



USGS Nonindigenous Aquatic Species Aquatic Risk Mapper (NAS ARM)

Wesley M. Daniel, PhD ¹

Pam Fuller²; Matt Neilson, PhD²; and Ian Pfingsten¹

1- Cherokee Nation Technology

2- US Geological Survey

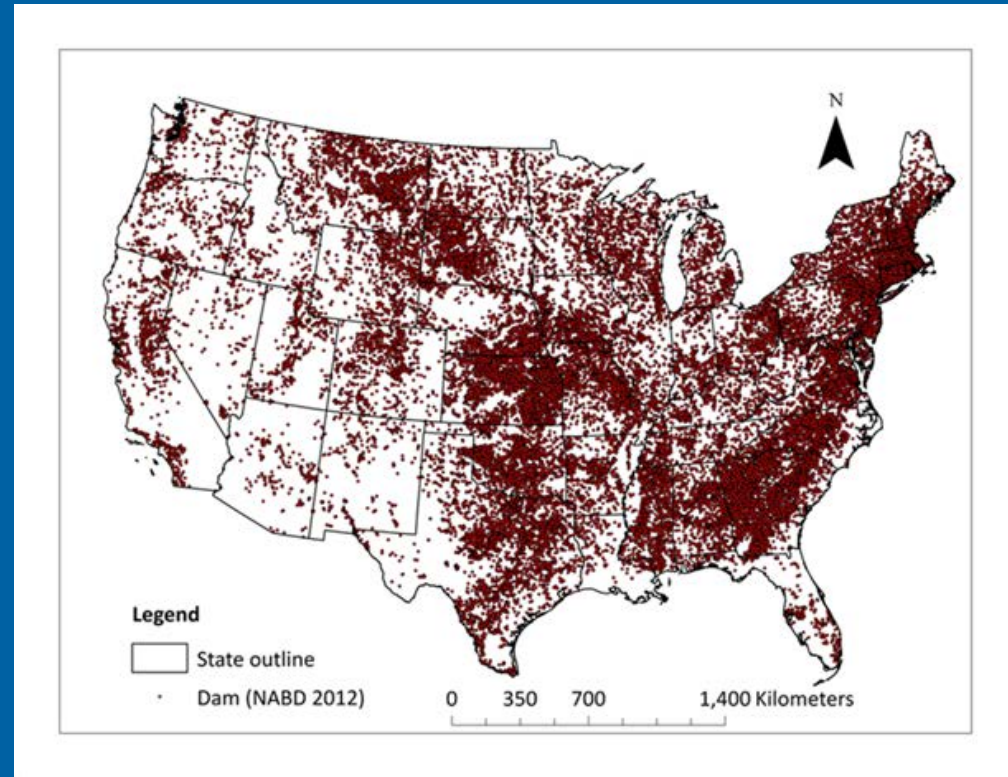
NAS Alert system

- **The Nonindigenous Aquatic Species (NAS) Alert System**
 - provides a framework for the rapid dissemination of new invasions
 - notifies registered users of new sightings
 - part of a national early detection/rapid response system

