

APPENDIX 1

FEDERAL AGENCY AND COOPERATIVE STATE/NON-GOVERNMENTAL PARTNER ACTIVITIES TO CONTROL SPREAD OF ASIAN CARP IN THE UPPER MISSISSIPPI AND OHIO RIVER BASINS

1 State Agencies: Upper Mississippi River Basin

1.1 Illinois

Field Monitoring: Seasonal Intensive Monitoring (SIM) in CAWS – This project represents a modification to response actions and Planned Intensive Surveillance in the CAWS and target areas that have been previously monitored through response actions. These efforts have the benefit of advanced planning and are in locations where the repeated detection of eDNA in previous years indicates the potential presence of Asian carp in the waterway.

- Completed 2-two week SIM events with conventional gears in the CAWS upstream of the electric dispersal barrier in 2014.
- Estimated 2,205 person-hours were spent to complete 87.1 hours of electrofishing, set 77.7 km (48.3 mi) of trammel/gill net and 2.2 km (1.4 mi) of commercial seine in 2014.
- Across all locations and gears in 2014, sampled 27,678 fish representing 57 species and 2 hybrid groups.
- Captured a Spotted Gar in the North Branch of the Chicago River in 2014. It is the first-ever recorded in the CAWS, and the western-most occurrence associated with Lake Michigan.
- Since 2010, an estimated 19,388 person-hours were spent to complete 769.4 hours of electrofishing, set 524 km (325.6 mi) of gill/trammel net and 3.7 km (2.3 mi) of commercial seine.
- A total of 278,991 fish representing 72 species and 6 hybrid groups were sampled, including 1,106 Banded Killifish (state threatened species) from 2010-2014.
- Examined 87,779 YOY Gizzard Shad since 2010 and found no Asian carp.
- Since 2010, 17 non-native species have been captured accounting for 14 percent of the total fish caught and 22 percent of the total species.
- No Bighead Carp or Silver Carp have been captured or observed since 2010 (1 Bighead Carp captured in Lake Calumet in 2010).
- Recommend continued use of SIM in the CAWS upstream of the electric dispersal barrier for localized detection and removal of Asian carp.

Strategy for eDNA Monitoring in the CAWS and Upper Des Plaines River – This project continues eDNA monitoring in strategic locations in the CAWS that will be used to inform on the status of Asian carp.

- Two eDNA comprehensive sampling events took place in the CAWS at four regular monitoring sites in 2014, resulting in 456 samples collected and analyzed. One event in June 2015 took place in 2015, immediately prior to the SIM event. Zero detections for Bighead and Silver Carp

eDNA were reported on July 23, 2015. This is the first time that DNA for either of these species was not detected in this area since eDNA surveillance began in 2009 in the CAWS.

Larval Fish and Productivity Monitoring – This information will aid in evaluating the potential for Asian carp to further expand their range in the Illinois Waterway, and may also be useful for designing future control strategies that target Asian carp spawning and early life history.

- Over 500 larval fish samples were collected from 11 sites across the length of the Illinois Waterway during April – September, 2014, capturing over 18,000 larval fish, including 5,231 larval Asian carp.
- Larval Asian carp were only collected in the LaGrange and Peoria Pools in 2014. No Asian carp larvae were observed from the Upper Illinois Waterway.
- Multiple peaks in larval Asian carp abundance were observed during June and July 2014, coinciding with a period of rising water levels and water temperatures consistently above 20°C. Low numbers of Asian carp larvae continued to be collected into August, indicating that spawning continued to occur during this time, although at much lower levels.
- Over 180 larval fish samples were collected from four Illinois River tributaries (Spoon, Sangamon, Salt Fork of the Sangamon, and Mackinaw Rivers) from April – October, 2014, capturing over 4,700 larval fish. Processing and identification of these samples is ongoing and results will be reported once available.

Young-of-Year and Juvenile Asian Carp Monitoring – Monitoring for the presence of young-of-year Asian carp in the Illinois River, Des Plaines River, and CAWS occurred through sampling planned by other projects in the MRP and targeted a segment of the Asian carp population typically missed with adult sampling gears.

- Sampled for young Asian carp from 2010 to 2014 throughout the CAWS, Des Plaines River, and Illinois River between river miles (RM) 83 and 334 by incorporating sampling from several existing monitoring projects.
- Sampled with active gears (pulsed-DC electrofishing, small mesh purse seine, cast net, and beach seine) and passive gears (small mesh gill nets, and mini-fyke nets) in 2014.
- Completed 1,401 hours of electrofishing across all years and sites.
- Examined 127,007 Gizzard Shad <152 mm (6 in) long in the CAWS and Illinois Waterway upstream of Starved Rock Lock and Dam from 2010-2014 and found no young Asian carp.
- High catches of young-of-year Asian carp in 2014 in the LaGrange Pool indicate a high recruitment year despite limited to no recruitment in 2010-2013.
- Farthest upstream catch was a post larval Asian carp in the Peoria pool near Henry, Illinois (river mile 190) in 2012 and 2014, over 100 RM downstream from the electric dispersal barrier.
- Recommend continued monitoring for young Asian carp to determine the farthest upstream young fish are recruited into the population.

Distribution and Movement of Small Asian Carp in the Illinois Waterway - The purpose of this study was to establish where young (young-of-year (YOY) to age 2) Asian carp occur in the IWW through intensive, directed fish sampling which targets these life stages.

- A total of 39,409 fish specimens were collected and examined.
- Eighty-three species were identified along with two hybrid combinations.
- Two Illinois State threatened species were sampled.
- One Illinois State endangered species was sampled.
- No YOY Asian carp were sampled.
- The lack of YOY Asian carp in our samples suggests that the uppermost limit of these fish is still downstream of the Starved Rock Lock and Dam in the Peoria pool.

Fixed Site Monitoring Downstream of the Dispersal Barrier – This project included monthly standardized monitoring with pulsed-DC electrofishing gear and contracted commercial fishers at four fixed sites downstream of the Dispersal Barrier in Lockport Pool and downstream from the Lockport, Brandon Road, and Dresden Island locks and dams. It provides information on the location of the Asian carp detectable population front and upstream progression of populations over time.

- Estimated 10,224.5 person-hours spent sampling at fixed, random, and additional sites and netting locations downstream of the electric dispersal barrier from 2010-2014.
- 409 hours spent electrofishing and 439 km (273 miles) of trammel/gill net deployed.
- Sampled 146,882 fish, representing 97 species and seven hybrid groups.
- No Bighead or Silver Carp were captured by electrofishing or netting in Lockport and Brandon Road pools.
- Seventy-nine Bighead Carp and 19 Silver Carp were collected in the Dresden Island Pool during, fixed, random, and additional commercial netting from 2010-2014.
- Twenty-nine Bighead Carp were captured in a single hoop net in the Dresden Island Pool.
- One Bighead Carp and no Silver Carp were captured at Dresden Island Pool while electrofishing from 2010-2013, with none being captured in 2014.
- Detectable population front of mostly Bighead Carp located just north of I-55 Bridge at RM 280 (76 km (47 miles from Lake Michigan)). No appreciable change in upstream location of the population front in past five years.
- Recommend to continue current sampling plan below the electric dispersal barrier with electrofishing, hoop netting, mini-fyke netting, and gill, and trammel netting.

Monitoring Fish Abundance, Behavior, and Fish-Barge Interactions at the Barrier – This project uses split-beam hydroacoustics, side-scan SONAR, Dual-Frequency Identification SONAR (DIDSON), and caged fish experiments to assess fish abundances and behavior at the electric dispersal barrier system designed to prevent fish passage between the Mississippi River and Great Lakes Basins. This is an updated plan that includes protocols for monitoring fish at the electric barrier system area.

- No fish were observed crossing the electric dispersal barrier's IIB narrow array during October 2014.
- Reverse flows in the canal at the electric dispersal barrier site were common and could not be identified from the USGS Lemont IL stream gauge.
- Median size of young-of-year (less than 150 mm) present in Lower Lockport Pool the week following 2013 DIDSON sampling was 62.2 mm.
- Fish density and congregation directly below the electric dispersal barriers was significantly greater during summer 2013 data collections than during fall 2014 data collections.

Evaluating Asian Carp Detection Techniques with SONAR - This project evaluates the use of multiple hydroacoustic SONAR frequencies in order to assess whether live Asian carp can be specifically identified apart from any other fish species. These identifications could significantly reduce the amount of water targeted for future response efforts.

- There were significantly greater mean total densities of fish observed immediately below the electric dispersal barrier during the summer than in spring or fall.
- During spring both large and small mean fish densities were significantly greater directly below the barrier at night than during daytime or crepuscular periods.
- Differences in fish density patterns were observed between study reaches that could be indicative of between reach migrations.
- High relative densities of fish were shown to be present within the Brandon Road lock structure during both summer and fall.
- Acoustic remote sensing was used to communicate the presence of suspect potentially invasive fish targets to State agencies that subsequently successfully captured Asian carp in the area.

Des Plaines River and Overflow Monitoring – This project included periodic monitoring for Asian carp presence and spawning activity, in the upper Des Plaines River downstream of the old Hofmann Dam site. In a second component, efficacy of the Des Plaines Bypass Barrier constructed between the Des Plaines River and CSSC was assessed by monitoring for any Asian carp juveniles that may be transported to the CSSC via laterally flowing Des Plaines River floodwaters passing through the barrier fence.

- Collected 6,656 fish representing 52 species and 3 hybrid groups from 2011-2014 via electrofishing (38.65 hours) and gill netting (111 sets; 10,501 meters).
- IDNR basin survey completed 3.75 hours of electrofishing in 2014.
- No Bighead or Silver Carp have been captured or observed through all years of sampling.
- Two Grass Carp were captured in 2014. Analysis indicated both were triploid. Three Grass Carp tested in 2013 were also triploid. All Grass Carp were captured in the Des Plaines River.

Rapid response actions in the CAWS – This project uses a threshold framework to support decisions for response actions to remove any Asian carp from the CAWS upstream of the Dispersal Barrier with conventional gear or rotenone.

- Based on the criteria of the Threshold Framework (p. 45 of the 2015 Monitoring and Response Plan) there were no rapid response actions utilized in the CAWS in 2014. Alternatively two SIM events were conducted in 2014 yielding no Bighead Carp or Silver Carp being captured or observed. Refer to the SIM Interim report for complete results.
- Estimated 11,330 person-hours were spent to complete 170 hours of electrofishing, set 80.8 km (50.2 mi) of trammel/gill net, treat approximately 4 km (2.5 mi) (70 ha (173 acres)) of river with rotenone, made seven-0.7 km (800 yd) long commercial seine hauls, and deployed six tandem trap nets, 10 hoop nets and two Great Lake pound nets equal to 52.8 net-days of effort.
- Across all response actions and gears, sampled over 137,875 fish representing 57 species and 2 hybrid groups.
- No Bighead Carp or Silver Carp were captured or observed during rapid response actions.

Barrier Maintenance Fish Suppression – This project provides a fish suppression plan to support U.S. Army Corps of Engineers (USACE) maintenance operations at the Dispersal Barrier. The plan includes fish sampling to detect juvenile or adult Asian carp presence in the Lockport Pool downstream of the electric dispersal barriers, surveillance of the barrier zone with split-beam hydroacoustics, side-scan sonar and DIDSON imaging sonar, and operations to clear fish from between barriers by mechanical or chemical means.

- The MRWG agency representatives met and discussed the risk level of Asian carp presence at the electric dispersal barrier system at each primary barrier loss of power to water and supported two clearing actions on 27 May and 9 June 2014.
- A total of 34 fish from 8 species were removed using pulsed DC-electrofishing, with 8 fish > 12 inches (300 mm) in length.
- Split-beam hydroacoustics and side-scan sonar assessed the risk of large fish presence between the barriers on 15 January which precluded the need for further clearing actions.
- No Asian carp were captured or observed during fish suppression operations

Active prevention- Barrier Defense Asian Carp Removal Project – This program was established to reduce the numbers of Asian carp downstream of the electric dispersal barrier through controlled commercial fishing. It was anticipated that reducing Asian carp populations would lower propagule pressure and the chances of Asian carp gaining access to waters upstream of the barrier. Primary areas fished include Dresden Island, Marseilles, and Starved Rock pools.

- Contracted commercial fishers deployed 2,186.9 km) of gill/trammel net, 5.0 km of commercial seine, and 196 hoop nets set in the upper Illinois Waterway from 2010- 2014.
- A total of 70,882 Bighead Carp, 191,031 Silver Carp, and 1,718 Grass Carp were removed by contracted commercial fisherman from 2010-2014. The total weight of Asian carp removed was 1493.94 tons.
- Recommend continued targeted harvest of Asian carp in the upper Illinois Waterway with contracted commercial fishers and assisting IDNR biologists. Potential benefits include reduced carp abundance at and near the detectable population front and the possible prevention of

further upstream movement of populations toward the electric dispersal barrier and Lake Michigan.

Research focused on development or refinement of new tools/techniques:

Identifying Movement Bottlenecks and Changes in Population Characteristics of Asian Carp in the Illinois River - This project encompasses multiple studies with the goal of determining estimates of Asian carp abundance, biomass, size structure, demographics (e.g., growth and mortality), natal origin, and rates of hybridization in the Alton, LaGrange, Peoria, Starved Rock, Marseilles, and Dresden Island pools of the Illinois and Des Plaines Rivers.

- Asian carp abundance in the lower river (i.e. below Starved Rock Lock and Dam) appears to have increased compared to 2012 and 2013. Captures of YOY Asian carp also indicate relatively successful recruitment, likely due to high river discharge during the early spawning period in 2014 (compared to 2011–2013).
- Although data processing is ongoing for 2014, upper river hydroacoustic estimates suggest population changes (decreases in abundance, biomass and fish size) between 2012 and 2013.
- Definite separation patterns between the lower and upper river (at Starved Rock Lock and Dam) were observed in 2014. Fish tended to move as far as the Peoria pool, and then return back downstream. Movement in the upper river tended to be in the downstream direction through the Marseilles lock in 2014 and into and out of the HMS pits.
- Continued contract harvest in the upper Illinois River (above Starved Rock) plus intensive commercial harvest in the lower Illinois River may reduce density, potential recruitment, and perhaps immigration of Asian carp toward the electric dispersal barrier.

Barrier Effectiveness Evaluations:

Telemetry Monitoring Plan – This project uses ultrasonically tagged Asian carp and surrogate species to assess if fish are able to challenge and/or penetrate the electric dispersal barrier system and pass through navigation locks in the upper Illinois Waterway. An array of stationary acoustic receivers and mobile tracking was used to collect information on Asian carp and surrogate species movements.

- 15.1 million detections from 432 tagged fish have been acquired since 2010.
- The electric dispersal barriers have been effective at preventing upstream passage of free swimming tagged fish greater than 300 mm.
- Since 2011, two transmitters implanted into Common Carp downstream of the Barriers were located upstream although no detections were observed at barrier receivers. The most plausible explanation being assisted passage via barge entrainment; both transmitters were either expelled or the host had expired.
- Fish approaching the Dispersal Barriers spend a greater amount of time challenging the barriers with increased discharge rates.
- Common Carp over 415 mm in total length are repelled by electric field strengths as low as .1 to .5 V/in.

- Inter-pool movement of tagged fish was observed in both directions between all pools within the study area in 2014 (Lockport, Brandon, Dresden Island and Marseilles).
- Asian carp are consistently using the Kankakee River and Rock Run Rookery with little movement detected surrounding the Brandon Road Lock and Dam.
- A probability model for tagged Asian carp presence/absence has been generated for the Rock Run Rookery and the Kankakee River within the Dresden Island Pool based on temperature and discharge rates.

