Mississippi River Basin Panel on Aquatic Invasive Species

Panel Coordination Meeting in
Little Rock, AR

Compiled Member Reports

April 16, 2024

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State of Alabama

Submitted by Dave Armstrong

Invasive Carp (IC)

Efforts by Alabama Department of Conservation & Natural Resources (ADCNR) staff were expended on evaluation of potential sample sites, assistance to other cooperators, collection of monitoring data and eradication. Work supporting **IC** projects was performed within Tennessee River impoundments in Alabama, including Pickwick, Wilson, Wheeler and Guntersville Reservoirs. Nominal field work also included the Black Warrior and Tombigbee Rivers. Field management actions included:

- Twenty-six (26) field days were spent on fall to early spring monitoring of invasive carp abundance/distribution/demographics (objective 1 and 3). Data from 33 fixed-sites using an occupancy strategy developed during fall 2022, where sites are comprised of 4 consecutive day electrofishing reps (n=132 samples). An additional number of targeted sampling in tailwaters, small river sections and creek cove sites (n=132) were sampled using 2- or 7-boat gang electrofishing and *Early Detection* protocol (TWRA). Five Silver carp were either captured or sighted during these efforts; one sighted in Pickwick Lake, and four captured in Wilson Lake. The Wilson Lake fish were the first ever captures by ADCNR staff within this reservoir.
- Twenty-two (22) days were spent on non-biological work or assistance to agencies, including: telemetry receiver data retrieval at Guntersville Dam locks, assisting TWRA and USGS with fish collections for acoustic/loop tagging, on-site assessment of sites for new telemetry receivers, and install of invasive carp awareness signage (n=63) at access sites in the Tennessee, Black Warrior and Tombigbee Rivers during fall 2023 to present.
- More than 55 other assistance events to agencies, NGO's or universities were performed, including: reviews/edits to outside agencies; data, report and online survey submissions, meetings and comments for committees or working groups, and field or technical assistance.

ANS State Grant Activities in Alabama, 2022-2023

The following summarizes "non-carp" invasive aquatic species control activities by ADWFF staff.

- ADCNR staff secured a second year of a state funding invasive species grant to address "non-carp" issues. Primary goals: educational objectives, legislation and species-specific work.
- Staff submitted a large number and variety of carp, snail, and aquatic plant siting data as documentation to USGS NAS Office database; development of ADCNR website invasives section, rack cards and tri-fold pamphlets for general public; development of an aquaculture and pet store listing of acceptable commercial species, review of current regulations for further limitations on invasive species importation and stocking, review of educational opportunities.
- An apple snail control manuscript (targeted late 2024) for work in Threemile Creek watershed is being developed for a journal.
  Biologists provided five presentations on ANS initiatives and invasive carp status in Alabama to more than 226 attendees of the Alabama Chapter and Southern Division of the American Fisheries Society, the Lake Guntersville Management Assoc. and Alabama Extension Service

State of Arkansas, Game and Fish Commission

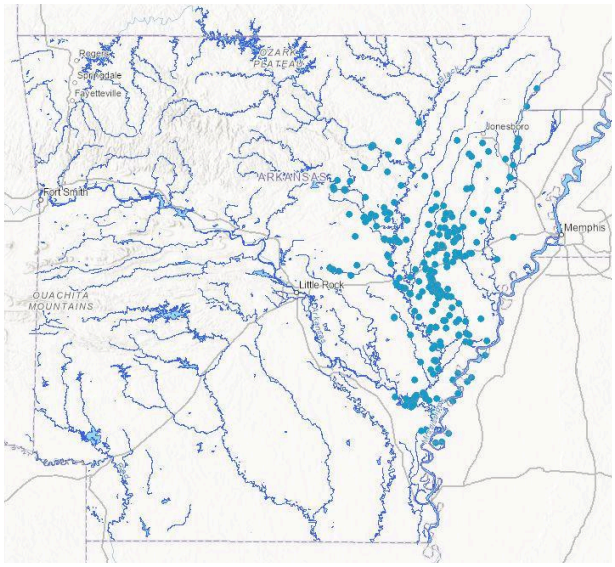
Submitted by Matt Horton

New ANS Introductions

No new ANS introductions were reported since July 2023.

Northern Snakehead Distribution

Northern Snakeheads continue to increase range expansion in Arkansas, although no reports were documented outside of drainages where they were documented in 2022.



Map of confirmed Northern Snakehead observations (blue dots) documented by AGFC in Arkansas, current through March 2024.

Invasive Carp Removal Program

The Arkansas Game and Fish Commission's (AGFC) Invasive Carp Removal Program continued removal efforts in the Arkansas and White River systems. The program is staffed with one full-time Invasive Carp Biologist to coordinate program activities and supervise up to five part-time technicians who operate two boat crews that conduct removals year round. Carp are removed using active gill netting methods. One of the biggest challenges of the program has been maintaining the five part-time staff positions who conduct removal efforts. From July 2023 – March 2024, the program removed 153,630 pounds of invasive carp (Silver, Bighead, Grass and Black Carp). Since the in-house removal program started in October 2021, it has removed 18,038 invasive carp totaling 304,258 pounds - Silver Carp (271,031 lbs.), Bighead Carp (20,268 lbs.), Grass Carp (12,872 lbs.), and Black Carp (86 lbs.). The program is funded by USFWS Invasive Carp Control and Management Grants.

Invasive Carp Removal Program staff with a boat load of Silver and Bighead Carp removed from the lower Cache River, October 2023.

In October, the AGFC Invasive Carp Biologist assisted USFWS Fisheries Biologists from Tupelo, MS, with testing the effectiveness of an Electrified Dozer Trawl (EDT) to capture Silver Carp in various habitats of the lower White River.

Invasive Carp Harvest Incentive Program

In February, the AGFC initiated a new Invasive Carp Harvest Incentive Program to increase biomass removal of invasive carp (Silver, Bighead, Grass and Black Carp) in Arkansas waters by increasing commercial harvest and market use. The program offers Arkansas commercial fishers who participate a per-pound subsidy of $0.18 for invasive carp that are harvested from Arkansas waters open to commercial fishing and sold for some legal, beneficial use. Participants will have access to start-up fishing supplies (i.e., gill net webbing and rope) to offset tackle costs associated with targeting invasive carp. The program also offers businesses access to supplies such as fish totes, insulated containers, and scales to help facilitate fish acquisition and establishment of fish buying stations. The Arkansas Economic Development Commission has partnered with AGFC to provide business development support to entities seeking to increase processing capacity, develop market products, or develop carp processing facilities in Arkansas. A web page was developed for the program www.agfc.com/carpharvest. In the first two month, 29 commercial fishers have enrolled in the program, and bills of sale for 164,540 pounds of invasive carp were submitted for subsidy payments. The program is fully funded by USFWS Invasive Carp Control and Management Grants.

Aquatic Invasive Plant Control

The AGFC continued efforts to monitor and control aquatic invasive plants across the state. From July 2023 – March 2024, AGFC spent $59,000 on contracted chemical control of Giant Salvinia (40 acres), Alligator Weed (220 acres), Cuban Bulrush (14 acres), and Water Hyacinth (145 acres) in ten public waterbodies. Control efforts along with subfreezing winter temperatures continue to keep Giant Salvinia densities minimized in both lakes. State ANS Management Plan Grant funds were used to purchase an amphibious ATV (ARGO Frontier 700) for monitoring and control of Giant Salvinia on Lake Columbia. Also, 2,000 feet of floating containment boom was purchased to help contain Giant Salvinia and Water Hyacinth and increase efficiency of chemical controls. No new invasive aquatic plant introductions were reported, and no new introductions of Giant Salvinia occurred.

Watercraft Cleaning Stations

In January 2023, the ANS Coordinator installed a CD3 Wayside Solar watercraft cleaning station at AGRED Park on Lake Erling. This was the first watercraft cleaning station installed on Arkansas public waters for ANS prevention. The cleaning station provides free tools for boaters to clean, drain, and dry their boats, trailers, and fishing and hunting equipment to prevent the spread of Giant Slavinia and other ANS. To date, the station's software system has documented over 300 user sessions. On February 29th, a second CD3 Wayside Solar station was installed at Beech Creek Access on Lake Columbia to help prevent the spread of Giant Salvinia. The new watercraft cleaning station has documented over 30 user sessions in March.

CD3 Wayside Solar watercraft cleaning station installed at Beech Creek Access on Lake Columbia, February 29, 2024.

Zebra Mussel Monitoring

Substrate samplers were monitored in nine reservoirs. No new zebra mussel detections occurred from July 2023 – March 2024. Zebra mussels are currently present in Beaver Lake, upper 37 miles of the Bull Shoals Tailwater (White River), and all pools of the Arkansas River. The ANS Coordinator quarantined and required decontamination of three house boats that were being moved from zebra mussel positive waterbodies to Lakes Ouachita and Greers Ferry.

Research

Four ANS research projects were completed. These include three invasive carp projects funded by FY20 USFWS Invasive Carp Control and Management Grants. Final reports are available through the AGFC's Fisheries Division.

1) *Movement of Silver Carp and Bighead Carp in the Red River in Arkansas*, conducted by Texas Tech University
2) *Evaluating the spacial and temporal distribution and ecology of Bighead and Silver Carp and native fishes of the Lower Red River basin*, conducted by Auburn University
3) *Population Characteristics, Movement, and Natal Origins of Silver Carp and Bighead Carp in the Arkansas and White Rivers*, conducted by the University of Arkansas at Pine Bluff
4) *Risk Assessment of Giant Salvinia in Arkansas Waters*, conducted by the Arkansas Cooperative Fish and Wildlife Research Unit, University of Arkansas, Fayetteville

Regulations

The ANS Coordinator proposed regulation changes that would add several species to the state prohibited aquatic species list. The regulation changes were proposed to strengthen our ability to prevent the introduction and spread of mystery snails and Giant Apple Snails, and align Arkansas' prohibited species list with neighboring state listings, USFWS injurious wildlife listings, and USDA plant pest listings. Also, a new Code Addendum was proposed to simplify and combine prohibited aquatic species lists. The public comment period for the proposed changes closed on March 15, 2024, and the comments are being reviewed by AGFC. If accepted, they will go into effect on January 1, 2025.

Pet Trade Industry Outreach

On December 31st, the AGFC Fish Pathologist and ANS Coordinator hosted a virtual meeting with pet trade industry representatives, including local business, national distributors, researchers, and representatives from the National Aquaculture Association and Pet Advocacy Group to develop a partnership/communication network with the industry and discuss regulations pertaining to the industry. Developing a communication network with local pet dealers, distributors, and industry leaders will help AGFC identify who is selling aquatic wildlife and what species are being sold in Arkansas, identify regulatory needs, and develop an efficient process to inform pet dealers and customers of regulations and prohibited species lists, and lawful alternatives available to pet owners for addressing unwanted pets and discourage unlawful pet releases into the wild. This was the first meeting between AGFC and the pet trade industry, and was well received by participants.

ANS Outreach Efforts

The following are outreach efforts conducted by AGFC's ANS Program staff to increased public awareness of ANS management activities, regulations, reporting, species identification, and prevention behaviors from July 2023 – March 2024:

- Updated ANS identification, regulations, and prevention messaging for the AGFC Fishing, Trout Fishing, Hunting, and Waterfowl Hunting Guidebooks.
- Published 6 articles in the AGFC Arkansas Wildlife Newsletter on invasive carp management, clean, drain, dry prevention behaviors, use of watercraft cleaning stations, invasive aquatic plant control and prevention, and reporting ANS observations.
- Published 2 articles in the AGFC Arkansas Wildlife Magazine on invasive carp management and use of watercraft cleaning stations to prevent the spread of Giant Salvinia.
- Gave 12 in-person presentations on ANS management, regulations, and prevention at public meetings and state and regional conferences.
- Made several posts related to ANS prevention and management activities on AGFC Fisheries Division Facebook page.
- Conducted targeted social media ads on Facebook and Instagram and radio spots (statewide) to increase public awareness of ANS, encourage clean, drain, dry prevention behaviors, and public reporting of ANS.
- Updated Arkansas' AIS Fact Sheet for MICRA's annual Washington DC fly-in.

Training

The ANS Coordinator conducted an all day workshop on invasive aquatic plant identification and control for the Arkansas Chapter of the American Fisheries Society. Forty-four members participated in the

workshop, which included live-plant identification and presentations on identification, plant biology, control methods, impacts to fisheries, regulations, and prevention.

State of Colorado, Colorado Parks and Wildlife

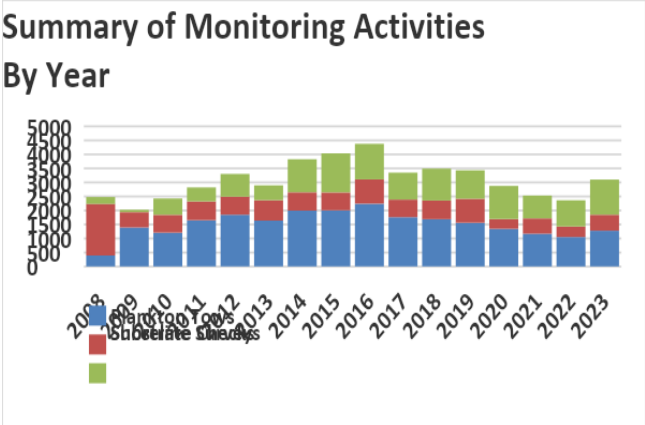
Submitted by Jennifer Murray

Sampling/Monitoring

CPW has sampled 584 "at-risk" waters for aquatic invasive species since inception. While CPW ANS staff has historically monitored the state's public waters for numerous invasive plants and animal species, and cataloging native species along the way, the focus of sampling is on the early detection of zebra and quagga mussels.

The state follows a three-tier sampling protocol targeting the three life cycles of the zebra or quagga mussel: (1) conducting plankton tows to find the veligers, (2) deploy and check substrates to find the juvenile "settlers" or attached adult mussels and (3) conduct surveys along the shoreline and existing structures for settled juveniles or attached adults.

The state requires three steps to identify, verify and confirm a detection of zebra or quagga mussel veligers: (1) visual analysis of plankton tows using a cross-polarized light microscope (2) DNA verification utilizing polymerase chain reaction [PCR] and (3) DNA confirmation utilizing gene sequencing.



In 2023, crews sampled 178 standing, and 52 flowing waters statewide. 24 of these waters had never been sampled for ANS. In addition to CPW's ANS crew, plankton samples were also received from partner organizations. Their contributions can be seen in Table 1.

Partner Organizations	Number of Plankton Samples Contributed
Wyoming Game and Fish Department	98
Curecanti NRA (National Park Service)	64

Tahoe Regional Planning Agency	36
Aquatic Animal Health Lab	20
California Department of Fish and Wildlife	6
New Mexico Department of Game and Fish	1

Table 1. The total number of additional samples received from partner organizations during the 2023 sampling season.

The sampling teams conduct early detection sampling for zebra and quagga mussels on public lakes and reservoirs. CPW has met western regional minimum standards for zebra and quagga mussel monitoring. The program has been unable in recent years to actively search for other ANS, sample flowing waters (rivers, streams, creeks), perform crayfish trapping, or conduct plant inventories.

Zebra Mussels

Zebra mussels were detected in Highline Lake in September of 2022 through routine early detection monitoring. This is the first finding of adult mussels in the state of Colorado. After exhaustive upstream sampling to ensure that Highline Lake was the origin of the infestation, an eradication plan was executed in March of 2023. Highline Lake was lowered until only 20% of its volume remained with the goal of exposing as many mussels as possible to freezing and drying conditions for several months. The remaining water was treated with a copper based EPA registered molluscicide, Earthtec QZ. This treatment was intended to target mussels with minimal damage to non-target organisms like fish. Target concentrations of the chemical were met and weekly ANS sampling was conducted throughout the summer to monitor for presence of zebra mussels. No findings that met the minimum criteria for detection were made throughout the summer.