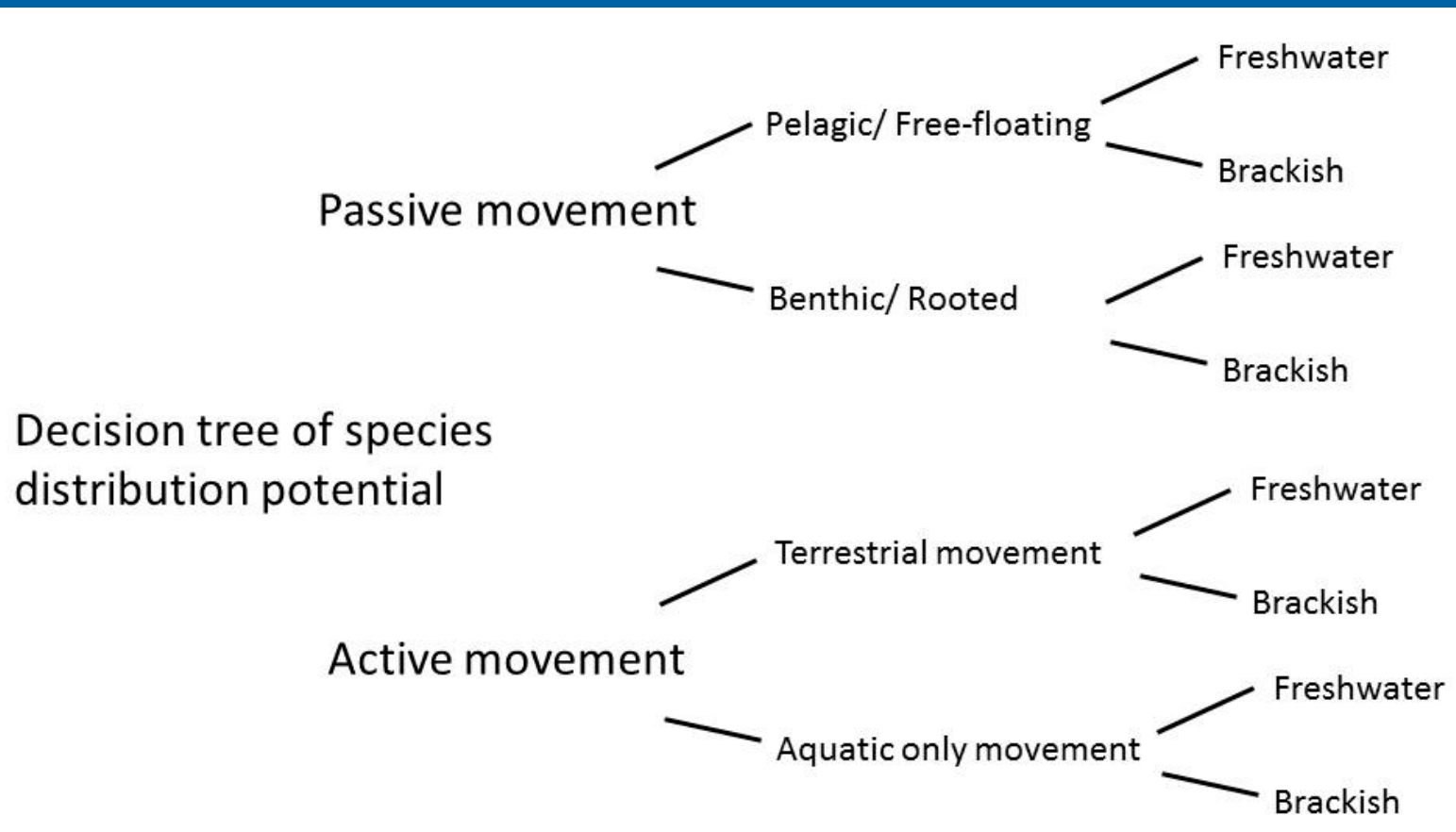


National Anthropogenic Barriers Dataset (NABD)

- barriers within the watershed can limit spread
- Includes >56,000 large dams
- Generally > 2 m in height



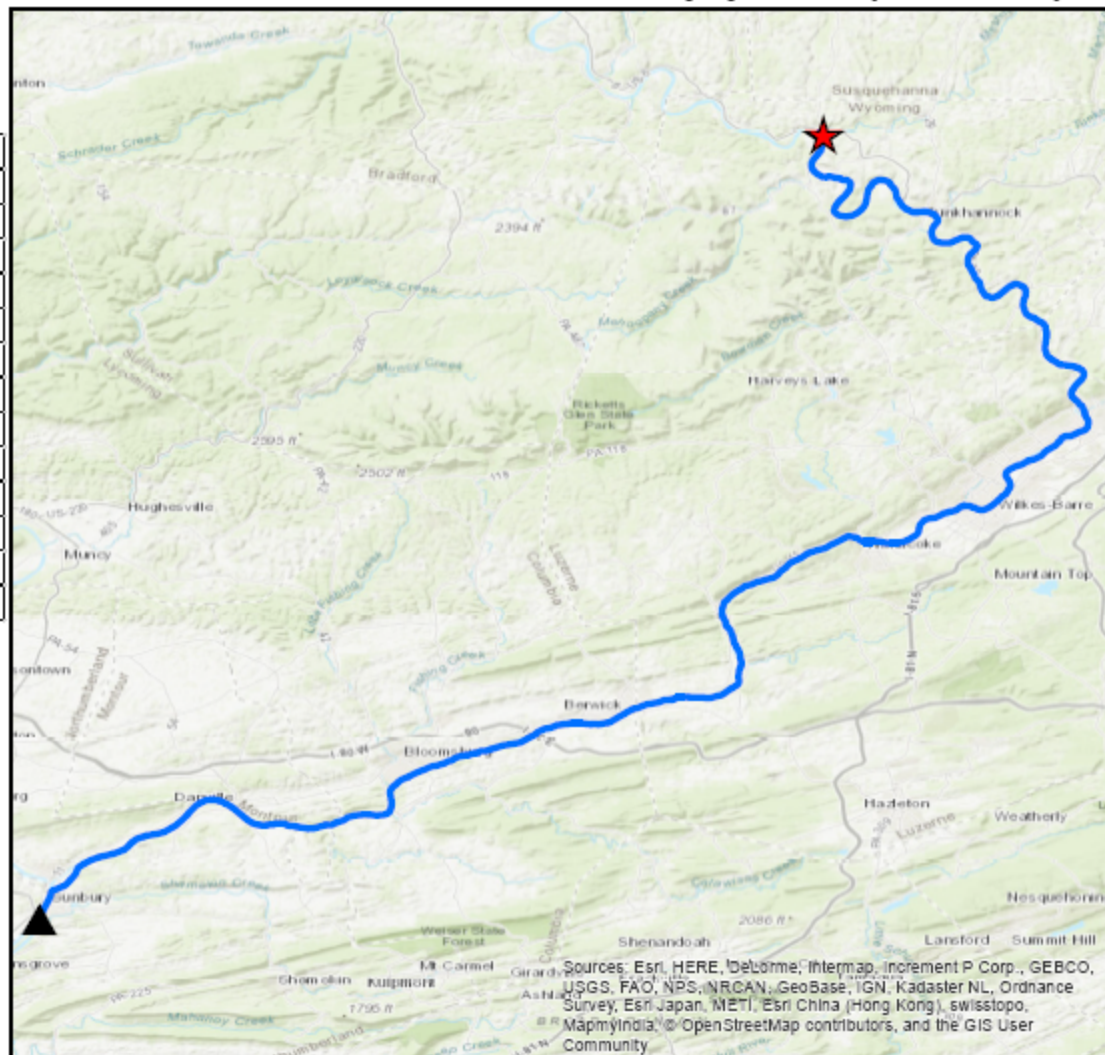
Develop of a species-specific distribution potential decision tree





NAS Alert Risk Mapper (ARM)

Specimen ID	1447224
Group	Mollusks-Bivalves
Genus	Dreissena
Species	polymorpha
Common Name	zebra mussel
Alert level	County: Wyoming (PA)
Alert Date	2/8/2018
State	PA
Locality	Susquehanna River
HUC8 Name	Upper Susquehanna-Tunkhannock
HUC8 Number	2050106
Collection Year	2017
Collection Month	2
Collection Day	8



0 10 20 30 Kilometers

Legend

-  Dam
-  Waterbodies at risk
-  Sighting location

Data Disclaimer: These data are preliminary or provisional and are subject to revision. They are being provided to meet the need for timely best science. The data have not received final approval by the U.S. Geological Survey (USGS) and are provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the data.



