a National Early Detection and Rapid Response Framework for Invasive Species

BIL-Funded EDRR Framework Projects

July, 2023

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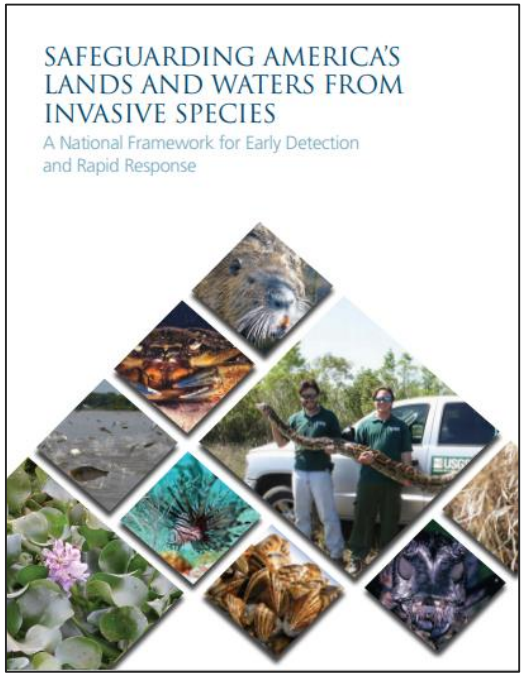
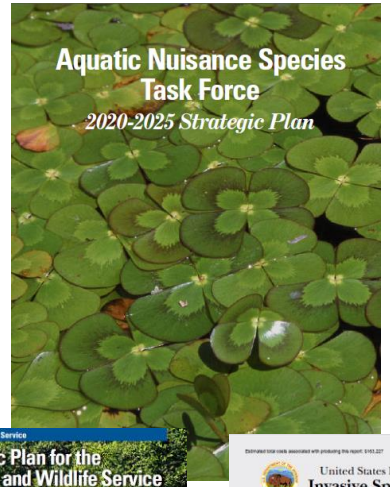
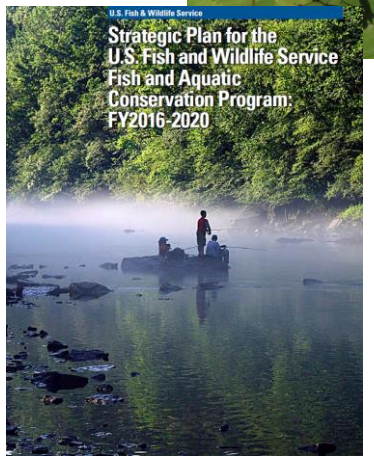
DOI INVASIVE SPECIES TASK FORCE



A National Framework for Early Detection and Rapid Response.

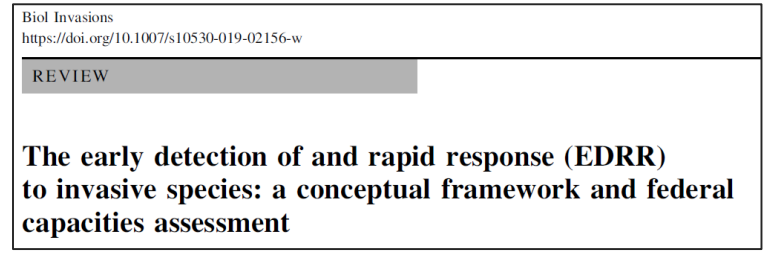




"Work with tribes, states, and other partners to implement a national early detection and rapid response framework"

12 papers published in Biological Invasions (2019)

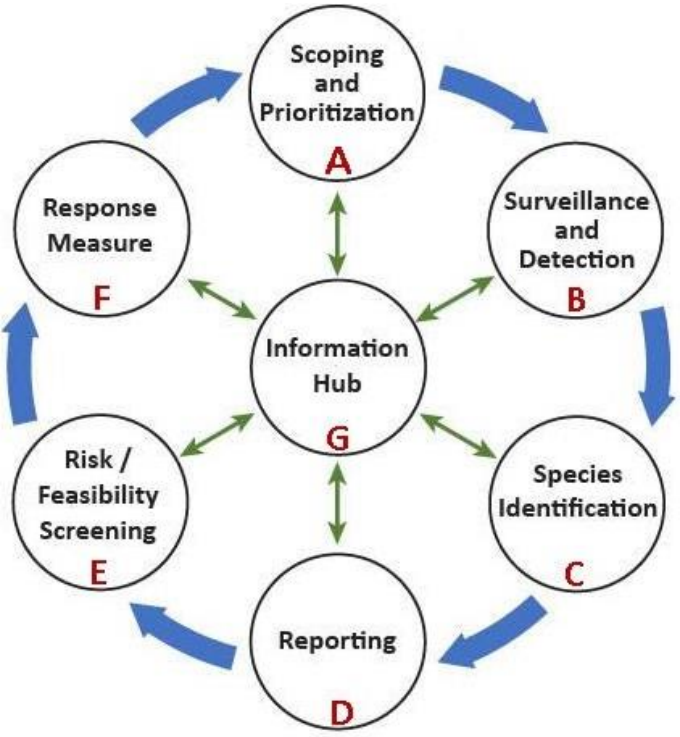
"A blueprint for a national program for the EDRR to invasive species"


Biol Invasions
https://doi.org/10.1007/s10530-019-02156-w

REVIEW

The early detection of and rapid response (EDRR) to invasive species: a conceptual framework and federal capacities assessment

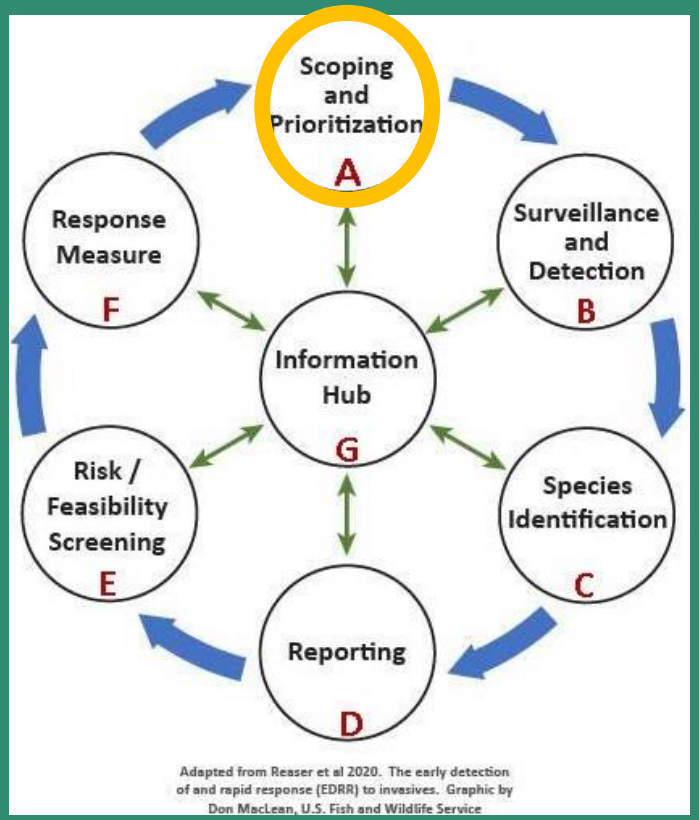
Advancing a National EDRR Framework



Adapted from Reaser et al 2020. The early detection of and rapid response (EDRR) to invasives. Graphic by Don MacLean, U.S. Fish and Wildlife Service

DOI Fiscal Years 2022+ EDRR Framework Projects	DOI Fiscal Years 2023+ Starting in FY23 (*) Proposed FY24
Horizon Scans & Hot Spot Analysis (A)	Targeted Early Detection Surveillance (A,B,C) Invasion Hotspots Asset Based Protection
Molecular detection @ points of entry (A,B,C)	
Resource Manager's eDNA Toolbox (B,C,G)	EDRR Molecular Lab Network (B,C,D,G) *Genetic Marker Development Processing Molecular Samples
Genetic Material Repository & Network (B,C)	
READI-Net: eDNA surveillance network (B,C,D,G)	Rapid Response (E,F) *Rapid Response Fund (Aquatic Invasive Species) DOI Interjurisdictional Rapid Response Team
INHABIT (terrestrial plant) advancements (B,G)	
NEDRRIS: National EDRR Information System (G)	

