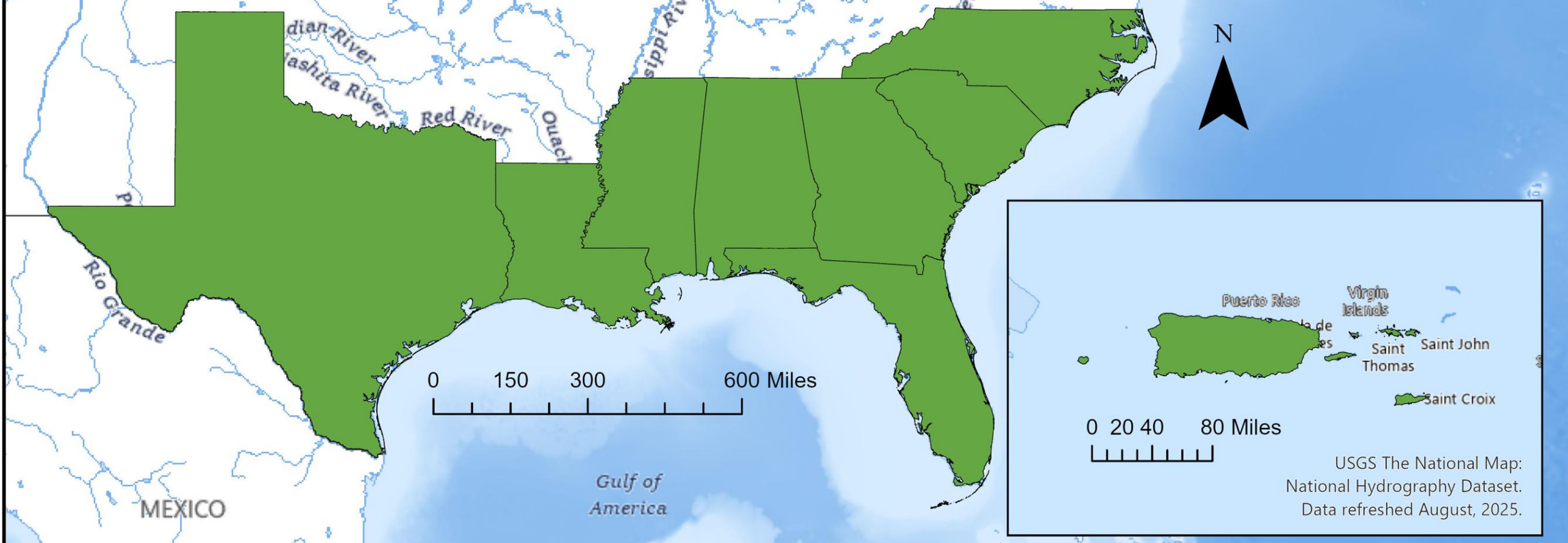




Nonindigenous Aquatic Species Database Update

Wesley M. Daniel, U.S. Geological Survey, Gainesville, FL

USGS Nonindigenous Aquatic Species Database



OUR MISSION

Our mission at the U.S. Geological Survey's Nonindigenous Aquatic Species Database is to be the centralized source for aquatic invasive species needs for resource managers, researchers, decision makers, and the public.