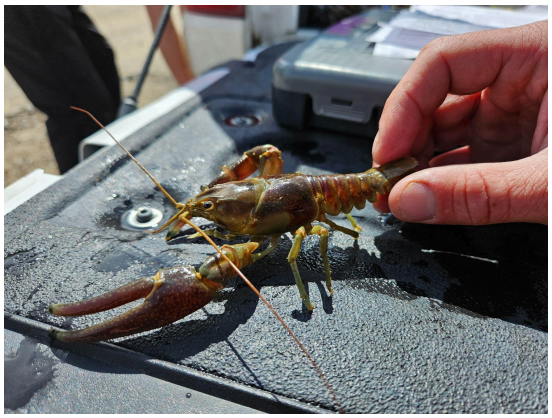
In October of 2023, at the conclusion of Highline's boating season, buoys, work boats, and docks were removed from the water. Inspection of this equipment led to the finding of additional adult zebra mussels. Although the original eradication attempt was not a total success, it was not without merit. If no action had been taken, the amount of zebra mussels in Highline may have exceeded the hundreds of thousands. In November of 2023, another Earthtec QZ treatment was conducted, not with the intent of eradication, but to limit zebra mussel reproduction and the potential of viable veligers moving downstream of Highline Lake into the Colorado River. Water quality parameters are

monitored regularly after the treatment and when the water is safe to discharge downstream, Highline Lake will be lowered and held at this level throughout the summer.

Highline Lake will be closed to all motorized boating for the 2024 boating season. In the fall of 2024, when irrigation water no longer needs to flow through the lake, CPW will initiate the process of completely draining Highline Lake. This eradication attempt will allow the least amount of variables influencing its success. Highline Lake is expected to be completely dry for several months over the winter of 2024/2025 before refilling in April of 2025. All eradication efforts are performed with respect for the irrigation needs of the Grand Valley as these are the systems that the ANS program strives to protect from harmful aquatic nuisance species.

Other ANS

Rusty Crayfish



Rusty crayfish were detected in Lake Granby in 2023. This is the first new detection of the species within Colorado since 2011. Rusty crayfish is an invasive species that was first discovered in 2009 in a main-stem impoundment of the Yampa River and at two river locations between Stagecoach Reservoir and Steamboat Springs. The ANS Program conducted extensive surveys statewide and detected a population in Sanchez Reservoir State Wildlife Area in 2010 and Stagecoach State Park in 2011. There are no current efforts ongoing to map crustaceans or control rusty crayfish in Colorado.

Populations have been managed through manual removal of adult rusty crayfish from 2010-2015 to reduce the reproducing population in the reservoirs and limit impacts to native communities and users. In 2016, CPW staff monitored the Yampa River's population and determined the manual removal was successful, as very few rusty crayfish were found in the river. Since they are still abundant in these reservoirs, trapping and monitoring efforts will be evaluated and potentially implemented, for future years.

CPW implemented regulations passed by the Wildlife Commission in November 2010 in which all crayfish caught west of the Continental Divide must be immediately killed and taken into possession, or immediately returned to the water from which they were taken. There are no crayfish native to the Western Slope. The same restriction applies to Sanchez Reservoir in Costilla County due to the invasive rusty crayfish.

New Zealand Mudsnail (NZMS)

NZMS was confirmed in three new locations in 2023 – The Eagle River, Poudre River near Greeley and Bear Creek near Idledale. Additional detections in the last several years included Colorado River,

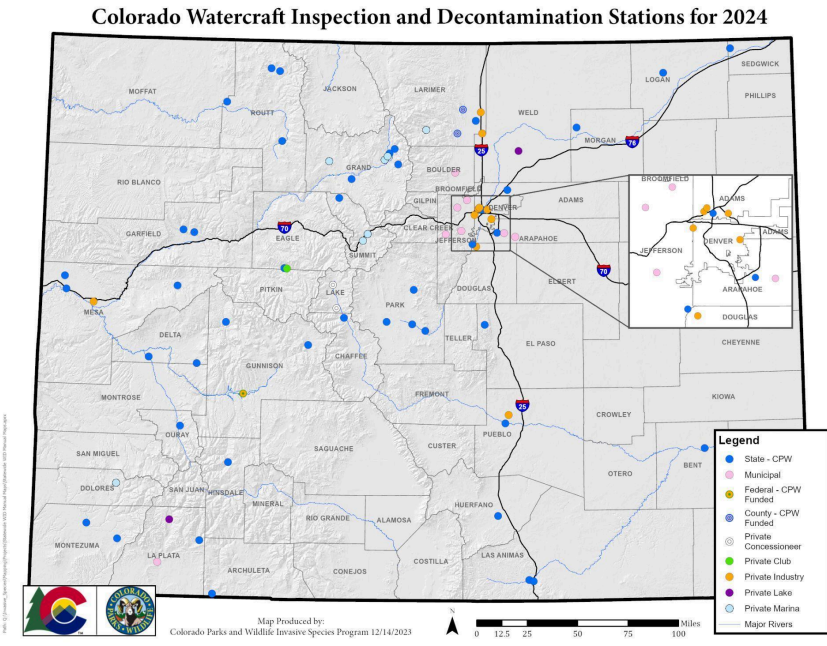
Government Highline Canal, Trout Creek, South Boulder Creek, the South Platte River in Downtown Denver, Lake Capote in Pagosa Springs, Elmer's Twomile Park in the City of Boulder, the South Platte River between Eleven Mile Reservoir and Strontia Springs Reservoir, Jimmy Camp Creek, Monument Reservoir, Trinidad Reservoir State Park, Badger Creek, The Arkansas River and the Sutherland Ditch in Pueblo.

Previously, the NZMS was detected in Chatfield Reservoir, during an aquatic noxious weed survey for Eurasian watermilfoil, in 2015. There were detections from 2010-2013 in Fountain Creek in Colorado Springs, Spinney Mountain Reservoir, Eleven Mile Reservoir, Delaney Buttes Lakes, College Lake at CSU in Fort Collins, and Dry Creek within the City of Boulder.

The tiny invasive snail was first found in Colorado in 2004 in Boulder Creek, the South Platte River below Eleven Mile dam and the Green River in Dinosaur National Monument. There were no detections from 2005-2009.

Watercraft Inspection and Decontamination (WID)

CPW coordinates a vast network of WID stations operated by CPW, the National Park Service, Larimer County, several municipalities, and numerous private industry locations including businesses, concessioners, marinas, clubs and private lakes. In total, the state has collectively performed over 7 million inspections and 233,298 decontaminations since 2008.



Per the state ANS Regulations, trailered watercraft must submit to an inspection, and decontamination if needed, prior to entrance in Colorado's waters following boating out of state or boating on a positive or suspect water. Boaters are also required to submit to an inspection prior to entering a water body where inspections are required by the managing agency. All persons performing inspections and/or decontaminations must be certified by CPW.

CPW taught 30 WID certification courses in 2023, in addition to maintaining an online recertification program for experienced inspectors and decontaminators. 28 of these 30 classes were taught virtually in 2023. There have been a total of 1,003 training sessions since the program's inception. In addition to the online course for experienced staff, the Invasive Species Program within CPW also provides two other specialized courses: (1) WID Trainer's certification and (2) Advanced Decontamination. CPW certified

756 individuals last year, for a total of 10,669 people certified or re-certified to perform WID since the implementation of statewide training and certification program in 2009.

In 2023, CPW authorized 75 locations to perform watercraft inspection and decontamination. Eleven locations operated as containment for other ANS. The focus of the containment program is to inspect watercraft leaving the lakes/reservoirs to prevent boats from moving ANS overland into currently uninfested areas, while maintaining prevention activities upon entrance to the reservoir.

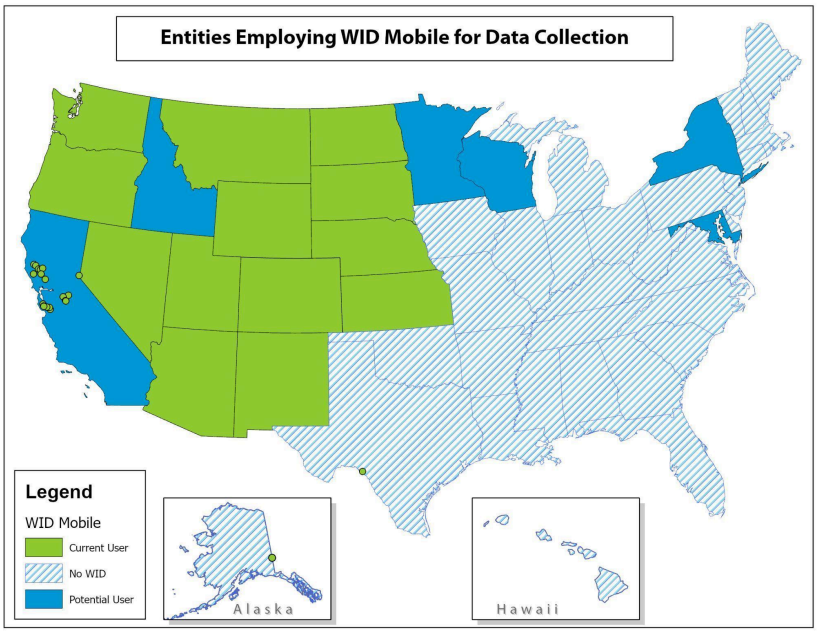
Sixty-two locations operated as prevention locations. Prevention locations are those that are negative for all ANS or are not located at a waterbody (e.g. offices or marine dealers). Green Mountain reservoir joined the list of prevention locations after its de-listing to a negative waterbody in January 2021.

Colorado conducted a total of 452,225 inspections and 33,833 decontaminations in 2023. There continues to be a large increase in the number of decontaminations performed as a direct result of CPW adapting to mitigate new threats. Increased invasions in the Colorado River Basin, from Lake Powell in Utah and Arizona downstream, continue to increase the need for diligent prevention at home in Colorado.

Regional WID Data Sharing System

The Regional WID Data Sharing System (System) is in use at more than 200 locations across the west, including 54 in Colorado. CPW developed the System and maintains ownership and oversight. The states of Arizona, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming as well as the National Park Service, Lake Tahoe Regional Planning Agency, Solano County Water Agency, County of Lake, Mussel Dogs, and TiGE are now employing the System as their primary form of data collection and management.

The purpose of the System is to record information related to WID electronically and to share information in a timely manner across jurisdictions to aid collaborative efforts to prevent the spread of zebra and quagga mussels and other ANS.
The System consists of a mobile application, website, and shared database hosted on a private server. The mobile application is compatible on all iOS and Android devices. This reduces the operating costs for mobile data collection and data entry while increasing accuracy. It provides for improved reliability in data collected in the field at WID stations, in addition to rapid query capacity for on-demand reporting. Lead agencies are able to customize the user interface of the mobile application in alignment with both western regional standards and state or local laws, regulations, and priorities.



The System is used for data entry, viewing, editing, querying, and reporting. An included risk assessment tool shows where boats are moving after launching in mussel infested waters and sends an alert to the next known destination. With the benefits of data sharing proving to be abundant, the states of Arizona, Nevada and Utah have been using the System to send out timely electronic alerts of watercraft leaving infested waters. This increased timely communication has directly increased the number of infested watercraft being intercepted within the western region before launching in uninfested waters.

CPW manages and operates the System through a private industry contract utilizing federal grant dollars. The data itself is the property of the state agency that input the information. CPW leads a Governance Committee, consisting of user organizations that is charged with evaluating and prioritizing requests, changes and enhancements. The Governance Committee works collaboratively to determine the viability and usefulness of new technologies.

It is expected that this System will become industry standard for entities performing WID. As users increase, this system will continue to improve communications among jurisdictions to enable field staff and managers to accurately focus resources towards effective risk mitigation related to the prevention and containment of zebra and quagga mussels and other harmful ANS.

Implementing HB21-1226 – More Robust Aquatic Nuisance Species Check Stations

HB21-1226 authorized Colorado Parks & Wildlife to implement a roadside watercraft inspection &

decontamination program. During the 2022 & 2023 field seasons, CPW is implemented a two-year pilot of this program. In 2022, CPW, in collaboration with CDOT & Port of Entry staff, implemented the first year of this pilot program at the eastbound Loma Port of Entry over the course of three days. This location was selected due to the high volume of boats traveling from Lake Powell towards Colorado. In total, 138 watercraft were inspected, 60 were decontaminated including 26 which were confirmed to have adult mussels. In 2023, nine different locations were selected in total, each with the goal of looking at different parts of the state that might have a high flow of out of state traffic. A mix of both Port of Entries and Welcome Centers were utilized, all of which were along a major travel route into the state of Colorado. In total, 21 watercraft were inspected and 10 were decontaminated, including two that were confirmed to have adult mussels over the course of this multi-day pilot effort.

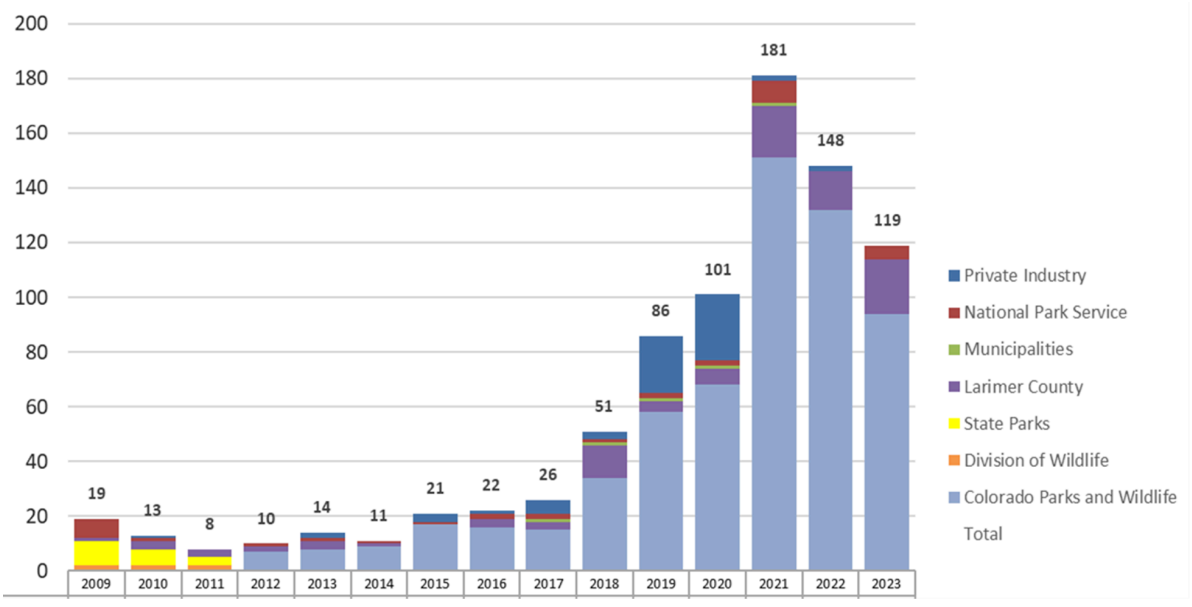
This initial effort has shown that the program can be effective at intercepting & decontaminating mussel fouled watercraft before they enter into the interior of the state. In 2024 CPW has selected Two locations to be staffed Thursday-Mondays from March to October. Trinidad Port of Entry and Loma Port of Entry both had more boat traffic and both are located closer to high risk water bodies from other states that have invasive zebra or quagga mussels. In addition, there will also be a roving crew that will rotate between Ports of Entry on the Eastern side of Colorado, with each week holding a pop up check point at a different location to gather more information on where the next more permanent location would optimally be located.

Mussel Boat Interceptions

This year the state intercepted 119 mussel fouled watercraft. All of these watercraft were fully decontaminated prior to being allowed into Colorado's waters. Since 2009, a total of 830 boats with adult zebra or quagga mussels were intercepted coming into Colorado.

In the past, infested vessels have been intercepted at Aurora Reservoir, Barr Lake, Beacon Landing Marina, Blue Mesa, Boulder Marine, Boulder Reservoir, Boyd Lake, Canon Marine, Carter, Cherry Creek, Chatfield, Clear Creek, Crawford, Denver CPW Office, Dillon, Electra Lake, Elkhead, Eleven Mile, Frisco Bay Marina, Granby, Grand Lake, Grand Junction CPW Office, Great Lakes Marine, Green Mountain, Highline, Horsetooth, Indian Peaks Marine, Jackson, John Martin, Lathrop, Loma Port of Entry, McPhee, Lake Meredith, Navajo, North Sterling, Pueblo, Ridgway, Rifle Gap, Roadside (SW Colorado), Ruedi, Shadow Mountain, Spinney Mountain, Stagecoach, Steamboat Lake, Strontia Springs, Sundance Marina, Sweitzer, Taylor Park, Trinidad, Turquoise, Vallecito, Vega, Williams Fork, Wolford, and Trinidad Port of Entry.

