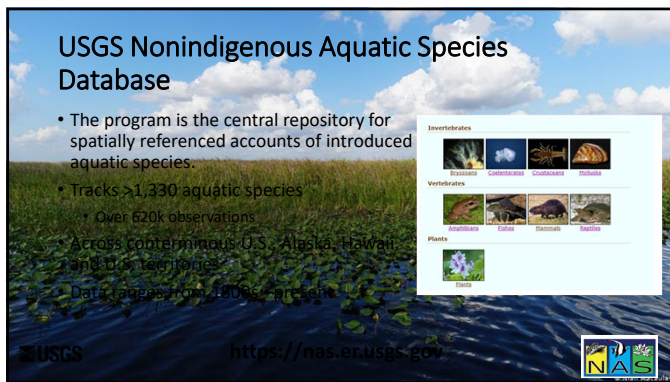
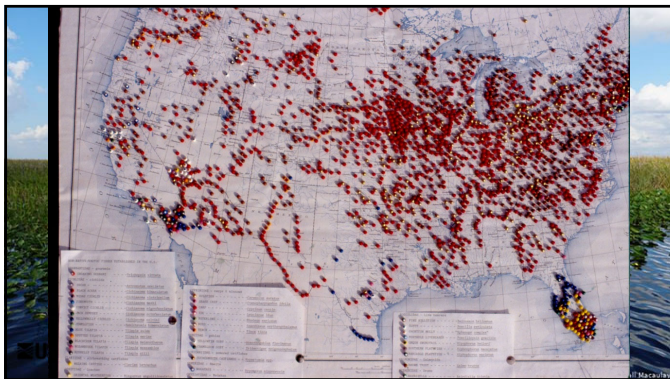




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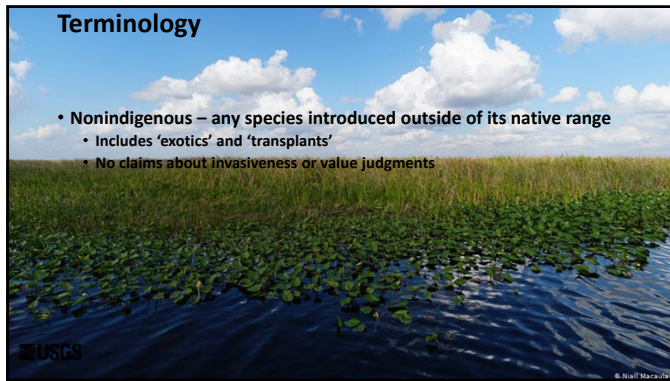
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3


Terminology

- Nonindigenous – any species introduced outside of its native range
 - Includes ‘exotics’ and ‘transplants’
 - No claims about invasiveness or value judgments

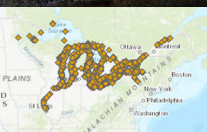


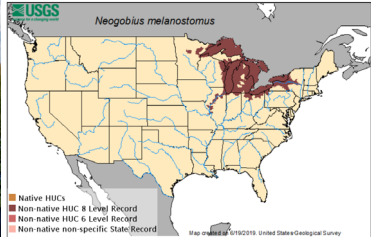
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USGS Nonindigenous Aquatic Species Database



Round Goby






Neogobius melanostomus

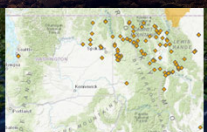
Map created 04/10/2018 United States Geological Survey

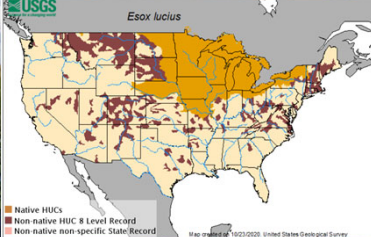
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USGS Nonindigenous Aquatic Species Database



Northern Pike





Esox lucius

Map created 04/10/2018 United States Geological Survey

6

[illegible][illegible][illegible]

NAS specimen records

- Capture basic information about NAS species sighting
 - What?
 - Where?
 - When?

