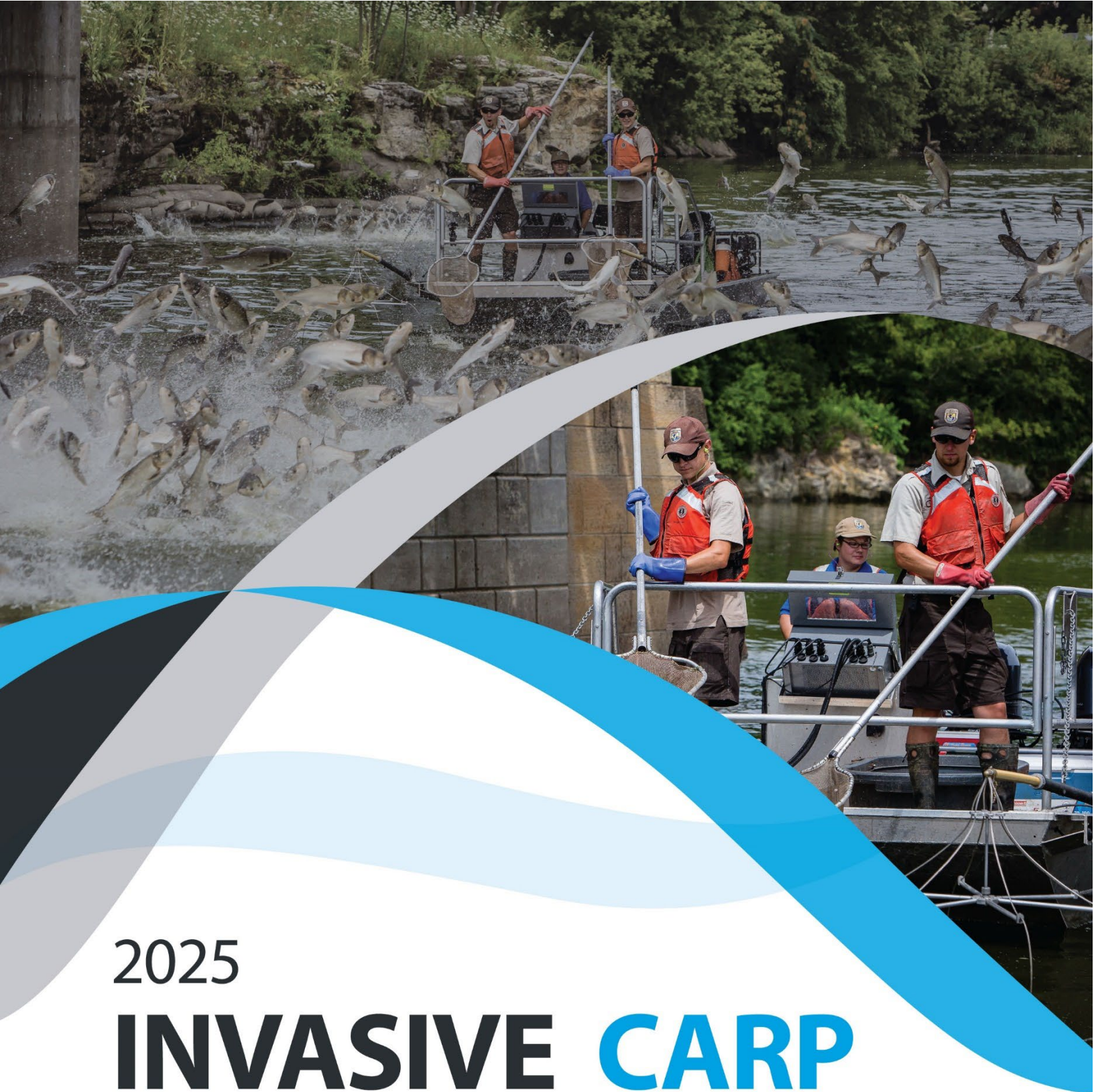




2025

INVASIVE CARP

Monitoring and Response Plan
for the Illinois Waterway

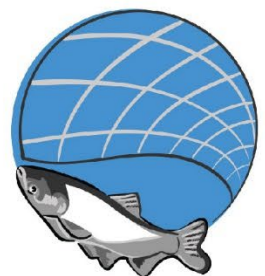


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List of Acronyms

Acronym	Definition
CarpDAT	Invasive Carp Database
CAWS	Chicago Area Waterway System
CRP	Contingency Response Plan
CSSC	Chicago Sanitary and Ship Canal
EDBS	Electric Dispersal Barrier System
eDNA	Environmental Deoxyribonucleic Acid
eRNA	Environmental Ribonucleic Acid
GLFC	Great Lakes Fishery Commission
ICRCC	Invasive Carp Regional Coordinating Committee
ILDNR	Illinois Department of Natural Resources
IRBS	Illinois River Biological Station
ISR	Interim Summary Report
IWW	Illinois Waterway
MAM	Multi-Agency Monitoring
MRP	Monitoring and Response Plan
MRWG	Monitoring and Response Work Group
OTN	Ocean Tracking Network
RAFT	Riverine Acoustic Fish Telemetry
SCAA	Statistical Catch-at-Age
SEICarP	Spatially Explicit Invasive Carp Population
SIM	Seasonal Intensive Monitoring
SIU	Southern Illinois University
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

EXECUTIVE SUMMARY

This 2025 Invasive Carp Monitoring Response Plan (MRP) presents up-to-date information on this year's set of 24 large-scale projects dedicated to preventing invasive carp from establishing populations in the Chicago Area Waterway System (CAWS) and Lake Michigan. The MRP is developed by the Monitoring and Response Work Group (MRWG), co-

Note: In this document, "invasive carp" refers to four species of carp: Bighead Carp, Silver Carp, Grass Carp, and Black Carp.

chaired by the Illinois Department of Natural Resources and the Great Lakes Fishery Commission. This plan also describes how these projects will be coordinated and implemented through the nine work groups established under the MRWG. The current work groups include the following: Contingency Response, Detection, Monitoring, Hydroacoustics, Telemetry, Removal, Modeling, Behavioral Deterrents, and Black Carp.

The MRWG has been implementing invasive carp activities in the Illinois Waterway (IWW) – which includes both the Illinois River and the CAWS – since 2010. Through the efforts of the MRWG member agencies during this time, the presence and reproductive fronts of invasive Silver Carp and Bighead Carp have not advanced.

