

MRBP Member Updates

July 2013

Arkansas – Submitted by: Brian Wagner, Arkansas Game & Fish Commission

The Arkansas ANS Management Plan nears completion. The plan has been endorsed by the Arkansas Game and Fish Commission (AGFC) and was submitted by Arkansas Governor Mike Beebe to the Aquatic Nuisance Species Task Force (ANSTF). The submission just missed the deadline for consideration at the Spring ANSTF meeting, so it is on the agenda for the Fall meeting.

We continue to have public reports of Northern Snakeheads in and around the area of attempted eradication in eastern Arkansas. Our District Office in the area still gets frequent calls to report sightings, most of which turn out to be Bowfin, but several have been confirmed as Northern Snakeheads. U.S. Fish & Wildlife Service Biologist Lindsey Lewis reports “We did go out to Bonner Farm (the original hot spot) a month ago to see if they were in there, and they were. We found 10 or so easily in one ditch, likely [there] were many more. They were 2-3 year old fish. Native fish were abundant and had recovered well and their numbers and diversity suggest that snakehead numbers are relatively low... for now.” With the enactment of the new labeling of rotenone, AGFC has discontinued its use in standard sampling, and we have still to find an effective alternative approach for investigating Northern Snakehead presence.

AGFC’s Fisheries Division has formed a joint committee with the Enforcement Division to review and overhaul Arkansas’s fish farming regulations. Goals of this effort are to make the regulations clearer and more enforceable, reduce the risk of invasive species introductions, and protect the aquaculture industry in the state.

Because Arkansas’ aquaculture industry is such a major producer of baitfish, this also intersects with growing concerns over bait as a vector for species introductions. The Fisheries Division has started to look at the issue of inter-basin transfer of bait. We recognize a need to balance reducing the risk of the public spreading ANS in this way with not unduly impeding traditional activities (such as collecting bait to fish with while you are on a camping or canoeing trip). As a first step, we will be working with our Communications and Education divisions to develop an educational program about inter-basin transfer of bait and the threats posed thereby.

Illinois – Submitted by Kevin Irons, Illinois Department of Natural Resources

Asian Carp Removal Project

- This program was established to reduce the numbers of Asian carp downstream of the Electric Dispersal Barrier through controlled and contracted commercial fishing.
- Contracted commercial fishers and assisting IDNR biologists deployed 643.3 miles of net in the upper Illinois Waterway from 2010- 2012.
- A total of 44,658 Bighead carp, 47,474 Silver carp, and 496 Grass carp were removed by contracted netting. The total weight of Asian carp removed was 698.72 tons (62.41 tons in 2010, 351.78 tons in 2011 and 284.53 tons in 2012).
- Winter Sampling: Building upon success of Barrier Defense (above), bi-monthly sampling with contracted fishers that use gill/trammel netting as well as monthly seining events are scheduled to further remove Asian carps in the upper Illinois River during winter months.
- Commercial seines are ½ mile long and can remove large numbers of fish per haul.
- Winter 2012-2013 has been relatively cold with many weekly events rescheduled due to weather and ice. All of the scheduled effort was completed for the winter in March.
- Two December seine hauls yielded 15, 000 lbs and 50,000 lbs of Asian carp each.
- We will continue to schedule these events to maximize removal efforts
- Over 8,200 bighead and silver carp (56.5 tons) were removed in this effort.

Intense Surveillance above the Electric Barriers

- Estimated over 9,600 person-hours spent sampling at fixed sites upstream of the Barrier in 2010, 2011 and 2012.
- Estimated 3,713 person-hours spent sampling at fixed sites, and 3,805 person-hours spent sampling in random areas upstream of the Barrier in 2012
- 533 hours spent electrofishing and 165.9 miles of trammel/gill net deployed at fixed sites in 2010, 2011, and 2012 and random areas in 2012.
- 192 hours spent electrofishing and 81.7 miles of trammel/gill net deployed at fixed sites and random areas in 2012.
- Sampled 192,763 fish representing 67 species and two hybrid groups during electrofishing and trammel/gill netting at fixed sites in 2010, 2011, and 2012 and random sites in 2012.
- Sampled 99,234 fish representing 63 species and two hybrid groups in during fixed and random electrofishing and trammel/gill netting 2012.
- No Bighead or Silver Carp captured or observed during fixed site and random area electrofishing and netting in 2012.

Agency Fixed Site Monitoring Downstream of the Dispersal Barrier

- Estimated 5,267 person-hours spent sampling at fixed sites and additional netting locations downstream of the Dispersal Barrier from 2010-2012.
- 94.5 hours spent electrofishing and 81.1 miles of trammel/gill net deployed.
- Sampled 60,709 fish, representing 84 species and four hybrid groups.
- A total of 25 Bighead carp and no Silver carp captured during contracted commercial netting at Dresden Island Pool fixed sites and additional netting locations.
- Detectable population front of mostly Bighead carp located just north of I-55 Bridge at river mile 280 (47 miles from Lake Michigan). No appreciable change in upstream location of the population front in past five years.
- Sampled 17 Bighead carp and 185 Silver carp by electrofishing, and 455 Bighead carp and 258 Silver carp by netting at fixed sites and additional netting locations in Marseilles Pool. Presence of mature adults capable of spawning occurred in this pool about 55 miles from Lake Michigan. However, Asian carp larvae and juveniles were not detected upstream of Peoria Pool or less than 100 miles downstream of the Dispersal Barrier and 137 miles from Lake Michigan.
- No Bighead or Silver carp were captured by electrofishing or netting in Lockport and Brandon Road pools.

Additional Actions in the CAWS

- Completed five response actions with conventional and experimental gears in the CAWS upstream of the Dispersal Barrier during 2012. Three of the actions were triggered by three consecutive positive detections for Asian carp eDNA in the same location.
- Estimated 1,630 person-hours were spent to complete 59 hours of electrofishing, set 18.4 miles of trammel/gill net, make three 800-yard long commercial seine hauls, and deploy two tandem trap nets, 10 hoop nets and two Great Lake pound nets equal to 30.3 net-days of effort.
- Across all response actions and gears, sampled over 29,818 fish representing 53 species and 2 hybrid groups.
- No Bighead or Silver carp were captured or observed during response actions.

Law Enforcement

- Invasive species unit (ISU) in IDNR law enforcement was formed.
- ISU logged 1,035 hours investigating invasive species issues.
- ISU gained much intelligence from a Chicago area live fish market inspection.
- Conducted a joint investigation with USFWS in which several charges and penalties were given to an out-of-state fish hauler.

- A multi-agency Asian carp task force was formed to share intelligence, information and plan future operations.

Urban Fishing Pond Surveys

- Sampled 19 ponds with electrofishing and trammel/gill nets during 2012.
- Estimated 727 person-hours were spent to complete 30 hours of electrofishing and set 6.2 miles of trammel/gill net.
- Sampled 9,103 fish representing 29 species and 2 hybrid groups.
- Six Bighead carp were removed from three ponds (Garfield Park, Humboldt Park, Joe's Pond); three are on exhibit at the John G. Shedd Aquarium.

Research

- Illinois DNR is developing control technology and understanding by funding research through multiple academic and research institutions in Illinois including: University of Illinois, Illinois Natural History Survey, Illinois-Indiana SeaGrant, Loyola University, Southern Illinois University, Eastern Illinois University, and Western Illinois University.
- Results will inform on efficacy of outreach-education, emergent technologies/barriers (chemical, electrical, and physical barriers), patterns of movement and risk of Asian carp movement, locations where Asian carp spawning is documented, documenting tributaries and locations statewide where Asian carp populations exist, provide response actions necessary to remove ANS from state waters
- Illinois DNR works closely with ACRC partners in developing strategies to prevent establishment of Asian carps in the Great Lakes

Aquatic Nuisance Species

- Illinois DNR has had a Statewide ANS plan since 1999. Work in 2012 began a critical review and update of this plan that will include pro-active risk driven planning and design multiple response plan based on ANS detected.
- USDA-APHIS issued an emergency rule for managing transport of species across stateliness (Great Lakes) due to VHS (Viral Hemorrhagic Septicemia). Statewide surveillance is now supported by IDNR funded work to keep an eye on this disease and potential impacts or movements into inland waters. Currently VHS has only been reported in Lake Michigan within Illinois.
- Other ANS of concern, black carp and grass carp, have been found in the Mississippi River Basin and work to monitor their spread is underway. Black carp collections are monitored closely with analyses of body parts to estimate where they have been spawned and where they are spending their time.
- ANS Program Manager Kevin Irons sits on several panels (Mississippi River Basin Panel on ANS, Great Lakes Basin Panel on ANS, co-chairs the Council of Great Lakes Governors AIS task force with MI, sits on the Mississippi Governor's Council

on AIS to assist in developing consistent and appropriate policy and regulation to lower the threat of introduction of ANS into the system as well as optimize management efforts.

- Developed an Outreach and Education Brand that builds off of other National campaigns. The "Be a Hero, Transport Zero" campaign will launch in May and will educate statewide partners on proper care when using aquatic resources: <http://www.youtube.com/watch?v=z83g72eZ1RM> ; www.transportzero.org
- Work on Lake Michigan continues, to date has evaluated Alewife genetic flexibility and Zooplankton (rotifer) populations in the lake. This informs managers on the demise of Alewife but also gives us some insight into other pathways where small plankton may be introduced, as well as better understanding of the productivity of the Lake that has been invaded by plankton feeding organisms.
- IDNR/INHS/IL-IN Seagrant will be teaching proper boat washing techniques at ramps across NE Illinois to further prevent spread of ANS where they may already exist.

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

Plant Control / Eradication

Indiana Department of Natural Resources has continued to utilize state and Great Lakes Restoration Initiative funding this to combat a variety of Aquatic Invasive Plants. We are midway through our 7 consecutive year of Sonar treatment to eradicate hydrilla at Lake Manitou in North Central Indiana. As a follow up to 6 years of whole lake Sonar application the second phase of this eradication project has limited direct application of Sonar to the northern 2/3 of the lake volume. As of 2013 the state of Indiana has declared the eradication of parrot feather at Meserve Lake, a small natural lake in northeast Indiana, and will have no need to fund any continued treatments or surveys after multiple years of no new occurrences within the watershed. We continue to fight the spread and growth of Starry Stonewort in northeast Indiana. This macroalgae has proven very difficult to control but we continue to try different chemical prescriptions with hopes of finding one that is effective at limiting the growth and success of this invasive aquatic plant.

Research

The Indiana DNR has contracted two research projects to continue to understand more about Asian carp, one just underway is researching diseases and pathogens and a second evaluating movement and stream usage downstream of the inter-basin watershed connection that occurs during flood stage at the boundary between the watersheds of the Maumee River (Great Lakes drainage) and the Wabash River (Mississippi drainage). Going into the third year of the Purdue University study of the Asian carp movement, spawning evaluations, and habitat usage study the hope is to have a three year total of 300 ultrasonic tags implanted into Silver and Bighead carp for tracking through the upper Wabash. We hope to learn as much about their spawning behavior and usage of smaller river systems like the Wabash, as well as preferable habitat use to aid in predicting potential spawning events and future control efforts. Preliminary findings and yearly study information is available online at <http://www.in.gov/dnr/fishwild/files/fw-PurdueAsianCarpMovements2011Report.pdf> and <http://www.in.gov/dnr/fishwild/files/fw-PurdueAsianCarpMovements2012Report.pdf>

Outreach

Using Great Lakes Restoration Initiative federal funds (GLRI), some important Asian carp outreach materials have been developed, printed and are being put into use. This includes 100 posters for display at bait and tackle shops, 150 metal Asian carp information signs for placement at public access sites and 5,000 Asian carp brochures for distribution around the state. These materials provide information on identifying Asian carp, explaining why they are a threat and outlining things people can do to help stop the invasion. Mounted replicas of a silver carp and a bighead carp were also acquired and displayed at the State Fair and sporting shows for educational uses. Other outreach materials including 200 “Don’t Dump Bait” bait bucket release posters and 50 Hydrilla awareness boat ramp signs have been acquired respectively from Indiana Illinois Sea Grant, and through our southern regional cooperative weed management groups along the Ohio river who are starting a large multistate Hydrilla awareness campaign.

