



USGS NONINDIGENOUS AQUATIC SPECIES DATABASE: OVERVIEW AND TOOLS

MATTHEW NEILSON

U.S. GEOLOGICAL SURVEY

WETLAND AND AQUATIC RESEARCH CENTER

GAINESVILLE, FL

USGS NONINDIGENOUS AQUATIC SPECIES DATABASE



NUMBER OF SPECIES TRACKED

1 3 5 1



TOTAL
RECORDS
677,738*



TRANSBOUNDARY
WATERBODIES AND
DRAINAGES BETWEEN
CANADA AND U.S.



255 TAXA



69 TAXA



82 TAXA



752 TAXA



6 TAXA



187 TAXA



nas.er.usgs.gov

Species profiles



Data sources / references



Actionable maps and tools



Distribution maps



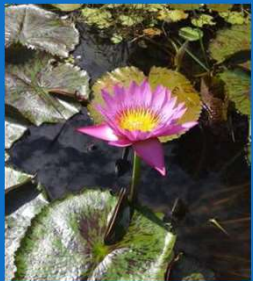
HIGH PROFILE SPECIES TRACKED

- INVASIVE CARPS (BIGHEAD, SILVER, GRASS, BLACK)
- DREISSENID MUSSELS
- ROUND GOBY
- LIONFISH

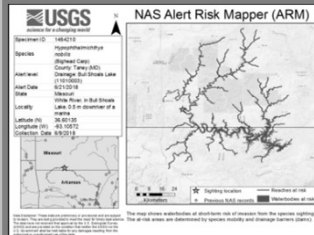


NAS DATABASE AND R4 FUNDED TOOLS

AQUATIC PLANT
RANGE
EXPANSIONS



ALERT RISK
MAPPER (ARM)