OUR SERVICES

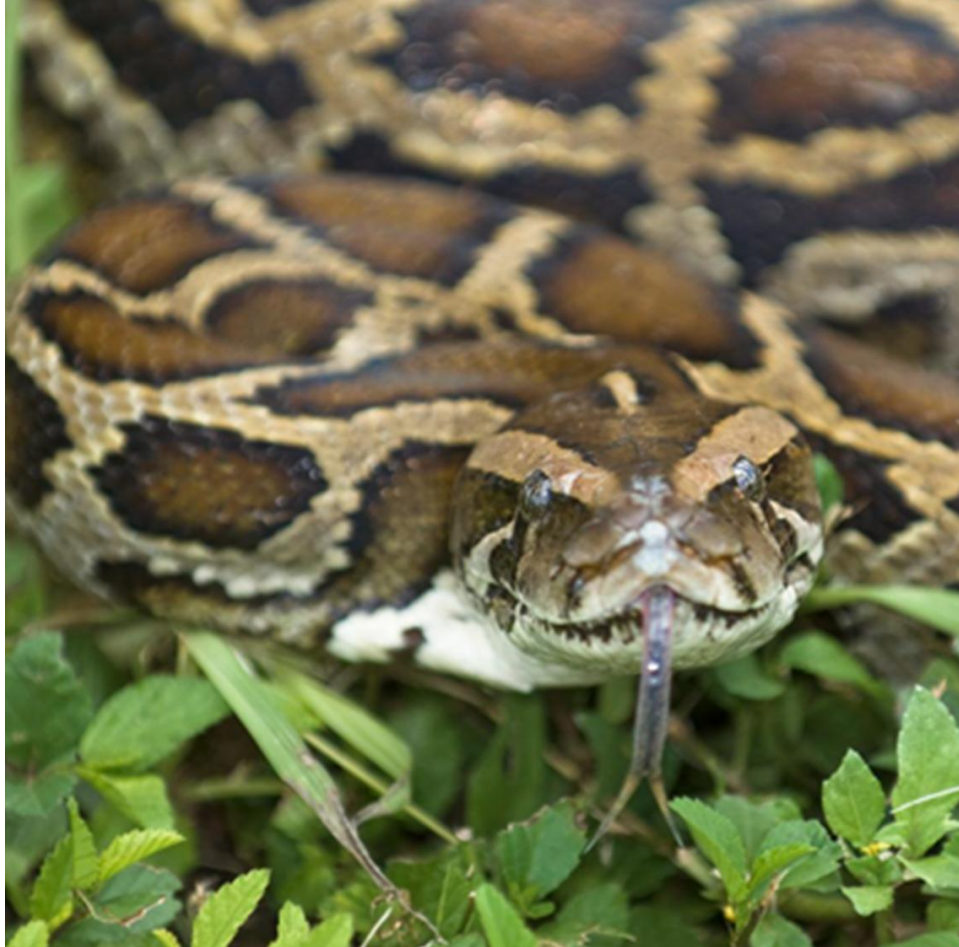
- Track every nonindigenous aquatic species in U.S. waters
- Contribute scientific reports
- Provide online/realtime queries of trusted data
- Create spatial data sets (biological and landscape)
- Develop actionable tools
- Serve distribution maps
- Lead horizon scans to identify risky species
- Offer general invasive species information

