

USFWS eDNA Monitoring Invasive carp

Amy McGovern

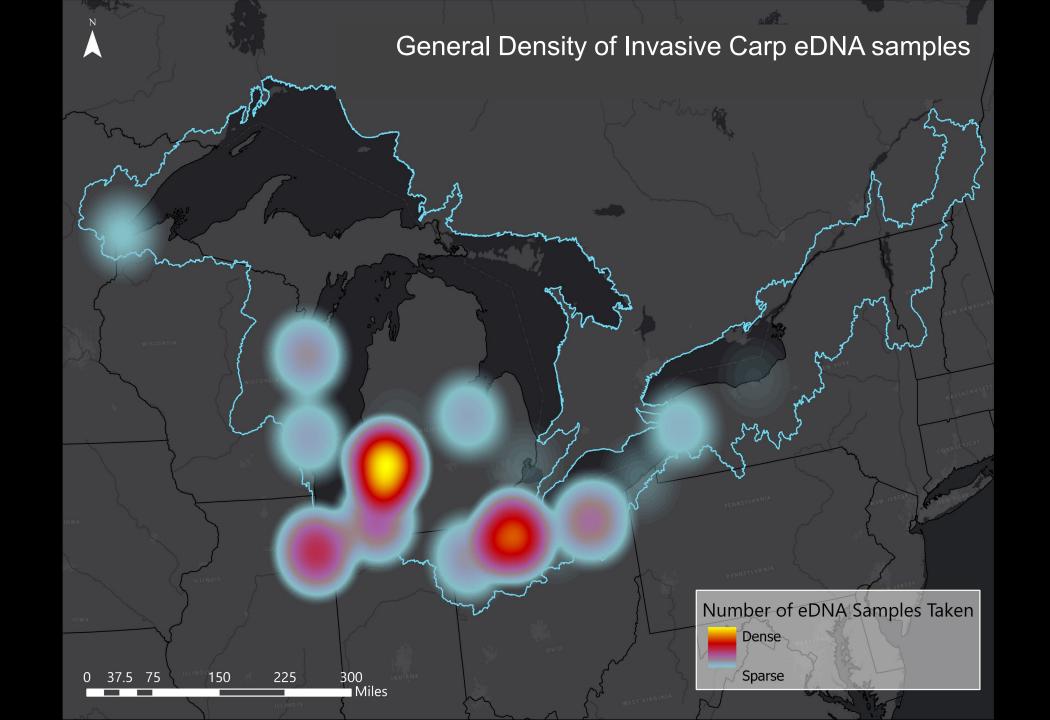
AIS Program Supervisor, Midwest Region, USFWS Great Lakes ANS Panel Meeting – December 2024

Deployment History of eDNA by FWS

- 2013: Fish and Wildlife assumed responsibility of eDNA surveillance in the Chicago Area Waterway System (CAWS)
 - Began testing and adopting improved techniques that increased sensitivity, reduced contamination risk, and increased efficiency.
- 2014: Efficiencies facilitated expansion to Great Lakes, Upper Mississippi and Ohio Rivers
- 2018-present day: Surveillance; Only Silver and Bighead Carp to date through formal monitoring program