Identity (SpeciesDB)

Place (SiteDB)

Time (CollectionDB)

Documentation (ReferenceDB)

Specimen

- Species
- Site
- Collection
- Reference

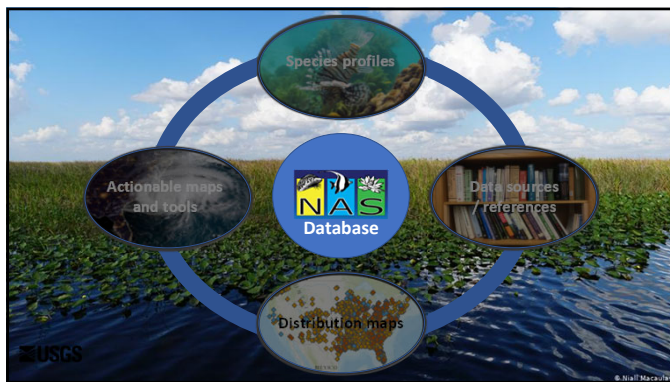
Other details

USGS

NAS specimen records

- Capture basic information about NAS species sighting
 - What?
 - Where?
 - When?

10



11

Fact Sheets

Green Sunfish (*Lepomis cyanellus*)
<http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=380>

12

[illegible][illegible]

Point mapping - interactive

Record ID	Specimen	Scientific Name	State	County	Locality	Year	HUC	Catalog Number	Accuracy	Status
28529	Hypophthalmichthys molitrix	AL		Black Warrior drainage	1998	33000100	Black Warrior-Tombigbee	Centroid	failed	
849276	Hypophthalmichthys molitrix	AL	Lawrence	Tennessee River, below Wilson Dam and above McFarland Park campground (Pickwick Lake)	2015	6030005	Pickwick Lake	Accurate	unknown	
1311080	Hypophthalmichthys molitrix	AL	Lawrence	Tennessee River, below Wilson Dam (Pickwick Lake)	2016	6030005	Pickwick Lake	Accurate	unknown	
26233	Hypophthalmichthys molitrix	AL	Tallapoosa	Yates Reservoir - cove 279 (Soughatchee Creek), Tallapoosa	1984	3150110	Lower Tallapoosa	Accurate	failed	
30224	Hypophthalmichthys molitrix	AL	Tallapoosa	Yates Reservoir (Soughatchee Creek), Tallapoosa	1984	3150110	Lower Tallapoosa	Accurate	failed	
26228	Hypophthalmichthys molitrix	AL	Tallapoosa	Yates Reservoir (Soughatchee Creek), Tallapoosa	1986	3150110	Lower Tallapoosa	Accurate	failed	
34101	Hypophthalmichthys molitrix	KS		state non-specific	1991	0	Centroid	established		
384376	Hypophthalmichthys molitrix	MS	Tishomingo	Bear Creek, Tennessee River tributary (Pickwick Lake)	2012	6030006	Bear	Approximate	established	
1447530	Hypophthalmichthys molitrix	MS	Tishomingo	Tennessee River, at Pickwick Lake	2015	6030005	Pickwick Lake	Approximate	established	

16

Spatial Queries

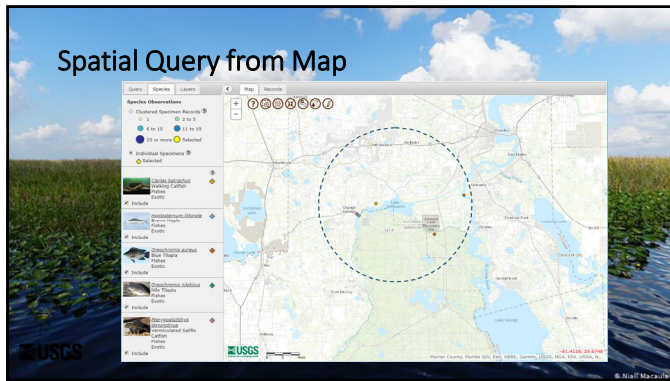
- Queries integrated with maps
 - Ability to map multiple species
 - Ability to do a spatial query from the map
 - Ability to download data