Iowa – Submitted by: Kim Bogenschutz, Iowa Department of Natural Resources

The Aquatic Invasive Species Program (DNR–AIS) staff consists of 1 full-time Coordinator/Natural Resources Biologist, 1 full-time Natural Resources Technician, and 19 seasonal Natural Resources Aides (16 watercraft inspectors, 3 survey crew) in 2013.

Planned activities and accomplishments so far in 2013 include the following.

- Conduct about 75 vegetation surveys in lakes throughout the Iowa. Duplicate or triplicate surveys are done on infested lakes to monitor growth of aquatic invasive plants. No new infestations of invasive aquatic plants have been discovered in 2013.
- Chemically treat about 25 waterbodies with Eurasian watermilfoil or brittle naiad.
- Survey zebra mussels in Clear Lake, Bluebill Lake, and the Spirit Lake/Okoboji chain of lakes.
- Placed about 100 zebra mussel veliger settlement samplers in 35 lakes and reservoirs.
- Sample water for zebra mussel veligers in about 15 lakes and rivers.
- Monitor Asian carp distribution and reproduction in Iowa rivers.
- Purchase equipment for DNR Fisheries management stations to prevent the spread of AIS during operations.
- Conduct about 15,000 watercraft inspections.
- Leased 15 billboards with AIS prevention messages on interstate and state highways.
- Distributed signs, brochures, identifications cards, posters, tattoos, maps, and regulations booklets; broadcast television and radio advertisement; cooperated on a traveling exhibit developed by the National Mississippi River Museum and Aquarium; published multiple press releases; conducted radio, television, and newspaper interviews, and presented at multiple events and meetings.
- Support about 20 partnerships and cooperative projects
- Enacted changes to the Code of Iowa (AIS Law) related to the transport of aquatic plants and draining of water from water-related equipment.

The following lakes in Iowa have known or suspected infestations of zebra mussels: Clear Lake, Bluebill Lake, Rathbun Lake, and the Spirit Lake/Okoboji chain of lakes (Spirit, East Okoboji, West Okoboji, Upper Gar, Minnewashta, Lower Gar). Zebra mussels have been present in Clear Lake since 2005. Zebra mussels were first discovered in Bluebill Lake (2 miles from Clear Lake) in 2012, and the population is still increasing. Zebra mussel veligers were collected in low numbers from Rathbun Lake from 2008 through 2011. No veligers were collected in 2012 and so far in 2013, and no adult zebra mussels have ever been found at Rathbun Lake. A single zebra mussel was found on a settlement sampler in September 2012 in Upper Gar Lake, and three zebra mussels were found in December 2012 on docks and boat lifts removed from East Okoboji Lake. Sampling in 2013 has revealed zebra mussel veligers in water samples from East Okoboji Lake. Additional sampling will occur throughout the summer and fall to try to determine where zebra mussels are present in the system.

Bighead and silver carp have been reported from the Missouri and Mississippi Rivers and several of their tributaries in Iowa since the early 2000's. The major flooding along the Missouri River in 2011 allowed both bighead and silver carp to expand their range into the Little Sioux River, its tributaries, and natural lakes in the watershed (e.g., Spirit Lake, Elk Lake). An electric barrier was completed below the outlet of the Spirit/Okoboji chain of lakes in 2013 to prevent further upstream movement of Asian carp into the lakes. New location records for Asian carp in 2013 include silver carp in the Cedar River near Palisades State Park (first collection in Cedar River) and bighead carp in the Cedar River near Waterloo (furthest upstream location). The DNR-AIS Program has contracted with Dr. Michael Weber at Iowa State University to study the distribution and population dynamics of Asian carp in Mississippi River tributaries in Iowa. DNR-AIS staff are also taking samples from Asian carp collected in Iowa for USGS staff to use for DNA and microchemistry analysis. Natural reproduction has been documented for grass carp, but not bighead or silver carp, in Iowa.

The DNR-AIS Program has contracted with Dr. Eric Merten at Wartburg College to study the distribution and densities of rusty crayfish in northeast Iowa. There have been incidental reports of rusty crayfish in northeast Iowa but no previous research to determine their range and population status.

Iowa has had versions of an AIS and AIS Rule (e.g., Code of Iowa, Iowa Administrative Rule) since 1996. The most recent version made it illegal to possess, introduce, import, purchase, sell, barter, propagate, or transport prohibited aquatic invasive species. The Iowa DNR lists prohibited aquatic invasive species by rule. In 2013, the Iowa Legislature changed the AIS Law to also prohibit the transport of aquatic vegetation, require water to be drained from all equipment before leaving a waterbody, and require drain plugs to be removed or open during transport. A proposed change to allow the Iowa DNR to prohibit bait collection from infested waterbodies was not included. Language was included stating that water-related equipment could be subject to inspection by Iowa DNR staff who could prohibit a person from entering waters of the state if the person refuses to allow an inspection or refuses to remove and dispose of AIS, aquatic plants, and water. Changes proposed for 2014 include adding diploid grass carp to the list of prohibited aquatic invasive species and amending the approved list of aquaculture species to only include triploid grass carp.

Kansas – Submitted by: Jessica Howell, Kansas Department of Wildlife, Parks, and Tourism

1.0 ANS Program Summary

The Kansas Aquatic Nuisance Species Management Plan was approved by the ANSTF in May 2005. The goals of the plan are to prevent new introductions of ANS to Kansas, prevent dispersal of established populations of ANS, eradicate or control to minimize the adverse ecological, economic, social, and public health effects of ANS, educate all aquatic users of ANS risks, and to support research ANS 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.

2.0 Major Accomplishments and On-going Works

(EO) (5A1) Implemented new outreach campaign that was developed last year that includes a zebra mussel watch card, a new informational brochure about ANS that explains "Clean, Drain, Dry," and several items to hand out with either a "Don't Dump Bait" logo or the Stop Aquatic Hitchhikers logo.

(DM) (3A1) 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 and Coffey County-Wolf Creek Lake and Chase County State Fishing Lake in 2012. Monitoring and outreach activities are underway including monthly veliger enumeration.

(DM) (3A1) Continue to monitor (Portland samplers and/or plankton tows) all department waters for the presence of zebra mussels.

(DM) (3A1) Monitor Kansas bait shops for prohibited species, unsecure water sources, and diseases.

(R) (6A1) Research the effectiveness of current fish transportation treatments in killing zebra mussel veligers.

(R) (6A1) Research which early detection method (eDNA, plankton tows, Portland samplers, etc.) is most effective in a suspected zebra mussel water.

(CM) (1A2) Support Statewide ANS Coordinator salary.

(CM)(5A3) Assist several communities with ANS infested water sources by outlining necessary management techniques.

(EO) (5A1) Continue to disseminate ANS information using a variety of media outlets, including newspaper articles, internet ads, radio ads, gas tank toppers, zebra mussel infested propeller cases on display at various offices, etc.

(EO) (5A1) Conduct 100th Meridian boater surveys at 32 KS waters at least 4 times this summer.

(EO) (5A1) An ANS media kit was produced to inform the public and press about the new outreach campaign. The media kit includes two radio ads, a video PSA, a bait fish regulation article, and a logo. Continue to include large section in fishing regulations dedicated to ANS.

(EO) (5A2) Maintain Clean Drain Dry message on all agency fisheries section vehicle tailgates and fish hauling boxes.

(EO) (5A2) Distributed ANS literature and displays to Kansas marinas, all KDWPT offices, state parks, and nature centers.

(EO) (5A2) Distributed ANS literature to Kansas boaters and bait shops.

(EO) Updated informational signage at infested waters with more visually captivating signs while maintaining awareness signs at all KS lakes.

¹ DM = Detection & Monitoring; CM = Control & Management; EO = Education & Outreach; R = Research

Louisiana – Submitted by: Rob Bourgeois, Louisiana Department of Wildlife and Fisheries

Inland Species

Apple snails continue to be reported in more of the canals in the New Orleans area and the upper Barataria Basin, indicating either range expansion or improved reporting by the public. The new infestations appear to be in the cement lined drainage canals in the areas west of the previously known areas. Also a few members of the public have started removing eggs and killing adults when observed on their property. A swamp tour operator has reported apple snails in the Jean Lafitte National Park. He has started discussing these and other exotics as part of his tour. None of the new reports have been surprising, so we expect this to be normal expansion and not man assisted.

We have had numerous snakehead reports that have yielded videos and pictures of many bowfin. We have not confirmed a snakehead in LA as of yet.

Aquatic Plants

Areas previously controlled by the USACE have once again been a priority, especially large areas of the Terrebonne marsh and Henderson Lake. Private applicators have treated a total of 9,150 acres in these areas to date in 2013. The majority of this effort was directed toward water hyacinth control but some giant salvinia was treated as well.

Giant salvinia has been a major focus of aquatic plant control efforts in Louisiana since 2006. The combination of herbicide applications, water level fluctuation, and biological control is being used to keep giant salvinia coverage at a level that allows for recreational use of the waterbodies. With the passing of successive mild winters, giant salvinia coverage continues to grow at rates that are difficult to control. Because of this, Lake Bistineau and Saline Lake are scheduled to be drawn down beginning in July 2013. This will allow us to strand and kill thousands of acres of giant salvinia. The water control structures will be closed on November 30, 2013 and January 31, 2014 for Bistineau and Saline, respectively.

Giant salvinia weevil stocking efforts have continued in 2013. Early spring weevil samples indicated that overwintering took place in Lake Bistineau, Caddo Lake, Saline Lake, and Turkey Creek Lake, all located in north Louisiana. This is encouraging considering winter survival had been extremely poor in these waterbodies in the past and made weevil control a non-factor. Giant salvinia infestations in southern Louisiana appear to be decreasing in coverage. Three years following initial weevil releases in these areas, giant salvinia weevil stocking efforts have proven to be very successful and their effect on the plant's reproduction and growth rate are evident.

The Louisiana Department of Wildlife and Fisheries (LDWF) treated 36,490 acres of nuisance aquatic weeds in 2013 as of June 24. These herbicide applications were completed by both LDWF spray crews and private spray contractors. Statewide spring aquatic weed estimates for our major nuisance species during the past five years are found in Table 1.

Table 1. LDWF Spring Weed Estimates for 2009-2013.

Plant	1 st Year	Acres of Infestation				
		2009	2010	2011	2012	2013
Water Hyacinth	1884	134,413	86,530	80,750	90,197	75,730
Hydrilla	1975	98,352	75,810	66,925	47,481	33,975
Common Salvinia	1980	188,815	102,082	49,735	30,247	24,180
Giant Salvinia	1998	13,691	2,706	25,076	32,237	34,775

Research

LDWF will use our 2013 ANS grant to survey selected public urban ponds in Baton Rouge and Lafayette for the presence of ANS. Plants, invertebrates and fish will be sampled to assess the presence of ANS in these high use public waters bodies. Outreach efforts will be targeted at those lakes with high ANS populations.

LDWF received a USFWS grant to extend and expand our 2012 ANS grant for drift net sampling for Asian Carp. We are currently sampling ichthyoplankton to determine the status, relative abundance and distribution of Asian carp. This baseline information from 2012 will be used to model distributions, understand recruitment and metapopulation dynamics, assess impacts, and inform management of these aquatic invasive species. The 2013-2014 grant will be used to expand sample site coverage and help develop a better understanding of these species.

