing federal funds for the existence of the program and for committing a coordinator role to implement the ANS Management Plan.

### **1B Support regional efforts for control of ANS in Oklahoma**

ODWC is actively involved in the MRBP, MICRA, and ANSTF and also supports work of the 100th Meridian for data sharing and coordination of ANS related activities on a regional level. The coordinator also stays up to date on the Western Regional Panel and what ANS issues the western states are facing. The ANS coordinator also serves on the Outreach and Education committee for the MRBP and worked with the committee chair to run the committee meeting and address agenda items and new ideas. The coordinator also works with Wildlife Diversity program staff to develop invasive species needs as they relate to species of greatest conservation need (SGCN) and assists in reviewing proposals for the State Wildlife Grant (SWG) program. An ANS priority was developed and included in the fall 2017 Request for Proposals for the State Wildlife Grant program as well as the Sportfish Restoration program. Proposals are currently being reviewed by the review and ranking team. During 2018 we selected for funding two crayfish projects

through the SFR program that have invasive species components and expanded the ANS priority on the RFP to include Asian Carp population dynamics within the Red River and to also include the potential for multistate projects. The SWG proposal ranking committee has completed the review and ranking process and preliminary information shows that we will be potentially funding an Asian Carp project focused within the Grand Lake watershed that includes eDNA sampling followed up by eradication attempts. This project would be slated to begin January 1, 2020.

ODWC and the ANS coordinator are providing technical assistance to Oklahoma State University and Lake Staff at Lake Carl Blackwell to pursue treatment options for a newly established aquatic invasive plant, Yellow Floating Heart as well as the continuation of the Invasive Aquatic Plant SWG project that is scheduled to be finished with field work during 2019.

The coordinator has been working with the USFWS and the Lower Mississippi River Conservation Commission (LMRCC) on the drafting of the Asian Carp Control Strategy Framework for the Arkansas River and Red River Basins and will be providing comments to the authors soon to ensure that the OK needs are captured accurately in the document. This plan could potentially open up funding sources in the future for OK to conduct Asian Carp management throughout these two watersheds.

### **1C Permanent Funding Mechanism**

ODWC's ANS program relies on federal funds from the USFWS to support the ANS coordinator and most of the operations of the program. ODWC has viewed the ANS program as successful and has dedicated state funds to supplement the program. The ANS coordinator submitted the grant proposal for the USFWS funding for the implementation of the state ANS management plans and will continue to submit these proposals and necessary reports on an annual basis as long as funding is available to states for the implementation of the ANS Management Plans.

### **1D Evaluate ANS Plan Progress**

The ANS boater survey was completed in 2009 and a final report with additional data was submitted in 2010. The ANS plan was updated in 2010 and is due for an official update and approval by the ANS Task Force. ANS awareness has definitely increased across the state due to the outreach efforts of ODWC and other stakeholders and agencies. Year 2017 will be dedicated to sampling for invasive and native crayfishes in Northeast Oklahoma, continued outreach efforts of ANS throughout the state including boat ramp stencil paintings, zebra mussel veliger sampling during the fall, possible revisions of the ANS Management Plan, and new outreach ideas and efforts will be pursued. The ANS coordinator will also continue to work with the University of Oklahoma and their State Wildlife Grant project looking at the distribution of invasive aquatic plants throughout the state.

In 2019 ODWC will be launching a newly updated angler survey to get feedback from our constituents about their fishing experiences in Oklahoma. The ANS coordinator has worked with our Human Dimensions specialist to develop questions in the survey about Aquatic Nuisance Species in OK. This will be a unique way to receive feedback from the public about invasive species in our state. The questions were pulled from the ANS boater mail out survey that ODWC completed in 2009 and modified to fit the

information need for now 10 years later. We are looking forward to seeing the results from the survey and the ANS coordinator is hoping to be able to use the updated data to help guide the near term future of the program.