Horizon Scans

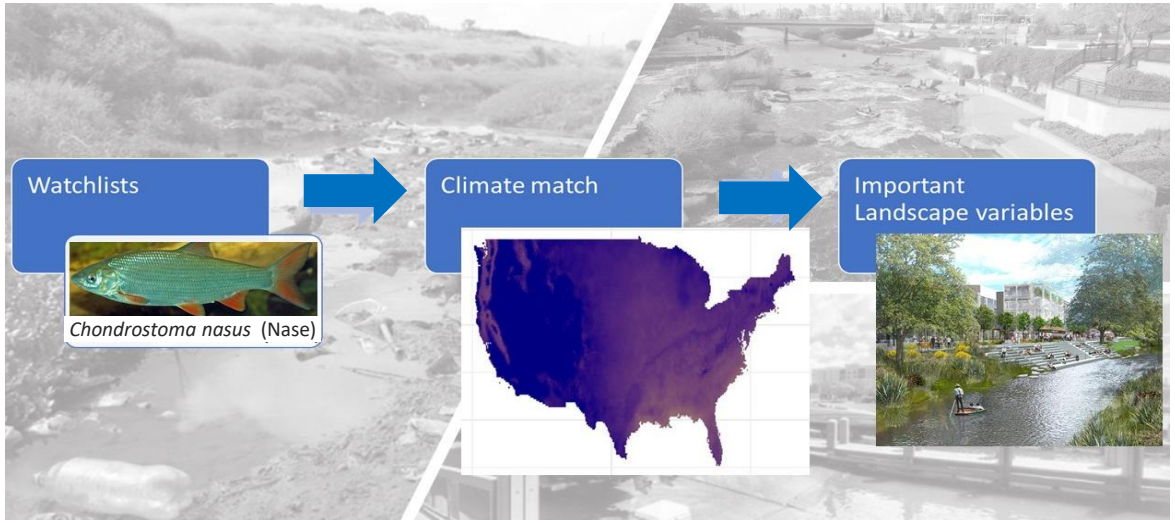


Adapted from Reaser et al 2020. The early detection of and rapid response (EDRR) to invasives. Graphic by Don MacLean, U.S. Fish and Wildlife Service

Consider potentially invasive species not yet found in the US:

Watch Lists!

Determine extent of potential habitat in the US:



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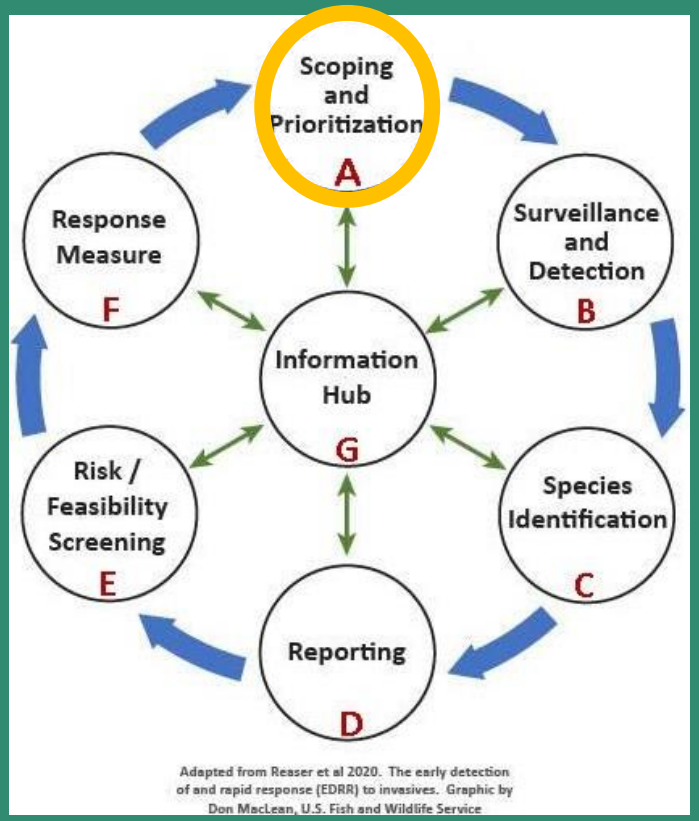
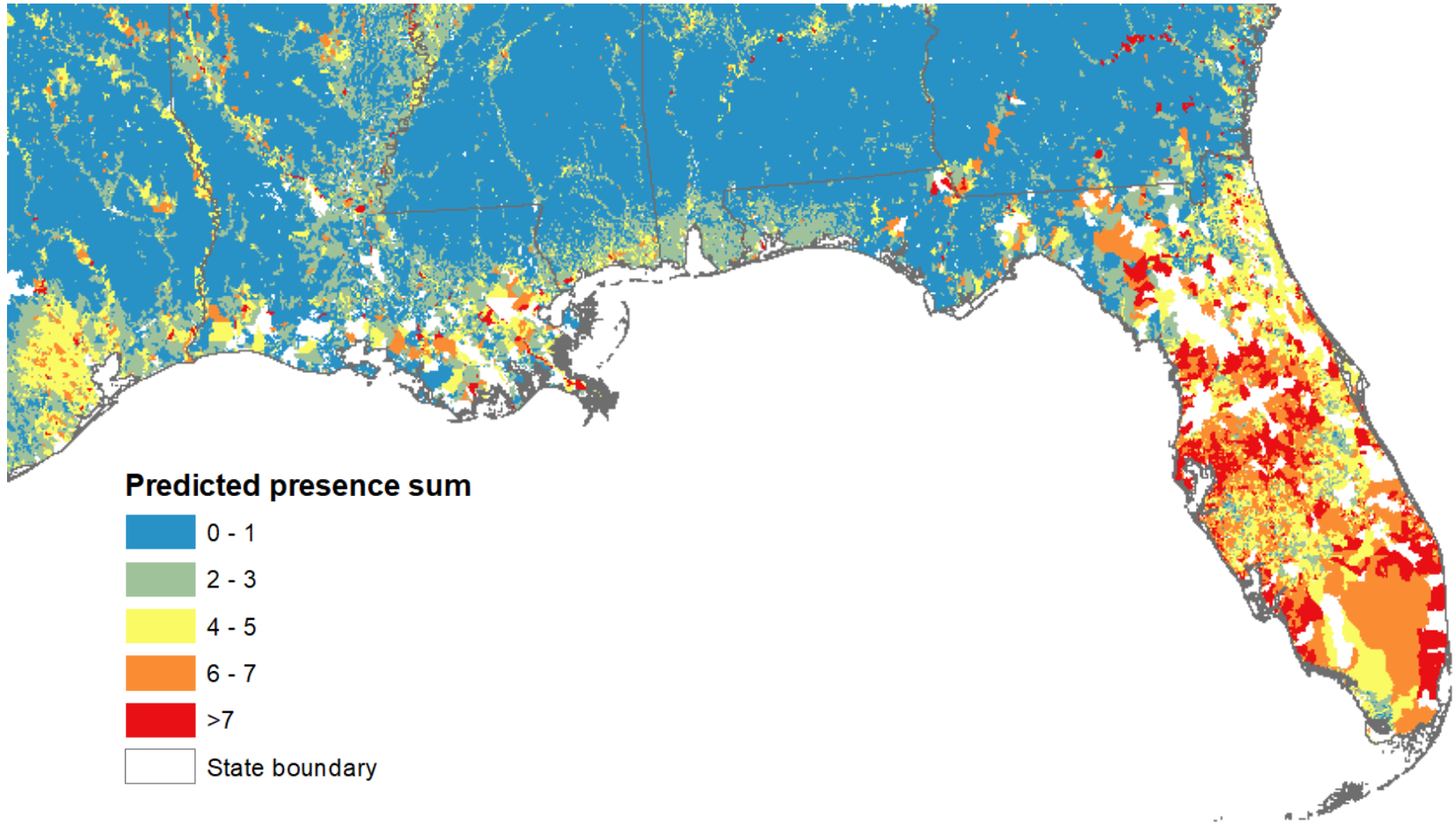
Hot Spot Analyses



Adapted from Reaser et al 2020. The early detection of and rapid response (EDRR) to invasives. Graphic by Don MacLean, U.S. Fish and Wildlife Service

Draft Example: Coastal Plain Hot Spot Analyses for Streams & Rivers



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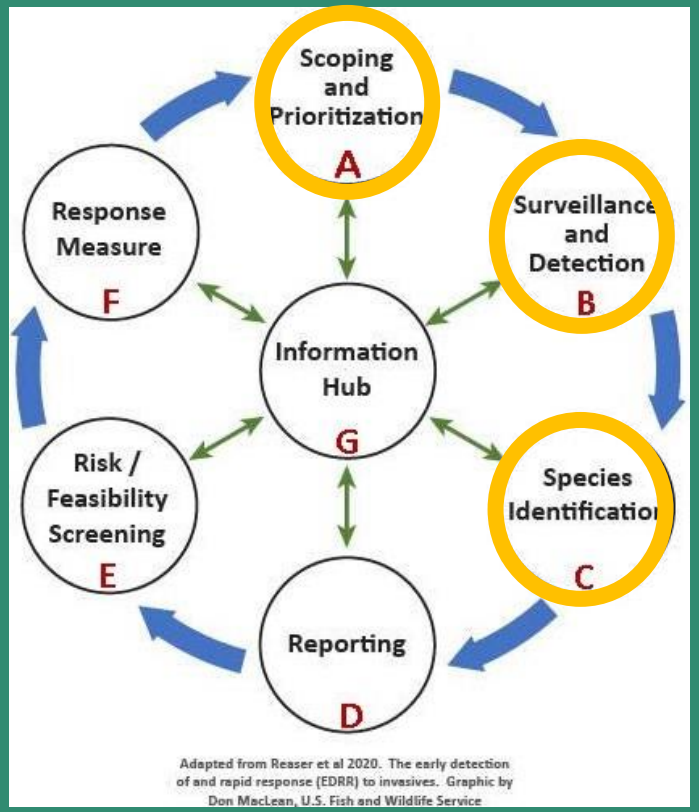
Molecular Detection Tools for Prioritized Potential Invader Species and Point of Use tools for Points of Entry