This year's set of projects fulfills three main objectives, consistent with the MRWG Strategic Vision: 2023 – 2027:

- **Detection:** Determine the distribution and abundance of invasive carp to guide response and control actions.
- **Management and Control:** Prevent the upstream passage of invasive carp toward Lake Michigan via use of barriers, mass removal, and understanding best methods for preventing passage.
- **Response:** Establish comprehensive procedures for responding to changes in invasive carp population status, test these procedures through exercises, and implement if necessary.

In 2025, MRWG member agencies will continue actions designed to prevent the upstream movement of invasive carp and, secondarily, other aquatic nuisance species into the Great Lakes from the IWW, including spring and fall seasonal intensive monitoring within the CAWS, environmental deoxyribonucleic acid sampling above the electric dispersal barrier, assessments of reproduction within the IWW, strategic removal through contract and commercial fishing, as well as population monitoring, modeling, and telemetry work. These non-structural measures will complement the Brandon Road Interbasin Project as construction continues since the Project Partnership Agreement between the U.S. Army Corps of Engineers and the states of Illinois and Michigan was signed on July 1, 2024.

The activities in this MRP build upon considerable work completed in previous years. A detailed accounting of the results and findings of previously completed work can be found at [Action Plans and Reports | Invasive Carp Regional Coordinating Committee](#).

INTRODUCTION AND STRATEGY

This 2025 Invasive Carp Monitoring Response Plan (MRP) presents up-to-date information on this year's set of 24 large-scale projects dedicated to preventing invasive carp from establishing populations in the Chicago Area Waterway System (CAWS) and Lake Michigan. The MRP is developed by the Monitoring and Response Work Group (MRWG), co-chaired by the Illinois Department of Natural Resources (ILDNR) and the Great Lakes Fishery Commission (GLFC). This plan also describes how these projects will be coordinated and implemented through the nine workgroups established under the MRWG. The current work groups include the following: Contingency Response, Detection, Monitoring, Hydroacoustics, Telemetry, Removal, Modeling, Behavioral Deterrents, and Black Carp.

Note: In this document, "invasive carp" refers to four species of carp: Bighead Carp, Silver Carp, Grass Carp, and Black Carp.

The MRWG has implemented invasive carp activities in the Illinois Waterway (IWW) – which includes both the Illinois River and the CAWS – since 2010. The work of the MRWG is focused on Bighead Carp and Silver Carp in the IWW. Through the efforts of the MRWG member agencies utilizing a variety of gear types, including electrofishing, netting, and telemetry, the leading edge of the Bighead Carp and Silver Carp populations remains around river mile 281 (north of I-55 Bridge within the Dresden Island Pool near the Rock Run Rookery), approximately 55 miles from Lake Michigan. Populations of Silver Carp and Bighead Carp have not advanced any further upstream toward Lake Michigan and have declined in abundance near the edges of their invasion fronts since the onset of management and control efforts.

This year's set of projects fulfills three main objectives, consistent with the MRWG Strategic Vision: 2023 – 2027 (Attachment 1):

- **Detection:** Determine the distribution and abundance of invasive carp to guide response and control actions.
- **Management and Control:** Prevent the upstream passage of invasive carp toward Lake Michigan via use of barriers, mass removal, and understanding best methods for preventing passage.
- **Response:** Establish comprehensive procedures for responding to changes in invasive carp population status, test these procedures through exercises, and implement if necessary.

In 2025, MRWG member agencies will continue actions focused on these three main objectives, including spring and fall seasonal intensive monitoring (SIM) within the CAWS, environmental deoxyribonucleic acid (eDNA) sampling above the electric dispersal barrier, assessments of reproduction within the IWW, strategic removal through contract and commercial fishing, as well as population monitoring, modeling, and telemetry work. These non-structural measures will complement the Brandon Road Interbasin Project as construction continues since the Project Partnership Agreement between the U.S. Army Corps of Engineers (USACE) and the states of Illinois and Michigan was signed on July 1, 2024.

The MRWG prepared this 2025 Invasive Carp MRP, released by the Invasive Carp Regional

Coordination Committee (ICRCC). It acts as an update to previous MRPs and presents up-to-date information and operational plans for a host of projects dedicated to preventing invasive carp from establishing populations in the CAWS and Lake Michigan. Specifically, this document is a compilation of 24 individual project plans, each of which plays an important role in preventing the expansion of the range of invasive carp and furthering the understanding of invasive carp location, population dynamics, behavior, and the efficacy of control and capture methods.

This document outlines actions planned for 2025. The actions and activities in this MRP continue to build upon the considerable work completed since 2010. A detailed accounting of the results and findings of previously completed work can be found at [Action Plans and Reports | Invasive Carp Regional Coordinating Committee](#). A summary of activities anticipated to be completed in 2025 is provided and grouped by MRWG work groups. Two or more work groups collaborate on many of the activities.

