AquaDePTH:
Aquatic Disease and Pathogen Repository

Wes Daniel and Matthew Neilson

USGS Wetland and Aquatic Research Center, Gainesville, FL

Jan Lovy

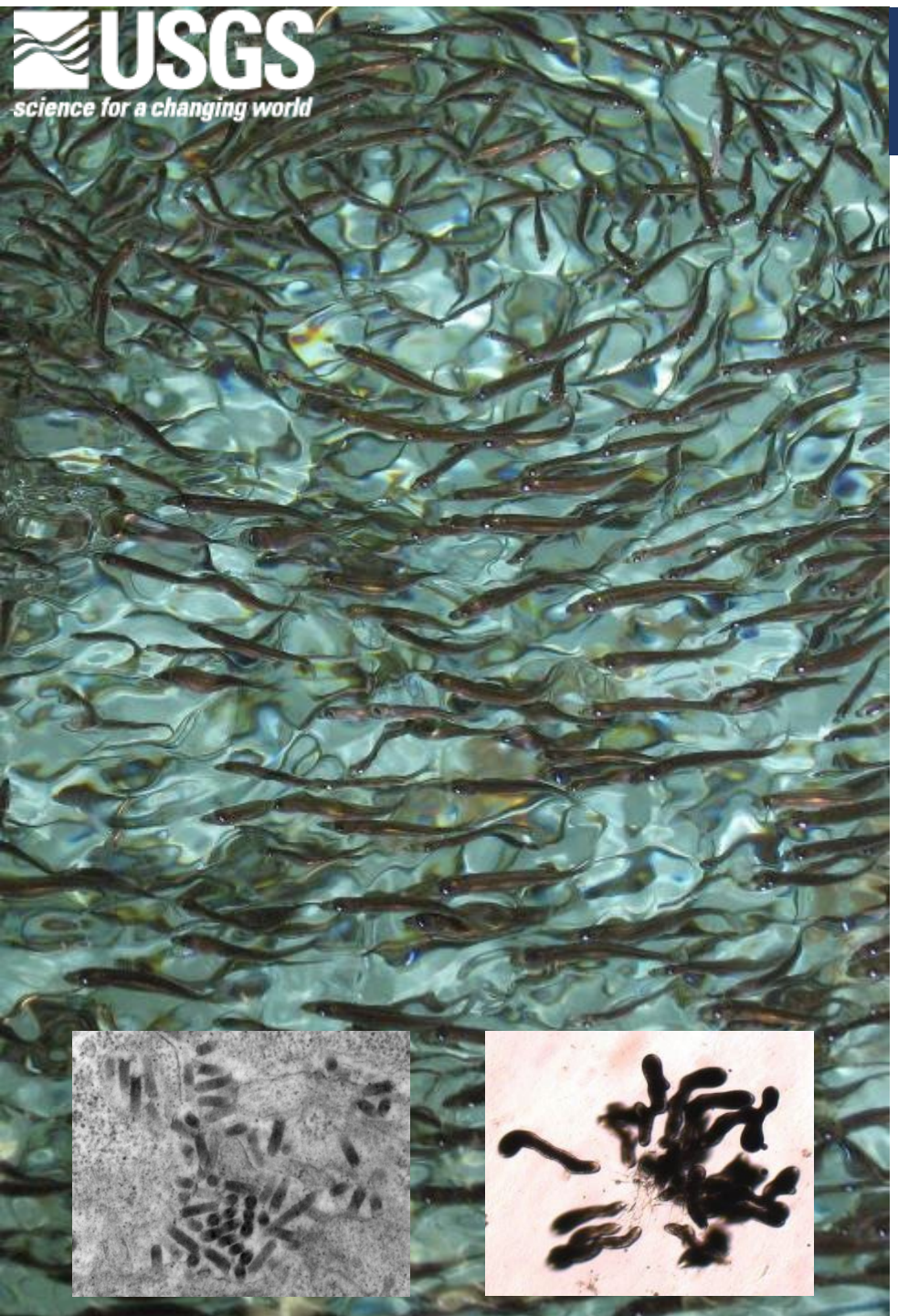
USGS Western Fisheries Research Center, Seattle WA

Clayton Raines

USGS Eastern Ecological Science Center, WV

Collab: Maureen Purcell (FRESC) & Paul Hershberger (WFRC)

Photo Credits: Milton Love (UCSB)