<https://nas.er.usgs.gov/viewer/omap.aspx>

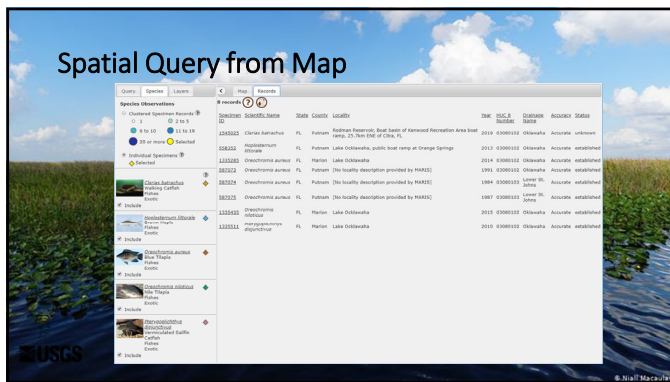
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Spatial Query from Map

18



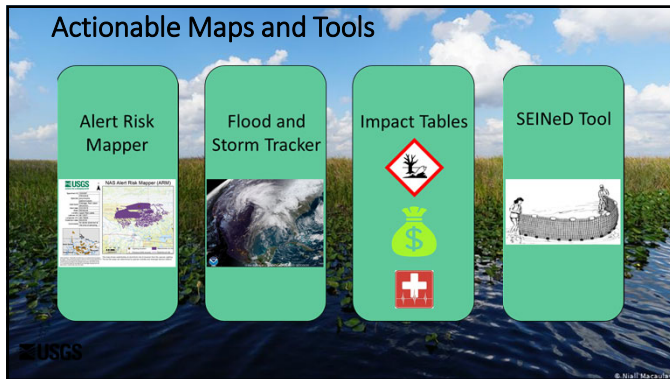
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20