The infested vessels were coming from Arizona, Arkansas, California, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Michigan, Minnesota, Mississippi, Missouri, New York, Nevada, Oklahoma, Ohio, Pennsylvania, South Dakota, Tennessee, Texas, Utah and Wisconsin. The majority of the intercepted vessels were coming from Arizona, Lake Powell, the Great Lakes, or Mississippi River states. All boats were fully decontaminated to ensure all mussels were dead, and no mussels were visibly attached to the vessel.



Information and Outreach

CPW and partner agencies have implemented a comprehensive, multi-faceted, public education campaign focused on boaters and anglers to prevent the spread of ANS utilizing a variety of mediums. The invasive species program within CPW has been conducting information, education and outreach efforts for terrestrial and aquatic plants (noxious weeds), animals, insects, and diseases. Accomplishments include distribution of tens of thousands of printed rack cards, brochures, handouts, DVDs, posters and signs at offices, boat ramps and water-access points. In addition, staff have implemented an aggressive media relations campaign, using press releases and conducting web-based, radio, print and television interviews. CPW staff hosted numerous outreach seminars to boating and angling groups, marine dealers, HOAs, watershed groups, basin roundtables, ditch companies, municipal water managers and providers, schools and youth educational opportunities.

One particular outreach effort the ANS Program has expanded in 2023 is Don't Let It Loose. Don't Let It Loose (DLIL) is an initiative founded by the Invasive Species Action Network (ISAN) to promote responsible pet ownership and discourage the release of exotic animals and plants into North American environments. ISAN has spread the initiative across the United States but partners with local or state organizations to provide support for their region. The Colorado Parks and Wildlife Invasive Species Program acts as the liaison for the state of Colorado. The Don't Let It Loose initiative is three-pronged: exotic pet store partners, signage for water bodies, and direct educational materials.

In 2022, ISAN partnered with CPW to connect with 16 exotic pet stores in the Denver Metro area and supplied these partners with DLIL branded plastic bags for fish or live feeders so customers can receive the message with their purchase. In 2023, CPW expanded the effort to 27 partner exotic pet stores from the Denver Metro area to the West Slope and southwest corner of the state. CPW also began a new initiative of distributing signage discouraging aquarium dumping to municipalities to post at neighborhood ponds or creeks that are likely candidates for the behavior. To date,more than 50 posted around the state. The third branch of DLIL also began this year with the production of a video intended for children grades 3-5, to provide an introduction to invasive species and tell them how they can help by being responsible pet owners and not releasing their pets.

Colorado Aquatic Nuisance Species Management Plan

The State of Colorado Aquatic Nuisance Species Management Plan was approved by the National Aquatic Nuisance Species Task Force in 2020. This plan, which was originally conceptualized in 2006, has been collaboratively developed by CPW, the Colorado ANS Task Force, and the ANS program's diverse group of stakeholders. The approval of this plan makes Colorado eligible to receive federal funding to support the implementation of the plan and sets a clear path forward for preventing & managing ANS in Colorado.

State of Iowa, Department of Natural Resources

Submitted by Kim Bogenschutz

Following is the Iowa DNR Aquatic Invasive Species Program update for 2024.

The Aquatic Invasive Species Program (DNR–AIS) staff in 2023 consisted of 1 full-time Coordinator/Natural Resources Biologist, 1 full-time Vegetation Management/Natural Resources Biologist, 1 full-time Natural Resources Technician, 16 seasonal Natural Resources Aides (i.e., watercraft inspectors, survey crews), and 1 Administrative Intern who surveyed waterbodies for AIS across the state.

Major accomplishments in 2023 included the following:

- Employed 16 Seasonal Workers and 1 Administrative Intern
- Conducted 2,813 watercraft inspections reaching 7,061 people on 86 waterbodies
- Conducted 174 angler interviews on 19 trout streams
- Supported 27 partnerships and cooperative projects
- Used geofencing, search retargeting, and contextual and content targeting to serve 400,000 ads to visitors at 66 boat ramps
- Ran 180,000 OTT commercials targeting registered boat owners in Iowa
- Served over 6,000,000 geofenced and targeted (licensed boaters and anglers in Iowa) Meta (Facebook, Instagram) ads
- Ran 360 commercials on Des Moines television stations and Dickinson County radio stations
- Recorded 2 segments for the Iowa Live television program
- Gave 28 live and virtual presentations at conferences, outdoor events and trainings
- Targeted water recreationists with AIS prevention messages using news station website banner ads, boat ramp signs, news releases, social media and displays
- Completed 167 full-lake vegetation surveys
- Surveyed vegetation at 461 access points on 79 lakes
- Chemically treated invasive aquatic plants in 29 waterbodies
- Placed 104 zebra mussel veliger settlement samplers in 35 lakes and reservoirs
- Collected 77 water samples from 56 lakes and reservoirs and analyzed them for zebra mussel veligers
- Surveyed for adult zebra mussels in Red Rock Lake, Lake Delhi, and Easter Lake
- Collaborated with Iowa State University and the U.S. Fish and Wildlife Service to acquire grants for 7 Asian carp projects in the Upper Mississippi and Missouri River Basins in Iowa
- Purchased and repaired equipment and supplies for DNR Fisheries management stations and hatcheries to prevent the spread of AIS during operations

Seven new infestations of Eurasian watermilfoil and seven new infestations of brittle naiad were discovered in Iowa in 2023.

No new infestations of zebra mussels were discovered in Iowa in 2023.

State of Kansas

Submitted by Chris Steffen

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.

The KDWP Aquatic Invasive Species Program staff consists of 1 full-time AIS Coordinator/Supervisor; 1 full-time AIS Biologist focused on WID and vegetation management; 1 full-time AIS Biologist focused on commercial bait permitting and inspection and outreach and education; 1 full-time Invasive Carp Biologist; and 1 full-time Invasive Carp Technician.

- **Conducted largescale Watercraft Inspection and Decontamination (WID) for the first time in Kansas –** Funding through the Bureau of Reclamation provided KDWP the ability to conduct WID activities at 6 BOR waters in Northwest Kansas:
  - Norton Reservoir – not known to contain zebra mussels
  - Lovewell Reservoir – not known to contain zebra mussels
  - Webster Reservoir - not known to contain zebra mussels
  - Kirwin Reservoir - not known to contain zebra mussels
  - Cedar Bluff Reservoir – zebra mussel infested
  - Glen Elder Reservoir – zebra mussel infested

  More than 1,200 boats were inspected and KDWP plans to maintain and expand WID efforts in future years as funding and staffing allows.
- **Continued removal of invasive carps from the Kansas River below the Bowersock dam.** In 2023, approximately 30,000 pounds of invasive carps were removed from the Kansas River below the Bowersock Dam to prevent upstream range expansion and to benefit native species and river users below this barrier. KDWP conducted these agency staff removal efforts using traditional boat electrofishing and gill nets. Comparisons of demographic data between the area being targeted for removal and two unfished locations (KS River below WaterOne Weir and the MO River at Atchison, KS) revealed that there are some differences between the removal location population and the unfished populations. Fifty (50%) of sampled carp in the population being fished were >718 mm in length compared to 654mm (Kansas River below WaterOne Weir) and 624 mm (Missouri River). Size structure of the population being fished is shifted toward larger fish than the two control populations. The population being fished is also exhibiting faster growth than the two unfished populations.
- **Conducted Quagga Mussel eDNA sampling at all known zebra mussel infested waterbodies.** A QZAP grant was applied for and received to conduct the first targeted detection sampling efforts for Quagga Mussels in Kansas. Water samples were collected from all 35 zebra mussel infested waterbodies and shipped to Pisces Molecular for analysis. Waters were each sampled spring and fall during with a minimum of 2 samples per lake and an additional sample per every 500 surface acres.

A total of 348 samples were processed. There were no positive hits for Quagga Mussel eDNA. This is a very encouraging result and KDWP will continue efforts to prevent the introduction of Quagga Mussels and other AIS into Kansas waters.

- **Continued bighead carp research and suppression work on Neosho River - Grand Lake system.** This collaborative project with Oklahoma Department of Wildlife Conservation and Missouri State University, funded by FWS, aims to better understanding the small, isolated, but reproducing population of bighead carp in the Neosho River – Grand Lake system and use findings to suppress the bighead carp in the system. KDWP, OWDC, and MSU have been able to educate and build relationships with fishers - paddlefish guides in particular – about the need to suppress bighead carp in the system. Fishing guides have begun using live-imaging sonar to target the bighead carp in the system and removed more carp in 2023 (approximately 70 bighead carp) than have been documented in the system in the last 30 years (approximately 25 fish). In 2024, a largescale, multiyear telemetry project is being initiated. Bighead carp in the system will be implanted with transmitters and acoustic receivers will be placed throughout the system. Information gained from this project will used to inform future bighead carp management and suppression efforts in the system.
- **KDWP completed a research project to design a protocol for sampling invasive crayfish in Kansas lakes and streams.** In 2024 KDWP AIS biologists will initiate detection sampling across Kansas. The goal for 2024 is to complete sampling at 50 high risk lakes. Wild, invasive Red Swamp and Rusty Crayfish populations were both detected in Kansas within the last 5 years and largescale crayfish sampling for invasive crayfish detection has never been conducted in the state of Kansas. This effort is meant to provide KDWP with baseline information on the presence/absence of invasive crayfish in lakes across Kansas to inform future invasive crayfish management decisions.
- **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.
- Inspections were conducted at 120 bait shops across the state in 2023. No invasive species were found at any of the bait shops. ANS literature was distributed to the bait shops during inspections.
- Education and outreach efforts were continued through a variety of media outlets including internet ads, press releases, and direct mailings. We recently contracted a marketing firm to revamp and greatly increase the reach of our education and outreach efforts, which will continue throughout 2023.
- ANS literature and outreach materials were distributed to all KDWP offices, state parks, nature centers, bait shops, 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.
- Fish disease sampling was conducted at all four state fish hatchery. None of the fish tested showed signs of concerning disease.
- 110 waterbodies not known to contain zebra mussels were sampled for zebra mussel veligers in 2022 (all 110 will be sampled in 2024 as well).

- Zebra mussels were detected I one new waterbody in 2023: Gardner 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; Linn Valley Lakes - Main Lake and Emerald Bay in 2020; and Lebo City Lake in 2021.

State of Kentucky, Department of Fish and Wildlife Resources

Submitted by Jeff Herod

Aquatic Plant Treatment and Monitoring

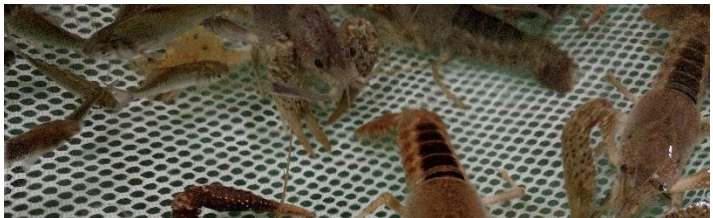
KDFWR continues its efforts to detect, treat, and monitor aquatic invasive plant species treatments in high priority management areas. The two (2) highest priority species are Eurasian watermilfoil and Hydrilla.

- There are patches of hydrilla at high traffic areas on Cave Run Lake and Paintsville Lake. Signage has been posted at all access areas of the potential threat and to provide public guidance on checking equipment for potential hydrilla fragments.
- Eurasian watermilfoil has been identified at Cave Run Lake and Clear Creek Lake (USFS property). Staff are working with agency partners to determine the distribution of the plant and potential treatment solutions.
- Southeast Fisheries District staff are aware of a significant presence of Eurasian Milfoil in Cedar Creek reservoir. Past efforts have included winter water level drawdowns and stocking of triploid grass carp and these efforts have yielded mixed results. The situation is complicated because a recent creel data shows 50% of the anglers liking the vegetation for fish habitat.
- The Central Fisheries District staff are working with the City of Williamstown and local landowners to determine how to best address Eurasian watermilfoil in Williamstown Lake.
- Staff responded to a University of Georgia/USGS request for hydrilla samples to detect the presence of toxic epiphytic cyanobacteria, *Aetokthonos hydrillicola*. The neurotoxin is linked to a degenerative brain disease in birds, reptiles, amphibians, and fish. There are plans to continue sharing samples in 2024.

Other Aquatic Invasive Species Efforts

KDFWR is working on several AIS issues that involve multiple partners.

- KDFWR continues efforts to prevent the spread of zebra mussels. Jeff Herod and the Central Fisheries District staff are working with malacologist Dr. Monte McGregor of the Center for Mollusk Conservation to monitor zebra mussels in Williamstown Lake. Staff have notified local officials and posted signage at all access areas of the potential threats. Multi-plate samplers have been placed at six (6) sites throughout the lake to monitor the zebra mussel distribution.
- KDFWR has partnered with Kentucky Division of Water (KDOW) on developing a plan for didymo (*Didymosphenia geminate*) below Laurel Dam in Southeast Kentucky. This area is adjacent to Daniel Boone National Forest and used by anglers and kayakers. KDOW detected didymo in the Laurel River below the dam for about 150 yards in late September 2023. KDOW continues to delineate the area where didymo is suspected, and convened a group to discuss didymo biology, ecology, and control options. KDFWR provided examples of signage, papers on treatment options, and discussed biosecurity measures to deploy during surveys. Another meeting is scheduled in April to discuss next steps.
- KDFWR started field sampling at historical locations and new locations for non-native crayfish species. KDFWR documented Red Swamp Crayfish (*Procambarus clarkii*) at two (2) locations and confirmed White River Crawfish (*Procambarus acutus*) is established at a historical site. KDFWR is compiling non-native crayfish records into a single document and will begin to revisit historical sites and update the species status during 2024-2025.



There are currently four (4) non-native species of crayfish, and most crayfish introductions are likely bait release.

- KDFWR participated in the Ohio River Basin (ORB) Horizon Scan project. The results will inform KDFWR's prohibited species list, surveillance locations, pathway risk level, and Early Detection and Rapid Response (EDRR) planning.
- KDFWR is working with USFWS R3 to sample eDNA. The first step is to establish a suite of sites located among inland reservoirs that could be sampled for invasive carp DNA (i.e., Silver and Bighead carp). Potential 2024 locations include Taylorsville and Cave Run lakes. These two (2) lakes are in the Ohio River Basin and connected to known invasive carp populations by the Salt and Licking rivers, respectively. This is part of KDFWR EDRR efforts to address threats to high priority inland fisheries and develop response plans.
- Work is ongoing with the revision of the 2008 Kentucky ANS Plan (KANSP). The revision includes new content on pathways, updated species tables, trends in introductions, history of introductions, a crosswalk of Kentucky's prohibited species list with federal and state lists, identifies threats listed in the 2024 Kentucky SWAP, and editorial review of the KANSP. A recommendation document is being drafted that outlines the updates and what type of revision is needed. The next step is seeking Fisheries Division Director's review, and approval on the type of the revision recommended.

Invasive Carp

KDFWR continues a myriad of efforts to detect, control, track the movements, and contain invasive carps.

- KDFWR completed reporting on its FY2023 efforts for two Mississippi River subbasins. KDFWR is active in both the Tennessee-Cumberland River Basin and the Ohio River Basin. In addition to harvest, KDFWR works on early life stage projects, occupancy sampling, community assessments, age and growth, and telemetry. Its annual activities are included with many other partners working in these subbasins. These project accomplishments are linked to national and subbasin priorities.
- Catch rates of adult silver carp during, paupier sampling in 2023 on Kentucky Lake were the lowest recorded since surveys began. KDFWR has detected no young of year fish in Barkley and Kentucky reservoirs since 2015, therefore a deterrent below the locks is a key component to fishing down the invasive carp population within the two reservoirs.
- KDFWR worked with Commercial fishers to harvest over 12.6 million pounds of invasive carp, which brings our cumulative total since 2013 to over 59 million pounds (see table). Over 80% of the statewide harvest came from Barkley and Kentucky reservoirs. This was made possible by Kentucky Department of Fish and Wildlife Resource's (KDFWR) incentive program that spent $766,707 of federal grant money to focus harvest on those reservoirs.
- In addition to Silver and Bighead carps, commercial fishers also capture Black Carp and Grass Carp. Although rare, these fish are critically important to understanding the distribution of these species. Four (4) Black Carp were captured by commercial fishers between November 2023 and March 2024 in the Ohio River. In addition, KDFWR continues

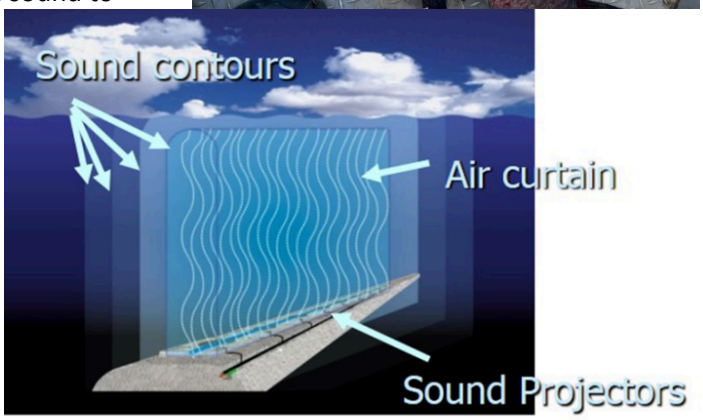
Year	Annual Harvest	Cumulative Total
2013	795,292	795,292
2014	1,337,205	2,132,497
2015	1,282,267	3,414,764
2016	4,269,237	7,684,001
2017	2,596,076	10,280,077
2018	2,558,658	12,838,735
2019	6,697,619	19,536,354
2020	7,736,693	27,273,047
2021	9,692,211	36,965,258
2022	9,542,086	46,507,344
2023	12,607,269	59,114,613

efforts to detect YOY Black Carp along the Ohio River. Furthest upstream collection so far is near Smithland, Kentucky.