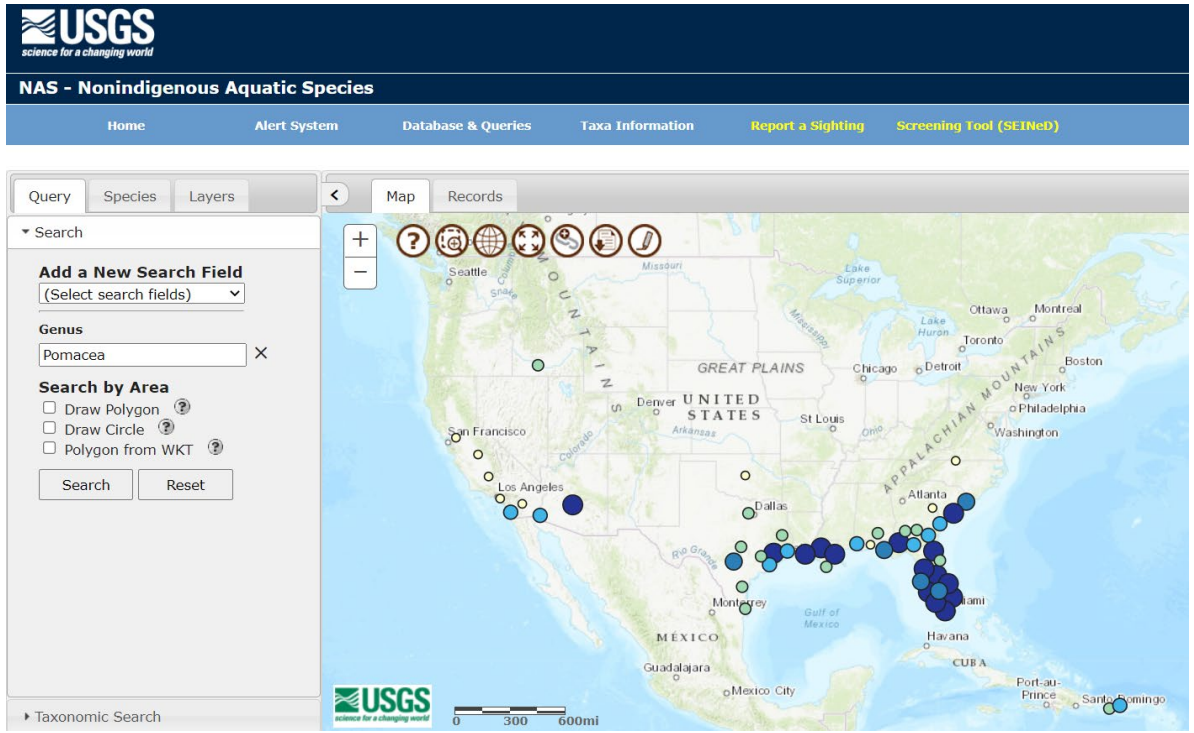


AquaDePTH Goals

- Develop a national repository to support **aquatic animal** diseases and **pathogen biosurveillance**
- **Freshwater** and **marine** aquatic pathogen and disease information
  - Monitor fish kill and aquatic pathogen trends spatially and temporally
  - Curate historically published data, previous records, and new data
- Host USGS data and invite cooperators to share their information
- Potential to host **state and tribal** fish health data for visibility in one searchable database
- Build on the **long-term success** of USGS Nonindigenous Aquatic Species (**NAS**) repository; a resource that has been operational since 1990