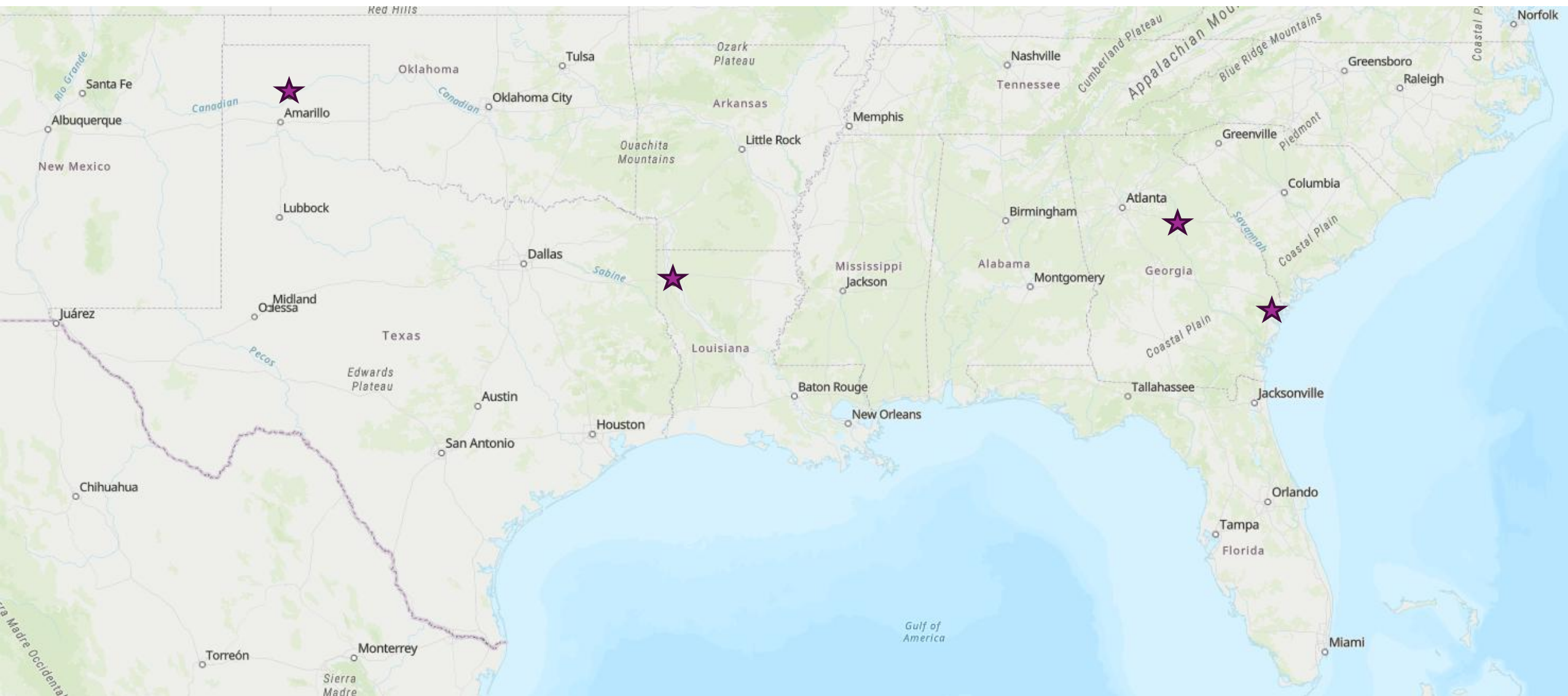
Database Characterization

1,486 Tracked Species

904,919 Records

**1,102 Alert System
User**





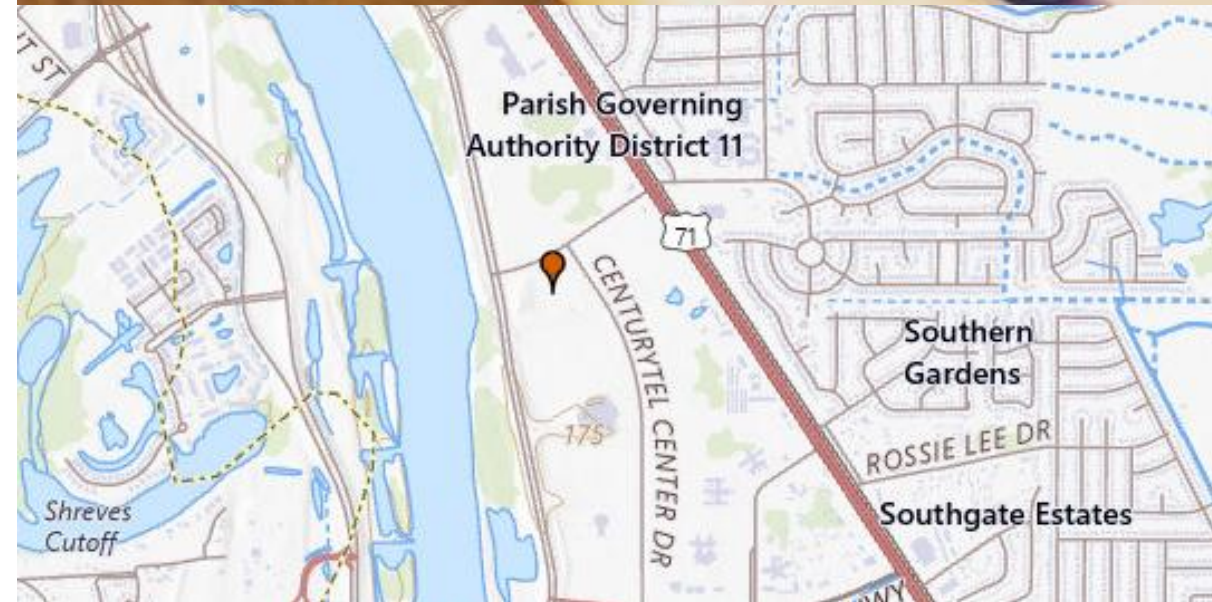
Pylodictis olivaris (Flathead Catfish)

- Sighter: Georgia Department Of Natural Resource
- Drainage: Canoochee
- Notes: Several fish sampled



Pomacea maculata (giant applesnail)

- Sighter: Louisiana Department of Wildlife and Fisheries
- Drainage: Red Chute
- County: Bossier, LA
- Notes:
 - Animals were reported in June of 2025.
 - The report was confirmed as a population the following spring 2026 by Louisiana Department of Wildlife and Fisheries.
 - Population still present August of 2026.



***Hydrilla verticillata*
verticillata
(whorled hydrilla)**

- Sighter: Georgia Department of Natural Resources
- Drainage: Upper Oconee
- County: Greene, GA
- Notes: Closet Landmark-Lighthouse Cir. Reporter says hydrilla very abundant.