## **2A Identify ANS that have the greatest potential to infest Oklahoma**

A distribution list of ANS in Oklahoma as well as a detailed map has been generated by the ANS coordinator and displayed in several publications and presentations. Oklahoma State University has completed a risk assessment/ modeling project of zebra mussels and bighead carp in the state and the final report was submitted and the work was published last year in *The Management of Biological Invasions* journal. Currently the biggest threat to Oklahoma's fisheries and aquatic resources are bighead and silver carp, aquatic invasive plants, and zebra mussels. The University of Oklahoma is conducting an aquatic invasive plant project through our State Wildlife Grants program and one of the end results will be a detailed map of updated distributions of non-native invasive aquatic plant species. A detailed distribution list of all ANS in OK has been compiled to date and sent to other state governmental agencies. The ANS coordinator was successful in the addition of an ANS priority on the Request for Proposals (RFP) for both the State Wildlife Grants Program and the Sportfish Restoration Program. Proposals. The ODWC is currently funding 2 invasive crayfish projects through Sportfish Restoration and will potentially be funding an Asian carp project in the Grand Lake watershed that will begin January 1, 2020. The ANS coordinator will also be launching an email campaign to anglers to gather updated information about the distribution of Bighead and Silver Carp in eastern OK waters including reservoirs and large rivers.

## **2B Establish approaches to prevent new ANS introductions**

Since 2010, several regulation changes were proposed and approved. ODWC has changed import/export requirements for all loads of aquatic wildlife crossing Oklahoma's borders. Each transporter must receive an approved import/export permit for each load of aquatic wildlife prior to entering or leaving the state. It is now illegal to launch any watercraft into public waters with attached zebra mussels and or aquatic vegetation. Oklahoma has also prohibited the sale of diploid grass carp for stocking in private waters. Only triploids may be stocked in private waters. Shad may not be transported from "Asian Carp Infested Waters". This list of waters is set by the fisheries division and is subject to change on an annual basis through the Oklahoma Fishing Guide. Rusty Crayfish and Australian Red Claw Crayfish have also been added to the restricted species list of aquatic wildlife. One new regulation that was passed during 2017 was to prohibit the stocking of any aquatic organism into public waters without ODWC's Director's approval including fish, plants, mussels, crayfish etc. This regulation went into effect in 2018. The ANS coordinator is currently working on rule change proposals that could assist with eliminating the potential for interbasin transfer of fish species and will bring these topics to the rule change committee this year for review.

### **3A Implement a surveillance and early detection program**

The ANS coordinator continues to serve on the board of directors for the Oklahoma Invasive Plant Council. The OKIPC has a citizen science program that reaches out to other volunteer groups for the reporting of invasive plants throughout OK. Outreach efforts have been accomplished in various ODWC publications for the purpose of the public reporting ANS especially Asian Carp and Zebra Mussels. The coordinator along with I&E staff developed an online citizen science page on the ODWC website that allows for the reporting of invasive species as well as provides links to the OKinvasives.org website and the OKIPC website.

The ODWC is currently funding a project through the State Wildlife Grants program involving the establishment of Aquatic Invasive Plants in Oklahoma. This project includes surveying public lakes statewide for seven target species: Hydrilla, Brazilian Waterweed, Parrot Feather Watermilfoil, Eurasian Milfoil, Australian Water Clover, Yellow Iris, and Purple Loosestrife. After data is collected, a distribution map will be generated for these aquatic invasive plant species throughout Oklahoma. Monthly reports from the principal investigator already show some new occurrences for some invasive aquatic plant species. The project summary will be provided when the project is completed.

The coordinator continues the zebra mussel veliger early detection program and limited sampling was accomplished during this report period. ODWC in coordination with the Tishomingo USFWS Office continues to sample a list of Oklahoma Lakes where zebra mussels have not been detected. Lakes that were sampled during this time reporting period were Holdenville City, Konowa, Arbuckle, and Tenkiller. Samples were sent to the BOR lab in Denver during January for analysis and results. Results from the analysis did not detect any new occurrences for zebra mussel veligers. Sampling will continue during the spring months of 2019.