Adapted from Reaser et al 2020. The early detection of and rapid response (EDRR) to invasives. Graphic by Don MacLean, U.S. Fish and Wildlife Service

Molecular Detection Tools

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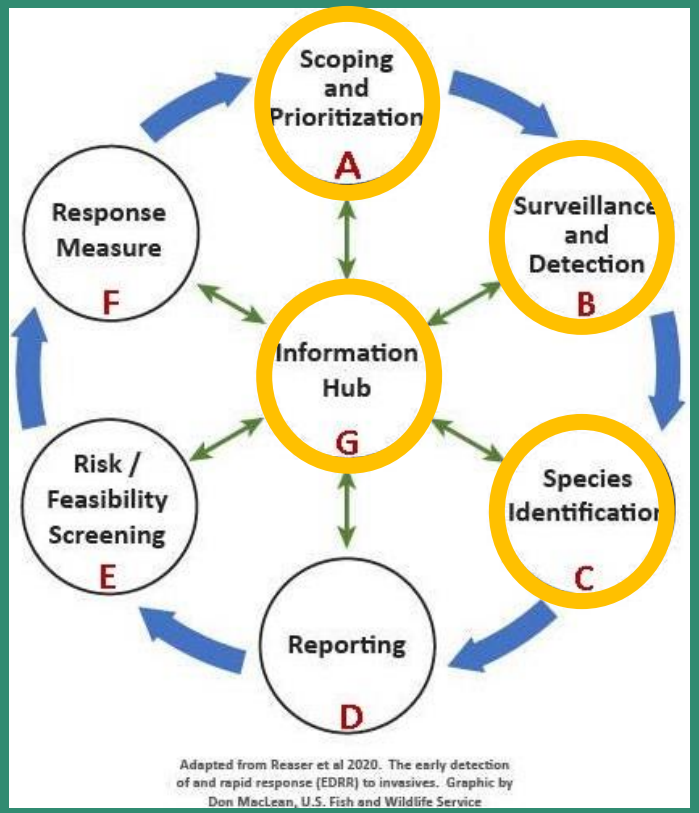
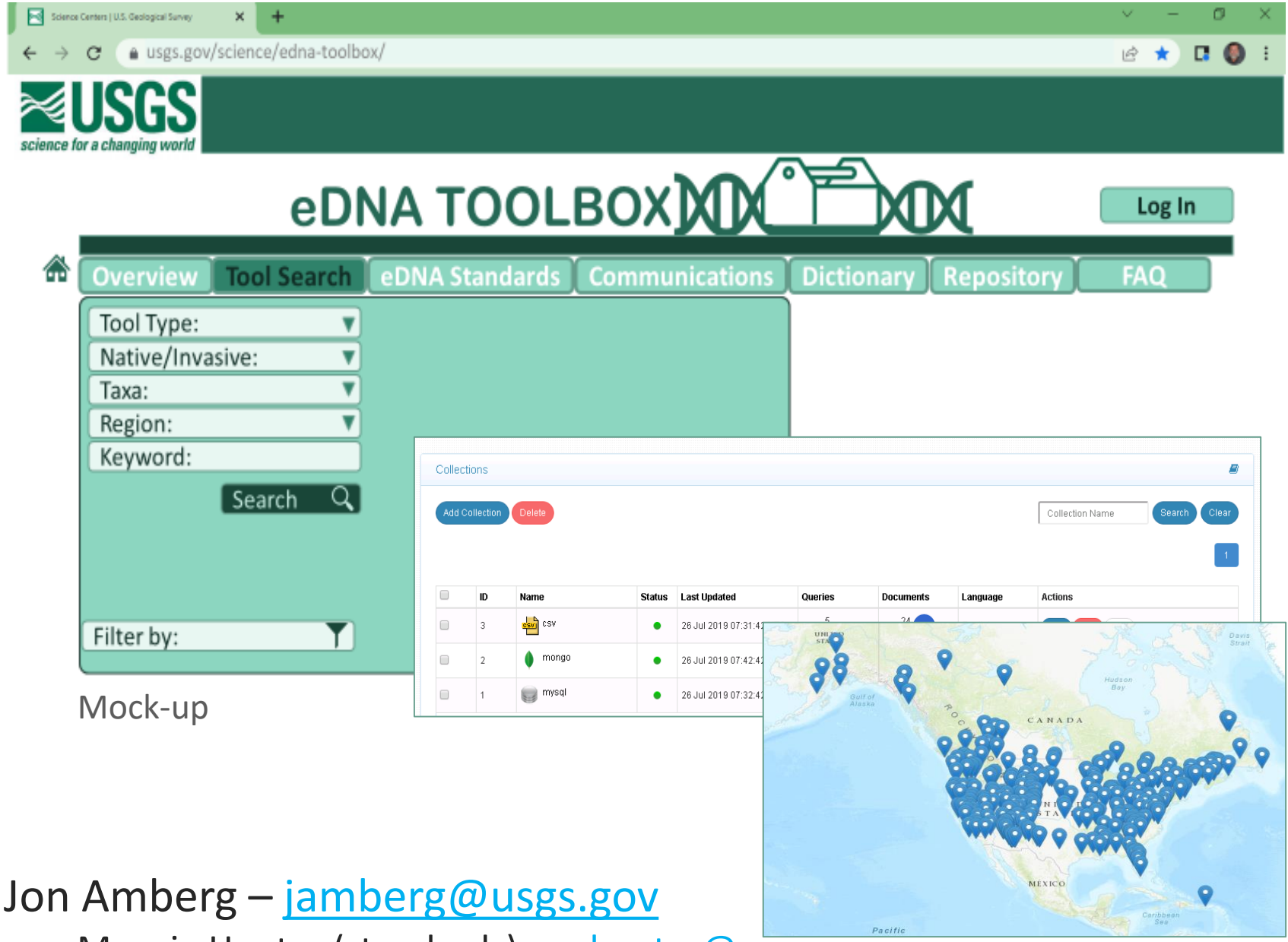
Resource Manager's eDNA Toolbox



Adapted from Reaser et al 2020. The early detection of and rapid response (EDRR) to invasives. Graphic by Don MacLean, U.S. Fish and Wildlife Service

One-Stop Web Tool for eDNA



Mock-up

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Adam Sepulveda (communications plan) – asepulveda@usgs.gov