Funding

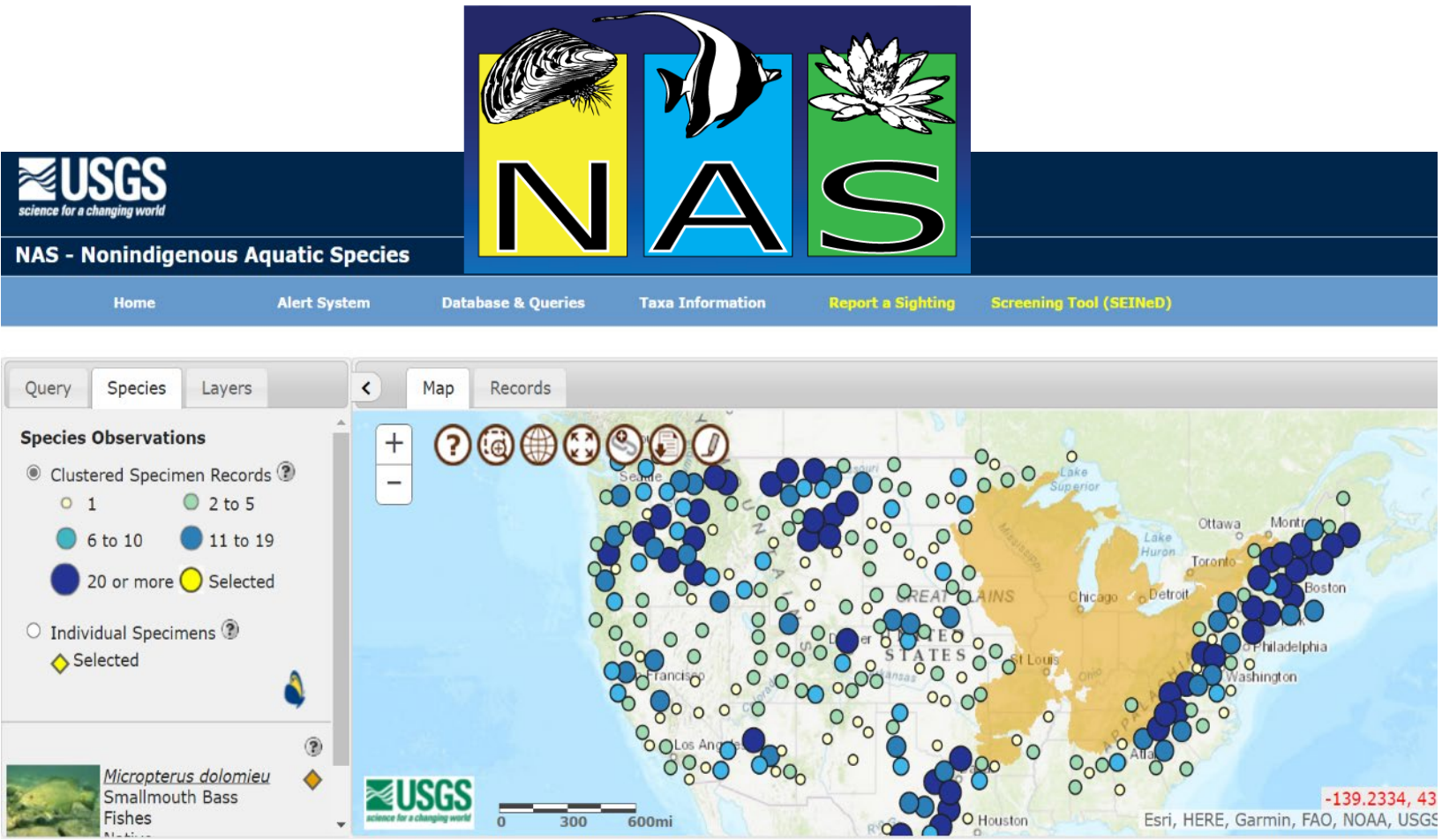
- American Rescue Plan Act 2021 H.R. 1319 funding to USFWS
  - “Research and extension activities to strengthen early detection, rapid response, and science-based management to address wildlife disease outbreaks…”
- USGS subaward
  - **AquaDePTH extension to NAS**
  - Expand capabilities of the National Wildlife Health Center (terrestrial focus)