### **4A Limit ANS dispersal across state**

The Hazard Analysis and Critical Control Points (HACCP) program is implemented each year. The ANS coordinator reviews HACCP logs from fisheries personnel quarterly and reports and assists staff with HACCP questions and in developing procedures. It is crucial that ODWC must enforce a decontamination program within the agency and the ANS coordinator has reached out to other agencies to enforce the same policy for watercraft and sampling equipment.

The ANS coordinator has been meeting and coordinating with staff at Lake Carl Blackwell regarding the treatment and possible eradication of Yellow Floating Heart on the lake. This is the first known widespread establishment of this species in Oklahoma and ODWC will continue to coordinate with the Lake Staff and Oklahoma State University regarding treatment options. The first round of herbicide treatments were completed during the summer of 2018 with some positive results in certain coves of the lake and benthic matting was conducting near the water intake structure with some positive results. This combination of treatments has knocked back the infestation to a small degree but the plan is to conduct more herbicide treatments during 2019 using a different herbicide variety which the team is hopeful will produce better results.

The ANS coordinator is currently working on ODWC rule change proposals to limit the spread of native and non-native species through inter-basin transfers of fishes in the bait trade and commercial minnow harvests.

## **5A Educate the public about ANS**

The ODWC maintains a number of publications and media to promote awareness about ANS. These include our fishing guide regulations, the Lakes of Oklahoma publication, the ODWC website, the Outdoor Oklahoma TV show and magazine, Zap the Zebra and Don't Free Lily brochures, various watch cards, and a number of other pamphlets and stickers.

The coordinator operated the Aquatic Nuisance Species educational booth at ODWC's annual Wildlife EXPO during the fall of 2017 with the help of other Wildlife Diversity staff. The total attendance for the 3-day event was estimated at 26,000 people. The event provided various ANS educational materials to the public in the form of display posters, brochures, and various informational games that the public could play to learn about invasive species such as Asian carp and zebra mussels.

The coordinator worked with I&E staff to design and print 6 new outreach signs to be posted at boat ramps and access areas. These signs include Yellow Floating Heart, Clean Your Gear Lake Carl Blackwell, Clean Your Gear Lake McMurtry, Clean Your Gear general, Didymo Algae, and Zebra Mussels. These signs were distributed to regional fisheries staff during 2018 and posted at appropriate access areas and boat ramps.

The ANS coordinator along with regional fisheries staff and staff with Oklahoma City worked to produce press releases to inform the public about a recent infestation of zebra mussels in Lake Overholser in Oklahoma County. The press release was sent out through local media outlets early this year in January/February. ANS coordinator also met with NW regional fisheries staff and BOR staff in August 2018 to confirm the presence of zebra mussels in Foss Lake and worked with internal staff to produce a media press release to notify boaters and anglers. Coordinator has been working with BOR and NW regional staff on outreach tools for the area. We also coordinated with the OG&E staff to develop zebra mussel signage for posting at Sooner Lake; signs were developed and posted during fall of 2018.

The ANS coordinator gave an ANS presentation/program to an Environmental Sciences graduate class at Oklahoma State University and highlighted several species, their occurrences in OK and also ANS program outreach efforts. The coordinator also gave an ANS program to a sister state agency, The Oklahoma Lands Commission. The coordinator also has two ANS programs already scheduled for 2019 for the Lake Thunderbird sailing club and a wildlife and fisheries management course at Northeastern State University.

The coordinator updated the Oklahoma Fact Sheet on ANS for the MICRA D.C. fly-in with local state representative.

The ODWC has partnered with the National Park Service and the Chickasaw National Recreational Area to launch an outreach campaign for the Area and Lake of the Arbuckles.

### **5C Train natural resource workers in ANS**

The ANS coordinator regularly meets with ODWC staff as well as other state agencies to discuss updates on the distribution of ANS and management efforts. The coordinator regularly gives ANS updates at the quarterly wildlife diversity meetings, the OKIPC board meetings, the Conservation Exchange Group meeting, Fisheries Division meeting, and various other stakeholder meetings.