Outreach

A large effort is being made for better public outreach/education.

- LDWF Extension section:
 - 2 School Fairs

- 4 Seafood Promotion Gatherings
 - 3 Public Festivals
 - 4 Exhibitions
 - 5 Fishing Tournaments
 - 1 Presentation
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- Facebook: LDWF is taking full advantage of the social media network, posting brochures, links, and articles about ANS species/concerns. To date, information on Tiger Shrimp, Rio Grande Cichlids & Northern Snakehead have been shared.

Marine Species

Since October there have been no reports of Tiger shrimp from the public. LDWF biologists continue to look for them in our Fishery Independent sampling. There have been no additional reports of marine species since October.

LDWF staff continues to monitor the spread of lionfish in the Gulf of Mexico. Besides reports from the public by divers and spear fisherman, we have 2 other studies which have reported incidental sightings of lionfish. Our research dive program has been monitoring fish assemblages at oil rigs. This program has documented the numbers and distribution of lionfish at these rig sites. The data presented below represent a small data set. The research dive program is developing a lionfish specific study to be implemented as early as summer 2013. LDWF biologists are currently reviewing videos and other data collected on our rig surveys. They will record other exotics as part of their data review.

Lionfish / Sport Fish Cohabitation

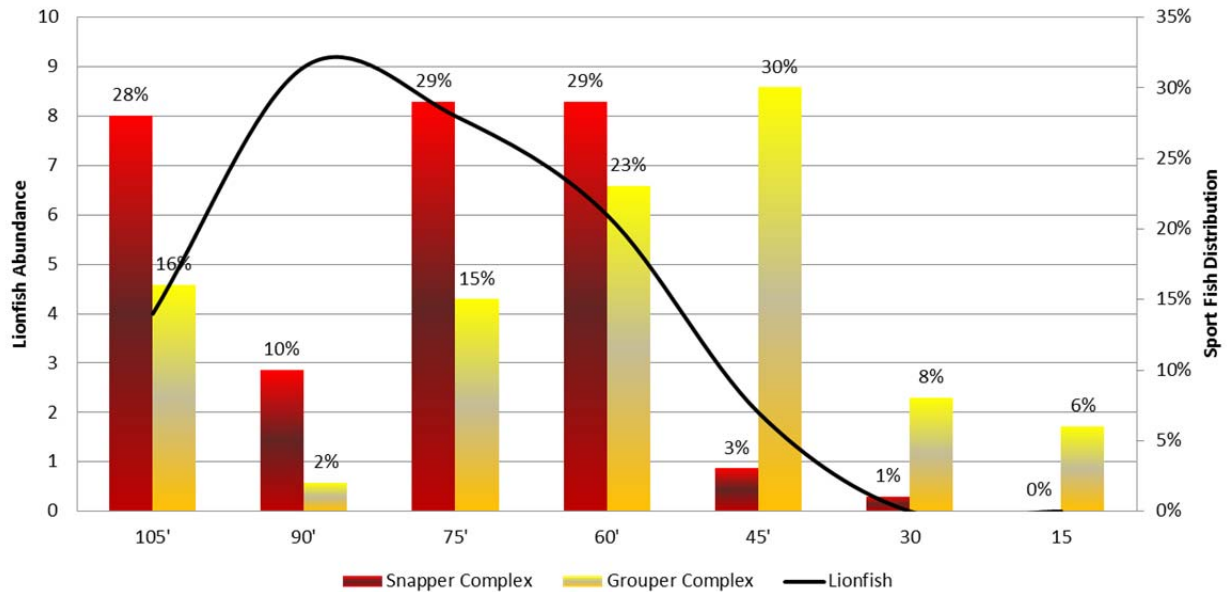


Figure 1. Data on lionfish in and around Louisiana waters has, to date, been incidental to other ongoing studies. Despite the non-targeted status, Louisiana Department of Wildlife and Fisheries (LDWF) scientific divers observed lionfish on 5 of 6 dive sites (the one exception being a structure in 58 feet of water). Observations include adults and juveniles, which could indicate an established, self-sustaining population

The second incidental reporting of lionfish has come from a ROV survey on 24 of our Artificial Reef sites. These ROV surveys were not biological in nature but rather to look at the structure of the reef sites. On these surveys, lionfish were recording on the videos at 5 out of the 24 sites. The videos are being viewed to add water depth and other physical parameters to the data set.

Minnesota – Submitted by Ann Pierce, Minnesota Department of Natural Resources

Minnesota Invasive Species Program:

- Minnesota Department of Natural Resources (DNR) has a comprehensive program with over 160 permanent and seasonal staff dedicated to AIS and an annual budget of almost \$8 million.
- The next (2014-2015) biennium, replaces one-time AIS funding with \$3.75 million in General Fund and Invasive Species Account to provide a more stable funding base for AIS programs.
- Minnesota has strong and comprehensive laws to prevent and curb the spread of AIS. Boaters are required to do the following:
 - 1) Remove visible aquatic plants and zebra mussels from boats and trailers before leaving any water;
 - 2) Remove drain plugs from boats, livewells and other water-related equipment before leaving any water; and
 - 3) Drain portable bait containers when leaving any water.
- In 2012 and 2013 Minnesota's AIS Program grew substantially. The MN DNR deployed 23 hot water/high pressure decontamination units and 150 watercraft inspectors at public water accesses around the state. These staff can require inspections of watercraft and deny launch for failure to comply with AIS laws. A number of the public access sites have been upgraded to include AIS best management practices and AIS enforcement efforts have also increased.
- However, even with the increased funding and staffing in recent years the task of protecting Minnesota's 11,842 lakes over 10 acres in size and 69,200 miles of natural rivers and streams is daunting. In Minnesota, we estimate that about 5 million boat launches occur each year from public and private accesses.
- Recognizing this need, the MN DNR is expanding partnerships with local and Tribal governments through delegation agreements. These delegation agreements allow local governments such as counties, cities, watershed districts, park districts, etc. or Tribal governments to have watercraft inspectors with the same authority that state inspectors have. In 2012, the DNR trained 216 inspectors that were employed by 18 local and Tribal governments. In 2013, the number of delegation agreements has increased and these partnerships are helping to expand our capacity to implement prevention measures.
- Minnesota works with other states on AIS prevention measures. In 2012, Minnesota DNR provided cost share (\$261,000) to Iowa DNR for construction of an electric fish barrier at Lower Gar Lake. This barrier will help prevent Asian carp from moving into the Iowa Great Lakes and protect streams and lakes in southwest Minnesota.

New Initiatives:

- MN DNR Conservation Officers have stepped up enforcement of AIS laws and have been looking at innovative ways to improve compliance. This spring, three zebra mussel detecting dogs were trained and ready to deploy by ice out. The MN DNR will use these dogs to assist with inspections, especially at road-side check sites. On average the dogs can detect the presence of zebra mussels 15X faster than a human can. The zebra mussel detecting dog program is based on a similar program in California. The program shows great promise and applicability for the MN DNR.
- MN DNR has a newly formed AIS advisory committee made up of citizens and folks from other agencies to recommend program improvements.

Asian Carp:

- We are working to prevent the spread of Asian carp:
 - 1) Making improvements to the Coon Rapids Dam and working with the Army Corps of Engineers to install an electric barrier at Lock and Dam 1 in the Twin Cities metro area to prevent spread into the Upper Mississippi River and protect our central and northern lakes region.
 - 2) In addition to the cost share project with Iowa, we are looking at barrier sites in several areas of southwestern Minnesota to prevent spread from Iowa.
 - 3) We are also working to improve habitat on the Mississippi River to benefit native fish species, so they are more resilient to invasion of Asian carp.
 - 4) In 2012, Minnesota DNR provided cost share (\$261,000) to Iowa DNR for construction of an electric fish barrier at Lower Gar Lake. This barrier will help prevent Asian carp from moving into the Iowa Great Lakes and protect streams and lakes in southwest Minnesota.

Mississippi – Submitted by Dennis Riecke, Mississippi Department of Wildlife, Fisheries & Parks

- The Mississippi State Management Plan for Aquatic Invasive Species received final edits and updates. After a 30-day public comment period, the plan was approved by the Governor's Office and by the ANS Task Force during their Spring meeting/webinar on June 17, 2013. Mississippi started working on the plan in 2003.
- As, AFS Resolutions Chairman I worked to guide consideration and voting on a *Resolution On The Federal Funding For Programs To Prevent, Control, And Manage Aquatic Invasive Species*. The SDAFS membership approved this resolution in January 2012 and voted to send it to the Parent Society for consideration. The SDAFS resolution is posted online at http://new.sdafs.org/wp-content/uploads/2012/10/ANS_Federal_Funding_wSDAFS-heading_2011_rev.pdf.
- The AFS Resolutions Committee sent a revised version of the SDAFS resolution to the AFS Governing Board in July 2012. The AFS Governing Board approved sending the resolution to the AFS membership for a vote in August 2012. The resolution was adopted by the AFS members on March 6, 2013. It will be published in the August 2013 issue of *Fisheries*. The Parent Society (national) AFS resolution is posted online at: http://fisheries.org/docs/policy_statements/policy_36f.pdf
- The resolution urges the Congress of the United States to appropriate \$61,000,000 on an annual basis to fund the Regional Panels (\$6,000,000), the State/Interstate Plans (\$53,000,000), the Quagga-Zebra Mussel Action Plan, (\$1,000,000) and to fund the USGS Aquatic Nuisance Species Database (\$1,000,000) for prevention, control and management of nonnative aquatic invasive species.
- A SDAFS *Resolution on Federal Funding for Implementation of the Management and Control plan for Bighead, Black, Grass, and Silver Carps in the United States* was adopted on http://sdafs.org/wp-content/uploads/2013/03/Federal_Funding_for_Asian-Carp-Control-2013_adopted_w_header.pdf. This resolution is currently being considered by the AFS Parent Society Resolutions Committee. The resolution urges the Congress of the United States to appropriate \$286,000,000 over 20 years to fully implement all the strategies and recommendations contained in the *Management and Control Plan for Bighead, Black, Grass, and Silver Carps in the United States* as approved by the Aquatic Nuisance Species Task Force in 2007.
- MDWFP formed an aquatic plant treatment team to deal with invasive aquatic plants that are impacting boating access sites. Team consists of one full time and two contract employees. Federal Boating Access funds and a grant from the Pearl River Valley Water Supply District (the state agency that operates Ross Barnett Reservoir) will provide annual funding of \$379,000.
- Participated in the Southeast Aquatic Resources Plan aquatic invasive species calls led by Jeffrey Herod.
- Responded to a January 2013 MICRA (Mississippi Interstate Cooperative Resource Association) survey regarding grass carp regulations, production, triploid certification, shipping and stocking.

- Attended the Gulf and South Atlantic Panel on Aquatic Invasive Species Meeting in Atlanta, GA in April 2013.
- Completed the ANS regulation survey being conducted by the Illinois-Indiana SeaGrant.
- Completed the ANS regulation survey being conducted by the Association of Fish and Wildlife Agencies.
- Completed the North American Invasive Species Network survey on the costs of controlling, monitoring and managing ANS.

New Detections

- Giant Salvinia was found at a boat ramp site on Ross Barnett Reservoir in late October 2012. Most of it was manually removed and the rest was chemically treated upon detection.
- Silver Carp reported in Pickwick Lake (northeast MS) in January 2013.
- Blue crab documented from wetland near Tupelo, MS in March 2013.

