COMPILED MEMBER UPDATES

October 2021

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Federal Member Updates

USDA Forest Service- Southern Region
Submitted by: Zanethia C. Barnett, Research Fisheries Biologist

The National Forest in Mississippi has been treating giant salvinia for the last 2-years on Okhissa Lake on the Homochitto Ranger District.

Mussels
We are currently conducting a series of studies looking at effects of invasive Asian Clams (*Corbicula fluminea*) on native mussels. We conducted a series of lab studies in 2019 and 2020 directly looking at food competition between Corbicula and natives. We are also working on a review of Corbicula effects on mussels with several European and US researchers. We have published one paper from this work, Haag, W. et al. 2020. Abundance of an invasive bivalve, *Corbicula fluminea*, is negatively related to growth of freshwater mussels in the wild (attached).

Crayfish
We have conducted a review of dam effects on native and invasive crayfishes. https://www.frontiersin.org/articles/10.3389/fevo.2020.621723/full

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 assessed 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 also plan 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.

Submitted by Susie Adams, Research Aquatic Ecologist
I am conducting a statewide survey of crayfishes in Montana in cooperation with MT Fish, Wildlife, and Parks (MFWP). In 2021, we sampled >100 sites over 6 weeks, covering much of the state. In addition, MFWP Aquatic Invasive Species crews were trained to look for and identify crayfish and are sampling an additional 200 sites. Crayfish vouchers are retained at each site. In addition, tissue samples are taken at a subset of sites which will allow us to address questions about the native status of species (particularly west of the continental divide) and possibly the source of invasive populations. Sampling will continue in 2022. To date we have found three species in the state. We discovered or confirmed the presence of an invasive *Pacifastacus leniusculus* (Signal Crayfish) at two locations east of the divide. We also found *Faxonius immunis* (Calico Crayfish) to be widespread in southeastern MT. This species is currently presumed to be nonnative in MT. Finally, while *Faxonius virilis* (Virile or Northern Crayfish) is native to MT east of the divide, it occurs in numerous locations where it is presumably introduced on both sides of the divide.

US Fish and Wildlife Service- La Crosse
Submitted by: Rebecca Neeley

eDNA
Due to Covid-19 and the travel restrictions put in place by the Department of Interior Region 3 Fisheries Program, regular eDNA work planned for April 2020 in Pools 13, 14, and 16 in the UMR were cancelled. This work included sampling backwater sites in Pools 13 and 14. Additionally, the Credit Island side channel in Pool 16 was to be sampled to serve as a control or calibration site due to the presence of a real time receiver.

In the fall of 2020, staff were able to conduct limited sampling in Pools 13 and 14. Sampling was restricted to day-trip events only, which reduced the number of sites within each pool that staff were able to sample. Only 1/3 of the sites were sampled compared to a normal sampling year. With the limited capacity to collect samples, sites where positive eDNA detections have occurred in the past were prioritized. This included Crooked Slough at the top of Pool 13, and the Clinton Marina and north pit in Pool 14. Eighty eDNA water samples were collected from each in October 2020. No Bighead or Silver Carp DNA was detected in any of the sampled areas.

Additionally in the fall of 2020, in coordination with MN DNR, staff conducted eDNA sampling in Pool 8 near La Crosse. The sites sampled were a subset of those being considered for the implementation of the Modified Unified Method (MUM) for Invasive Carp removal in the spring of 2021. In November 2020, 100 samples were collected in each of the five backwater areas. One backwater, Catgut Slough, which connects to the Black River in La Crosse, was positive for Silver and Bighead Carp DNA.

In April of 2021, staff collected eDNA samples from pools 13, 14 and 16 of the UMR. In Pool 13, 264 total samples were collected, 219 no eDNA was detected, and 45 were positive for Invasive Carp DNA. In Pool 14, 528 total samples were collected, 486 no eDNA detected, and 42 were positive for invasive carp DNA. In Pool 16, 88 samples were collected, 52 no eDNA detected, and 36 were positive for Invasive Carp DNA. In May 2021, eDNA sampling was completed in the Chicago Area Waterway System, Illinois. A total of 440 samples were collected and no Invasive Carp eDNA was detected. Additionally, staff conducted a single sampling event in Boston Bay in Pool 18 as part of a comparison study on extraction methods lead by the Whitney Genetics Lab. In July 2021, staff once again collected water samples in Pool 8 of the UMR as part of a method comparison study with the USGS UMESC.

Hydroacoustics
During the fall of 2019, staff performed over 317 miles of hydroacoustic surveys across main channel, side channel, and backwater habitats of pools 16-19 of the UMR. More than 36.6 million cubic meters of water were ensonified and 5,559 fish > 10 inches (254 mm) TL were counted. Physical sampling to inform hydroacoustics did not capture any Invasive Carp so density estimates were not species specific. Across all pools, large-bodied fish were least abundant in main channel habitats (0.060 fish/1,000 m3), followed by side channel habitats (0.113 fish/1,000 m3), and were most abundant in backwaters (1.578 fish/1,000 m3). For pool-wide density estimates, pool 17 had the highest overall observed densities (0.384 fish/1,000 m3), while pool 19 had the lowest observed densities (0.083 fish/1,000 m3). Examination of the length frequency data showed that acoustically detected fish within pool 17 were also significantly larger compared to other pools, and across all pools, fish were largest within backwater habitats. In 2020, due to covid-19 travel restrictions, surveys were restricted to pool 8, and were used to assist in identifying several backwater habitats suitable for removal operations.

In April of 2021, crews worked with partners from the Illinois Natural History Survey (INHS) to perform hydroacoustic surveys at locations of contracted removals in Pools 16-19 of the UMR. Selected sites were surveyed with hydroacoustics, and then contracted fishermen immediately entered the area and used gill nets to target Invasive Carp for removal. All collected fish were weighed and measured by INHS and FWS personnel, with native by-catch returned back to the river, and invasive carps removed from the system. After the removal operation and fish processing was completed, a post-removal hydroacoustic survey was then conducted.

Over the course of two weeks, eight pre/post surveys were completed at seven different backwaters. Length and weight information was collected from more than 2,500 fish, and tens of thousands of pounds of Invasive Carp were successfully removed. These pre/post-removal surveys coupled with the collection of length, weight and species information, will be used to validate the hydroacoustics data and determine how well hydroacoustic length-frequency estimates match with the sampled catch. These surveys will also provide information about the efficacy of removal operations at different locations in the UMR, and lay the groundwork for pool-wide evaluations of contracted removals.

Telemetry

All USFWS telemetry operations were postponed or cancelled because of travel restrictions established by DOI leadership. In most years, telemetry receivers are deployed in March and April. However, during 2020, a limited longitudinal array was not deployed until June. Staff deployed receivers in Pools 5A-10 of the UMR and in the Wisconsin River. Staff from LAX worked with partners at INHS to deploy a limited number of receivers in Pools 14-19.

In response to the large capture event of 35 silver carp in Pool 8 during March 2020, staff worked with MN DNR to gain permission to target and tag Invasive Carp in Pool 8. Within a week, crews from MN DNR had captured six Silver Carp in the waters around La Crosse, WI. Staff from the La Crosse FWCO and from the USGS established a COVID-safe rapid-response, mobile surgery system and responded to calls from MN DNR whenever fish were captured. Staff were able to tag five of the six fish captured prior to the onset of colder weather that cooled water temperatures enough to restrict tagging operations. The La Crosse FWCO also deployed two of our real-time telemetry receivers in Pool 8 to assist MN DNR in keeping track of those tagged fish following release.

Modified Unified Method Support

In response to 51 Invasive Carp that were captured in pool 8 of the Upper Mississippi River between December 2019 and March of 2020, the La Crosse FWCO partnered with the Minnesota DNR, and other agencies, to conduct a Modified Unified Method (MUM) event. This mass removal technique has been used in the Illinois River as well as at Creve Coeur Lake, MO. This method uses underwater speakers, electrofishing and boats, to herd invasive carp into a harvest area for removal.

Prior to the MUM event, the La Crosse FWCO conducted eDNA sampling as well as hydroacoustics sampling, looking for Invasive Carp in both the fall of 2020 and March of 2021. The MUM event was conducted over a week in early April 2021 in seven separate backwaters. Invasive Carp were collected in one of the seven locations, Bluff Slough which is just south of the city of La Crosse, WI. A total of 31 Silver Carp were captured in the same location that the Invasive Carp were captured in 2019 and 2020.

Although staff from the La Crosse FWCO were not on the water during the event, staff preformed the necropsies on all 31 of the Silver Carp captured. During the necropsies, staff collected a series of metric data including weight, length, sex, gonad mass, and removed dorsal spines and otoliths for aging purposes. Staff from the La Crosse FWCO continued to provide

partner support as the MNDNR continues to use commercial fishermen to remove Invasive Carp in pool 8 of the UMR.