IMPACT
TABLES



EDNA
DATA
STANDARDS



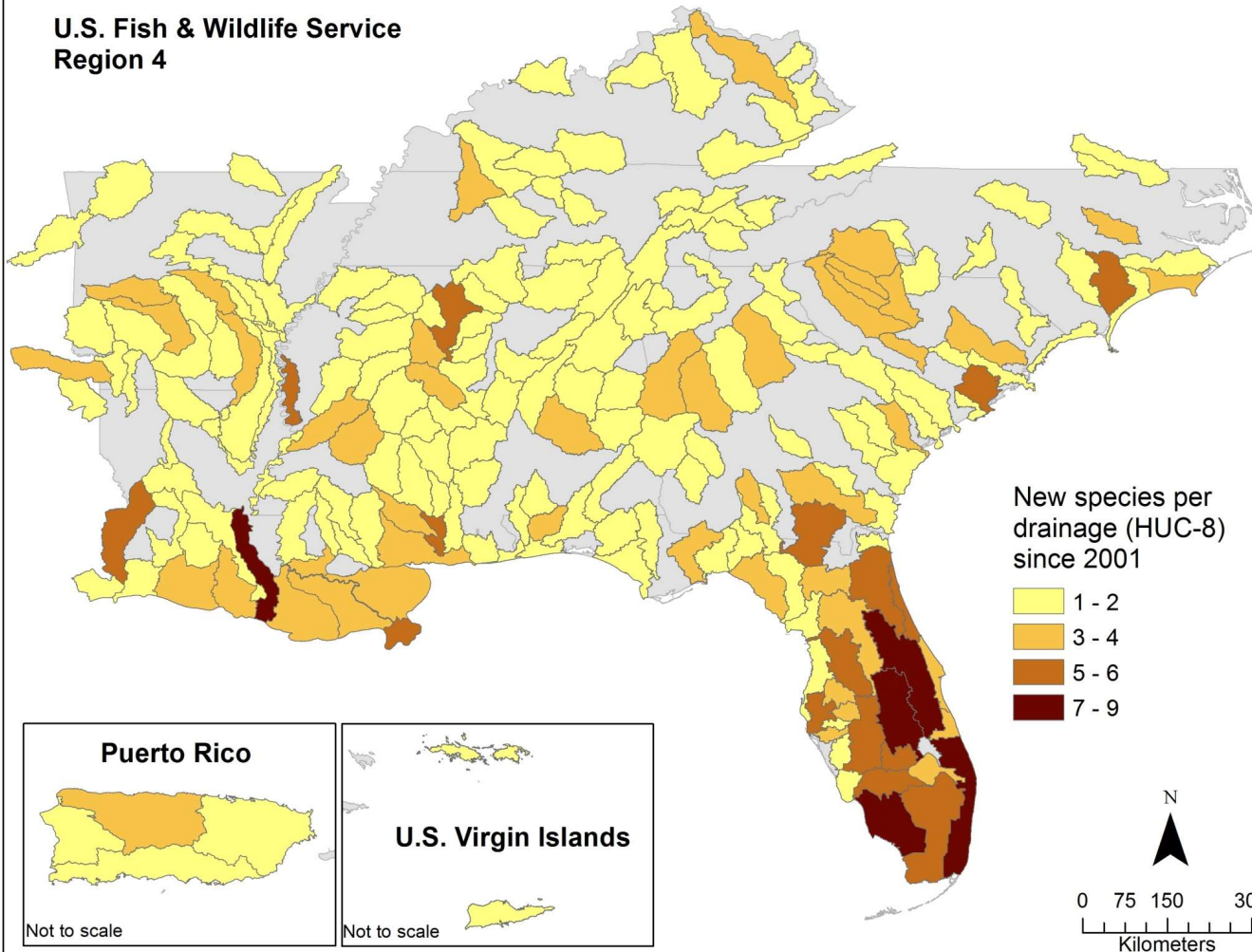
PR
HORIZON SCAN



RANGE EXPANSION OF AQUATIC PLANTS

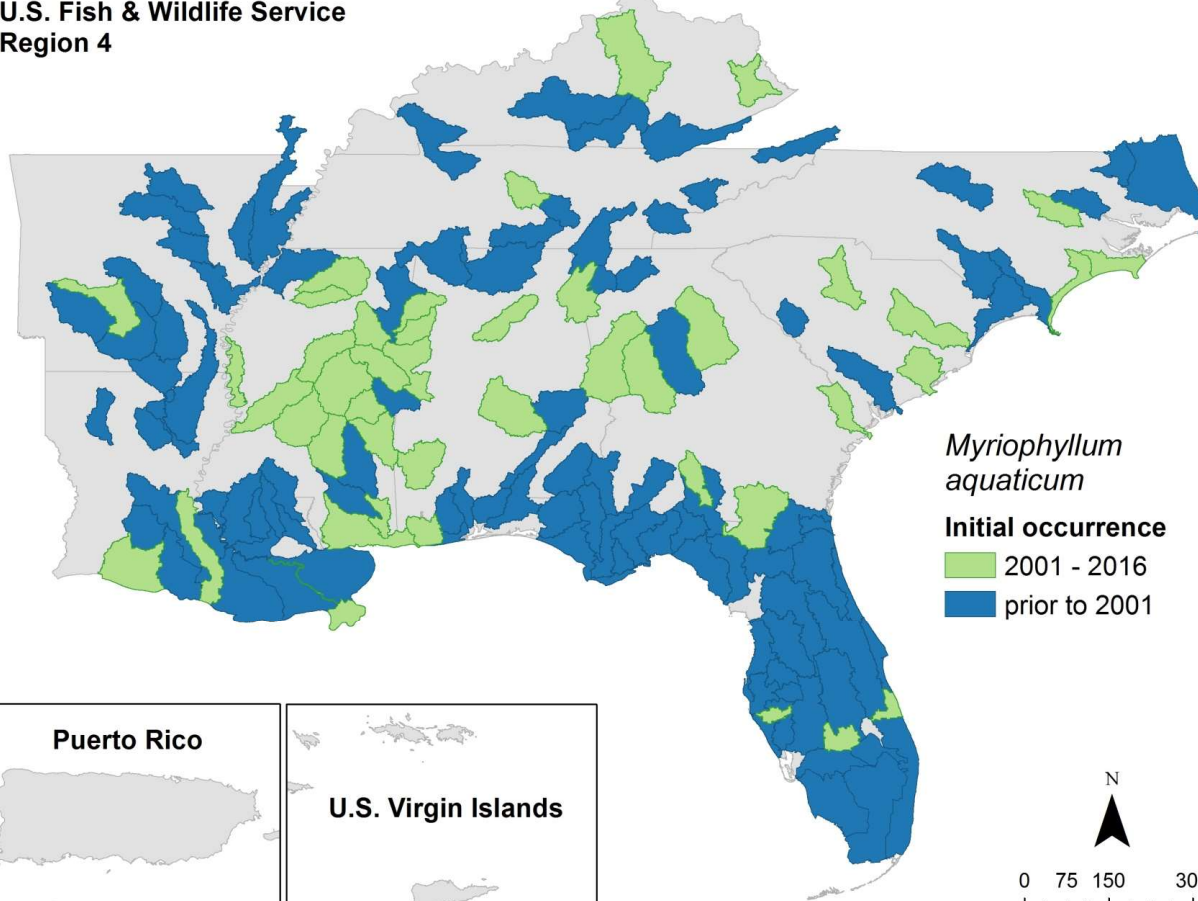
- TARGETED DATA COLLECTION AND ANALYSIS FOR INTRODUCED AQUATIC PLANT SPECIES IN THE SE US
 - FOCUS ON RANGE EXPANSION SINCE 2001 ACROSS THE REGION
 - IDENTIFIED 60 SPECIES WITH RANGE EXPANSIONS, AND PROVIDED A DETAILED REVIEW OF 14 PREVIOUSLY ESTABLISHED SPECIES; 9 NEWLY INTRODUCED SPECIES

**U.S. Fish & Wildlife Service
Region 4**



State:	AL	AR	FL	GA	KY	LA	MS	NC	PR	SC	TN	VI
1 st reported:	1957	1970	1906	1951	1990	1915	1944	1938		1957	1956	