NAS Alert Risk Mapper (ARM)

Specimen ID	1456478
Species	Nymphaea lotus (white Egyptian lotus)
Alert level	County: St. James (LA); Drainage: Lake Maurepas (8070204)
Alert Date	3/5/2018
State	Louisiana
Locality	Blind River, west of railroad tracks and Airline Hwy [61]
Latitude (N)	30.1032
Longitude (W)	-90.74466
Collection Date	11/4/2017



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0 10 20 30 Kilometers



Sighting location



Waterbodies at risk

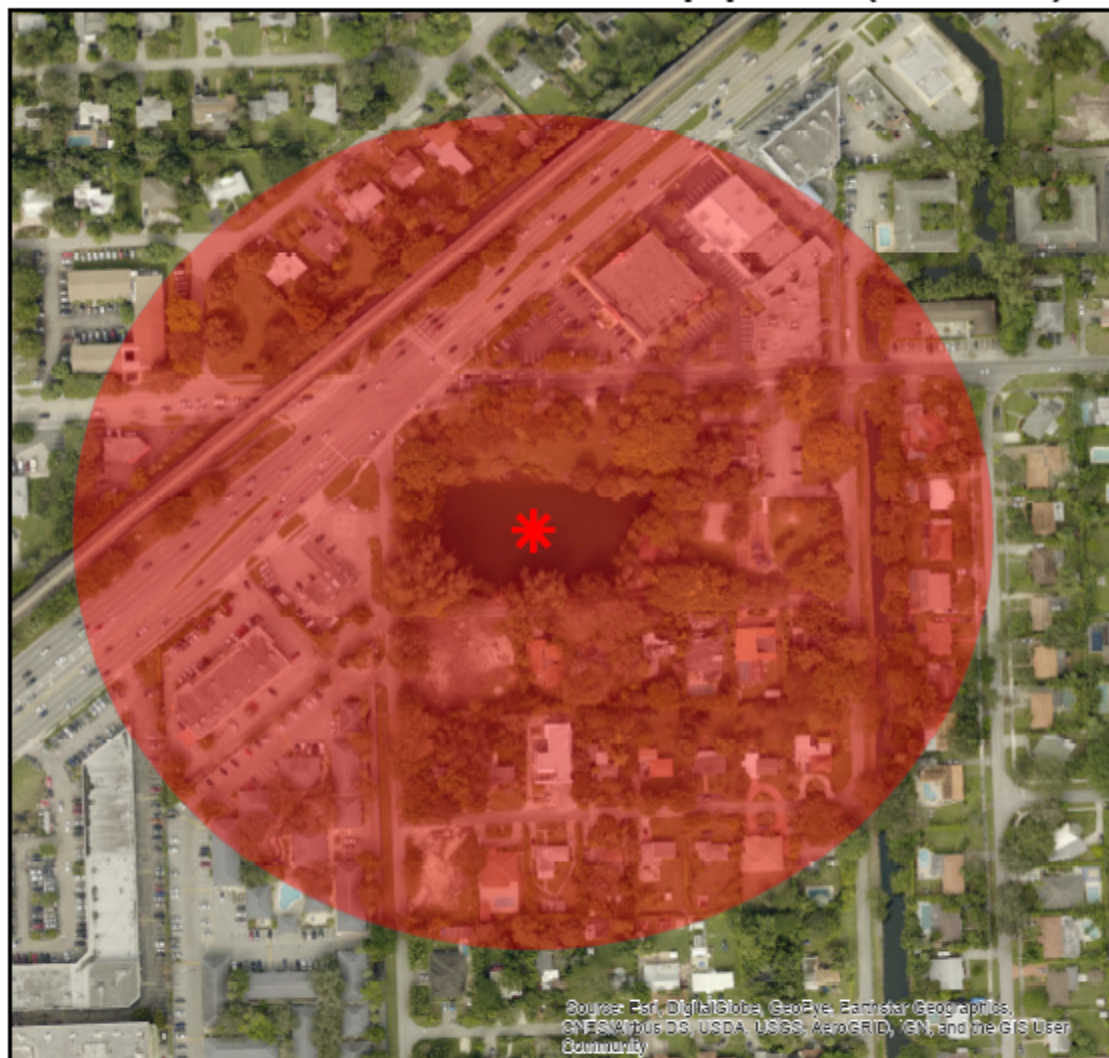


Reaches at risk



NAS Alert Risk Mapper (ARM)

Specimen ID	1446927
Group	Fishes
Genus	Colossoma
Species	macropomum
Common Name	tambaqui
Alert level	County: Miami-Dade (FL)
Alert Date	2/6/2018
State	FL
Locality	Fuch's Pond
HUC8 Name	Florida Southeast Coast
HUC8 Number	3090206
Latitude	25.69591
Longitude	-80.29848
Collection Year	2017
Collection Month	8
Collection Day	11



0 0.05 0.1 0.15 Kilometers

Legend

-  Sighting location
-  200 m Buffer

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Thanks

- US FWS Region 4
- GSARP
- Arthur Cooper (MSU)- use of NABD segments
- *We are working to expand this nationally



NAS FaST: a new tool to track the possible spread of nonindigenous aquatic species from flood waters of Hurricane Maria

Wesley M. Daniel, Bogdan Chivoiu, Pam Fuller, Mathew Neilson, Ian Pfingsten, Craig Conzelmann