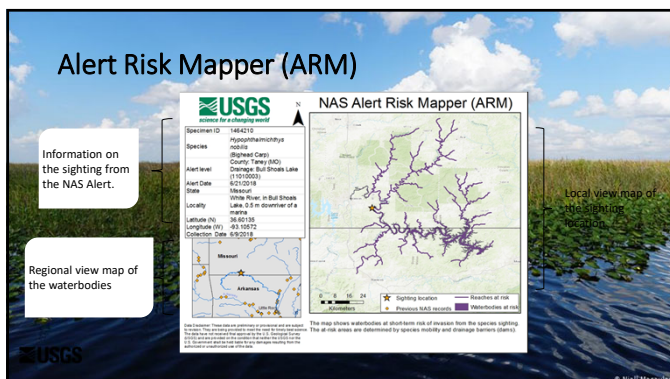
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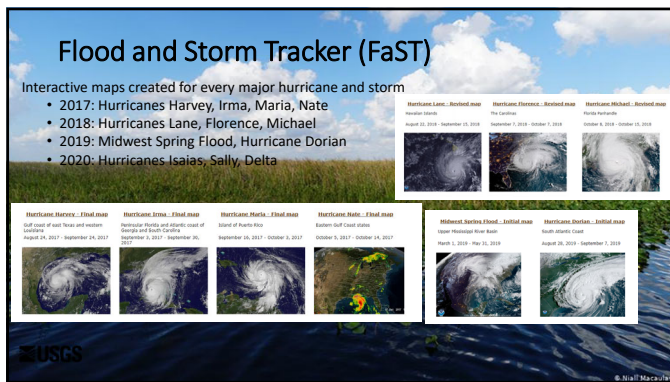
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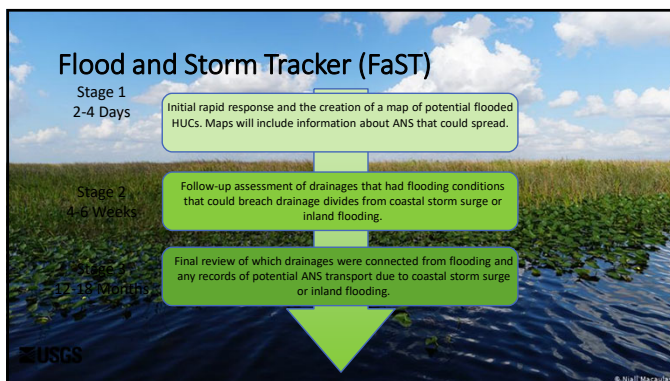
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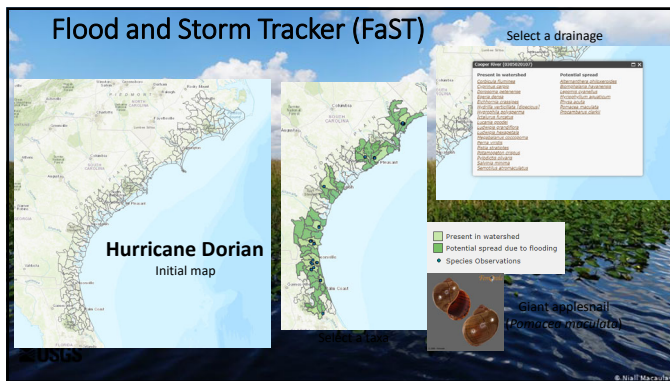
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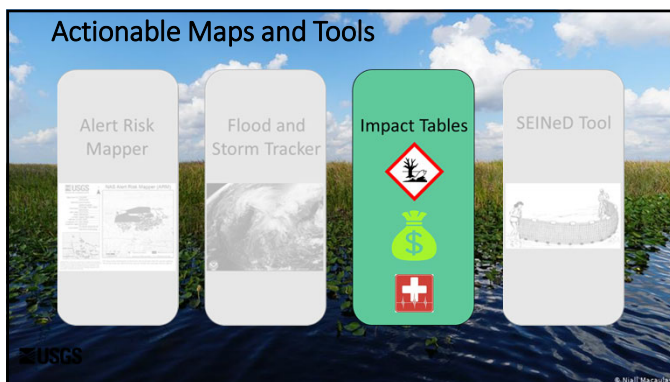
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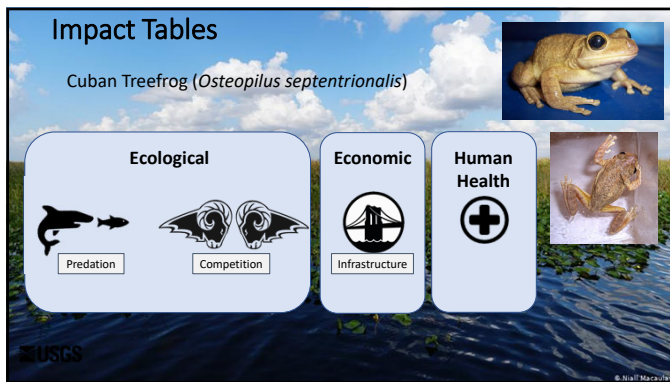
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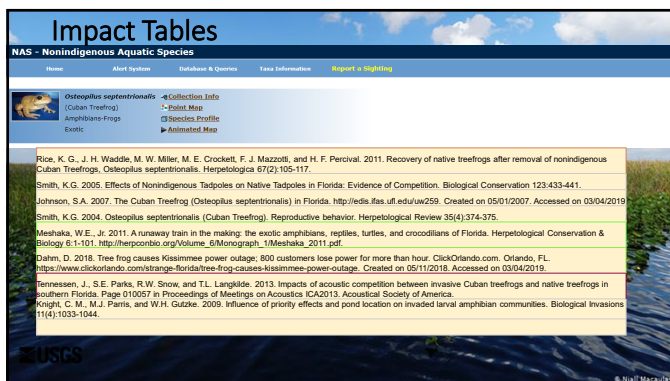
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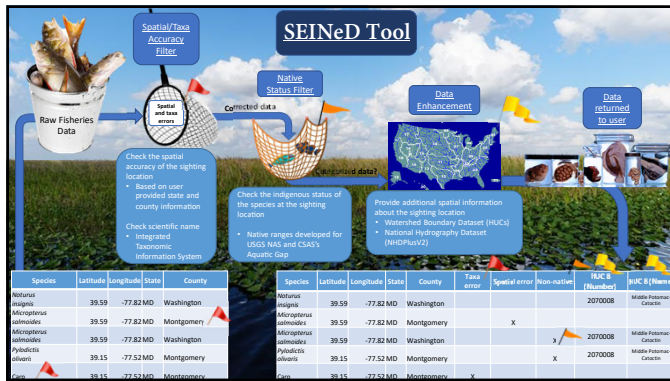
31