State Member Updates

Alabama Division of Wildlife and Freshwater Fisheries
Submitted by Dave Armstrong, Alabama Aquatic Invasive Species Coordinator

Site Reconnaissance and Biological Collections for Invasive Carp (IC) in Alabama during 2021
Efforts in Alabama were expended on evaluation of potential sample sites, assistance to other cooperators and collection of data on captured IC for eradication. All work within the IC project was performed within the four (4) Tennessee River impoundments in Alabama, including Pickwick, Wilson, Wheeler and Guntersville Reservoirs. Field work on these management actions were as follows:

- Fifty-three (53) field days were spent on spring and summer collections of invasive carp abundance/distribution (objective 1) data at 32 gillnet and 105 electrofishing sites, as well as an additional 25 sites for eradication (objective 3) sampling.
- Three (3) days were spent assisting Tennessee Tech University with collections of IC, deployment of Vemco sonic receivers, and electronic data retrieval at Guntersville Dam locks.
- During 2021, approximately 20 IC (n = 12 Silver Carp; n = 8 White Amur) were witnessed using standardized gear in Pickwick, Wilson and Wheeler Reservoirs.
- Two (2) Silver Carp were captured in Wilson Reservoir (reservoir upstream of Pickwick); one in Shoal Creek by a TVA biologist and a 2nd individual from McKiernan Creek by an angler

Other Significant Achievements and Activities in Alabama, 2021
The following summarizes invasive aquatic species documented and control activities in Alabama.

- Steve Rider and other ADWFF staff biologists have completed final edits of the Alabama ANS statewide plan which should be completed for final review in late 2021 and early 2022.
- A new infestation of Apple Snails (aka Giant Apple Snails) has been documented in Gulf Shores (Baldwin County) Alabama near Gulf State Park. This makes three snail-infested watersheds in coastal south Alabama.
- Reports of Zebra Mussels *Dreissena polymorpha* located in Holt Reservoir (Black Warrior River basin) continue to come from multiple sources and sightings confirmed by ADWFF biologists. Other biologists confirm small numbers in Holt Reservoir tailwaters (Oliver Lake).
- Japanese Mysterysnail *Cipangopaludina japonica* have been documented in Lewis Smith Reservoir and one other Alabama location to date.

Arkansas Game and Fish Commission
Submitted 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 just below Dam 1 at Batesville, at Clarendon, just below the navigation canal at Tichnor and examined every 42 days during known spawning temperatures for Zebra Mussels. Since 1999, the only detection in this portion of the river occurred 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.

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 is done below Felsenthal Dam, Moro Bay, below Camden and above Camden. 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, Norfork 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.

Giant Salvinia

Giant Salvinia was detected in Lake Columbia in December 2019. This is a county owned 2900 acre water supply lake for the city of Magnolia. The AGFC has worked with the lake owners and the Arkansas Health Department to develop and treatment protocol for the lake. Booms are being installed at the three access ramps to help prevent movement to other locations.

Giant Salvinia was detected in Millwood Lake in December 2020. This is a 29,000 acre COE lake in southwest Arkansas. The rapid response assessment was done by AGFC staff and COE staff in early January 2021. During this assessment any Giant Salvinia found was removed. It was only found along the original river channel in the upper portion of the lake. The ANS coordinator did a follow up assessment in May and no Giant Salvinia was found. The lake will be assessed again later this year.

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.

Northern Snakehead

Northern Snakeheads have continued to increase their range throughout the eastern one-half of Arkansas. We have had more reports during 2021 than other years. At this time we are not sure if it is because the population is growing or because of the increase in fishing due to the COVID 19 virus. Tracking of new locations is being monitored and sampling will be conducted as time allows.

Arkansas Task Force

The Arkansas ANS Task Force held a virtual meeting in March with 29 attendees representing state and federal agencies, NGO's, and universities participating in the meeting. An in person meeting is scheduled for December 8, 2021. The steering committee has developed an Operational Guidelines document for the operation of the Task Force. Plans are to get this approved at the December meeting.

Regulatory Actions

A regulation requiring boat plugs (bilge, livewells, ballast tank, etc.) to be removed at the boating access and remain out during transportation went into effect January 1, 2021.

A regulation requiring commercial fishers to report harvest goes into effect January 1, 2022. This will allow better information on native fish harvest as well as Invasive fish.

Colorado Parks and Wildlife

Submitted by: Robert Walters

- CPW and our partners have intercepted a record number of mussel fouled boats for 2021. To date we intercepted more than 160 watercraft with confirmed zebra or quagga mussels during the 2021 boating season. More than 75% of these mussel fouled boats originated from Lake Powell.
- On January 1, 2021 Colorado Parks and Wildlife officially de-listed Green Mountain Reservoir for the suspect presence of quagga mussels. This de-listing makes Colorado completely free of invasive mussels!
- CPW gained approval from the Aquatic Nuisance Species Task Force for the State of Colorado Aquatic Nuisance Species Management Plan. This plan has been in development since 2004 and sets a clear path forward for aquatic nuisance species management in the state of Colorado.
- CPW passed legislation to allow for a pilot roadside watercraft inspection & decontamination program at ports of entry. The intent is to implement this pilot program at the Loma Port of Entry on I-70 in the 2022 season and is highly focused on intercepting mussel fouled boats from Lake Powell and other western waters prior to them entering the interior of the state. This roadside program is intended to supplement Colorado's current ramp based watercraft inspection & decontamination program.
- CPW filled their vacant Invasive Species Program Manager position with Robert Walters who has been with CPW's invasive species program since 2012. His former Invasive Species Specialist position was backfilled by Travis Beam who has been working with zebra and quagga mussels since 2015.

Indiana Department of Natural Resources
Submitted by: Eric Fischer

The Indiana Department of Natural Resources continues its efforts to prevent the spread of AIS species throughout the state of Indiana but especially across the Watershed divide between the Mississippi River Basin watershed and the Great Lakes watershed.

Indiana Department of Natural Resources has continued to utilize state and Great Lakes Restoration Initiative funding to provide for the implementation of the state AIS management plan implementation but also over the last few years we also have continued to fight the spread of Eurasian Watermilfoil and the growth of Starry Stonewort in northeast Indiana. Starry stonewort a macro algae especially, has proven very difficult to control but we continue to try different chemical prescriptions and are coordinating with universities and plant control companies with hopes of finding better tools that are effective at limiting the growth and success of this invasive aquatic plant. The aggressive and large scale control and eradication efforts on over 270 acres of infestation that we have put in place through Great Lakes Restoration Initiative grant funding has slowed the spread of this aggressive macro alga but has yet to provide the answers to the best path forward.

In 2020 Indiana DNR put a special emphasis on the completion of all revisions of the 2020 Indiana AIS Management Plan revision. The ANS Task Force reviewed and gave us a chance to present our revised plan during the December 8-10th meeting of 2020. On December 10th I presented the revised state management plan to the ANSTF and received unanimous approval of the revised state management plan.

In the past year plus the Indiana DNR has put special emphasis and funding toward a dedicated Asian Carp program to engage with neighboring states and region partnerships and committees to contribute to better understanding and implementation of control strategies across the drainages.

Along with many other representatives of the AIS programs in the Midwest we continue to be engaged and participating in the following groups: Great Lakes Panel, Mississippi River Basin Panel, the Invasive Mussel Collaborative, Interstate ANS planning group, Indiana Invasive Species Council, regional hydrilla coordination and Asian Carp Regional Coordinating Committee.

Iowa Department of Natural Resources

Submitted by Kim Bogenschutz, Aquatic Invasive Species Program Coordinator

The Aquatic Invasive Species Program (DNR–AIS) staff in 2021 consist of 1 full-time Coordinator/Natural Resources Biologist, 1 full-time Natural Resources Technician, and 19 seasonal Natural Resources Aides (i.e., watercraft inspectors, survey crews). Iowa Lakeside Laboratory students assisted with watercraft inspections in Dickinson County during summer 2021.

Accomplishments so far in 2021 include the following:

- Employed 19 Seasonal Natural Resources Aides
- Used geo-fencing to target 400,000 ads to visitors at high use boat ramps
- Ran 140,000 impressions OTT/CTV, Video Pre-Roll, and Display targeting addresses of registered boat owners
- Targeted water recreationists with AIS prevention messages using boat ramp signs, print media, radio interviews, websites, social media, displays, and presentations
- Chemically treated invasive aquatic plants in over 20 waterbodies
- Completed over 80 full-lake vegetation surveys
- Placed zebra mussel veliger settlement samplers in lakes and reservoirs across the state
- Collected and analyzed water samples from lakes and reservoirs across the state for zebra mussel veligers
- Surveyed Asian carp in the Des Moines, Iowa, and Cedar Rivers
- Purchased supplies for DNR Fisheries management stations and hatcheries to prevent the spread of AIS during operations
- Participated in Rehoming Our Aquarium/Animals Responsibly (ROAR) surrender event
- Submitted Proposal and Paperwork for Grant F21AP03111 from the USFWS
- Participated in the AFWA Conservation and Science MultiState Conservation Grant Program Technical Review Team

Two new infestations of brittle naiad were discovered in Iowa so far in 2021. No new infestations of Eurasian watermilfoil or other invasive aquatic plants have been found in 2021.

No new infestations of zebra mussels have been discovered in Iowa so far in 2021.

Asian carp projects in Iowa waters submitted through Iowa State University that received funding for FY21 for the Upper Mississippi River are monitoring movement of Asian carp in the Des Moines, Iowa and Cedar Rivers and sampling for Asian carp larvae in Iowa tributaries. Projects for the Missouri River Basin that received funding for FY21 are testing an Asian carp egg identification app, monitoring Asian carp movement in the Little Sioux River and monitoring the effectiveness of the electric barrier below Lower Gar Lake. We are also planning an invasive carp symposium for the Midwest Fish and Wildlife Conference to be held in Des Moines in February 2022.

Iowa DNR staff are members of the Lock and Dam 19 sound barrier research project's Planning Team, Science Advisory Team, and Communications Team. Testing of the barrier began in May, and Kim Bogenschutz and Jason Euchner participated in the site visit/media day in June.