U.S. Fish & Wildlife Service
Region 4



Myriophyllum aquaticum

Initial occurrence
■ 2001 - 2016
■ prior to 2001

Puerto Rico

U.S. Virgin Islands

Not to scale

Not to scale

N

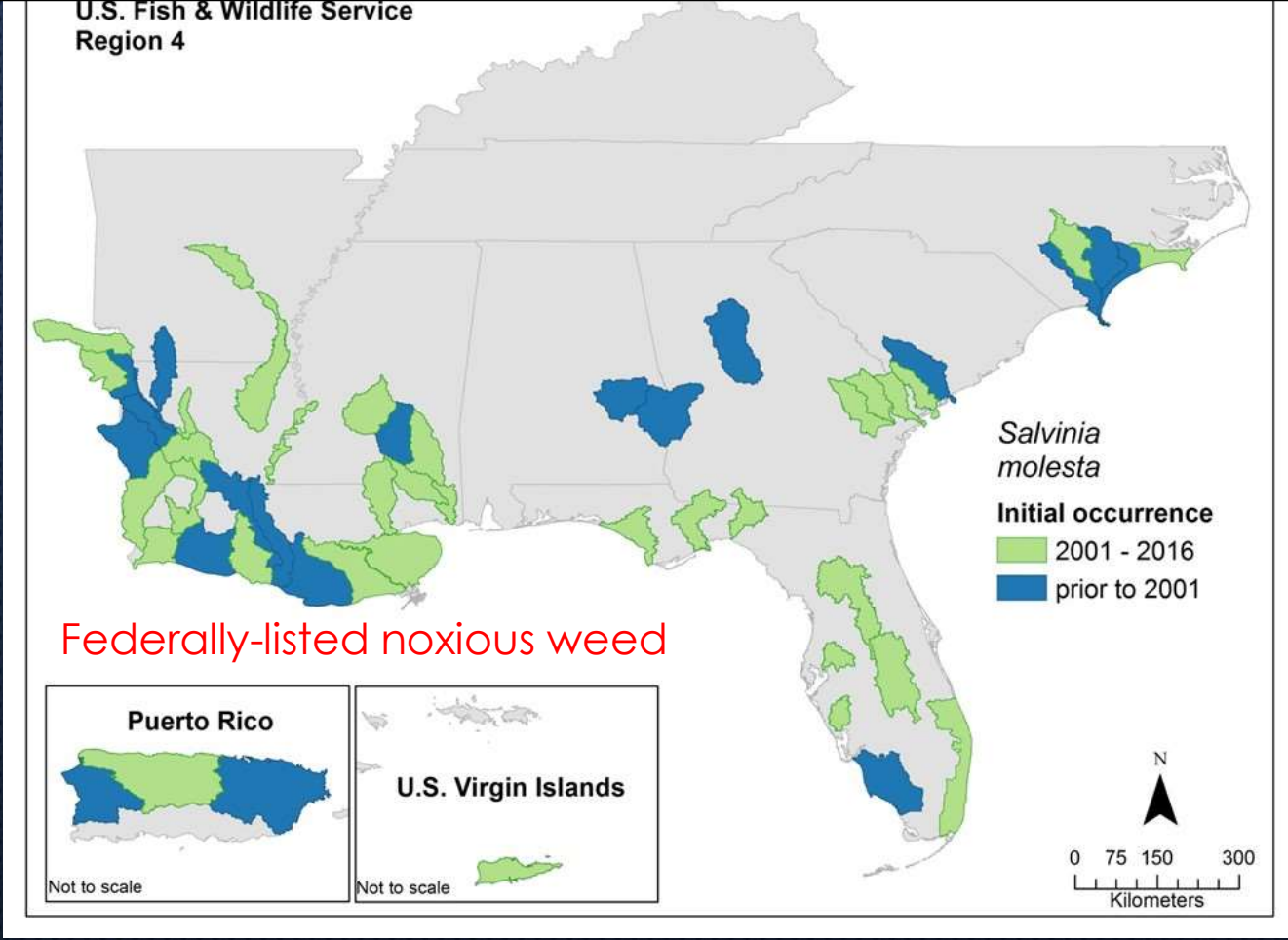
0 75 150 300
Kilometers

Parrot feather



Ryan Wersal - Mississippi State University

State:	AL	AR	FL	GA	KY	LA	MS	NC	PR	SC	TN	VI
1 st reported:	1999	2008	1999	1999		1998	1999	2000	2000	1995		2012



Giant salvinia



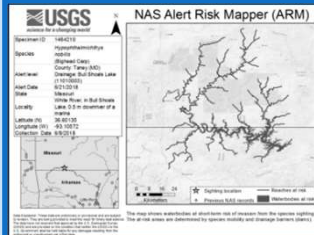
Ian Pflugsten - USGS

NAS DATABASE AND R4 FUNDED TOOLS

AQUATIC PLANT
RANGE
EXPANSIONS



ALERT RISK
MAPPER (ARM)



IMPACT
TABLES



EDNA
DATA
STANDARDS



PR
HORIZON SCAN



NAS ALERT SYSTEM

- PART OF EARLY DETECTION/RAPID RESPONSE SYSTEM
- OPT-IN FOR SPECIES/REGIONS OF INTEREST

NAS Alert System
Nonindigenous Aquatic Species Program
USGS

[Alert List](#) [My Alerts](#) [Account Management](#) FOLLOW US ON [twitter](#)