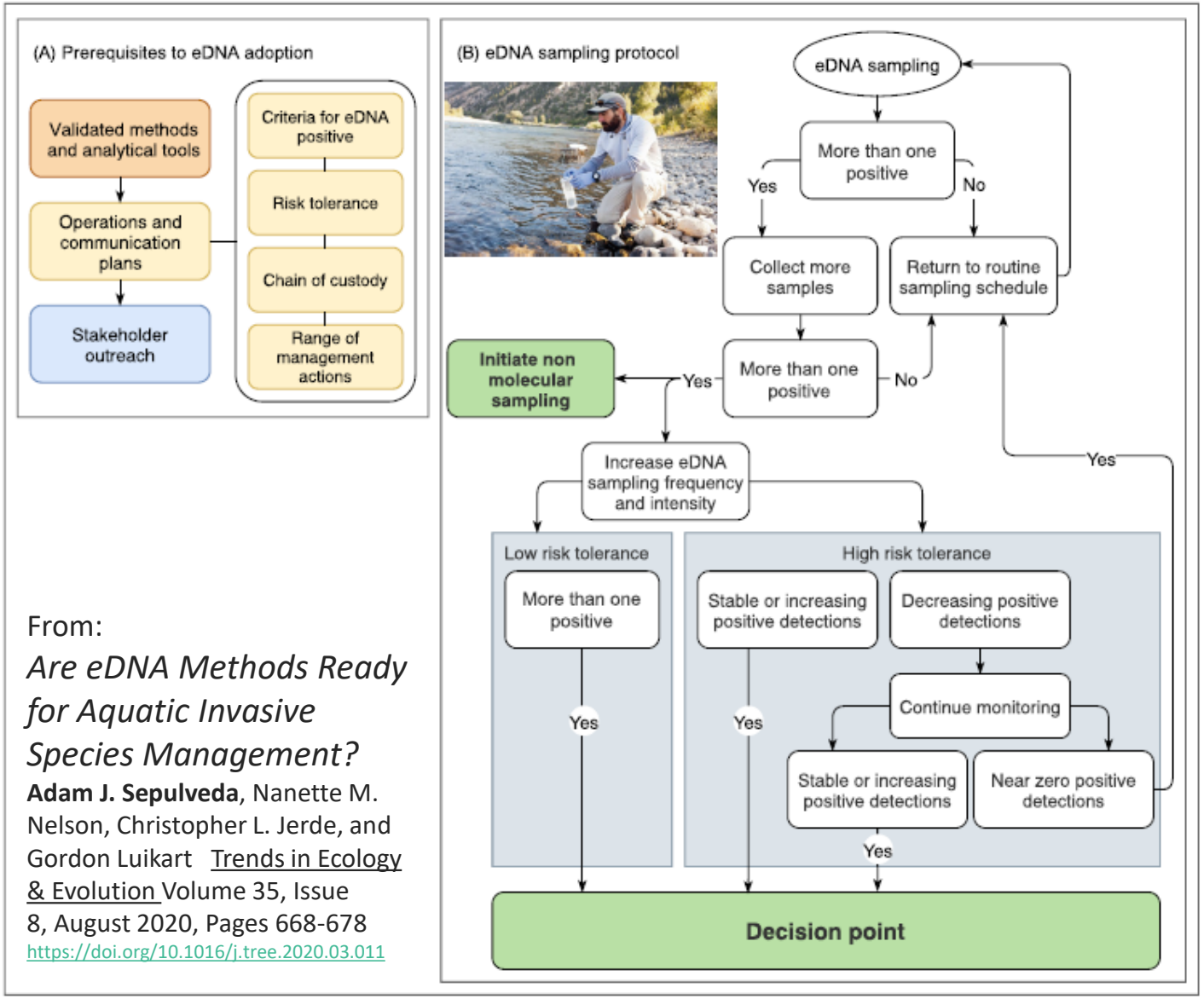
Resource Manager's eDNA Guide

1) High-level overview of eDNA basics & eDNA Standards & Metadata
2) Deciding if eDNA can help with specific manager's surveillance needs
   a) Questions eDNA *can* help with
   b) Questions eDNA *does not* help with
3) Components for operational implementation
4) Understanding & Communicating eDNA Data

Modified from: *Strategic considerations for invasive species managers in the utilization of environmental DNA (eDNA): steps for incorporating this powerful surveillance tool*. Morisette et al. (2021), Management of Biological Invasions 12(3): 747–775, https://doi.org/10.3391/mbi.2021.12.3.15

Communication Protocols & eDNA Data Communications Plan Template

Pre-Public-Release Communications Plan Template including Jurisdictional Authority



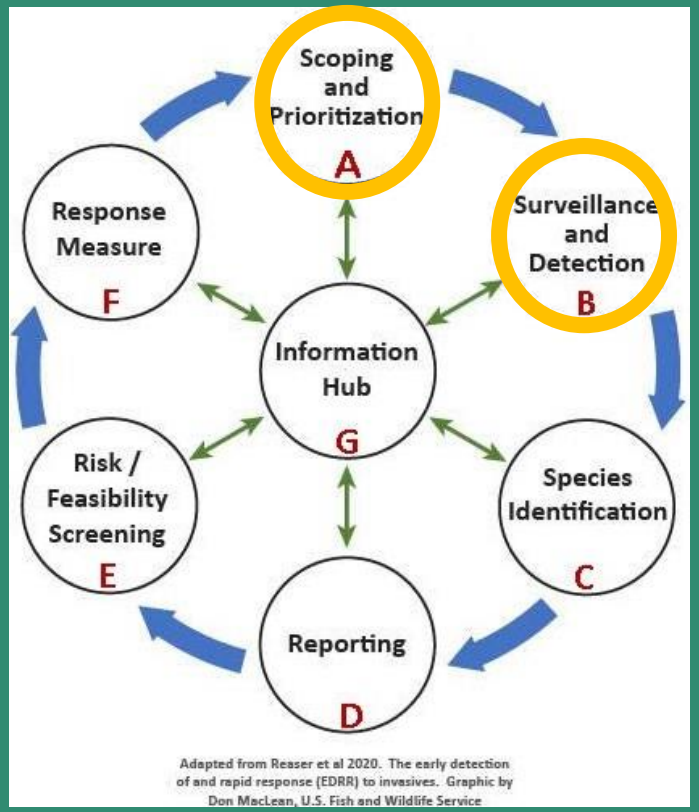
From:

Are eDNA Methods Ready for Aquatic Invasive Species Management?

Adam J. Sepulveda, Nanette M. Nelson, Christopher L. Jerde, and Gordon Luikart Trends in Ecology & Evolution Volume 35, Issue 8, August 2020, Pages 668-678

https://doi.org/10.1016/j.tree.2020.03.011

Genetic Material Repository & Network



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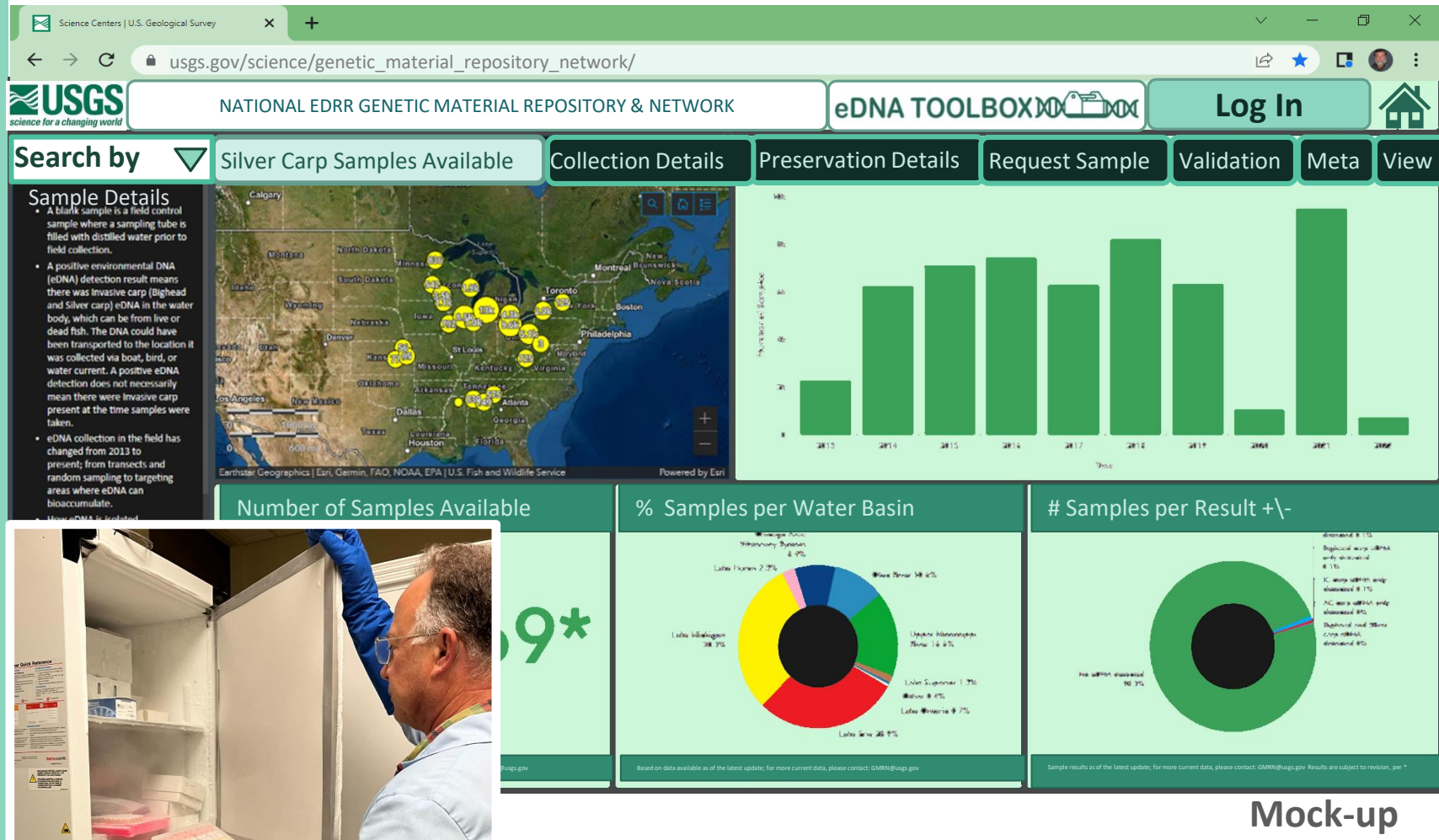