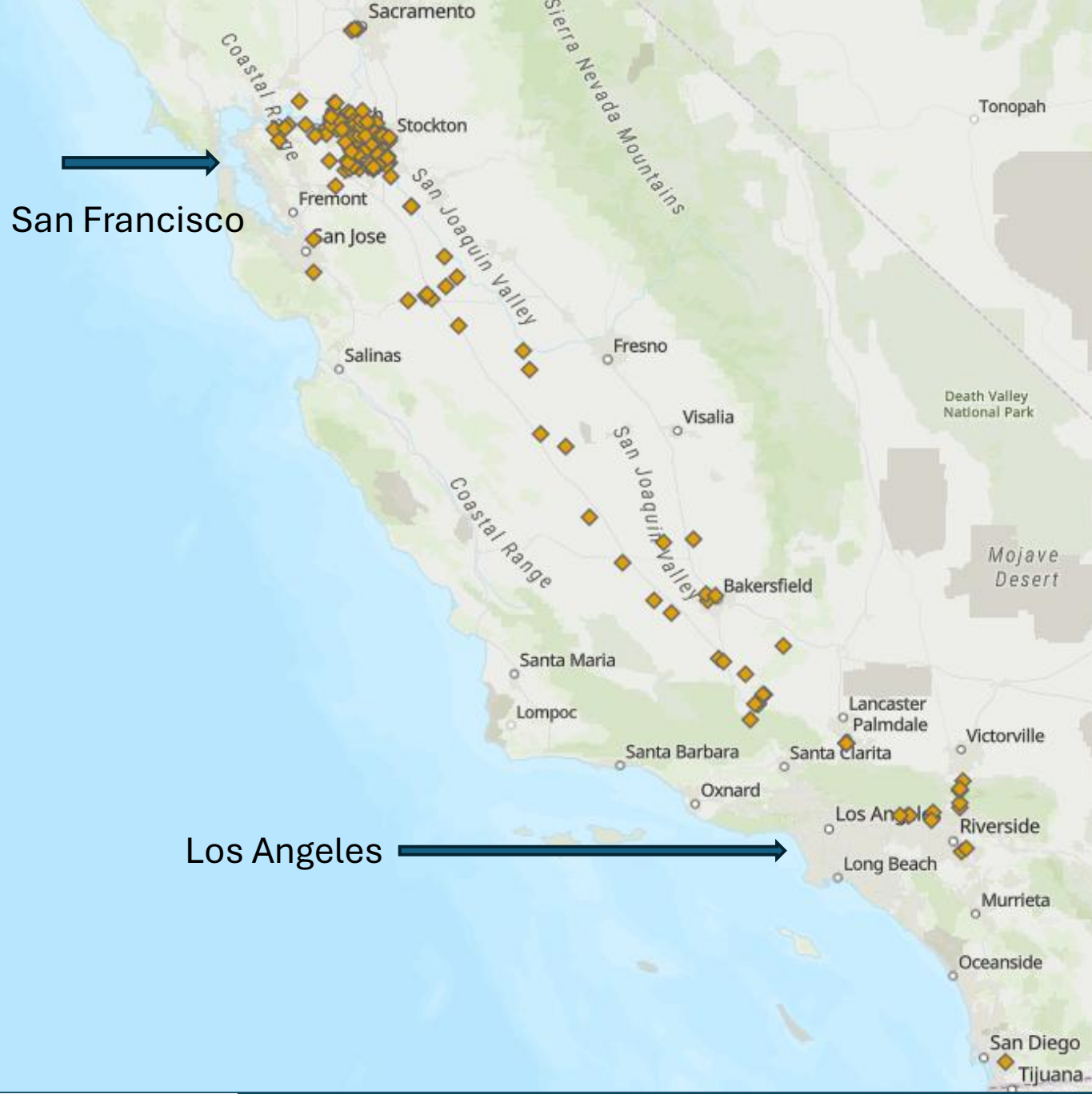


Dreissena polymorpha (Zebra mussel)

- Sighter: Texas Parks and Wildlife Department
- Drainage: Lake Meredith
- County: Moore, TX
- Notes: Texas Parks and Wildlife Department (TPWD) has designated Lake Meredith, near Amarillo, as fully “infested” with invasive zebra mussels.
 - This designation signifies that an established, reproducing population of these invasive mussels is present in the lake.



Golden Mussel (*Limnoperla fortunei*)





AquaSale

A guide to buying and selling aquatic species responsibly

Trade Legally

State laws regulating the purchase, sale, import, and transport of aquatic species help protect ecosystems by reducing the spread of invasive species and preventing harm to native habitats and wildlife. Check state laws and regulations to help determine whether your activities comply with state law.

- Search by **state** or **species**
- Get **direct links** to state laws and regulations
- Learn best practices to prevent the spread of aquatic invasive species

 I'm a seller

 I'm a buyer

 Learn more



- <https://glc-ais-aquasale.share.connect.posit.cloud/>



Aquatic Nuisance Species Task Force

5-Year Strategy

- This provides an opportunity to engage with individual subcommittees to identify priorities and activities that:
 - Benefit individual states
 - Address regional needs
 - Advance priorities for the ANS Task Force as a whole
- Sub-committees
 - EDRR, Outreach, Research, Prevention, Control
- As chair of the EDRR Committee, I welcome recommendations and ideas from the panel.
 - How can the EDRR Committee's efforts better support the panel's priorities and needs?
- Opportunity to align committee activities with state and regional priorities and maximize their impact.