Top: Silver Carp Bottom: Bighead Carp Top: Black Carp Bottom: Grass Carp

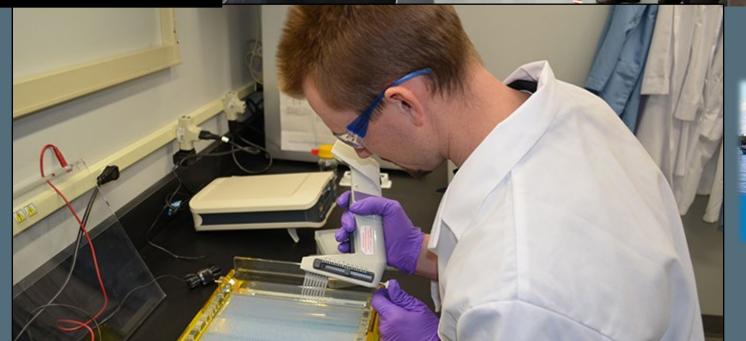






Whitney Genetics Laboratory

La Crosse, WI







Invasive Carp eDNA Monitoring Program

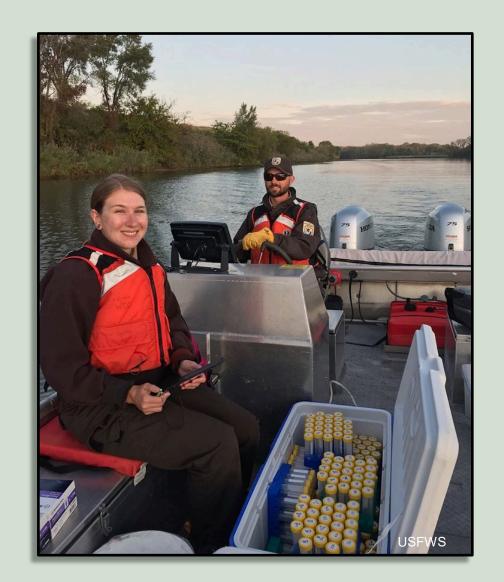
- Used as early detection monitoring tool for Bighead and Silver Carp, in cooperation with States and Tribal partners.
- Informs holistic sampling efforts, in concert with traditional monitoring gears, to help verify presence of live fish and rule out other vectors
 - Must be used in a monitoring context: what will you do with results?
 - Not a single indicator of fish presence
 - Identifies areas of concern to increase vigilance/focused monitoring
- Implementation of QAPP: strict QA/QC procedures

Important Considerations Beyond the Field and Lab:

✓ Interpretation of results and response plans for partners and managers

What's next after a positive result?

- ✓ Communications Plan with partners to handle positive results
 - Strict communication chain so no one is surprised by media or other non-official channels
 - > Agreement on timeline to release results
 - Great Lakes Protocol used as a foundation for other efforts across the U.S.



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Bighead carp eDNA only detected 0.12%

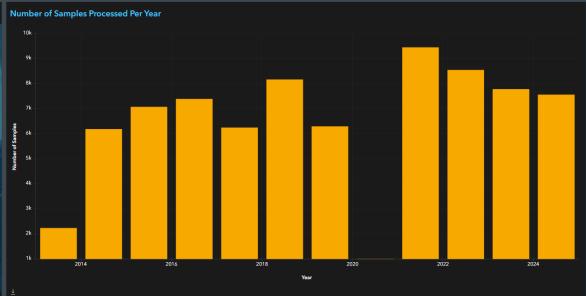
Bighead and Silver Carp Environmental DNA Monitoring U.S. Fish and Wildlife Service Midwest Region 3

Data Interpretation

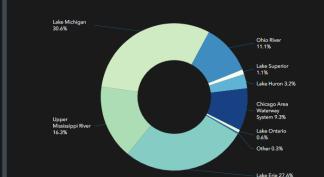
- · A blank sample is a field control sample comprised of a sample tube filled with distilled water prior to field collection. Blanks are not true monitoring samples but are instead a quality control measure used to ensure that contamination is not occurring between samples.
- A positive eDNA detection result means there was Invasive carp DNA in the water body, which can be from live fish, dead fish, or a secondary vector. Secondary vectors are things like barges, boats, birds, and sewer systems that may potentially transport Invasive carp DNA to the area of detection from somewhere else. A positive eDNA detection does not necessarily mean there were Invasive carp (Bighead and/or Silver carp) present at the time samples were
- · eDNA collection density and strategy in the field has evolved from 2013 to present and has ranged from collecting transects across large areas to targeted, high-density sampling in areas where eDNA can accumulate. Differences in sample collection technique and distribution should be considered when comparing eDNA data across years.
- The genetic markers used to detect Invasive carp eDNA changed in 2014. In 2015, the detection methods used changed from conventional PCR (cPCR) to quantitative PCR (qPCR). Due to these changes, eDNA detection data prior to 2015 are not the same as eDNA detection data from 2015-present.
- The process used to concentrate the eDNA from a water sample has changed over time; from filtering samples (2013-2014) to centrifugation (2015-present). Caution should be taken when comparing detections from the two methods together.
- In 2020, the genetic markers used to detect Invasive carp eDNA changed from single marker qPCR to a multi-marker (multiplex) qPCR reaction, increasing efficiency and consistency.
- · Decontamination of all boats, personal equipment, and nets is standard practice due to the Em udy (URL). eDNA detections prior to 2014 should be carefully interpretated because it is very likely that the majority, if not all, of the detections from that time period could have resulted from unintentional cross-contamination or movement of genetic material from downstream carp populations to the CAWs in the absence of live Invasive carp.
- Please read carefully the Quality Plan (PDF) for the U.S. Fish and Wildlife Service (USFWS) Midwest Region Invasive carp eDNA Program before interpreting the data.
- Please read carefully the metadata tab for the invasive er (URL) displayed in the map before interpreting the data.
- To view the entire data set, see the data tab (URL) for the feature layer. To download the data, from the feature layer page, sign in to ArcGIS Online or use one of the download data links in the dashboard.

For more information or questions, or static map books, please contact the eDNA Program Coordinator Nick Frohnauer at nicholas_frohnauer@fws.gov





♣ 78,172*



Proportion of Samples Based on Water Basin



Number Of Processed Samples By Result



What's Next?

- R&D on methods, comparison study
- Single sample result v. patterns over time
- eRNA feasibility
- Communication improvements
- Response actions
- Modified sampling location, timing, density
- Grass carp?