- Telemetry results continue to clarify our understanding of invasive carp movements in the relation to harvest, invasive carp behavior, and deterrent efficacy. Estimated mean pool-to-pool transition probabilities were generally low (< 0.2) for Silver Carp, suggesting that most of these Ohio River fish remain within the pool in which they were tagged.

Deterrents and Planning

- KDFWR participated in 20 structured decision-making meetings with collaborating agencies to provide data and expert opinion on the distribution of invasive carp populations, identify available deterrent methods, and prioritize installation and maintenance of deterrents in the Tennessee, Cumberland, and Tombigbee waterways.
- KDFWR also assisted the USFWS with testing of a Bio-Acoustic Fish Fence (BAFF) technology on the downstream approach to Barkley Lock chamber. In the spring KDFWR led the tagging of, 618 fish with acoustic transmitters, to support deterrent and movement projects.
- The Bio-Acoustic Fish Fence, at Barkley lock, is now being operated in a constant state. This type of deterrent uses air and sound to create an environment invasive carp avoid. KDFWR is working with partners to secure funding to maintain that system into the future. The initial study period has demonstrated this system deters silver carp crossings by at least 50%. This is helping reduce the number of invasive carp from immigrating into the reservoirs.



Education and Outreach

KDFWR continues to engage the public with updates on species and best methods they can use to prevent the spread of aquatic invasive species.

- In late July 2023, KDFWR provided video content and Jeff Herod was interviewed for Kentucky Education TV (KET). The episode was about KY Fish and Wildlife's efforts to remove

the carp. Here's a link to the episode. https://ket.org/program/kentucky-edition/july-20-2023/

- In December 2023, KDFWR Jeff Herod was interviewed by WKU Morning addition which did an interview and a print copy on invasive carp. Here's the link to the article. https://www.wkyufm.org/news/2023-12-27/over-6-million-pounds-of-invasive-carp-now-removed-from-kentucky-waters-annually-thanks-to-harvest-partnerships
- In March 2024, KDFWR Josh Tompkins provided information in response to request about invasive carp from the Calloway County Tourism Commission. He provided an update on the status of invasive carp in Western Kentucky, that could be shared on the Commission's Facebook page.
- The KDFWR ANS Management Team reviewed and provided comments on the revision of the 2023-2024 Kentucky Fishing and Boating Guide. The guide is a summary of laws regarding fishing and boating in Kentucky. Information on several ANS threats is included on two pages of the public document. The link is here. https://fw.ky.gov/FishBoatGuide/Pages/default.aspx
- Jeff Herod participated in a March 2024 podcast hosted by 8th Graders at Bernheim Middle School. The podcast covered invasive carp and what KDFWR is doing to address invasive carp.
- KDFWR participated in both the November 2023 and March 2024 MICRA fly-in events.

State of Louisiana, Department of Wildlife and Fisheries

Submitted by Rob Bourgeois

LDWF Office of Fisheries

Louisiana's Aquatic Nuisance Species (ANS) Report MRBP Spring 2024

(June 2023 – April 2024)

New Reported ANS:

There were no new species reported during this reporting period.

Update to recently reported ANS:

Peacock Bass:

A Peacock Bass was confirmed in the summer 2022. LDWF electro-fished the area but did not find the fish. LDWF sampled in this area in the early summer and Fall 2023. This will be the last update on Peacock Bass as none were found during the sampling trips.

Status of established ANS

Apple Snail:

Public reports for Apple Snails have slowed due to the drought and high temperatures over the summer. This resulted in virtually no reports in roadside ditches and fewer reports even from bigger waterbodies. The recent warmer temperatures and rains have increased the number of Apple Snails being reported to LDWF.

Asian Swamp Eels:

Asian swamp eels (Monopterus cuchia) were found in Bayou St John, New Orleans in June 2019. LDWF and a local university professor continue to monitor and sample the population. LDWF electrofishing did not detect any swamp eels. It is believed that this is a population with very low numbers at this time. There have been no reports of swamp eels in 2023. LDWF will continue to electro-fish in the area. There is a shoreline vegetation restoration project near the site where the swamp eels were found. They will be looking for swamp eels during their activities.

Invasive Carp:

Since fiscal year 2020, LDWF has had projects funded through USFWS's Lower Mississippi River Invasive Carp Partnership and the Atchafalaya, Red, and White Rivers Invasive Carp Partnership. LDWF collaborated with Nicholls State University to investigate the presence of invasive carp larvae on rivers in the LMR. The objective of the study was to determine the extent of invasive carp spawning activity Mississippi River, Atchafalaya River, Ouachita River, Red River, and Tensas River Basins within Louisiana. Figure 1 below shows the results of that survey where carp were present. This data indicates that invasive carp are reproducing in the majority of the Lower Mississippi River (LMR) Basin sites sampled in LA. Reproduction is taking place on the Red, Mississippi, Atchafalaya, and the Ouachita Rivers. The surprising thing about this is that the Ouachita River seems to have more larval carp than the Red River. This may be due to the natural flow of the Red River being interrupted by the lock and pool structure of the Red River.

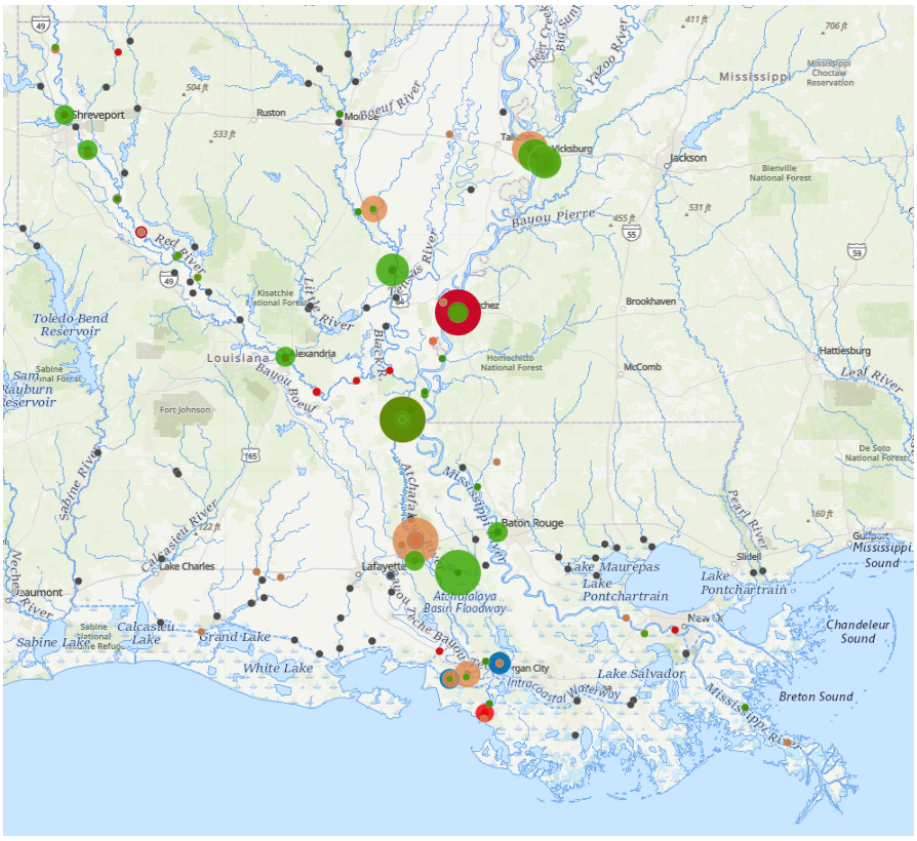
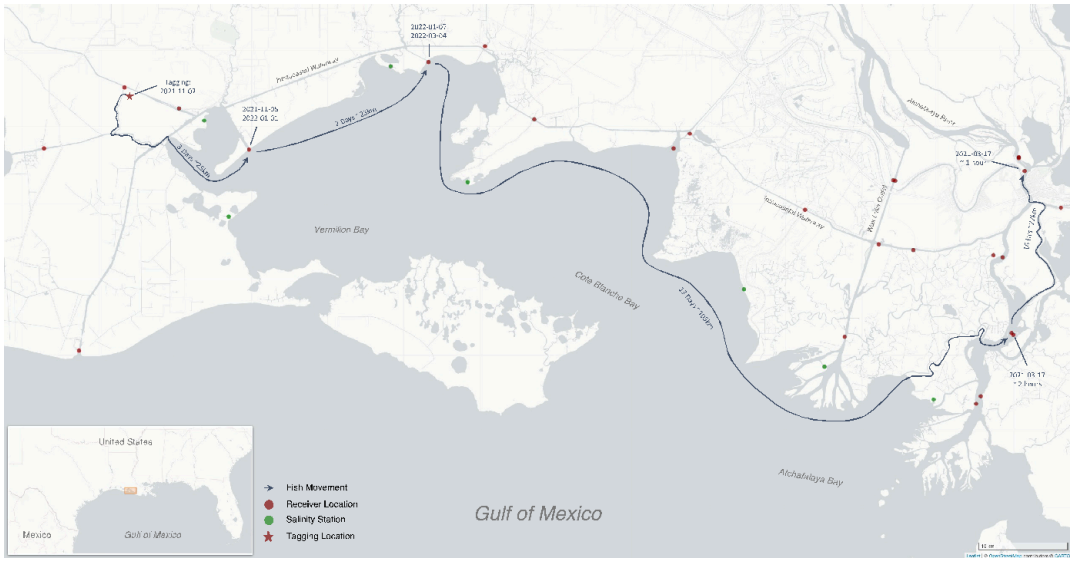


Figure 1. Ichthyoplankton sample locations (colors represent years but were ignored to look at the overall pattern)

LDWF has collaborated with Louisiana State University (LSU) since 2020 to tag 260 invasive carp and set up a receiver array. The object of the project was to determine intrabasin and interbasin movement to inform the placement of potential deterrent technologies and removal efforts. Figure 2 shows three examples of Silver carp using low-salinity estuaries to move between river basins.


Vermilion Bay
Cote Blanche Bay
Atchafalaya Bay
Gulf of Mexico
United States
Mexico
Gulf of Mexico
Fish Movement
Receiver Location
Salinity Station
Tagging Location


Patterson
Morgan City
Houma
LOUISIANA
Fish Movement
Receiver Location
Tagging Location
10 km


Franklin
Patterson
Morgan City
LOUISIANA
Fish Movement
Receiver Location
Tagging Location
10 km

Figure 2. Silver carp used low salinity waters to move from one river basin to another. Salinity in these areas varied between 3 and 7ppt.

Another interesting movement which is also tied into the reproduction of the carp shows 2 carp tagged in different years following the same pattern of moving from the lower Atchafalaya Basin to the Ouachita River. These fish stayed around a lock and dam structure on the Ouachita River. Figure 3 shows the general movement of those fish from where they were tagged to where they were detected near the lock and dam.

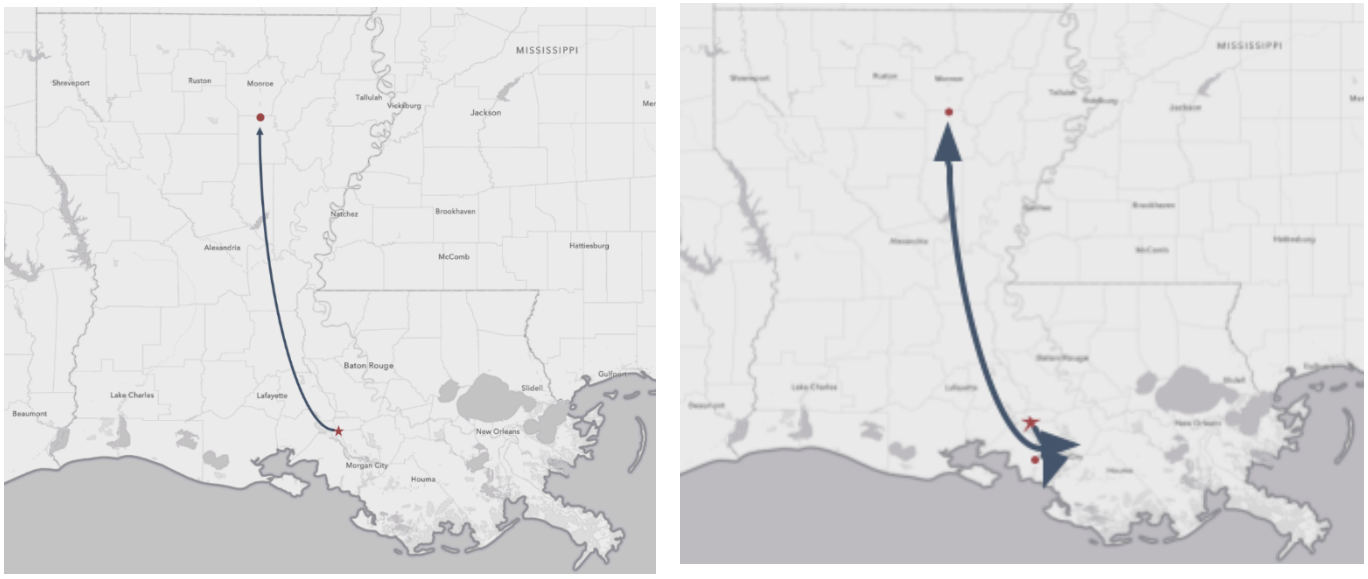


Figure 3. The map on the left shows the movement of a carp tagged in August 2022 and its movement up to the Columbia Lock and Dam in May 2023. The map on the right shows a carp tagged in Dec 2021 which stayed in the lower Atchafalaya basin for all of 2022 before moving up to the Columbia Lock and Dam on the Ouchaita River in May 2023.

Aquatic Plant Control Program:

LDWF continued with our control of invasive aquatic weeds using a variety of techniques. Aquatic plant control plans were developed for 53 different waterbodies during the reporting period. A total of 12,670 acres of nuisance vegetation were treated in 2023. Giant Salvinia continues to be the most problematic invasive plant in Louisiana, with herbicides being applied to over 10,036 acres during that time. Additionally, 675 acres of Water Hyacinth and 785 acres of Alligator weed were treated across the state during the reporting period. LDWF uses an integrated pest management (IPM) 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. In 2023, LDWF had an Aquatic Plant Control Program budget of approximately $6,500,000, of which a large portion was spent on the monitoring, treatment, and research of Giant Salvinia.

State of Minnesota

Submitted by Adam Doll

Watercraft Inspection and Enforcement

In 2023, Minnesota DNR and local government watercraft inspection partners completed 469,038 inspections on watercraft arriving and leaving water accesses within Minnesota. DNR conservation officers provided 13,121 hours of AIS enforcement and education. Conservation officers worked in partnership with watercraft inspectors to conduct 12 roadside check stations to inspect watercraft and equipment transported within Minnesota.

The DNR installed the first state-owned, on-demand decontamination station at Big Bog State Recreation Area as part of a project with Red Lake Nation in response to the discovery of larval zebra mussels in Red Lake.