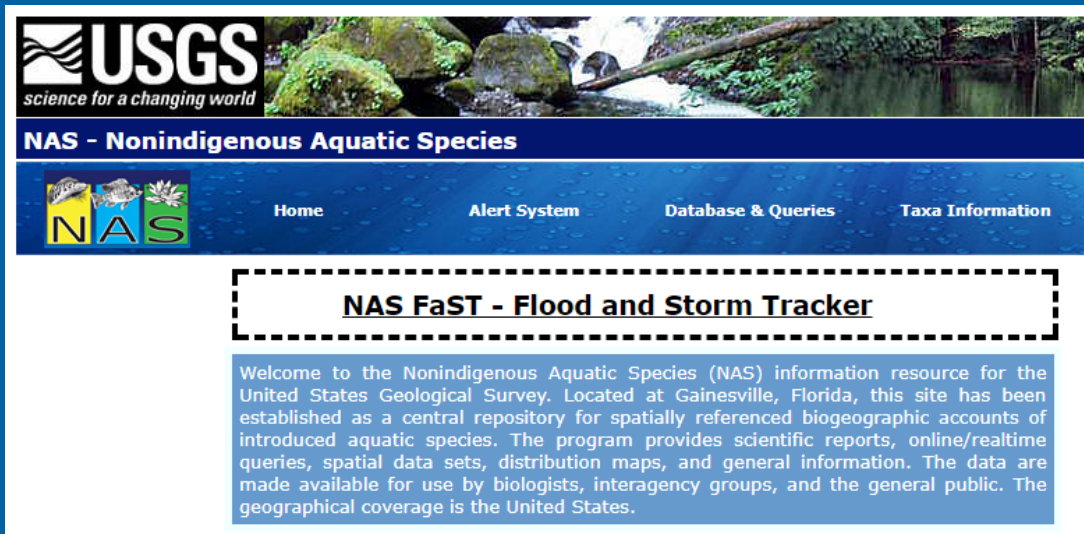
Nonindigenous Aquatic Species Flood and Storm Tracker (NAS FaST) Maps

- Flooding during storm and hurricane events has the potential to transport nonindigenous aquatic species.
- As part of the EDRR system, the NAS program is interested in alerting managers of these possible new introductions.
- Created to help assess transportation of nonindigenous aquatic species between drainages due to storm surge and inland flooding.
- Help natural resource managers determine potential new locations for individual species, or to develop a watchlist of potential new species within a watershed.



NAS FaST Maps

- <https://nas.er.usgs.gov/viewer/Flooding/>



Current maps

- Hurricane Harvey
- Hurricane Irma
- Hurricane Maria
- Hurricane Nate



NAS FaST Maps

Stage 1
2-4 Days

Initial rapid response and the creation of a map of potential flooded HUCs. Maps will include information about NAS that could spread.

Stage 2
6-8 Weeks

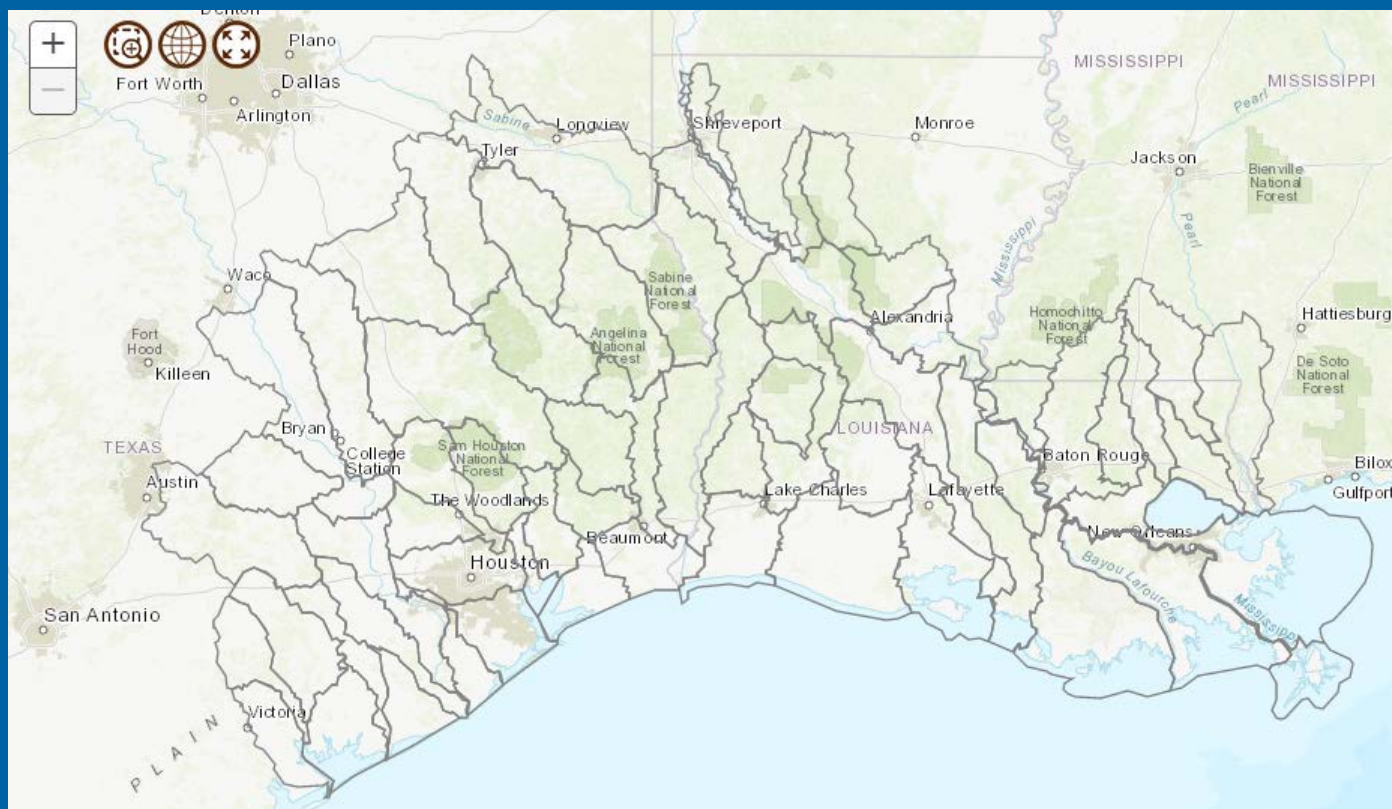
Follow-up assessment of drainages that had flooding conditions that could breach drainage divides from coastal storm surge or inland flooding.