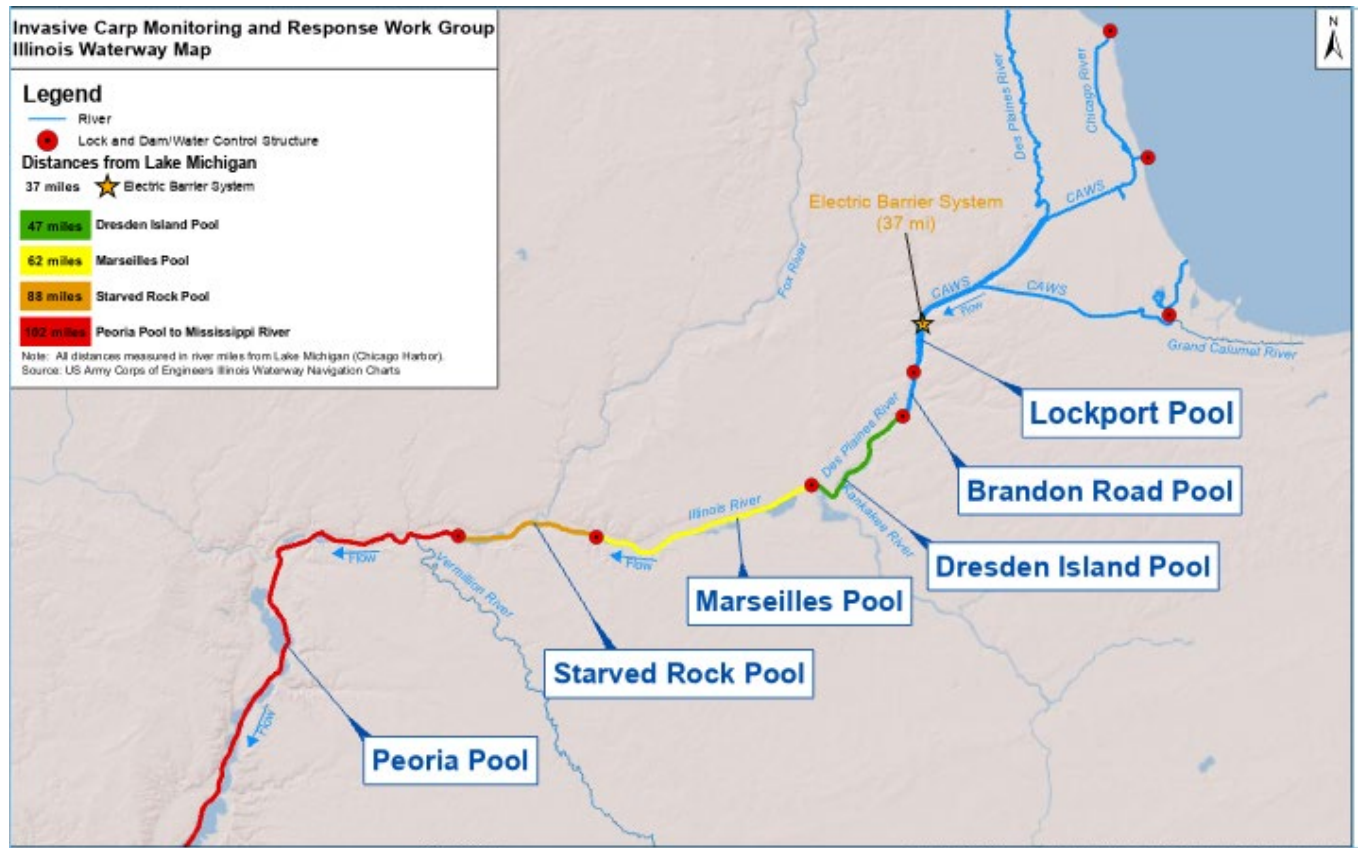
All MRPs to date, including the 2025 MRP, have benefitted from the review of technical experts and MRWG members, including, but not limited to, Great Lakes states' natural resource agencies and non-governmental organizations. Contributions to this document have been made by several state and federal agencies.

This 2025 MRP provides information about project activities, incorporating new information, technologies, and methods as they have been discovered, field-tested, and implemented. The MRWG is also completing a companion document, the 2024 Invasive Carp Interim Summary Report (ISR), which summarizes each project's activities, results, findings, and recommendations for future actions. Collectively, the 2025 MRP and 2024 ISR present a comprehensive accounting of the activities and projects conducted to prevent the establishment of invasive carp in the CAWS and Lake Michigan. Through these documents, the reader can obtain a thorough understanding of the most current project results and findings, as well as how these findings will be used to guide future activities.

This MRP provides operational direction regarding IWW-related projects described in the ICRCC [Action Plans](#). The ICRCC is convened by the U.S. Fish and Wildlife Service (USFWS) and the U.S. Environmental Protection Agency (USEPA) to assist ICRCC member agencies in implementing their authorities to reduce and eliminate the threats to the Great Lakes posed by invasive carp. The ICRCC membership includes 26 U.S. and Canadian federal, state, provincial, tribal, regional, and local agencies.

This MRP is a natural extension of the [Illinois State Comprehensive Management Plan for Aquatic Nuisance Species](#) and further builds upon the [Management and Control Plan for Bighead, Black, Grass, and Silver Carps in the United States](#). Figure 1 depicts the six pools, CAWS, and the Electric Dispersal Barrier System (EDBS) in the IWW and their distances from Lake Michigan.

Figure 1 – MRWG IWW Map



MRWG Work Groups

Discipline-specific work groups assist in developing the most informed MRPs. Work groups may also help in focusing expertise for further evaluation, assisting in decision-making, or otherwise providing MRWG co-chairs, agencies, and the ICRCC with insights as technical experts on a range of subjects. Expected work groups for 2025 are listed below, with leads identified to assist in communication and structure. Co-leads may also be identified to assist with managing these work groups as appropriate and helpful. Work groups may be added or deleted to serve MRWG and ICRCC needs. Table 1 lists the work groups and their corresponding leads and co-leads.

Table 1. MRWG Work Group Leads

<i>2025 Work Group</i>	<i>Lead</i>	<i>Agency</i>	<i>Co-Lead</i>	<i>Agency</i>
Contingency Response	Nick Barkowski	USACE	Alex Catalano Mindy Barnett	USACE ILDNR
Detection	Steve Butler	INHS	Jen-Luc Abeln Joe Parkos	USFWS INHS
Monitoring	Jim Lamer	INHS	Eli Lampo	ILDNR
Hydroacoustics	Jim Garvey	SIU	Elizabeth Harrell	USFWS
Telemetry	Marybeth Brey	USGS	Alex Catalano	USACE
Removal	Allie Lenaerts	ILDNR	Justin Widloe	ILDNR
Modeling	Richie Erickson	USGS	Benjamin Marcek	USFWS
Behavioral Deterrents	Marybeth Brey	USGS	Christa Woodley Nick Barkowski	USACE USACE
Black Carp	Rob Simmonds	USFWS	-	-

Project Crosswalk

The MRWG has prepared a project location crosswalk to clearly depict the geospatial scale and focus of projects by work groups included in the MRP (Figure 2). This crosswalk tool allows readers to understand where a specific work group focuses its efforts and quickly discern all projects operating in a specific portion of the IWW and CAWS.

Figure 2 – Project Crosswalk

PROJECT	Illinois River Pool (Upstream → Downstream)									WORK GROUP	LEAD AGENCY
	CAWS	Lockport	Brandon Road	Dresden Island	Marseilles	Starved Rock	Peoria	La Grange	Alton		
Early Detection Monitoring for IC	↔									Detection	USFWS
SIM in the CAWS	↔									Detection	ILDNR
IC eDNA Sampling and Processing	↔									Detection	USFWS
Planning for Field Demonstration of CO2	↔	→								Behavioral Deterrence	USACE/USGS
Real-Time Telemetry Alert System	↔	→	→	→	→	→				Telemetry	USGS
Support for Early Detection of IC in the IWW	↔	→	→	→	→	→				Detection	USFWS
Upper IWW CRP	↔	→	→	→	→	→				Contingency Response	USFWS
Alternative Pathway Surveillance – Law Enforcement	↔	→	→	→	→	→	→	→	→	Detection	ILDNR
IC Stock Assessment in IL River Using Hydroacoustics	↔	→	→	→	→	→	→	→	→	Hydroacoustics	ILDNR
IC Database Management /Integration Support	↔	→	→	→	→	→	→	→	→	Modeling	USGS
Operation & Maintenance of EDBS		↔								Behavioral Deterrence	USACE
Hydroacoustic Surveys in the Upper IWW		↔	→	→	→	→				Hydroacoustics	USFWS