Ongoing Activities

- Continued posting “Stop Aquatic Hitchhiker” signs at new boat ramp sites.
- Reprinted and continued distributing “Stop Aquatic Hitchhiker” cards along with all boat registrations or renewals that are mailed out.
- Continued printing The Stop Aquatic Hitchhiker logo and bullet list in the annual regulation guides --- *Mississippi Outdoor Digest* and *Guide to Mississippi Saltwater Fishing*.
- Links to the Mississippi River Basin Panel on Aquatic Nuisance Species and the Gulf and South Atlantic Panel on Aquatic Invasive Species, Stop Aquatic Hitchhiker and Habitattitude websites are on the department website.
- The Mississippi Museum of Natural Science has a permanent exhibit on exotic species.
- The Mississippi Department of Marine Resources has been monitoring and treating Giant Salvinia (*Salvinia molesta*) and other invasive plants in Mississippi’s coastal river systems.

Future Activities

- Implement the activities specified in the Mississippi State Management Plan for Aquatic Invasive Species.
- Compose freshwater fishing bait regulations to specify what bait can be legally, sold, possessed, transported and used in Mississippi.
- Seek approval of legislation required to initiate licensing of retail bait outlets selling live freshwater fishing bait.

- Adopt a list of approved, restricted and prohibited species under the authority specified in MS Code 49-7-80 and as specified in the *Mississippi State Management Plan for Aquatic Invasive Species* Amend list of approved, restricted and prohibited species as specified in the public notice that regulates aquaculture activities in Mississippi.
- Establish an EDRR monitoring program comprised of state and federal personnel who sample aquatic species in Mississippi public waterways on a routine basis.
- Update and expand information for Mississippi contacts listed in the Expert Taxonomic Database.

Mississippi – Submitted by Mike Pursley, Mississippi Department of Marine Resources

Early Detection / Rapid Response Activities

- 37 field surveys were conducted for early detection of AIS totaling 530 miles. Herbicide spray activities were conducted on small infestations of giant salvinia, invasive phragmites, common salvinia and Brazilian elodea in accordance with State and Federal laws. Manual removal of water hyacinth on Gulfport Lake and Bernard Bayou continues as plants are found.
- Common salvinia weevils were obtained from LSU Ag. Center and released with permission from MDWFP at Stennis Space Center and Robinson Bayou in an effort further manage existing common salvinia infestations.
- One citizen report of water hyacinth in a Biloxi drainage ditch was received and investigated. Report proved to be accurate. Management efforts are underway. Several false reports of lionfish were received and investigated.

Coordination and Outreach Activities

- No reports of Asian tiger shrimp were received during this period. Tissue samples from seven previously captured shrimp were sent to the NOAA-NMFS Tiger Shrimp Tissue Repository as part of a nationwide effort to better understand this species.
- The Mississippi State Management Plan for Aquatic Invasive Species received final edits and updates. After a 30-day public comment period, the plan was approved by the Governor's Office and by the ANS task at their annual meeting.
- Participated in the Mississippi Cooperative Weed Management Area (CWMA) meeting, SARP ANS conference calls and working groups, the Mississippi Bight Lionfish Response Unit (MBLRU), a regional cogon grass summit meeting and an AIS Incident Command System training workshop.
- Gave a presentation entitled "*Invasive Species – A Threat to Mississippi's Artificial Reef Habitats*" at a public artificial reef science seminar.
- Produced a lionfish awareness poster for distribution at dive shops and boat ramp kiosks.
- Submitted multi-state, multi-agency aquatic AIS project pre-proposal to MASGC to try to secure funding to better document aquatic invasions and their effects.
- Approx. 1,000 "Stop Aquatic Hitchhikers" brochures were provided to the MS CWMA for distribution at the Gulf Coast Garden and Patio Show and other public venues.
- Authored article for publication in an upcoming issue MDMR's quarterly newsletter *Coastal Markers* entitled "*Aquatic Invasive Species Program Begins Eighth Year of Protecting Coastal Waterways*". Authored article about Asian tiger shrimp that was published in "*Shrimping the Sound*", the annual publication of DMR's Shrimp and Crab Bureau.
- Responded to media and FOIA requests regarding department's "drone program".

- Presented a talk at the Gulf and South Atlantic Panel on Aquatic Invasive Species meeting in April 2013 in Atlanta, GA on the use of drones to detect invasive plants in coastal marshes of Mississippi.

Missouri – Submitted by Tim Banek, Missouri Department of Conservation

1. Consulted with USGS to design treatments to eradicate New Zealand mudsnail (NZMS) from the USGS's Columbia Environmental Research Center. Several planning meetings were conducted during January 2013. The plan included several different treatments that were selected for treating unique areas of the facility. Example, the wet lab was treated differently than the lagoon and the ponds. The eradication plan was executed between February 4th and early May 2013. No live NZMS have been observed in the facility since the eradication effort concluded. Monitoring in the facility and Clear Creek will continue.
2. Aired a 30-second "Stop Aquatic Hitchhikers" paid radio spot for a week prior to Memorial Day. The ad aired on 61 stations of the Missouri Net.
3. Due to opposition from the Missouri Aquaculture Association, Farm Bureau and a few crayfish producers Missouri's regulation prohibiting the sale of crayfish for live bait that became effective in March 2012 was amended to allow one species of crayfish (*Orconectes virilis*) to be sold for bait. The regulation was adopted to protect endemic crayfish populations from being invaded by crayfish species not native to a particular watershed. Unfortunately, the virile crayfish is not native in area of the state that contains the rare endemic crayfish species.
4. Work on the White River Crawfish study is ongoing with the contribution from the MRBP being used to analyze concentrations of chemical treatments in treated water.
5. Coast Guard Auxiliary conducted 100th Meridian surveys and inspections on Pomme de Terre, Harry S Truman, Smithville and Stockton reservoirs during fiscal year 2013. An agreement providing \$15/survey up to 100 surveys on each lake was used to reimburse flotilla members for their expenses. The forms will be copied and provided to David Brittan for entry into the 100th Meridian database. The intent is to continue educating Missouri boaters about aquatic invasive species and teach them how to prevent spreading them.
6. Signed a contract for implementing an AIS containment program in the Kansas City Area. The contractor will work with lake associations, media, marine dealers and the public to reduce the risk of infesting additional lakes with zebra mussels and other AIS in the Kansas City area.
7. Plans have been made to implement a plan to address the recent hydrilla discovery in southwest Missouri.
8. Zebra mussels were discovered in one new Missouri location in 2013, Barber Lake. Barber Lake is located on Schell-Osage Conservation Area and in the Osage River watershed downstream from Melvern Reservoir, a Kansas reservoir known to contain zebra mussels. It is expected that zebra mussels will be discovered in the 55,000 acre Harry S Truman Reservoir before long as well. Barber Lake is the 6th reservoir with zebra mussels.
9. Wrote letters of support for the Conservation Federation of Missouri to Missouri's legislative delegates to support Asian carp work outside of the Great Lakes and for support of H.R bill 996.

Montana – Submitted by Eileen Ryce, Montana Fish, Wildlife & Parks

2013 Legislature

HB586 revised the AIS Act establishing a statewide management area, adding the Department of Transportation to the active departments, defined equipment that could be inspected in addition to vessels, and provided \$1.58 million to FWP and Natural Resources & Conservation for the prevention and control of AIS in Montana. The Governor's Office also released their Blueprint for AIS in Montana, which included consolidating the authority for all AIS to FWP, including aquatic plants to FWP from Agriculture.

Watercraft inspections

FWP has established 20 inspection crew: 8 highway stations on the border, 4 internal highway inspection stations, and 8 crews that operate at boat ramps on popular waterbodies. As of July 2 watercraft inspection crews have inspected a total of 11,967 boats—10,358 from in-state and 1609 from out-of-state. Inspectors have intercepted 11 Dreissenid mussel-infested boats. Other AIS that have been found include cases of Eurasian watermilfoil (EWM), illegal bait, illegal live fish, and numerous cases of non-EWM aquatic vegetation and standing water. All in all, inspectors have found a total of **194** AIS violations so far.

FWP Early Detection and Monitoring

Waterbodies surveyed in Montana are prioritized based on: previous years' work, angler/boater pressure, water quality data, risk of introduction, etc. AIS early detection and monitoring includes: invertebrate and macrophyte sampling, and plankton sampling for veligers (samples processed at the FWP lab in Helena). Priority locations for sampling include the 10 state, 3 federal, and 12 private hatcheries. Sampling is ongoing for 2013, and will also include lake surveys for aquatic plants.

Dreissenid Veliger Lab

Montana's lab is processing the majority of plankton samples for the Missouri River Basin. In 2012 this included almost 800 samples processed for 7 states. Similar numbers are expected for 2013. More than 200 samples have already been received.

Bait

Montana FWP is currently reviewing bait practices and regulations. There is a concern that current bait practices may increase the risk of importation of invasive species and/or pathogens into the State or increase the spread within the state. In addition to potentially impacting native minnow populations.

Nebraska – Submitted by Steve Schainost, Nebraska Game and Parks Commission

Nebraska Game and Parks and the University of Nebraska (UNL) have been working cooperatively through the new state Invasive Species Council (formed as a result of a 2007 conference on invasive species sponsored by UNL). An Invasive Species Project Coordinator was hired (Karie Decker) and an Invasive Species Council (Council) has formed which conducts regular meetings. Ms. Decker spearheaded an effort to write the Nebraska Aquatic Invasive Species Management Plan, which was completed and approved by the ANS Task Force. Ms. Decker has also created an Invasive Species Project website, which can be viewed at <http://snr.unl.edu/invasives/>. In 2013, Ms. Decker took another position with the Nebraska Game and Parks and a new Project Coordinator, Rodney Verhoeff, took over.

Legislative bills have been submitted in several sessions to give official recognition to the Council and fund the Project. The Council received Legislative recognition in the 2012 session while a funding bill did not pass. A new funding bill was submitted in the 2013 Legislative session (LB63). The bill proposed that 50% of the tax on the sale of motor boats and trailers as well as rental fees be diverted from the Department of Roads to the Invasive Species Project. This bill never got out of committee. The hiring of a full-time Aquatic Invasive Species Coordinator will have to wait until a stable funding source is enacted.

A project to eradicate zebra mussels from Offutt Base Lake through the application of copper sulfate was completed in September of 2008 and April of 2009. Monitoring results were promising but lives were found in 2010. Curiously enough, monitoring for veligers and adults in 2012 did not find either.

A second zebra mussel population was discovered in Zorinsky Reservoir (a Corps flood control/recreation lake in western Omaha) in the fall of 2010. A work group consisting of Federal, State, and Local government was formed to attempt an eradication at Zorinsky Lake before they became established. The lake was lowered as far as possible (~20 feet) over the winter in the hope that desiccation/freezing might do the job. An intensive veliger monitoring program was conducted in 2011 and 2012. To date, no veligers have been found.

Numerous reservoirs across Nebraska are being monitored for zebra mussel veligers. To date, none have been found.

The Invasive Species Project and the University of Nebraska have begun studying the Japanese/Chinese Mystery Snail. These have been present in Nebraska for over 30 years but nothing was known about them. Apparently, literature searches have found virtually nothing. As of this writing, I have no further information on what they may have found.