FILTER ALERT RESULTS

Group:
 In State:
 Genus:
 Species:
 Common Name:
 Dates Between: and
 Sort by:
 Records per page:

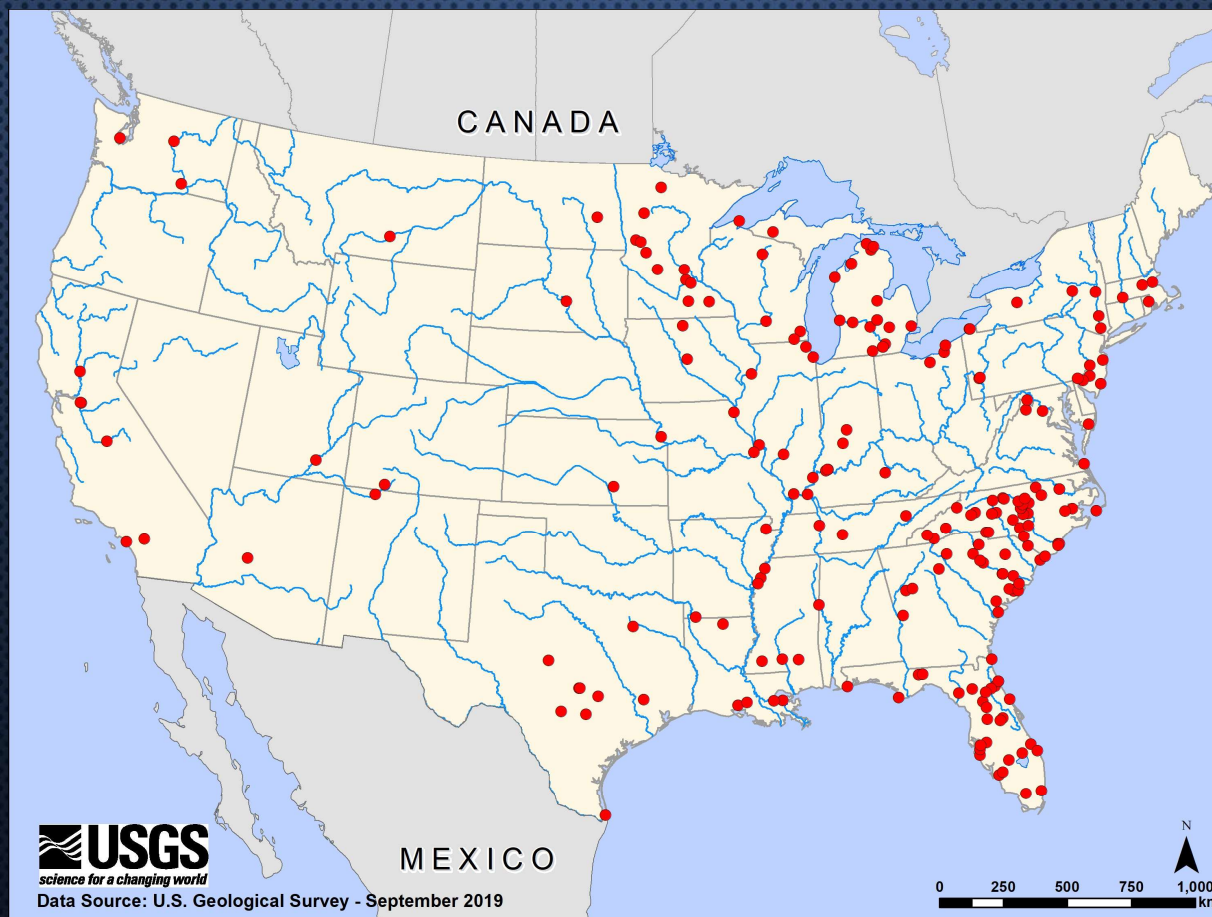
The 10 most recent alerts are available at [RFE 2.0](#)

total of 658 alerts match your criteria. Click on the dipnet to get details about the collection.

	Date	Species	New Area
Bonus	2/27/2015	redtail catfish <i>Phractocephalus hemioiopterus</i>	State: FL
	2/23/2015	redtail catfish <i>Phractocephalus hemioiopterus</i>	County: Miami-Dade (FL) Drainage: Florida Southeast Coast (3090206)
	2/10/2015	Bighead Carp <i>Hypophthalmichthys nobilis</i>	State: PA County: Washington (PA) Drainage: Upper Ohio (5030101)
	2/10/2015	Grass Carp <i>Ctenopharyngodon idella</i>	County: Washington (PA)
	2/9/2015	Asian Swamp Eel <i>Monopterus albus</i>	County: Hardee (FL) Drainage: Peace (3100101)
	2/2/2015	redtail catfish <i>Phractocephalus hemioiopterus</i>	State: MA County: Worcester (MA) Drainage: Nashua (1070004)
	1/29/2015	Chain Pickerel <i>Esox niger</i>	State: MI County: Chippewa (MI) Drainage: Lake Huron (4080300)
	1/6/2015	Yellow Bullhead <i>Ameiurus natalis</i>	County: Fresno (CA) Drainage: Middle San Joaquin-Lower Chowchilla (18040001)
	1/6/2015	Oriental Weatherfish <i>Misgurnus anguillicaudatus</i>	County: Sullivan (NY) Drainage: Middle Delaware-Mongaup-Brodhead (2040104)
	12/22/2014	Oriental Weatherfish <i>Misgurnus anguillicaudatus</i>	Drainage: Middle Hudson (2020006)
	12/22/2014	Oriental Weatherfish <i>Misgurnus anguillicaudatus</i>	County: Dutchess (NY) Drainage: Hudson-Wappinger (2020008)
	12/18/2014	chocolate surgeonfish <i>Acanthurus pyroferus</i>	Country: US State: FL County: Palm Beach (FL) Drainage: Florida Southeast Coast (3090206)