PROJECT	Illinois River Pool (Upstream → Downstream)									WORK GROUP	LEAD AGENCY
	CAWS	Lockport	Brandon Road	Dresden Island	Marseilles	Starved Rock	Peoria	La Grange	Alton		
Early Detection of IC in the IWW		←→								Detection	USFWS
IC Demographics in the IWW	←→									Monitoring	USFWS
Multi-Agency Monitoring	←→									Monitoring	USFWS
Assessment of IC Reproduction		←→								Detection	ILDNR
Contract Fishing for IC Removal Near the EDBS				←→						Removal	ILDNR
Support for IC Population Modeling				←→						Modeling	USGS/USFWS
Telemetry Tracking in the IWW to Support the SEICarP					←→					Telemetry	USFWS
Evaluation of Fish Transfer System					←→					Removal	ILDNR
SIU Longitudinal Receiver Array and Tagging						←→				Hydroacoustics	SIU
Enhanced IC Removal in the Lower Illinois River						←→				Removal	ILDNR
Enhanced Detection of Black Carp							←→			Black Carp	ILDNR
Data Collection from Captures of Black Carp in Lower IL River							←→			Black Carp	ILDNR

WORK GROUP DESCRIPTIONS

A brief description of the mission or purpose of each work group is provided to give the reader an understanding of the work groups' top priorities and main focuses.

CONTINGENCY RESPONSE WORK GROUP

The Contingency Response Work Group maintains and updates the Contingency Response Plan (CRP). The CRP outlines the process and procedures the MRWG and ICRC member agencies will follow in response to detected changes in invasive carp distribution or abundances of particular life stages in any given pool of the Upper IWW.

DETECTION WORK GROUP

The Detection Work Group ensures thorough surveillance for the presence of invasive carp in each of the pools upstream of Starved Rock Lock and Dam and in the Des Plaines and Kankakee rivers to enable an effective response to any detection before invaders challenge the EDBS, CAWS, or further threaten the Great Lakes.

MONITORING WORK GROUP

The Monitoring Work Group supports the MRWG in maintaining a portfolio of projects throughout the IWW that assist in developing, evaluating, and monitoring management actions that prevent Bighead Carp, Black Carp, Grass Carp, and Silver Carp from establishing in Lake Michigan.

HYDROACOUSTICS WORK GROUP

The Hydroacoustics Work Group provides information on trends in invasive carp abundance, size distributions, and habitat use through space and time in the IWW that inform and assess management actions.

TELEMETRY WORK GROUP

The Telemetry Work Group's purpose is to ensure the multi-agency telemetry efforts are coordinated to efficiently and effectively meet the MRWG goals of detection, management and control, and response. The objectives of the work group are to measure movement and distribution to inform management through (1) modeling efforts (e.g., Spatially Explicit Invasive Carp Population [SEICarP] model), (2) barrier evaluations, and (3) contingency and response efforts.

REMOVAL WORK GROUP

The Removal Work Group's primary objective is to capture and remove invasive carp in the Upper Illinois River via contracted commercial fishing efforts to reduce the risk of upstream migration and minimize propagule pressure on the EDBS. This data will help refine population models to inform future removal efforts.

MODELING WORK GROUP

The Modeling Work Group provides quantitative support and guidance for bigheaded carp monitoring and removal in the Illinois River.

BEHAVIORAL DETERRENTS WORK GROUP

The goal of the Behavioral Deterrents Work Group is to provide current information to the MRWG on the deployment, operation, and evaluation of behavioral deterrents for invasive carp.

BLACK CARP WORK GROUP

The Black Carp Work Group works within the Illinois River and many other parts of the Mississippi River basin to better understand the biology, distribution, and abundance of Black Carp in the U.S. The Black Carp Work Group identifies management actions, monitoring, and research that help limit the distribution and abundance of Black Carp, prevent their spread into the Great Lakes, and minimize their effect on native mollusks.

PROJECT FOCUS IN 2025

The below sections summarize the MRWG projects planned for the 2025 field year.

Early Detection Monitoring and Contingency Response in the Illinois Waterway

Work Group: Detection

Lead Agency: ILDNR/USFWS

This project has several components, including three projects described in more detail below, that will implement monitoring and early detection in the Upper IWW, including monitoring for invasive carp above the EDBS, monitoring of invasive carp population changes within the pools above Starved Rock, and agency support for contract commercial fishing in these same areas to suppress populations and prevent invasive carp from becoming established in the Great Lakes. Intensive monitoring will occur in the spring and fall using eDNA monitoring in the CAWS above the EDBS. Monitoring and removing invasive carp will be conducted below the EDBS where adult invasive carp are present utilizing the semi-annual unified method approach and deploying contract commercial fishers in conjunction with agency staff. Electrofishing, hoop nets, and mini-fykes will be deployed weekly to monitor the presence of small invasive carp above the reproductive front (i.e., upstream of Starved Rock Lock and Dam).

Upper Illinois Waterway Contingency Response

Work Group: Contingency Response

Lead Agency: ILDNR/USACE

This project has established a set protocol for determining whether detection results merit a direct response action and laid out a framework for taking response actions, including steps for coordinating between agencies and communicating with the public. Contingency planning allows for heightened and more coordinated agency responses. In 2025, relevant agencies will continue developing and refining the CRP to make it more concise and straightforward and identify any needed improvements to the plan. An Incident Command System Field Day prior to the Spring SIM will be conducted. The Contingency Response Work Group will also update and manage contingency response efforts around the Brandon Road Lock and Dam during the Brandon Road Interbasin Project construction.

Seasonal Intensive Monitoring in the CAWS

Work Group: Detection

Lead Agency: ILDNR

SIM is a planned intensive surveillance of the CAWS upstream of the EDBS conducted twice annually in conjunction with agency partners. These 2025 events are planned for the spring season (May 12 to 23) and the fall season (September 29 to October 10). The SIM deploys fixed and random site monitoring. This project includes standardized monitoring with pulsed-DC boat electrofishing gear and contracted commercial fishers. Along with maintaining the spatial coverage upstream of the

EDBS, each SIM event will provide extra sampling focus on a unique location in the CAWS. SIM provides a spatially and temporally robust assessment of the potential presence of invasive carp in the CAWS upstream of the EDBS. The 2025 SIM events will replicate the 2024 sampling effort per reach and continue Grass Carp ploidy testing and otolith removal.