Ohio – Submitted by John Navarro, Ohio Department of Natural Resources and Eugene Braig, Ohio State University Extension School of Environment and Natural Resources

- Ohio continues to monitor for Asian carp in the Ohio River and Lake Erie using traditional collection methods and eDNA. Both bighead and silver carp have been observed in the Ohio portion of the Ohio River and although both silver and bighead carp eDNA has been detected in Western Lake Erie, no live fish have been detected in recent surveys using traditional sampling gear.
- Ohio is working closely with the USACE to develop closure options at the four Ohio GLMRIS connections. The two medium risk connections at the Ohio-Erie Canal and Little Killbuck Creek are a priority and are currently being evaluated. The USACE will evaluate the Ohio-Erie Canal closure options and NRCS will take the lead on the Little Killbuck Creek connection.
- Ohio's revised AIS State Management Plan was approved by the ANSTF in March of 2013. The plan addresses changes to the quickly changing AIS landscape. The plan will include a Rapid Response Plan (RRP).
- Working with the USFWS and the Ohio River Fisheries Management Team on an Ohio River Asian Carp Action Plan.
- Developing a statewide Asian Carp Management Plan to address silver, bighead and grass carp threats.
- Partnered with Buckeye Hills RC&D and Appalachian Ohio Weed Control Partnership for signage and postcards to educate boaters along the Ohio River to help limit the spread of Hydrilla inland.
- Outreach to tournament organizers and the general public continues via several Great Lakes Restoration Initiative and NOAA grants as well as developing collaborations with ODNR Division of Watercraft to support SAH!, Habitattitude, and other programming.
- In October 2012, along with several interstate collaborators, Ohio State University Extension launched the Great Lakes Early Detection Network, a smart-phone app for Android and iPhone operating systems. Image libraries and brief encyclopedia-like entries aid users in identification of invasive species. Users can upload photos of sightings with location automatically attached by on-board GPS. Verification of general-public reports by professionals augments invasive species range maps in the Center for Invasive Species and Ecosystem Health database maintained in Georgia.

Tennessee – Submitted by David Roddy, Tennessee Wildlife Resources Agency

- Purchased and posted 18"x24" Invasive Species Alert signs for Asian carp and zebra mussels on reservoirs that are affective.
- ANS presentation at Tennessee Tech University aquaculture class.
- ANS booth at family night at the Tennessee Aquarium.
- Creel clerks distributed "Don't Dump Bait" stickers to anglers.
- Started sampling Asian carp on the TN and Cumberland rivers.
- Asian carp replicas purchased for display.

Texas – Submitted by Luci Cook-Hildreth, Texas Parks and Wildlife Department

- Giant salvinia on Caddo Lake (our only “natural” lake) has surged from 1,370 acres in 2012 to approximately 7,000 this year. Additionally, giant salvinia is on the rise in Toledo Bend Reservoir on the border with Louisiana. It is estimated that there are approximately 4,000 acres on the Texas side alone
- Giant salvinia and water hyacinth have both become extremely problematic in the wetlands of southeast Texas near Wallisville. We are planning on entering into contracts with the Corps of Engineers (Wallisville Project) and DOI to help fund control measures
- The number of confirmed zebra mussel lakes has doubled from two in 2012 (Lake Texoma and Lake Ray Roberts) to four in 2013 (Lake Texoma, Lake Lewisville, Lake Bridgeport, and Lake Ray Roberts). We have entered into a contract with Dr. Robert McMahon at UT-Arlington to monitor 23 water bodies this year. The spring/summer monitoring is under way.
- Although hydrilla has surged from 25 acres in March 2010 to almost 600 acres as of February 2013, the stocking of 9,000 triploid grass carp this spring (bringing to total stocked during 2011-2013 to over 40,000 fish) seems to have finally begun to get a handle on the problem. The last survey conducted in June 2013 indicate a reduction of over 200 acres.
- Elephant ear control measures on the South Llano River have been very successful over the last year. Whereas large stands were present before treatment efforts began, plants are now very difficult to find.
- Texas Parks and Wildlife continues to work with the Nueces River Authority to manage the *Arundo donax* issues on the Nueces, Sabinal, Frio, and Dry Frio Rivers in that area. To date, over 130 acres of *Arundo* have been chemically treated on the Sabinal and Nueces Rivers and over half a million sprouting *Arundo* nodes have been pulled from the stream beds.
- The ANS program at Texas Parks and Wildlife has two new additions. One of our new biologists will be stationed at the Austin Headquarters office and the other will be working with spray crews out in the East Texas area.

West Virginia – Submitted by Frank Jernejcic, West Virginia Department of Natural Resources

In cooperation with Kentucky and Ohio we are conducting Fishing the Edge program with contracted fishers to gain information on Asian Carp abundance in the WV reach of the Ohio River. We are also working with the other Ohio River states and the US FWS to track movements of AC in the Ohio River.

Chris O'Bara has visited congressional staff in Washington, DC on two occasions to discuss AC issues. WVDNR staff has also been working with state legislators to draft new ANS rules for WV.

In 2011, we initiated a policy and procedures for aquatic nuisance species and fish disease control to protect the aquatic species inhabiting West Virginia's public waters. These procedures are required for all West Virginia Division of Natural Resources (WVDNR) staff, as well as any governmental agency, individual, or private company operating in West Virginia public waters under the authority of a WVDNR issued scientific collecting permit (WV State Code 20-2-50) or as a WVDNR cooperator. Our major concerns at this time are for preventing VHS entering the state, and reducing the spread of zebra mussels. Fish health monitoring of selected impoundments and rivers has detected largemouth bass virus but not VHS.

Wisconsin – Submitted by Bob Wakeman, Wisconsin Department of Natural Resources

Since our last meeting in October of 2012, Wisconsin has completed its review of the Great Lakes Mississippi River Interbasin Study, Other Pathways, reports prepared by the US ACOE. Eight sites were identified in Wisconsin as having the potential to allow for AIS to transfer between basins. Other federal activity includes submitting an application for additional Great Lakes Restoration Initiative funding through the USFWS. Additional GLRI funds have been awarded to Wisconsin to conduct early detection and rapid response activities, education and outreach, and the implementation of the state's Wetland Invasive Species Strategic Plan. Wisconsin is working to finalize a statewide decontamination guidance document, fish passage guidance and implement its rapid response framework. Wisconsin has partnered with Minnesota and Michigan to produce a tri-state public service announcement which will highlight iconic fishing and boating locations in the three states and identify the need to prevent the spread of AIS to protect our states waterways. Wisconsin has provided free ice packs to anglers to remind them to drain water from their boats, live wells and coolers before leaving a launch (Wisconsin's law). These ice packs have been well received by our angling public.



Wyoming – Submitted by: Beth Bear, Wyoming Game and Fish Department

Legislation

- Several species were added to the prohibited list of AIS which now includes: zebra and quagga mussels, New Zealand mudsnail, Asian clam, rusty crayfish, brook stickleback, Asian carp (bighead, silver, black), snakeheads, hydrilla, Eurasian watermilfoil, and curly pondweed.
- From March through November, any watercraft entering Wyoming must have an AIS inspection before it can launch in the state. This requirement also applies to water hauling trucks, fire fighting equipment, and any conveyance capable of transporting AIS.
- At all times of year if a watercraft has been in a zebra/quagga mussel water within 30 days, it must be inspected before launching in Wyoming.

Outreach

- Outreach in 2013 has focused on educating boater about new inspection requirements. Boaters have been notified through direct mailing, newspaper ads and articles, radio ads, website updates, and regulation booklets.
- New outreach for the 2013 year is a “Don’t Let it Loose” aquarium/pet brochure which will be sent to all 4th graders in Wyoming in the fall.
- Since 2010, over 49,000 different boaters have been contacting during inspections and have received an AIS educational message.

Watercraft Inspections

- In 2012, 38,705 inspections were conducted at 35 waters, eight regional offices, and two Port of Entries. A total of 251 high risk inspections were conducted and 104 resulted in decontamination. Four of those watercraft contained dead invasive mussels.
- In 2013 watercraft inspections shifted to 15 locations at Port of Entries and other border locations. From mid-April through May 31st, a total of 5,911 watercraft inspections have been conducted. Of these, 181 have resulted in a high risk inspection and 57 watercraft have been decontaminated. To date, 10 watercraft have been intercepted with attached mussels; on all but one watercraft the mussels were dead.

Monitoring

- 63 waters were surveyed for aquatic invasive species during 2012.
 - All samples were negative for larval zebra/quagga mussels.
 - Curly pondweed was found in three locations.
 - Asian clam were confirmed in one location.
 - New Zealand mudsnails were confirmed in three locations.

At-Large Member – Submitted by: Peter Sorensen, University of Minnesota

The Minnesota Aquatic Invasive Species Research Center (MAISRC) is now operational and is based at the University of Minnesota. A study of Asian carp eDNA in the Mississippi River was completed by MAISRC in collaboration with the U.S.G.S.(UMESC, LaCrosse WI) and the MN DNR. Protocols followed the QUAPP except that all presumptive positives were sequenced (this was not attempted in an earlier 2011 study which yielded many positives). This study yielded no definitive evidence for either silver carp or bighead carp eDNA in Minnesota waters while failing to measure bighead carp eDNA below Lock&Dam#19 where this species is known to be abundant (Amberg et al. 2102. USGS Open File report 2013-1080). Based on these findings, the MN DNR has chosen not to use eDNA to guide its monitoring program for Asian and include additional netting. This effort, not that of commercial fisheries, have yielded any captures of bigheaded carp have in Minnesota waters in 2013 although a single adult grass carp was recently captured in Sartell. The MN Asian Carp Action plan is presently being revised (process is just starting and includes multiple groups including NGOs). The possibility of building an Asian carp deterrent system in Lock&Dam #2 using electrical 'sweeping technology' that is being developed by Smith Root Inc. is being considered by the state. Meanwhile, the MAISRC has applied for funding to examine lock and dam function to see if it could be modified (ex. enhancing flows by changing the order of gate opening) to reduce Asian carp movement upstream. MAISRC is also presently reviewing applicants for a new zebra mussel researcher at the University of Minnesota.

Louisiana Sea Grant – Submitted by Julie Anderson, Louisiana Sea Grant

Louisiana Sea Grant (LSG) has been involved with outreach and public awareness of AIS. First, LSG promoted public awareness of AIS at numerous educational events. These included Louisiana Earth Day (Audubon Zoo and Baton Rouge) and Ocean Commotion (over 2,000 2nd-8th graders; and 400+ teachers and chaperones). Recipes for AIS and educational articles have been featured in the monthly fisheries letter *Lagniappe* (2000+ subscriptions). An online reporting website with outreach poster was created for Tiger Prawns (http://www.seagrantfish.lsu.edu/pdfs/Wanted_TigerPrawn.pdf).

LSG updated their marine education resource pages including the invasive species topic page: <http://www.lamer.lsu.edu/invasivespecies/index.html>

National Park Service – Submitted by John Anfinson, Mississippi National River and Recreation Area, National Park Service

Political Actions

Minnesota Senator Amy Klobuchar attached an amendment to the Water Resource Development Act (WRDA) that would close the Upper St. Anthony Falls Lock, in Minneapolis, based on the level of tonnage using the lock over the last five-year period. The House has not yet acted on Senator Klobuchar’s amendment for its version of the WRDA bill.

Concurrently, Minnesota Representative Betty McCollum introduced legislation in the House that puts the Fish and Wildlife Service in charge of fighting the spread of Asian carp in the Ohio and Upper Mississippi River basins, with the help of the Army Corps of Engineers and the National Park Service. The Senate approved a companion amendment to McCollum’s bill, attaching it to WRDA.

Minnesota Governor Mark Dayton hosted the Midwest Governors Association at the end of June and made Asian carp a focus of the gathering.

Public Outreach Efforts

A coalition of about 20 non-governmental organizations - the Stop Carp Coalition - has become the major entity pushing to stop the spread of Asian carp (see stopcarp.org). The NGO Coalition is working with the Department of Natural Resources (DNR) and the National Park Service on an Outreach Campaign to educate people about Asian carp and the actions they can take to prevent or slow the spread of these fish. A key piece of this campaign is getting boaters to stop or minimize their use of three locks in the Twin Cities. The National Wildlife Federation is undertaking a public survey to learn what issues people are concerned about and what kinds of measures they might support to stop Asian carp. This information will help focus the outreach campaign.

Other Efforts

Action Plan Update: A small committee has been formed to update the Asian Carp Action Plan for Minnesota. The draft will be shared with the NGO Coalition, government organizations and University of Minnesota and others working on the issue here.

Locating Asian Carp: The DNR conducted commercial fishing surveys last spring in Pool 2, between Hastings and St. Paul, but has not captured any Asian carp.