Invasive Carp

The Minnesota DNR released an updated statewide Invasive Carp Action Plan in January of 2024. The plan prioritizes a suite of actions that build upon the DNR's current invasive carp efforts, including prevention and deterrence, monitoring to inform response actions, management and control strategies, and outreach and coordination. The DNR's update of the plan was informed by a 2023 structured decision-making process that engaged public stakeholders and experts to evaluate options for invasive carp management. The DNR tags, releases, and tracks small numbers of invasive carp to better understand movement patterns and identify locations for capture. Tracking data, collected in partnership with Wisconsin DNR and U.S. Fish and Wildlife Service, led to DNR's successful removal of 351 silver carp, 52 grass carp, and five bighead carp in Pool 6 of the Mississippi River in November and December 2023.

Regulation

In 2023, Minnesota Statutes, section 84D.10, subdivision 3(5) was changed to allow a conservation officer or other licensed peace officer to order decontamination of water-related-equipment if decontamination equipment is not present on site. Minnesota Statutes, section 84D.02, subdivision 3 was changed to require the state management plan for invasive species to be revised every five years and to include the impacts of climate change on invasive species management.

In February 2024 the DNR finalized proposed rule changes to add 13 new species to the state prohibited invasive species list. This change strengthens our ability to prevent the introduction and spread of priority species like jumping worms and nonnative Phragmites. Twelve species were listed as prohibited in February of 2024, and jumping worms will be prohibited effective July 1, 2024.

County AIS Prevention Aid

The Minnesota DNR provides technical support to local government staff leading their county's AIS prevention programs by facilitating regional workshops and providing technical support. In February and March of 2023, the DNR hosted a series of five online workshops and one in-person collaboration

meeting. These meetings included topics including AIS activities at water accesses, improving public engagement, strategic planning, and invasive species monitoring, detection, and response.

Early Detection

In September 2023, the DNR confirmed the presence of nonnative signal crayfish in Lake Winona, Douglas County. This was the first confirmation of signal crayfish in Minnesota waters, and the first confirmation of signal crayfish in the Midwest. Initial specimens were discovered by a commercial harvester and follow-up trapping by the DNR found no evidence of signal crayfish reproduction. The DNR is currently working with local county partners and is developing an intensive trapping plan to be conducted in 2024.

The Minnesota DNR partnered with the Minnesota Aquatic Invasive Species Research Center (MAISRC), the University of Minnesota Extension, and many counties and local partners on an annual statewide search for new populations of starry stonewort, called “Starry Trek.” In 2023, 187 volunteers searched 215 waterbodies. No new starry stonewort populations were found during the 2023 Starry Trek.

Invasive Aquatic Plant Management Grants

In 2023, the Minnesota DNR Invasive Species Program issued 402 permits to control invasive aquatic plants. Through our grant program, $400,000 was made available to local partners such as lake associations, watershed districts, and lake improvement districts. This money was distributed to 102 projects to treat Eurasian watermilfoil, curly-leaf pondweed, flowering rush, and starry stonewort.

Invasive Aquatic Plant Management Grants

The Minnesota DNR continued to fund nonnative Phragmites control throughout the state. Management efforts were focused on “clearing counties” by targeting management in areas of the state with a limited number of small infestations. In 2023, DNR contractors visited 420 nonnative *Phragmites* sites in 38 counties. Of the 292 sites where treatment occurred, 210 of them were less than one tenth of an acre. At 95 sites no nonnative *Phragmites* were found.

State of Missouri, Department of Conservation

Submitted by Joe McMullen

Invasive Species Management Program

MDC Contact Information

Name: Angela Sokolowski - Invasive Species Ecologist
Email: angela.sokolowski@mdc.mo.gov
Phone: 573-522-4115 x3641

Status: Ongoing

Description: Provides leadership to develop and implement a strategic approach for the Department and partners to address the threats and minimize impacts posed by terrestrial and aquatic invasive species, including identifying which species should be targeted and priority areas in which invasive species should be more aggressively controlled.

- Status of State ANS Grant: In 2024, MDC will be applying for the Federal ANS Grant for the first time in several years. The pre-proposal was accepted by the USFWS, and full application will be submitted by the May 2024 deadline.

Literature/Reports:

Invasive and Nuisance Species | Missouri Department of Conservation (mo.gov)

Hydrilla Eradication

MDC Contact Information

Name: Kara Tvedt - Fisheries Biologist
Email: kara.tvedt@mdc.mo.gov
Phone: 417-895-6881 x1626

Status: Ongoing

Description: Efforts to eradicate hydrilla still continue in southwest Missouri. As of March 2024, 37 hydrilla sites have been detected in southwest Missouri with most being in private waters. These sites are in the James, Little Sac, Pomme de Terre, Niangua, and White River watersheds. Of the known sites, 35 of 37 are under a hydrilla eradication plan which includes an initial multi-year “treatment” phase followed by a multi-year “monitoring-only" phase. Hydrilla has been reduced to non-detectable levels in over 80 percent of the sites and six of those sites have stayed hydrilla free for at least five consecutive years (i.e., now considered eradicated). With the six sites that are considered eradicated, only 5 sites remain in the “treatment” phase and 24 sites are in the “monitoring-only” phase. The two remaining sites made it to the “monitoring-only” phase before the sites changed ownership. Since then, we have been unable to engage with the new owners. Efforts to reach the new landowners and get the sites back on track will continue in 2024.

Similar hydrilla eradication efforts are also ongoing at a handful of sites in Kansas City Region, with several sites moving into the “monitoring-only” phase in 2024.

Literature/Reports:

Hydrilla Control | Missouri Department of Conservation (mo.gov)

Round Goby Monitoring

MDC Contact Information:

Name: Sarah Peper - Fisheries Biologist
Email: sarah.peper@mdc.mo.gov
Phone: 636-441-4554 x4130

Status: Ongoing

Description: Monitor for range expansion of Round Goby population in the Mississippi River. In 2018, USWFS crews led by Jenna Bloomfield first discovered Round Gobies in the Mississippi River (Pool 26) near Grafton, IL. MDC joined USFWS' efforts to monitor for further expansion of this species into other areas of the UMR or into nearby tributaries: Missouri River and Meramec River. During 2019 - 2021, sampling revealed a slight range expansion into lower Pool 26 near Alton, IL (river mile 201). No further expansion was recorded until 2023, when an LTRM crew captured a single specimen at river mile 82 on the Mississippi River.

Literature/Reports:

MDC asks anglers to help stop invasive round gobies | Missouri Department of Conservation (mo.gov)

Invasive Carp Telemetry

MDC Contact Information

Name: Josh Abner - Scientist
Email: joshua.abner@mdc.mo.gov
Phone: 573-290-5730 x4485

Status: Ongoing

Description: Document movement of invasive carp throughout the Mississippi River basin to inform management, control, and containment actions (e.g., location of potential deterrent technologies and removal efforts) and determine residence time and movement in association with season, environmental conditions, and barriers. The existing stationary receiver array is regularly maintained (i.e., download/sharing of detection data and replacement of damaged/lost receivers), and occasionally bolstered by adding receivers in areas with poor coverage.

Literature/Reports:

Lower Mississippi River Sub-Basin Annual Summary Reports - Mississippi Interstate Cooperative Resource Association (micrarivers.org)
Upper Mississippi River Sub-Basin Annual Summary Reports - Mississippi Interstate Cooperative Resource Association (micrarivers.org)
Missouri River Sub-Basin Annual Summary Reports - Mississippi Interstate Cooperative Resource Association (micrarivers.org)

Invasive Carp Control & Removal

MDC Contact Information

Name: Joe McMullen - Scientist
Email: joe.mcmullen@mdc.mo.gov
Phone: 314-301-1506 x4215

Status: Ongoing

Description: On 12 October 2023, the Missouri Incentivized Carp Harvest Program (MO-ICHP) was launched to promote the commercial harvest of invasive carp from upper Mississippi River (Pools 20-25) and the lower Mississippi River (Ohio River confluence to the Missouri-Arkansas border). The program offers $0.10/lb. for invasive carp (silver carp, bighead carp, grass carp, and black carp) caught in designated waters and sold to any processor for at least $0.07/lb. Individuals with a valid commercial

fishing permit in Missouri, Illinois, Tennessee, or Kentucky can participate and must abide by all applicable commercial fishing regulations. As of March 2024, 28 commercial fishers are enrolled in the program and have reported the harvest of 831,364 lbs. of invasive carp.
MDC staff conducted fish assemblage sampling, utilizing boat electrofishing during fall 2023 to collect baseline data and identify potential effects of invasive carp removals may have on native fish. Sites were randomly selected and sampling was standardized with Long Term Resource Monitoring sampling efforts on the upper Mississippi River. Sampling sites were located within a relatively small section of river due to accessibility issues associated with low water levels. All fish captured were identified and measured, and a subset were weighed before being released. Water quality and habitat data were collected and recorded at each site and included Secchi disk measurement, dissolved oxygen, water conductivity, water temperature, water depth, and substrate type. Staff collected a total of 770 fish which included 33 unique fish species from ten sites on the lower Mississippi River. Five Silver Carp were collected but no other invasive carp were encountered. Missouri Species of Conservation Concern collected included skipjack herring.

Literature/Reports:

Lower Mississippi River Sub-Basin Annual Summary Reports - Mississippi Interstate Cooperative Resource Association (micrarivers.org)

Upper Mississippi River Sub-Basin Annual Summary Reports - Mississippi Interstate Cooperative Resource Association (micrarivers.org)

Grand River Invasive Carp Removal

MDC Contact Information:

Name: Adam McDaniel - Scientist
Email: adam.mcdaniel@mdc.mo.gov
Phone: 660-646-3140 x1381

Status: Complete

Description: In September 2023, MDC staff, working in conjunction with USFWS - Columbia and KDWP conducted an intensive short-term invasive carp removal on the lower Grand River in northwest Missouri. Daily hydroacoustic surveys were used to quantify invasive carp densities. Four gear types, including boat electrofishing, electrified paupier trawl, electrified dozer trawl and gill nets, were utilized to remove invasive carp over the course of the two four-day sampling periods. Grand River removal efforts resulted in 10,843 Silver Carp, 32 Bighead Carp, and 244 Grass Carp for a total of 17,554 kilograms (38,700 lbs.) of invasive carp removed from the lower Grand River. No Black Carp were sampled. Intensive rapid removals over the last two years on the Grand River have resulted in 17,506 Silver Carp and 63,600 lbs. of invasive carp harvested. Hydroacoustic data indicated Silver Carp densities were lower in 2023 compared to 2022 and densities decreased throughout each sampling period. A similar experimental removal effort is planned for fall 2024 on the Lamine River.

Literature/Reports:

Missouri River Sub-Basin Annual Summary Reports - Mississippi Interstate Cooperative Resource Association (micrarivers.org)

State of Nebraska

Submitted by Kristopher Stahr

Watercraft Inspections

The Nebraska Game and Parks Commission (NGPC) employed five seasonal AIS technicians from May through September in 2023. Technicians conducted watercraft inspections directly at boat ramps on select waterbodies utilizing a roving system. More than 3,400 inspections were completed in 2023, the second highest number recorded in one season in Nebraska's history. Inspectors averaged 682 inspections completed per inspector over the season. As Nebraska continues to have limited resources in its battle against AIS, maintaining this high average is essential.

Zebra Mussel Monitoring

Nebraska continues to perform routine veliger sampling at 49 waterbodies statewide for early zebra mussel detection. Samples are collected once monthly during zebra mussel's reproductive season. In 2023, NGPC conducted all sample analysis in-house at NGPC's headquarters office. All 148 veliger samples collected were processed within 1-2 weeks upon their reception, avoiding potential rapid response delays that occur with outsourced processing.

Zebra Mussel Establishment in Beaver Lake

In May of 2023, NGPC was alerted to the sighting of an adult zebra mussel in Beaver Lake, a private waterbody in southeast Nebraska. Subsequent veliger sampling confirmed zebra mussel reproduction in Beaver Lake and more adult mussels were identified. Beaver Lake becomes the fifth waterbody in Nebraska with an established zebra mussel population. Due to its private status, NGPC has no jurisdiction over the area and had not performed prior prevention efforts at the site. Despite this, NGPC continues to offer support to the Beaver Lake community as they focus on management and containment of their newly established zebra mussel population.

Aquatic Vegetation Surveys

In 2021, the AIS Program began the first systematic sampling of aquatic vegetation in Nebraska. Aquatic vegetation surveys are designed to document current species distribution and detect new invasions. More than 80 public waterbodies have been sampled to date, with 42 of these containing some form of invasive vegetation. Discussion regarding invasive vegetation treatment began in 2023, identifying sites with Eurasian watermilfoil and curly-leaf pondweed that are designated to receive either whole lake or spot chemical treatment in 2024. Other Activities

An annual AIS inspection was conducted at each Nebraska state hatchery in 2023, yielding no detection of novel invasive species establishment. The NGPC AIS Program increased presence at public education and outreach events and continued to promote the program's new "Protect Our Waters from Invasive Species" campaign. Additionally, the AIS Program, alongside the Nebraska Invasive Species Council, co-hosted the NAISMA Annual Conference in Lincoln, NE in October.

State of North Carolina

Compiled and Submitted by Rob Emens

This report is a compilation of AIS updates from the following NC State Agencies: NC Department of Environmental Quality (NCDEQ), NC Wildlife Resources Commission (NCWRC), NC Department of Agriculture and Consumer Services (NCDA&CS), and the NC Department of Cultural and Natural Resources (NCDNCR).

NCWRC – Inland Fisheries Division:
Point of contact: Rachael Hoch, rachael.hoch@ncwildlife.org , (919) 707-0130
NCWRC ANS Website: Aquatic Nuisance Species - ANS (ncwildlife.org)

Zebra Mussels
In mid-September of 2023, NCWRC and Duke Energy received a report of Zebra Mussels in a private quarry in Iredell County. NCWRC coordinated with the USFWS Southeast Region Dive Team to conduct a survey of the quarry and collect water samples for eDNA and water chemistry analyses. The quarry was surveyed on Sept. 21, 2023, and Zebra Mussels were confirmed with visual detections and eDNA. The eDNA was processed by the NCWRC Conservation Geneticist. The quarry is a closed system, and the threat of spread has been contained. NCWRC has sent out a press release and is putting together an eradication plan. The owner is fully cooperating with NCWRC to eradicate Zebra Mussels. Other bodies of water under the same ownership were surveyed in mid-October by the USFWS SE dive team and using eDNA. All surveys and eDNA results were negative for Zebra Mussels. In mid-October Lake Norman was visually inspected by staff from Duke Energy and WRC and eDNA water samples were taken. Zebra Mussels were not detected in Lake Norman.

Apple Snails
A report of Apple Snails was received by NCWRC on September 7, 2023. NCWRC investigated the report and documented Apple Snails along the Lumber River near Lumberton in Robeson County. Subsequent WRC surveys documented them near the I-95 bridge crossing and in Saddletree Swamp and Fivemile Branch. The report has been submitted to the USGS AIS database. WRC expects the species to go dormant this winter. WRC staff are currently evaluating management options.

NCWRC ANS Reporting Tool
Due to the recent increase in ANS reports, a NCWRC Aquatic Nuisance Species reporting tool was launched on October 2, 2023. NC Wildlife - Aquatic Nuisance Species Reporting (arcgis.com). To date, the tool has received a total of 32 reports from NC, FL, and Ohio. Reported species are primarily Apple Snails, Mystery Snails, Dark False Mussel, Alabama Bass, and one nuisance beaver. NCWRC has reached out to USGS about incorporating the data into the National USGS database.

Updates to the reporting tool were made to limit reports outside of NC and ask people to submit observations from other states to the USGS Nonindigenous Aquatic Species Database.

NCDEQ – Division of Water Resources (Aquatic Weed Control Program):

Point of contact: Rob Emens, rob.emens@deq.nc.gov, (919) 707-9012

Program website:

https://deq.nc.gov/about/divisions/water-resources/water-planning/water-supply-planning/aquatic-weed-control-program

2023 Summary

The program was staffed by 2 permanent FTEs. Two seasonal employees are hired each year (assignments typically run from June to December). Recruitment and retention of seasonal staff continued to be a major challenge in 2023. We started one seasonal person on August 10th and a second person on October 2nd.

Management activities are supported by a special fund, called the Aquatic Weed Fund. Money spent from the Aquatic Weed Fund requires a 1:1 non-state dollar match. The program develops annual work plans (calendar year); $898,230 from the fund was earmarked for specific aquatic weed management projects in 2023.

Gapway Swamp Giant Salvinia project (Columbus County)

This infestation of Giant Salvinia was brought to our attention during the summer of 2020. Gapway Swamp is a blackwater swamp forest in a rural setting, near the NC/SC State line. Approximately 250 acres of the watershed is infested. To our knowledge this is an isolated event and the only Giant Salvinia site in NC.