Understanding Surrogate Fish Movement with Barriers – This project monitors the movements of tagged surrogate species in Dresden Island, Brandon Road and Lockport Pools, and Rock Run Rookery to assess fish movement between barriers structures (i.e. electric dispersal barriers and lock and dams). Obtain information on recapture rates of surrogate species to help verify sampling success using multiple gear types.

- Multiple agencies and stakeholders cooperated in successfully tagging 1,654 fish in Lockport Pool, Brandon Road Pool, Dresden Island Pool, and Rock Run Rookery (Between April 1 and December 11).
- A total of 18 fish were recaptured using pulsed DC-electrofishing, gill nets, trammel nets, and hoop nets.
- A total of 14 recaptures had tags but showed no movement between barrier structures, 3 recaptures were observed due to caudal fin clip but had no tag to show movement and 1 recapture showed movement from Dresden Island Pool downstream through the Dresden Island Lock and Dam into the Marseilles Pool.
- Recommend continued tagging of Common Carp, Bigmouth Buffalo, Smallmouth Buffalo, Black Buffalo and Common Carp x Goldfish hybrid using pulsed DC-electrofishing, gill nets, trammel nets, and 6 foot diameter hoop nets to monitor fish movement between barrier structures.

Gear Effectiveness Evaluations and Development Projects: Asian Carp Gear Efficiency and Detection Probability Study – This project assessed efficiency and detection probability of gears currently used for Asian carp monitoring (e.g., DC electrofishing, gill nets, and trammel nets) and others potential gears (e.g., mini-fyke nets, hoop nets, trap nets, seines, and cast nets) by sampling at 10 sites in the Illinois River, lower Des Plaines River, and CAWS that have varying carp population densities. Results will inform decisions on appropriate levels of sampling effort and monitoring regimes, and ultimately improve Asian carp monitoring and control efforts, including:

- Large numbers of juvenile Asian carp were captured in the LaGrange and Peoria Pools during 2014, but none were captured or observed upstream of the Peoria Pool. All juvenile Asian carp observed during 2014 were Silver Carp. No juvenile Bighead Carp were identified.
- Mini-fyke nets captured by far the highest number of juvenile Silver Carp in 2014. Beach seines and purse seines were also moderately effective. Pulsed-DC electrofishing and cast nets captured smaller numbers of juvenile Silver Carp. No juvenile Asian carp were captured in gill nets.

- Beach seines captured the smallest sizes of juvenile Asian carp (mean = 38 mm), whereas purse seines captured larger average sizes (mean = 53 mm). Cast nets (mean = 41 mm), pulsed-DC electrofishing (mean = 48 mm), and mini-fyke nets (mean = 49 mm) captured more intermediate sizes. However, electrofishing was the only gear that consistently captured juvenile Asian carp larger than 90 mm.
- Tributary sites were sampled with pulsed-DC electrofishing gear in the Spoon, Sangamon, Salt Fork of the Sangamon, and Mackinaw Rivers during 2014. A total of 796 adult Asian carp (6 Bighead Carp, 790 Silver Carp) were captured from tributaries. No juvenile Asian carp were observed in tributaries during electrofishing sampling.

Exploratory Gear Development Project – A professional net designer has been consulted to develop and build enhanced purse seines, trawls, and gill nets for more effective harvest of Asian carp. Enhanced gears will be evaluated in areas known to have abundant Asian carp populations. If effective, gears may be used in place of rotenone for removal actions in the CAWS and for commercial fishing in the lower Illinois River or other Asian carp infested waterways.

- The paupier captures juvenile carp without electricity.
- The surface trawls capture juvenile carp.
- All sizes of Silver Carp were readily captured throughout the year in all habitats sampled.
- Juvenile invasive carp occupy lower reaches of tributary stream habitats of large rivers in the early life stages.
- Young-of-Year invasive carps transition to occupy shallow, still water habitats in the fall.

Unconventional Gear Development Project – The goal of this project is to develop an effective trap or netting method capable of capturing low densities of Asian carp in the deep-draft canal and river habitats of the CAWS, lower Des Plaines River, upper Illinois River, and possible Great Lakes spawning rivers.

- Driving fish into surface-to-bottom gill nets resulted in higher catch rates of all fish species and of Silver Carp than control sets. The highest catch rates were obtained by driving fish using a pulsed-DC electrofishing boat.
- The majority of fish species, including Silver Carp, were more vulnerable to smaller mesh sizes (6.4 – 7.6 cm) of surface-to-bottom gill nets, whereas Bighead Carp appear to be more vulnerable to larger mesh sizes (7.6 – 10.2 cm).
- Pound nets captured large numbers of fish, primarily consisting of Asian carp, and produced substantially higher catch rates of Asian carp than traditional entrapment gears in backwater habitats.
- Pound nets captured larger sizes of Bighead Carp than hoop nets or fyke nets, but sizes of captured Silver Carp did not differ among these gear types.

Water Gun Development and Testing – Pneumatic water guns that emit high pressure underwater sound waves have potential to deter or kill fishes if they are in close enough proximity to the wave

source. This technology is being evaluated to determine their efficacy as a tool to modify Asian carp behavior and act as a barrier that can support maintenance of the electric dispersal barrier.

Evaluated two 100 in³ water guns firing every ten seconds as a barrier in an open water field setting.

- Behavioral responses of Asian carp and native fishes were observed with sonar and acoustic telemetry under controlled conditions. Initial results indicate fish passed through the water gun barrier during operation.
- Evaluated the behavioral and physiological effects of firing a 100 in³ water gun on three species of native mussels.
- Results indicate that native mussels did not alter their behavior in response to 100 firing of a 100in³ water gun.
- Results indicated that 100 firing of a 100 in³ water gun did not affect the shell of any of the mussels or cause mortality; even the thin-shelled mussels placed near the water gun.

Law enforcement/regulatory actions:

Alternate Pathway Surveillance in Illinois – This project creates a more robust and effective enforcement component of Illinois DNR’s invasive species program by increasing education and enforcement activities at bait shops, bait and sport fish production/distribution facilities, fish processors, and fish markets/food establishments known to have a preference for live fish for release or food preparation. A second component conducts surveys at urban fishing ponds in the Chicago Metropolitan area included in the Illinois DNR Urban Fishing Program as well as ponds with positive detections for Asian carp eDNA using conventional gears (electrofishing and trammel/gill nets) in an effort to remove potential accidentally stocked Bighead or Silver carp.

Law Enforcement:

- January 2014 - Sweetwater Spring Fish Company and owner each pled guilty to importing live VHS susceptible species without permits and paid a fine of \$25,400, which was deposited in the Illinois Conservation Police Operations Assistance Fund.
- In August 2014, an Indiana bait dealer arrested for selling minnows and Grass Carp in Illinois without an aquatic life dealer’s license, VHS permits, or a restricted species permit pled guilty and paid a \$4,000 fine which was deposited in the Illinois Conservation Police Operations Assistance Fund.
- November 2014 – A commercial fisherman targeted in an Invasive Species Unit (ISU) investigation was arrested for the unlawful sale of 1,800 pounds (816 kg) of Bighead and Silver Carp – Class 3 Felony. His brother was arrested for possession of live Bighead and Silver Carp – Class A Misdemeanor.
- On December 01, 2014, Farm Cat Fish Transportation Company and the owner pled guilty to importing VHS susceptible species w/o permits and paid a \$2,500 fine and \$22,500 to the Illinois Conservation Police Operations Assistance Fund. They were also arrested for selling aquatic life without a license.

Urban Fishing Pond Surveys:

- Thirty-two Bighead Carp have been removed from five Chicago area ponds using electrofishing and trammel/gill nets since 2011.
- Sampled four ponds with electrofishing and trammel/gill nets during 2013.
- Estimated 165 person-hours were spent sampling Chicago area ponds in 2013.
- Sampled 179 fish representing 5 species and 1 hybrid group.
- Six Bighead Carp were removed from Humboldt Park and Flatfoot Lake; a replica of the carp from Flatfoot Lake has been made for outreach and educational events.
- Recommend additional sampling of ponds from which Bighead Carp have been removed, as well as repeat sampling of ponds yielding positive results for Asian carp eDNA.

Non-Carp Specific Initiatives in Illinois:

- Illinois DNR Illinois River Basin Surveys Summary - Illinois DNR conducted Basin Surveys along the Illinois River at several key locations. These surveys provided the Department critical information on the native species communities and nonnative species including Asian carps. These assessments have provided data on the establishment and distribution of Asian carp within the entire Illinois River basin.
- Twenty-seven biologists that survey and manage fish populations in Illinois report all invasive species when collected anywhere in the state to the Aquatic Nuisance Species (ANS) Program and thus put into the national USGS NAS database.
- Long Term Resource Monitoring Program Summary - The Long Term Resource Monitoring Program conducted fish community surveys in 3 key pools in the Illinois and Mississippi Rivers. The long term monitoring has documented the Asian carp distribution and population trends within the key pools. Data was compiled and housed at the USGS Upper Mississippi River Sciences Center. Key findings are reported through the program directly or indirectly to State and Federal managers.
- Long Term Electrofishing Program Summary - Long Term Electrofishing Program conducted fish community monitoring within Illinois, Mississippi, Ohio, and Wabash River. Monitoring has documented the long term trends of Asian carp populations in these rivers that are shared with other states.

1.2 Iowa

Interagency coordination: Iowa DNR AIS and Fisheries Bureau staff were involved with several interagency efforts related to preventing the spread of Asian carp within the Upper Mississippi River (UMR) Basin. Much interagency coordination occurred while developing an UMR Asian Carp Action Plan and identifying priority projects from within the plan for FY2015 funding. Iowa DNR staff were members of the UMR Asian carp project planning team that collaborated on a UMR multi-year work plan, identified annual priorities, and developed project proposals. Other interagency coordination took place in the form of discussions and exchange of information through the Mississippi River Basin Panel on

ANS, the Association of Fish and Wildlife Agencies Invasive Species Committee and Fisheries and Water Resources Policy Committee, the Upper Mississippi River Conservation Committee, the Upper Mississippi River Basin Association, and the Midwest Governors Association AIS Collaborative. Iowa DNR staff also shared information with the USGS, USFWS, and adjacent State agency staff on plans for research and monitoring of Asian carp in the Mississippi River and tributaries in Iowa in order to coordinate and prevent duplicative efforts between agencies.

Field monitoring: Bighead Carp and Silver Carp distribution throughout the Mississippi River and in its tributaries in southern and central Iowa has been expanding for the past 10 years. They have been collected or observed as far upstream in Iowa as Pool 9 (Allamakee County) of the Mississippi River, below the Lake Red Rock dam (Marion County) on the Des Moines River, at the confluence with Big Cedar Creek (Henry County) on the Skunk River, and below the Center Street dam in Iowa City (Johnson County) on the Iowa River. In the Cedar River, Bighead Carp have been collected as far upstream as Waterloo (Black Hawk County), and Silver Carp have been collected as far upstream as Palisades Kepler State Park (Linn County). Stocking of diploid Grass Carp is allowed in Iowa, and their distribution is widespread throughout lakes and ponds in Iowa. Grass Carp have also been reported from the Mississippi River up to Pool 9 and from multiple locations on the Cedar, Des Moines, Iowa, Raccoon, Skunk, and Winnebago Rivers. No Black Carp have been documented in Iowa.

Iowa DNR staff used electrofishing to sample Bighead Carp and Silver Carp and determine population structure below dams in the Des Moines, Iowa, and Skunk Rivers during summer 2014 and in the Des Moines and Iowa Rivers during summer 2015. Iowa DNR staff did not sample specifically for Grass Carp in 2014 or 2015. Bighead, Silver, and Grass Carp collections from routine fisheries management surveys, Long Term Resource Monitoring Program surveys in Pool 13, and commercial fishing reports are documented yearly in annual Iowa DNR reports.

Iowa DNR funded an Iowa State University research project to evaluate adult population characteristics and dynamics of Asian carp in the Mississippi, Des Moines, Skunk, Iowa, and Cedar Rivers and to evaluate Asian carp reproduction and recruitment in the Mississippi, Des Moines, Skunk, Iowa, and Cedar Rivers. Juvenile and adult Asian carp were sampled monthly at 13 sites from these rivers using electrofishing and trammel nets from July through October 2014 and April through September 2015. Data recorded for collected fish included species, weight, length, age, gender, and gonad development. Surface ichthyoplankton tows were conducted every 10 days from July through October 2014 and April through September 2015 at the same sites as juvenile and adult fish collections. Eggs and larval fish were enumerated and will be identified to genus or species. No Bighead Carp or Silver Carp were captured in the Cedar or Iowa Rivers in 2014; however, individual Silver Carp were collected from these rivers in 2015. Grass Carp were collected each year in all rivers. The size structure of adult fish varied considerably from both years from all locations. Gonad development indicated that the majority of spawning occurred in May and June 2014; however, females with ripe ovaries were observed until September. Eggs and larval fish were collected in each river at every site in 2014 but are still in the process of being identified. Gonad development, egg, and larval data for 2015 were not available when this report was written. This research project will continue through 2016 in order to better understand

Asian carp populations in Iowa and to guide future efforts to prevent the spread of invasive fishes in Iowa.

Bighead Carp and Silver Carp reproduction have not been documented in Iowa. Final results from the Iowa State University research project should give us the data needed to determine their reproduction status in Iowa. Grass Carp reproduction has also not been documented or studied in Iowa prior to 2014. The Iowa State University research project identified Grass Carp larvae from the Iowa, Skunk, and Mississippi Rivers and eggs from the Mississippi River at the Skunk River and Des Moines River confluences in 2014. In 2014 and 2015, Iowa DNR staff also collected young-of-the-year Grass Carp from Coralville Lake below the Lake Macbride spillway and from Hoosier Creek.

Rapid response: Iowa DNR staff did not conduct any rapid response exercise or projects specific to Asian carp during this reporting period.

Risk assessment: Iowa DNR staff members worked on implementing the recommendations in the report “The use of Grass Carp (*Ctenopharyngodon idella*) in the United States: Production, triploid certification, shipping, regulation, and stocking recommendations for reducing spread throughout the United States.” The project that was the basis for the report assessed the risk of diploid Grass Carp being transported and stocked through the triploid Grass Carp chain of supply. The report provided recommendations to implement in order to minimize that risk.

Active prevention: Iowa DNR staff did not coordinate active prevention projects within the UMRB during this reporting period.

Outreach with industry or the public/stakeholder participation: Signs alerting the public to the presence of Asian carp were posted at fishing access sites below dams with known populations of Bighead Carp and Silver Carp. The signs show how to identify the species and warn that it is illegal to possess or transport live Asian carp. Along with these Asian carp-specific signs, the Iowa DNR used different types of outreach materials targeting water recreationists in Iowa. Stop Aquatic Hitchhiker signs were posted at all boat access sites and information was available on the Iowa DNR website. Brochures, identification cards, posters, and banners were available for distribution and use at watercraft inspection stations, outdoor events and fishing clinics, the Iowa State Fair, parks and nature centers, and businesses (e.g., marinas, bait shops, sporting goods stores). The 2014 and 2015 Iowa Fishing Regulations booklet contained AIS information and a list of AIS-infested waters in Iowa. The Iowa DNR also provided information through billboards and news releases. Exhibits at the Iowa State Fair in 2014 and 2015 included an aquarium with Bighead Carp and Silver Carp. The 2014 Iowa State Fair also featured an Asian carp cooking demonstration. Television commercial advertising aired during the summer months along with magazine advertisements in local magazines. In October 2014, an Iron Chef competition utilizing Asian carp as the main ingredient was held at Indian Hills Community College. Seasonal Iowa DNR staff inspected watercraft and interviewed boat operators at boat accesses at high-use and infested waterbodies throughout Iowa during the summers of 2014 and 2015. They also discussed the importance of cleaning and draining water-related equipment and not dumping bait to prevent the spread of AIS. In 2014, staff conducted 9,053 watercraft inspections reaching 24,959 boat

operators. Ninety-five percent of the boaters interviewed in 2014 were aware of Asian carp and knew that they were an invasive species. Data for 2015 was not compiled when this report was written.