Fish Behavior Study: The DNR has also tagged several species of fish to learn about their migration habits, especially their use of the locks and dams in the Twin Cities.

The U.S. Geological Survey and National Park Service (St. Croix National Scenic Riverway and Mississippi National River and Recreation Area) are beginning a “food web” study of the lower St. Croix and Pool 2 of the Mississippi River to better understand the existing food web before Asian carp disrupt it.

The Minnesota Aquatic Invasive Species Research Center, University of Minnesota: The Center is up and running and is studying the best methods to attract Asian carp to specific locations and measures to deter their migration. Peter Sorensen will be attending Mississippi River Basin Aquatic Nuisance Species Regional panel meeting and will provide an update on his work.

U.S. Forest Service – Submitted by: Nick Schmal, U.S. Forest Service

1) Riverworks Discovery Travelling Museum Exhibit web link and final report attachment.

<http://www.riverworksdiscovery.org/traveling.cfm>

The *RiverWorks Discovery: A Journey of Exploration* traveling exhibit has begun its 3 to 5 year national tour which raises awareness of the importance of river commerce, culture, and conservation of our nation's rivers, with the subjects of Invasive Species being an essential message of the exhibit.



The 2,000 square foot exhibit opened February 21, 2013 at Shreveport, Louisiana at Sci-Port: Louisiana's Science Center, where it will be on display until May 2013. The following is a list of sites that have confirmed interest in hosting RiverWorks Discovery for a minimum of 3 month periods each.

- Mud Island-Mississippi River Museum – Memphis, Tennessee (June 2013 to Oct 2013)
- Science Museum of Minnesota – St. Paul, Minnesota
- Audubon Aquarium of the Americas – New Orleans, Louisiana
- COSI (Center of Science and Industry) – Columbus, Ohio
- Tennessee State Museum – Nashville, Tennessee
- Point Pleasant River Museum – Point Pleasant, West Virginia
- St. Louis site still to be determined

In addition to the sites above, the Museum & Aquarium will explore other opportunities for display in cities such as Houston, Chicago, and Pittsburgh. The audience for all of these sites is at a minimum 500,000 people, but could be much higher depending upon the actual timing of the exhibit in each city.

The invasive species messaging is an important conservation message and blends well with messaging on the importance of rivers, the health of rivers, and what people can do help keep our rivers clean. This invasive species messaging was created in collaboration with the Mississippi River Basin Panel on Aquatic Nuisance Species, the U.S. Forest Service Eastern Region, the Iowa Department of Natural Resources, and Wildlife Forever. As you will see in the attached photos, the messaging of invasive species is presented graphically, via flip panels, on video, and through interactive activities and 3 dimensional objects. It includes the following topics.

- Zebra Mussels and the negative affect they have on native species, boating, and industry.
- Asian Carp and the negative affect they are having on sport fish population. Looping video footage from “Silent Invaders” TV series is included on the graphic panel.
- Invasive Plants including Hydrilla, Purples Loosestrife, Water milfoil and Didymo (rock snot) and the negative affect they are having on fish and wildlife habitats as well as recreation.
- “Clean, Drain, Dry” and the proactive steps that can be taken to stop the spread of these invasives. Clean, Drain, Dry campaign brochures are also available to all guests for additional Stop Aquatic Hitchhiker invasive species education providing a “take away” element they can bring home with them to further spread the message.

CONSERVATION

"Alien" Invaders

Species that are not native to an ecosystem can be harmful.



Foreign invaders are introduced by accident and by intent, and they often have no natural limitations on their growth in their new ecosystems. They quickly adapt and crowd out native species. This reduces the biodiversity, which is the variety of life and habitats, within an ecosystem. Across the country, non-native intruders have had major negative effects on our river systems and a \$3.8 billion impact on the U.S. economy.

Yikes! Flying Fish!



Asian carp are non-native intruders that eat up to 40% of their weight in plankton each day. They have been taking over rivers and streams, replacing sport fish populations, getting in the way of boats, and even injuring people on boats.

Four species of Asian carp were imported to the U.S. in the 1950s and 1970s. The grass carp, black carp, nilghead carp, and silver carp were imported to be able to improve water quality, and eventually to help keep other unwanted species under control.

Who Invited the Zebras?

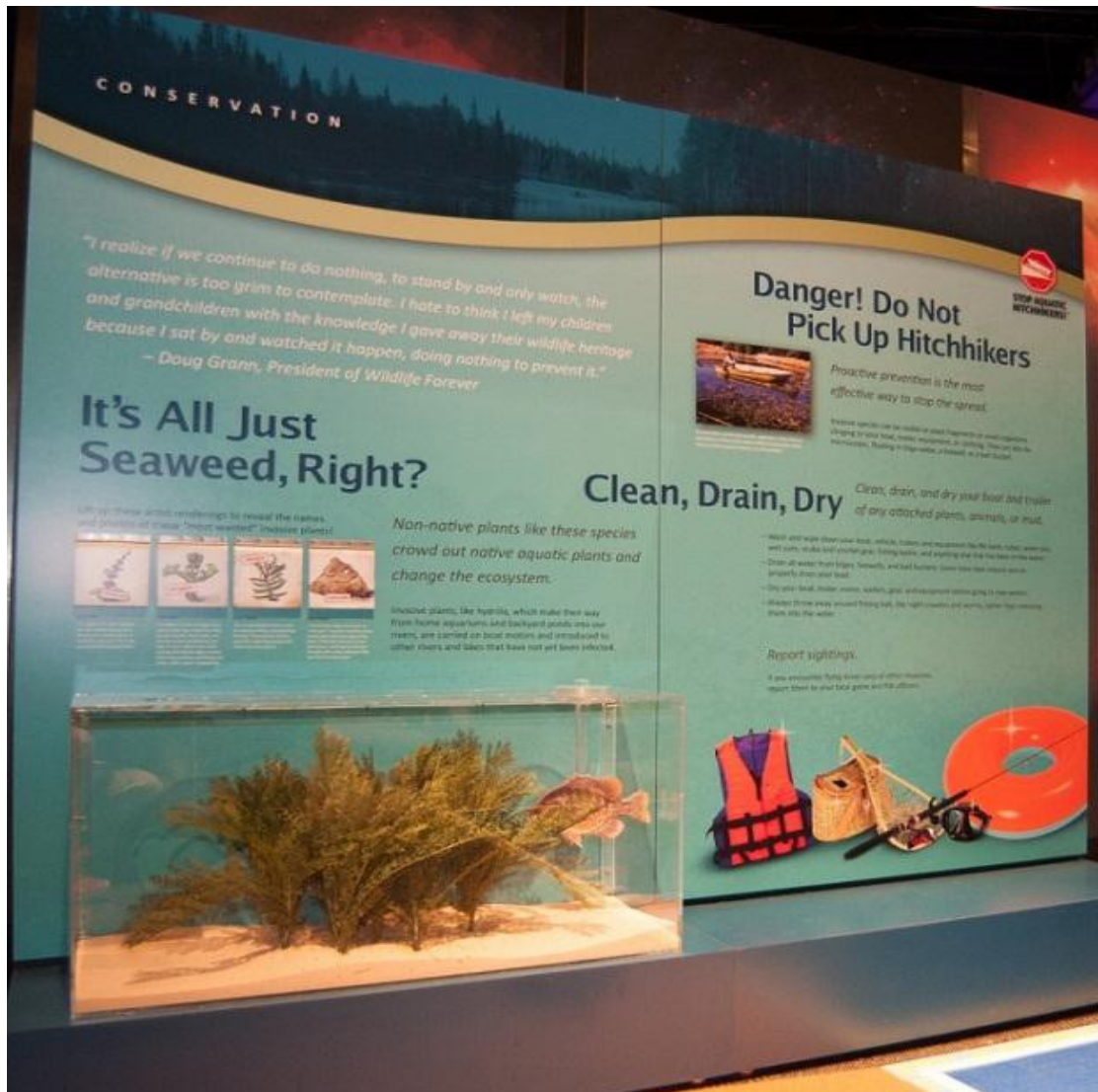


Zebra mussels are small mussels that attach to solid surfaces

Zebra mussels use small fibers to attach to surfaces and usually remain attached even when they die. These black and white striped mussels, about one-inch long, were brought to the United States in the ballast tanks of transatlantic ships from Western Europe and Russia. They then spread into the Great Lakes and into the Illinois, Mississippi, and Ohio Rivers as well as other lakes and streams.

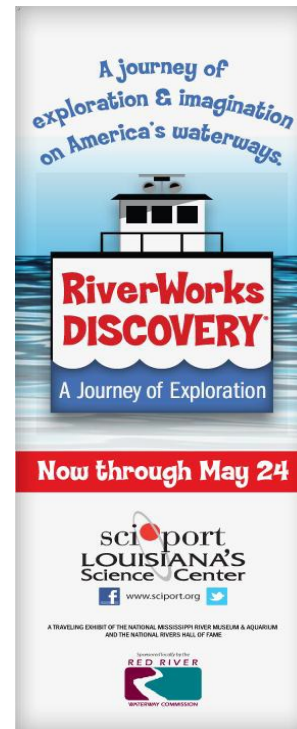
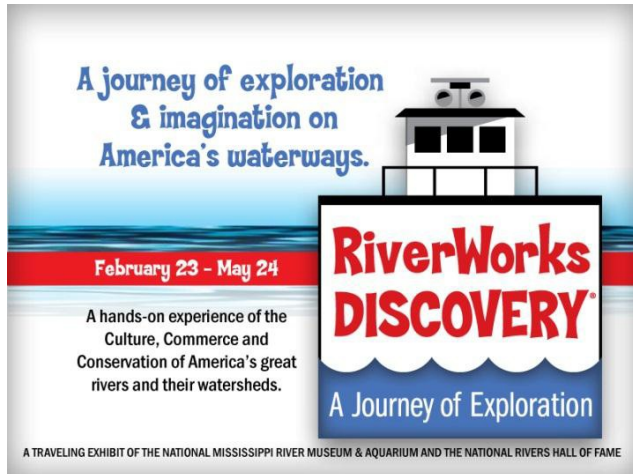
So what's the problem?





Each hosting site has a responsibility for promoting this exhibit to their local community and this will vary greatly by the size of the organization. However, minimally by contract, each hosting site is required to allocate \$5,000 for the opening event, educational workshops, and marketing the exhibit.

The first site, Sci-Port: Louisiana's Science Center, is a large science center and has promoted the exhibit via press releases, their weekly NBC affiliate segment, their website, local magazines and newspapers, a banner on the outside of their building and within their IMAX and Planetarium. They have also obtained funding from a local sponsor which is paying for 7,000 4th grade students from Title I schools to visit the exhibit and science center.



The financial support and content support for the invasive species messaging is also recognized within the exhibit as shown in the following photos, with both panels being found at or near the entrance of the exhibit.



The *RiverWorks Discovery: A Journey of Exploration* traveling exhibit is off to a great start and we are excited this messaging will reach more than 500,000 people over the life of the exhibit.

- 2) US Forest Service Eastern Region 2012 Invasive Species report:

http://www.fs.fed.us/wildflowers/invasives/documents/FY2012_NNIS_Reports/NNIS_USDAFS_EasternRegionAccomplishments2012.pdf

- 3) Intermountain Region Best Management Practices for Fire Activities and Suppression for AIS

PREVENTING SPREAD OF AQUATIC INVASIVE ORGANISMS COMMON TO THE INTERMOUNTAIN REGION

OPERATIONAL GUIDELINES FOR 2013 FIRE ACTIVITIES

Why? Firefighter and public safety is still the first priority, but aquatic invasive plants and animals pose a risk to both the environment and to firefighting equipment (some species can clog valves and pumps if equipment is not completely drained or treated). Avoidance and sanitation can prevent the spread of these organisms and help to assure that firefighting equipment remains operational.