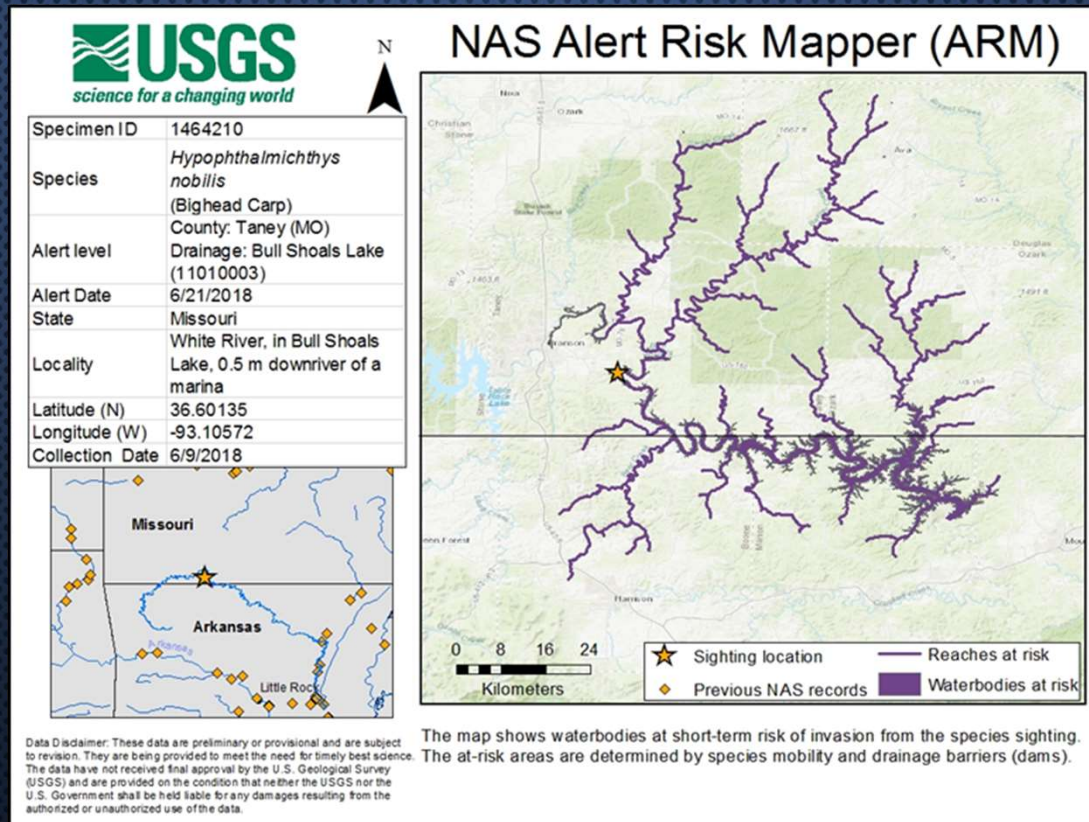
NAS ALERT SYSTEM



ALERT RISK MAPPER (ARM)

Information on the detection from the NAS Alert

Regional view map of the waterbodies



Local view map of the detection location

IMPACT TABLES

- EXHAUSTIVE SYSTEMATIC LITERATURE REVIEW OF DOCUMENTED IMPACTS FOR A SPECIES THAT IS UPDATED WITH NEW LITERATURE IN PERPETUITY
- IMPACT: AN EFFECT A SPECIES HAS OUTSIDE OF ITS NATIVE RANGE
- INCLUDES ANECDOTAL CLAIMS TO FIND DATA GAPS IN IMPACT RESEARCH
- EASILY SEARCHABLE WITH ICONS IN A TABLE ON SPECIES PROFILES

Ecological	Economic
Predation/Herbivory	Infrastructure
Competition	Recreation
Habitat Alteration	Aquaculture/Agriculture
Water Quality	Property Value
Food Web	Human Health
Genetics	Harvest
Disease/Parasite/Toxicity	Commerce
	Navigation

IMPACT TABLES

- **USEFUL IN MANY WAYS**
- **REFERENCES STUDIES MAKING THE IMPACT CLAIM(S)**
- **MORE REFERENCES FOR AN IMPACT CLAIM = MORE SUPPORT**
- **IMPACT AGGREGATIONS CAN HELP DISCOVER PRIORITY SPECIES FOR MANAGEMENT FOCUS**
- **ANECDOTAL CLAIMS SHOW RESEARCH GAPS AND CAN ASSIST IN DIRECTING RESOURCES, FUNDS, AND TIME FOR RESEARCH PRIORITIES**
- **EXHAUSTIVE LITERATURE REVIEW UPDATED REGULARLY WITH NEW PUBLICATIONS SAVES RESEARCH TIME**

Ecological					Economic					Human Health	Other
											
											

NAS - Nonindigenous Aquatic Species

[Home](#)
[Alert System](#)
[Database & Queries](#)
[Taxa Information](#)
[Report a Sighting](#)
[Screening Tool \(SEINeD\)](#)

Generate a Nonindigenous Species List

Select your criteria below. A list of species that matches your criteria will be generated. Species with profiles will have links to the profiles.