NAS 2.0

[Read More](#)



Welcome to the Nonindigenous Aquatic Species (NAS) information resource for the United States Geological Survey. Located at Gainesville, Florida, this site has been established as a central repository for spatially referenced biogeographic accounts of introduced aquatic species. The program provides scientific reports, online/realtime queries, spatial data sets, distribution maps, and general information. The data are made available for use by biologists, interagency groups, and the general public. The geographical coverage is the United States.



Alert System

Browse or search for new aquatic species introductions



Report a Sighting

Submit an observation of introduced aquatic species



Map Search

Search for NAS records via our custom spatial query map.



Find a Species

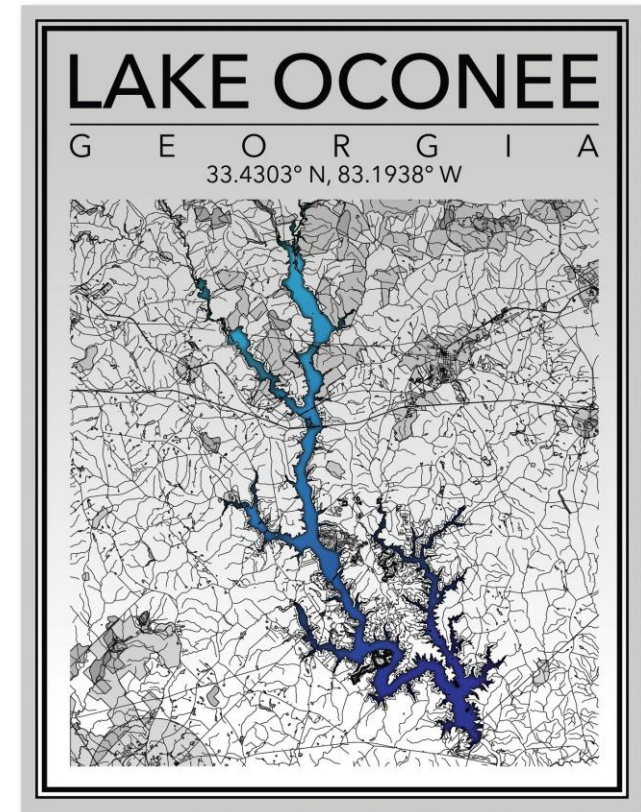
Search the NAS database by species groups such as vertebrates, invertebrates, and plants.

New Search Abilities

Search by:

Data provider

Waterbody Name



New and updated data

- **Control Table**

- Integrate invasive species control methods directly into NAS species profiles
- Provide a centralized, go-to source for published and recognized control methods
- Document mechanical, physical, chemical, and biological control options
- Prioritize control information for high-impact invasive species

Enhanced pathways

- Modernize the NAS pathways table, building on years of pathway tracking
- Simplify and standardize pathway classifications to improve usability and consistency
- Create a more comprehensive, modern framework for understanding invasion pathways

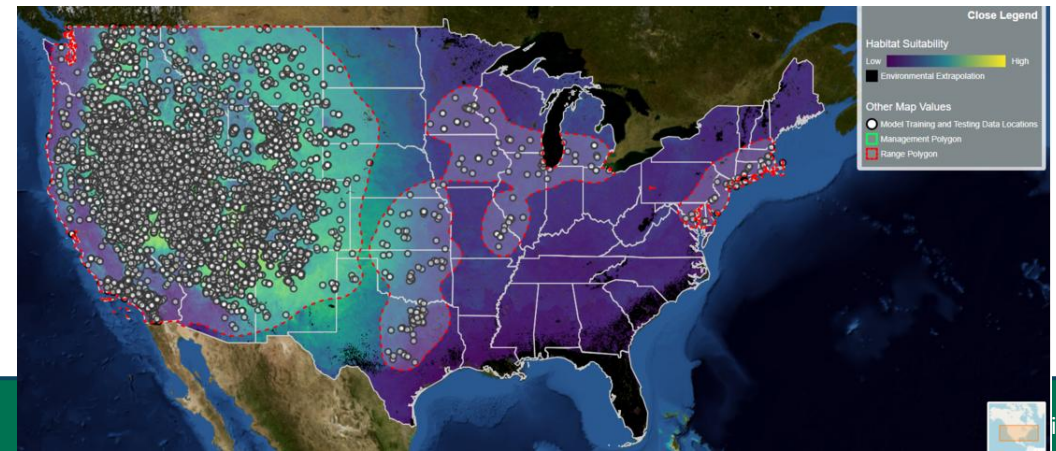
State-Specific Aquatic Invasive Species Prioritization

- Develop state-specific priority lists of the most pertinent aquatic invasive species for each state.
- Use priorities to guide NAS Database efforts, including data curation, updates, and resource allocation.
- Develop species distribution models (SDMs) for prioritized taxa to assess current and potential future distributions.