Mock-up

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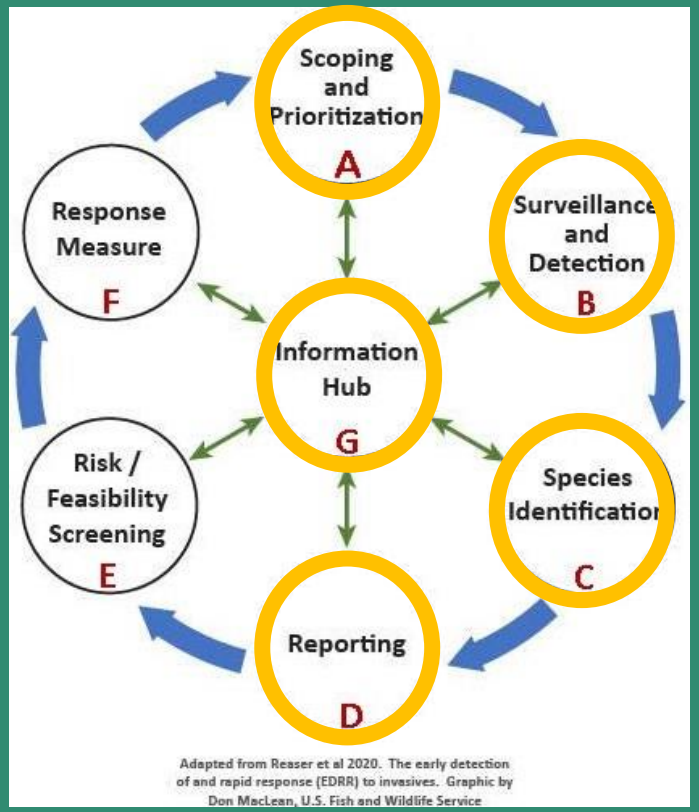
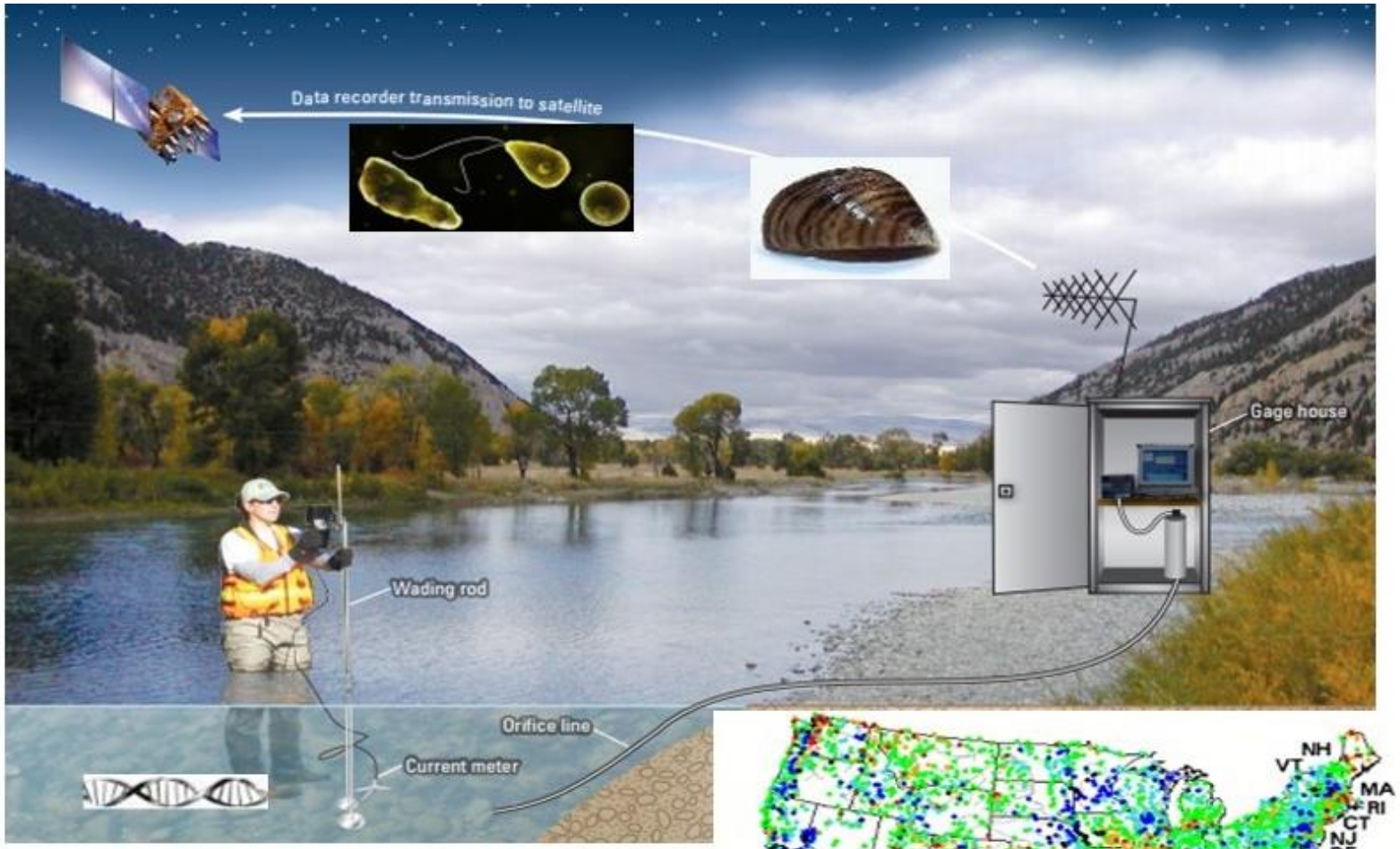
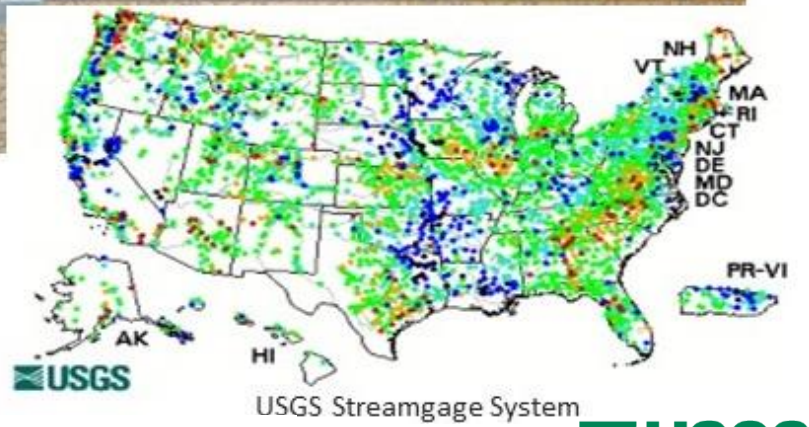
Rapid eDNA Assessment & Deployment Initiative Network



Adapted from Reaser et al 2020. The early detection of and rapid response (EDRR) to invasives. Graphic by Don MacLean, U.S. Fish and Wildlife Service