Multi-Agency Monitoring Activities

Work Group: Monitoring

Lead Agency: ILDNR/USFWS

Three 6-week periods of multi-agency monitoring (MAM) consistent with MAM protocol will occur in Lockport, Brandon, and Dresden Island pools utilizing various gear types and sampling locations. This weekly surveillance by agency staff in the upper pools of the Illinois River will use hoop nets, electrofishing, and mini-fykes to monitor for the presence of small fish and changes in adult invasive carp demographics. Many of these locations are targeted due to the shallow nature and are unreachable by the other sampling techniques deployed. MAM by the Illinois River Biological Station (IRBS) is also supported in the lower river pools – Marseilles, Starved Rock, and Peoria. This standardized sampling approach provides direct and indirect data on invasive carp population demographics and impacts on native fish populations. The general purpose of this project is to prevent the establishment of invasive carp in the Great Lakes by preventing movement through the CAWS through various ILDNR actions.

Support for Early Detection of Invasive Carp in the Upper Illinois Waterway

Work Group: Detection

Lead Agency: USFWS

This project supports early detection monitoring for invasive carp between the EDBS and Lake Michigan, and enhanced monitoring for juvenile and adult Bighead Carp and Silver Carp in the Lockport, Brandon Road, Dresden Island, and Marseilles pools and the Kankakee River will also be supported. Monitoring results will inform evaluations of the current invasion risk to the Great Lakes via the CAWS and the Illinois River CRP. Also, USFWS will conduct early detection monitoring in the Des Plaines River, focusing on detecting invasive carp that might move into the river prior to overflow events to reduce the risk of invasive carp transfer between the Des Plaines River and the Chicago Sanitary and Ship Canal (CSSC) near the EDBS during high-water events. Sites will be monitored during the 2025 field season utilizing boat electrofishing, fyke netting, and gill netting. When Des Plaines River conditions indicate overflows, physical inspections of the barrier between the river and the CSSC will occur, as well as ichthyoplankton sampling. USFWS will be notified of the location of potential overflow events by USACE so that monitoring teams may be deployed. This project will prevent invasive carp from becoming established in the Great Lakes by preventing the movement of invasive carp through to Lake Michigan.

Assessment of Invasive Carp Reproduction in the Illinois Waterway

Work Group: Detection

Lead Agency: ILDNR

This project will monitor invasive carp reproduction in the Illinois River, Des Plaines River, CSSC, and select tributaries of the IWW, including the Kankakee, Fox, Vermilion, Mackinaw, Spoon, and Sangamon rivers. This project will result in (1) rapid detection of any invasive carp reproduction in the Upper IWW (upstream of Starved Rock Lock and Dam); (2) early detection of Black Carp reproduction in the Illinois River; (3) an evaluation of the spatial and temporal extent and magnitude of invasive carp reproduction in the IWW and its tributaries; and (4) quantified relationships

between adult invasive carp densities, reproductive productivity, juvenile invasive carp abundance, and subsequent recruitment to inform invasive carp removal efforts. This project will also prevent invasive carp from becoming established in the Great Lakes through rapid detection of invasive carp spawning in the IWW, guiding targeted responses to disrupt invasive carp reproduction, and in combination with harvest and removal efforts in the IWW, assessing removal levels that will diminish invasive carp population growth rate, thereby slowing expansion of the invasion front toward the Great Lakes via the IWW. During 2025, ichthyoplankton sampling will be conducted to monitor for the presence of invasive carp eggs and larvae to assess the extent, location, timing, and magnitude of invasive carp reproduction in the IWW.

Invasive Carp eDNA Sampling and Processing

Work Group: Detection

Lead Agency: USFWS

eDNA provides a valuable surveillance tool to track the presence and range of invasive species. This project will continue sampling for Bighead Carp and Silver Carp eDNA in the Great Lakes, Upper Mississippi River, and Ohio River basins. Semi-annual sampling will continue in Lake Calumet, Calumet Harbor, the Grand Calumet River, and Powderhorn Lake. One sampling event will be conducted prior to the late-spring SIM event, and the second will be conducted just before the fall SIM event. Monitoring for eDNA in Lake Calumet and the Little Calumet Marina will continue in 2025. USFWS expects 9,000 to 10,000 water samples will be collected and analyzed in 2025.

Early Detection Monitoring for Invasive Carp in the Great Lakes

Work Group: Detection

Lead Agency: USFWS

This project will examine existing environmental ribonucleic acid (eRNA) science to inform the development of baseline tools targeting live Silver Carp and Bighead Carp surveillance. A state-of-the-science document will be produced that will help inform decision-makers on the applicability of this technology and provide Bighead Carp and Silver Carp eRNA detection tests for future field testing. This program complements the invasive carp eDNA monitoring program implemented by the USFWS and partners in the U.S. waters of the Great Lakes and key tributaries.

Alternative Pathway Surveillance in Illinois – Law Enforcement

Work Group: Detection

Lead Agency: ILDNR

This project created a more robust and effective enforcement component of the ILDNR invasive species program by increasing education and enforcement activities at bait shops, bait and sportfish production/distribution facilities, fish processors, and fish markets or other food establishments known to prefer live fish for release or food preparation. Two projects will be initiated in 2025, including the enforcement phase of the GLFC Law Committee's Least Wanted Aquatic Invasive Species project, which targets businesses selling aquatic invasive species on the internet. The second project will initiate commercial inspection projects for businesses with the greatest likelihood of possessing or trading aquatic invasive species.

Invasive Carp Demographics in the Illinois Waterway

Work Group: Monitoring

Lead Agency: USFWS

Detection and monitoring of invasive carp populations in the Illinois River are critical for achieving management goals. To address this important information need, natural resource agencies

collaborate to implement a standardized multiple-gear sampling approach. This project will provide additional fisheries monitoring capacity for an existing standardized interagency sampling effort utilized by MRWG in the Illinois River and support the collection of key demographic data (e.g., total length, weight, age, sex, and maturity) for invasive carp captured in the lower six pools of the river. This project provides an additional sampling technique (the electrified dozer trawl) within the existing MAM and supports the acquisition of fishery population information for conducting statistically robust analyses of Silver Carp in the Illinois River. Community data collected from 633 samples will be integrated into the MAM program database, as well as age and growth data derived from 1,600 invasive carp individuals. Data will be provided to the MRWG Modeling Work Group to inform invasive carp population models that evaluate and inform harvest efforts in the Illinois River. Such models will be used to evaluate the relative importance of fishing mortality, fish movement, and natural mortality to observed changes in Silver Carp abundance. In addition, spectroscopy will be assessed for potential use to improve and streamline the process of annual aging of fish.