Kim Bogenschutz is chairing the ANS Task Force Control and Restoration Subcommittee which completed a report on the status of and recommendations for each national ANS management and control plan, completed a draft guidance document for development of new national control and management plans and summarized comments on a survey of gaps in ANS control and restoration measures completed by the Research Subcommittee.

Kansas Department of Wildlife, Parks and Tourism
Submitted 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.

- Initiated bighead carp research project on Neosho River - Grand Lake system – The project, funded in conjunction with FWS, aims to better understanding the small, isolated, but reproducing population of bighead carp in the Neosho River – Grand Lake system. The project objectives are to:
  - Identify locations of presence and upstream extent of Bighead Carp population within the Neosho River – Grand Lake system.
  - Collect baseline population demographic information including relative abundance, age and growth, and size structure.
  - Determine broadscale movements within the Neosho River system using otolith microchemistry.
  - Identify locations within the Neosho River – Grand Lake system for containment, removal, and/or eradication efforts.
- Initiated feasibility study for an invasive carp acoustic barrier on the Kansas River – A feasibility study (funded in part by FWS) is being conducted to determine which current barrier technologies could be most practically integrated into the Bowersock Dam to prevent upstream spread of silver and bighead carp during high flow events. KDWP contracted Juniper Environmental and the Kansas Alliance of Wetlands and Streams to conduct the feasibility study and produce a report which includes information on potential barrier options as well as approximate installation and maintenance costs.
- Collected eDNA samples to inform silver and bighead carp management efforts **-** In collaboration with FWS, KDWP ANS program staff collected eDNA samples for silver and bighead carp in the upper Kansas River basin above the Bowersock Dam. Very few silver or bighead carp records occur above this barrier. Results from this sampling will inform efforts to prevent invasive carp from establishing breeding populations above this location.
- Initiated a research project to design a protocol for sampling invasive and native crayfish in Kansas lakes and streams **-** This is a joint project between the Fisheries and Ecological Services divisions of Kansas Wildlife and Parks and New Mexico State University. Crayfish are the second most imperiled group of animals in North America (behind only native mussels). Negative interactions with invasive crayfish species and the diseases they carry threaten to further impact Kansas' crayfish populations. In 2019, the first introduced population of invasive Red Swamp Crayfish were found in Kansas and tested positive for crayfish plague. Invasive Rusty Crayfish have been detected in all Kansas' neighboring

states and may already occur in Kansas, but no targeted sampling for their presence has ever been conducted. There is very little existing data on Kansas' crayfish and most crayfish research that has taken place in North America has focused on stream populations, therefore no good protocols exist for sampling crayfish in lakes. This project looks to address these issues by:
    - Comparing a suite of common sampling techniques to determine the best sampling methods for crayfish assemblages in Kansas lakes and streams
    - Investigating the effort requirements needed to detect all species of crayfish inhabiting a lake or stream
    - Evaluating habitat-species relationships for crayfish assemblages in lakes and streams
    - Providing management recommendations to Kansas Department of Wildlife and Parks regarding long-term monitoring of crayfish in lakes and streams
- Visited approximately 250 locations in response to moss ball concerns **–** Within two weeks of notification of potentially zebra mussel infested moss balls being imported into the US, KDWP staff visited about 250 locations in Kansas. Pet stores, water garden stores, plant shops, and other locations suspected to possibly possess these moss balls were visited to educate the locations about ANS and get zebra mussel infested moss balls out of circulation.
- Education and outreach efforts were continued through a variety of media outlets including internet ads, press releases, and direct mailings.
- ANS literature and outreach materials were distributed to all KDWPT 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.
- Kansas continues to participate in the *Don't Let it Loose* campaign. The program has been well received and is 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.
- KDWPT 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.
- Fish disease sampling was conducted at all four state fish hatchery facilities and 2 private fish farm locations. None of the fish tested showed signs of significant disease.
- Zebra mussels were detected in one new waterbody in 2021: Lebo City Lake.
    - 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; Osage State Fishing Lake, Tuttle Creek Reservoir, and Geary State Fishing Lake in 2017; Lyon State Fishing Lake in 2019; and Linn Valley Lakes - Main Lake and Emerald Bay in 2020.
    - 101 additional waterbodies were sampled for zebra mussel veligers in 2021.

Kentucky Department of Fish and Wildlife Resources
Submitted by: Jessica Morris and Andrew Stump

The Aquatic Invasive Species program in Kentucky is housed within the Critical Species Investigations branch (CSI) of the Fisheries Division. KDFWR-CSI includes staff members at two locations and includes five full time biologists (Christopher Hickey, Andrew Stump, Jessica Morris, Joshua Tompkins, and Taylor Culbertson), and four full time technicians. Other fisheries staff in KDFWR contribute their time to general ANS projects on an as needed/available basis. Invasive carp are currently considered the most demanding ANS issue within the state and a considerable amount of focus has been placed on their management and control.

Accomplishments and findings to date since last reported include the following:

General ANS Management:
KDFWR currently relies on each of its seven fisheries districts to identify and manage ANS found within Kentucky's borders. An increase in coordination has recently been established through the formation of an ANS Management Team. This team has identified several priorities within the state including: the need to list additional prohibited species that may pose threats to native wildlife if released; the formation of content used in educating the public on ANS issues; the establishment of protocols decreasing the probability of inadvertent transport and spread of invasive species through agency work; and the submission of a revised ANS Management Plan by 2022. Accomplishments to date include: approximately 50 hours of field treatments in an attempt to control invasive aquatic weeds, such as hydrilla and Eurasian watermilfoil; around 70 hours creating outreach video content concerning ANS; collaborative meetings discussing messaging on bait bucket introductions and discouraging releases of nonindigenous or anthropogenically transported species; the designation of funds to purchase hot-water pressure washers for districts, hatcheries, and research staff to use in Clean, Drain, Dry protocols; and the identification of zebra mussel infested moss balls and public messaging discouraging their sale and providing information on the proper treatment of tanks and product disposal.

Invasive Carp Interagency Coordination:
KDFWR currently collaborates with numerous partners on invasive carp related issues within the Ohio River basin. These groups include West Virginia Department of Natural Resources, Ohio Department of Natural Resources, Indiana Department of Natural Resources, Illinois Department of Natural Resources, Pennsylvania Fish and Boat Commission, Tennessee Wildlife Resources Association, Mississippi Wildlife Fisheries and Parks, Alabama Wildlife and Freshwater Fisheries, United States Fish and Wildlife Service (Columbia FWCO, Carterville FWCO, LMR FWCO, Lacrosse FWCO), United States Geological Survey (Columbia Environmental Research Center, IN-KY Water Science Center, Upper Midwest Environmental Science Center, Columbia River Environmental Research Center), United States Army Corps of Engineers (Nashville District, Louisville District, Huntington District), Tennessee Valley Authority, Tennessee Technological University, Murray State University, Southern Illinois University at Carbondale, Mississippi State University, Indiana Wildlife Federation, and the Tennessee Wildlife Federation. These partners have participated in one or more levels of coordination established through MICRA, the Ohio River Invasive Carp Technical Team, or the Tennessee & Cumberland River Invasive Carp Team.

Monitoring, Early Detection, Early Life Stages, and Rapid Response to Invasive Carp in the Ohio River:
KDFWR worked with basin partners to double the sampling effort of previous years when conducting spring targeted monitoring in the Cannelton, McAlpine and Markland pools of the Ohio River. This information is used to assess relative abundances of invasive carp in the

Middle Ohio River and has indicated that there has been an increase in silver carp populations in Cannelton Pool since work began in 2016. Capture rates above Cannelton Pool remain so low that there are no measurable changes in relative abundance of silver carp. More than 40 larval tows were conducted in 2021 in an effort to aid INDNR with the early life stages project, which aims to determine the extent of upriver spawning. Potential invasive carp larvae and eggs have been identified from five of those locations (above and below McAlpine Locks & Dam, above and below Kentucky River Dam 1, and in Salt River 30 miles upriver of its confluence with the Ohio). Suspected eggs and larvae will be sent for genetic verification and species identification. In addition, three weeks of intensive sampling have provided more than 600 otoliths shared between the Early Life Stages and Monitoring & Evaluation projects. Otoliths will be used to describe age distributions in each pool and provide SIU with otoliths for their collaborative effort with INDNR in determining the approximate origins of silver carp recruitment in the ORB. Currently, KDFWR is conducting seine hauls to identify areas with YOY invasive carp and has responded to investigate a report of young of year silver carp in Craig's Creek (a tributary of the Markland Pool). No young of year fish were captured using the 100ft seine hauls or boat electrofishing. As in 2020, time has been dedicated to improving telemetry array analysis using Power BI and expanding some telemetry monitoring through active tracking.

Prevention and Population Control of Invasive Carp in the Ohio River:

KDFWR determined that additional removal from the invasion front was necessary to aid in controlling upriver expansion of invasive carp. To aid in this strategic effort, contract fishers were placed in Cannelton Pool and have removed more than 200,000 lbs of invasive carps in 2020. Several program limitations were identified in 2020 that are being addressed when the program starts back up in 2021. Some improvements include allowing multiple fishers to access inland tributaries at the same time, increases in seasonal personnel used for vessel observation, and a more focused effort during cooler months of the year in an attempt to decrease bycatch and bycatch mortality. In addition, KDFWR crews have focused more efforts to reduce populations above the contract fishing zone as well as in the inland waters of the Salt and Kentucky rivers.