Group: ▾


Genus:

Species:

Common Name:

[Advanced Search](#)

Search tips:

Images	<u>Group</u>	<u>Family</u>	<u>Scientific Name</u>	<u>Common Name</u>	<u>More info</u>	<u>Native Habitat</u>	<u>Species Origin</u>
	Plants	Hydrocharitaceae	<i>Elodea canadensis</i>	Canadian waterweed	Collection info Point Map Species Profile Animated Map Impacts	Freshwater	Native Transplant



Elodea canadensis
 (Canadian waterweed)
 Plants
 Native Transplant

- [Collection Info](#)
- [Point Map](#)
- [Species Profile](#)
- [Animated Map](#)
- [Impacts](#)

16 results for *Elodea canadensis* (Canadian waterweed)

Results per page: 25

Impact ID	Scientific Name	Impact Type	Study Type
3072	<i>Elodea canadensis</i>	Competition	Anecdotal
4481	<i>Elodea canadensis</i>	Habitat Alteration	Observational
4482	<i>Elodea canadensis</i>	Competition	Observational
4483	<i>Elodea canadensis</i>	Competition	Observational
4484	<i>Elodea canadensis</i>	Recreation	Observational
4485	<i>Elodea canadensis</i>	Water Quality	Observational
4490	<i>Elodea canadensis</i>	Habitat Alteration	Observational
4491	<i>Elodea canadensis</i>	Water Quality	Observational
4497	<i>Elodea canadensis</i>	Navigation	Observational



Elodea canadensis
 (Canadian waterweed)
 Plants
 Native Transplant

- [Collection Info](#)
- [Point Map](#)
- [Species Profile](#)
- [Animated Map](#)
- [Impacts](#)

Impact ID	4481
Impact Type	Habitat Alteration
Study Type	Observational
Study Location	Field
Impact Description	In Kilpiaistenpohja Bay, Finland, it was found that as the density of <i>Elodea canadensis</i> increased, the total biomass of <i>Daphnia longispina</i> decreased, suggesting that <i>E. canadensis</i> does not provide a favorable habitat or a good refuge for <i>D. longispina</i> .
Reference	36386
Notes	
Great Lakes Region	No
Cost	
Location	Kilpiaistenpohja Bay, Finland

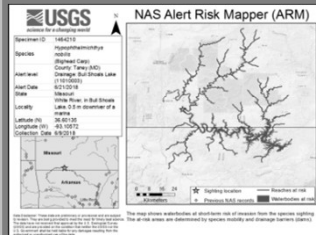
[Return to impacts listing for *Elodea canadensis*](#)

NAS DATABASE AND R4 FUNDED TOOLS

AQUATIC PLANT
RANGE
EXPANSIONS



ALERT RISK
MAPPER (ARM)



IMPACT
TABLES



EDNA
DATA
STANDARDS



PR
HORIZON SCAN



EDNA AND AQUATIC INVASIVE SPECIES

- EDNA IS A POWERFUL TOOL FOR BIOSURVEILLANCE EFFORTS
 - SPECIES OF CONSERVATION CONCERN
 - CRYPTIC SPECIES
 - EARLY DETECTION OF INTRODUCED SPECIES

GOALS FOR EDNA INTEGRATION INTO NAS DATABASE

- UNIFIED SOURCE FOR INTEGRATED ORGANISMAL AND GENETIC OBSERVATIONS OF INTRODUCED AQUATIC SPECIES
- PORTAL FOR NATURAL RESOURCE MANAGERS, ACADEMICS, PUBLIC
- INCLUDE EDNA INTO EXISTING ED/RR FRAMEWORK AND TOOLS
- NOT A TRUSTED GENETIC REPOSITORY, RAW DATA STORAGE
 - GENBANK, BOLD, AQUATIC EDNATLAS (USFS)

EDNA TOOLS/PRODUCTS BEING DEVELOPED

eDNA
Community
Standards

Communication
Plan with
Resource
Managers

eDNA Detections
on NAS
Distribution Maps



1 Experimental DNA (eDNA) Standards

- eDNA literature review
- Establishing minimum criteria for USGS Nonindigenous Aquatic Species (NAS) database display
 - Incl. field sampling, lab processing, data analysis