Invasive Carp Stock Assessment in the Illinois River Using Hydroacoustics

Work Group: Hydroacoustics

Lead Agency: ILDNR

This project continues previous work by Southern Illinois University (SIU) that has intensively monitored the movement and density of invasive carp in the Illinois River since 2012. A combination of hydroacoustic and telemetry tracking and associated sampling surveys will yield information on trends in density, biomass, and population information, such as size structure, catch per unit effort, and length-weight relationships of invasive carp in the Illinois River. These surveys provide valuable long-term trends. SIU's contribution to continued model support will include maintenance of the Illinois River stationary telemetry array to document inter-pool movements, deployment of additional acoustic telemetry tags in Bighead Carp and Silver Carp, and continued hydroacoustic monitoring of Bighead Carp and Silver Carp densities throughout the Illinois River. In 2025, invasive carp "heat maps" of Bighead Carp and Silver Carp densities will be produced.

SIU Longitudinal Receiver Array and Tagging

Work Group: Hydroacoustics

Lead Agency: ILDNR

As part of the Invasive Carp Stock Assessment project, this SIU project detects patterns in the longitudinal movement of invasive carp within the Illinois River and contributes to the number of active transmitters for real-time receiver detections. In 2025, SIU plans to maintain the receiver array, replace four lost receivers, increase tags in the Alton Pool during the spring to 45 and fall to approximately 200 invasive carp, and range test receivers.

Hydroacoustic Surveys of Fish Abundance and Distribution in the Upper Illinois Waterway

Work Group: Hydroacoustics

Lead Agency: USFWS

Since 2016, hydroacoustic surveys have been completed biweekly to monthly to gain greater temporal resolution on fish abundance and distribution dynamics near the EDBS. This project will provide estimates of large fish abundance and distribution near the EDBS and in the Dresden, Brandon Road, and Lockport pools of the Upper IWW. This project will ensure changes to the operation of the EDBS are informed by data on current fish presence near the system. Hydroacoustic surveys at the EDBS will be conducted monthly, and Upper IWW pool scans will be conducted

annually in the fall. A scan will also be conducted in the spring, and a heatmap of fish densities will be produced to help inform invasive carp removal efforts. Additional scans will be conducted upon request at the need of the partnership for management activities.

Real-Time Telemetry Alert System

Work Group: Telemetry

Lead Agency: USGS

Real-time telemetry receivers are deployed at strategic locations in channel and off-channel areas in the Upper Illinois and Des Plaines river systems and the CAWS. This project will result in (1) updated transition (movement between pools) probability estimates from telemetry data to parameterize population models used to evaluate alternative management actions, (2) management and maintenance of the real-time alert system for tagged invasive carp, (3) measurement of immigration and emigration of invasive carp to and from the Illinois River, and (4) development of a framework for using either existing telemetry data or planning future studies to refine population model parameter estimates (e.g., fishing mortality) to prevent invasive carp from becoming established in the Great Lakes. This project will also support the maintenance of real-time telemetry to inform contingency actions (including replacement of outdated receivers), summarize immigration and emigration estimates, review and format additional years of telemetry data for future updates to transition probabilities, provide guidance for efficient distribution of tagging effort and receiver placement in the Illinois River, and develop a framework for estimating or refining additional model parameters that may use acoustic telemetry data.

Acoustic Telemetry in the Illinois Waterway to Support Population Modeling

Work Group: Telemetry

Lead Agency: USFWS/USGS

This project uses invasive carp acoustic telemetry and movement data to inform management actions to control the abundance of invasive carp in the IWW. Acoustic telemetry data from the Telemetry Work Group's longitudinal telemetry array and tagged fish from the inter-agency partnership support modeling efforts to estimate fish movement probabilities between river pools and parameterize supplemental population models used to evaluate alternative management actions, such as contract fishing or use of behavioral deterrents. In 2025, data will also be used to estimate invasive carp immigration and emigration rates between the Mississippi and Illinois rivers and to explore the potential to estimate invasive carp fishing or natural mortality. This project supports the continued operation and maintenance of strategically placed real-time telemetry receivers in the Upper Illinois River and the CAWS and an associated email-based alert system to inform contingency actions and contract fishing.

Contract Fishing for Invasive Carp Removal Near the EDBS

Work Group: Removal

Lead Agency: ILDNR

Contracted commercial fishing below the EDBS uses contracted commercial fishers to reduce Bighead Carp, Black Carp, Grass Carp, and Silver Carp numbers and monitor for their expansion in the Upper Illinois River and Lower Des Plaines River downstream of the EDBS. The project aims to decrease invasive carp numbers, resulting in the anticipated reduction of migration pressure toward the barrier and lessening the chances of invasive carp gaining access to upstream waters in the CAWS and Lake Michigan. In 2025, the goal is to remove approximately 1 million pounds of invasive carp from the Upper IWW, especially targeting Starved Rock and Marseilles pools. Twenty-four

weeks of contracted removal in these pools are scheduled annually and begin in the spring following ice-out and continue to mid-summer when temperatures become too warm to harvest fish effectively. Effort resumes in September until freeze up. Monitoring for upstream expansion of invasive carp should help identify changes in the leading edge, distribution, and relative abundance of invasive carp in the IWW. The contracted fishers are also available as rapid responders and can be called up to participate in a coordinated contingency effort if information indicates further investigation is warranted or if additional harvest is needed.

Enhanced Invasive Carp Removal in the Lower Illinois River

Work Group: Removal

Lead Agency: ILDNR

This project reduces the abundance of invasive carp in Peoria, LaGrange, and Alton pools through controlled and contracted fishing efforts. This program issues fishing contracts to commercial fishers willing to target invasive carp in these three pools and fulfill contractual obligations of selling, reporting, transporting, and fishing in the identified area. This project also provides critical information about population densities of invasive carp through time in the lower three pools of the Illinois River to guide management efforts. This project works to identify and employ mechanisms for the use of harvested fish by private industry, including human consumption. A cooperative relationship between agencies, fishers, markets, and end users will provide advice and support to further inform fishers on the quality and quantity of fish in demand. 2025 plans include subcontracting 40 to 50 commercial fishers to remove an aggregate average total of approximately 400,000 pounds of invasive carp per week. Fish processors who pick up invasive carp or have facilities or buying stations within 10 miles of the river in the Alton, LaGrange, and Peoria pools will also be contracted.