These guidelines were developed for USFS fire managers to help them avoid the spread of aquatic invasive species. These are the *operational* guidelines; see Technical Guidelines for more information and references.

All documents are available on the Region 4 Aquatic Invasive Species website:

http://www.fs.usda.gov/detail/r4/landmanagement/resourcemanagement/?cid=fsbdev3_016101

PREVENTION

- Map the distribution of aquatic invasive organisms in watersheds where the operation will take place. An ArcMap project file and a geodatabase of species layers are available for download at: http://www.fs.usda.gov/detail/r4/landmanagement/resourcemanagement/?cid=fsbdev3_016100. You can never be certain that invasives are NOT present, but at least you will know ahead of time where they ARE known to be present.
- Avoid drafting from waterbodies with known infestations of aquatic invasive species
- Avoid entering waterbodies or contacting mud and aquatic plants.
- Avoid transferring water between drainages or between unconnected waters within the same drainage. Do not dump water directly from one stream or lake into another.

- Avoid sucking organic and bottom material into water intakes when drafting from streams or ponds. Use screens. If pumpkins can be filled with municipal water, draft from pumpkins instead of streams or ponds.
- Avoid obtaining water from multiple sources during a single operational period unless drafting/dipping equipment is sanitized between sources (see 'Sanitizing Equipment', below).
- If contamination of gear with raw water or mud/plants is unavoidable, see 'Sanitizing Equipment', below.

SANITIZING EQUIPMENT

Any equipment that comes into contact with raw water should be sanitized, which means destroying any unwanted organisms. Sanitizing may be accomplished using several methods (see *Methods of Control Table, Appendix 1*), and may not require chemical disinfectants. Surfaces to be sanitized may include tanks, portable pumps, hoses, and helicopter buckets. Cleaning and sanitizing equipment will be necessary after use as well as before use if equipment has been obtained from a source where sanitizing history is unknown.

- Establish sanitation areas where there is no potential for runoff into waterways, storm drains, or sensitive habitats.

SANITIZING WITHOUT CHEMICAL DISINFECTANTS (specifically, quat or bleach)

Chemical disinfectants, though effective, can be hazardous to use and dispose of. Non-chemical methods are effective in most situations, and are recommended for:

- External surfaces of all equipment that comes in contact with raw water
- Aircraft
- Tanks with accessible internal surfaces and minimal baffling (such as in CL215 or 415 scoper aircraft)
- Thorough drying alone is an easy and effective sanitizing method, but required drying times vary considerably with the species (see *Methods of Control Table, Appendix 1*) and may not be practical for a quick turnaround. Drying may be doable, however, after the incident, especially in hot weather.
- Remove all visible plant parts and mud from external surfaces of gear and equipment. Power wash all accessible surfaces with clean water (ideally, hot water $\geq 140^{\circ}\text{F}$ for 5 to 10 seconds). Power washing will greatly reduce the likelihood that any target aquatic invasives are present, and chemical treatment of external surfaces is not recommended.
- Alternating used (possibly contaminated) helicopter buckets with spare (clean) helicopter buckets can save time and increase efficiency.

Internal tanks of water tenders, engines, scoopers and other aircraft, and other equipment:

- Internal tanks that are accessible (with little or no baffling) are effectively sanitized with hot ($\geq 140^{\circ}\text{F}$) water from a hot washer or hotsie. Allow spray to contact surface for 5 to 10 seconds. This method is recommended for scooper aircraft (e.g., CL215, 415) tanks.
- Aircraft internal tanks that are NOT accessible (e.g. baffles) have surfaces difficult to reach with hot water. Use of corrosive chemical disinfectants is not recommended in aircraft. Although rinsing equipment with clean (cool) water is not as effective as using chemical disinfectants or hot ($\geq 140^{\circ}\text{F}$) water, plain water can flush unattached organisms (e.g. larvae, pathogens) from the system. Fill tanks, pumps, or hoses with clean, preferably hot, water and flush. Tank baffles may make flushing difficult, and while rinsing with water may not eliminate all organisms, it is better than not flushing.

SANITIZING WITH CHEMICAL DISINFECTANTS

Chemical disinfectants are options only for ground-based internal tanks and equipment which are not possible to flush with $\geq 140^{\circ}$ water.

Using chemical disinfectants is a reliable method to kill and eliminate most aquatic invasive species. Quaternary ammonium compounds, common cleaning agents used in homes and hospitals, are safe for MOST gear and equipment when used at recommended concentrations and rinsed. Chlorine products are not emphasized for use in these guidelines because of their corrosiveness to fabrics, plastics, rubber, and metal.

Cautions for using chemicals:

- In 2012, quaternary ammonium compounds did not meet corrosion requirements for aluminum and should not be used in aircraft (e.g fixed-tank helicopters or air tankers). However, they are safe for ground-based tanker equipment.
- Disposal of large volumes of quat is problematic. See **Disposal**

To sanitize with quat disinfectant:

- Set up a portable disinfection tank (pumpkin) using a quat cleaning solution. Two brands are readily available (see below for suppliers): *Sanicare Quat128*[®] (identical to HDQ[®]) or *Green Solutions High Dilution 256*[®] (**which replaces the discontinued Sparquat 256**[®]). Costs and effectiveness are comparable; all are labeled for use as fungicides/virucides.

**Recipes for cleaning solutions using either *Quat128*[®] , *Sparquat 256*[®] ,
or *Green Solutions High Dilution 256*[®]**

Volume of tap water	Volume of <i>Quat128</i>[®] (4.6%)	Volume of <i>Sparquat 256</i>[®] (3%)	Volume of <i>Green Solutions High Dilution 256</i>[®] (1.8%)
100 mL water	4.6 mL	3.0 mL	1.8 ml
1 gallon water	6.4 liquid oz	4.1 liquid oz	2.5 liquid oz
1 gallon water	12.7 tbsp	8.2 tbsp	5 tbsp
1 gallon water	0.8 cup	0.5 cup	0.3 cup
100 gallons water	5 gallons	3.2 gallons	1.9 gallons
1000 gallons water	50 gallons	32.2 gallons	19.4 gallons

- For engines and tenders, empty the tank, then circulate the cleaning solution for 10 minutes. Float portable pumps in the disinfection tank and pump cleaning solution through for 10 minutes, then rinse with water. Pump cleaning solution through hoses, then rinse with water. Discharge cleaning solution back into the disinfection tank for re-use.
- For directions for **TESTING DISINFECTANT CONCENTRATIONS**, see **Appendix 2**

DISPOSAL

- Used cleaning solution may be disposed over open land or on roadways where there is no potential for runoff into waterways, storm drains, or sensitive habitats. Quat chemicals are quickly bound to soil and are immobilized, but if soil with bound quat enters water, some of the quat can be released and become toxic.
- Do not dump treated water into any stream or lake, or on areas where it can migrate into any water body, storm drain, or sensitive habitat. Do not dispose of large quantities of diluted quat chemicals in municipal sewer systems without consulting the facility.
- Use caution when disposing the used cleaning solution and follow all federal, state, and local regulations.

SAFETY

- Use protective, unlined rubber gloves and splash goggles or face shield when handling the cleaning solution and take extra precautions when handling undiluted chemicals. Have eye wash and clean water available on-site to treat accidental exposure.
- Consult the product label and Material Safety Data Sheet for additional information.

STORAGE AND SHELF-LIFE

Sparquat 256[®], *Green Solutions High Dilution 256*[®], and *Sanicare Quat 128*[®] can be stored at least 2 years in unopened containers without losing their effectiveness. They should be stored in a cool, dry place, out of direct sunlight. Temperatures can range from 32 to 110 F.

Once the quat solution is made up, it can be used repeatedly for up to a week unless heavily muddied or diluted. Solutions kept in sealed containers, free of contamination by foreign materials, remain more stable and can be effectively used for longer timeframes (Ron Cook, Spartan Chemical Co., personal communication).

SUPPLY SOURCES

The recommended chemicals are available through GSA (<https://www.gsaadvantage.gov>) and also through local janitorial chemical suppliers.

Green Solution High Dilution 256[®] (replaces *Sparquat 256*[®])

Spartan Chemical Company

GSA (NSN No. 3508-1) = \$68 per case (4 gal) = \$17 per gal

EPA registration #1839-169-5741. Additional info at <http://www.spartanchemical.com>

Sanicare Quat 128[®] (Buckeye)

Buckeye International Inc.

EPA registration # 47371-130-559 Additional info at <http://www.buckeyeinternational.com>

Bell Janitorial Supply 801-394-5559 <http://www.bellclean.com> = \$20 per gal

HDQ[®] (identical to *Sanicare Quat 128*[®])

Spartan Chemical Company

GSA (No. 101-1202) = \$52 per case (4 gal) = \$13 per gal

EPA registration # **10324-155-5741** Additional info at <http://www.spartanchemical.com>

Super HDQ[®] (twice as concentrated as *Sanicare Quat 128*[®])

Spartan Chemical Company

GSA (No. 1204-04) = \$64 per case (4 gal) = \$16 per gal

EPA registration # **10324-141-5741** Additional info at <http://www.spartanchemical.com>

pHydrion[®] *Quat Test 1000 Papers (0-1000 ppm Hi-Range)*

(These papers are NOT available from GSA. GSA only has the papers for low concentrations)

- Microessential Labs (<https://www.microessentiallab.com/ProductInfo/W20-QUATT-QUATCK-SRD.aspx>) \$47 for 10 kits. Each 'kit' provides 150 tests.
- Grainger, Inc. (<http://www.grainger.com/Grainger/items/3UDF5?Pid=search>) \$51 for 10 kits. Each 'kit' provides 150 tests.

AQUATIC INVASIVE SPECIES OF CONCERN IN INTERMOUNTAIN REGION AND METHODS OF CONTROL						
APPENDIX 1	Whirling Disease	New Zealand Mudsnails	Chytrid Fungus	Zebra/Quagga Mussels	Didymo	Eurasian Watermilfoil
Sources	C.Wilson; E. Wagner UDWR Hedrick et al. 2008 Wagner 2002	M. Vinson, USU Schisler et al. 2008 Hosea&Findlayson 2005 Richards et al 2004	K. Hatch, BYU (Johnson et al 03)	J. Herod, FWS Sprecher&Getsinger 00 Cope et al.2003 Britton&Dingman 11 Comeau et al 11 Choi et al 13	Spaulding and Elwell 2007 Kilroy et al. 2006 Matthews 2007	Smith&Barko 1990 Madsen&Smith 1997
Wash and remove organics (e.g. mud)	Yes	Yes	Yes	Yes, pressure wash flushes veligers	Yes	Yes
Temperature	90°C (195° F);10 min	46°C (120°F); 5 min -3°C (27°F); 1 hr	60°C (140°F);5 min	≥140°F water for 5 seconds	60°C (140°F); 1 min	NA
Drying	Be dry for 24 h, in sunlight best	Be dry for 48 hr, in sunlight best	Be dry for 3 hr, in sunlight best	5 days for veligers in internal tank residual water	Be dry for 48 h, in sunlight best	NA
Bleach (e.g. Clorox®) 6% sodium hypochlorite (NaClO)	For 10 min: 1% bleach solution (500 ppm NaClO) ▪Liquid oz Clorox per gallon water = 1.1 ▪Tbsp liquid Clorox per gallon water =2.2 ▪Gallons Clorox per 100 gallons water = 0.9	Not effective	For 30 sec: 20% bleach solution (>1% NaClO) ▪Liquid oz Clorox per gallon water = 22 ▪Gallons Clorox per 100 gallons water =17 OR For 10 min: 7% bleach solution (0.4% NaClO) ▪Liquid oz Clorox per gallon water = 9 ▪Gallons Clorox per 100 gallons water = 7	Gear rinsed with 0.5% bleach solution (250 ppm NaClO) ▪Liquid oz Clorox per gallon water = 0.6 ▪Tbsp liquid Clorox per gallon water =1.1 ▪Gallons Clorox per 100 gallons water =0.5	For 1 min: 2% bleach solution (800 ppm NaClO) ▪Liquid oz Clorox per gallon water =1.8 ▪Tbsp liquid Clorox per gallon water =3.6 ▪Gallons Clorox per 100 gallons water = 1.4	NA