READI-Net: Automated Targeted eDNA Detection





USGS Streamgage System

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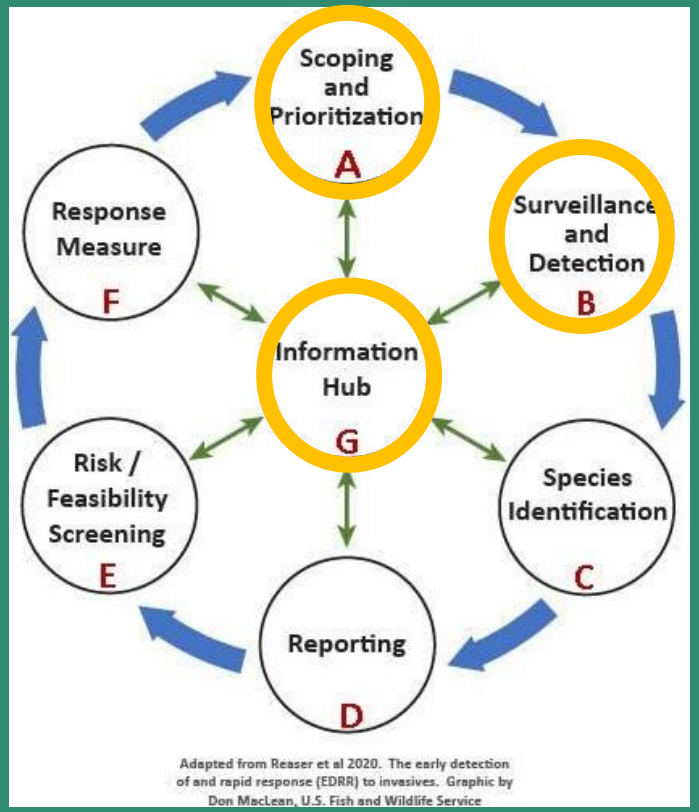
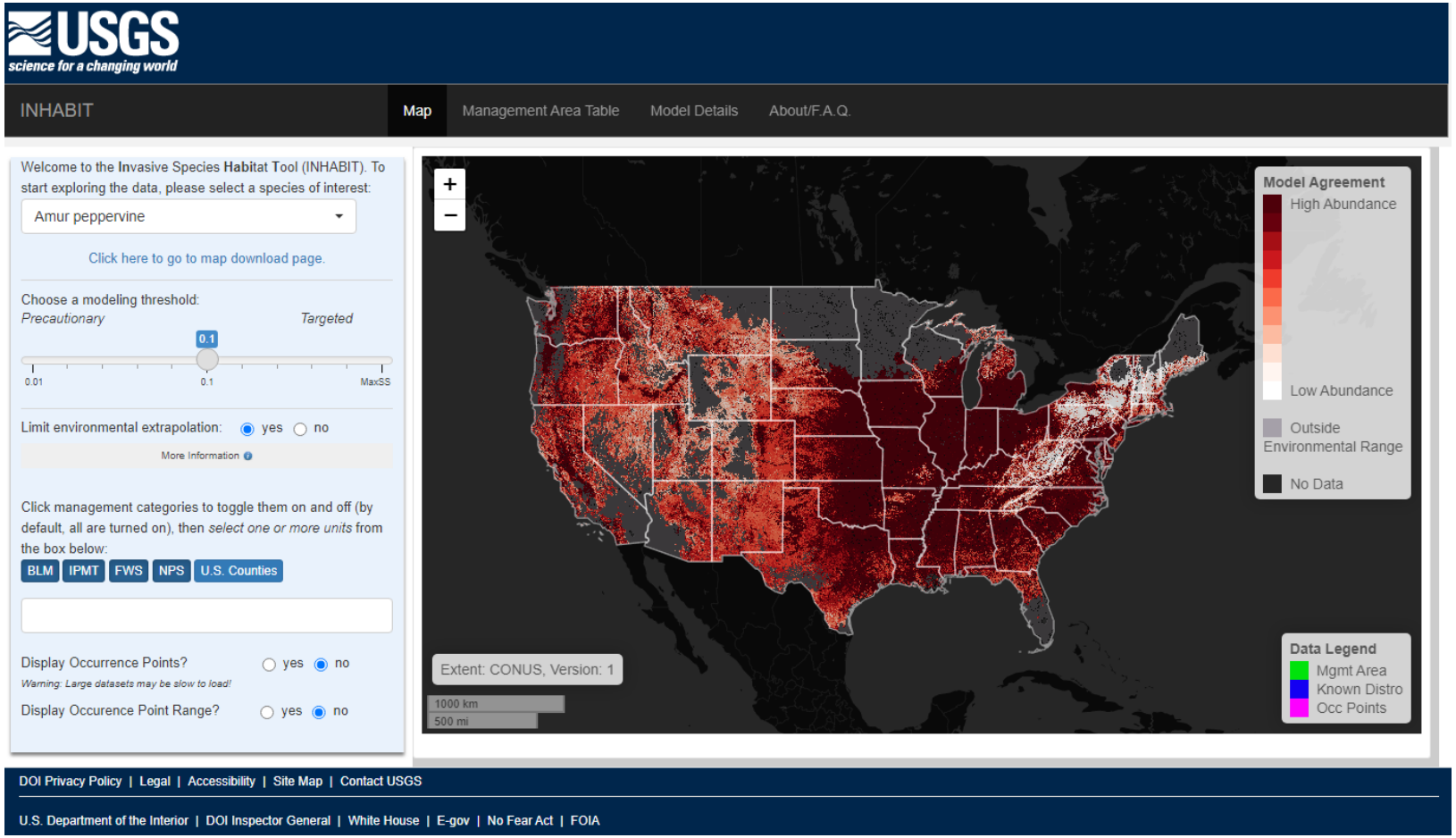
Increase EDRR Capacity for Terrestrial Plants



Adapted from Reaser et al 2020. The early detection of and rapid response (EDRR) to invasives. Graphic by Don MacLean, U.S. Fish and Wildlife Service

Invasive Species Habitat Tool (INHABIT)



- Predicting species ***abundance*** not just suitability of invasive species.
- Including watchlist species that are ***not yet known to occur*** in the U.S.

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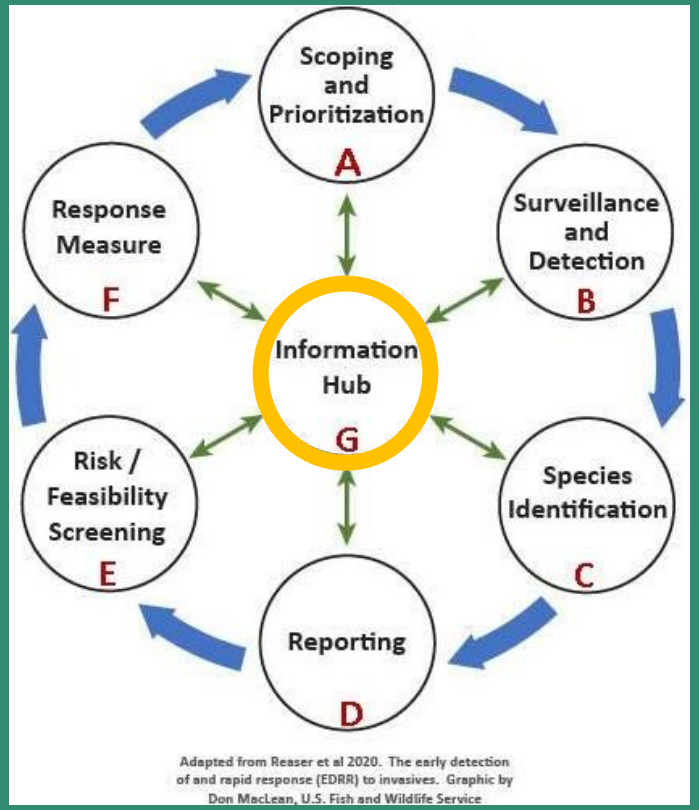
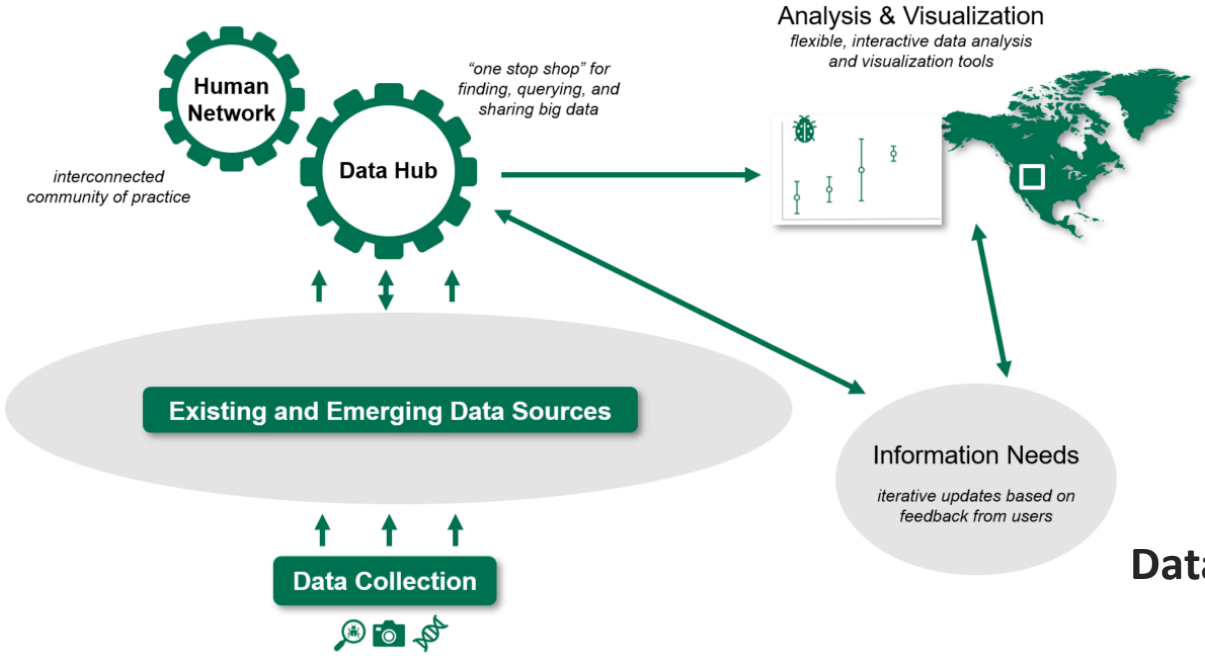
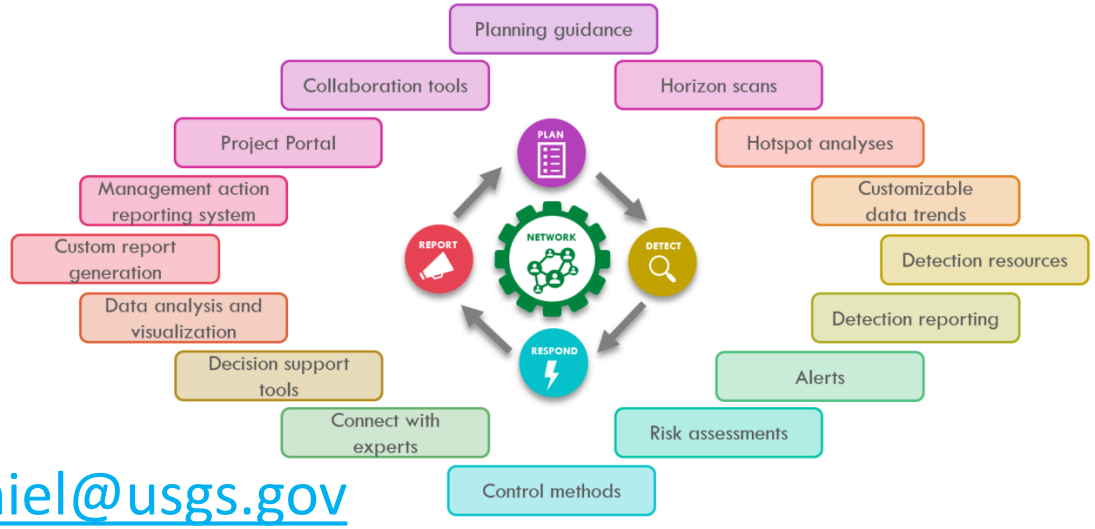
National EDRR Information System