Evaluation of Fish Transfer System to Promote Native Species Movement and Invasive Carp Harvest

Work Group: Removal

Lead Agency: ILDNR

This project will evaluate invasive carp attraction to and utilization of a mobile fish movement system/ladder with associated technology to support fish scanning and sorting capabilities in the Illinois River and adjacent waterways. A mobile pilot fish passage system that supports fish passage while facilitating invasive carp harvest will be implemented. A floating mobile platform to support the fish ladder will allow the unit to be evaluated in multiple locations as needed, help determine optimum height and angle, and overcome the limitations of a fixed design and mobility. Prior work has shown that Silver Carp and Grass Carp will climb a fish ladder, but native fish outperformed the invasive ones in the pilot study. The more flexible design will allow the attempt to optimize the fish ladder for invasive carp movement while also assessing the conditions necessary to selectively pass natives. A series of experiments controlling for multiple variables will be conducted, including the angle of the steep pass, the flow rate and depth of water in the steep pass, the flow rate and depth of water in the flow box, the elevation of the steep pass distal end to or in the water's surface, invasive carp attractants, and environmental conditions conducive to invasive carp movement.

Invasive Carp Database Management and Integration Support

Work Group: Modeling

Lead Agency: USGS

This project will provide invasive carp data management and decision support tools for the Illinois River with extensions to the entire Mississippi River Basin. This project will help prevent invasive carp from becoming established in the Great Lakes by providing partners access to data and tools to analyze, visualize, model, and understand invasive carp movements and life history. The databases use data compilation and analysis to inform ongoing management and control actions. Specific objectives for 2025 include (1) developing additional features for the Riverine Acoustic Fish Telemetry (RAFT) Network by integrating a data download feature for transmitters and receivers, completing the development of the detections query and download feature, creating an Application Programming Interface to support regular data retrieval, adding notifications and administrative functions for project owners, and incorporating continuous integration, delivery and development, security, and operations procedures into the database development process; (2) completing RAFT data integration with the Ocean Tracking Network (OTN) and leveraging OTN expertise to begin developing invasive carp analysis tools; (3) working with USFWS to develop and deploy a public invasive carp database (CarpDAT) data catalog to ensure invasive carp information is findable, accessible, interoperable, and reusable; and (4) continuing maintenance of the Illinois River Carp Database application.

Invasive Carp Population Modeling to Support an Adaptive Management Framework

Work Group: Modeling

Lead Agency: USGS/USFWS

This project will develop objective, data-driven models to inform decisions concerning invasive carp control efforts in the Illinois River. This project will result in population status estimates and identify management recommendations that, when implemented, should minimize the number of invasive carp challenging the EDBS. Initial management recommendations can be provided from the SEICarP model, which is entering the production phase. To estimate the population size and harvest mortality of Bighead Carp and Silver Carp in the Illinois River, the MRWG Modeling Work Group is using catch statistics, age and growth data, and telemetry-based movement data (e.g., data received from the Removal, Monitoring, and Telemetry Work Groups and the enhanced contract harvest program) to begin developing a Statistical Catch-at-Age (SCAA) model. Once operational, these models can be used iteratively to set management targets, estimate the effectiveness of management actions, and recalibrate management targets based on this new information.

Operation and Maintenance of the Electric Dispersal Barrier System

Work Group: Behavioral Deterrents

Lead Agency: USACE

The USACE operates three electric dispersal barriers (Barrier 1, Barrier 2A, and Barrier 2B) for aquatic invasive species in the CSSC, collectively referred to as the EDBS. The USACE has operated electric barriers in the CSSC since 2002. Over the years, several operational and procedural improvements have been implemented to improve the effectiveness and continuously deliver an uninterrupted flow of electricity to the water to deter fish. In 2025, USACE will activate the new components of Barrier I for full-time operation and continue to operate and maintain existing barriers. Additional efforts in 2025 include completing ongoing minor construction and real estate acquisition.

USACE Planning for Field Demonstration of Carbon Dioxide Deterrent at the EDBS/USGS Planning for a Field Demonstration of Carbon Dioxide Deployment at the EDBS

Work Group: Behavioral Deterrents

Lead Agency: USACE/USGS

Carbon dioxide injected into water is a registered aquatic pesticide (Carbon Dioxide-Carp; EPA Reg. Number: 6704-95) and a behavioral deterrent method for invasive carp. This project is the next step to complete the planning for implementing a Carbon Dioxide-Carp injection system in the CAWS as a backup invasive carp deterrent at the EDBS. This project will assess the feasibility of using Carbon Dioxide-Carp as a deterrent to prevent invasive carp from moving into and becoming established in the Great Lakes by clearing fish from the EDBS during or after electrical outages (e.g., planned or unplanned system maintenance). If successful, Carbon Dioxide-Carp could enhance general safety by eliminating the need to place agency fishing boats and crews within the electrified field to manually remove fish. The project team will coordinate with regulatory authorities to identify, complete, and acquire all necessary regulatory compliance and permits for field testing; validate fluid dynamic models; identify locations and specifications for structural modifications to allow installation of invasive carp deterrents (e.g., identify locations where the canal wall could be modified/notched to allow installation of invasive carp deterrents without risk for interference with vessels); and develop needed contract documents for field testing.

Enhanced Detection of Black Carp in the Lower Illinois River

Work Group: Black Carp

Lead Agency: ILDNR

This project will monitor for Black Carp and determine their abundance in the Alton Pool of the Illinois River. This project will result in relative abundance estimates that can be used to assess the impacts of management activities. In 2025, the ILDNR will continue sampling for Black Carp using hoop nets augmented with experimental baits to assess the Black Carp population in the Lower Illinois River and the efficacy of different baits used for collection. Expanded hoop netting efforts will be conducted in main- and side-channel habitats during three sampling periods between June 15 and October 31, similar to ongoing standardized long-term resource monitoring hoop netting efforts. Relative abundance estimates will be used to detect Black Carp population status changes and to help inform and assess management actions.

Data Collection from Commercial Fishers and Recreational Angler Captures of Black Carp in the Lower Illinois River

Work Group: Behavioral Deterrents

Lead Agency: ILDNR

This project will fund incentive payments to sport and commercial anglers who submit captured Black Carp for agency analysis in the Illinois River from Peoria to Alton. The project will also focus on Black Carp populations in the Mississippi River Basin that could impact expansion into the Illinois River. This project will result in valuable information regarding the range expansion of Black Carp and prevent invasive carp from becoming established in the Great Lakes by functioning as an early detection and monitoring tool.