The coordinator also moderated the invasive species session at the OK Natural Resources Conference in February which brought together a wide variety of natural resource professionals involved in invasive species work across the state.

### **5D Educate private industry on the laws regulating and effects of ANS**

The ANS coordinator continues to review and issue all aquatic import permits for Oklahoma and educates the bait industry about invasive species and particularly the regulations pertaining to grass carp ploidy in OK. The ANS coordinator also reviews applications for commercial minnow dealers, commercial turtle harvesters, scientific collectors, and ploidy certifications for triploid grass carp and works with those groups on invasive species issues.

### **6A Support research that identifies, predicts and prioritizes potential ANS introductions**

The Geographic Distribution and Ecological Impact of Aquatic Invasive Plants in OK project is still ongoing. This project is funded through the State Wildlife Grants program and includes field surveys statewide at public water bodies for invasive aquatic plants and creating a distribution map of the findings for seven or more target species. The ANS coordinator was successful in the addition of an ANS priority on the Request for Proposals (RFP) for both the State Wildlife Grants Program and the Sportfish Restoration Program. Proposals for both programs were submitted and proposals were reviewed this past spring. ODWC has decided to fund 2 research projects that have an invasive crayfish component. One research project focuses on the Ouachita mountain streams of Southeast OK and the other project focuses its efforts in the NE part of the state in Ozark streams. The ODWC SWG ranking and review committee has decided to suggest funding for a Bighead Carp project in the Grand Lake watershed that has an eDNA component as well as eradication efforts following. If this project is selected for funding by the administration then it will begin in January 2020.

### **6C Facilitate collection/ dispersal of ANS information, research results, and data**

ANS information is disseminated through a multitude of avenues including the OK fishing guide, outdoor OK magazine and television show, you tube and social media, the department's website, the Lakes of Oklahoma publication, press releases, brochures, watch cards and posters at various events and various commercial permit applications. The new ANS signs have been distributed to all regional fisheries offices and are currently being installed at access points statewide for boaters and anglers.

South Dakota—Submitted by Mike Greiner, Senior Biologist—AIS Coordinator, South Dakota Game, Fish, and Parks

- **Coordination** – Hosted a dreissenid mussel summit to inform surface water stakeholders in South Dakota and neighboring states on effects and costs, case studies in dreissenid control, lessons learned, and mitigation options for dreissenid mussel infestations. Met with regional fisheries, parks, communications, and law enforcement staff to direct AIS work. Provided training for 8 seasonal AIS interns and all park ranger/ conservation officer new hires.
- **Monitoring** – Deployed 150 Hester-Dendy samplers statewide. Collected 300 veliger samples and processed in house for the first time. Vegetation surveys revealed Brittle Naiad at Lewis & Clark Lake for the first time.
- **Watercraft Inspection** – Inspected 1,320 boats statewide, did not intercept any boats with suspected AIS.
- **Enforcement** – Conducted multiple compliance checks to educate boaters and enforce boat plug rules. Issued 166 tickets and 82 warnings in 2018. Nearly every violation was due to not pulling boat plugs. Provided a local boat registry to help boaters in the zebra mussel containment zone to use their boats without requiring decontamination every trip. As long as the LBR sticker is displayed, they have their boat log/ paperwork, and they don't take their watercraft outside of the transportation zone, the boater is free to use as normal.
- **Outreach** – Targeted emails and press releases were sent to a distribution group of over 135,000 resident and nonresident fishing license holders. Held a wakeboard package giveaway to survey rec boaters and to get their contact info for targeted email list. Generated more than 3,000 new contacts with the promotion. Utilized memes, web banner ads, Pandora radio, Facebook and Instagram ads to educate boaters and drive them to the <http://sdleastwanted.com/> website. Page views were up 379% in 2018. Used geofencing to send targeted messages to boaters at ramps in our zebra mussel containment zone at Lewis & Clark Lake. Used takeover marketing, wrapping gas pump toppers and ice box wraps with placement gas pump toppers and ice box wraps with placement gas pump toppers and ice box wraps with placement in key areas statewide.