U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

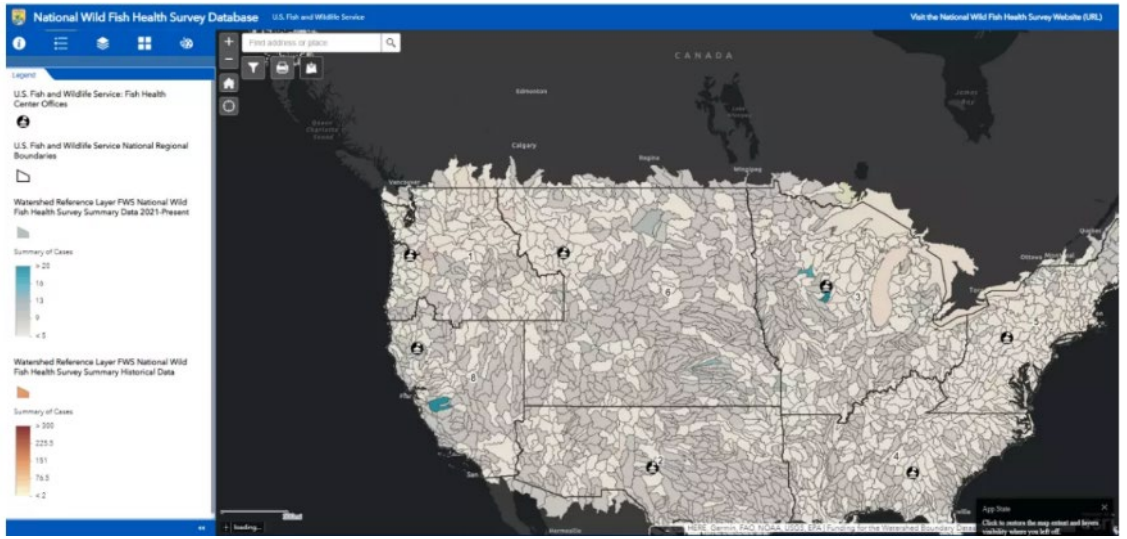
USGS
science for a changing world

AquaDePTH to be built on NAS platform



- Trusted partners to Federal, State, Regional and Tribal fisheries managers responsible for aquatic animal health and aquatic invasive species
- NAS is flexible, transparent, accessible and valued
- Watershed resolution and meaningful search filters to explore aquatic connectivity
- NAS upgrades in progress
- Actionable tools to track and predict aquatic transmission pathways
- Threat of aquatic invasive species and pathogens may not be mutually exclusive

Interoperable with other databases



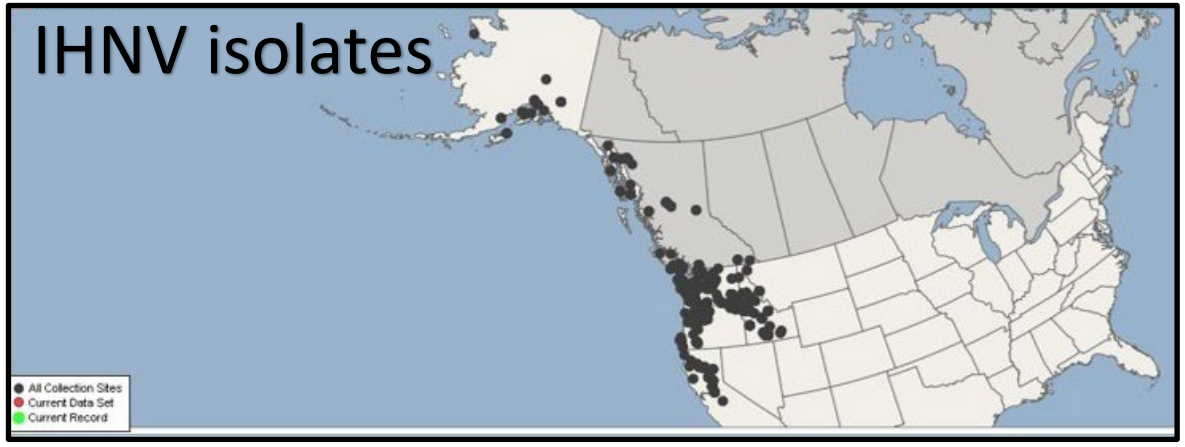
- Overlay data with existing resources
  - USFWS National Wild Fish Health Survey
  - WHISPers USGS wildlife health portal
- Inclusive of diverse aquatic species

WHISPers: wildlife health data portal

Existing data and other databases to inform development

- Data rescue for USGS data on aquatic rhabdoviruses (G. Kurath)
  - Nearly 30 years of data tracking IHNV epidemiology
  - Used extensively by agencies to understand risks of viral spread