Stage 3
12-18 Months

Final review of which drainages were connected from flooding and any records of potential NAS transport due to coastal storm surge or inland flooding.

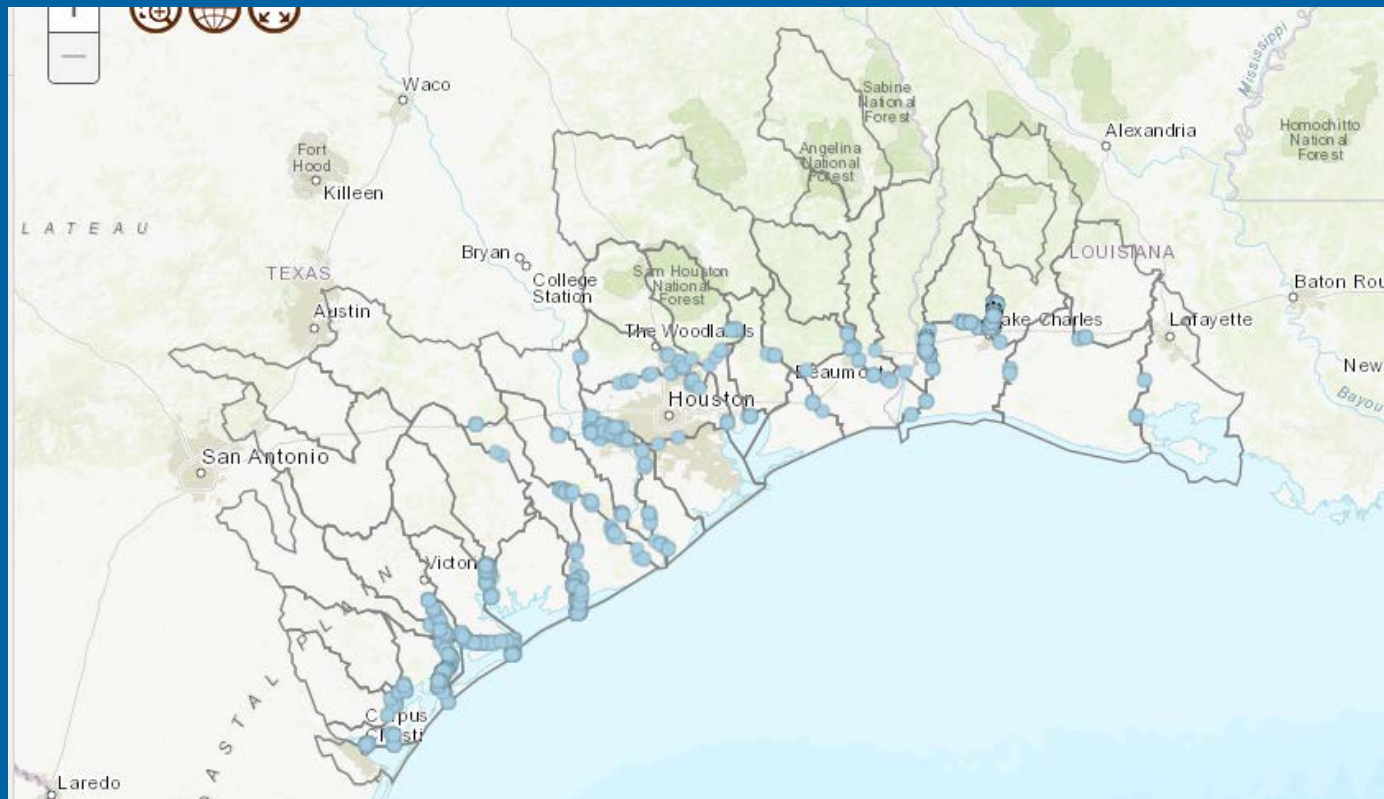
Stage 1 (2-4 Days)

- Area of interest was defined using USGS WaterWatch data on flood and high flow conditions along with data on the storm path.
- The map was created by using known locations of established or possibly established species. All surrounding hydrologic units were selected as potential areas of infestation.



Stage 1 (2-4 Days)

- Area of interest was defined using USGS WaterWatch data on flood and high flow conditions along with data on the storm path.
- The map was created by using known locations of established or possibly established species. All surrounding hydrologic units were selected as potential areas of infestation.



