



UMR Invasive Carp Acoustic Telemetry Report 2020

Geographic Location:

The US Fish and Wildlife Service (USFWS) telemetry receiver array typically spans from Pool 5A downstream to Pool 20 on the Upper Mississippi River. However, during 2020, the array was limited from Pools 5A-10 and Pools 14-19 because of travel restrictions imposed during the height of the COVID-19 pandemic.

Participating Agencies:

Minnesota Department of Natural Resources (MNDNR)
Missouri Department of Conservation (MDC)
Southern Illinois University (SIU)
U.S. Army Corps of Engineers (USACE)
U.S. Coast Guard (USCG)
U.S. Geological Survey – Upper Midwest Environmental Sciences Center (USGS)
Western Illinois University (WIU)
Illinois Natural History Survey (INHS)

Point of Contact:

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Statement of Need:

Populations of Silver Carp (*Hypophthalmichthys molitrix*) and Bighead Carp (*H. nobilis*) as well as hybrids (*H. molitrix x nobilis*) between these species, are advancing in the Upper Mississippi River (UMR) basin (Conover et al. 2007; Chapman and Hoff 2011; O’Connell et al. 2011). Three zones of relative abundance of Asian carp have been identified in the UMR; a robust core population (established) below L&D 19, a transitional zone of moderately dense populations with potential reproduction from L&D19 to L&D 15, and a zone where individual captures of some adults have been recorded above L&D15 (USFWS 2016).

Project Description

Telemetry operations span all three management zones to help understand movement and habitat use within and among pools across these zones. It is maintained by a multi-agency cooperative with broad interests concerning the management and spatial ecology of Asian carp and native species whose habitats overlap with Asian carp. Telemetry programs serve two projects described in the *2018 Monitoring and Response Plan for Asian Carp in the Mississippi River Basin*: Evaluation of controls, impacts and behaviors of Asian carp in the lower UMR and Evaluation of fish passage for assessment of Asian Carp deterrents at multiple locks in the Upper Mississippi River (Jackson and Runstrom 2018). Personnel from USFWS manage the extended longitudinal array and real-time receivers in support of the Evaluations of Controls project. Personnel from USGS manage concentrated telemetry arrays near Locks and Dams 15 and 19 in support of the Evaluation of fish passage project. A project summary for FY 20 Evaluation of fish passage is included in a separate section of this report.

Project Objectives:



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- 1) Utilize real-time and passive receivers to understand Asian carp movement patterns and identify environmental variables that influence those patterns.
- 2) Increase efficiency of removal efforts by locating congregations of Asian carp and sharing information with removal teams in a timely manner.

Project Highlights:

- The deployment of the UMR telemetry array was delayed and restricted in size because of COVID-19 related travel bans during 2020.
- USFWS crews collaborated with biologists from the MN DNR and contracted commercial fishers to capture, tag, and release five Silver Carp in Pool 8. These fish represent the first invasive carp captured, tagged, and released in Pool 8.

Methods:

Acoustic Transmitter Tagging: Staff from the USFWS La Crosse FWCO and from USGS Upper Midwest Environmental Science Center worked with Minnesota DNR and contracted commercial fishers to capture and release five Silver Carp implanted with telemetry transmitters in Pool 8 near La Crosse, Wisconsin. Captures of invasive Silver, Bighead, and Grass carp expanded in Pool 8 during spring and summer 2020. In March 2020, 35 Silver Carp and 15 Grass Carp were netted by commercial fishers during a two-day fishing effort in Pool 8. For context, only 21 Silver Carp and 34 Bighead Carp have been reported from UMR Pools 2-11 from 1996-2019, according to the USGS Nonindigenous Aquatic Species database. Work restrictions caused by COVID-19 mitigation protocols limited USFWS, MN DNR, and WI DNR's efforts to respond to this large catch event. However, biologists from all three agencies along with scientists from USGS remained engaged on the issue of capturing, tagging, and releasing invasive carp in the Pool 8 whenever conditions permitted. When biologists from MN DNR were finally able to gain clearance to mobilize contracted commercial fishers to pursue carp in Pool 8 during October 2020, USFWS crews made preparations to respond to any capture reports. When notified of three Silver Carp captures on 13 October, a combined USFWS and USGS crew quickly mobilized from telework status to meet MN DNR biologists and fit the carp with tracking devices and get them back into the river. The crew responded again to tag a fourth and fifth Silver Carp on 21 and 23 October, respectively.