Gapway Swamp is currently impounded. The impoundment is called Richardson Pond and it incorporates multiple private properties. Immediately upstream of Richardson Pond is Buffkin Pond; an impoundment with a breached dam, also on private properties. Columbus County Cooperative Extension has assisted with this project by acting as a liaison (between NCDEQ and property owners).

Giant Salvinia was likely introduced to this system between 2012-2015. The rate of spread/movement of Giant Salvinia within this site was limited due to #1: physical blockage from the dam at Richardson Pond, the relic dam at Buffkin Pond, beaver activity, and heavily vegetated conditions (extensive tussocks and stands of hardwoods), and #2: low flows (average discharge at Richardson Pond is ~5 CFS).

The objective of this project is to eradicate Giant Salvinia from the site. Herbicide treatments began in 2021. The areas targeted with herbicides increased in 2022 and were expanded further in 2023. Approximately 150 acres of the site was targeted with herbicides in 2023.

Eno River Hydrilla project (Orange County)

The Eno River watershed has a history of Hydrilla dating back to the early 1990's. Prior to 2005 Hydrilla was only observed in Lake Orange, an impounded section of the Eno River in the upper reach of the watershed. During the late 2000's and early 2010's Hydrilla levels reached nuisance levels throughout the Eno River State Park. In 2015 a ~16-mile section of the Eno River was treated

with fluridone using an injection system which metered product into the river based on flow. This was a historic event, being the first time this type of treatment method was used in the State. The river was treated with fluridone each year 2015-2019. Some adjustments to the treatment and target area were made during those years. Hydrilla was removed from much of the target area but was not eradicated from the watershed.
During the years 2020-2021 the treatment was paused. The reason for the pause was to:

- Allow for an evaluation of the treatment.
- Allow time to conduct reconnaissance in the upper reaches of the watershed.
- Multiple "farm ponds" in the upper reach of the watershed were found to be infested.
- Allow further progress of Hydrilla management operations within Eno River

tributaries. Ongoing Hydrilla management was occurring in both main tributaries of the Eno River. The injection system was re-deployed in 2022 to continue treating the section of the Eno which passes through the Eno River State Park. This continued in 2023. A visual reconnaissance survey of the treated section was conducted in September-October and no Hydrilla was observed. No tuber survey was conducted.

NCDEQ – Division of Marine Fisheries
Point of contact: Robert Corbett, Robert.Corbett@deq.nc.gov , (252) 381-6000

Blue Land Crabs
On Friday July 21, 2023, North Carolina Wildlife Resources Commission (NCWRC) Helpline received a report of an encounter with a Blue Land Crab *Cardisoma guanhumi*. The images were shared to Dr Bronwyn Williams, Research Curator at the NC Museum of Natural Science (NCMNS) for species verification who, upon receipt, agreed that the animal in the photos was a Blue Land Crab. *Cardisoma guanhumi**,*** is a species of land crab typically found in tropical estuarian and maritime habitats from southeast Florida and the Gulf of Mexico coast to Central and South America to Brazil. Adults can reach a carapace width of up to six inches and weigh over 500 grams. They are mostly nocturnal and omnivorous, primarily feeding on leaves and fruits but will also readily feed on insects, carrion and other crabs. Recently (since 2008) populations have extended as far north as Charleston South Carolina with reported sightings in Myrtle Beach South Carolina (2022).

Upon receipt of this report Nick Shaver, Biologist with NCWRC, shared the pertinent information with Robert Corbett, Marine Fisheries Biologist I and lead Non-native Invasive Species Biologist with the North Carolina Division of Marine Fisheries.

On August 15, 2023, Dr. Tim Ellis, Quantitative Ecologist, Albemarle-Pamlico National Estuary Partnership, hosted a special meeting involving NCWRC, NCDMF, SCDNR, & N.C. Museum of Natural Sciences to collaborate and plan our collective approach on how to respond to this current situation. During this meeting, representatives from S.C. shared the history of how they were contacted back in 2021 with a spate of sighting and the steps they took to notify the public and document all observations. In short, SCDNR developed a website for the public to easily report any observations to: https://survey123.arcgis.com/share/73155cf36b124961a366a8b116147a54. SCDNR advised that they would be open and willing to edit their website to begin a collaborative effort between N.C. &

S.C., which they completed shortly after the meeting. In addition, during this meeting it was decided NCDMF would take lead on this situation.
NCDMF proceeded to publish a press release on September 20,2023 (https://www.deq.nc.gov/news/press-releases/2023/09/20/marine-fisheries-asks-public-report-blue-land-crab-sightings) followed up by a social media post on September 23, 2023, urging members of the public to visit NCDMF's newly created blue land crab species profile page (https://www.deq.nc.gov/about/divisions/marine-fisheries/public-information-and-education/species-profiles/blue-land-crabs) where from there they can locate the link to the SCDNR website to report any and all sighting of blue land crabs. To date, the social media post received 49 comments and has been shared 558 times. Since the press release and social media post the SCDNR website has obtained 21 additional reports from N.C. of which 3 have been confirmed as being blue land crabs. One was in Emerald Isle (the original sightseeing from July 21st) and the other two confirmed sightings were from the north side of Bouge Sound near Wildwood west of Spooners Creek. NCDMF plans to repost the press release this upcoming spring in hopes of reigniting interest when sightings are more favorable.

Tiger Shrimp
NCDMF continues to record reports of tiger shrimp within N.C. waters. In 2023 we received 2 reports. One sighting was in the ICW along Holden Beach, caught in a 3/16", 8' cast net with which was later used as bait. The second tiger shrimp was discovered while purchasing shrimp from a dealer in Beaufort.

NCDA&CS – Plant Industry Division:
Point of contact: Jarred Driscoll, Jarred.Driscoll@ncagr.gov , (919) 707-3741

The State Noxious Weed Regulations, adopted under authority of the N. C. Plant Pest Law, were established to prevent the widespread establishment of harmful non-native plants that are placed on the Noxious Weed List. Any plant on the Noxious Weed List is prohibited entry into the state without a permit. Noxious Weeds already present in the state are contained by prohibiting movement of the plant outside of regulated areas. In addition to the plant itself, articles that could contain Noxious Weed propagules such as soil or hay, are also regulated. In addition, the sale of Noxious Weeds is prohibited unless exempted by provisions of the Noxious Weed Regulations. In addition to the State Noxious Weed Regulations, the General Assembly of North Carolina has adopted the Aquatic Weed Control Act providing the Department of Agriculture with the authority to regulate the importation, sale, use, and distribution of noxious aquatic weeds.
The NCDA&CS Plant Industry Division's Plant Protection Section monitors aquatic nurseries through annual inspections to ensure regulated plants are not being sold online or at retail locations and nurseries.

NCDNCR – State Parks
Pont of Contact: Oliver Denny, oliver.denny@ncparks.gov , (919) 418-0251

The North Carolina State Parks has been working on their invasive species program across the state over the last years. A recent addition to the program is an Invasive Species Coordinator named Oliver Denny. The Invasive Species Coordinator will be the program manager to focus on all invasive

species issues across the state parks system. Oliver will be working closely with Jonathan Short, the Invasive Species Biologist.
There are several projects in NC State Parks related to Aquatic Nuisance Species. Those projects include two boat cleaning stations at Lake Waccamaw, treating Hydrilla in the Eno River, and a project managing Phragmites in a wetland restoration site at Carolina Beach.
At Lake Waccamaw State Park, two boat cleaning stations were installed March 2023 to help prevent the spread of invasive aquatic species. The cleaning stations are waterless systems, that have a vacuum system with hand tools, which can collect debris and water from boats before and after a boat is taken out on the lake. More information can be found in here.
At Carolina Beach State Park, staff have worked to remove Phragmites since 2010. This year a wetland restoration project was started this year in the footprint of the phragmites area. At Eno River State Park, there is an ongoing project for the last 7 years to manage Hydrilla.

NC Aquatic Nuisance Species Management Plan (NC-ANS Plan):
Points of contact:
Rob Emens, rob.emens@deq.nc.gov, (919) 707-9012
Tim Ellis, tim.ellis@deq.nc.gov, (919) 707-8106
A copy of this plan is posted here: https://deq.nc.gov/conservation/natural-resource-conservation

The NC-ANS Plan was drafted in 2014-2015. In 2016, the NC-ANS Plan was adopted by NC Department of Environment and Natural Resources (now NC Department of Environmental Quality), NC Wildlife Resources Commission, and NC Department of Agriculture and Consumer Services. The NC-ANS Plan is a working document that provides a framework for implementing state-level collaboration on NC's ANS challenges.

Staff within state agencies continue to pursue the goal of submitting the NC-ANS Plan to the ANS Task Force. Rob Emens (NCDEQ – Division of Water Resources) and Tim Ellis (NCDEQ - Albemarle-Pamlico National Estuary Partnership) are the primary contact for questions about the NC-ANS Plan.

State of North Dakota

Submitted by Ben Holen

Aquatic nuisance species (ANS) efforts continue to grow in North Dakota. In 2023, the North Dakota legislature approved an increase of over a million dollars per biennium to our ANS program's spending authority. The North Dakota Game and Fish Department (NDGFD) plans to use federal APC-WID cost-share dollars to expand its program, which includes increasing prevention, education, and monitoring efforts.

Outreach

NDGFD continues to implement a comprehensive ANS education/outreach program. NDGFD utilizes print materials, radio, television, social media, digital marketing, and personal contacts to raise ANS awareness at a regional level. We continue to partner with Midco, a regional TV/internet provider, to develop and disseminate ANS commercials. These new commercials play during prominent sporting events throughout the summer. In 2023, Midco produced/shot an ANS watersports commercial. Marketing efforts in North Dakota resulted in over 3 million social/digital impressions, over 11,000 TV exposures, and 500,000 OTT/CTV impressions.

Monitoring

Zebra mussel

North Dakota currently has four lakes and three rivers designated as zebra mussel infested waters. There were no new detections of zebra mussels in 2023. NDGFD collected 1426 plankton tow net samples from 150+ waters for the early detection of Dreissenid mussels and Corbicula. Substrate deployment and snorkeling surveys are conducted at select high-risk waters.

Invasive carp

Silver carp continued to be documented in the James River in low abundance. Captured fish otoliths are sent to South Dakota Game Fish and Parks, where they will be part of an otolith microchemistry project to determine natal origin.

Nuisance vegetation

No new documentation of invasive vegetation has occurred during the reporting period. Other than a handful of large waterbodies, most of North Dakota's waters remain free of invasive vegetation.

Prevention/Inspection

NDGFD hires 12-15 seasonal employees that conduct watercraft inspections at 20 different waterbodies. In 2023, the Department inspected 8,725 watercraft. Boater compliance with ANS regulations remains relatively high. Large commercial equipment, including barges and tugboats, remains one of the highest risk vectors for spreading zebra mussels. NDGFD amended some administrative rules to increase the enforceability to inspect and manage select commercial and construction equipment. Another administrative rule was amended to increase the penalty related to transporting water away from zebra mussel infested waterbodies. NDGFD continues to inspect wholesale/retail bait vendors, pet stores, and federal fish hatcheries.

State of Ohio

Submitted by John Navarro

ANS Program Activities

- Continue control efforts of Hydrilla at several inland impoundments in the Ohio River basins, including Mosquito Creek Lake and Alum Creek.
- Continue to monitor Bighead Carp and Silver Carp in the Ohio and Muskingum Rivers using telemetry and eDNA.
- Continue to work on closing the GLMRIS connections at Little Killbuck Creek; phase I will start in the summer of 2024.
- Continue the surveillance of Ohio's bait and Grass Carp supply chain to determine if AIS, including Bighead and Silver Carp, are being transported through the bait trade.
- Working with Butler County Metro Parks to control a red swamp Crayfish infestation on their property.
- Continue an AIS outreach campaign through Wildlife Forever to target anglers moving AIS in bait. This outreach program includes billboards, print media, and items for distribution at events with the slogan "Trash Unused Bait".
- Revised the Ohio Aquatic Invasive Species guide and will print copies for distribution.
- Participated in the following groups: Great Lakes Panel, Mississippi River Basin Panel, Ohio Aquatic Invasive Species Committee, and Invasive Carp Regional Coordinating Committee.

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State of Oklahoma

Submitted by Elaine Gainer

The Oklahoma Department of Wildlife Conservation (ODWC) hired an ANS/Fish Kill Technician and an Invasive Carp Technician starting November 15, 2023. Oklahoma's ANS activities have recently included invasive carp sampling and specimen collections, zebra mussel veliger sampling, triploid grass carp certification documentation from the US Fish and Wildlife Service, approval or denial of aquatic import/export permits, participating in the Don't Let It Loose program, updating signage, working with our Communication and Education division for outreach efforts, and other miscellaneous activities.

Invasive Carp

In 2023, 79 bighead carp were removed from the Grand Lake O' the Cherokees system. Samples were taken from the bighead carp that were donated to ODWC for ageing, ploidy, genetics, microchemistry, and fecundity purposes. Missouri State University is continuing research on the Grand Lake system (including Neosho and Spring rivers) in cooperation with Kansas Department of Wildlife and Parks, collaborating with ODWC and US Fish and Wildlife Services. Telemetry work on this bighead carp population is nearly underway.

Auburn University has an ongoing invasive carp project on the Red River, working with ODWC, Arkansas Game and Fish Commission and Texas Parks and Wildlife. Telemetry on bighead and silver carp in the Red River is underway along with population dynamic studies conducted by Auburn. US Fish and Wildlife Service in Tishomingo is also working on invasive carp research in the Red River and cooperating with ODWC and Auburn University.

The ODWC has been awarded additional funds to put towards invasive carp research, monitoring and removal efforts in the Grand Lake O' the Cherokees system as well as the Arkansas River below Robert S. Kerr Reservoir to the Arkansas border. Environmental DNA work has begun on the Arkansas River below Robert S. Kerr Lock and Dam to the Arkansas-Oklahoma border. Analysis is underway.

Zebra Mussels

Zebra Mussel veliger sampling efforts were completed in the months of May and June on 36 lakes throughout the state. Samples were sent to the ECOLAB in Denver, Colorado. In 2023, no new zebra mussel positive lakes were detected via sampling. However, one historically clean reservoir was reported invested by a member of the public. Spring 2024 sampling efforts have not begun but will once water temperatures warm. We intend to sample as many or more lakes in Spring 2024.

Future Directions

Plans for the future include assisting universities in the field with ongoing and upcoming invasive carp projects, starting/continuing our internal invasive carp projects on the Grand Lake system and Arkansas River, cooperating and collaborating with various agencies and municipalities on other statewide ANS issues, updating and performing ANS signage checks around public waters, performing shoreline observations, hiring an hourly position, attending annual meetings, when feasible, and writing interim/final reports for grants.

State of Pennsylvania, Fish and Boat Commission

Compiled and Submitted by Sean *Hartzell*

- During spring/summer 2023, Pennsylvania Fish and Boat Commission (PFBC) staff surveyed 14 public lakes for AIS. This project was supported by Great Lakes Restoration Initiative funding and is the first geographically "statewide" survey for AIS in Pennsylvania. All lakes surveyed had 1-4 AIS present. Species found included Curly Leaf Pondweed (*Potamogeton crispus*), Eurasian Water Milfoil (*Myriophyllum spicatum*), Red-eared Sliders (*Trachemys scripta elegans*), Allegheny Crayfish (*Faxonius obscurus*), Asian Clams (*Corbicula fluminea*) Chinese Mystery Snails (*Cipangopaludina chinensis*), Virile Crayfish (*Faxonius virilis*), and Hydrilla (*Hydrilla verticillata*). Most of these AIS are relatively widespread in Pennsylvania, and so their presence was not a major surprise. An exception was the documentation of Virile Crayfish in two northern Pennsylvania Lakes, as this species has previously been known primarily from southcentral Pennsylvania. A detailed report is available upon request.

- On January 1st, 2024, revised regulatory language went into effect related to the propagation and introduction of aquatic organisms into Pennsylvania waters. PFBC staff and Commissioners drafted 58 Pa. Code Chapter 71a to replace 58 Pa. Code Chapters 71 and 73 and includes new or revised language relating to a notice of stocking, prohibitions on the release of live bait fish, fish health requirements, and watercraft decontamination requirements. The new watercraft decontamination requirements require draining of a watercraft and removal of any aquatic vegetation and prohibited aquatic invasive species prior to transport.