State-Specific Aquatic Invasive Species Prioritization

- Create a public-facing interface to make model outputs and invasion information accessible to managers, researchers, and the public.
- Incorporate future scenarios to model invasion risk under projected:
 - Land-use change
 - Climate change
 - Other relevant environmental conditions
- Bring on a postdoctoral researcher to lead and support SDM development, scenario modeling, and integration of results into the public interface.

INHABIT: A web tool for invasive plant management across the contiguous United States



Panel Paper

Working Smarter Together: Practical Guidance on Best Practices for Working Effectively across Academia and Agency Jurisdictional Partners on Aquatic Invasive Species Issues

- Thank you for everyone's efforts
- Remember we have a final deadline of Sept. 20th for the final review and ensure author's names and affiliations are correct.
- If you liked this process, I have two additional ideas we could work on as a panel.

Panel Paper

Collaboratively identify data standards for absence data

- Build on statistical and methodological standards established in the literature
- Develop agreed-upon elements for documenting absence within the NAS Database
- Ensure absence data can be represented alongside traditional sighting and eDNA data

Develop a shared terminology/lexicon

- Build on Sarah Funck's idea of establishing an agreed-upon panel lexicon
- Create consistent definitions for commonly used terms
- Address challenging terms such as “establishment”
- Bridge differences among jurisdictions
 - Identify commonalities across state and political definitions



A public-facing national repository created and curated by the U. S. Geological Survey to show the distribution of aquatic animal disease and pathogens in North America.



Curate aquatic animal health data in a single common source for aquatic animal health professionals, researchers, and the public



Interoperability with other relevant databases



Two types of data or events

Surveillance

- Will always have a condition or infectious agent in mind to

Mortality

- Will document mortality events that trigger an investigation



Testing will be provided for both and will be searchable in the maps

Un-detected data is included and used in a testing intensity layer



Welcome to the **Aquatic Disease and Pathogen Repository** (AquaDePTH), a public-facing national repository that supports bio surveillance of aquatic animal diseases and pathogens. The program provides scientific reports, online/real time queries, spatial data sets, and general information. The data are made available for use by biologist, interagency groups and the general public.



Bio-sketch

View list of informational profiles of pathogen or hosts.



Pathogen Map

Search for AquaDePTH pathogen records via a custom spatial query map



Host Map

Search for AquaDePTH host records via a custom spatial query map



Pathogen List

Search for pathogen records by species group and broader geographical borders.



USGS Data Submission

Submit surveillance or mortality observations to USGS for review and upload



30

Pathogen Species



8

Mortality Events



0

Visits



50

Host Species



22

surveillance Events



1124

Point Records



0

Downloads

Submission

*Myxobolus
cerebralis*

Whirling disease

Stephen Atkinson,
OSU

Citation

Found 5 Host(s) Records in
AquaDePTH

Pathogen Map

Animated
Map**Agent Name:** *Myxobolus cerebralis* (Hofer, 1903)

Overview: *Myxobolus cerebralis* is a cnidarian myxozoan parasite that causes whirling disease in salmonid fish. This parasite has a complex life cycle with two distinct life stages and hosts: a mixospore, infectious to an oligochaete worm (*Tubifex tubifex*), and a triactinomyxon infectious to fish. Whirling disease damages the fish cartilage and affects its nervous system, causing swimming behavior in a whirling motion, blackened tail, and skeletal deformities. Susceptibility to whirling disease varies based on host and environmental factors. For instance, young rainbow trout are highly susceptible to whirling disease. *Myxobolus cerebralis* first appeared in the United States in 1958 and has since been detected in 25 states. However, detection does not mean the parasite has an established population. Several efforts exist to track and manage the disease, given its impact on some salmonid fish. There is no risk of infection to humans for whirling disease.

Description of etiological agent: *Myxobolus cerebralis* is a cnidarian myxozoan parasite that forms two distinct life stages: a myxospore and a triactinomyxon. Myxospores, infectious to an oligochaete worm, are mostly spherical to oval, approximately 9 micrometers in size, and contain two symmetrical polar capsules of about 5.1 by 3.2 micrometers (Figure 1A). Polar capsules are the equivalent of other cnidarian nematocysts, with each containing a polar filament with 5 to 6 coils, which are used during the attachment of spores when infecting its host (Lom and Hoffman, 1971;

Host Species: Myxospores only infect the invertebrate oligochaete worm, *Tubifex tubifex*, where they produce and shed actinomyxons (triacinomyxons). Salmonid species are the only suitable vertebrate hosts for the actinomyxons, with rainbow trout being particularly susceptible to infection (O'Grodnick, 1979; Wolf and others, 1986; Hoffman, 1990; Hedrick and others, 1999b; Kerans and others, 2004). Certain strains of salmonids have various levels of resistance to whirling disease, showing milder disease impacts (Hedrick and others, 2003; Wagner and others, 2006).