AQUATIC INVASIVE SPECIES OF CONCERN IN INTERMOUNTAIN REGION AND METHODS OF CONTROL

	Whirling Disease	New Zealand Mudsnails	Chytrid Fungus	Zebra/Quagga Mussels	Didymo	Eurasian Water milfoil
<p>Quaternary ammonium compounds</p> <p>(e.g. alkyl dimethyl benzylammonium chloride [ADBAC]; dicyl dimethyl ammonium chloride [DDAC])</p>	<p>For 10-15 minutes: (1500ppm quat compounds)</p> <p>4.4% <i>Sanicare Quat128</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz Quat128 per gallon water = 6.1 ▪Gallons Quat 128 per 100 gallons water = 4.8 <p style="text-align: center;">OR</p> <p>3 % <i>Sparquat 256</i>[®] solution (12.5% quat compounds)</p> <ul style="list-style-type: none"> ▪Liquid oz Sparquat256 per gallon water =4.1oz/gal ▪Gallons Sparquat per 100 gallons water = 3.2 <p style="text-align: center;">OR</p> <p>1.7% <i>Green Solutions High Dilution 256</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz <i>Green Solutions256</i> per gallon water =2.4oz/gal ▪Gallons <i>GreenSolutions</i> per 100 gallons water = 1.9 	<p>For 10 min:</p> <p>4.6% <i>Sanicare Quat128</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz Quat128 per gallon water = 6.4 ▪Gallons Quat 128 per 100 gallons water = 5 <p style="text-align: center;">OR</p> <p>3.1 % <i>Sparquat256</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz Sparquat256 per gallon water = 4.3 ▪Gallons Sparquat256 per 100 gallons water = 3.4 <p style="text-align: center;">OR</p> <p>1.8% <i>Green Solutions High Dilution 256</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz <i>Green Solutions</i> per gallon water =2.5oz/gal ▪Gallons <i>GreenSolutions</i> per 100 gallons water = 1.9 	<p>For 30 sec:</p> <p>.015% <i>Sanicare Quat128</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz Quat128 per gallon water =0.02 ▪ml Quat128 per gallon water= 0.6 ▪tsp Quat128 per gallon water= 1/8 <p style="text-align: center;">OR</p> <p>.04% <i>Sparquat256</i>[®]</p> <ul style="list-style-type: none"> ▪Liquid oz <i>Sparquat256</i> per gallon water =0.06 ▪ml <i>Sparquat256</i> per gallon water =1.8 ▪tsp <i>Sparquat256</i> per gallon water= 0.36 <p style="text-align: center;">OR</p> <p>0.01% <i>Green Solutions High Dilution 256</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz <i>GreenSolutions</i> per gallon water =0.03 ▪ml <i>GreenSolutions</i> per gallon water =1.0 ▪tsp <i>GreenSolutions</i> per gallon water= 0.2 	<p>For 10 min:</p> <p>3 % <i>Sparquat 256</i>[®] solution (12.5% quat compounds)</p> <ul style="list-style-type: none"> ▪Liquid oz <i>Sparquat256</i> per gallon water =4.1oz/gal ▪Gallons Sparquat per 100 gallons water = 3.2 <p style="text-align: center;">OR</p> <p>1.7% <i>Green Solutions High Dilution 256</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz <i>Green Solutions256</i> per gallon water =2.4oz/gal ▪Gallons <i>GreenSolutions</i> per 100 gallons water = 1.9 	<p>For 1 min:</p> <p>2% <i>Sanicare Quat128</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz <i>Quat128</i> per gallon water= 2.4 ▪Gallons Quat 128 per 100 gallons water = 1.9 <p style="text-align: center;">OR</p> <p>1.2% <i>Sparquat256</i> solution</p> <ul style="list-style-type: none"> ▪Liquid oz <i>Sparquat256</i> per gallon water =1.7oz/gal ▪Gallons <i>Sparquat256</i> per 100 gallons water = 1.3 <p style="text-align: center;">OR</p> <p>0.7% <i>Green Solutions High Dilution 256</i>[®] solution</p> <ul style="list-style-type: none"> ▪Liquid oz <i>GreenSolutions</i> per gallon water =1.0 ▪ml <i>GreenSolutions</i> per gallon water =29 ▪tsp <i>GreenSolutions</i> per gallon water= 6 	<p>NA</p>

RECOMMENDATIONS

Whirling disease	NZ Mudsnails	Chytrid Fungus	Zebra/Quagga Mussels	Didymo	Eurasian Watermilfoil
<p>The principle vector for spread of whirling disease is contaminated fish parts and not typically through fire activities. Avoiding and removal of organics (the spores reside in mud), power washing, and flushing will greatly reduce or eliminate spores on external gear surfaces. However, wet internal tanks and hoses can be decontaminated with a quaternary ammonium compound, such as <i>Green Solutions</i>²⁵⁶. While 2.4 oz per gal is required for whirling disease, a negligibly higher concentration (2.5oz/gal) would also knock out NZ mudsnails and quagga mussel larvae.</p>	<p>NZ mudsnails are resistant to treatment, and may insert themselves in small crevices and resist flushing. However, unless vehicles are driving through streams, or buckets scrape bottom sediments, they are unlikely to get snails on external surfaces. Avoiding organics, power washing, flushing, and drying gear in the sun for 48 hours (if possible) will reduce risk. Wet internal tanks and hoses can be decontaminated with a quaternary ammonium compound, such as <i>Green Solutions</i>²⁵⁶ at a concentration of 2.5oz/gal. This concentration will also kill whirling disease spores, chytrid fungus, and quagga mussel larvae.</p>	<p>Avoiding organics, power washing, flushing, and letting equipment dry in the sun for 3 hours (if possible) will reduce risk of transfer on external surfaces. However, wet internal tanks and hoses can be decontaminated with a quaternary ammonium compound, such as <i>Green Solutions</i>²⁵⁶. While only 1/5 tsp per gal is required for chytrid, a higher concentration (2.5oz/gal) would also knock out whirling disease, quagga mussel larvae, and /or NZ mudsnails.</p>	<p>Fire activities are unlikely to come into contact with adult mussels. However, it is possible that water used for activities or surfaces of gear may be contaminated with the microscopic larvae, which can survive in residual water inside tanks for 5 days. Pressure washing and strong flushing of tanks and hoses should be sufficient to injure and remove these organisms. Wet internal tanks and hoses, if originating from an unknown location and inaccessible to hot water, can be decontaminated with 3% Sparquat or 0.01% <i>Green Solutions</i> solutions to eliminate larvae.</p>	<p>Didymo is a native diatom that erupts into high densities in special habitats, such as tailwaters below dams. Avoiding contaminated water sources and organics, power washing, and flushing would likely reduce risk of transfer on fire equipment to acceptable levels. For waders, routine protocols for chytrid or whirling disease may apply for this species. Though little research is available for effectiveness of quat compounds, it is probable that the concentrations provided for <i>Quat128</i>, <i>Sparquat</i>, and <i>Green Solutions</i>²⁵⁶ will work. See Matthews 2007 for supportive documentation.</p>	<p>Watermilfoil propagates from broken stems. Avoiding organics, power washing, and flushing to ensure the removal of all plant parts will prevent transport on external and internal gear.</p>

Appendix 2 TESTING DISINFECTANT CONCENTRATIONS

When a large volume of quat solution (as in a pumpkin) has been used repeatedly and possibly diluted with excess water or mud, the solution can lose its effectiveness.

To determine if the solution is at the correct strength, use “Quat Chek 1000” Test Papers, which function like Litmus paper (see below for suppliers). The cleaning solution needs to be diluted before it can be tested with these papers. To do this:

For Sanicare Quat 128[®], Sparquat 256[®], or Green Solutions High Dilution 256[®]:

- Add ¼ cup (2 oz) of the quat solution to a gallon of water. Mix. Test the diluted solution with “Quat Chek 1000” Test Paper.

Match up the color of the paper with the ppm’s on the color chart. For optimal disinfection, the diluted **Sparquat 256[®]** or **Green Solutions High Dilution 256[®]** solution should have a concentration of between **400 and 600 ppm**; the diluted **Sanicare Quat 128[®]** solution should have a concentration between **600 ppm and 800 ppm**.



4) US Forest Service Research and Development Fact Sheet



USDA Forest Service
 Research & Development
Science Serving Society

Research to Address Aquatic Invasive Species Issues

Forest Service Research & Development informs efforts to prevent and detect aquatic invasive species and restore ecosystem from the damage of aquatic invasive species.

BACKGROUND

Aquatic invasive species have significantly impacted ecosystems in the United States, resulting in millions of dollars in damages and control efforts. Forest Service scientists help provide a small, but high-quality body of research to inform efforts to prevent and detect aquatic invasive species and to restore affected ecosystems. The Forest Service advances in knowledge include: the role population size and genetic diversity play in invasive species' success; new sampling and monitoring techniques for aquatic invasive species; the effects of environmental characteristics (e.g., hydrologic regime, water temperature, land management, natural disturbance, and climate) on an invasive species' success; effects of invasive species on basal food sources and food web dynamics; and recovery of native riparian communities after invasive species control.



PHOTO CREDIT: MARY EDWARDS

Brook trout is a non-native species in the Western United States.

HIGHLIGHTED RESEARCH

Understanding Limited Invasion Success: Molecular evaluations of successful invaders are common, but studies of introduced species that have had limited invasion or died out completely are rare. Forest Service scientists explored an introduced population of speckled dace in California that has remained relatively restricted. They observed a population response consistent with a bottleneck, which has rarely been documented, thus the introduction of speckled dace represents an important model system for future investigation.

Developing a New Approach to Large-Scale Fish Monitoring: Forest Service scientists have developed an alternative to laboriously counting fish that is both easier to use and provides more comprehensive results. By linking newly developed occupancy modeling approaches with genetic patterns to stream conditions and habitat, this new method is being utilized by a diverse set of federal, state, and local partners to determine which stream characteristics are the best predictors of robust and genetically intact fish populations.

Building Decision Support Tools: Models developed to understand how aquatic ecosystems will respond to forecasted climate changes and encroaching invasive plants are being incorporated into a new decision support tool. The tool will aid in the conservation or restoration of Pacific Island watersheds, streams, and water resources vital for humans, animals, and plants.

Strengthening the Reliability of eDNA Testing: In the western United States, brook trout are an invasive fish species that has been widely stocked into small streams, where it commonly displaces native species such as bull trout. eDNA-based sampling would be extremely valuable for detecting early invasions of brook trout and to detect rare bull trout when brook trout are common. Scientists developed TaqMan MGB assays for detection of these two closely related species, and provided measures of assay reliability and sensitivity for detection of brook trout—both in detecting isolated brook trout DNA and when applied to mixtures of DNA from multiple species.

Informing Future Invasive Removal Efforts: Control efficacy studies typically measure the amount of the invasive Japanese knotweed, but not the plant community resulting after treatment. Forest Service scientists examined the recovery of the native plant community and found that removal of knotweed opened up riparian habitat for colonization by both native and exotic plants. Their work highlights the need monitor and control secondary invasive species soon after knotweed removal to help weed control groups prioritize areas for knotweed control or native re-plantings.

MORE INFORMATION:

For more information contact Katherine Smith, Fisheries Research National Program Lead, klsmith@fs.fed.us