- In 2023, PFBC staff and partners installed aquatic invasive species composting stations at several public boat launches in northwestern and central Pennsylvania. Stations were funded through federal AIS Management Plan Grant funding and in partnership with Pennsylvania Sea Grant. Stations were based on designs previously used in Pennsylvania by the Pennsylvania Department of Conservation and Natural Resources as well as in the Finger Lakes region of New York state. (Photo below of a station installed at Tamarack Lake in Crawford County, PA).

- During summer 2023, Pennsylvania Fish and Boat Commission staff and partners documented population expansion and reproduction of invasive Northern Snakehead (*Channa argus*) for the first time in the Conowingo Pool of the lower Susquehanna River. A press release is available for more details: https://www.media.pa.gov/pages/fish-and-boat-commission-details.aspx?newsid=534

- In 2023, the PFBC issued a press release on the expansion of non-native Blue Catfish (*Ictalurus furcatus*) and Freshwater Drum (*Aplodinotus grunniens*) in the lower Delaware River basin to alert anglers of their presence and encourage reporting/harvest of these non-native species. The press release is available at this link: https://www.media.pa.gov/pages/fish-and-boat-commission-details.aspx?newsid=545

- During March 2023, Pennsylvania, like many other states, found that crayfish species were being transported as "hitchhikers" in shipments of feeder goldfish in pet stores. PFBC's Bureau of Law Enforcement staff examined pet stores throughout the state and confiscated a total of 40 crayfish. Collected crayfish were tentatively identified as White River Crayfish (*Procambarus clarkii*) or possible Southern White River Crayfish (*Procambarus zonangulus*). Several specimens were too badly damaged for ID.

- Invasive New Zealand Mudsnails (*Potamopyrgus antipodarum*) continue to be documented in new locations in Pennsylvania. In 2023, PFBC staff documented New Zealand Mudsnails for the first time on the Ohio River basin in two tributaries of the Monongahela River in Armstrong County, Pennsylvania (manuscript in prep). PFBC staff and partners documented range expansions in two peer-reviewed publications focused on range expansions of this species in the Delaware, Susquehanna, and Potomac River basins.

  Citations:

  Hartzell, S. M., and N. Macelko. 2022. Range expansion of the invasive New Zealand Mudsnail (*Potamopyrgus antipodarum*) in the Susquehanna and Delaware River basins of Pennsylvania. *Journal of the Pennsylvania Academy of Science* 96: 36– 45.

  Hartzell, S. M., and J. R. Frederick. 2023. First records of the invasive New Zealand Mudsnail (*Potamopyrgus antipodarum*) in the Potomac River basin. *Northeastern Naturalist* 30: N13–N16.

State of South Dakota, Department of Game, Fish and Parks

Submitted by Tanner Davis

2023 OVERVIEW

In 2023, SDGFP conducted 18,642 watercraft inspection. Thirteen inspections stations were in operation across South Dakota on any given week during the summer months. A new roving watercraft inspection crew was implemented in the 2023 season to show a presence at high trafficked lakes in eastern SD. GFP was able to hire 63 inspectors, which include two seasonal supervisors. The seasonal supervisors oversaw operations in western and eastern SD. Additionally, GFP law enforcement officers are assisting with compliance during inspections, when available, and fewer law enforcement vacancies are helping with added presence compared to 2022. Law enforcement has also conducted their own AIS compliance checks when time allowed as well.

SDGFP continues education and outreach efforts to educate boaters and water users on best management practices, specifically focusing on 'clean, drain, dry' messaging. For a fourth year in a row, utilizing Lawrence and Schiller for our marketing campaign, GFP conducted gas station television at 43 gas stations across South Dakota. Individuals who encountered these gas stations or utilized infested waterbodies received digital and/or social media advertisements following up on these messages as well. GFP built upon their outreach and education aspect of the AIS Program by also incorporating an AIS Awareness week this year which occurred the week of May 22nd.

Outside of watercraft inspections, SDGFP continues to pursue invasive carp funding to better understand invasive carp distribution and habitat use, hydrological risk assessment, site suitability risk assessment, otolith microchemistry to better understand natal origins, and eDNA work related to bait trade and presence/absence of invasive carp in areas where risk was associated during the flooding in 2019, as well as better ways to communicate outreach and educational materials related to invasive carp.

WATERCRAFT INSPECTION STATIONS

Maximize boater engagement to increase adoption of best practices to clean, drain, and dry watercraft between uses. Three roadside stations were operated in central and eastern South Dakota to maximize boater contacts, as well as implementing a new access based roving WID crew.

Inspection stations occurred at nine boat launch areas at the six largest western South Dakota reservoirs. In 2023, there was a secondary WID station at Sheridan Reservoir due to the recent infestation at Pactola Reservoir in 2022.

Looking forward, the USFWS is helping fund stations through the QZAP grant at Angostura, Belle Fourche, Deerfield, Sheridan, Pactola and Shadehill Reservoirs with Western Dakota Water Development District also contributing funds for Pennington County reservoirs.

Sixty-three inspectors were hired between GFP and local County Conservation Districts in 2023. GFP added a new position, East River Watercraft Inspection and Decontamination Supervisor to oversee WID operations primarily in the NE part of state where we have seen the largest spread of zebra mussels. This position was created after seeing the utility in our West River Watercraft Inspection and Decontamination Supervisor, which was put into place in 2022.

Minimize transport of water, vegetation, and aquatic animals among waters by:

- Increasing awareness of AIS and impacts to water users
- Engaging boaters at inspection stations to help them develop best practices to slow the spread
- Utilizing law enforcement to engage boaters and help increase regulation compliance
- **98%** Boat plug compliance average at all WID station's in 2023, up from 2022.
-

ENFORCEMENT INCREASES COMPLIANCE

Issuance of warnings and citations for violations of AIS statutes and administrative rules helps increase compliance with boat plug, vegetation, and fish and bait transport rules. In 2023, approximately 147 warnings and 136 citations were written, which is up from last year due to less vacancies for law enforcement.

STATE AGENCY PARTNERSHIPS

Transportation- use of DOT field locations for watercraft inspections and include a provision in construction contracts stating contractors must obey AIS regulations.
- Also helped install Zebra Mussel Infested Water signs and Preventative AIS signage as part of SDGFP rapid response plan.
Public Safety use of motor vehicle carrier weigh station locations for watercraft inspections.
Agriculture and Natural Resources - distribution of information to irrigators, municipalities, and businesses with surface water withdrawals.
Revenue - distribution of rack cards on "clean, drain, dry" to county treasurers for inclusion in registration renewal mailings.
Sioux Wahpeton Oyate Tribe – Partnered with SD Parks on placement of CD3 units placed at Pickerel.
ND Game and Fish – Partnering on zebra mussel monitoring on Lake Oahe.

FEDERAL AGENCY PARTNERSHIPS

Bureau of Reclamation - Coordination with prevention efforts and mussel veliger sampling at BOR reservoirs.
US Forest Service - Use of USFS boat ramps for watercraft inspection locations and storage of equipment as well as placement of education signage at water access point and funding for future efforts related to WID.
US Corp of Engineers - Allowed signage at their public boat ramps and partnered through the 50% reimbursement program through WRDA funding.

NGO PARTNERSHIPS

Wildlife Forever - GFP utilized Clean. Drain. Dra hats purchased through Wildlife Forever.

The Invasive Species Action Network - Received Don't Let It Loose signage for urban fisheries and purchased Don't Let It Loose pet store bags.

Glacial Lakes and Prairies Tourism Association - Placed rack cards at Bramble Park Zoo in Watertown for more public outreach.

SD Lakes and Streams – Partnered with SDGFP and SDSU extension on community-based monitoring inspection workshop.

Education and Outreach
Reinforce key messages of “Clean, Drain, Dry”, leave boat plugs out except when launching, loading, and on the water, do not move water when transporting bait and fish, and be aware of current AIS infestations.

Tools include organic and paid social media messages, Youtube videos including AIS Biology and Inspection/Decontamination training videos, gas station TV, targeted emails, news releases, rack cards, AIS posters at Welcome Centers across the state, digital advertisements, lake association meetings, AIS training for volunteer inspectors and youth at SDGFP Outdoor Campus’s, ***sdleastwanted.sd.gov*** website, Citizen Monitoring Program, and enhanced AIS signage and equipment at boat ramps to mitigate the spread of AIS.

GFP partnered with SDDOT to use interstate DOT signs for AIS messaging and partnered on installation of zebra mussel infested water signs in the central and eastern portions of SD.

GFP reached out to 32 lake associations for partnership and through that effort several lake associations have partnered to some degree on AIS prevention through signage and deploying monitoring devices for early detection of dreissenid mussels.

2023 New Zebra Mussel Infested Waters
Roy Lake, James River/Sand Lake Wildlife Refuge, Big Sioux River, Bigstone Lake, and Lake Oahe

State of Texas, Parks and Wildlife

Submitted by Monica McGarrity

Zebra/Quagga Mussels

Lake Amistad in the Rio Grande basin has now been confirmed to be fully infested with zebra mussels, following detection of settled mussels of several size classes in February. Zebra mussel larvae were detected in the lake in 2022 and 2023 but no settled mussels were found in shoreline/substrate surveys until lake levels reached record lows. The status of quagga mussels remains uncertain, with no detections since the early reports of quagga mussel larvae in 2021 and 2022 and no settled quagga mussels found.

Invasive Carp

TPWD is continuing to work with Oklahoma Department of Wildlife Conservation, Arkansas Game and Fish Commission, Auburn University, and Texas Tech University to assess the population status of invasive bigheaded carp (bighead and silver) in the Lower Red River Basin across the tri-state area. The project has reached the end of the three-year population assessment phase in most areas and is in the final year of a two-year telemetry study. To date, bigheaded carps have been found in the Red River upstream to Denison Dam below Lake Texoma and in all monitored tributaries. However, thus far, successful reproduction has not been documented and more carp have been caught in Arkansas waters than upstream. A total of 421 bigheaded carp (313 Silver, 108 Bighead) were collected from 2021-2023, and an additional 25 of each species were captured and tagged for telemetry. Future project directions may move toward implementation of invasive carp removal efforts.

Aquatic Invasive Plants

Giant salvinia continues to be the most problematic aquatic invasive plant in Texas and is present in 26 reservoirs and 7 river systems. Early detection and rapid response efforts continue and have resulted in giant salvinia being extirpated from 2 public water bodies. Biological control using giant salvinia weevils continues to show success and the weevils are being used as part of our IPM strategy on 15 water bodies with a total of 336,583 weevils released in fiscal year 2023. Self-sustaining weevil populations are now present at J.D. Murphree WMA lakes, Toledo Bend Reservoir, Sheldon Lake, Lake Naconiche, Lake Nacogdoches, and Lake Raven. Over-wintering populations were also noted at Lake Murvaul and Caddo Lake but cold weather reduced giant salvinia coverage on both lakes, removing the weevil's food source and preventing the population from building. Herbicide treatments are also used to control giant salvinia on 35 water bodies, with nearly 13,200 acres treated in fiscal year 2023.

Water hyacinth also continues to be problematic and is present in 58 reservoirs and all major rivers across the state. In fiscal year 2023, nearly 2,500 acres of water hyacinth were treated with herbicides on 30 water bodies.

Crested floating heart is currently found in 4 water bodies and yellow floating heart in 2 water bodies, as well as the latter being present on the Louisiana side of Toledo Bend Reservoir on the state border. Treatment using ProcellaCOR has been highly effective, and infestations have been significantly reduced on most water bodies.

Because hydrilla in many cases provides much needed fish habitat in those aging reservoirs in Texas with minimal littoral zones, treatments of this species are limited to addressing access issues at swimming

areas, campsites, along shorelines where it has become problematic for lakefront landowners for access, boat ramps, and boat lanes unless coverage exceeds 40%. Control strategies include herbicides and triploid grass carp. In fiscal year 2023, 104 acres of hydrilla were treated across 8 water bodies.

Riparian Invasive Plants
Giant reed (*Arundo donax*) control is ongoing in Central Texas and has expanded to include the Pedernales, Blanco, Guadalupe, Medina, Nueces, and Llano rivers and San Felipe Creek. Control is implemented on hundreds of private and public properties across these basins in collaboration with the landowners.

Saltcedar control on the Upper Brazos River in critical habitat for smalleye and sharpnose shiners in collaboration with the USFWS continues to be a priority. To date, over 20,000 acres have been treated across approximately 150 primarily private properties.

Watershed-scale elephant ear control on the Llano River continues, with over 50 river miles in monitoring or active management status.

Outreach and Prevention
The TPWD and partners support two major outreach campaigns for AIS. The “Protect the Lakes You Love” clean, drain, dry campaign uses billboards, gas station advertising, boat ramp signage, and a variety of digital media to reach boaters to encourage prevention actions. The “Never Dump Your Tank” campaign employs digital advertising to address the aquarium dumping pathway for new invasions.

Aquatic Invasive Species Research
TPWD is currently supporting three AIS research projects, described below, through our biennial AIS grant program; projects will be completed by the end of August 2025.

Developing spawning protocols and identifying the sex determining regions in suckermouth armored catfish to facilitate the production of neofemales and YY males for use in population control - Texas A&M University facilitate production of YY males for use in genetic/biological population control. This project will also begin to test protocols for spawning these species and beginning the process of feminizing males. This work will contribute to furthering efforts to control these invasive species.

Assessing seasonal variation in thermal refugia use and drivers of angler participation in removal efforts of suckermouth armored catfish in San Felipe Creek, Val Verde County - University of Texas at San Antonio
This study will evaluate use of thermal refuges (e.g., springs) by suckermouth armored catfish during winter months to increase survival. Locating aggregations of this invasive species can aid in enhancing removal efforts. This study will also examine angler interest in participating in removal tournaments, including any seasonal differences in willingness to participate. This work will aid in enhancing ongoing removal efforts.

Distribution of the Australian redclaw crayfish in Texas - University of Texas at Tyler
Invasive Australian redclaw crayfish have become established in South Texas, but little is known of their distribution. This study will evaluate distribution of this species in Texas as well as abundance and life-history traits. This work is an important step toward better understanding this invasion as well as facilitating potential future assessments of impacts on native species.

State of Wyoming, Game and Fish Department

Submitted by Josh Leonard

AIS Program Activities

1. The Wyoming Game and Fish Department (WGFD) increased seasonal personnel hiring in 2024 with 2 new seasonal positions to staff check stations on the western part of the state in response to the Quagga mussel discovery in Idaho. Our technician hourly wages were increased from $16.11 to $18.71 to address recruitment and retention issues from previous years. Additionally, the AIS program converted three contract AIS Specialist positions to FTE positions in Evanston, Jackson and Laramie. The program now operates with 77 personnel during peak season; 8 FTE personnel, one 12 month contract Specialists, four crew leads and 64 seasonal inspectors.
2. In 2023, WGFD constructed two new AIS check stations in the towns of Manville and Newcastle in response to the Pactola, South Dakota infestation. Operations at these locations began March 1, 2023, and were open until November 30, 2023.
3. In 2023, watercraft check stations were operated from March 1 through November 30 at seventeen 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. In 2023, over 73,000 inspections were conducted. Of these, 7,415 were high risk watercraft and 1,154 were decontaminated for water onboard or suspect AIS. A total of sixty-four boats were intercepted with mussels attached or in compartments.
4. The WGFD is continuing to upgrade utilities at check stations around the state in an effort to provide power and water to locations historically operated using generators and water hauling.
5. The WGFD recently completed construction of a new check station along I-25 south of Cheyenne to relocate in a safer, more user friendly location for watercraft inspections. Ironically, the existing check station trailer was hit by a semi during the middle of the night, proving the move to be worthwhile (see pic).

6. The WGFD will continue to upgrade utilities at check stations while transitioning mobile decontamination units to on-demand units, to help deliver more reliable temperatures when performing decontaminations.
7. The WGFD is in the process of constructing a new check stations at Keyhole Reservoir and upgrading the Beulah AIS Check Station to more efficiently and effectively decontaminate watercraft coming from South Dakota.