Law enforcement/regulatory actions: The Aquatic Invasive Species Law in Iowa makes it illegal to transport prohibited aquatic invasive species, including live Asian carp, and any aquatic plant on water-related equipment. Boaters are also required to drain all water from boats and equipment before leaving a waterbody and to keep drain plugs removed or opened during transport. It is also illegal to release unused bait into a water body in Iowa.

Research focused on development of new tools/techniques: Iowa DNR staff did not conduct research focused on the development of new tools or techniques for Asian carp prevention within the UMRB during this reporting period.

Financial support provided to partner agency/organizations and Expenditures: As described under Field Monitoring for Asian carp, the Iowa DNR is funding a research project by Iowa State University from 2013 through 2016 that will cost \$212,555. A sum of \$46,378 was provided to Iowa State University during FY2015. Iowa DNR staff and expenditures related to Asian carp activities were estimated at \$100,000 during FY2015.

1.3 Minnesota

Interagency coordination: The Minnesota DNR is an active participant in the Asian Carp Regional Coordinating Committee, Upper Mississippi River Asian Carp Action Plan, Mississippi River Interstate Cooperative Resource Association, Upper Mississippi River Conservation Committee, Upper Mississippi River Basin Association, Great Lakes Panel on Aquatic Nuisance Species, 100th Meridian Initiative, and Mississippi River Basin Panel on Aquatic Nuisance Species.

The Minnesota DNR employs a full time employee to help coordinate Minnesota DNR's carp efforts both within the agency and with other entities.

Field monitoring: The Minnesota DNR relies on several methods to detect and monitor the expansion of Asian carp into Minnesota (funding source):

- traditional fisheries monitoring programs (Base),
- targeted sampling (Environment and Natural Resources Trust Fund; ENTRF),
- contracted commercial fishing (ENTRF),
- monitoring the commercial catch (Base), and
- reported sightings (Base and ENTRF).

The Minnesota DNR sought to maintain three full time (but limited term) invasive carp specialists (ENTRF) during this time period for targeted sampling on the Mississippi River, St. Croix River, and Minnesota River. In May 2015, Minnesota DNR converted one of the positions to a permanent position to lead field efforts. Effort and results are summarized in annual reports:

Minnesota Department of Natural Resources – Division of Fish and Wildlife. 2015. *Invasive Carp Sampling Report January-December 2014*. MN DNR, St. Paul, MN. [Print]

Rapid response: One rapid response exercise was done during this time period. An angler reported on May 27, 2015 catching a Bighead Carp at a power plant outlet near Stillwater, Minnesota. Upon verification, DNR invasive carp specialists responded on May 28, 2015 with targeted sampling using a variety of gears at the capture location. A single Bighead Carp was captured with these efforts. In addition, the DNR contracted commercial angler was brought in to sample the area. The commercial angler captured no invasive carp. Subsequently, for more Bighead Carp were captured in the area by anglers for a total of six (May 26, 2015 to June 8, 2015 time period). This is the furthest upstream on the St. Croix River that invasive carp have been verified.

Risk assessment: Minnesota DNR Fisheries released a GIS risk-based spatial map depicting where invasive carp may spread by their own swimming capabilities (<http://www.dnr.state.mn.us/invasive-carp/migration.html>) in November 2013. This included assigning relative risk of invasive carp passage at stream barriers and identification of potential watershed breaches. Since publication, work has been done on verifying watershed breaches.

Minnesota DNR fisheries biologists identified 43 potential breach locations using GIS and local expertise. Biologists visited 22 of these sites and revisited 9 of these 22 sites during higher water conditions. Two of the examined locations were determined to be high risk for a watershed boundary breach. Work continues on visiting remaining sites and locations needing a revisit during higher water conditions.

Additionally, The Minnesota Center for Environmental Advocacy sponsored a project that examined using GIS data to refine potential locations. Project results are summarized in a completion report:

Bevis, B. 2015. *Expansion of invasive carp range in Minnesota: using glacial geomorphology, digital elevation models and vector data to identify potential watershed breaches in ArcGIS*. University of Minnesota – Center for Urban and Regional Affairs.
<http://www.cura.umn.edu/publications/catalog/cap-197>

Active prevention:

St. Anthony Falls -The Minnesota DNR believed that the best way to keep Invasive Carp out of the upper Mississippi River watershed was to close the Upper St. Anthony Falls Lock. It required an act of Congress to close the lock, which is administered by the USACE. Lock closure provisions were included in the WRRDA bill which was signed into law by President Obama on June 10, 2014. The lock was closed on June 10, 2015.

Lock and Dam 1(OHF)- At the beginning of 2013, the DNR explored alternative barrier technologies to prevent upstream movement of Asian carp. The agency took this approach because it was unknown whether a St. Anthony Falls Lock closure provision would make progress at the Federal level – either as its own bill or as part of a larger bill. In addition, it was highly unpredictable if such a provision would pass. In December 2014, Smith-Root delivered 100 percent completed design plans for a “sweeping”

electrical barrier in Lock 1. The barrier will not be built due to the closure of Upper St. Anthony Falls Lock.

SW MN barriers (OHF) - In FY 2013, the Minnesota DNR received funding from the Outdoor Heritage Fund (State of Minnesota) to place additional barriers in southwest Minnesota. The area fisheries office identified seven sites for new projects to prevent the spread of Asian carp into high value lakes or between watersheds. Work continued in 2015 on one uncompleted electric barrier project to protect a high value recreational lake. A build contract has been awarded with a completion date set for November 2015.

Minnesota River Watershed (OHF) - In response to the risk in the Minnesota River watershed, Minnesota DNR fisheries identified priority aquatic resources for protection. As funding becomes available, barrier sites are chosen to prevent carp expansion into these resources. As of September 2015, the DNR had identified two sites in the Le Sueur River watershed to protect upstream lakes. These sites are currently in the design stage and negotiations with landowners are underway.

Outreach with industry or the public/stakeholder participation: The Minnesota DNR routinely engages with Minnesota Stop Carp Coalition, an active group of non-governmental organizations collaborating to bring attention and support efforts on the invasive carp issue.

- The Minnesota DNR maintains an invasive carp web page.
- The Minnesota DNR in collaboration with the National Park Service hosted an invasive carp forum in December 2014.
- The Minnesota DNR invasive carp coordinator routinely presents information and Minnesota's efforts to a variety of groups.

Law enforcement/regulatory actions: Sections of the following statutes pertain to Invasive carp prevention: Minnesota Statute 97C and Minnesota Statute 84D

Research focused on development of new tools/techniques: Most research is done in collaboration with Minnesota Universities.

The University of Minnesota is continuing to pursue a number of research initiatives, including:

- Understanding and developing strategies for Implementing eDNA as a molecular technique to assess potential presence of Asian carp in large Minnesota rivers
- Evaluating the potential to detect and locate Asian carp through the use of "Judas fish," a new behavioral tool to locate aggregating invasive fish so they might be tracked and/or removed
- Developing food, pheromone, and hormone attractants for Asian carp to induce high-density aggregation for the purposes of fish detection, measurement, control, and removal
- Conducting an assessment of effectiveness of enhanced bubble curtains as effective deterrents of Asian carp movement into small tributaries
- Installation of sound deterrents to Asian carp in the Mississippi River
- Assessing the potential use of native pathogens as invasive carp control agents

- Conducting risk analyses to identify Asian carp control priorities and methods

In addition, the University of Minnesota is continuing its collaboration with USACE to develop ways (including applications of new technologies) to modify operations of Lock and Dam numbers 2 through 8 to optimize their ability to impede Bighead and Silver Carp movement into the St. Croix and Mississippi Rivers within Minnesota. Specific activities include:

- Immediate development and implementation of a deterrent strategy for Lock and Dam 8, including installation of an experimental underwater sound deterrent shield
- Quantification of adult Bighead Carp swimming capabilities
- Testing and development of new acoustical deterrent systems for locks that deter Asian carp and minimally affect native fishes

1.3.1 Minnesota State University – Mankato

In addition to being accessible, the Minnesota River appears to have the habitat requirements to support invasive carp populations. Preventing the establishment of invasive carp species is the ideal strategy. One of the tools in the prevention toolkit is establishing barriers to fish movement. The Minnesota DNR contracted with Minnesota State University to evaluate the Minnesota River for invasive carp risks and barrier potential. The University began collecting data in spring 2015. A progress report will be submitted to the Minnesota DNR in December 2015.

1.3.2 Minnesota Department of Natural Resources

DNR fisheries began a fish telemetry study in spring of 2013 to understand fish movement around lock and dams and in the Mississippi River system. The USFWS also connected the receiver system with one located in Missouri to help monitor carp movements throughout the river. This study continued in 2014 and 2015. Updated information can be found in the following report:

Minnesota Department of Natural Resources – Division of Fish and Wildlife. 2015. East Metro Area Rivers Telemetry Project – 2014 Progress Report. MN DNR, St. Paul, MN. [Print]

Financial support provided to partner agency/organizations:

- Minnesota Environment and Natural Resource Trust Fund (ENTRF) – \$101,843
- Minnesota Outdoor Heritage Fund (OHF) - \$1,340,122
- DNR base funding - ~\$85,000/year for coordinator; additionally, multiple DNR staff have contributed time to the invasive carp effort (ranges from a few hours to over a hundred hours).
- MAISRC invasive carp expenditures for fiscal year 2015 was \$383,046

2 Federal Agencies: Upper Mississippi River Basin

2.1 U.S. Army Corps of Engineers

Interagency coordination: The USACE work under this category consists of participation in various workgroups including, but not limited to, the Asian Carp Regional Coordination Committee (ACRCC) and its workgroups, the Great Lakes and Mississippi River Interbasin Study (GLMRIS) Executive Steering Committee, and the Brandon Road Working Group. Unstructured interagency coordination occurred during the execution of activities described in the subsequent sections of this report.

Field monitoring: As part of the ACRCC's Monitoring and Response Workgroup (MRWG), USACE monitored for the Asian carp presence during the reporting period within the Chicago Area Waterway System (CAWS) and its tributaries largely using two tools – telemetry and electrofishing.

The telemetry program consists of tagging fish with individually coded ultrasonic transmitters in the Upper Illinois Waterway (IWW) and CAWS. Telemetry is used to assess effectiveness of the electric barriers by monitoring movement of fish in the immediate vicinity of the barriers in order to determine if the fish can challenge and/or penetrate the barriers. Additionally, telemetry is used to identify the leading edge of the Asian carp population and whether Asian carp can navigate through lock structures in the IWW system. Surrogate species (i.e. Common Carp, buffalo spp.) were tagged at and near the Barrier in the Lockport Pool, while Asian carp were tagged in the Dresden Island and Marseilles Pools. The acoustic network, shown on the previous page, is composed of stationary acoustic receivers supplemented by a *mobile hydrophone unit*.

Fixed site electrofishing samples; During the reporting period, IDNR, USFWS, and USACE coordinated efforts to sample five fixed locations and additional reaches in the CAWS for the presence of Asian carp and local fish population. In addition to monitoring for Asian carp, these data were used to inform a fishery statistical-based model that will ultimately quantify the potential of Asian carp presence/absence and relative abundance. This effort is part of a larger CAWS monitoring program developed by the MRWG of the ACRCC. In addition, USACE conducts monthly electrofishing surveys at the Barrier, outside of the regular MRWG fixed site monitoring activities.

USACE also cooperated with USFWS and the Minnesota DNR in placement of monitoring equipment at Corps locks within the St. Paul District footprint.

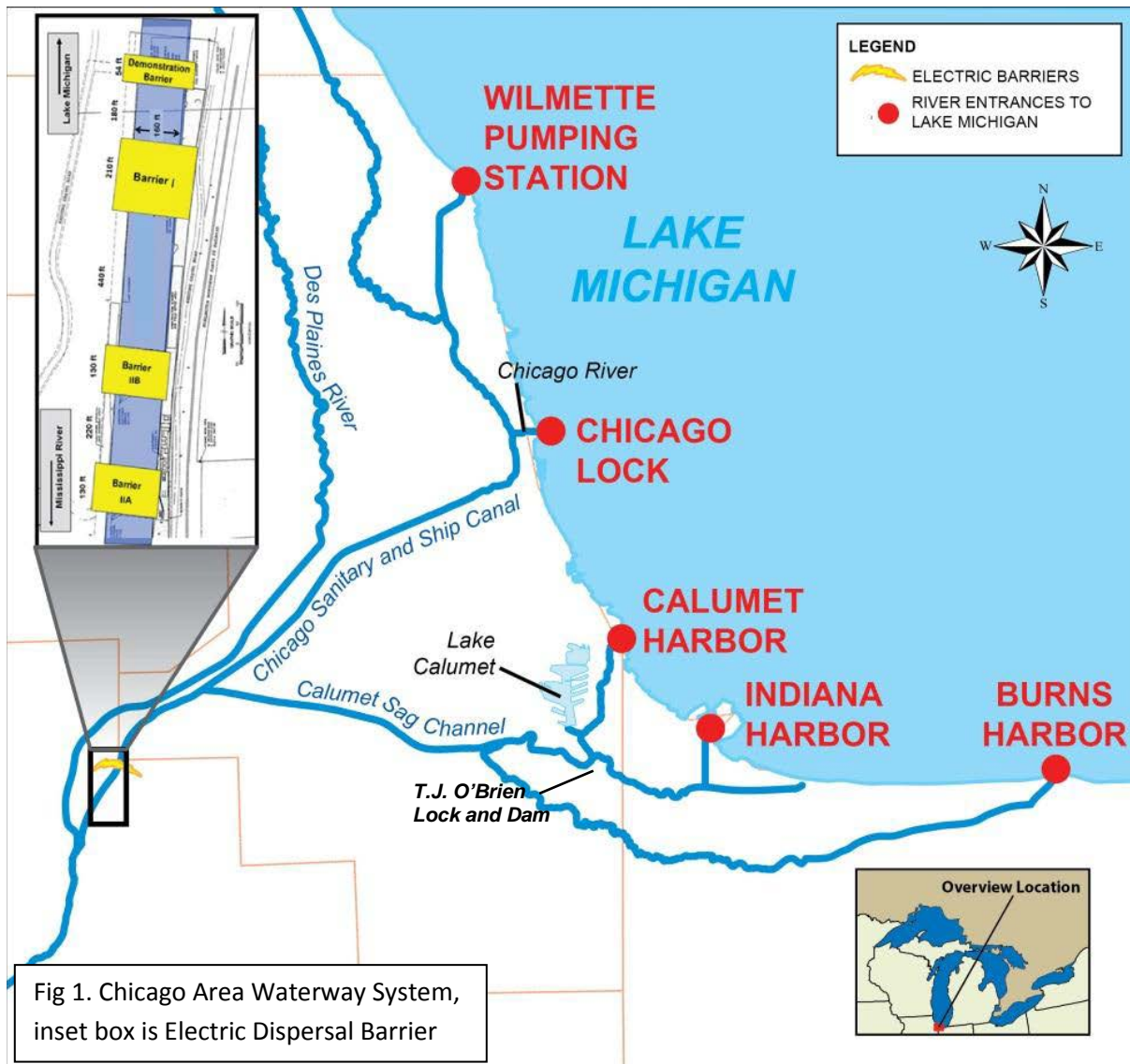
- Collaboration, technical and field support to the ACRCC MRWG on the implementation of the Asian Carp Control Strategy Framework and the Monitoring and Response Plan.
- Collaboration and evaluation of Asian carp control measures for use in the IWW and development of monitoring strategies and a project implementation plan at Brandon Road Lock and Dam.
- Internal USACE coordination of ACRCC activities.
- Biological, engineering, and navigation technical expertise.