Tennessee ANS update – David Roddy, Tennessee Wildlife Resources Agency

- High School Fishing team ANS program and watercraft inspection training. Provide classroom power point presentation on general ANS topics and specific species of concern to Tennessee waters. Preventative measures and the fundamentals of a watercraft inspection are discussed. Within the program, students are involved in finding zebra mussels and other ANS on an Agency watercraft and are tested on how successful they were in finding them.
- Professional Bass Angler partnering with TWRA to promote Aquatic Nuisance Species awareness. Michael Neal, Bass Pro Tour Tournament Angler, Displays Agency ANS logo on his boat, truck and jersey. Michael occasionally makes appearances at the High School Fishing Team ANS training. Michael has taped several ANS videos for Agency distribution, most recent was the identification of Asian carp and native bait fish.
- Asian Carp/native bait fish identification cards printed and distributed to the public.
- Asian Carp “Alert” boat ramp signage was purchased and installed where needed.
- Purchase Asian carp fillets for public taste testing. Tasting and ANS awareness booths set up at Bass Pro, Nashville Tennessee, State Legislatures Outdoor Caucus event and the Tennessee Wildlife Foundation events. These events give the public opportunity to taste test and visually inspect Asian carp filets as a consumable item.
- Hired two interns from the University of Tennessee at Knoxville, to do ANS outreach in the east Tennessee area. Whirling disease, zebra mussels and non-native vegetation concerns and how to limit the spread by anglers and recreational boaters was done via educational booths and disinfecting gear videos.
- Nile tilapia mount – an education tool to make the public aware this ANS species is increasing its range in the Old Hickory and Cheatham Reservoirs.
- Several ANS education and awareness booths set up at several fishing and boating events across the state.
- Purchased Asian carp sampling gear. Gills nets purchased for sampling on Kentucky and Barkley Reservoirs.

- Black carp has entered the state. This Asian carp species has been captured in Reelfoot Lake and in the Tennessee portion of Kentucky Reservoir.
- Evaluating reproductive success, establishing leading edges and abundance of age-0 in Kentucky and Barkley Reservoirs using larval light traps.
- Assessing spatial variation in relative abundance of Asian carp in Kentucky, Pickwick, Barkley and Cheatham reservoirs. Also, developing the indices of abundance in the dam tailwaters of these reservoirs which are proximal sources of further upstream invasions. Evaluating tailwater sampling efficiency and relating tailwater indices to catches in the main basin. Sampling additional tailwaters within the Tennessee and Cumberland River systems to determine the leading edge of Asian carp. Implanting and monitoring telemetry tagged Asian carp movement and lock and dam passage in the Tennessee River.
- Zebra trap monitoring in several east Tennessee reservoirs revealed a reduction in zebra mussel densities.



### **Aquatic Invasive Species: A Problem for All Texans**

It's estimated that the annual economic impact of invasive species in the USA exceeds \$120 billion. Globally, impacts are estimated at more than \$4 trillion. Aquatic invasive species negatively affect water infrastructure, hydroelectric generation infrastructure, municipal, agricultural, and private water intakes, water-front property values, boating and other water-based recreation, fish and wildlife, and related fishing and hunting opportunities. Prevention is internationally recognized as one of the best strategies for management aquatic invasive species, and the prevention campaign being delivered by Texas Parks and Wildlife Department (TPWD) and partners is one component of a comprehensive statewide program to manage aquatic invasive species. This update profiles the need for and recent accomplishments of this statewide program.