U.S. Army Corps of Engineers

Submitted by Mark Cornish

The U.S. Army Corps of Engineers (USACE) is the steward of 12 million acres of public lands and waters at hundreds of water resources projects nationwide. In the efforts to conserve, protect and restore these lands and waters it is necessary to manage and control invasive species. Through its primary Civil Works missions, USACE has constructed and/or operates infrastructure in most major river systems and coastlines throughout the nation, with significant impacts on aquatic ecosystems and the species that depend on them. This infrastructure has taken the form of large dams to support its flood risk management, hydropower, and water supply missions; locks, dams, and canals to support navigation, levee systems, diversions, and coastal storm protection features. In the area covered by the Mississippi River Basin Panel, the USACEs has five Divisions that generally fall along watershed boundaries, including the Mississippi Valley Division (Mississippi River), Great Lakes & Ohio River Division (Ohio River), Northwest Division (Missouri River), Southwest Division (Red River), and the South Atlantic Division. Within each Division are Districts that oversee the management of USACE activities within their respective areas of responsibility. These include activities include both terrestrial and aquatic nuisance species management on USACE managed lands through both authorized projects, Ecosystem Restoration programs and the Environmental Stewardship programs for each USACE project office. USACE also has research facility based in Vicksburg, MS that oversees the Aquatic Plant Control Research Program and the Aquatic Nuisance Species Research Program. This summary highlights both authorized projects and research activities relating to invasive carp and is not intended to be comprehensive. There are numerous other aquatic nuisance species activities that involve plant, insect, and animal control that are not included in this summary.

Electric Dispersal Barrier System (EDBS) – Operation, Maintenance and Construction – Chicago Sanitary and Ship Canal, Romeoville, Illinois

The EDBS is located in the Chicago Sanitary and Ship Canal, which is a man-made waterway creating the only continuous connection between Lake Michigan and the Mississippi River Basin. The dispersal barrier system was developed to prevent the spread of invasive fish species between these watersheds. USACE has operated electric barriers in the CSSC since 2002. Over the years, several operational and procedural improvements have been implemented to improve the effectiveness and continuously deliver an uninterrupted flow of electricity to the water to deter fish. In 2024, USACE is continuing to operate and maintain the barriers and complete construction on the Barrier I southern array. The FY24 cost was estimated at approximately $ 15,296,000.

Figure 1 Electric Dispersal Barrier 1 Control Building, Romeoville, IL

In support of barrier efforts USACE tracks and monitors fish throughout the Chicago area waterway system. The goal is to monitor the EDBS for upstream passage of large fishes, assessing the risk of Bighead Carp and Silver Carp presence, identifying lock operations and vessel characteristics that may contribute to the passage of fish through navigation locks in the Chicago area waterway system, and evaluating temporal and spatial patterns of habitat use at the leading edge of the invasion front.

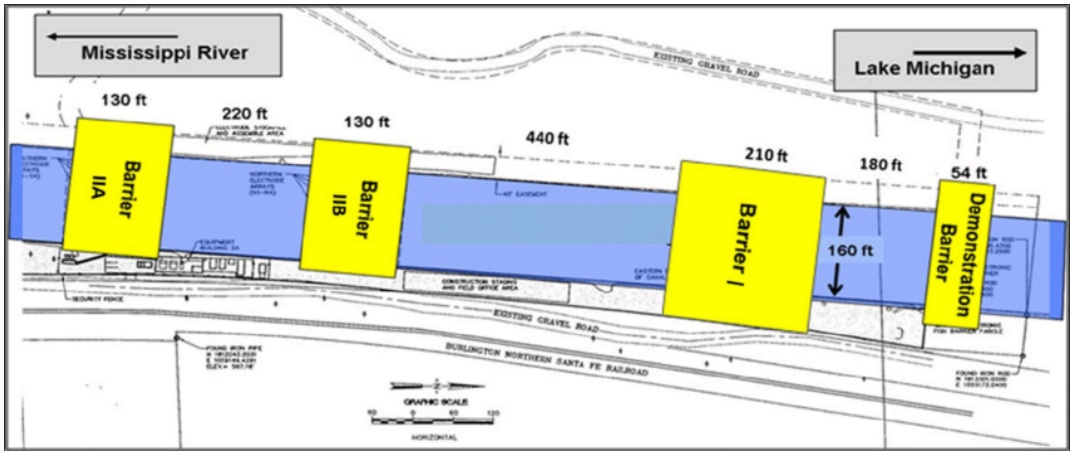

Figure 2 Location of electrodes in the Romeoville Electric Dispersal Barrier System

Brandon Road Lock and Dam Aquatic Nuisance Species Barrier Project – Design phase – Des Plaines River, Joliet, Illinois

The project includes a layered system of structural controls and non-structural measures. The structural plan includes a new control point on the Des Plaines River at Brandon Road Lock and Dam in addition to the control point that is already provided by the Chicago Sanitary and Ship Canal EDBS in Romeoville, Illinois. The new structural control point would include an acoustic fish deterrent, a bubble deterrent, an engineered channel, an electric deterrent, a flushing lock, and an automated barge clearing (barge entrainment) deterrent. The project includes managing the waterway below Brandon Road Lock and Dam as a "population reduction zone" where monitoring and overfishing would occur. Non-structural measures that may be implemented primarily by other federal and state agencies include public education and outreach, nonstructural monitoring, integrated pest management, piscicides, manual or mechanical removal of fish, research, and development and two boat launches.

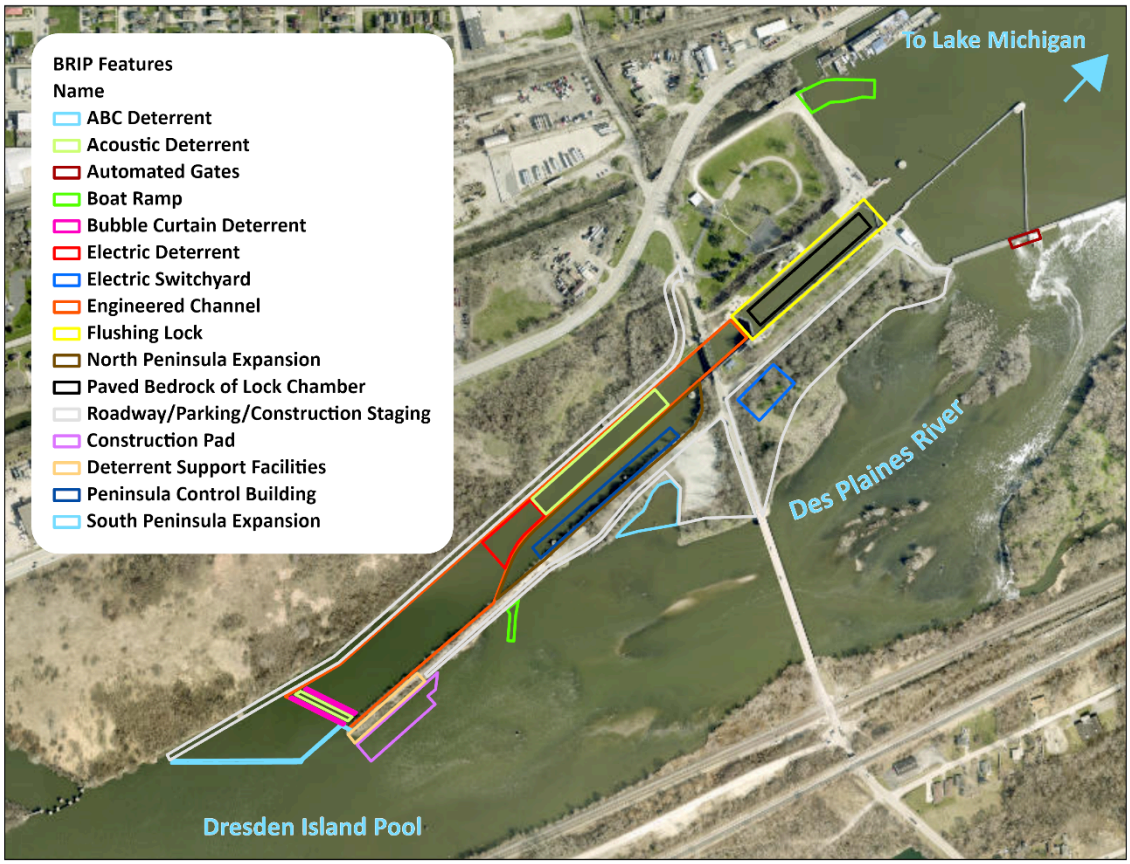

Figure 3 Project features of the Brandon Road Interbasin Project, Joliet, Illinois

The project is anticipated to be constructed in three increments:

- Increment I: bubble deterrent, acoustic deterrent, automated barge clearing (entrainment) deterrent, support facilities, upstream boat launch, site prep, and channel rock excavation.
- Increment II: electric deterrent, large acoustic deterrent, engineered channel floor & wall for electric & large acoustic deterrent, flushing lock, downstream boat launch, and support facilities.
- Increment III: the completion of the engineered channel floor and walls.

The project delivery team has completed the 100% design of Increment I-A and is working with the State of Illinois to sign the Project Partnering Agreement to begin contracting for construction.

Pilot study of underwater Acoustic Deterrent System (uADS) (Year 3) - Lock and Dam 19 – Mississippi River, Keokuk, IA

USACE and USGS are working on a multi-year effort to investigate underwater sound as a potential management technology, including piloting the use the underwater Acoustic Deterrent System (uADS) to deter invasive carp at Lock and Dam 19 on the Mississippi River. Deploying large-scale experimental acoustic structures at critical passage points in the Ohio River and Upper Mississippi River basins will help managers understand the effectiveness of acoustic deterrents in natural settings where invasive carp populations are already established and allow for the evaluation of the technology prior to deployment in other locations where it might help prevent upstream migration to the Great Lakes.

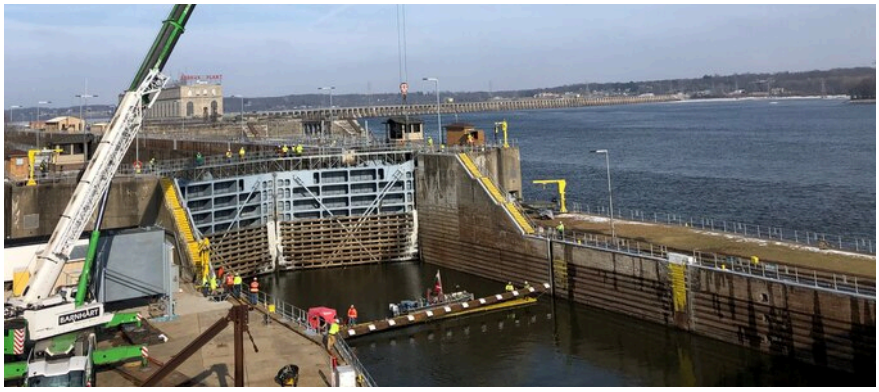

Figure 4 uADS installation at Lock 19, Keokuk, Iowa

For this large-scale deployment, underwater sound equipment was installed at “pinch points” in the river system where carp are only able to swim upstream through a lock chamber because the head height of the dam structure is impassable. Migration of fish is then confined to a single passage point and can be monitored with the use of telemetry and hydroacoustic equipment. In addition to field-testing uADS, research efforts in the lab will continue to refine and optimize sound frequencies, sound pressure levels, and speaker designs to repel invasive carp while limiting or eliminating undesirable effects on native species. FY24 activities include maintenance of the uADS until it is dismantled in April 2025.

Barkley Lock Bio-Acoustic Fish Fence

The USFWS is collaborating with researchers from USACE (ERDC), USGS, KDFWR, and UMN to evaluate the Bio-Acoustic Fish Fence (BAFF) deterrent at Barkley Lock and Dam on the Cumberland River. The evaluation will be completed in 2024.

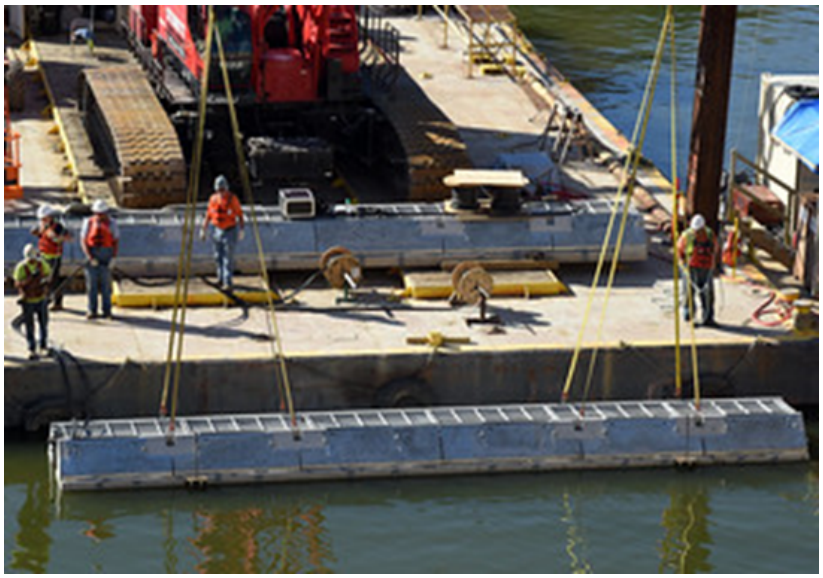

Figure 5. Installation of the Bio-Acoustic Fish Fence at Barkley Lock.

Tennessee and Cumberland Rivers

The Water Resources Development Act of 2020 authorized USACE to implement an Invasive Carp Prevention and Control Pilot Program in conjunction with the Tennessee Valley Authority and other relevant Federal Agencies to carry out projects to manage and prevent the spread of invasive carp using innovative technologies, methods, and measures. The most recent WRDA expanded the scope of USACE's effort from the Tennessee and Cumberland Rivers basins to include to include the Tombigbee Waterway and Mississippi River Basins.

The U.S. Army Corps of Engineers Nashville District initiated scoping under the National Environmental Policy Act (NEPA) to evaluate measures and alternatives to manage and prevent the spread of invasive carp in the Tennessee River, Cumberland River, and northern section of the Tennessee-Tombigbee Waterway (TTWW) in 2020. Proposed management measures include:

- Underwater Acoustic Deterrent System (uADS) – consists of an underwater installed apparatus with speakers that produce various loud sounds to repel carp away from the lock or dam.
- Bio-acoustic Fish Fence (BAFF) – sends a curtain of bubbles, sound, and light from the riverbed to the water surface, which deters noise sensitive invasive carp from entering the lock chamber.
- Carbon Dioxide (CO_2) Infusion – consists of a process infusing water with recycled CO_2 gas to discourage the movement of invasive carp by avoiding the soda-like water.
- Electrical current barrier – consists of a barrier located along the waterway that emits electrical current which doesn't electrocute the carp but repels them when they encounter the strong electrical field.

Section 509 of WRDA authorizes no more than ten projects to be carried out in the pilot program. The evaluation prioritized ten locations from the following project sites:

Tennessee River Locations

- Kentucky Lake Lock and Dam (Kentucky)
- Pickwick Lake Lock and Dam (Tennessee)
- Wilson Lock and Dam (Alabama)
- Wheeler Lock and Dam (Alabama)
- Guntersville Lock and Dam (Alabama)
- Nickajack Lock and Dam (Tennessee)
- Chickamauga Lock and Dam (Tennessee)
- Watts Bar Lock and Dam (Tennessee)
- Melton Hill Lock and Dam (Tennessee)
- Fort Loudon Lock and Dam (Tennessee)

Cumberland River Locations

- Barkley Lake Lock and Dam (Kentucky)
- Cheatham Lock and Dam (Tennessee)
- Old Hickory Lock and Dam (Tennessee)
- Cordell Hull Lock and Dam (Tennessee)

Tennessee-Tombigbee Location

- Bay Springs Lake Whitten Lock and Dam (Mississippi)

USDA Forest Service Southern Research Station

Submitted by Zanethia Barnett

Crayfish

Work completed by Susan Adams, susan.adams@usda.gov

We are continuing to work with Montana Fish, Wildlife and Parks, the US Forest Region 1, and other partners on crayfish issues in Montana.

- We are preparing a manuscript on a novel control method being tested for burrowing crayfish.
- We continue with genetic assessments to try to understand where virile crayfish (*Faxonius virilis*) are native versus invasive east of the divide in Montana.
- We are working with a former ORISE intern on publishing insights into cryptogenic crayfish in Montana that we obtained from reviewing primary historical documents and early dictionaries of indigenous languages.
- We, along with colleagues in Spain, are preparing a manuscript documenting crayfish plague in the state.
- I am seeking funding to continue our research on crayfish plague in Montana and throughout the country. One of the questions to be addressed is if plague expression occurs due in part to introduction of novel pathogen strains or to introduced crayfish being exposed to native strains to which they are not adapted.


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