2 Stakeholder Input

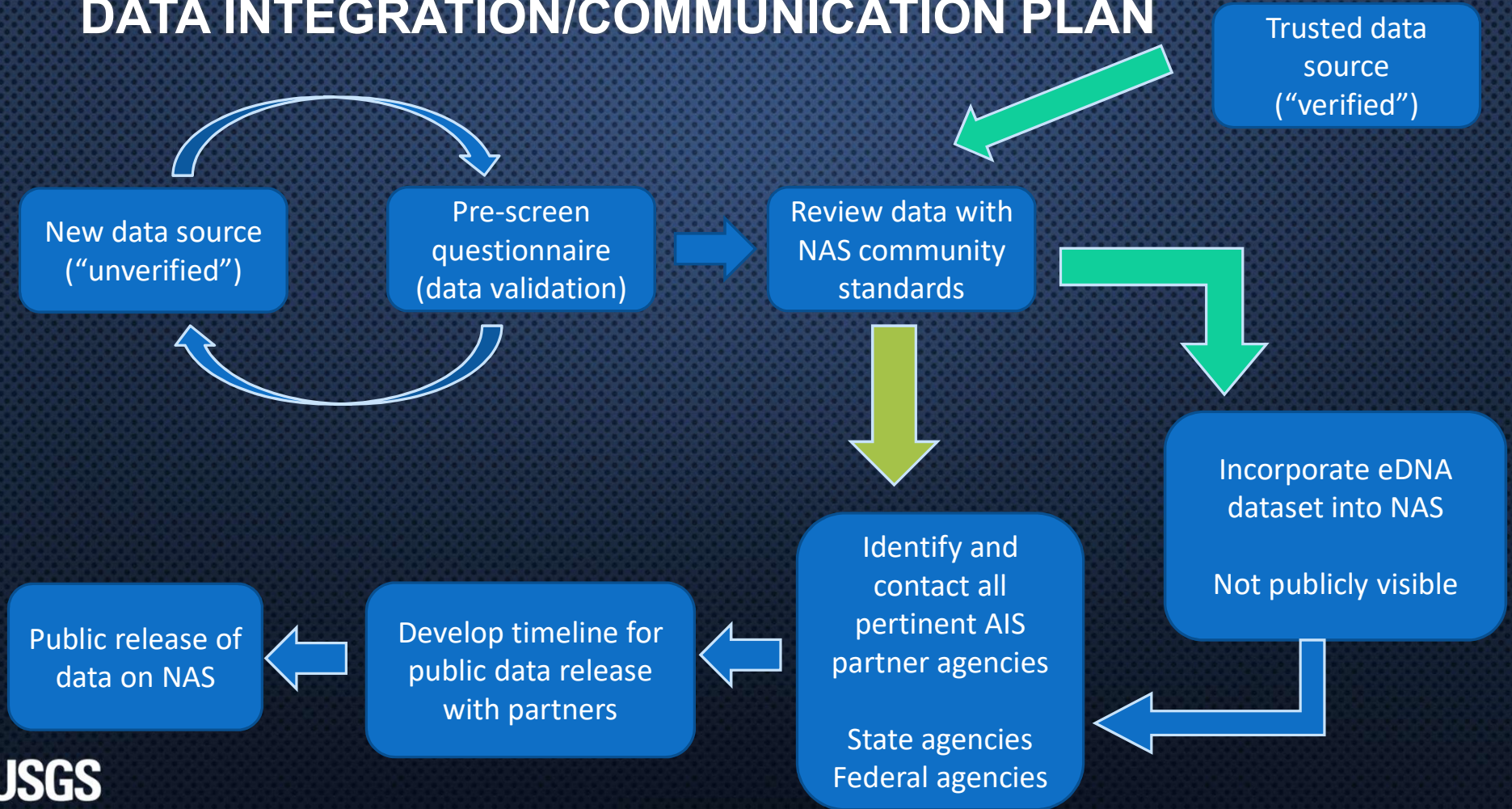
- Review of criteria by Dept of Interior and Federal stakeholders
- Input by broader eDNA Community
- Virtual conferences and peer reviews for consensus (N=11)