ATTACHMENT 1
MRWG Strategic Vision: 2023 -2027

MRWG Strategic Vision: 2023 -2027

The Monitoring and Response Work Group (MRWG) is the action arm of the Invasive Carp Regional Coordination Committee (ICRCC) working to monitor the Upper Illinois Waterway (IWW) and the Chicago Area Waterway System (CAWS) for invasive carp to manage invasive carp populations (Bighead Carp, Silver Carp, Grass Carp, and Black Carp) and to respond to any changes in the status of invasive carp in the upper IWW.

The projects undertaken by the MRWG are designed to address three primary objectives for preventing the spread of invasive carp to Lake Michigan. These objectives are:

- **Detection:** Determine the distribution and abundance of invasive carp to guide response and control actions.
- **Management and Control:** Prevent the upstream passage of invasive carp upstream of Brandon Road Lock and Dam toward Lake Michigan using barriers and mass removal and understanding the best methods for preventing passage.
- **Response:** Establish comprehensive procedures for responding to changes in invasive carp population status, test these procedures through exercises, and implement if necessary.

The short-term strategic vision laid out below is dependent on continued funding at levels consistent with previous years to sustain aggressive removal efforts that reduce the risk of range expansion, as well as to continue focused surveillance to ensure that management agencies have an accurate understanding of changes to invasive carp range, population dynamics, and behavior.

Purpose

This strategic vision is intended to provide foundational guidance for detection, management, control, and response activities in the annual Monitoring and Response Plan (MRP) for 2023 to 2027. The overarching purpose of this strategic vision is the prevention of expansion of invasive carp populations within the Illinois Waterway system and the protection of the Great Lakes from invasion by Bighead, Silver, Grass, and Black Carp. It reflects the collective input of the MRWG agency leads and MRWG co-chairs.

Detection

Determine the distribution and abundance of invasive carp to guide response and control actions.

- Maintain a comprehensive and complementary suite of detection activities (physical detection, telemetry, eDNA, etc.) that efficiently and effectively informs ongoing adaptive management and control or response needs.
 - Ensure sufficient detection effort is deployed through standardized multi-agency monitoring throughout upper IWW, Des Plaines, and Kankakee rivers to maintain ICRCC and MRWG leadership confidence that invasive carp are not present, including:

- Detection for invasive carp upstream of the Electric Dispersal Barrier System (EDBS) in Romeoville, Illinois, through bi-annual eDNA and Seasonal Intensive Monitoring.
- Annual assessment and status of adult fish, small fish, larvae, and eggs, as outlined in the Monitoring and Response Plan for each pool between Starved Rock Lock and Dam and the EDBS.
- Adapt actions as appropriate to guide decisions and response planning through annual work group communication and coordination via the annual MRWG meetings.
- Evaluate the amount and types of effort needed to most effectively characterize the risk of invasive carp upstream of Brandon Road Lock and Dam.
- Maintain alternative pathway surveillance.
 - Conduct invasive carp surveillance in Chicago area ponds using trammel nets and electrofishing every 5 years or when a verifiable invasive carp record is received.
 - Coordinate, train, and support law enforcement staff in intelligence gathering, commercial inspections, and enforcement actions related to invasive carps.

Management and Control

Prevent the upstream passage of invasive carp toward Lake Michigan using barriers and mass removal and understanding the best methods for preventing passage.

- Support the development, testing, and/or operation of behavioral deterrents aimed at reducing or eliminating upstream movement of invasive carp.
 - Support optimal operation and maintenance of a state-of-the-art EDBS in the CAWS with ongoing effectiveness evaluation.
 - Support the design, installation, and evaluation of an effective carbon dioxide (CO₂) deterrent system to function as a clearing mechanism in support of the EDBS.
 - Support the design, installation, or evaluation needs of the multi-deterrent system to be installed at Brandon Road Lock and Dam.
- Remove invasive carp from between Starved Rock Lock and Dam and Brandon Road Lock and Dam to reduce upstream propagule pressure at the leading edge of the population. This work will complement efforts further downstream to reduce invasive carp biomass.
 - Conduct annual contract fishing to suppress invasive carp to reduce densities to 2015 levels or lower.
 - Target: Reduce the estimated biomass of invasive carp in the Dresden Island Pool by an additional 25 percent from the biomass observed in 2020.
 - Target: Reduce the estimated biomass of invasive carp in the Marseilles Pool by an additional 25 percent from the biomass observed in 2020.
 - Target: Reduce the estimated biomass of invasive carp in the Starved Rock Pool by an additional 25 percent from the biomass observed in 2020.
 - Maintain or increase annual removal of 1.1 million pounds of invasive carp between Starved Rock Lock and Dam and Brandon Road Lock and Dam.
- Evaluate attractant, deterrent, and repellent technologies in combination with contracted fishing to increase harvest.

- Enhance existing commercial fishing downstream of Starved Rock Lock and Dam to increase harvest of invasive carp in source areas of the IWW.
 - Implement branding and marketing strategy to support commercial utilization.
 - Expand commercial fishing incentives downstream of Peoria Pool.
 - Increase removal/harvest in this part of the river to 20 million pounds annually by 2027.
- Evaluate and adaptively improve effectiveness/efficiency of all ongoing management and control actions.
 - Refine survey techniques to provide reliable estimates of invasive carp biomass per unit area in the IWW downstream of the Brandon Road Lock and Dam.
 - Improve the Spatially Explicit Invasive Carp Population (SEICarP) model predictions through integration of telemetry results and revised population vital rates to evaluate effectiveness of removal efforts.
 - Develop additional population and movement models to assist MRWG and ICRCC leadership with resource allocation decisions.
 - Adaptively refine removal strategies based on lessons learned and new technologies identified to continually improve efficiency and effectiveness.
 - Integrate effective technologies to enhance control activities to herd or attract carp, such as modular electric barriers, algal attractants, acoustic deterrents and attractants, and use of CO₂.
- Leverage MRWG experience and expertise to support the development of invasive carp management and control strategies in other waterways, as requested.

Response

Establish procedures for responding to changes in invasive carp population status, test these procedures through exercises, and implement if necessary.

- Maintain effective response capability within 48 hours or less of detected population changes deemed actionable per the Contingency Response Plan.
 - Develop appropriate tabletop exercises annually and incorporate lessons learned into the Contingency Response Plan.
 - Recommend training when agency personnel change to maintain operational familiarity with Incident Command System structures and principles.
 - Identify, evaluate, and integrate potential new technologies for use in responses.
 - By 2023, evaluate the population status metrics for each pool and the suite of available response tools available for use within the Contingency Response Plan for future years.
- Review barrier operations and operational changes in close collaboration with U.S. Army Corps of Engineers and MRWG members during the annual MRWG meeting to ensure effectiveness at preventing upstream movement of carp.