32



33



37

New spatial datasets

- Freshwater fish native ranges**
 - 218 completed, with ~100 more to be released soon
 - <https://www.nature.com/scienceopen/fulltext/10.1038/s41598-020-54461-4>
 - API access in development
- Locations of U.S. waterfalls**
 - Linked to NHDPlusV2
 - <https://www.sciencebase.gov/catalog/item/5f9d7b58554581249000b3>
- Locations of U.S. boat launches, ramps, and marinas (coming soon)**

USGS

38

eDNA in the NAS Database

- First effort to aggregate ALL aquatic invasive species data in a single database
- Development of minimum data standards to help guide eDNA monitoring and data sharing
- Collaborative effort

USGS

39

USGS Nonindigenous Aquatic Species Database

- The program is the central repository for spatially referenced accounts of introduced aquatic species.
- Tracks >1,330 aquatic species
 - Over 620k observations
- Across conterminous U.S., Alaska, Hawaii, and U.S. territories
- Data ranges from 1800s to present

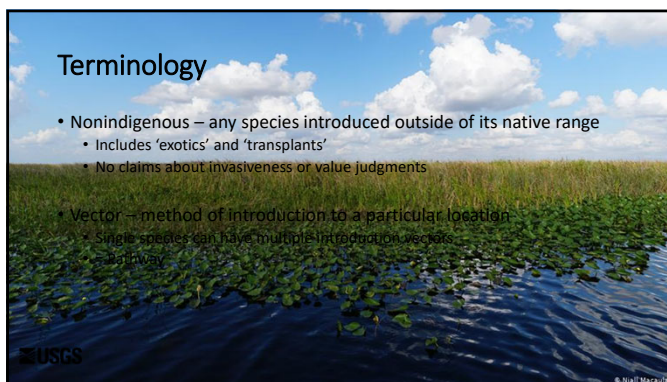



USGS <https://nas.er.usgs.gov> 

40

Terminology

- Nonindigenous – any species introduced outside of its native range
 - Includes 'exotics' and 'transplants'
 - No claims about invasiveness or value judgments
- Vector – method of introduction to a particular location
 - Single species can have multiple introduction vectors
 - Example




USGS 

41

Early fish introductions in the U.S.

- Little documentation prior to ~1850



USGS 

42

Early fish introductions in the U.S.

- Little documentation prior to ~1850
- Transplants of natives
 - Yellow perch, walleye, sunfishes, Pacific salmonids



USGS

43

Early fish introductions in the U.S.

- Little documentation prior to ~1850
- Yellow perch, walleye, centrarchids, Pacific salmonids
- Importation of exotics
 - Goldfish, common carp, brown trout, tench, ide



USGS

44

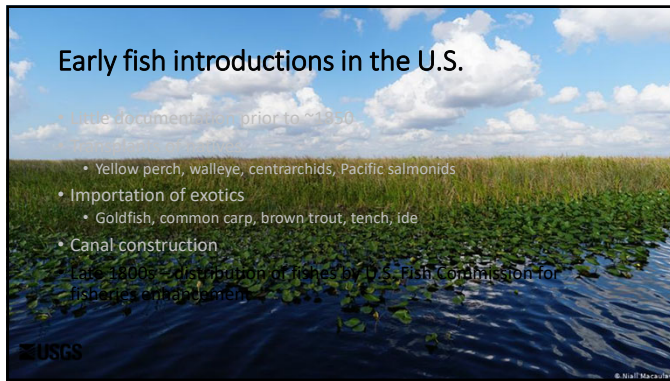
Early fish introductions in the U.S.