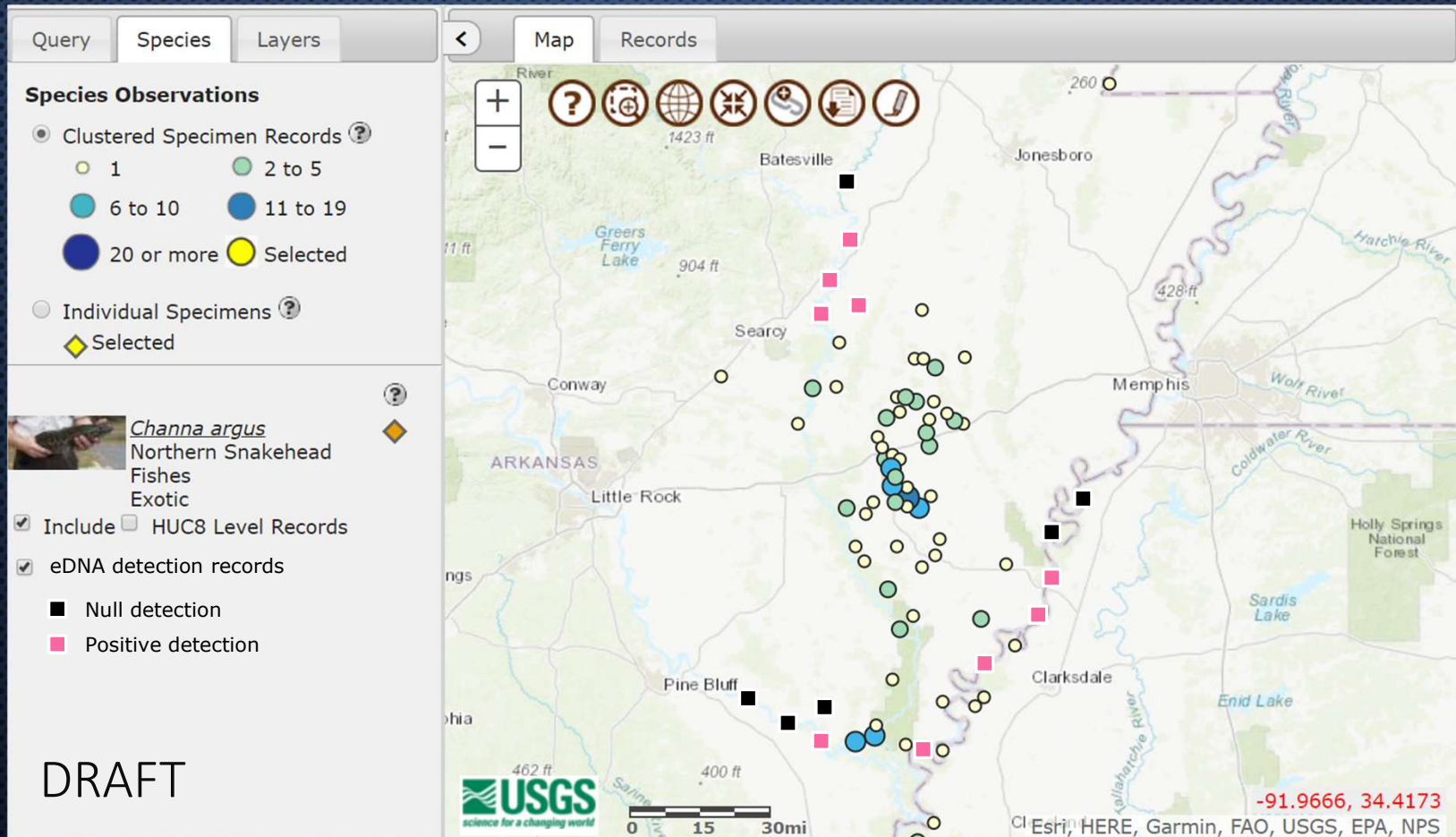
3 Integration into NAS

- Web based forms
- Templates for data, metadata
- NAS website map viewer
- FAIR data management

DATA INTEGRATION/COMMUNICATION PLAN



NAS DISTRIBUTION MAPS

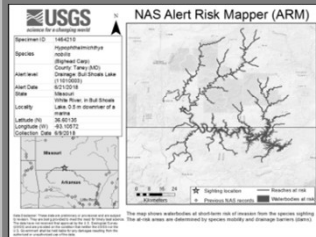


NAS DATABASE AND R4 FUNDED TOOLS

AQUATIC PLANT
RANGE
EXPANSIONS



ALERT RISK
MAPPER (ARM)



IMPACT
TABLES



EDNA
DATA
STANDARDS



PR
HORIZON SCAN



HORIZON SCAN TO COLLABORATIVELY IDENTIFY INVASIVE SPECIES THREATS TO THE ISLAND OF PUERTO RICO AND U.S. VIRGIN ISLANDS

- COLLABORATION WITH DEAH LIEURANCE (UNIVERSITY OF FLORIDA)
- WILL CONSIDER ALL TAXA IN THIS HORIZON SCAN
- EXPERTS WILL CONDUCT THE SCAN AS OUTLINED BY SUTHERLAND *ET AL.* (2011) AND ROY *ET AL.* (2014)
- EMPHASIS ON RECRUITING INDIGENOUS AND LOCAL EXPERTS ON THE ISLANDS

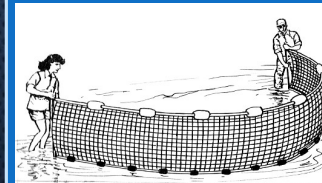


OTHER ACTIONABLE MAPS AND TOOLS

**FLOOD AND
STORM
TRACKER
(FAST)**



SEINeD



- WESLEY DANIEL – **COORDINATOR**, INVERTS, MOLLUSKS, HERPS, AND MAMMALS

WDANIEL@USGS.GOV

- MATTHEW NEILSON – FISHES AND TECHNICAL DETAILS

MNEILSON@USGS.GOV

- IAN PFINGSTEN – PLANTS

IPFINGSTEN@USGS.GOV

- CAYLA MORNINGSTAR – MOLLUSKS

CMORNINGSTAR@CONTRACTOR.USGS.GOV

- JONATHAN FREEDMAN – FISHES AND HERPS

JFREEDMAN@CONTRACTOR.USGS.GOV

- KRISTEN REAVER- MARINE FISHES

KREAVR@USGS.GOV

THANK YOU

NAS.ER.USGS.GOV