Query by Species

- Light blue dots are drainage connections from flooding

Query

Hurricane Harvey - Revised map

Select a species:

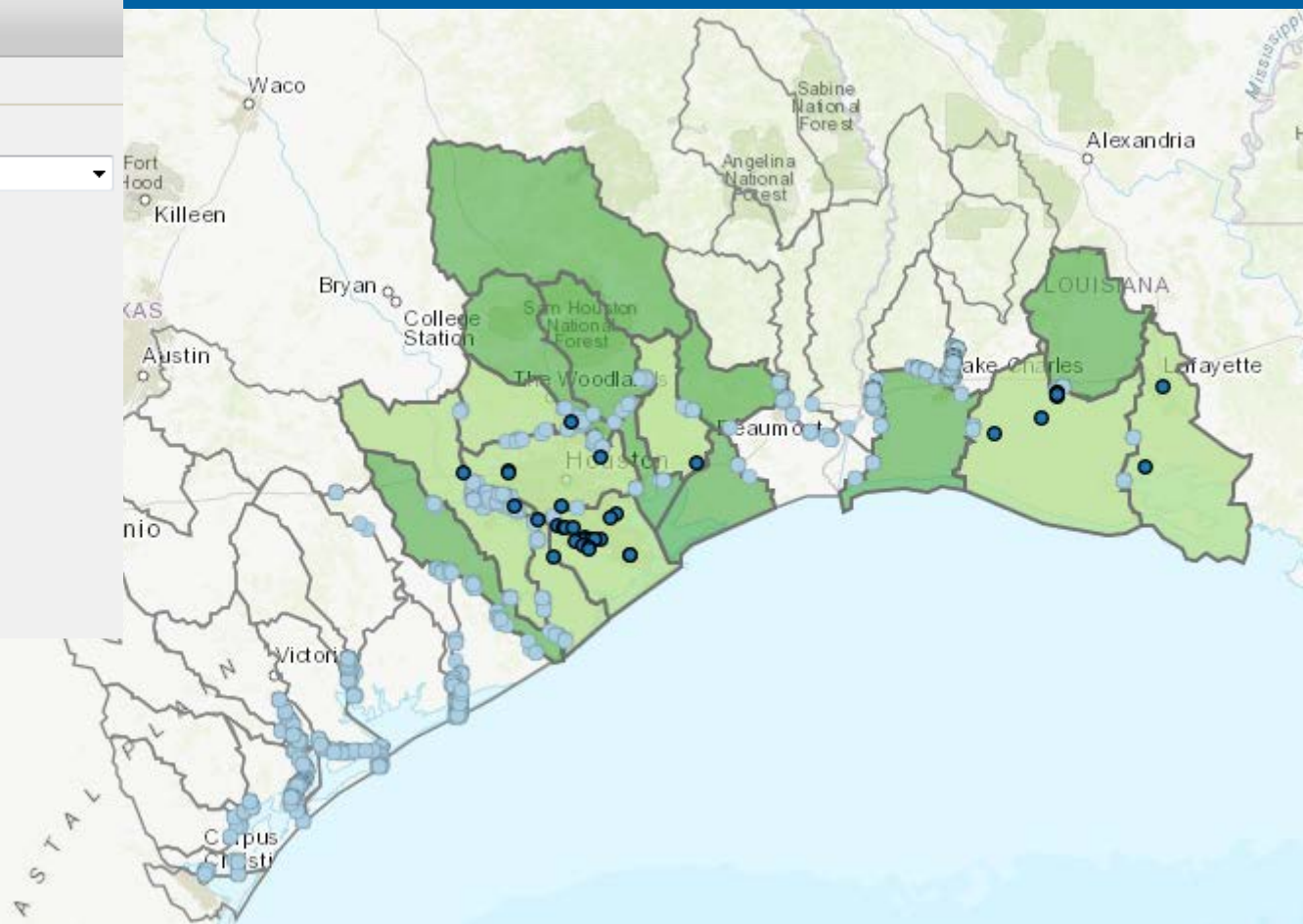
giant applesnail (*Pomacea maculata*)