- Little documentation prior to ~1850
- Transplants of natives
 - Yellow perch, walleye, centrarchids, Pacific salmonids
- Importation of exotics
 - Goldfish, common carp, brown trout, tench, ide
- Canal construction



USGS

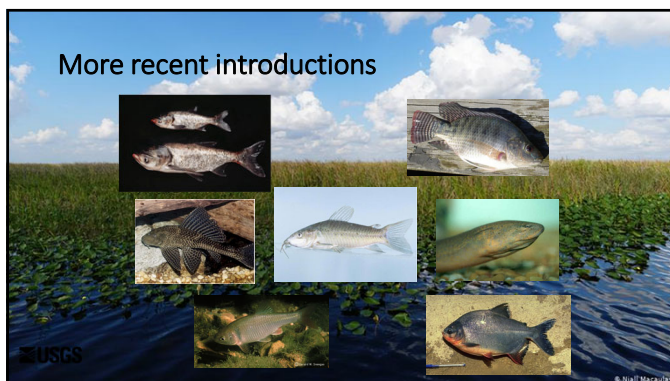
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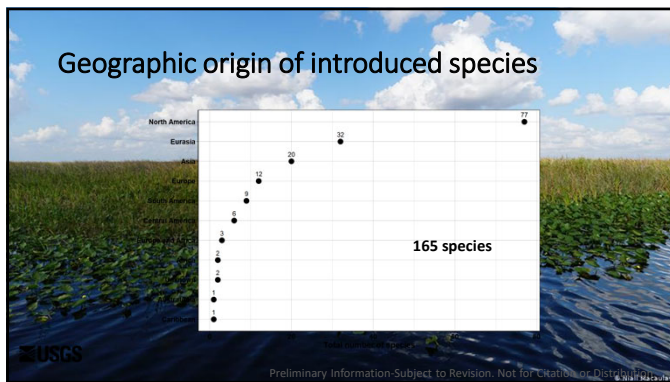
Overview of AIS in Ohio

- Geographic source
- Taxonomic source
- Geographic location
 - State
 - Watersheds
- Pathway