Rapid response: The USACE has not undertaken any rapid response efforts.

Risk assessment: The USACE has not undertaken any risk assessment efforts.

Active prevention: USACE applies three different types of fish deterrent measures throughout the CAWS. Each is designed to prevent a distinct pathway of Asian carp toward the Great Lakes.

- The Electrical Dispersal Barrier System, located on the Chicago Sanitary and Ship Canal (CSSC) in Romeoville, Illinois, was designed to reduce the risk of transfer of fish between the Mississippi River to the Great Lakes drainage basins via the CSSC. The system currently consists of three barriers (Demonstration, IIA, and IIB) that create a waterborne, pulsed, direct current, electric field in the canal, which expose fish penetrating the electric field to electrical stimuli that act as a deterrent. As fish swim into the field, they feel increasingly uncomfortable. When the sensation is too intense, the fish are either immobilized or deterred from progressing farther into the field. Although the barriers were placed into service prior to the reporting period, USACE continues to operate and maintain them as an integral part of its strategy to prevent movement of Asian carp toward the Great Lakes.



- The Des Plaines River Bypass Barrier is a 13-mile long combination of fence material and jersey barrier that physically blocks known bypasses around the electric barriers that occur during periods of flooding from the Des Plaines River and the Illinois and Michigan (I&M) Canal, thereby halting possible fish movement through this area. The barriers placed in these locations are intended to stop juvenile and adult Asian carp. A map depicting the alignment of the barrier is below.

Bar screens on sluice gates at Thomas J. O'Brien Lock and Dam were installed to impede entry of Asian carp to Lake Michigan. USACE closed the Upper St. Anthony Falls Lock and Dam to navigation traffic at midnight on June 9, 2015 as directed by WRRDA 2014. USACE Louisville District provided feedback to NRCS on construction-related changes relative to closure structures at Eagle Marsh. USACE monitored flood conditions at Eagle Marsh relative to inter-basin species transfer.

Outreach with industry or the public/stakeholder participation: USACE participated in the following organized stakeholder groups:

- Technical and Policy Workgroup consisting of academia and non-governmental organizations (NGOs) interested in technical and policy issues relating to the design and operation of the electric barriers
- Barrier Navigation Task Force consisting of representatives of the navigation industry interested in research on the efficacy of the electric barriers
- CAWS Advisory Committee comprised of more than two dozen stakeholder organizations that have expressed an interest in preventing AIS transfer into the Great Lakes, especially Asian carp.

Additionally, USACE employed a comprehensive public engagement strategy during the reporting period consisting of public meetings, focused briefings, stakeholder conference calls, media events, social media, and project websites.

Law enforcement/regulatory actions: The USACE has not undertaken any law enforcement/regulatory actions.

Research focused on development or refinement of new tools/techniques: USACE conducted field and laboratory research to assess the efficacy of the electric barriers and to improve their effectiveness. Some of the projects conducted included laboratory research to assess the impact of various environmental conditions on barrier effectiveness and fish behavior. For example, Laboratory tests were conducted to confirm barrier optimal operating parameters by examining a number of factors including, but not limited to, how variations in canal water temperature and dissolved oxygen levels impact the effectiveness of the barrier. USACE also conducted tests that expose fish to the electrical field for longer durations of time to determine if the fish become less affected by the field over time.

USACE led the eDNA Calibration Study (ECALS) to improve the application of eDNA methodology to assess and manage uncertainty. ECALS investigated alternate sources of Asian carp DNA, developed improved genetic markers and investigated the relationship between the number and distribution of positive eDNA samples with the density of Asian carp populations. The results of this study will allow project managers to better interpret eDNA results, as well as investigate ways to make the eDNA process more efficient (decrease processing time and cost).

USACE cooperated with the University of Minnesota Aquatic Invasive Species Research Center (MAISRC) on their work to assess deterrent technology and Asian carp swim capabilities at varying river flow velocities through dam gates. The district has entered into a real estate agreement allowing MAISRC to install and operate an array of acoustic deterrent speakers at Lock and Dam 8 as a demonstration project. The demonstration project became operation in early August 2014.

Financial support provided to partner agency/organizations: None

USACE expenditures:

	Base Agency Funding	GLRI Funding	Total Expenditures
Oct 2014 - Sep 2015	\$25,737,131.75	\$2,797,232.66	\$28,534,364.41

2.2 U.S. Fish and Wildlife Service

Interagency coordination: USFWS led or participated in various partnerships and work groups involving coordination of activities for Asian carp management in the Mississippi River Basin. USFWS worked closely with MICRA and State partners to formulate field projects and longer term plans for managing Asian carp in the Upper Mississippi River sub basin. Additionally, USFWS participated in Asian carp and other interagency coordination efforts through the UMBRA, UMRCC, and with the ORFMT.

USFWS also served as co-chair of the 24-member ACRC (including co-chairing its Communication Work Group and membership on its Monitoring and Response Work Group); serving as a co-lead on a barrier studies workgroup; participation in the ACRC Monitoring and Response Workgroup and the Brandon Road Workgroup. ACRC efforts were focused in the upper Illinois Waterways and Chicago Area Waterway System.

USFWS was also engaged in the UMRBA and UMRCC and within the UMR basin, and with the ORFMT in the ORB. Additionally, USFWS participated in other AIS groups that coordinate and communicate activities related to Asian carp management efforts, including the Aquatic Nuisance Species Task Force, the Mississippi River Basin Panel on ANS, and the American Fisheries Society. The USFWS Fish and Aquatic Conservation Program works closely with other USFWS programs, other Federal agencies, State and academic partners, academia and industry to coordinate and plan efforts focused on Asian carp prevention and control.

Field monitoring: USFWS assisted Illinois DNR with fixed site monitoring downstream of the electric dispersal barrier by electrofishing during four weeks. In 2014, electrofishing was completed in July and September in which 12 Silver and 2 Bighead carp were collected in Marseilles Pool, yet no Asian carp were collected in Dresden Island Pool. Electrofishing conducted in April and July of 2015 also yielded no Silver or Bighead Carp in Dresden Island Pool. USFWS conducted enhanced monitoring below the Electric Dispersal Barrier in the Dresden Island, Marseilles, and Starved Rock pools. This work was conducted in May and July of 2015 for a total of six weeks. Severe flooding occurred in June of 2015 which hindered these efforts. A total of 6,700 yards (6,126 meters) of gillnets were set as well as 2.16 hours of electrofishing. During these two months of sampling crews captured 476 Silver Carp, 17 Bighead Carp, and 29 Grass Carp. The audio used in conjunction with the gillnet sets consisted of banging on the boat as well as using the motor to create more sound.

USFWS assisted the Illinois DNR with seasonal intensive monitoring upstream of the electric dispersal barrier by electrofishing during three weeks. In 2014, electrofishing was completed in September (1 week) and the 2015 sampling occurred in June (2 weeks). During the September 2014 sampling event

crews collected 32 species and a total of 1,628 fish in the 38 sites sampled. In June of 2015, crews collected 48 species and a total of 4,250 fish within the 76 sites sampled.

Efforts to monitor the distribution and movement of small Asian carp in the Illinois Waterways by the Service in 2015 exceeded 2014 efforts. In July through October 2014, sampling efforts consisted of traditional boat electrofishing, push trawl, and mini-fyke nets in Starved Rock, Marseilles, and Dresden Island pools. In 2015, effort was expanded to the LaGrange and Peoria Pools and additional techniques included paupier butterfly frame trawl, surface trawls, and dozer trawls. The use of shallow water gears (e.g. mini-fykes and push trawl) decreased in June and July 2015 due to flood conditions. During this time, these gears were heavily utilized in Dresden Island Pool where flooding was less severe. In 2015, electrofishing runs were adjusted so that specific habitat types could be targeted. Instead of requiring 15-minute runs, electrofishing was conducted for the span of time that was required to cover a specific habitat type (e.g. backwater), typically 5-15 minute runs. Therefore, an increased number of runs in 2015 did not necessarily equate to a greater number of hours spent electrofishing, but allowed crews to collect habitat-specific catch rates, species counts, and water quality measurements.

Over the last several years, the USFWS-Columbia Fish and Wildlife Conservation Office (FWCO) developed a variety of novel and innovative trawls to detect, monitor, and remove Asian carp of all sizes in varying habitats. Several techniques are showing great success, including the paupier butterfly frame trawl, mid-column trawl, and dozer trawl. All of these trawls target the water column, but differ in the habitat and size classes for which they are best suited. Habitat suitability depends on the area, water depth, and water velocity. Modeled after shrimp trawlers in the Gulf of Mexico, the customized paupier butterfly frame trawl utilizes paired nets extending twelve feet (3.6m) on either side of the boat attached to out-riggers and fishes a maximum of ten feet (3m) below the surface of the water but can be raised to sample water as shallow as 2 feet (<1m). The paupier can be deployed in combination with electrofishing delivering a pulsed DC waveform. All of these innovative gears capture Asian carp of multiple sizes; however, combining the sampling technique with electricity greatly increases the likelihood of catching an Asian carp greater than 100 mm. The small mesh in the end of the net allows for the capture of young-of-year and juvenile Asian carp. These trawls are showing great promise for sampling the large open backwater lakes associated with the Illinois River. The 2015 field season introduced the dozer trawl, a seven foot wide by ten foot (2.1m x 3m) long net attached to a rigid frame. The dozer trawl successfully sampled young-of-year and juvenile Asian carp in smaller backwaters and flowing main channel habitats. Modifications are being made to combine this sampling technique with electrofishing and a mud motor to increase the size range of Asian carp that can be captured as well as allow for sampling of shallow, mud-bottomed backwater habitats.

Innovative gears are being evaluated in comparison to traditional fisheries techniques including, but not limited to, mini-fykes and traditional boat electrofishing. Gear comparisons focus on the Asian carp catch per unit of effort, size classes of Asian carp, and bycatch. Over 30,000 Silver Carp measuring 13-900 mm were effectively collected in back waters, tributaries, and big rivers with novel and innovative sampling techniques. Nearly half (45 percent) of those were juveniles less than 400 mm, most likely representing the 2014 and 2015 year classes. In addition to testing the efficacy of these novel gears, they are also being incorporated in eradication (barrier defense) and research (movement and

distribution of small Asian Carp). These collaborative efforts are implemented in cooperation with other USFWS offices, Illinois Natural History Survey, and Illinois DNR.

Further research is recommended to determine the best technique for mass removal of Asian carp in the Illinois River system. A benefit of removing juvenile fish is that the biomass waste is easier to manage and may reduce the population of reproductive adults. However, further advances in mass removal of adults and the subsequent management of removed biomass is imperative for controlling the population.

No small Asian carp were captured in Starved Rock or Marseilles pools in 2014, nor were any captured April through July 2015. Small Asian carp were consistently detected during sampling efforts in the LaGrange and Peoria Pools in April, July, and August 2015. In August 2015, small Silver Carp were detected via push trawl (TL: 133 and 128mm) and electrofishing (TL: 140mm) in the Starved Rock Pool. Aging conducted by USGS in Columbia, MO, revealed that these fish were age 0, indicating they hatched in 2015. Over 100 more small Silver Carp were captured in the Starved Rock Pool in the closing months of 2015: 94 via paupier, seven via electrofishing, and four via surface trawl. Prior to August 2015, no small Asian carp had been captured upstream of the Peoria Pool. Multiple observations of invasive carp spawning aggregations were seen by USFWS personnel in the Peoria Pool in June 2015, while other agencies observed similar aggregations upstream.

Barrier Surveys: The Electric Dispersal Barrier system in the Chicago Sanitary and Ship Canal (CSSC) operates with the purpose of preventing upstream fish migration from the Mississippi River Basin to Lake Michigan. Observational evidence from previous studies suggests that fish congregate below the barrier system at different times throughout the year, primarily during the summer and fall (USFWS unpublished data). Monthly maintenance, daily barge traffic, and other regular maintenance operations have been shown to have the potential to allow fish to pass the Electric Dispersal Barrier (see <http://www.fws.gov/midwest/fisheries/carterville/didson-barge.html> for reports). If and how fish interact with the Electric Dispersal Barrier over varying temporal scales (i.e. diel to seasonal) is not well understood. Having a greater understanding of the temporally varying density and spatial distribution of fish below the Electric Dispersal Barrier system is important to barrier management because it allows operational and maintenance decisions to be made in sync with potential risk factors. To determine when periods of elevated risk might occur, crews from the Carterville FWCO performed split beam hydroacoustic remote sensing surveys immediately downstream of the Electric Dispersal Barrier on a monthly basis and throughout a 24 hour period within each season during 2014. In 2015 crews from the Carterville FWCO-Wilmington Sub-station increased the temporal intensity of sampling efforts by conducting surveys directly downstream of the barrier on a weekly basis through July.

Diel sampling below the electric dispersal barrier took place on September 12-13 and November 3-4, 2014 (Figure 1). The hydroacoustic survey equipment consisted of a scientific echo sounder and a pair of 200 kHz split-beam transducers. The two split-beam transducers were mounted in parallel on the starboard side of the boat on dual axis automatic rotators. The rotators repositioned the transducers to preset positions every 45 seconds. Transects were conducted that began below the barrier system (\approx 300 m). The survey vessel traversed a path close to the west wall traveling north with the side looking

hydroacoustic transducers aimed towards the east wall. Each transect continued through the barrier system, turned south, and then traveled closely along the east wall to the starting point. Three consecutive replicate surveys took place during eight distinct and evenly spaced periods in the 24 hour cycle. Sampling periods included: sunrise, mid-morning, solar noon, mid-afternoon, sunset, mid-evening, midnight, and early-morning. Results suggested that fish density was greatest at night.

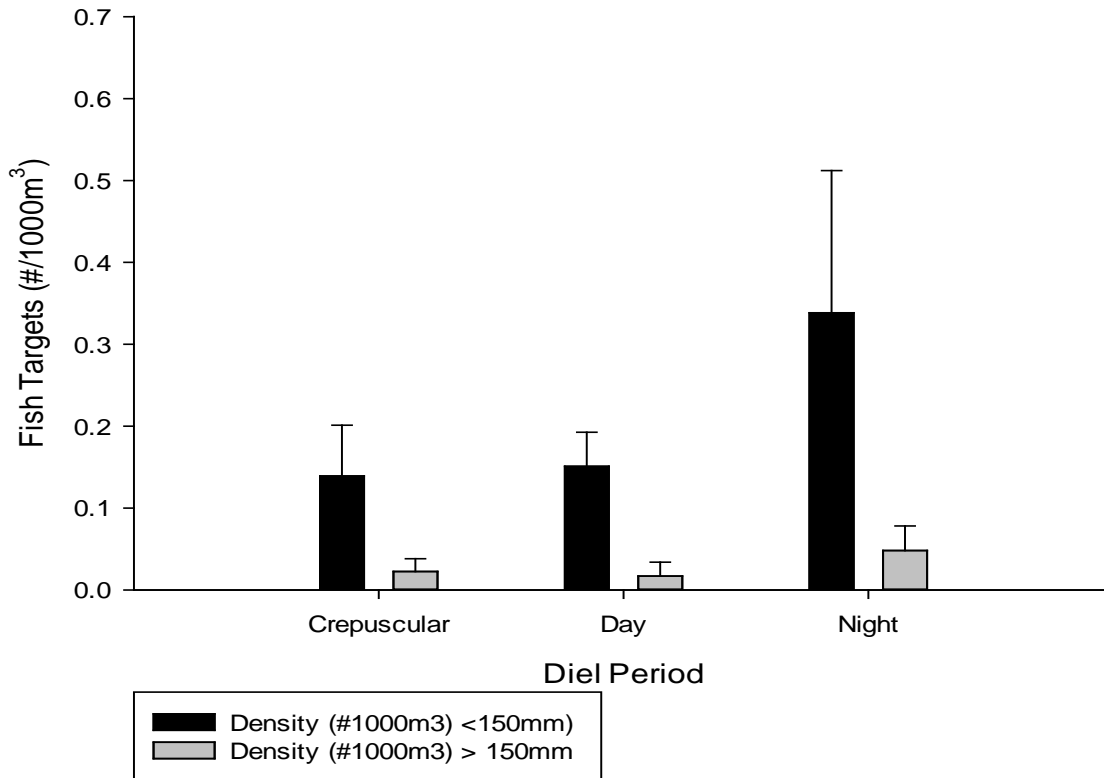


Figure 1. Grouped bar graph of mean fish density (# fish / 1000 m³) showing differences in mean density of large (> 150 mm) and small (< 150 mm) fish between diel periods (Crepuscular n= 6; Day, n= 8; Night, n= 6), during spring 2014 surveys, directly below the electric dispersal barrier (0-300 m). Significant differences in mean density were observed in both large (> 150 mm, ANOVA F= 3.90, df= 19, P= 0.04) and small fish (< 150 mm) (ANOVA F= 6.750, df= 19, P= 0.007). Error bars denote S.D.