National EDRR Information System (NEDRRIS)



Data – Analysis – Tools



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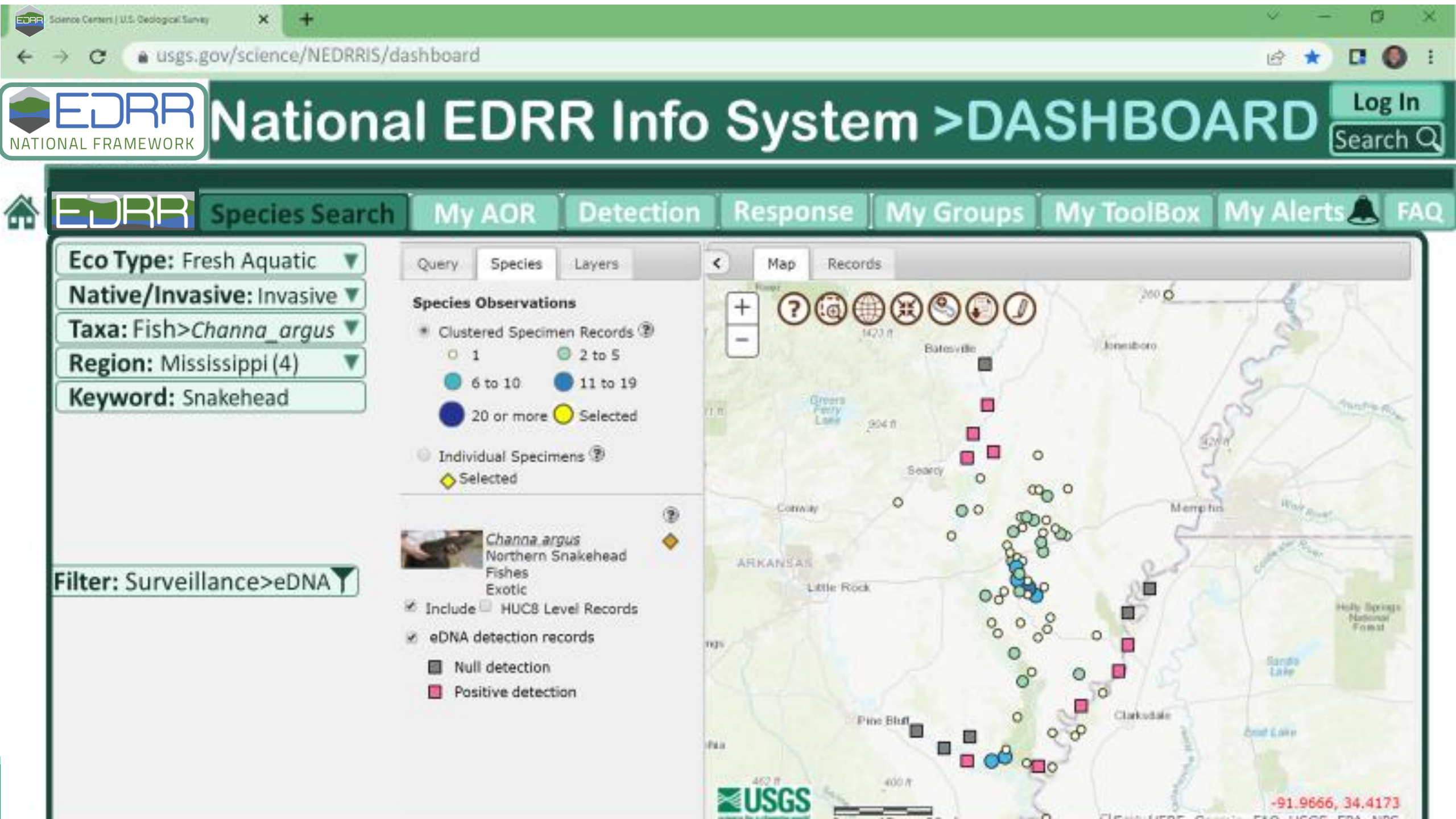
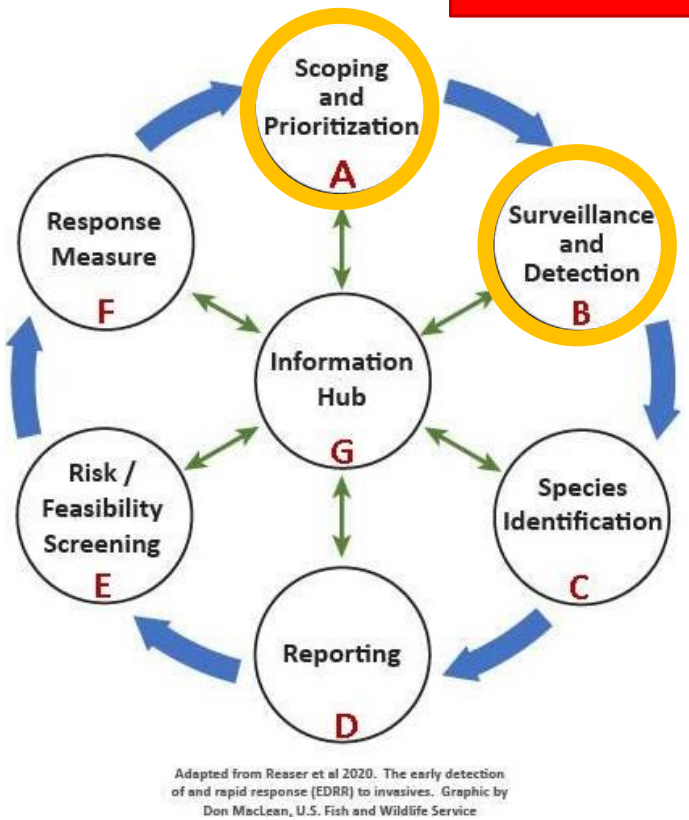

Science Center | U.S. Geological Survey
usgs.gov/science/NEDRRIS/dashboard
EDRR
NATIONAL FRAMEWORK
National EDRR Info System >DASHBOARD
Log In
Search
EDRR
Species Search
My AOR
Detection
Response
My Groups
My ToolBox
My Alerts
FAQ
Eco Type: Fresh Aquatic
Native/Invasive: Invasive
Taxa: Fish>Channa_argus
Region: Mississippi (4)
Keyword: Snakehead
Filter: Surveillance>eDNA
Query
Species
Layers
Species Observations
Clustered Specimen Records
1
2 to 5
6 to 10
11 to 19
20 or more
Selected
Individual Specimens
Selected
Channa argus
Northern Snakehead
Fishes
Exotic
Include
HUC8 Level Records
eDNA detection records
Null detection
Positive detection
Map
Records
Batesville
Jonesboro
Searcy
Conway
Memphis
ARKANSAS
Little Rock
Pine Bluff
Clarksdale
USGS
-91.9666, 34.4173