West Kentucky Projects:

Asian Carp and Scaled Rough Fish Harvest Program (ACHP)

KDFWR-CSI administers a harvest program for invasive 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 invasive carp and other scaled "rough fish" (buffalo, gar, drum, common carp, etc.). Their harvest ratio of invasive carp to other rough fish must be 65:35 on a monthly basis. Since the program began in 2013, the Asian Carp Harvest Program has facilitated the harvest of 21 million pounds of invasive carp from Kentucky's waters. To date in 2021, 32 commercial fishers have participated in the ACHP and reported harvest of 10,657 lbs of bighead carp, 35,713 lbs of grass carp, and 3,051,560 lbs 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 2021 KDFWR has conducted 51 ride alongs with 17 different commercial fishers to collect data on harvest and bycatch.

Invasive Carp Contract Fishing

KDFWR-CSI administers a contract fishing program for Invasive carp (bighead, silver, grass, and black carp) harvested from Kentucky Lake (Tennessee River) and Lake Barkley (Cumberland River). The program facilitates payment to the fishermen on a per pound basis. In

2021, $336,535.21 has been paid out to contracted fishers for Invasive carp harvested from Kentucky and Barkley lakes.

Western Kentucky Silver Carp Demographics
In 2021, KDFWR continues to collect data from silver carp harvested from both Kentucky and Barkley Lakes. Results from 2020 indicated that silver carp in Lake Barkley continue to be larger on average than silver carp in Kentucky Lake. Ages of silver carp ranged from 4-9 years old, with age 5 being the dominant year class represented in both lakes. Age and growth data has not been analyzed for 2021 at this time.

Estimating Relative Abundance of Invasive Carp
KDFWR continues to conduct standardized sampling with gill nets in April, July, and October in both Kentucky and Barkley lakes. To date, 36 tagged fish have been recaptured and reported through the commercial fishery from the marking event conducted on Kentucky and Barkley lakes in 2018. Additional data on harvest through the commercial fishery continues to be analyzed yearly and fully captured in KDFWR's annual report.

Identifying Gear Types for Capturing Invasive Carp
KDFWR-CSI began a project in 2017 to identify and test new gear types for capturing Invasive carp in Kentucky Lake, Lake Barkley and their associated river systems. KDFWR had planned to continue partnering with the USFWS for use of their Paupier Net and electrified Dozer Trawl in 2021, however, this was postponed to 2022 due to COVID-19 restrictions. KDFWR has one entity on contract to use experimental methods for invasive carp harvest in the lakes and Mississippi and Ohio Rivers. Since the fall of 2020, this entity has harvested 709,784 lbs of invasive carp.

Impacts of Invasive 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 invasive 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. During 2021 spring sampling 2,213 fish were collected, comprised of 38 species, during 5.75 hours of effort. During sampling efforts, emerald shiner was the most abundant species captured in both tailwaters. The most common sport fishes captured in both tailwaters were bluegill, largemouth bass, smallmouth bass and flathead catfish. KDFWR will be conducting an access point creel survey in Kentucky Lake tailwaters and Lake Barkley tailwaters in 2022.

Tracking Silver Carp Movement in the Tennessee and Cumberland Rivers
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. In 2021 KDFWR & partners surgically implanted 475 silver carp with transmitters in the Lake Barkley tailwaters. To date, 50 stationary receivers have been deployed in Kentucky waters of the Tennessee and Cumberland rivers. KDFWR staff monitor these receivers and download data on a monthly or bi-monthly schedule depending on location.

Invasive 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. KDFWR will continue to tag silver carp and some native fish species to monitor movement through the lock chamber during testing of the BAFF. Additionally, KDFWR will continue to provide support to the research team for various aspects of the BAFF testing. KDFWR has also worked with the USGS, USFWS, and state natural resource agencies to develop a strategic plan for Invasive carp barrier placement in the Tennessee, Cumberland, and Ohio Rivers, once funding becomes available.

Incidental Black Carp Detections and Monitoring Efforts
KDFWR has recovered 7 black carp caught in the Ohio River by commercial fishers using gill nets. All black carp reported were collected by KDFWR staff, dissected, and sections were shipped on ice to the respective laboratories for analysis (Black Carp Processing Protocol, USGS). A complete listing of black carp captures and reported locations is kept by the USGS on the Nuisance Aquatic Species data base (https://nas.er.usgs.gov/).

Louisiana Department of Wildlife and Fisheries

New Reported ANS

Red Piranha
On May 26, 2021, the LDWF ANS coordinator received a report from the public of a Pacu capture in University Lake in Baton Rouge. Upon receiving the fish, it was determined to be a Red Piranha. LDWF has sampled the lakes monthly and has not recovered any more piranha. LDWF will continue to sample in the area since it is located near a long-term sampling location.

Status of established ANS

Apple Snail:
Public reports of Apple Snails slowed to a few dozen from January 2021 to mid-March 2021. Reports increased to a comparable level of previous years. Most reports were from known locations with some expansion within water bodies or drainages with existing populations. Any potential impacts of the February freeze were apparently short lived or very localized. In March, the LDWF ANS coordinator visited an isolated private pond in Sorento, LA where Apple Snails were actively laying eggs and visible at dusk on the margins of the pond so the freeze did not have an effect on that population. Floods in May and Hurricane Ida floods has increased the amount of Apple Snail reports.

Invasive Carp:
Preliminary work has begun on 2 projects that have been funded through USFWS's Lower

Mississippi River Invasive Carp Partnership and the Atchafalaya, Red and White Rivers Invasive Carp Partnership. These two projects should assist LDWF in locating breeding areas and identifying potential locations for carp barriers. During plankton tows for one project, LDWF biologist have captured 1 to 2 inch Silver Carp in June. LDWF has also tagged approx. 40 invasive carp to help understand the movement of the carp in South Louisiana. This year, LDWF is working on four partnership funded projects which will help develop markets for Asian carp, investigate obstacles inhibiting commercial fisherman from harvesting Asian carp, as well as studying the impacts of Asian carp on native commercially important fish.

Asian swamp eels:
Monopterus cuchia were found in Bayou St John, New Orleans in June 2019. LDWF and a local college professor continues to monitoring and sample the population. Small eels were found in samples collected in Sept 2020. No eels were found from September 2020 to August 2021. During one sampling event, LDWF biologists caught 2 eels in the same vicinity as before. It is unlikely they would have suffered any effects of the freeze due to their fossorial behavior and limited time below freezing in the area where they were located. LDWF plans to monitor the area and sample in the Spring and Summer of 2022.

Lionfish:
LDWF's planned sampling during the reporting period was canceled due to COVID-19 restrictions on research cruises. LDWF received an extension on this grant and resumed the sampling program this summer with limited success. Recent impacts of Hurricane Ida may further delay this work from occurring as our marine research laboratory was damaged and all research has shut down till repairs can be made and people are allowed back onto Grand Isle.

Tilapia:
Blue Tilapia (*Oreochromis aureus*) were found during routine sampling by LDWF in University Lake located in Baton Rouge in October 2019. Repeated sampling in 2020 has shown a reproducing population. The February 2021 freeze kept the Baton Rouge area under 40 degrees for 137 hours and below freezing for 94 hours. A member of the public sent a photograph of a decomposing tilapia so we expected a reduced population due to the freeze.

In late February, sampling efforts did not find any tilapia in areas where a small number of tilapia were found in prior years. On March 29, 2021, the LDWF ANS coordinator and Inland fisheries staff electrofished the area of the lake where tilapia were found in previous years. The effort did not produce any tilapia. A member of the public reported 8

to 10 large dead fish in the days after the freeze. She described the dead fish as similar to the shape of bluegill with bigger fins. This further suggests that the tilapia did suffer a freeze kill. LDWF has sampled frequently in this area and has not seen any tilapia. LDWF has a long term dataset on the lakes which will allow us to track any impacts to native fish if the tilapia population is found to still be thriving.

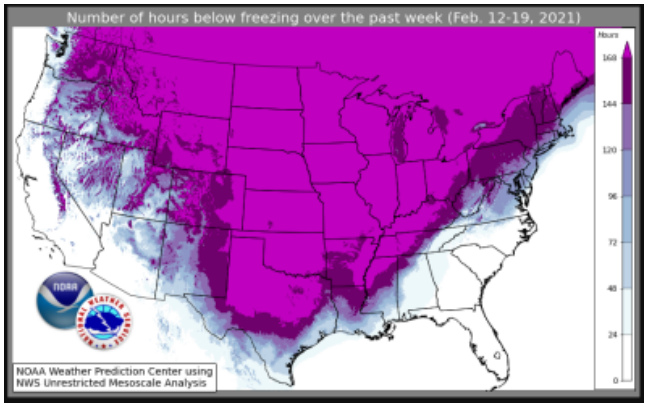
Aquatic Plant Control Program:

The program is housed within the LDWF's Inland Fisheries Section. The freeze in February 2021 appears to have helped with aquatic plant control. The lakes in north Louisiana including Turkey Creek Lake, Lake Darbonne and Caney Creek Reservoir were not showing any active vegetative growth by the end of March indicating that a substantial Giant Salvinia die off has occurred. Other more heavily invested lakes such as Caddo Lake, Lake Bistineau, Black Lake, and Saline Lake have begun to exhibit vegetative growth by the end of March. In south LA, minimal amounts of salvinia have been found. Pockets of salvinia have started actively growing as temperatures have begun to increase. Water Hyacinth will continue to be the biggest aquatic plant problem in south LA as the surviving plants have started actively growing immediately after the freeze. Statewide spray crews are concentrating their efforts in areas with chronic Giant Salvinia problems.