Weekly surveys of fish density directly downstream of the Electric Dispersal Barrier system took place from March thru July 2015. The survey data was subsequently processed and reported within one week of the completion of surveys. These data allowed the Barrier Monitoring and Response Workgroup and other partners to closely monitor fish abundance and density directly below barrier on a fine temporal scale. Methods and survey equipment followed the same design utilized during the diel surveys with the exception that surveys were always conducted during late morning and five replicate transects were completed on each survey date. Results of these surveys suggested that fish density directly

downstream of the Electric Dispersal Barrier was low in late winter and spring. Fish density then increased substantially in early summer. This change was likely the result of the influx of young-of-year fishes into the fish community.

Fixed DIDSON: Direct observations of the behavior of fish in the vicinity of the Electric Dispersal Barrier system were made by utilizing two DIDSON multi beam sonar systems that were deployed directly over the narrow array of Barrier IIB (area of ultimate field strength). A boom lift was utilized to deploy both sonar units into the canal from a sturdy position on the west canal bank. This system provides video quality acoustic images of fish as they probe and challenge the electric barrier system. Because two units were deployed, coverage of the top 1.0 m of water over the entire narrow array was accomplished. These data allow us to better understand the actual behavior fish exhibit when confronted with the barrier system.

Data collections were conducted by the Cartersville FWCO during October 2014 that included 1,340 minutes of sonar video footage. These collections were conducted both during the day and at night. Sonar footage cannot determine the species of fish that were being observed so concurrent fish sampling was conducted by the Columbia FWCO (Figure 2). During these data collections fish abundance was very low in the canal and few fish were observed in the vicinity of Barrier IIB.

USFWS staff from Cartersville FWCO-Wilmington Sub-station returned to conduct additional fixed DIDSON sonar work at the Electric Dispersal Barriers during July 2015. In July, 1,720 minutes of data were collected over Barrier IIB. These data collections showed small non-Asian carp fish challenging and in some instances crossing into the narrow array of Barrier IIB. Results from fish on-site fish monitoring/collections conducted concurrently with the DIDSON evaluation by USFWS staff from Columbia FWCO demonstrated that the dominant fish species present near the Electric Dispersal Barrier system during the study was Gizzard Shad, *Dorosoma cepedianum*. The majority of these fish were juveniles, with the dominant size class ranging from 72-105 mm. Several smaller juvenile Gizzard Shad were also collected (26-29 mm; n=6). Data processing and analysis is ongoing. This study will provide a better understanding of the fine scale dynamics associated with fish interactions at the Electric Dispersal Barrier system.

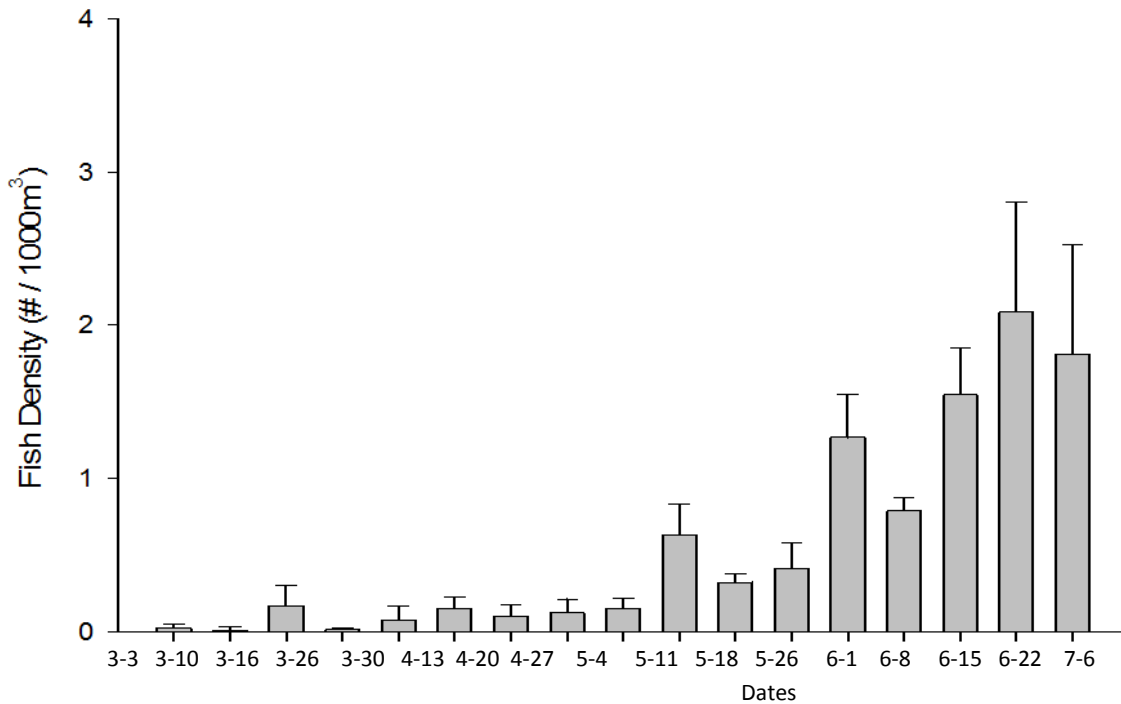


Table 1. Mean total fish density (# / 1000 m³) observed during summer and fall 2014 acoustic remote sensing surveys in the Upper Illinois River.

Pool Surveys: USFWS staff from the Carterville FWCO and Wilmington Sub-station conducted split beam hydroacoustic remote sensing surveys of the Lockport, Brandon Road, and Dresden Island navigation pools in the Upper Illinois Waterway during spring, summer, and fall of 2014 and 2015. This work provided a better understanding of the dynamics of temporally varying fish densities, patterns in spatial distribution within the study pools, and size frequency distributions of the fish community in these study areas. Understanding fish community dynamics throughout the Upper Illinois Waterway will allow the findings from a range of other research activities at the Electric Dispersal Barrier to be put into a system wide context; this enables more refined interpretation of results and better informed management decisions. Additionally, identification of areas of high fish density may help to better target ongoing Asian carp removal efforts. The surveys were conducted using a scientific echo sounder and a pair of 200 kHz split-beam transducers. The two split-beam transducers were mounted in parallel on the starboard (right) side of the boat on dual axis automatic rotators. The rotators repositioned the transducers to preset positions every 45 seconds. The portion of each pool within the navigation channel was surveyed by navigating the research vessel on clockwise transects around the navigation pool near the channel margin. The Lockport pool was surveyed on a monthly to bi-monthly basis during both 2014 and 2015. Brandon Road and Dresden Island pools were surveyed on a seasonal basis during both 2014 and 2015.

Results from the intensive acoustic remote sensing surveys conducted in the Lockport pool throughout 2014 and 2015 showed relatively stable and low fish densities throughout the winter, spring, and early summer. Fish densities were then observed to increase greatly in July and peak in August; this was followed by substantial declines as fall progressed in 2014 (2015 data pending). In addition, the majority of the area within the navigation channel of the Upper Illinois Waterway between the Electric Dispersal

Barrier and the Dresden Island Lock and Dam was surveyed using hydroacoustic remote sensing gear during spring, summer, and fall in both years. Results from those surveys followed the same general trend that the Service observed in the Lockport pool, which fish densities were highest during summer. This trend can likely be accounted for by recruitment of young of year individuals into the fish community.

Brandon Road Lock Surveys: Preliminary surveys were conducted during fall 2014 and spring 2015 to answer a variety of preliminary questions about lock mediated fish passage at the Brandon Road Lock including 1) to what extent are fish utilizing the lock structures as habitat and 2), what effects do locking operations have on the abilities of acoustic remote sensing gears to quantify fish density, and 3) what survey design will be best suited to quantify between reach movements of fish through the lock chambers in our study area. These preliminary acoustic remote sensing surveys were conducted within and adjacent to the Brandon Road Lock structure during September and November 2014 and during May 2015. The surveys used the same equipment and methods described for navigation pool surveys. Briefly, the research vessel entered the lock chamber from downstream with the lock chamber emptied (depth over sills \approx 5 m). The vessel then conducted three replicate transects around the inside of the lock chamber in a clockwise fashion staying as close as possible to the wall while surveying the opposite side of the chamber. Results of these preliminary surveys suggested that fish are utilizing the Brandon Road Lock structure as habitat and were present at densities greater than were observed in the Lockport, Brandon Road, or Dresden Island study reaches during the same season, despite the lock doors being closed except to receive in-coming vessel traffic. We observed mean total fish densities inside the Brandon Road Lock chamber during summer that were well above any densities observed throughout our other remote sensing studies (mean = 38.625 fish / 1000 m³). During fall, densities decreased dramatically but remained higher than levels throughout the remainder of the Upper Illinois Waterway (mean = 4.407 fish / 1000 m³) (Table 2). Additionally, we found that acoustic remote sensing gear proved very efficient at observing and quantifying fish density within the lock chamber both at the empty stage and at the full stage. During the emptying and filling cycles air bubbles obscured the survey equipment for approximately ten minutes after filling. Air bubbles are also problematic during emptying when positioned outside of the chamber on the downstream side. From the knowledge gained during the 2014 season it is believed that deployment of a stationary acoustic remote sensing system on the upstream side of the lock chamber would allow us to collect data that would quantify lock mediated fish passage rates through the Brandon Road Lock chamber.

In June 2015, USFWS staff from the Carterville FWCO-Wilmington Sub-station deployed a stationary split beam acoustic remote sensing system at the upstream side of the Brandon Road Lock chamber. This system utilized two split beam transducers of 120 kHz and 420 kHz and collected data on fish density, fish size, and direction of travel twenty four hours a day seven days a week throughout the summer. Data processing is ongoing.

Location	Summer (# fish / 1000 m ³)	Fall (# fish / 1000 m ³)
Brandon Road Lock	38.625	4.407
Lockport Pool	1.75	0.438
Brandon Road Pool	3.52	1.57
Dresden Pool	0.632	2.27

Table 2. Hydroacoustic results of fish densities within lock chambers of the IWW

Acoustic Telemetry Evaluation of Asian Carp Distribution and Movement in the UMR

Status:

The USFWS La Crosse FWCO has continued to evaluate the distribution and movement patterns of Asian carp within each pool, among pools, and around/through the lock and dams within the UMR. The Upper Mississippi Asian Carp Telemetry project is a continuation of work that begun in the Fall on 2013. Since then 140 Asian carp have been tagged with transmitters in Pools 17, 18 and 19. The results of this effort will be utilized to develop and improve efficiency of removal and deterrent strategies.

Accomplishments:

- 140 bighead, silver, and hybrid carp have been tagged to date but only 90 transmitters are currently active
- To date, 3.5 million detections of acoustically transmitted Asian carp have been recorded on stationary and mobile receivers from Pool 16 to Pool 19
- Monthly manual tracking provided almost 500 pinpointed locations which identified hot spot areas (high use areas) on Pools 17 and 18
- Manual Tracking also identified more locations to add stationary receivers to improve coverage throughout the year
- More Asian carp have used the Iowa River (n=46) than any other tributary
- Asian were also detected in the Rock (n=6) and Skunk (n=4) rivers during the spawning window
- Over 200 passage events have been recorded indicating that Asian carp populations are open and intermix especially during the spawn season
- The acoustic study has identified several areas to target with removal efforts in Pools 17, 18, and 19
- No long, upstream movements have been recorded suggesting only a very small percentage of fish (<1%) may move upstream and not return

Rapid response: The USFWS has not undertaken any rapid response efforts.

Risk Assessment: The USFWS did not perform any risk assessments in 2015, however, MICRA submitted a report to the USFWS titled: *“The use of Grass Carp (Ctenopharyngodon idella) in the United States: Production, triploid certification, shipping, regulation, and stocking recommendations for reducing spread throughout the United States.”* The report provided recommendations to address the risk of diploid Grass Carp being transported and stocked through the triploid Grass Carp chain of supply. The

recommendations are being worked on by the Iowa DNR and Minnesota Center for Environmental Advocacy.

Active prevention: While the USFWS did not directly lead active prevention efforts within the reporting period in the river basin, the USFWS did provide support for state active prevention efforts.

Outreach with industry or the public/stakeholder participation: The USFWS co-chairs the ACRC Communication Workgroup and maintains the AsianCarp.us website, which is a critical communication tool used by our partners, the public, and other stakeholders. The USFWS works on an ongoing basis to provide updates on Asian carp sightings and other developments using vetted interagency communication processes. The AsianCarp.us has been expanded beyond its initial focus of the ACRC to include the UMRB and ORB efforts. The USFWS continues to work with its partners to provide briefings to Congress, Industry, and other stakeholder groups.

Law enforcement/regulatory actions: The USFWS continues to work with its State and Federal partners to support enforcement of the Lacey Act to regulate and minimize the illegal interstate transport of injurious species, including Bighead, Silver, and Black Carp.

Research focused on development or refinement of new tools/techniques: The USFWS works closely with the USGS, USACE and other partners to assist the development of new control tools including carbon dioxide, microparticles, and complex sound. This includes providing environmental compliance expertise required for the development and registration of potential new Asian carp control tools and techniques. For example, the Service has been developing guidance to ensure compliance with Sec 7 of the Endangered Species Act in the event these tools are deployed in open water environments.

Financial support provided to partner agency/organizations: The USFWS provided \$400,000 in FY2015 funding to support high priority partnership projects with states in the UMRB for Asian Carp monitoring and control. USFWS worked with MICRA to develop a process for identifying priority needs, and selecting and developing projects chosen for funding.

2.3 U.S. Coast Guard

Interagency coordination: The role of the USCG is to ensure the safety, security, and environmental protection of the Great Lakes and the Western Rivers. With respect to Asian carp, the USCG focuses on ensuring the safety of mariners, vessels, ACRC personnel, and the public during Asian carp activities on or near federally navigable waterways and in the vicinity of the electric fish barriers. The USCG also exercises control of ballast water on vessels transiting the Chicago Area Waterways System (CAWS) to reduce the risk of Asian carp movement towards the Great Lakes. To carry out these responsibilities, the USCG manages federally navigable waterways through the establishment and enforcement of Regulated Navigation Areas (RNA) and safety zones.

When operations associated with the electric fish barrier, rapid response actions, research projects, or any other Asian carp activity will impact the flow of traffic on a navigable waterway, the USCG issues an RNA or safety zone and provides notice to the public and mariners to inform them of the planned

activities and expected impact on navigation. If a partial or full closure of a navigable waterway is required, the USCG may deploy assets on scene to enforce the closure. For extended closures, the USCG may also establish a temporary vessel traffic service that tracks delayed vessels and facilitates the orderly resumption of traffic after the closure is lifted.