Fish receiving transmitters were placed into a holding tank (~375 L) on a boat containing river water adjusted to a 0.5% salt solution (Wurts 1995) upon capture. Total length (mm), weight (g), and sex were recorded for each Silver Carp captured. Vemco Model V16-6H acoustic transmitters (69 kHz 16mm diameter, 96 mm length, 34g), programmed to transmit on a random delay of 120 seconds with a projected battery life of approximately 5-7 years, were tested for recognition with a mobile receiver (VR-100-200) and surgically implanted according to procedures outlined by Summerfelt and Smith (1990).

Stationary Receiver Array: Staff from the La Crosse FWCO have maintained an array of stationary receivers (Vemco Model VR2W and VR2-Tx) in the UMR since 2013. During 2020, the size and extent of the array was severely restricted because of travel bans instituted after the onset of the COVID-19 pandemic. Receivers were deployed by USFWS-La Crosse staff in Pools



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5A-10 and partners with Illinois Natural History Survey deployed receivers in Pools 14-19 (Figure 1). Data from stationary receivers were downloaded every 4-8 weeks. These data provided information on gross movement patterns, possible spawning events, and habitat use; and in turn, inform removal and potential deterrent placement.

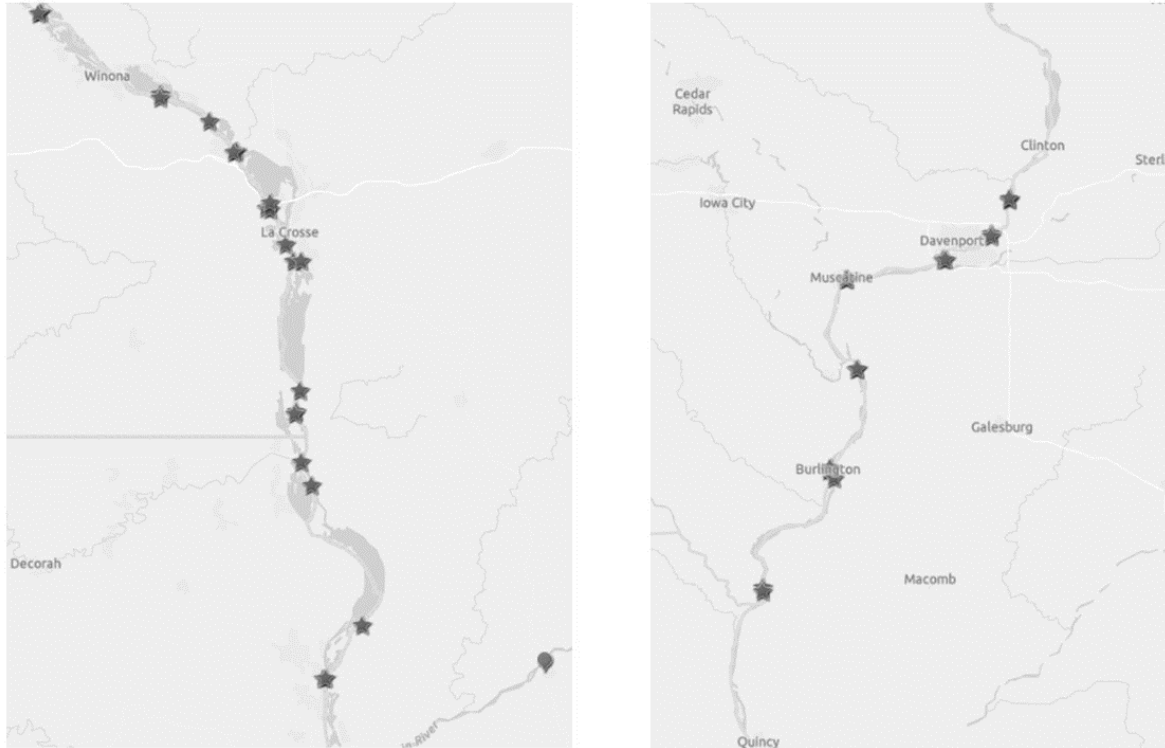


Figure 1. Locations of stationary receivers deployed by the USFWS/INHS (stars) in the Mississippi river basin during 2020. Receivers in Pools 5A-10, including the Wisconsin River (left figure) were deployed and maintained by the USFWS. Receivers in Pools 14-19 (right figure) were deployed and maintained for USFWS by Illinois Natural History Survey.

Real Time Receivers: COVID-19 travel restrictions limited the USFWS' capacity to deploy and maintain real-time receivers in Pools 16-18. During June 2020, a team from USGS, who were permitted to travel overnight, volunteered to deploy two of four real-time receivers at Credit Island (Pool 16) and Boston Bay (Pool 18). The information provided by these receivers supported contracted commercial removal efforts in those areas until they were removed in November.

Biologists from Minnesota DNR requested that USFWS deploy the remaining two real-time receivers in Pool 8 following the capture, tagging, and release of five silver carp near La Crosse. These receivers were deployed in the I-90 scour in upper Pool 8 and Bluff Slough near the middle of Pool 8. These receivers assisted MN DNR biologists in relocating the tagged Silver Carp until the receivers were removed in early December.