### **The Need for Management of Aquatic Invasive Species**

Texas freshwater boating and fishing opportunities are world renowned and generate billions of dollars for our state's economy. Top fishing lakes generate an annual economic value of \$14-32 million per lake. Bank, wade, and kayak fishing in rivers of the Texas Hill Country generates approximately \$70 million annually. As a whole, freshwater fishing in Texas has an estimated annual economic output of over \$1.7 billion, and is responsible for more than 13,000 jobs. Freshwater fishing, boating, and other forms of water-based recreation are clearly important to our state's economy. Those quality of life benefits are diminished by aquatic invasive species infestations.

The most problematic aquatic invasive species were introduced into Texas from Africa, Eurasia, Australia and South America. Those include hydrilla, giant salvinia, water hyacinth, and water lettuce, which form dense floating mats that impede boater and angler access, consume high amounts of water, and interfere with water conveyance for agricultural and municipal water supply. Other species such as saltcedar and giant reed form dense stands along streams and degrade habitats for fish and wildlife. Zebra mussels were introduced into Texas waterways in 2009, and have been shown to colonize and clog water intakes and even flood control infrastructure, resulting in costly, perpetual maintenance and repairs. Furthermore, studies of real estate and property values have identified linkages between infestations of aquatic invasive species and declines in waterfront property values of up to 19 percent.





Before and after photos of a successful TPWD water hyacinth control project that restored boater and angler access



TPWD, landowners, and other partners cooperate to control Arundo along Hill Country rivers

### **TPWD and Partners Take Action to Manage Aquatic Invasive Species**

During state fiscal years 2018-2019, the Texas Legislature allocated approximately \$3.2 million annually to TPWD for statewide management of aquatic invasive species. Planning and implementation of aquatic invasive species management projects are conducted in cooperation with universities, river authorities, municipal water districts, non-governmental organizations, local, state and federal agencies, public and private landowners, and other partners. During fiscal years 2018-2019, these partnerships planned and delivered more than 60 aquatic invasive species management projects statewide. Current funding will allow those projects to continue through fall 2019. For Texas to keep pace with the constant and growing problems associated with aquatic invasive species, it will be critically important that the state's investment of technical and financial resources be supported at adequate levels for the long-term.

### **Significant Accomplishments (September 1, 2017 - December 31, 2018):**

- 564,000 registered boaters received "Clean, Drain and Dry" invasive species prevention information
- 179 million impressions were made through radio, online, print, and outdoor advertising as part of the 2018 "Protect the Lakes You Love" campaign
- 64 high-risk lakes were monitored to aid in early detection of zebra mussels
- 60 rivers and lakes were managed to control infestations of aquatic invasive plants
- 2,001 acres of water hyacinth were treated on Texas lakes
- 18,390 acres of giant salvinia were treated on Texas lakes
- 394,616 giant salvinia weevils were produced and stocked in Texas lakes to control giant salvinia
- 9,452 acres of aquatic invasive plants were treated at Caddo Lake
- 3,472 acres of aquatic invasive plants were treated at Toledo Bend Reservoir
- Arundo and other invasive plants were treated along 180 river miles across six Hill Country river basins in partnership with more than 400 landowners as well as cities, river authorities, the Texas Department of Transportation, and other individuals and organizations
- 10,400 acres of saltcedar were treated along 178 miles of the upper Brazos River in partnership with 60 landowners, the U.S. Fish and Wildlife Service, Texas A&M AgriLife Extension, and others

More information, including detailed project descriptions and status reports, is available online at:

<http://tpwd.texas.gov/aquatic-invasives/>

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West Virginia – Submitted by Katie Zipfel, West Virginia Division of Natural Resources