LDWF continued with our control of invasive vegetation species using a variety of techniques. Aquatic plant control plans were developed for 74 different waterbodies during the reporting period. Giant Salvinia continues to be the most problematic invasive plant in Louisiana. Since 2010, LDWF has treated an average of 21,404.33 acres of Giant Salvinia per year with herbicides. LDWF uses an integrated approach to control aquatic plants, consisting of chemical, physical (booms and drawdowns), and biological (insects and grass carp) methods in an effort to achieve a greater combined benefit. LDWF has an annual Aquatic Plant Control Program budget of $3,200,000 of which more than 50% of that is spent on Giant Salvinia alone for monitoring, treatment, and research.

February Freeze Impact on Aquatic Nuisance Species (ANS)

During the week of Feb 12 -19, 2021, a late season record cold event occurred. This event appeared to have an impact on the ANS species of the state. The freeze occurred late in the winter and water temperatures were already rising, so it was hoped that this event may have helped mitigate the impact to the tropical invasive species of the state. Other than the absence of tilapia in University Lakes and the reduction in swamp eels captured this year it is uncertain if the freeze had any long term effects on ANS species in LA.



COVID-19 Impacts:

COVID 19 has reduced the number of public events where LDWF distributes ANS outreach to the public. LDWF published social media posts during the year on apple

snails and invasive vegetation. The reduction in COVID restrictions have allowed us to conduct our sampling efforts and increased public requests to hold outreach events. Time will tell if these events and attendance at these events reach the levels prior to the pandemic.

LA Invasive Species Project on iNaturalist:
A project was initiated where observations from members of the public are filtered on iNatualist to produce a list of all invasive species reported. This list of species and locations will be screened by the LDWF ANS coordinator to look for new invasive species and well as any range extensions observed. Any observations of interest may generate a site visit to determine if the report is accurate. This is a relatively new project on iNaturalist so its utility is still being evaluated.

Mississippi Department of Wildlife, Fisheries, and Parks
Submitted by: Dennis Riecke

Aquatic Plant Control Activities
Giant Salvinia management in Ross Barnett Reservoir included:

- Maintained floating containment booms within Pelahatchie Bay
- Monthly boat surveys conducted to determine presence of Giant Salvinia
- Recreational access remained closed inside the containment booms
- Drawdown (1.5') remained in effect through March 2021
- No Giant Salvinia found during this time period

MDWFP fisheries biologists chemically treated Water Hyacinth, Alligator weed, Cuban bulrush, and Hydrilla, at Ross Barnett Reservoir

New herbicide mixes were used on alligator weed, water hyacinth, and Cuban bulrush at Ross Barnett Reservoir to increase effectiveness. Early-season mix included imazapyr (32 oz)/flumioxazin (6 oz)/nonionic surfactant (32 oz). Late-season mix included glyphosate (64 oz)/2,4-D (64 oz)/nonionic surfactant (32 oz). Initial results have been positive. These populations will be monitored for long-term control.

Current hydrilla treatments include fluridone (2.5 lbs/ac) in areas with little water exchange and copper (3.3 g/ ac-ft)/diquat (2 g/ac) in areas with elevated water exchange. Due to turbidity on the reservoir, diquat may not be the most effective option. Due to mode of activity (foliar, in-water, and soil), flumioxazin (1 lb/ac-ft) herbicide was evaluated for treatment effectiveness of hydrilla populations on Ross Barnett Reservoir. Initial results have been positive. These populations will be monitored for long-term control.

July 2021 biologists sprayed 300 gallons of chemical herbicide on 5 acres of smartweed at Holmes County State Park (English Lake).

July 2021 biologists sprayed 300 gallons of chemical herbicide on 5 acres of alligator weed at Simpson County Lake.

August 2021 biologists sprayed 700 gallons of chemical herbicide on <1 acre of Giant Salvinia and torpedo grass at Mike Conner State Lake. Greater than 80% of the shoreline was also treated as a precaution to eliminate individual plants which may have scattered throughout the lake. Floating containment boom (150') was deployed around the main infestation.

MDWFP fisheries biologists chemically treated (35 tanks)Water Hyacinth, Alligator weed, Cuban bulrush, Giant Cutgrass and Common Salvinia at Lake Tangipahoa in Percy Quin State Park. Alligator weed flea beetles were also added as biocontrol in May 2021.

MDWFP fisheries biologists chemically treated (2 tanks) Water Hyacinth at Lake Bogue Homa in Laurel, MS.

MDWFP fisheries biologists chemically treated Water Hyacinth and Alligatorweed at Lake Mary Crawford in Monticello, MS.

MDWFP fisheries biologists surveyed Lake Lincoln and Lake Jeff Davis for Giant Salvinia after a new detection at a nearby lake (Lake Mike Conner).

MDWFP fisheries biologists surveyed oxbow lakes, creeks and streams connected to the Leaf River in an attempt to identify the source of Giant Salvinia in the Pascagoula River.

Giant Salvinia management in Lake Mike Conner included:
- Containment with floating booms
- Boat and on-foot surveys conducted for Giant Salvinia
- New colonies identified and treated with glyphosate and flumioxazin\

Parrotfeather management in Wall Doxy State Park Lake (Spring Lake) included:
- Surveying and photographing parrotfeather biomass March – September 2021.
- Treating critical areas (around piers and boat ramp) with Navigate, monitored results.
- Treated 30 acres of main lake with 2,4 -D, diquat and depth charge, monitored results.
- Performing winter drawdown November 20 – March 2.

Invasive Carp Control Activities

Abandoned effort to recruit commercial fisherman as contract workers to harvest invasive carp in the Mississippi River, Yazoo River Basin and Pickwick Lake due to almost no interest (N=1 out of 1,200) among the fishermen. January – February 2021 wrote processor reimbursement contracts, scope of work, fish purchase tickets and fish invoices. Contracts were advertised to processors to reimburse them 28 cents/lb. if they paid at least 25 cents/lb. to fishermen for invasive carp harvested from the Mississippi River and Yazoo River Basin. Two instate carp processors signed contracts in early March 2021. One firm purchased invasive carp from April – August. They purchased:

Total Pounds Invasive Carp – 80,584 (x .18 cents/lb. = $14,505 reimbursed)

Silver Carp	73,750	(91.52%)
Bighead Carp	5,171	(6.42%)
Grass Carp	1,663	(2.06%)
Black Carp	0	

Contracts were again issued to two firms in October 2021. No Mississippi carp processing firms bid on the contract to pay for invasive carp from Pickwick Lake.
Agency permission (MS and TN) was granted to contact carp processing firms in Tennessee regarding Pickwick Lake.

Issued Invasive Carp Commercial harvest permits to fish Moon Lake.

Coordination Activities

Ongoing activities:
Coordinated and administered federal ANS grant to implement activities specified in the *Mississippi State Management Plan for Aquatic Invasive Species.*
Coordinated and administered ANS grant for research on ” Development of management strategy for surveillance and containment of invading Invasive carp in waters connected to the Tennessee River”. Initiated in September 2019, ended September 2021.
Attended the June and September 2021 conference calls of the Mississippi Aquatic Invasive Species Council to guide implementation of the activities specified in the *Mississippi State Management Plan for Aquatic Invasive Species.*

Assist the MS Dept. of Environmental Quality in applying for FY21 federal funds for State ANS plans.
Attended MS Cooperative Weed Management Area (CWMA) quarterly meetings (in person and virtual).
Attended Gulf and South Atlantic Panel on Aquatic Invasive Species virtual meetings in Dec. 2020 and April 2021; the ANSTF and Panel Principal meetings (December 2020 and June 2021) and the MRBP virtual meeting in Dec.2020.
Participated in multiple Invasive Carp conference calls for Lower Mississippi River and Tennessee-Cumberland River Basin projects funded in FY19-21.
Votes on funding ANS research projects with USFWS Region 4 small grants program.
Continued 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*.

New activities:
Commented on invasive carp barrier placement for TVA reservoir Environmental Assessment.
Sent revisions to the grant application package instructions for invasive carp grants to the USFWS regional offices.

Information & Education Activities
New activities:
Distributed ANS brochures at the Outdoor Exposition Trade Show in Jackson..
Edited ANSFT National Report and Bylaws.
Completed ANS Expense Survey from Auburn Univ.'
Sent Invasive Carp fishing/harvest regulations to MICRA.
Reviewed of Ecostar labels for MRBP project.
Sent copies of existing Outreach and Education materials on AIS to MRBP Outreach and Education Committee and phone call in July 2021.
Participated in MRBP Microsatellite Chemistry of water collection process.

Ongoing activities:
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.

Monitoring & Reporting Activities
Monitored Giant Salvinia population at Ross Barnett Reservoir.

Collected data on Silver Carp captured during electrofishing sampling, Tunica Cutoff.

Continued Invasive Carp Telemetry Project on Pickwick and Tennessee -Tombigbee Waterway (TTW).

Assisted various federal and state agencies with tagging Invasive Carp on Pickwick Lake.

Issued possession permit to ERDC to obtain small invasive carps to be used in barrier deterrent effectiveness research.

Continued telemetry project for Invasive Carp in TN River and TTW. Continue to sample for Invasive Carp in Pickwick, the Divide Cut, and Bay Springs.

Continued to monitor Giant Salvinia in Pickwick and the TTW. Treated as needed in Pickwick.

Reported new Northern Snakehead locations to the USGS NAS database.

Research Activities

New activities:

Solicited preproposals, budgets, project narratives for 3 FY21 invasive carp research projects submitted by MS State University (TNCR data application, Miss. Alluvial Valley Oxbow Lake Typology and Eagle Lake movement study.

Prepared, submitted and edited all grant application documents and forms as required in Grant Solutions to obtain USFWS Invasive Carp project funding starting October 1, 2021.