Several offices within USCG headquarters, located in Washington, DC, support Asian carp funding requests and processes interagency agreements for Asian carp activities. These offices also represent the USCG in briefings on Asian carp activities to the Office of Management and Budget and Congressional representatives.

The Ninth Coast Guard District, which is located in Cleveland, OH, is the primary USCG representative to the Asian Carp Regional Coordinating Committee (ACRCC). The Ninth District participates in regular ACRCC teleconferences to discuss Asian carp control activities. The Ninth District also participates in ACRCC Senior Executive teleconferences between the federal agencies to collaborate on Asian carp projects. Finally, Ninth District personnel travel to attend ACRCC meetings, which are normally held in or near Chicago, IL.

Sector Lake Michigan and Marine Safety Unit (MSU) Chicago are the primary field units engaged in Asian carp activities. MSU Chicago is a sub-unit of Sector Lake Michigan, which is itself a sub-unit of the Ninth District. Sector Lake Michigan and MSU Chicago supports Asian carp activities locally at the field level (industry outreach, law enforcement operations, etc.) and attend ACRCC teleconferences and meetings.

The USCG Research and Development Center conducts independent Asian carp research and advises the Ninth Coast Guard District, Sector Lake Michigan, and Marine Safety Unit Chicago on technical issues regarding Asian carp control measures.

Field monitoring: The USCG does not participate in Asian carp monitoring.

Rapid Response: The USCG does not directly conduct rapid response operations; however, the USCG does support the response activities of other ACRCC members when their efforts could conflict with vessel traffic on federally navigable waterways. In these instances, the USCG may establishing a temporary safety zone to restrict or stop vessel traffic in the vicinity of Asian carp rapid response activities in order to ensure the safety of the responders and maritime traffic. The USCG did not support any rapid response actions from June 2012 to June 2014.

Risk Assessment: The USCG Research and Development Center (RDC) performed no new risk assessments for Asian Carp from July 2014 to Sep 2015.

Active prevention: The USCG does not participate in active Asian carp prevention efforts. The USCG monitors the efforts of other ACRCC members engaged in active prevention and provides support when prevention efforts could conflict with vessel traffic on Federally navigable waterways. In these instances, the USCG may establish and enforce a temporary safety zone to restrict or stop vessel traffic in the vicinity of Asian carp prevention activities.

Outreach with industry or the public/stakeholder participation: The USCG conducts public outreach effort when other agencies are engaged in electric barrier testing, maintenance, or construction activities, rapid response activities, fish suppression activities, tool/technology testing activities, or any other Asian carp action that could impact a Federally navigable waterway. The type of outreach depends on the impact these activities could have on vessels and mariners operating nearby (i.e., from awareness only to full waterway closures). Communication tools include Broadcast Notice to Mariners, Local Notice to Mariners, Marine Safety Information Bulletins, and in certain situations, direct telephone contact with local industry stakeholders.

Law enforcement/regulatory actions: The USCG has created the Safety Zones and Regulated Navigation Areas listed below.

Waterway Traffic Management, Safety Risk Assessment Tools	
Safety Zone, Chicago Sanitary and Ship Canal, Romeoville, IL.	Title 33 Code of Federal Regulations Part 165.923(a) All vessels are prohibited from transiting the safety zone with any non-potable water on board if they intend to release that water in any form within, or on the other side of the safety zone. Non-potable water includes, but is not limited to, any water taken on board to control or maintain trim, draft, stability, or stresses of the vessel. These provisions are enforced at all times.
Regulated Navigation Area, Chicago Sanitary and Ship Canal, Romeoville, IL.	Title 33 Code of Federal Regulations Part 165.923(b) The USCG has established a permanent RNA at the barrier to prescribe vessel size, type, and operating requirements. These requirements are necessary to protect vessels and mariners from hazards associated with the electric current radiating from the fish barrier. These provisions are enforced at all times.
Safety Zone, Brandon Road Lock and Dam to Lake Michigan including Des Plaines River, Chicago Sanitary and Ship Canal, Chicago River, and Calumet-Saganashkee Channel, Chicago, IL	Title 33 Code of Federal Regulations Part 165.930 In order to support Asian carp activities anywhere in the Chicago Area Waterway System (CAWS), the USCG created a safety zone in 2010 that covers 77 miles of the CAWS and allows the USCG to restrict or stop vessel traffic for Asian carp activities. Even the though Safety Zone is always in place, the USCG only enforces the safety zone when restrictions or closures are necessary. The USCG strives to provide at least a 30-day notice to waterway users prior to safety zone enforcement, but immediate measures can be put in place without advanced notice if they are needed to protect mariners, vessels, or the public.

The USCG has established a Regulated Navigation Area (RNA) and Safety Zone from mile (MM) 296.1 to 296.7 on the Chicago Sanitary and Ship Canal (CSSC) that, among other stipulations, sets restrictions on the discharge of non-potable water for vessels that transit the safety zone with the intent to release that water in any form within, or on the other side of the Safety Zone. The non-potable water requirements

were implemented to address concerns about the potential transport of carp eggs, gametes, and juvenile fish in bilge, ballast, or other non-potable water.

Law enforcement/regulatory actions: The USCG’s regulatory effort in establishing and enforcing the RNA and Safety Zone is focused primarily on safety; as the RNA mentions: “the USCG’s Ninth District Commander has determined that the electric current radiated from the electric barriers poses certain safety risks to commercial vessels, recreational boaters, and people on or in portions of the CSSC in the vicinity of the barriers”. Consequently, the Ninth USCG District Commander has concluded that a RNA is necessary to mitigate such risks. Several times a year, in support of operations conducted between MM 296.1 and 296.7 on the CSSC, the USCG has issued a Notice of Enforcement for the safety zone listed within 33 CFR 165.930. Operating out of a trailer provided by the Will County Office of Emergency Management, USCG Auxiliary and Active Duty personnel coordinate with vessels from the Romeoville Fire Department, and/or Illinois Department of Natural Resources to manage passing vessel traffic at each end of the safety zone.

Research focused on development or refinement of new tools/techniques: The USCG does not develop its own Asian carp prevention tools/techniques. The USCG supports other agencies as they develop tools/techniques by providing advice focused on the safety of vessels and mariners that may need to operate near Asian carp prevention measures.

Financial support provided to partner agency/organizations: The USCG did not provide financial support to partner agencies/organizations in their efforts to prevent Asian carp.

Summary of Collective GLRI & USCG Base Fund Expenses:

Category	GLRI Funds	Base Funds
Interagency Coordination	\$ 0	\$ 16,747
Field Monitoring	\$ 0	\$ 0
Rapid Response	\$ 0	\$ 0
Risk Assessment	\$ 0	\$ 0
Active Prevention	\$ 0	\$ 0
Outreach with Industry or the Public/Stakeholder Participation	\$ 0	\$ 0
Law Enforcement/Regulatory Actions	\$ 0	\$ 29,901
Research	\$ 0	\$ 0
Total	\$ 0	\$ 46,648

2.4 National Park Service (NPS)

Interagency coordination: NPS participated in a series of inter-agency coordination meetings in 2015 to discuss details, process and projects related to USFWS FY15 base funding increases in support of activities outside the Great Lakes Basin (Upper Mississippi and Ohio Rivers). In this role, NPS participated as a Federal agency partner in two webinars and three face-to-face meetings (Dubuque, IA; La Crosse, WI and St. Charles, Missouri) for the purposes of identifying priority needs and developing projects for implementation, in support of WRRDA Section 1039. The purpose of the meetings was to: determine how funding would be provided and set the stage for project development; develop a list of actions needed to accomplish the objectives identified in the draft UMR Asian Carp Strategy Framework (from this list the group identified priority project needs for FY15; present the proposed process and recommendation to the Fish Tech and UMRCC Exec Board; review and discuss draft project templates for FY15 project priorities previously identified at the March 17 meeting; and finalize project templates for 2015 priority projects, with costs identified (see *Enhanced Upper Mississippi River Agency Collaboration under WRRDA* for list of selected projects).

Field monitoring; rapid response; Outreach with industry or the public/stakeholder participation: On May 28, 2015, a recreational angler fishing at the outflow of the King power plant in Bayport, WI caught a single live Bighead Carp via hook and line. The Minnesota DNR verified the fish as a Bighead carp using a photograph taken by the angler. As a result, later that day Minnesota DNR Fisheries personnel closed the outflow from the main channel and electroshocked the bay. One additional mature female Bighead Carp was captured. Parts of the fish were sent to USGS for analysis. On May 30 and 31, public anglers fishing in the outflow of the power plant, captured two additional Bighead Carp. On June 1, the Minnesota DNR and a contractor electrofished and gill-netted Anderson Bay (just south of the King power plant) and captured no additional Bighead carp. The Minnesota DNR has continued to monitor for Asian carp via electrofishing and gillnetting from Bayport to St. Croix Falls, WI. In addition, USGS and NPS have conducted additional sampling for Asian carp using eDNA monitoring (results are pending).

In addition, the following monitoring and prevention projects are ongoing in the UMRB:

- Monitoring using tagging, electroshocking, nets, lights (attracts larva).
- Sound Deterrence at Lock and Dam 8, equipment at Ford Dam to assess native fish/common carp affects.
- The University of Minnesota (Sorensen Lab) is creating a set of blueprints for an acoustic/bubble array at the mouth of the St. Croix River (project to be designed in a way to be installed very quickly (months), with the primary goal of ensuring a healthy, intact native fishery)
- NPS is funding the creation of blueprints for a sound, sound/bubble barrier at the mouth of the St. Croix. The installation of this project in the river is not funded (equipment, compliance, operation and maintenance), however these plans will allow for a quicker response should the need arise.
- At the end of May 2015, several Bighead Carp were snagged at a site within LOSA by the public and netted/shocked by the Minnesota DNR. The USGS and NPS then took water samples for

eDNA detection and the DNR enhanced monitoring. To date, these fish have not been caught outside the area first discovered (a power plant outflow).

- The Lock at Upper St. Anthony Falls, in Minneapolis, closed in June as part of the WRRDA legislation.

3 State Agencies: Ohio River Basin

3.1 Indiana

Field monitoring: There was one documented range expansion of Silver Carp that Indiana can report on (Section 2.1). For many years the population front in the West Fork of White River stalled out below a low-head dam near Martinsville, Indiana. As a result of the extended period of flooding in the summer of 2015, Silver Carp were able to expand a minimum of 41 miles from their former front near Martinsville to upstream locations in the heart of Indianapolis. In this expansion they were able to bypass 4 in-channel low-head dams. Large numbers of individuals are readily observable in pool areas above Indianapolis dams. Because of the pools above these dams, it is very likely that these fish will remain in the Indianapolis area whereas if the river were free-flowing they would very likely drop back down in the system during periods of low water.

Indiana can confirm juvenile Silver Carp distribution further up in a system than previously documented (Section 2). When Indiana conducted work within the upper Wabash River Asian carp with Purdue University in previous years, common abundance of eggs in the vicinity of Lafayette (approximate river mile 312) was confirmed. Juvenile Asian carp, however, were not apparent until near Terre Haute and south (approximate river mile 214 and lower), a considerable distance downstream, where backwater areas become more abundant and juveniles invade. Because of the extended period of high water in the upper Wabash in the summer of 2015 it seems that Silver Carp spawned further up in the system than they normal and juveniles were found in backwater areas a considerable distance from where they have been found in the past. The most upstream occurrence of juvenile Silver Carp observed in the Wabash occurred on August 6, 2015 was when several young Asian carp were found in standing water left behind when flood waters receded near the junction of the Tippecanoe River and the Wabash River (river mile 322). This demonstrated that juvenile Silver Carp were more than 100 miles further up in the system than there known established location. Because there is commonly not backwater habitat available for juveniles to take advantage of in this area of the Wabash River (except during extreme floods), it is highly unlikely that juveniles will be found very often in this portion of the river.

Sampling specifically targeting Asian carp has been conducted on a limited basis in Indiana. The following sampling occurred during the reporting period:

- In August 2014 the J.E. Roush Lake tailwater was scheduled to be drained by the Army Corps of Engineers for inspection of the stilling basin. The Roush Lake Dam is at river mile 411 and it is the first dam encountered when moving upstream in the Wabash River from the Ohio River. In 2004, a small number of large Bighead Carp were found when the basin was drained, but no Silver Carp were present. When it was drained again in 2014, Indiana wanted to investigate Asian carp population changes over the last 10 years in the uppermost portion of the Wabash River.. In addition, the USFWS took the opportunity to collect eDNA samples to determine whether eDNA could be used to document the fish assemblage that was trapped within the basin. In 2004, records indicated that approximately 5 Bighead Carp were in the basin during the drainage. In 2014 a total of 78 Silver Carp and 11 Bighead Carp were collected and a

number more were still observable in the basin that could not be removed because of the sheer numbers and weight of fish found in the basin. In total over 5,500 pounds of fish comprising 30 species were removed from the basin. Asian carp comprised 15 percent of the biomass by weight (Silver Carp 11.8 percent and Bighead Carp 3.6 percent)

- Over the last few years, Big River Program biologists have performed annual sampling in the lower Wabash River and lower White River to monitor the Asian carp populations. Size, weight, and sex are all determined and otoliths are removed to facilitate aging the fish. The most recent sampling was performed in July 2015.

Active prevention: The bulk of the Asian carp involvement in Indiana has centered around severing the upper Wabash and Maumee watershed connection at Eagle Marsh. Engineering plans were developed by NRCS to construct a nearly 2 mile (11.3 km) long earthen berm on the Eagle Marsh property to separate the watersheds. Some initial work was performed in the fall of 2014 to prepare for the full construction during 2015. It was anticipated that berm construction would begin in the spring of 2015 and the project completed by October of 2015. Unfortunately Ft. Wayne experienced record rainfall in the summer of 2015 and the site was flooded for a large portion of the summer. When flood waters receded the low lying property was far too saturated for an additional length of time to allow for work; therefore, construction of the berm did not begin until the middle of August, more than a month from when completion of the berm was originally anticipated. Since that time construction conditions have been mostly ideal and progress is proceeding at a rapid pace. However, as a result of the delay that the berm will not likely be raised to its full height until the middle of 2016; yet ideal project conditions, a late freeze, or a dry spring may keep the project on its original schedule. In addition, heavy rains in the summer of 2015 delayed construction of the 20 acres of new wetland that will be created off-site for mitigation of the wetlands filled by the berm construction project. Indiana hopes that the wetland mitigation excavation work will be completed in the fall of 2015 and be followed by seeding and wetland plug plantings in the early months of 2016 and spring, respectively. Approximately \$3.5 million has been secured at full Federal share to address this connection area that is second in importance behind the CAWS. This funding includes berm construction and restoration on the Eagle Marsh property, land acquisition, mitigation-related expenses at the off-site mitigation area, and near-term maintenance related to both the berm and mitigation sites.

Expenditures: The following expenditures relating to Asian carp occurred during Indiana fiscal year 2015 (July 1, 2014 to June 30, 2015). These are broken down by funding source:

- GLRI Funding to Indiana DNR to implement the Indiana ANS Management Plan:
 - \$59,415.74 for DNR personnel time – Indiana DNR related to planning and coordination for the Eagle Marsh work. Also includes AIS program administration that is generally related to statewide Asian carp outreach efforts.
 - \$45,000 paid to Little River Wetlands Project - Expenditures were for contracted maintenance of the current barrier fence at Eagle Marsh and for their planning and coordination efforts for the new Eagle Marsh berm.