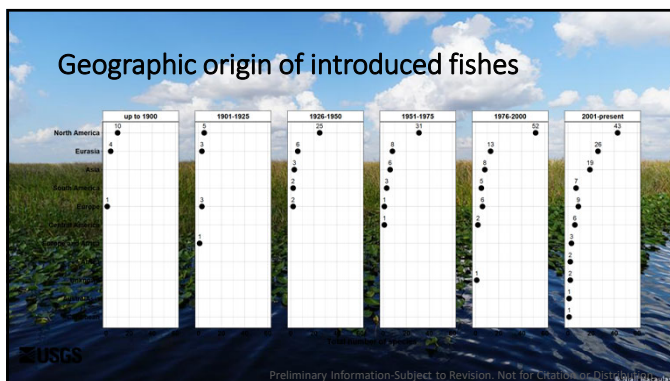
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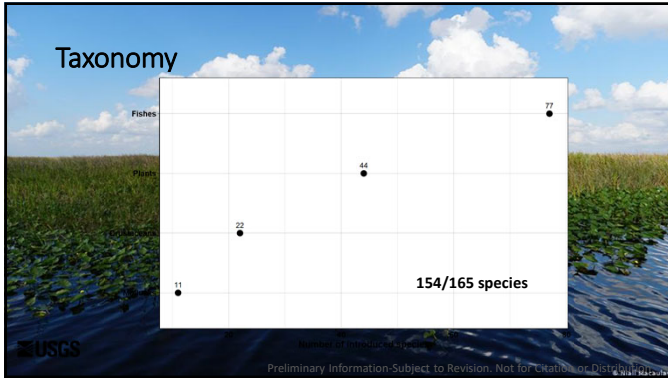
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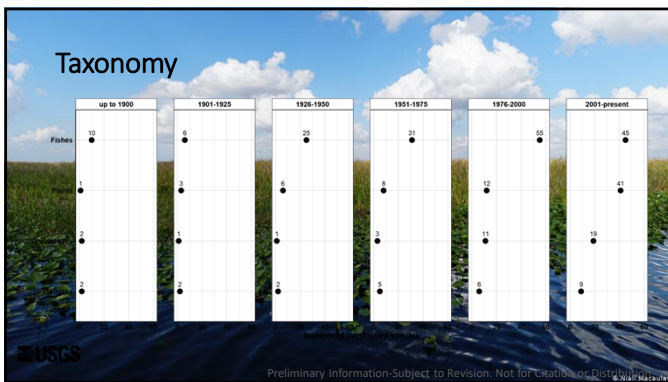
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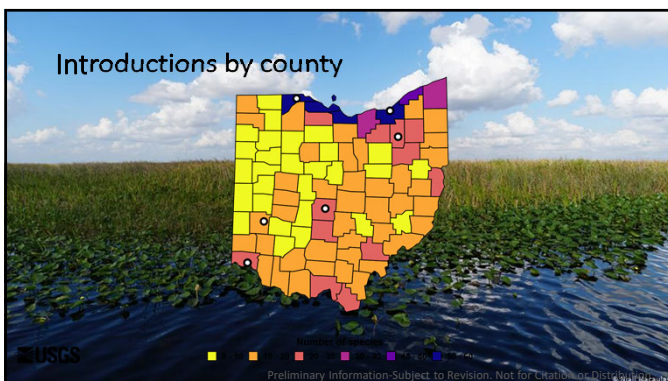
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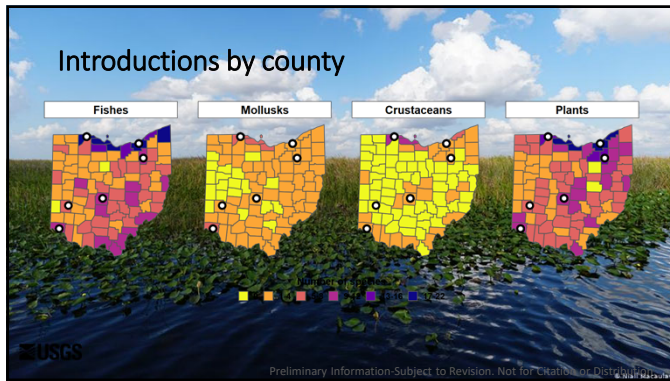
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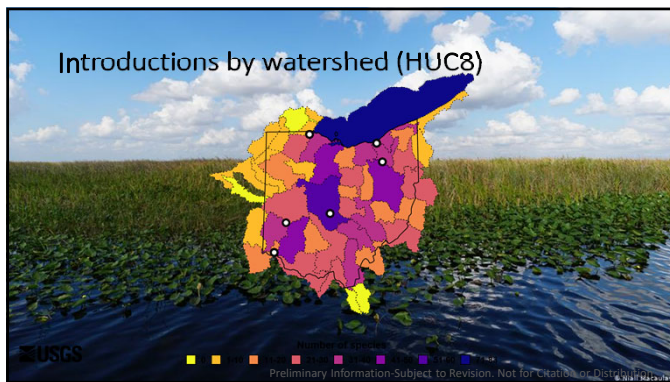
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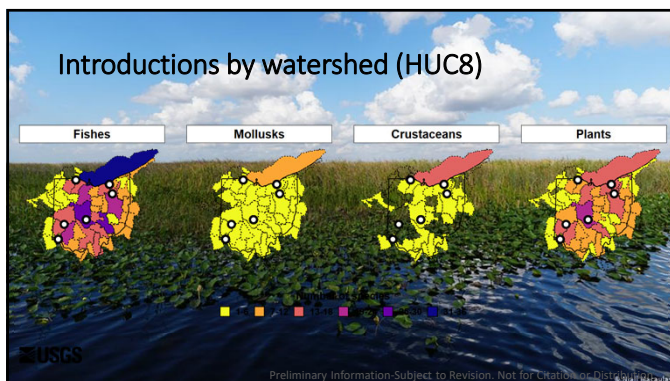
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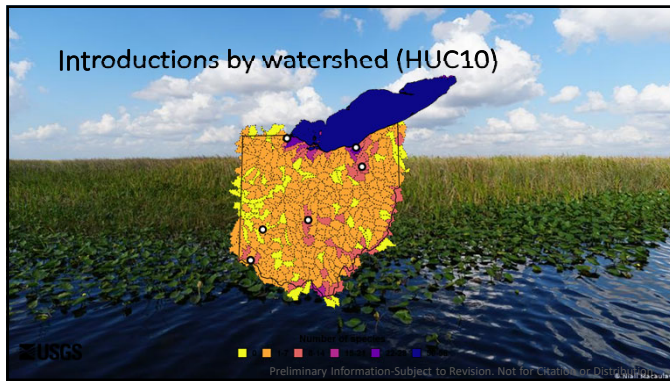