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Data Analysis: All analyses of telemetry detections data were completed using the V-Track package in Program R (Campbell et al. 2012; R Core Team 2020). The package condensed detection records in situations where at least two detections for an individual fish within 12 hours at a fixed location (i.e., a receiver) constituted a residence event. The event was terminated/timed-out when 1) the individual was either not detected for 12 hours at a given receiver, or 2) it was detected at a new receiver. Data from both stationary and real-time receivers were incorporated into this analysis. Residence events were later summarized by UMR pools and tributaries to examine the geographic extent of Silver and Bighead carp dispersal during 2020.

Results:

Despite the limited extent of the 2020 array, the analysis indicated that receivers deployed by USFWS and INHS biologists recorded detections from 27 Bighead Carp, 57 Silver Carp, 5 hybrid carp, 50 Bigmouth Buffalo, 46 Paddlefish, and 1 Lake Sturgeon in 8 pools of the UMR. Most invasive carp residency events were concentrated in Pools 16-19 where the highest densities of tagged invasive carps occur. Residency events were filtered to determine the number of individual carp contributing events in each pool (Table 1). The five Silver Carp tagged in Pool 8 contributed unique residency events in Pool 8 and in Pool 9 when one individual moved downstream across Lock and Dam 8.

Table 1. Results from residency event analysis for Silver and Bighead Carp and their hybrids in the UMR during 2020. The number of residency events recorded in each location provides an indication of the number of tagged individuals who passed through these locations from June-December 2020.

Species	Number of individuals with unique residency events in each navigational pool												Total
	Upper Mississippi River Navigation Pools												
	5A	6	7	8	9	10	14	15	16	17	18	19	
Bighead Carp									5	1	6	17	29
Hybrid Bighead-Silver Carp									2		1	2	5
Silver Carp				5	1		3	5	13	5	10	21	63

Discussion:

The success of the USFWS telemetry efforts during 2020 would not have been possible without the assistance of our partners at INHS and USGS. Overnight travel restrictions limited the extent of travel for any one crew, but the strength of the UMRACT partnership allowed the USFWS to complete their mission of deploying and maintaining the UMR telemetry array.

The capture, tagging, and release of invasive carp in Pool 8 is also a notable first that occurred during 2020. Prior to 2020, no carp had been tagged between Pools 14 and the St. Croix River. Hopefully, these fish will act as guides leading contracted commercial fishers working with MN



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DNR towards other congregations of invasive carp in this region. These fish may also inform future studies of the habitat use patterns of invasive carp in the highly braided portions of the UMR characteristic of Pools 2-12.

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