Ongoing activities:

Mississippi State Univ. Research Project: **"***Development of management strategy for surveillance and containment of invading Invasive carp in waters connected to the Tennessee River*".

Field Work completed in September 2021.

Preliminary findings:

- Three silver carp have been collected at Bay Springs and no Invasive carp has been collected at Yellow Creek. Catch rate at Bay Springs has been 0.125 silver carp per net night. A review of other sampling data sets reveals that lower catch rates of invasive carp are related to the distance of the capture waterbody from the main stem of the Mississippi River/
- working with TVA's long-term gillnetting data set searching for signs of shifts in fish assemblages that can be linked to the Invasive carp invasion.
- We have obtained data on movement of approximately 300 bigheaded carp in the Tennessee River system. These detections will be used to test whether bigheaded carp movements differ among seasons, focusing on the time period in March when the water level is raised and the time period in September when the water level is drawn down. Our objective is to determine whether seasonal water level changes encourage movements.
- We continue to investigate the potential effects of bigheaded carps on native fish assemblages in reservoirs of the lower Tennessee River relying on TVA's long-term dataset. Temporal changes are apparent, but at this point they cannot be directly attributed to bigheaded carps. Shad populations were declining in the treatment and control water bodies prior to treatment waters being invaded by invasive carp.

Mississippi State Univ. Research Project**: "***FY 2020 Lower Mississippi River -Moon Lake Invasive Carp Tracking Research"* Initiated October 2020.

- Currently have 83/85 of acoustic tags inside Silver Carp with functioning passive acoustic array collecting movements of these fish.
- Have started manual tracking of fish within Moon Lake.
- Wildlife cameras are set up to relate direction of flow to movement of Silver Carp.
- Have started to create a relational database to hold, manipulate, and relate collected data
- More than 50% of my tagged fish have been detected on the passive receivers.
- Collected over a half million observations (hits) in total.
- 19 observed fish have moved out of the immediate study range of the transceivers downstream into the Old Coldwater River.
- 5 fish were observed moving multiple spatial units between late March to early May (~6-week period) with some staggered starts. This corresponds with high flows and with that, some imperfect detection.

- Outside of that 6-week time period, there have been minimal movements between spatial units.
- Once fish were originally translocated, they seemed to settle down or moved out of the study site area.
- Most fish that were left in Moon Lake have stayed in Moon Lake.

New Detections
Giant Salvinia - Lake Mike Conner, Collins, MS ---August 2021 – new location.

Invasive Swamp Eels, *Monopterus cuchia*, found in a live Invasive food market in Jackson, MS (March 2021) seized and charged.

Northern Snakehead – April & May 2021 – tow new locations – Lane Bayou (Bolivar Co.) and Lake Whittington.

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

Purchase additional floating containment booms for emergency response to new detection of Giant Salvinia on public water in Mississippi.

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 Game and Parks Commission
Submitted by: Kristopher Stahr, AIS Program Manager

Watercraft Inspections: The Nebraska Game and Parks Commission (NGPC) employed 3 AIS technicians from May to September to conduct watercraft inspection on selected waterbodies. In this period, 1,826 watercraft inspections were conducted on 39 different waterbodies, a near 50% increase from 2020 (920) with no additional staff.

Zebra Mussel Monitoring: NGPC staff conducted zebra mussel monitoring on 43 different waterbodies in 2021. At each waterbody, veliger samples were taken either once or twice per month and adults were sampled concurrently. Additionally veliger samples were taken at each Nebraska state fish hatchery as part of a new AIS annual inspection. NGPC also now has the

capability to analyze veliger samples in-house, significantly decreasing time for rapid response zebra mussel detection.

Invasive Carp Monitoring: Rivers and Streams NGPC staff sampled 5 different stream and interior rivers for invasive carp to evaluate distribution across the state. The University of Nebraska-Lincoln currently has two invasive carp graduate students focused on eDNA detection and adult distribution along the Platte River. Two additional graduate students will start in 2022 on invasive carp projects.

Aquatic Vegetation Surveys: For the first time, aquatic vegetation surveys were conducted on Nebraska waters in 2021. Aquatic vegetation surveys are designed to document current species distributions and to detect new invasions. Surveys were conducted on 38 lakes, leading to 11 new detections of Eurasian watermilfoil and the first detection of Brittle Naiad in a Nebraska public waterbody. Spot treatments of invasive aquatic plants occurred on several waterbodies and vegetation management plans will be developed for each infested lake for 2022.

Other activities: An AIS inspection was conducted at each Nebraska state hatchery in 2021. The inspection consists of aquatic vegetation surveys, zebra mussel veliger samples at each inflow and outflow, and crayfish sampling. These inspections will be conducted annually. One new detection of Chinese Mysterysnail was found in 2021.

North Dakota Game and Fish
Submitted by: Ben Holen, ANS Coordinator

Major Accomplishments and on-going works

- *Outreach*- In 2021, North Dakota Game and Fish Department (NDGFD) deployed a new ANS digital marketing campaign that is expected to total over 15 million impressions. The Department renewed its contract with Jason Mitchell Outdoors for the development and dissemination of ANS messaging. A significant portion of the agreement was used on billboards and television advertising, with the remainder used for radio, print advertising, and social media boosting. NDGFD returned to educating the public through in-person public meetings, club get-togethers, kids camps, and special events. Governor Doug Burgum proclaimed May 16-22, 2021, the first North Dakota Aquatic Nuisance Species Awareness Week. NDGFD worked with multiple state, federal and private partners to raise public awareness of ANS through press releases, social media, television, radio, and special events.
- *Monitoring*- NDGFD conducted early detection sampling on over 140 waterbodies for zebra mussels. Adult zebra mussel settlement samplers were placed at lakes that have significant recreational usage as an additional detection measure. Over 200 waterbodies received ANS sampling efforts. A new zebra mussel population was confirmed at Twin Lake. Twin Lake is located 10 miles north of Lake LaMoure, designated as a zebra mussel-infested water in 2020. Flowering rush was documented for the first time on the James and Sheyenne Rivers.
- Inspections- The Department conducted over 5,000 watercraft inspections at 17 different water bodies.
- Law Enforcement Efforts- Law Enforcement reported a total of 111 ANS violations and 40 warnings so far in 2021. Department game wardens also participated in ANS roadside checkpoints. Beyond listed offenses, wardens actively discussed ANS concerns with North Dakota water users during these contacts.
- Partnerships- NDGFD partnered with multiple agencies and associations to place CD3 and ILIDS prevention devices at a few high-use ramps. CD3s are self-serve, waterless cleaning devices that provide boaters with tools to clean, drain, dry, watercraft, and equipment quickly. ILIDS are remote inspections cameras that encourage boaters to comply with ANS

regulations. Additionally, we procured new pressure washer units that allowed us to decontaminate high-risk watercraft quickly.

Ohio Department of Natural Resources
Submitted by: John Navarro, Aquatic Stewardship Program Administrator

- Continue control efforts of *Hydrilla* using chemicals and Grass Carp at several inland impoundments in the Ohio River basin.
- Continue to monitor for Bighead Carp and Silver Carp in the Ohio and Muskingum Rivers using telemetry and eDNA.
- Continue to maintain the GLMRIS connection at Ohio Erie Canal and closure efforts at the Little Killbuck Creek and Grand Lake St Marys connections.
- 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 commercial trade.
- Continue an AIS campaign through Wildlife Forever on the "Trash Unused Bait" outreach effort to target anglers potentially moving invasive fish through bait transfer using billboards, print media, and items for distribution at events.
- Continue to distribute the *Ohio Aquatic Invasive Species* guide.
- Discovered internet trade for Marbled Crayfish, which is prohibited in Ohio, and currently working through our law enforcement section to determine risk of release to the wild.
- Discovered two populations of Oriental Weatherfish in the Scioto River in the Ohio River basin. Because of multiple locations and multiple year-classes present, this species is considered established.
- Participated in the following groups: Great Lakes Panel, Mississippi River Basin Panel, Ohio Aquatic Invasive Species Committee, and Asian Carp Regional Coordinating Committee.

Oklahoma Department of Wildlife Conservation
Submitted by: Katherine Schrag

The Oklahoma Department of Wildlife Conservation (ODWC) had a vacancy in the ANS coordinator position from March 1, 2021 to June 22, 2021. In consideration to that timeline, there were no Zebra Mussel veliger sampling efforts completed in the spring of 2021, however, there were two university-based Invasive Carp projects starting around April 2021. One is focused on the Neosho-Grand River system with Dr. Quintin Phelps of Missouri State and the other on the Red River led by Dr. Shannon Brewer of Auburn University. Brian Fillmore out of the US Fish and Wildlife Service office at Tishomingo and his biologists are also working on Invasive Carp research in the Red River and cooperating with the Auburn University researchers.

Once the position was filled by Katie Schrag (replacing Curtis Tackett), ODWC started assisting Dr. Kyle of Texas A & M University on an AIS messaging study to better understand how the effectiveness of the western state's outreach messaging and delivery methods elicit desired behavior change for prevention of ANS. Other ANS activities included the correspondence and investigation of Yellow Floating Heart spread in Oklahoma, assistance with Crayfish surveys in Northeast Oklahoma by an Auburn graduate student, Triploid Grass Carp certification documentation from the US Fish and Wildlife Service, approval or denial of various permits such as the aquatic import/export permit, scientific collectors permit, commercial minnow dealer permit, and others.