West Virginia DNR staff has been active in completing research associated with the Ohio River Basin Asian Carp Monitoring and Response Plan. Specific projects include: Monitoring and Response to Asian Carp in the Ohio River, Control and Removal of Asian carp in the Ohio River, Quantifying lock and dam passage, habitat use, and survival rates of Asian carp in the Ohio River and Abundance and distribution of early life stages of Asian carp in the Ohio River. Fifteen hours of electrofishing effort was expended during spring and fall samples in the Greenup and R.C. Byrd pools of the Ohio River yielding data on 32 species of fish and the removal of three grass carp. Gill net effort consisted of 4500ft of net set during spring and fall surveys in the same pools yielding the removal of two bighead carp. Additional targeted removal surveys in the R.C. Byrd pool (some in conjunction with KDFWR and USFWS) yielded the removal of four additional Bighead carp. WVDNR staff also coordinated and assisted USFWS with eDNA surveys of the Willow Island, New Cumberland and Montgomery Island pools of the Ohio River as well as in the Little Kanawha River and the London Pool of the Kanawha River (tributaries of the Ohio). WVDNR staff has also assisted USFWS with downloading data from stationary telemetry receivers in the upper pools of the Ohio River and assisted WVU staff with larval tows in the R.C. Byrd and Greenup pools of the Ohio River.

## Aquatic invasive update

### USDA Forest Service Southern Research Station

Submitted by: Zanethia C. Barnett, Natural Resource Specialist

#### Mussels

We are investigating the potential role of Asian Clams (*Corbicula fluminea*) in native mussel declines. *Corbicula* arrived in eastern North America in the late 1960s, about the time that native mussel populations crashed in many streams. The potential role of *Corbicula* in these declines has not been well studied. Below is an abstract providing details of this study.

We examined growth of juvenile *Lampsilis cardium*, *Venustaconcha troostensis*, and *Villosa taeniata* in 84-day silo exposures at 17 sites in the Rockcastle River system, Kentucky. We measured 155 water chemistry analytes in four samples taken about every 20 days at each site during the study. We also measured water temperature every 90 min and estimated *Corbicula* abundance at each site. Growth responses were similar among species, but the absolute increase in individual mass varied among sites by two orders of magnitude (mean across species = 0.001–0.241 g; instantaneous growth = 0.002–0.032 g d<sup>-1</sup>). *Corbicula* abundance varied among sites from <1 to 240 m<sup>-2</sup>. There was little evidence of severe water pollution (e.g., agriculture, coal mining, urban) in the watershed, and water chemistry explained little of the variation in growth among sites. Growth was best explained by a model including water temperature (positive effect) and *Corbicula* abundance (negative effect), and there was no significant interaction between these variables. The models explained 69–73% of the observed variation in growth and predicted strong, negative effects of *Corbicula* even at low *Corbicula* abundance. Predicted juvenile mussel growth was on average about 50% lower at 10 *Corbicula* m<sup>-2</sup> than at 0.1 m<sup>-2</sup>. By reducing mussel growth, *Corbicula* may be an important factor in widespread native mussel declines.

This summer, we will be following up on this by conducting laboratory experiments to assess potential food competition between native mussels and *Corbicula*.

#### Crayfish

We are investigating the effect of impoundments on gene flow of native (*Faxonius erichsonianus*) and invasive crayfishes (*F. virilis*) in Alabama streams. *Faxonius virilis* is invasive throughout northeastern Alabama and has invaded 23 other states. Impoundments are creating one way (downstream) or no gene flow in native crayfish populations. Data is still being collected for invasive crayfish populations. Impoundments may potentially serve as a barrier to gene flow for *F. virilis* as well.

We are also addressing several questions that arose from discussions within the group working on the Fish and Wildlife Service Crayfish Invasion Risk Assessment Model. The questions ultimately address disease risks from moving crayfishes within North America. We are studying the oomycete pathogen (*Aphanomyces astaci*) that causes crayfish plague. North

American crayfishes coevolved with this native pathogen (i.e., they have immunity to it), but after their introduction to other continents, the crayfish plague decimated native crayfishes there. We are investigating the diversity of *A. astaci* strains and screening for other oomycete (e.g., *Saprolegnia* spp.) and bacterial pathogens that crayfishes may carry. We hope to obtain funding to further investigate virulence of different *A. astaci* strains, the susceptibility of N. American species to strains they did not evolve with, and the risks of increased virulence when strains are introduced to waters with thermal regimes that differ from those where they evolved.