- \$40,661.20 paid to the University of Purdue – Expenditures for the upper Wabash telemetry and spawning. This project is now completed.
- \$19,679.49 paid to the University of Purdue – Expenditures for the Asian carp pathogen work. This project is now completed.
- Wetland Reserve Program funding to NRCS and then to Indiana DNR:
 - \$133,600.24 – Expenditures related to berm construction on the Eagle Marsh property that is enrolled in the Wetland Reserve Program (WRP)
- GLRI Funding to NRCS and then to Indiana DNR:
 - \$122,644.64 – Expenditures related to the berm construction project including design and construction of berm and barrier features that are not on the WRP easement. Expenses related to regulatory permitting for the entire project. Costs related to survey and design of the mitigation wetland area. Costs associated with railroad agreement. Costs associated with utility relocations.

3.2 Kentucky

Interagency coordination: KDFWR has taken a leading role in implementation of the Ohio River Fish Management Team’s (ORFMT) Ohio River Basin Asian Carp Control Strategy Framework including 6 projects on the Upper Ohio River (Telemetry, Monitoring, Control and Removal, Locks and Dams, Communication, and Wabash River fish community) with multiple partners (ORFMT states, USFWS, USACE, USGS).

KDFWR is also leading efforts to coordinate and conduct Asian carp work on the lower Ohio, Tennessee, and Cumberland Rivers including Kentucky Lake and Lake Barkley in western Kentucky. KDFWR partnered with Murray State University (MSU) and USFWS to perform a pilot hydroacoustics study on the lower Tennessee River below Kentucky Dam. KDFWR is also cooperating with Murray State University to implement an Asian carp telemetry project in Kentucky Lake. This project will likely be expanded up the Tennessee and Cumberland Rivers as the Tennessee Wildlife Resources Association (TWRA) has shown interest. Collaboration between KDFWR, MSU, and two Asian carp processing plants (Two Rivers Fisheries LLC, and RCB Fish Company) is also resulting in studies on demographics and life histories of Asian carp, juvenile Asian carp distribution, age, and potential spawning locations.

Field monitoring: Telemetry- KDFWR participates in a cooperative Asian carp telemetry project directed at understanding movement and habitat use of Asian carp in the upper Ohio River. The primary method of detection is an array of 125 receivers stationed from McAlpine Lock and Dam to Hannibal Lock and Dam. There are currently 176 tagged Asian carp at large in the Ohio River. Initial results show brief periods of movement by tagged Asian carp in the spring and fall with relatively little movement at other times of year. Many of the Silver Carp in this portion of the Ohio River spend most of their time in tributaries of the Ohio River. With the assistance of the USACE, stationary receivers were placed in lock chambers in September 2015 to specifically assess Asian carp movement through lock chambers.

KDFWR has led additional monitoring efforts (electrofishing and gillnetting) in the Upper Ohio River and tributaries with USFWS and WVDNR to provide information on Asian carp distribution. In July and August 2015, 28,746 feet of gillnet and 24 hours of electrofishing effort were completed along the leading edge of Asian carp presence in the Ohio River. No Asian carp were captured in the upstream pools of Greenup and Meldahl. Sixty-three Silver Carp were captured in the McAlpine pool while two Bighead Carp were captured in the Markland pool.

Rapid response: KDFWR houses employees who are dedicated to ANS response in two offices located at each end of the state. Through our ANS coordinator, these offices coordinate with district and research field staff to monitor for new sightings of Asian carp and update the Kentucky ANS distribution database and the USGS NAS program. There were no rapid response events directed towards Asian carp in 2015.

Risk assessment: No state-specific risk assessment has been conducted regarding Asian carp in Kentucky. However, multiple sampling efforts for Asian carp throughout the state are aimed at providing relative abundance estimates of Asian carp. One of the ultimate goals of these projects is to relate changes in our long-term sport fish sampling data to relative abundance of Asian carp.

Active prevention: The KDFWR Control and Removal project specifically targets removal of Asian carp from the Ohio River and tributaries to limit the movement of Asian carp upstream. Due to the relative lack of Asian carp in the upper reaches of the Ohio River in Kentucky (Meldahl and Greenup pools), removal efforts were focused in McAlpine and Cannelton pools in 2015. In August and September, KDFWR completed 38 hours of electrofishing, removing 350 Silver Carp, 2 Bighead Carp, and 3 Grass Carp from the Ohio River. KDFWR has worked to increase catch rates of Asian carp in this project, enlisting the help of commercial fishers and considering atypical sampling methods. Despite an increase in funding in 2015, the current funding levels preclude large scale removal efforts to reduce Asian carp populations in the Ohio River and their upstream movement.

In addition to the work on the upper Ohio River, KDFWR continues to promote commercial fishing to reduce Asian carp populations in the lower Ohio, Tennessee, and Cumberland Rivers, as well as Kentucky and Barkley Lakes. KDFWR initiated a \$0.05 per pound subsidy for commercial fishers fishing for Asian carp in Kentucky Lake and Lake Barkley in 2015. Initial interest from the commercial fishers to sign up for the program was low, but is expected to increase in 2015.

KDFWR continues to manage an Asian Carp Harvest Program (ACHP) which works closely with commercial fishers to allow access to dense populations of Asian carp in areas that are typically closed to commercial fishing. Eighteen commercial fishers fished 241,000 feet of gillnet on 296 trips to harvest 28,893 and 465,468 pounds of Bighead and Silver Carp, respectively. The majority of the effort in that program was directed towards Lake Barkley (36 percent) and Kentucky Lake (22 percent) with less effort in the Ohio (5 percent), Tennessee (3 percent) and Cumberland (3 percent) rivers. The majority of effort was between June and October due to fishermen having access to the lakes during the winter months via a special net permit.

In order to monitor by catch and harvest, KDFWR biologists observed eight commercial fishers on 25 trips within the ACHP. On those trips, 3,533 and 60,584 pounds of Bighead and Silver Carp were

harvested, respectively, while 687 fish representing 19 species were captured as by catch. Sixty-four percent of the total by catch was released alive. Five species of sport fish (N=11) were collected and half were released alive. Kentucky also observed the capture of 361 paddlefish, of which 156 were dead upon release. KDFWR is working closely with our commercial fishermen to monitor and limit the impacts of the expanded commercial fishery for Asian carp.

KDFWR continues to support the commercial harvest of Asian carp. In the 2014-15 season, 1.154 million pounds of Silver carp and 172, 819 pounds of Bighead Carp were harvested by our commercial fishermen in 15 separate water bodies. Kentucky and Barkley lakes and their tailwaters accounted for approximately 793,000 pounds of Silver Carp and approximately 73,849 pounds of Bighead Carp. The Ohio River provided 316,229 pounds of Silver Carp and 87,669 pounds of Bighead carp to the commercial fishery while about 50,000 pounds were harvested from the Mississippi River. The numbers of Asian carp harvested have continually increased as the processing businesses and their markets continue to expand

Outreach with industry or the public/stakeholder participation: KDFWR has continued outreach efforts within the Ohio River Basin via active involvement in a delegation from MICRA that was formed to educate Congressional members and their staffs in Washington D.C. regarding Asian carp issues in the ORB and to increase awareness of ORB needs.

KDFWR is currently working with the Indiana Wildlife Federation to host a meeting of ORB stakeholders/NGO's to inform them of the current progress on Ohio River Asian carp projects and establish relationships for future cooperation.

KDFWR continues working with commercial fisherman, fish processing facilities, and investors to promote fishing for Asian carp. This has included visiting facilities and communicating with commercial fishermen. In addition, KDFWR has worked with our Senators to lobby for tax incentives for investors looking to establish Asian carp processing facilities.

Current outreach programs in Kentucky seek to negate potential conflict between commercial fishers and recreational anglers in our Asian Carp Harvest Program. KDFWR staff has placed signs at boat ramps in areas that are routinely fished by commercial fishers at Kentucky Lake and Lake Barkley and handed out pamphlets describing the Asian Carp Harvest Program to marina operators and anglers at boat ramps. The Kentucky Afield television show and magazine have run segments and published articles educating the public about our Asian Carp Harvest Program.

KDFWR biologists continue to take numerous opportunities to reach the public via communication with news outlets, local schools, fishing groups, and etc.

Law enforcement/regulatory actions: No new laws were passed within the specified time frame. However, KDFWR routinely communicates Asian carp project information and issues with our law enforcement division.

Research focused on development of new tools/techniques: KDFWR has begun assessing atypical gears that may improve catch rates of Asian carp. These gear types are currently variations of gill nets that take advantage of the habits of Asian carp to improve capture. KDFWR fished for juvenile Asian carp using light traps, cast nets, and fyke nets in Kentucky Lake and Lake Barkley in 2015. Silver Carp and Grass Carp were captured in cast nets in August and September 2015, the first young of year Asian carp verified in Kentucky Lake. Juvenile Asian carp captured in this project will be aged, a hatch date will be estimated, and potential spawning areas will be predicted using Tennessee River hydrology data and current Asian carp egg drift models. In the past KDFWR has sampled for Asian carps in lock chambers to assess their use, and movement through locks. Kentucky continues to consider new methods to develop tools to sample carps in the lock chambers.

Financial support provided to partner agencies/organizations: KDFWR supports Asian carp prevention through support of partner agencies in various ways.

- \$60,000 to Murray State University researchers over two years to conduct an Asian carp telemetry project in Kentucky Lake.
- \$30,000 available to commercial fishers through the 5 cent per pound Asian carp subsidy in Kentucky Lake and Lake Barkley.

Expenditures: USFWS Funds (excluding WRRDA funding): \$70,000 (SFR, Aquatic Nuisance Funding), State Funds: \$60,000

3.3 Ohio

The Ohio DNR Division of Wildlife contributed efforts to the Asian carp issue during July 15, 2014 through September 30, 2015 by implementing actions directed at objectives identified in the *Asian Carp Tactical Plan: 2014-2020* (ODNR-DOW 2014). These actions are consistent with interests of states bordering the Ohio River identified in the *Ohio River Asian Carp Control Strategy Framework* (ORFMT 2014) and described in the first *Annual Report to Congress: Summary of Activities and Expenditures to Manage the Threat of Asian Carp in the Upper Mississippi and Ohio River Basins, June 2012 to June 2014* (USFWS 2015). This work included the item below, which are summarized in Table 1.

Field monitoring - USFWS telemetry and eDNA study: The ODNR Division of Wildlife has assisted with this USFWS-lead project in primarily two ways. For the second consecutive year, Ohio has made available a full-time (40-hour per week) seasonal employee to assist the USFWS during the field season with field work. This assistance has been at the discretion of the USFWS project leader and involved both the telemetry and eDNA work. In addition, our staffs in one research unit and three districts have helped maintain the acoustic hydrophone array in the Markland, Meldahl, and Greenup pools used to track fish movement. Ohio has also contributed hydrophones and hydrophone stands and hardware to this effort.

- Traditional fisheries monitoring in the Ohio River - The ODNR Division of Wildlife conducts annual fisheries surveys of black bass, *Morone spp.*, and *Sander spp.* in the Ohio River in conjunction with neighboring Ohio River states. These surveys provide opportunities to observe and remove Asian carp when captured as non-target (secondary objective) species. During the

report period black bass and *Morone spp.* were sampled in tailwaters, embayments, and tributaries of six Ohio River pools and *Sander spp.* were sampled in five tailwaters.

- Monitoring bait dealers - The ODNR Division of Wildlife issues more than 500 baitdealer permits each year. Through a stratified random approach, bait dealers were sampled to monitor for the presence of invasive species by Law Enforcement staff. During the past year officers were trained, equipped, and mobilized for this effort in both the Lake Erie and Ohio River watersheds.

Outreach with industry or the public/stakeholder participation: Advertisements and signage were distributed to promote awareness of aquatic invasive species issues in Ohio.

Active prevention - Evaluation, engineering design, and closure of GLMRIS pathways: GLMRIS pathway closure was evaluated at Long Lake, Little Killbuck Creek, Grand Lake St. Marys, and Mosquito Creek Lake. Design plans have been completed for closure of the pathway at Grand Lake St. Marys at the east end of the reservoir.

Expenditures:

Table 1. Activities, expenditures, and funding sources for addressing the Asian carp issue during July 15, 2014 through September 30, 2015 by the ODNR Division of Wildlife.

Activity	Personnel Expense	Non-personnel Expense	Source of Funds
USFWS telemetry and eDNA study	\$39,673	\$72,569	GLRI
Traditional fisheries monitoring in the Ohio River	\$28,387		Ohio Wildlife Fund (Fund 7015)
Monitoring bait dealers	\$112,180	\$43,671	GLRI
Outreach		\$49,411	GLRI
GLMRIS pathways	\$88,097	\$85,080	GLRI

Table 2. Total Ohio DNR agency expenditures during July 15, 2014 through September 30, 2015 on the Asian carp issue.

Total Agency GLRI*	Total Agency Base	Total Reported Expenditures	Total UMRB/ORB Expenditures (Except CAWS)**
\$1,012,651	\$28,387	\$1,041,038	\$519,068

*Includes work outside of the Ohio River Basin and work on non-Asian carp AIS concerns (e.g., Phragmites control).

**Total expenses relevant to both basins (e.g., pathway closure, bait dealer monitoring, etc.) identified in Table 1.

3.4 North Carolina

Monitoring:

- No known occurrences of Black, Silver or Bighead Carp in Mississippi River Basin (i.e., Tennessee basin in North Carolina) or Ohio (i.e., New River basin in North Carolina) Basins in North Carolina.
- North Carolina has not conducted monitoring or management efforts for Grass Carp in these Basins.

No field sampling, research or fiscal expenditures directly related to Asian carp prevention and control in North Carolina at this point.

3.5 Pennsylvania

The following is a synopsis of coordinated management activities of the Pennsylvania Fish and Boat Commission (PFBC) that supported monitoring, early detection, control, containment, and eradication of Asian carp in the upper Ohio River Basin. These activities ensued between July 15, 2014, and September 30, 2015.

Interagency coordination: As an active member of the Ohio River Fisheries Management Team (ORFMT), PFBC has continued to collaborate at regular intervals over the course of the subject period with state and federal agencies to coordinate Asian carp activities on the Ohio River. On several occasions, these interactions have occurred informally (e.g., regular phone calls and email correspondence), as well as formally during the following assemblies:

Meetings:

- October 29, 2014; Moraine State Park, Pennsylvania: PFBC contributed a presentation on Asian carp at the annual meeting of the Ohio River Basin Fish Habitat Partnership.
- February 3 and 4, 2015; Indianapolis, Indiana: PFBC participated in the Ohio River Asian Carp Management Coordination Meeting, sponsored by the USFWS and MICRA.

Teleconferences:

- August 5, 2014: PFBC participated in a teleconference call with the USFWS regarding Asian carp eDNA sampling of private pay lakes.
- October 30, 2014: PFBC participated in a teleconference call with the USFWS and ORFMT members to discuss reporting of Asian carp eDNA results.

- December 18, 2014: PFBC participated in a WebEx with the USFWS to discuss final results of 2014 Asian carp eDNA samples.
- March 26, 2015: PFBC participated in a teleconference call with ORFMT members to finalize decisions initially made during the Ohio River Asian Carp Management Coordination meeting in Indianapolis.
- April 17, 2015: PFBC participated in a teleconference call with ORFMT members to discuss logistics of 2015 Asian carp eDNA sampling and the Ohio River Asian Carp telemetry project.

Field monitoring: Over the course of the subject period, PFBC assisted staff from the USFWS Carterville Conservation Office during three Asian carp eDNA sampling events – July 2014, May 2015, and September 2015, of the upper Ohio River and several of its major tributaries. These events are summarized as follows:

Table 3. Sampling events conducted in 2015 by PFBC for Asian carp surveillance

Sample Stream	July 2014			May 2015			September 2015*
	# Samples	Bighead Carp (+)	Silver Carp (+)	# Samples	Bighead Carp (+)	Silver Carp (+)	# Samples
Ohio River (OH and WV)	131	1	1	91			45
Ohio River (PA)	232	3**	1**	90	4**		135
Little Beaver Creek (PA)	23			9	1		18
Raccoon Creek (PA)	23						
Beaver River (PA)	23			18			27
Chartiers Creek (PA)	23			18			
Allegheny River (PA)	92			22			
Monongahela River (PA)	46			22			
Private Pay Lakes				8			

*At the time of preparation of this summary report, PFBC was awaiting results of September 2015 Asian carp eDNA samples from the USFWS Whitney Genetics Laboratory.