On August 17, 2021, we received word from our assistant chief of Law Enforcement that Marbled Crayfish had been imported into Oklahoma via the aquarium pet trade. We immediately completed a title 800 rule change form to add the Marbled Crayfish (Procambarus virginalis) to

Oklahoma's prohibited species list; making possession of any specimen illegal. The intention is to have this rule change approved and effective by September 2022.

Plans for the fall include assisting in the field wherever possible on the Auburn Crayfish surveys in Northeast Oklahoma, any of the Invasive Carp projects, ANS signage checks around public waters, attending the MRBP annual meeting, AFWA Invasive Species committee meeting, WRP on ANS annual meeting, and NAISMA annual conference as well as writing final reports for grants.

Pennsylvania Fish and Boat Commission
Submitted by: Sean Hartzell, AIS Coordinator

Here is a brief list of ongoing ANS activities on the behalf of the Pennsylvania Fish and Boat Commission. Please let me know if you have any questions or need further detail. Most of these bullet points were also submitted by our MICRA representative for the recent MICRA board meeting.

- Round Goby status assessment work in Lake LeBeouf, French Creek Drainage (PFBC collaboration with Indiana University of Pennsylvania).
- Recently produced Round Goby signage to help prevent further "bait bucket" spread into the basin from Lake Erie.
- Work on draft risk assessments for AIS of concern relevant to the basin (e.g., Zebra Mussel, Quagga Mussel, Rusty Crayfish, Red Swamp Crayfish, Round Goby, Bighead Carp, Grass Carp, and Silver Carp, Rudd, and Eurasian Ruffe).
- Completed Agency Invasive (Asian) Carp Control Plan update.
- Invasive (Asian) Carp eDNA monitoring.

Tennessee Wildlife Resources Agency
Submitted by Cole Harty, ANS Coordinator

- Although abbreviated due to Covid-19, the High School Fishing Team ANS program and watercraft inspection training informed students about ANS. Program topics were general and state specific. Students were also taught and tested on the importance of preventative measures and watercraft inspection.
- Bass Pro Tour Tournament angler, Michael Neal, partnered with TWRA to promote ANS awareness. Michael displays Agency ANS logo on his boat, truck, and jersey. Michael has made appearances at High School Fishing Team ANS programs and taped several ANS videos for Agency distribution.
- Participated in and developed numerous ANS outreach actions including webinars, press releases, expos, news interviews, radio interviews, newspaper interviews, pamphlets, etc.
- Hired three interns form University of Tennessee – Knoxville to do statewide ANS outreach. Interns assisted with regional ANS sampling, improved and replaced signage at access points, and developed draft ANS outreach material and media posts.
- Continued research on the use of freshwater prawns as a control for red swamp crayfish.
- Hired interns from University of Tennessee – Martin to assist with invasive carp study evaluating reproductive success, establishing leading edges and abundance of age-0 carp in Kentucky and Barkley Lakes using larval light traps, larval tows, and mini-fyke nets.
- Acquired a new electrified dozer trawl boat for invasive carp sampling.
- Assessment of spatial variation in relative abundance of invasive carp in Kentucky, Pickwick, Barkley, Cheatham, and Old Hickory reservoirs.

- Monitored invasive carp movement and lock and dam passage in the Tennessee and Cumberland rivers. Assisted efforts by USGS and Tennessee Tech to implant acoustic tags in over 200 Silver Carp.
- Examined harvest at licensed wholesale fish dealers and collected biological information from Silver and Bighead Carp.
- TWRA has continued surveillance and outreach for invasive carp in response an angler reported Silver Carp in Chickamauga Lake from January 2020. Extensive search efforts in East Tennessee reservoirs and tailwaters have found no additional Silver Carp.
- TWRA Asian Carp Harvest Incentive Program (ACHIP) supports commercial fishers and wholesale buyers with monetary incentives applied to harvested invasive carp. As of 8/17/2021, the program has resulted in the harvest of more than 10.4 million lbs. of invasive carp from Kentucky and Barkley lakes since its inception in September 2018.
- Four new full-time invasive carp positions have been hired. One additional position has been approved by the Commission and will require legislative approval.
- TWRA has been actively engaged in a structured decision-making process to inform TVA's programmatic environmental assessment for the implementation of barriers on its lock and dam sites on the Tennessee River.
- Assisted MICRA/MWF with an invasive carp outreach field trip at Pickwick Lake.

Texas Parks and Wildlife Department

Submitted by: Monica McGarrity, Senior Scientist for Aquatic Invasive Species

Accomplishments/priorities for the past year:

Aquatic Invasive Plant Management

Aquatic invasive plant management continues to be a priority in Texas, with Giant Salvinia and Water Hyacinth remaining the most problematic species, although a high degree of control has been achieved and no water bodies are currently considered impaired for recreational access. The February 2021 freeze resulted in a significant reduction in floating aquatic invasive plant species—giant and common salvinias, water hyacinth, and water lettuce. However, water hyacinth has quickly rebounded from seed. Giant salvinia integrated pest management includes a variety of control methods including salvinia weevil introductions; fortunately, the weevils were able to survive the severe winter weather on some reservoirs. Crested floating heart, first introduced in Texas approximately 6 years ago, has become a significant problem on Caddo Lake, where efforts to treat with ProcellaCOR, the most effective herbicide found to date, are meeting with limited success and additional treatment effort will be needed in 2021-2022.

Riparian Invasive Plant Management

Watershed-scale riparian plant management in key Native Fish Conservation Areas also continues to be a key priority. Efforts are ongoing to manage saltcedar across the Upper Brazos River watershed in critical habitat for Smalleye and Sharpnose shiners to improve habitat, with nearly 140 private landowners participating and 18,591 acres treated to date. The Healthy Creeks Initiative has partnered with more than 350 private landowners and the Nueces River Authority to treat Arundo (Arundo donax; aka giant reed) infestations along streams and rivers in the Pedernales, Blanco, Guadalupe, Medina, and Nueces river watersheds of the Texas Hill Country in Central Texas, and recently expanded to include the Llano River and San Felipe Creek.

Invasive Carp Population Assessment

Invasive silver and bighead carp have been detected in the waters of the Red River Basin, but information regarding this species was limited primarily to isolated angler reports. Texas partnered with Oklahoma and Arkansas and researchers from Auburn University and Texas

Tech University to conduct an invasive carp population assessment and collect baseline native fish assemblage data. The project is reaching the end of the first year, with a second year already funded, and the team will be proposing to add an additional year to the project to collect data and conduct otolith microchemistry analysis to evaluate origins. Invasive carp have been detected in Texas tributaries of the Red River, and TPWD will be seeking to implement changes to regulations to prevent the transfer of invasive carp to include these waters in Spring 2022.

Public Outreach Campaign

Public outreach on aquatic invasive species is a key component of Texas' ANS management strategy and is funded by TPWD and a group of partners. The 'Protect the Lakes You Love' public awareness campaign made hundreds of millions of impressions through billboards; gas station advertising including clean, drain, and dry pump videos; digital pre-roll video ads; Facebook ads and posts; geofenced Pandora radio ads near infested and high-risk lakes; boater registration mailings; emails to registered boaters and marinas; print ads in outlets such as the Outdoor Annual, Texas Parks & Wildlife magazine, and the Marina Association of Texas newsletter. Outreach this year also expanded to include focus on the Never Dump Your Tank campaign and direct, targeted angler outreach to prevent the spread of invasive carp.

Aquatic Invasive Species Research

Texas recently completed a request for proposals and will be funding four new AIS research projects in fiscal years 2022-2023. Two projects focus on zebra mussels—assessment of drivers of population differences between two Texas lakes and evaluation of rapid, automated veliger detection technology. One project investigates key aspects of the ecology of suckermouth armored catfish, with a focus on enhancing ongoing removal efforts in critical habitat for Fountain Darter and Texas Wildrice. The final project uses remote sensing methods to survey Native Fish Conservation Areas around the state for presence of significant Arundo donax infestations with an increasing trend to aid in guiding future management efforts.

Priorities for the upcoming year. The above key activities for the past year will remain the priorities for Texas for the upcoming year, in addition to ongoing zebra mussel early detection monitoring.

West Virginia Department of Natural Resources

Submitted by: Katie Zipfel, Fisheries Biologist

WVDNR currently collaborates with numerous state and federal partners on invasive carp related issues within the Ohio River basin. WVDNR is a participating agency on the Early Detection and Monitoring, Control and Containment, Telemetry and Early Life Stages Projects.

Invasive Carp Monitoring

- *Monitoring & Early Detection* - WVDNR conducted annual monitoring boat electofishing surveys on the R.C. Byrd Pool of the Ohio River in Spring 2021. No invasive carps were observed at any of the 23 survey locations (5.14 hours). Throughout April 2021, WVDNR deployed gill nets in the R.C. Byrd (3300 feet) and Greenup Pools (1650 feet) of the Ohio River. One Grass Carp was removed from the Greenup Pool during these surveys.
- *Early Life Stages* - In Summer 2021, WVDNR conducted larval tows in Raccoon Creek, a tributary in the R.C. Byrd Pool. All larval fishes that were collected were sent to Craig Jansen (INDNR) for identification.
- *Telemetry* - WVDNR continues to assist the USFWS with their telemetry receivers deployed throughout the West Virginia section of the Ohio River. Receivers were offloaded every two months.
- *Control and Containment* - In Summer 2021, WVDNR conducted several gill net surveys on Raccoon Creek in an effort to remove invasive carps. One Silver Carp was removed during these efforts.

- *Interagency Efforts* - In July 2021, WVDNR travelled to Brandenburg, KY to assist KDFWR with an extensive removal effort to better understand invasive carp growth in the Ohio River.