Table 1. Host species for *Myxobolus cerebralis* with data points present in AquaDePTH*.

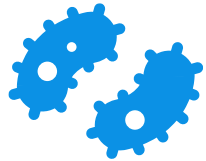
Host species	Common name
1. <i>Oncorhyncus mykiss</i>	Rainbow Trout
2. <i>Oncorhyncus clarki</i>	Cutthroat Trout
3. <i>Oncorhyncus clarki virginalis</i>	Rio Grande Cutthroat Trout
4. <i>Salmo trutta</i>	Brown Trout
5. <i>Salvelinus fontinalis</i>	Brook Trout

* List includes only host(s) present in AquaDePTH for the specific pathogen listed. Not an inclusive list of all potential hosts

Associated disease name and description: *Myxobolus cerebralis* causes whirling disease in several salmonid species. Disease susceptibility depends on species, environmental factors, and host developmental stage, with young fish most susceptible (Gilbert and Granath, 2003; Steinbach Elwell and others, 2009; Sarker and others, 2015). Asymptomatic disease carriers are possible in some salmonid species (Hedrick and others, 1999a). Upon infection of the fish, the parasite migrates through the nervous system concentrating in cartilage rich areas, like the cranium and spine, in which it develops into the hardier myxospores while permanently damaging the cartilage. The disease is characterized by several clinical signs: 1) whirling behavior, due to spinal cord constriction and brain stem compression that causes fish to swim erratically in tail-chasing or whirling form; 2) blackened tail caused by pressure on nerves that control pigmentation; and 3) skeletal deformities of the head, spine and operculum due to cartilage damage and interference with bone development (Halliday, 1976; Wolf and others, 1986; Hedrick and others, 1999b; Rose and others, 2000). Common deformities include shortened operculum, indented skull, crooked spine, and shortened nose (Fig. 2). The disease can cause mortality due to direct physical damage or inability to feed or evade predators, younger fish are more susceptible than older fish due to the high proportion of developing cartilage (Steinbach Elwell and others, 2009).



Maps

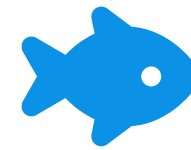
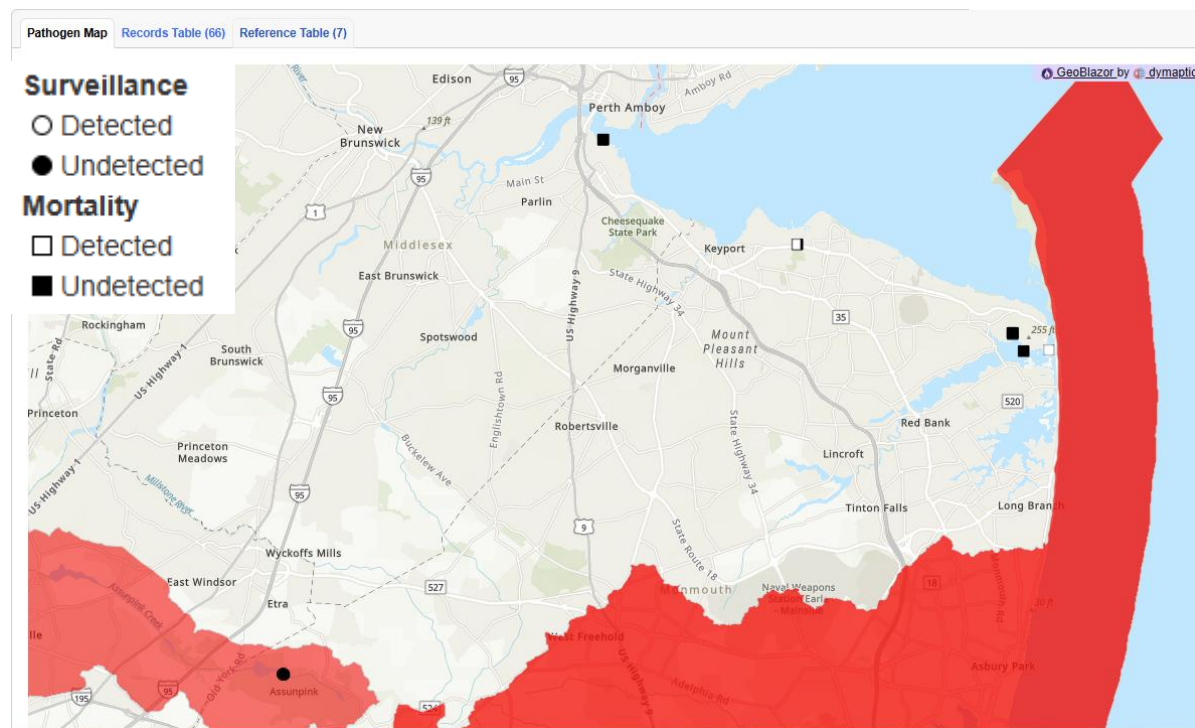