**These positive detections were reported for samples collected from the Ohio River Montgomery Slough – a 22-acre natural backwater/off-channel feature located directly upstream of the Montgomery Locks and Dam along the right descending bank. PFBC has planned to conduct an Asian carp surveillance survey of the Montgomery Slough using gill nets in November 2015.

During August 5-6, 2014, PFBC conducted Asian carp surveillance surveys using boat electrofishing gear on: (1) the upper Ohio River at the tailwaters of New Cumberland Locks and Dam (river miles 54.3 to 57.4); (2) within the Ohio River Montgomery Slough (river miles 30.9 to 31.6); and (3) tributary Raccoon Creek (river mile 0.0 to 0.7). No Asian carp were collected or observed during these surveys.

As part of its programmatic fisheries management strategies for the upper Ohio River, PFBC conducts periodic surveys at fixed sites within tailwaters of navigation locks and dams (L/D) to monitor trends in abundance, size structure, and age structure of sport fish species. Many of these surveys are coupled with evaluations of overall fish assemblage diversity. At the time of preparation of this summary report, Asian carp were not primary targets during PFBC’s routine stock assessments of Ohio River sport fish species (e.g., Smallmouth Bass, Walleye, and Sauger). However, PFBC feels that any fisheries survey on the Ohio River could serve as surveillance for AIS. All stock assessment surveys by PFBC on the Ohio River over the course of the subject period are summarized as follows:

Table 4. Stock Assessment Surveys performed by PFBC in 2014-2015

Survey Purpose/Gear Type	Montgomery L/D Tailwaters (rivermiles 39.1 to 31.7)	Dashiields L/D Tailwaters (rivermiles 15.5 to 13.3)
Night boat electrofishing targeting Black Bass, White Bass, Striped Bass, and their hybrids (conducted jointly with Ohio DNR Division of Wildlife District 3)	September 16, 2015*	
Day boat electrofishing targeting young-of-year Smallmouth Bass		July 23, 2014* July 30, 2015*
Nearshore beach seining collecting all fish		August 11, 2014* August 17, 2015*

*No Asian carp were collected or observed during these surveys.

Rapid response: Over the course of the subject period, PFBC has not participated in any Rapid Response activities related to Asian carp.

Risk assessment: Over the course of the subject period, PFBC has not participated in any Risk Assessment activities related to Asian carp.

Active prevention: Over the course of the subject period, PFBC has not participated in any Active Prevention activities related to Asian carp.

Outreach: Over the course of the subject period, PFBC has continued to post information regarding Asian carp on its Website (<http://fishandboat.com/ais.htm>).

Law Enforcement: Over the course of the subject period, PFBC's Bureau of Law Enforcement remained engaged in a criminal investigation and related incrimination of the owner of a private pay (for fishing) lake where three illegal Asian carp were found and eradicated by PFBC biologists. The pay lake is comprised of three small impoundments that feed the headwaters of a large tributary of the Ohio River. An Incident Response Plan was prepared and submitted to the owner, and the captures were reported to the USGS NAS Database:

(<http://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=775544>).

Research: PFBC allows citizens to introduce live, sterile, triploid Grass Carp for control of nuisance aquatic vegetation in their private ponds. Purchase and possession of live Grass Carp is monitored by means of a regulated permit system. Purchase of Grass Carp must be made from a USFWS-certified supplier who deals in certified triploid Grass Carp. From 1994 through 2014, PFBC issued 6,676 Grass Carp permits, 1,563 of these in the Ohio River Basin. PFBC knows through observations made during surveys that Grass Carp have escaped private ponds and entered jurisdictional flowing waters. Considering recent finds of wild diploid Grass Carp in Lake Erie and some of its tributaries, PFBC implemented a Grass Carp ploidy testing program for escaped, feral Grass Carp collected by PFBC biologists during surveys or by anglers. Eyeballs are sent to the USFWS Whitney Genetics Laboratory for ploidy testing to determine if diploid fish have eluded the USFWS National Triploid Grass Carp Inspection and Certification Program.

Thus far in this testing program, two individual Grass Carp collected by PFBC biologists within the ORB were found to be fertile diploid:

(<http://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=775545>); and
(<http://nas.er.usgs.gov/queries/SpecimenViewer.aspx?SpecimenID=860023>).

Financial Support/Expenditures: Over the course of the subject period, no Federal appropriations, grants, or other funding sources were used to support the accomplishments listed above. A conservative estimate of \$40,000, however, which includes staff time, vehicles, boats, other equipment, travel, fuel, supplies, and other outlays, was expended by PFBC's Division of Fisheries Management Area 8 office in Somerset to support Pennsylvania's coordinated management activities of Asian carp in the Ohio River Basin.

4 Federal Agencies: Ohio River Basin

4.1 U.S. Fish and Wildlife Service

Interagency coordination: USFWS led or participated in various partnerships and work groups involving coordination of activities for Asian carp management in the Ohio River Basin. This includes working with MICRA and State partners to formulate field projects and longer term plans for managing Asian carp in the Ohio River sub basin. Additionally, USFWS participates in other AIS groups that coordinate and communicate activities related to our Asian carp management efforts, including the Aquatic Nuisance Species Task Force and the American Fisheries Society. The USFWS Fish and Aquatic Conservation Program works closely with other USFWS programs, other Federal agencies, State and academic

partners, academia and industry to coordinate and plan efforts focused on Asian carp prevention and control.

Monitoring: The USFWS conducted telemetry tagging work (gillnetting and electrofishing) during two weeks in September and October of 2014 to support collaborative Asian carp management in the ORB. During 2014, Asian carp (n=75) were tagged with ultrasonic transmitters in the Ohio River and tributaries. USFWS staff retrieved telemetry receivers and downloaded data during July, August and November 2014. Severe flooding postponed redeployment of receivers until April and July 2015. Additional telemetry downloading and fish tagging work was initiated after July 2015 when water levels in the Ohio River receded to levels that allowed for continued research by staff.

Rapid response: The USFWS has not undertaken any rapid response efforts.

Risk Assessment: The USFWS did not perform any risk assessments in 2015, however, MICRA submitted a report to the USFWS titled: *"The use of Grass Carp (Ctenopharyngodon idella) in the United States: Production, triploid certification, shipping, regulation, and stocking recommendations for reducing spread throughout the United States."* The report provided recommendations to address the risk of diploid Grass Carp being transported and stocked through the triploid Grass Carp chain of supply.

Active prevention: While the USFWS did not directly lead active prevention efforts within the reporting period in the river basin, the USFWS did provide coordination, technical, and financial support for State active prevention efforts.

Outreach with industry or the public/stakeholder participation: The USFWS co-chairs the ACRC Communication Workgroup and maintains the AsianCarp.us website, which is a critical communication tool used by our partners, the public, and other stakeholders. The USFWS works on an ongoing basis to provide updates on Asian carp sightings and other developments using vetted interagency communication processes. The AsianCarp.us has been expanded beyond its initial focus of the ACRC to include ORB efforts. The USFWS continues to work with its partners to provide briefings to Congress, Industry, and other stakeholder groups.

Law enforcement/regulatory actions: The USFWS continues to work with its State and Federal partners to support enforcement of the Lacey Act to regulate and minimize the illegal interstate transport of injurious species, including Bighead, Silver, and Black Carp.

Research focused on development or refinement of new tools/techniques: The USFWS works closely with the USGS, USACE and other partners to assist the development of new control tools including carbon dioxide, microparticles, and complex sound. This includes providing environmental compliance expertise required for the development and registration of potential new Asian carp control tools and techniques. For example, USFWS has been developing guidance to ensure compliance with Sec 7 of the Endangered Species Act in the event these tools are deployed in open water environments. While much of this research is currently being developed for potential implementation in the Upper Illinois Waterway and/or CAWS focused on Great Lakes protection, new proven technologies and tools for

Asian Carp control could potentially be implemented to support prevention strategies in other basins, including the ORB, pending the availability of designated resources.

Financial support provided to partner agency/organizations: The USFWS provided \$400,000 in FY2015 funding to support high priority partnership projects with states in the ORB for Asian Carp monitoring and control. USFWS worked with MICRA to develop a process for identifying priority needs, and selecting and developing projects chosen for funding.

4.2 U.S. Geological Survey

The USGS collected hydraulic and water-quality data on the Muskingum River in 2014. The purpose of the data collection was to characterize the river so the likelihood of Asian carp spawning success could be determined. The Muskingum River data were collected June 23-26, 2014 in an 80 km reach from Coshocton (where the Walhonding and Tuscarawas rivers join) to McConnelsville. The collected field data were supplemented with a HEC-RAS hydraulic model of the lower 100 km of the Muskingum River developed by the USGS in 2014 for the purposes of floodplain mapping. The Fluvial Egg Drift Simulator (FluEgg) model will be used to analyze the likelihood of spawning success and results will be published in 2016.

4.3 U.S. Army Corps of Engineers

Interagency coordination: The USACE work under this category consists of participation in various workgroups including, but not limited to, the Asian Carp Regional Coordination Committee (ACRCC) and its workgroups, the Great Lakes and Mississippi River Interbasin Study (GLMRIS) Executive Steering Committee, and the Brandon Road Working Group. Unstructured interagency coordination occurred during the execution of activities described in the subsequent sections of this report.

LRP has continued to collaborate at regular intervals over the course of the subject period with states, other federal agencies and The Nature Conservancy (TNC). On several occasions, these interactions have occurred informally, via telephone or e-mail, as well as formally during the following meetings:

- October 29, 2014; Moraine State Park, Pennsylvania: LRP attended PFBC presentation on Asian Carp, at the annual meeting of the Ohio River Basin Fish Habitat Partnership. (LRP contributed a presentation regarding GLMRIS results pertinent to a Round Goby infestation in northern PA.)
- February 3 - 4, 2015; Indianapolis, Indiana: LRP participated in the Ohio River Asian Carp Management Coordination Meeting, sponsored by the USFWS and MICRA.
- March, 30, 2015; Stonewall Jackson Lake Office, WV: Spin-off meeting re: the implementation of Sec. 1039 of WRRDA 2014 with PFBC & WVDNR. Essentially, the states wanted to know: 1) what flexibility the Corps has in L/D operations, 2) if monitoring equipment can be placed within or near lock chambers, 3) if monitoring equipment can piggy-back on existing Corps WQ platforms, and 4) if the Corps can develop a feasible concept to block invasives, such as Asian

carp, using existing technologies at one of its structures, such as Dashields Lock and Dam (Trip Report attached).

LRH has coordinated informally, via telephone or e-mail, as well as formally during the following meetings:

- February 3 - 4, 2015; Indianapolis, Indiana: LRH participated in the Ohio River Asian Carp Management Coordination Meeting, sponsored by the USFWS and MICRA.
- March 30, 2015; Stonewall Jackson Lake Office, WV: Spin-off meeting re: the implementation of Sec. 1039 of WRRDA 2014 with PFBC & WV Department of Natural Resources (WVDNR). Essentially, the states wanted to know: 1) what flexibility the Corps has in Lock and Dam operations, 2) if monitoring equipment can be placed within or near lock chambers, 3) if monitoring equipment can piggy-back on existing Corps water quality platforms, and 4) if the Corps can develop a feasible concept to block invasives, such as Asian carp.
- LRH Operations Staff has coordinated with WV DNR concerning attaching small monitoring devices to the locks and dam on the Ohio River.

In addition, a 61.8 lb (28 kg) Bighead Carp was caught in September 2015 in the old lock chamber at RC Byrd Lock and Dam on the Ohio River. LRH's Water Management Staff was on-site when the fish was caught by the WVDNR. The WVDNR published an educational press release after this fish was caught.

Rapid response: The USACE has not undertaken any rapid response efforts.

Risk assessment: The USACE has not undertaken any risk assessment efforts.

Law enforcement/regulatory actions: The USACE has not undertaken any law enforcement/regulatory actions.

Research focused on development or refinement of new tools/techniques:

The Nashville District performed research and development in conjunction with the Corps' Engineering and Development Center (ERDC) to evaluate the 2014 fish kill of Silver and Bighead Carp at Barkley Dam on the Cumberland River in Kentucky. This effort evaluated operational data from the dam prior to the die-off. This fish kill resulted in an estimated die-off of 300K-500K Bighead Carp in mid-April 2014 and this evaluation centered on whether any operational aspects and/or water quality conditions could be identified and replicated during 2015. The start-up of one hydropower turbine following an extended period of inactive operation was identified as a potential cause; although similar operations occurred in 2015, yet did not result in fish kills of similar magnitude.

On January 27, 2015, USACE initiated a first draft of an idea set developing a generalized approach to building CFD models to be used to assess fish passage potential at USACE Lock and Dams (DRAFT "Building a Generalized Fish Passage Assessment Tool for Application at Corps' Lock and Dams in Support of EMRRP Work Unit 'Managing Movement of Threatened, Endangered, and Invasive Species Using Corps Water Resources Infrastructure.' Nestler *et al.* USACE ERDC Environmental Laboratory,

Coastal & Hydraulic Laboratory and Pittsburgh District. – currently in review). This work follows, Smith et al. 2013. *Planning Guide for Fish Passage at Pittsburgh District Dams*. ERDC WQTN-AM-16, August 2013.

Financial support provided to partner agency/organizations: None

5 Other Priority Basins

Mississippi

Interagency coordination: Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) staff efforts have been directed towards evaluating the potential for the inter-basin transfer of Asian carp from the Tennessee River basin to the Mobile River basin via the Tennessee-Tombigbee Waterway (TTW) from the Tennessee River system. Completed in the early 1980's, the TTW is a 234 mile man-made navigation canal with a series of ten lock-and-dam impoundments that connects the Tennessee River at Pickwick Lake to the Black Warrior/Tombigbee River system in Alabama; eventually leading to Mobile Bay. The TTW is considered a major tributary of the Tennessee River.

Teleconferences:

- July 21, 2014: MDWFP initiated conference call with USFWS, USACE, and biologists from neighboring states to discuss inter-basin transfer into the TTW from Pickwick Lake on the Tennessee River.
- October 27, 2014: MDWFP participated in a conference call to discuss sampling and potential barriers on the TTW.
- March 12, 2015: MDWFP participated in a conference call about Asian carp in the TTW and eDNA sampling.
- April 10, 2015: MDWFP participated in a conference call regarding eDNA sampling in Bay Springs and Pickwick Lakes.

Meetings:

- December 2014; Fulton, Mississippi. MDWFP met with USACE personnel about potential barrier options on the TTW.
- February 3 and 4, 2015; Indianapolis, Indiana. One MDWFP staff member participated in the Ohio River Asian carp management meeting.
- August 5 – 7, 2015; Iuka, Mississippi. MDWFP hosted a joint technical staff meeting with Alabama and Tennessee. Asian carp monitoring, sampling, and telemetry projects were discussed.

Field monitoring: MDWFP personnel assisted staff from the USFWS Cartersville Conservation Office (April 2015) with the collection of 81 water samples from Lock E and Bay Springs Lake along the TTW for analysis for Asian carp eDNA to determine the leading edge. USFWS also collected 41 samples in the Bear Creek arm of Pickwick Lake along the Tennessee River. Many of these samples were taken in the Mississippi portion of the lake. None of the samples yielded any positive detections of Asian carp. However, Mississippi is aware based on information gained from commercial anglers, that Asian carp (Silver and Bighead) are well established in Pickwick Lake.

Expenditures: Total expenditures are estimated to be approximately \$5,000.