Hydrilla
- WVDNR continues to communicate with ORSANCO in monitoring the advancement of Hydrilla downstream in the mainstem Ohio River. The number of inland waters with reports of Hydrilla continues to increase. No management actions are planned at this time.

Northern Snakehead
- Despite proximity, WVDNR has yet to receive any reports of sightings or catches of Northern snakehead in the WV portion of the Potomac river drainage.

Regulatory Actions
- No new regulations have been put into place

Wisconsin Department of Natural Resources
Submitted by: Amy Kretlow, AIS Program and Policy Leader

Staffing
- March 2020: Elizabeth (Liz) Tanner MRBP Admin Assistant
- August 2021: Amy Kretlow replaced Bob Wakeman as the AIS Program and Policy Leader
- Currently: Adding 2 Mississippi River Basin AIS Specialists (new positions) to compliment the 3 Specialist in the Great Lakes Basins. This creates a balance AIS Team with Amy as lead and Maureen Ferry, the Statewide Monitoring Coordinator.

May 2021: WI held a virtual mock response exercise sponsored by Great Lakes Governors and Premiers which included, WI Fisheries and AIS staff, MN AIS staff, and USGS responding to an inland Invasive Carp detection in the St. Croix River. Basic training using lessons learned is being incorporated into state fisheries biologist training programs.

April 2021: Spring Meeting with State AIS partnership and State CISMA groups, held virtually

New Responses in the Mississippi Basin (March 2020 to present):
- New Zealand Mud snails (*Potamopyrgus antipodarum*) – Discovered in Elvers and Token Creeks in Dane County, this species continues to expand in cold water streams in SW WI.
- Brittle Naiad (*Najas minor*) – Newly found in Pools 8 and 9. Follow up monitoring and verifications are taking place by LTRM (Long Term Resource Monitoring) Vegetation crews.
- Flowering Rush (*Butomus umbellatus*) – Large populations were found in Pools 4, 9 and 12, while a smaller population was found in Pool 6. Planning on treatment and monitoring are still being discussed.
- Japanese Stilt Grass (*Microstegium vimineum*) – Found in La Crosse County. Water Resources and AIS Staff monitored downstream ands drainage ditches with no new populations found.
- Floating Marsh Pennywort (*Hydrocotyle ranunculoides*) Discovered by DNR staff at Wisconsin's Horicon Wildlife Area. Due to limited access to many areas, the AIS staff worked with the DNR Forestry Aeronautics team to deploy drones to delineate the population.

Statewide Achievements

Law Enforcement
- Marbled Crayfish (*Procambarus fallax forma virginalis)* – Law Enforcement led an investigation stemming from one man raising and selling this species from his basement. Law Enforcement is working with 12 other states where the crayfish were shipped and made

the discovery of 1,000 crayfish and hundreds of additional leads that have not been fully investigated to this point in other states.
- Red Swamp Crayfish (*Procambarus clarkii*) – Discovery of one crayfish in a pet store led Law Enforcement into finding 900 others of this species in pet stores throughout Wisconsin. Investigations concluded on this case in 2021 with a total of 38 charges and thousands of warnings.

Pathways – Pathway management is a major focus in Wisconsin's AIS Management Plan. Three priority pathways have been chosen to prevent the spread of invasive species through behavior change, new partner developments, or education and outreach methods. These pathways include Maritime Commerce & Ballast Water, Organisms in Trade, and Recreation Activities & Service Providers.

Testing new monitoring technologies
- Environmental DNA (eDNA) – Testing surface water to try and help detect new species. We have been working with partners and the State Lab to refine our methods.
- Drones – In very preliminary stages, but AIS staff is working with the Aeronautics team to use in hard to access locations.
- Conservation Dogs – Using canines and their extraordinary sense of smell to help detect in invasive species.

Collaboration of Monitoring efforts – In 2020, COVID restrictions did not stop staff, partners, and citizens from monitoring. During this challenging time we were able to have over 1000 sites monitored with 150 new AIS populations found.

Citizens	514
Partner	393
DNR	201
Grand Total	1,087

Outreach
- Landing Blitz July 2020 – 12,291 boats inspected; hours spent 4687; contacts made 27,403
- Landing Blitz 2021 (numbers are still preliminary) – 10,488 boats inspected; hours spent 3,753; contacts made 23,231
- Lakes Monitoring and Protection Network Grants – From this new program Wisconsin has been able to partner with counties and non-profits to provide nearly statewide coverage in the AIS Prevention Program.

Wisconsin's Invasive Species Rule, NR40 Review –In 2020 and 2021, all the Species Assessment Groups met and are performing literature reviews on new and old species for regulation updates.

Updated rule on Aquatic Plant Management permitting drafted and being released for first full public review. This program permits herbicide, mechanical, biological control of aquatic plants and nuisance species. First update of chemical rules since 1989.

Wyoming Game and Fish Department
Submitted by: Josh Leonard**,** Aquatic Invasive Species Coordinator

Please provide a description of your top five AIS activities/accomplishments/priorities for the past year:
- In 2021, watercraft check stations began operation in late March and will remain open into October at fifteen permanent check stations at port of entry, rest area, and other locations to intercept watercraft entering the state. Roving crews focused on inspections at major waters throughout the state to contact resident boaters. Through the end of August, a total of

59,752 inspections have been conducted, a slight increase of thus far compared to the increase we witnessed in 2020. Of these, 3,676 were high risk watercraft and 850 were decontaminated for water onboard or suspect AIS, already surpassing 2020 decontamination totals by the end of August. Thus far, forty-five boats have been intercepted with mussels attached or in compartments, two of which were harboring live mussels. A boat last used in Texas destined for Washington State was quarantined in Laramie, WY after decontamination to ensure mussels were no longer viable. Through the end of August, Wyoming has already intercepted twice as many mussels infested boats compared to 2020 totals.

- The Wyoming Game and Fish Department (WGFD) responded to the moss ball incident quickly by coordinating with the WY Dept. of Agriculture to implement the first quarantine of the product into Wyoming. In addition to supporting the federal investigation, Wyoming is still monitoring water treatment facilities for the presence of mussel DNA in response to the likelihood veligers were introduced to these systems in cities where mussels were found in stores. This effort would not have been possible without the coordination with WY Dept. of Health by tapping into their already existing infrastructure to monitor water treatment facilities for COVID-19 spikes. Thus far all samples have come back negative for mussel DNA.
- This year the WGFD completed an intensive two year project on developing water specific rapid response plans for the 23 highest at risk waters for mussel invasion. For more information and access to these plans, please visit: https://wgfd.wyo.gov/Fishing-and-Boating/Aquatic-Invasive-Species-Prevention/AIS-Rapid-Response-Plans.
- In 2020 and 2021, the WGFD hired four FTE AIS Specialist located in Evanston, Cheyenne, Sheridan and Casper, to help oversee operations at check stations. Wyoming now has five FTE employees (1 AIS Coordinator and 4 AIS Specialists), four contract AIS Specialists, and 51 seasonal AIS technicians.
- The WGFD is now wrapping up regulation changes to further protect our state from AIS in regards to Private Hatchery importation, which will be implemented in 2022. The AIS program has now adopted the AIS Hatchery Inspection obligations and will begin their sampling of hatcheries in the coming weeks.

Please outline your priorities for the upcoming year. This will help identify coordination opportunities moving forward.

- Continue efforts to move towards live inspections with mobile printers for receipts. The goal for WGFD is to have 75% of our operations using tablets and Bluetooth printers by the middle of the 2022 boating season.
- The WGFD is currently processing a request for proposals to move a portion of their AIS Inspector training to an online at-home format, similar to most Hunter Education Classes, so inspectors can complete this at their leisure and attend an in-person field day to gain the experience on proper inspection and decontamination protocols.
- The WGFD will be transitioning some office decontamination units to on-demand units, to help deliver more reliable temperatures when preforming decontaminations.
- Continue ongoing coordination efforts with PSMFC to acquire WRDA funds to help fund expansion efforts and upgrades to existing infrastructure at check stations in Wyoming.

University/Research Member Updates

Louisiana Sea Grant College Program
Submitted by: Emily Maung

Louisiana Sea Grant funded a project focused on lionfish through its Undergraduate Research Opportunities Program (UROP). Through UROP, undergraduate student Adam Brunner of Louisiana State University is working with Dr. Cassandra Glaspie. Together, they are assessing the threat posed by invasive lionfish in Louisiana's coastal waters by studying the species' ability to hunt under various turbidities.

The LASG seafood extension specialist, Evelyn Watts, provides regulatory compliance and food safety guidance to people in industry interested in processing invasive Asian Carp. Dr. Watts assisted a local group to review Asian Carp processing plant design to comply with local, state, and federal requirements.

The LSU AgCenter has been producing Giant Salvinia beetles and offering them to landowners and land managers who have infestations of the invasive aquatic plant Giant Salvinia in their marsh land, ponds and lakes. The beetles (also called weevils) consume Giant Salvinia. Mark Shirley, a marine extension agent who holds a joint appointment with Louisiana Sea Grant and LSU AgCenter, has been reaching out to landowners and duck hunters with known infestations of the invasive aquatic plant to inform them about the availability of the weevils.

Louisiana Sea Grant's Department of Education and Engagement has an online invasive species page. This subset of webpages lives within Louisiana Sea Grant's website and contains general introductory information on invasive species; information on example of a few species invasive to Louisiana; lesson plans, curricula, and classroom activities for teachers; reference guides and other background resources.
http://www.laseagrant.org/education/topics/invasive-species/