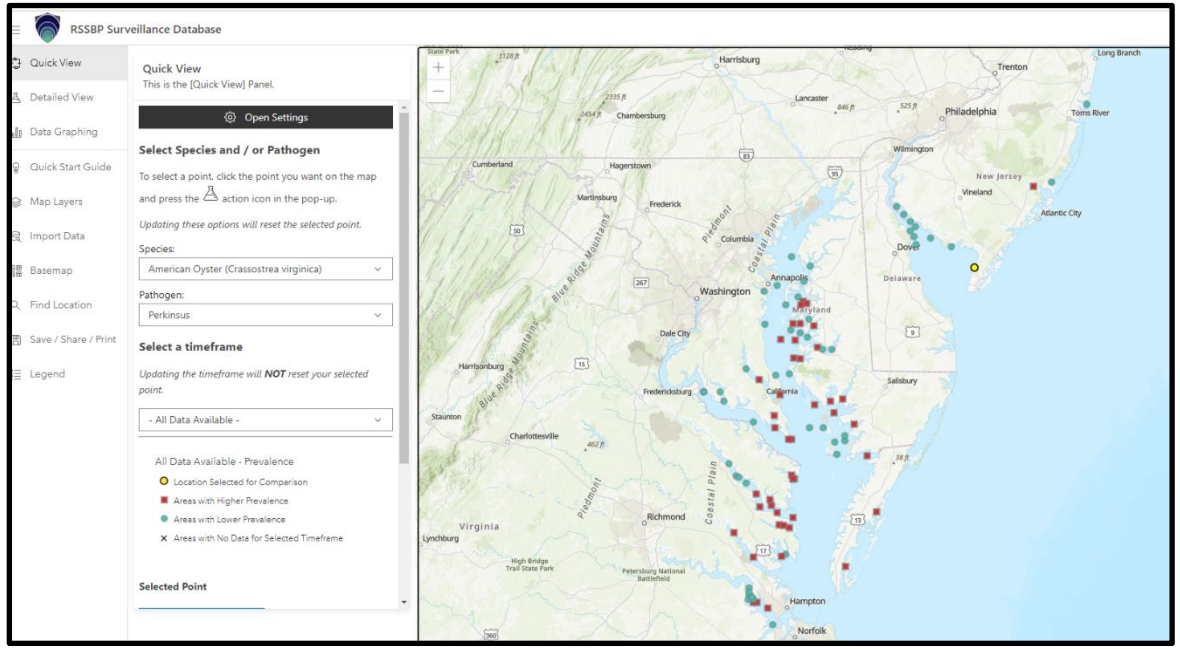
USGS science for a changing world



- Regional shellfish pathogen surveillance program database
  - Database to support shellfish
  - seed movements for aquaculture
  - Goals to expand nationally

RUTGERS THE STATE UNIVERSITY OF NEW JERSEY

VIMS | WILLIAM & MARY VIRGINIA INSTITUTE OF MARINE SCIENCE



*State fish health data

AquaDePTH Advisory Group

Role is to communicate the database and acquire feedback on:

- Metadata, data fields, definitions and overall site design
- Desired database outputs and functionality
- Information privacy and ownership
- Attributions, disclaimers and appropriate use
- Supporting materials such as pathogen descriptions
- Test datasets for initial design stages
- Other public / private platforms that could become interoperable with AquaDePTH
- Future applications for AquaDePTH

Current Advisory Group

Academic / Private	State	USDA	NOAA	USFWS	International
• Stephen Atkinson – Oregon State University • Nick Phelps – University of Minnesota	• Jayde Ferguson – Alaska Dept Fish and Game • Tony Capps – Washington Dept of Fish and Wildlife • Gary Whelan – Michigan Dept. of Natural Resources • Coja Yamashita – Pennsylvania Fish and Boat Commission	• Lori Gustafson – USDA APHIS • Lynn Creekmore – USDA APHIS • Chris Ellis – USDA APHIS	• Linda Rhodes - NOAA Northwest Fisheries Science Center	• Jordan Richad – USFWS Virginia Ecological Services • Joel Bader – USFWS Headquarters	• Mark Higgins – Fisheries and Oceans Canada

Two types of data streams

Surveillance

- Pathogen-driven
  - Will always have a condition or infectious agent in mind to search
- Will have a set sample size to ensure detection at a certain confidence level.
  - Pooling can be reported
- I want to know all areas where VHSV has not been detected.
- I want to determine how detection of VHSV has changed over time.

Mortality

- Host-driven searches
- I want to know incidence of Largemouth Bass mortality over time.
- I want to know how common fish kills are in a certain region.
- What is the most frequent cause of mortality in trout farms nationwide?
- I want to know all coral bleaching events over time.

Data confidence and searchable tools

- Importance of making **negative data** visible when necessary
  - Distinguish between areas where pathogens have not been detected vs. areas where no surveillance has been done
- **Testing methods** and **laboratory visibility**
  - How were detections conducted? QA/QC checks for testing assays
  - Presumptive/confirmatory tests and reference to methods (Microscopic wet mounts, histology, isolation of agents, PCR, sequencing, ELISA, etc.)

Suspect **Presumptive** **Confirmed**

- What searchable fields are most valuable to you?
- What questions and searches are most valuable for your programs?

AquaDePTH: Timeline

FY23-24

Building advisory group to inform database development for the duration of the project

FY25

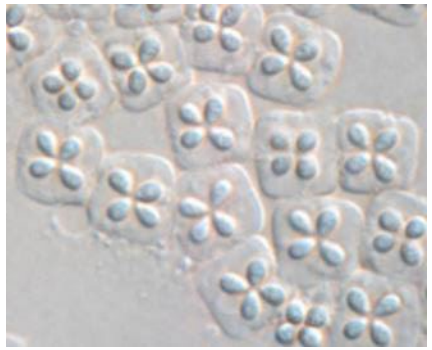
Develop required elements including public landing page and dashboard

FY26

Finalize database and public launch

Photo Credit: Theresa Liedtke USGS

Discussion and Questions



USGS science for a changing world

NAS - Nonindigenous Aquatic Species