Map updated 12/19/2017

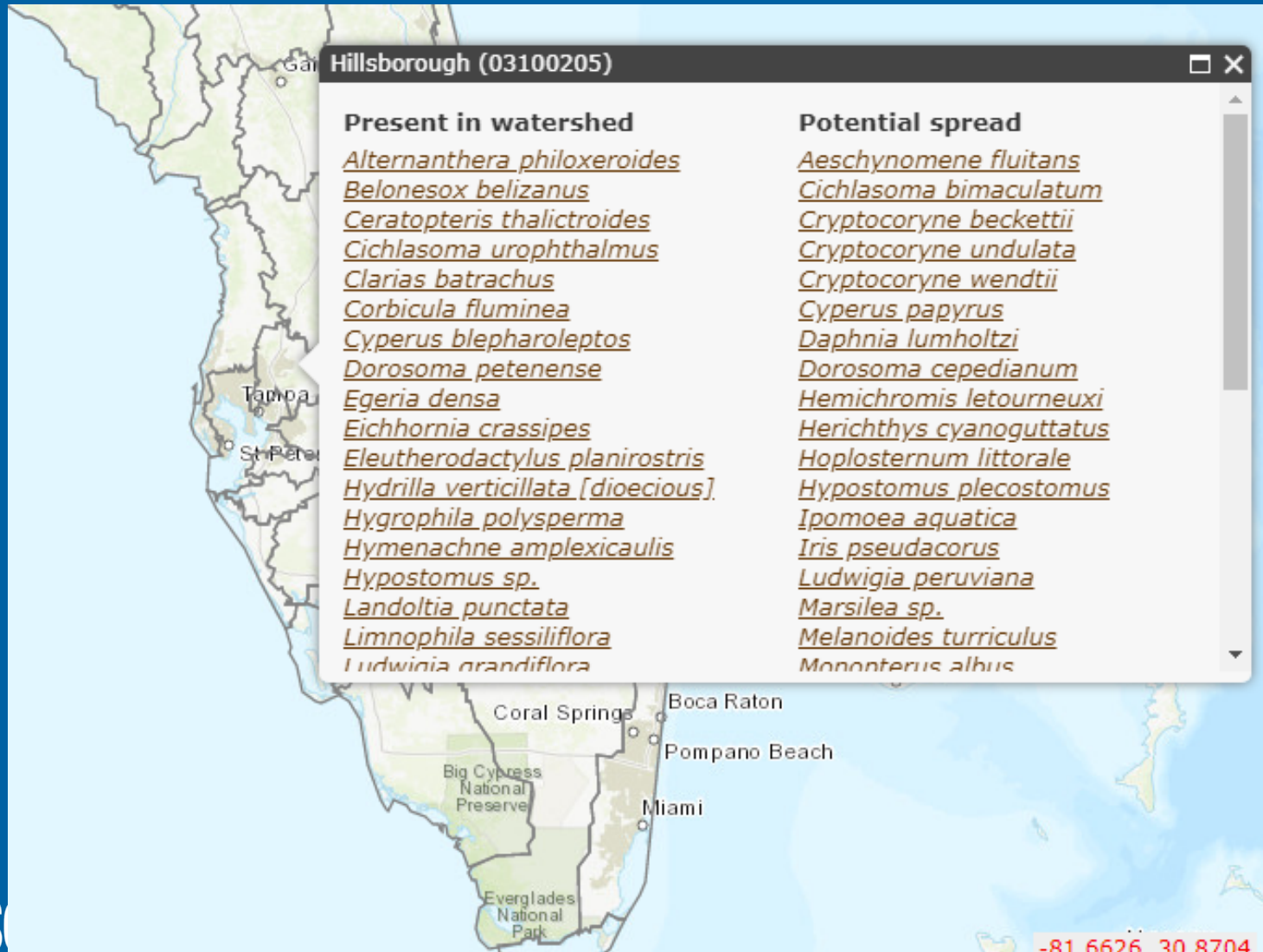


Pomacea maculata
giant applesnail
Mollusks- Gastropods
Exotic
[View Species Profile](#)

- Present in watershed
- Potential spread due to flooding
- Connection points
- Species Observations