Pathogen Map

- Proportion of detected vs un-detected samples for a pathogen or set of pathogens?
- Provides **Proportion** at zoom in

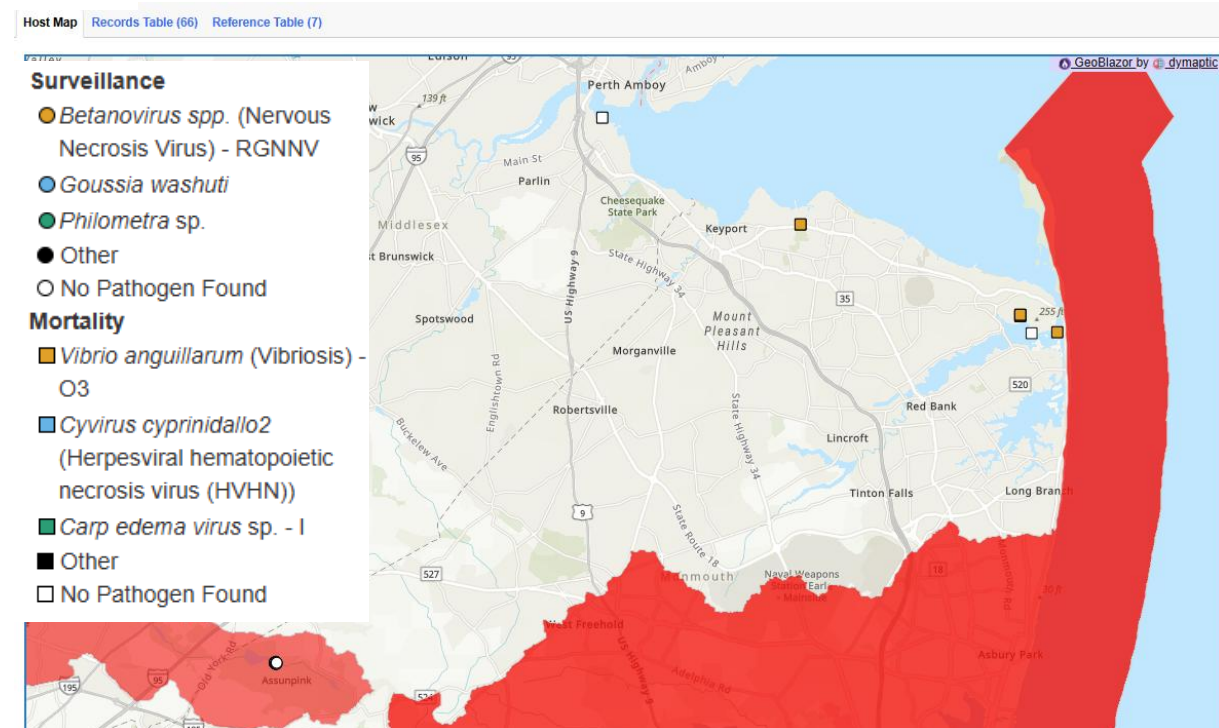
Testing Intensity: ?

1 981



Host Map

- What type of pathogens are present in a particular host or set of hosts?
- Provides **Pathogen Species** at zoom in



Nonindigenous Aquatic Species Database Team



Dr. Wesley Daniel

wdaniel@usgs.gov



Dr. Matt Neilson

mneilson@usgs.gov



Ian Pfingsten

ipfingsten@usgs.gov



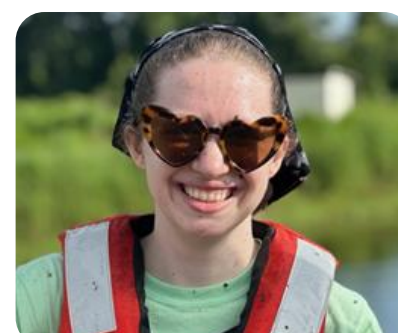
Mary Brown

mbrown@usgs.gov



Logan Stratton

ldstratton@contractor.usgs.gov



Arden Williams

elisewilliams@contractor.usgs.gov



Cayla Morningstar

cmorningstar@contractor.usgs.gov

WARC Advanced Applications Team: Christina Hunnicutt & Joey Richard
WARC Leadership: Dr. Lynn Copeland, Dr. Glenn Suir, Craig Conzelmann & Sarai Piazza