Conduct HotSpot Analysis For Priority Species & Locations



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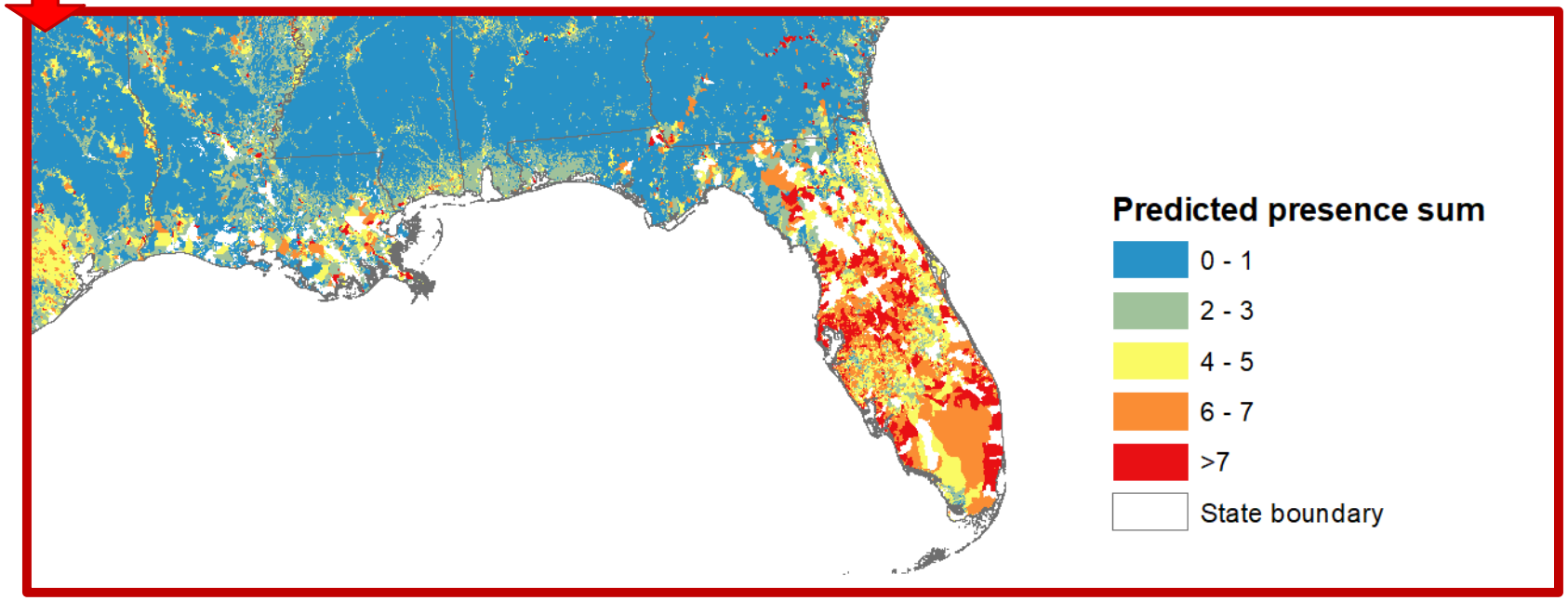
Focus on Place



Partner Engagement Coordinator
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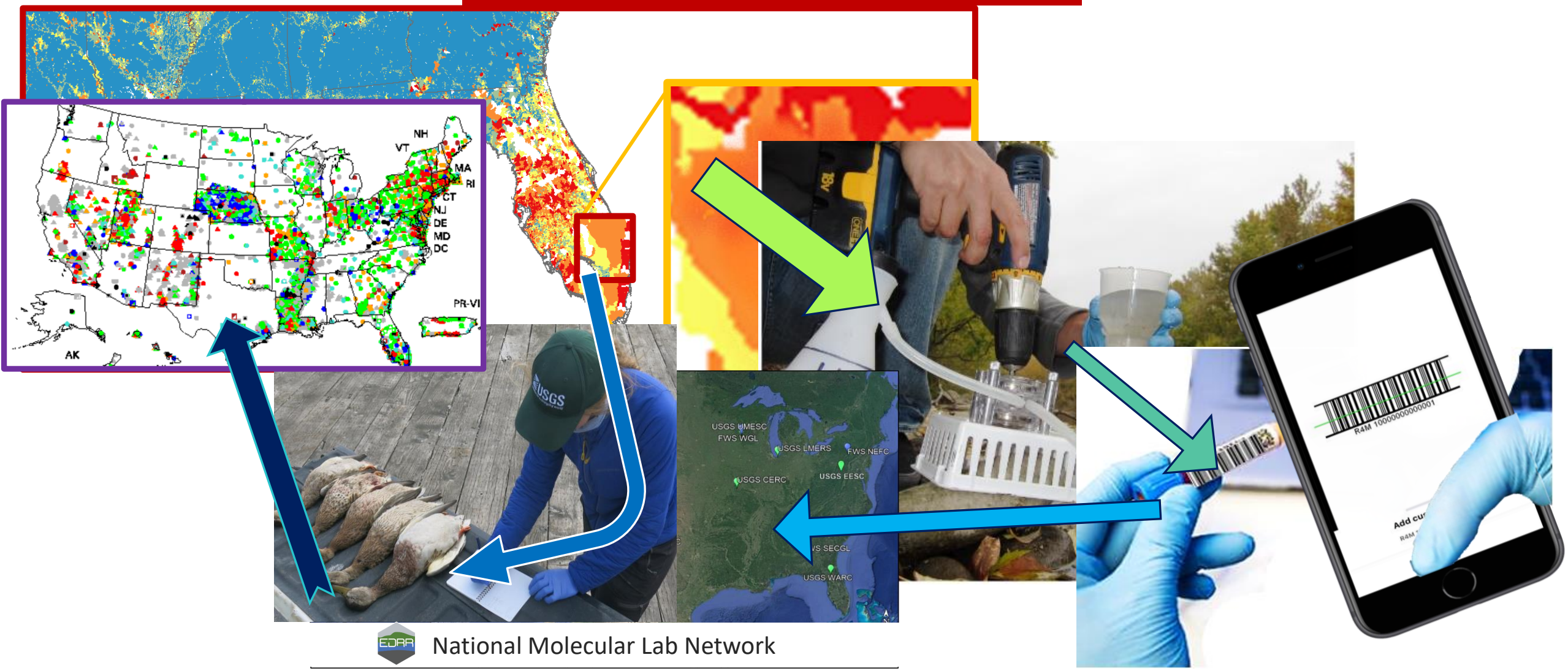
Surveillance, Detection, ID, Reporting, Communication

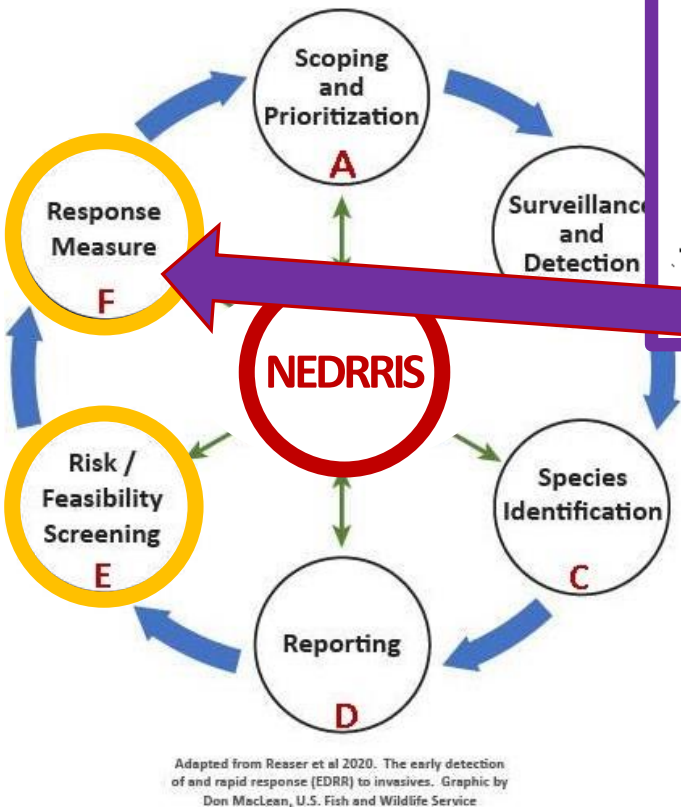


National Molecular Lab Network

Coordinate ED with RR in NEDRRIS

Grass Carp spawning monitoring event, Sandusky River, June 2018. Eric Weimer, Ohio DNR

https://www.dnr.wa.gov/programs-and-services/aquatics/habitat-conservation/invasive-species-control



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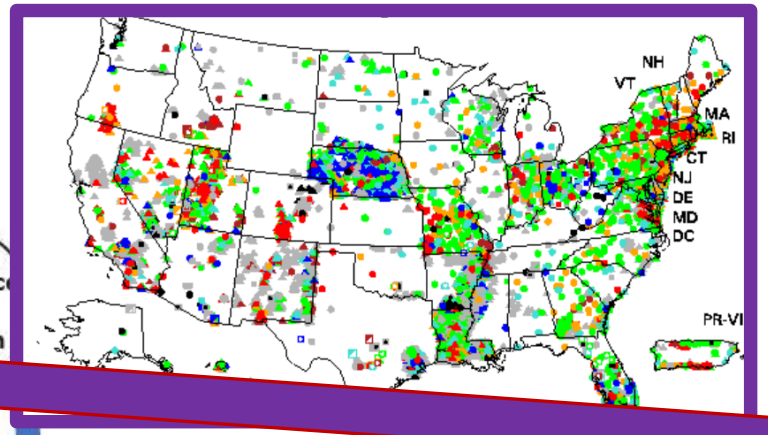

https://www.nps.gov/subjects/invasive/nw.htm

https://blog.nature.org/science/2013/10/28/adirondacks-rapid-response-an-invasives-success-story/

EDRR NATIONAL FRAMEWORK

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