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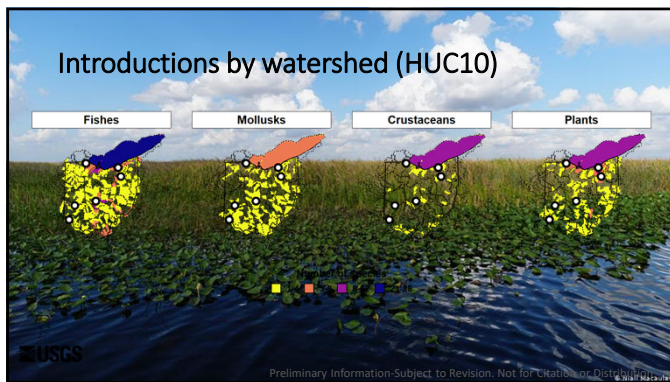
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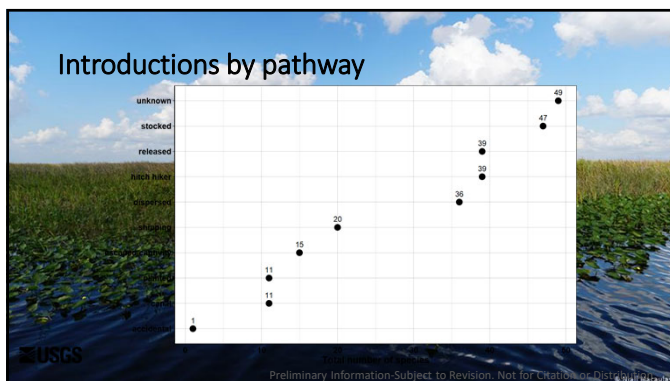
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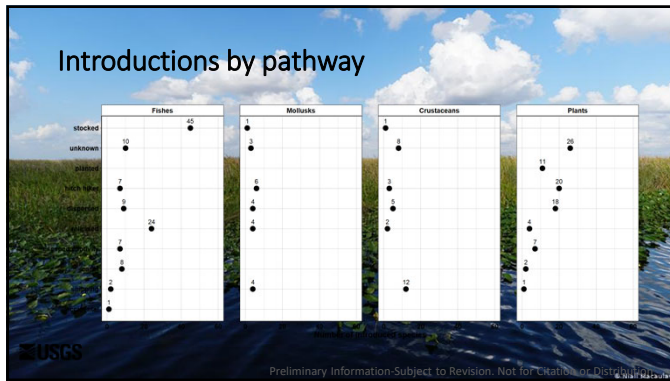
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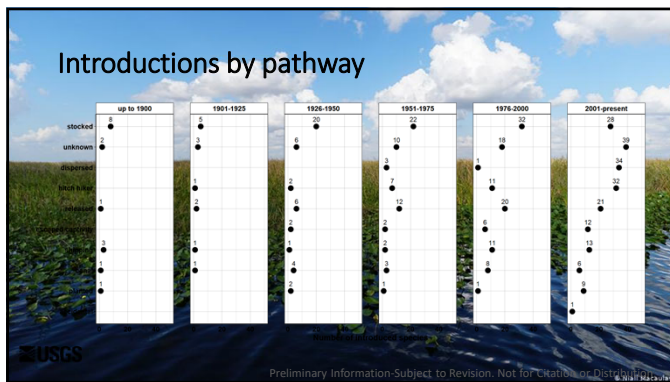
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65



66

Conclusions

- AIS in Ohio are statewide, concentrated around major waterbodies near population centers
- Four primary taxonomic groups: fishes, crustaceans, mollusks, and plants
- Primary pathway of introduction varies taxonomically and temporally



67

Thank you

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68