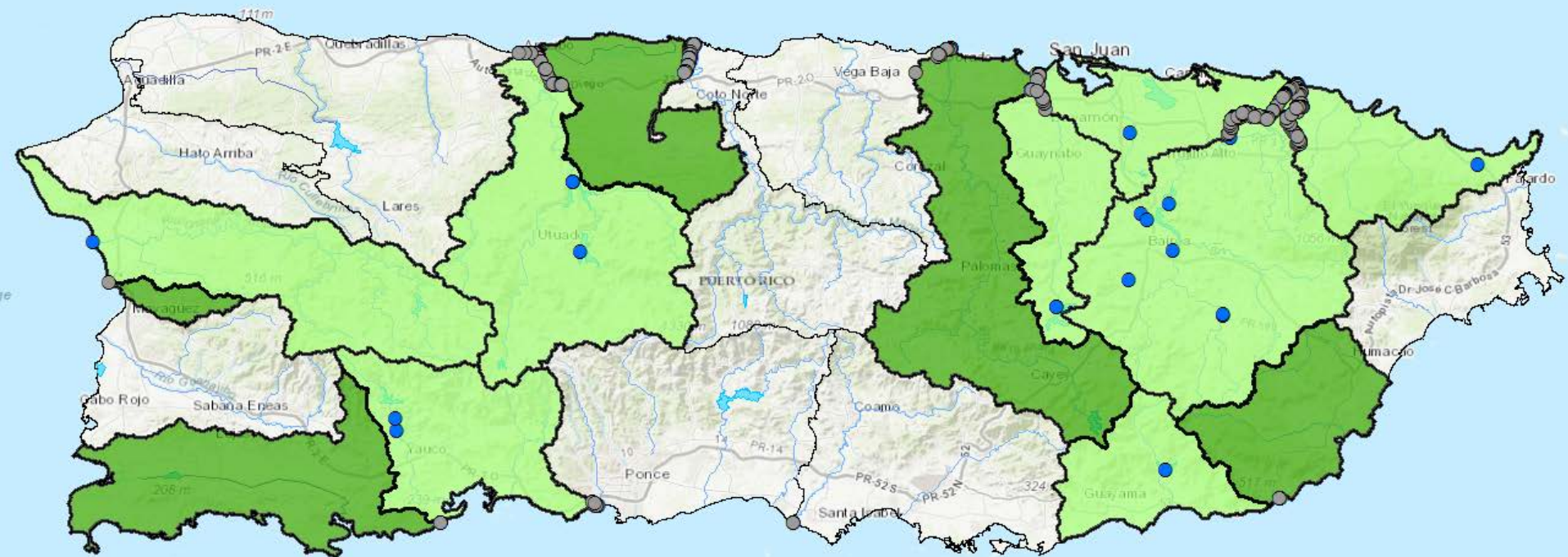
Query by drainage



Sailfin Catfishes

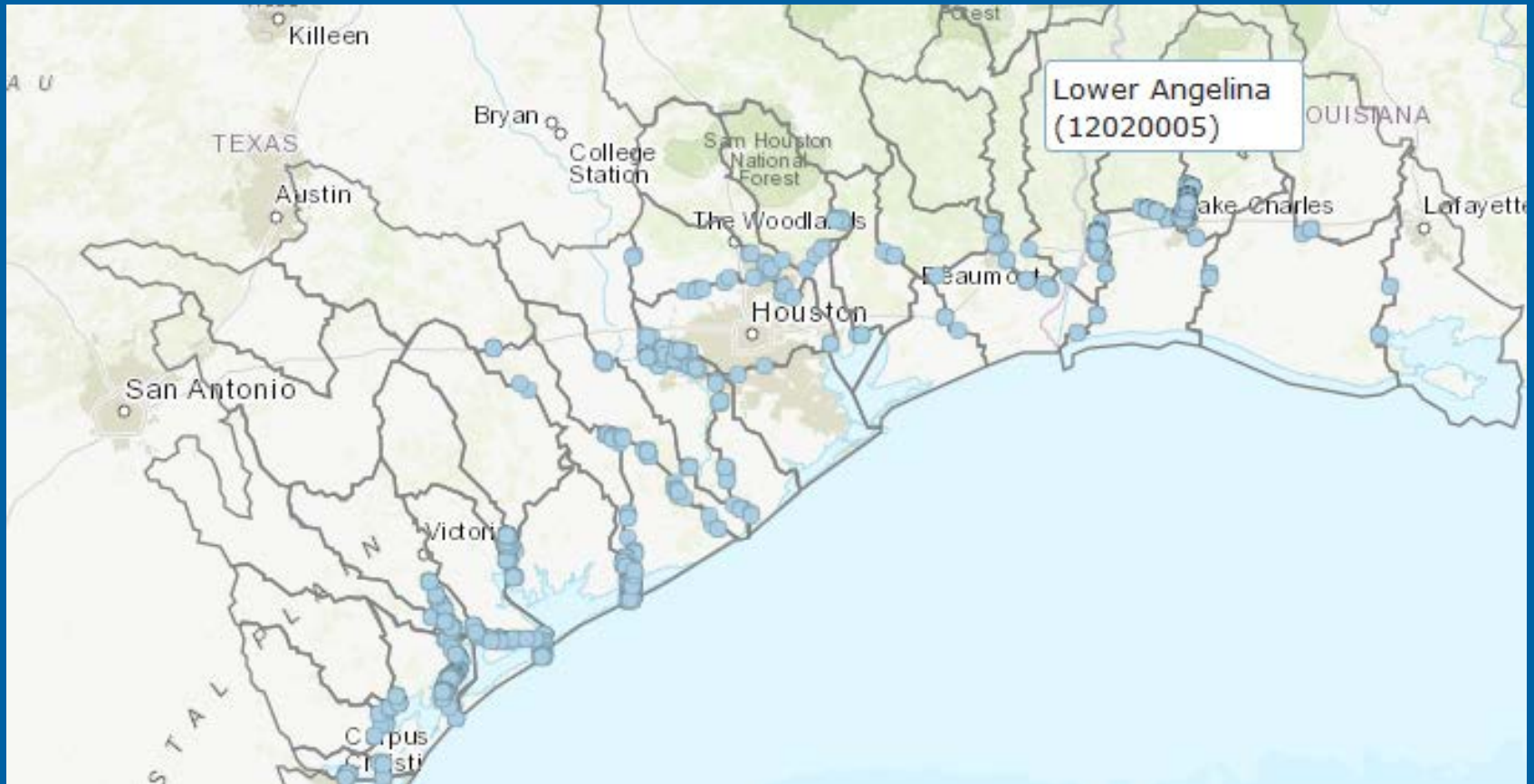
(*Pterygoplichthys pardalis*)

(*Pterygoplichthys multiradiatus*)



Stage 2 (6-8 Weeks)

- Identified drainage divide height
- Identify areas of flooding that had sufficient height to breach drainage divides

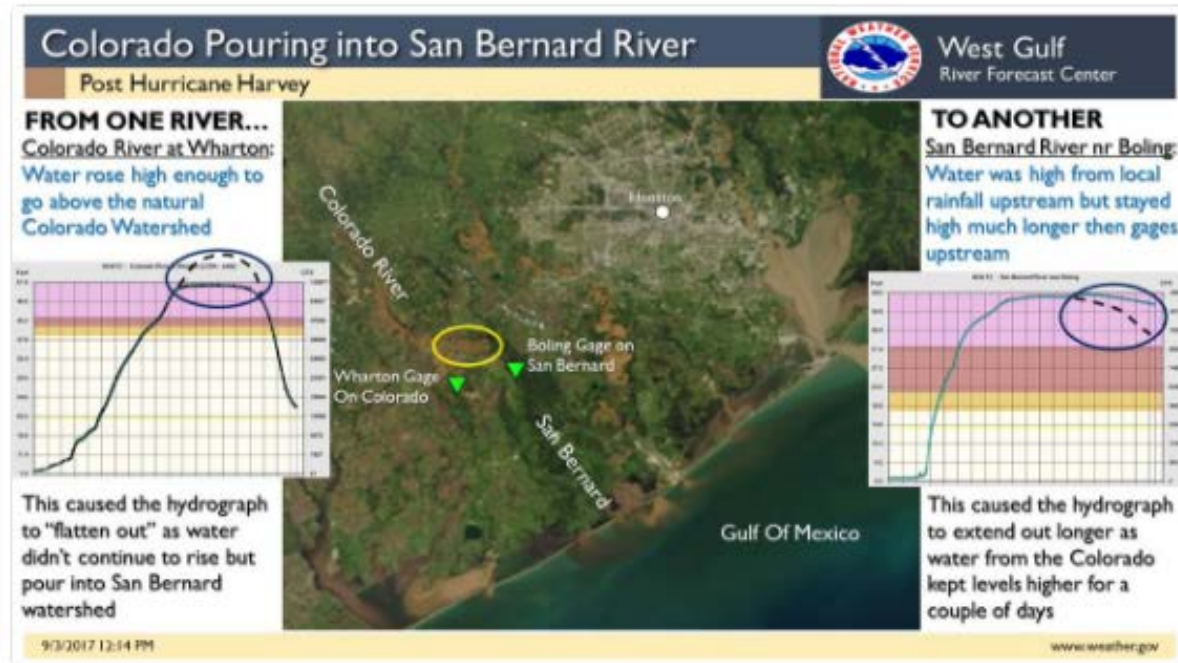




NWSWGRFC
@NWSWGRFC

Follow

#HurricaneHarvey caused such significant flooding the rivers have jumped over watershed boundaries! #txwx #txflood #HarveyFlood #houwx



10:20 AM - 3 Sep 2017

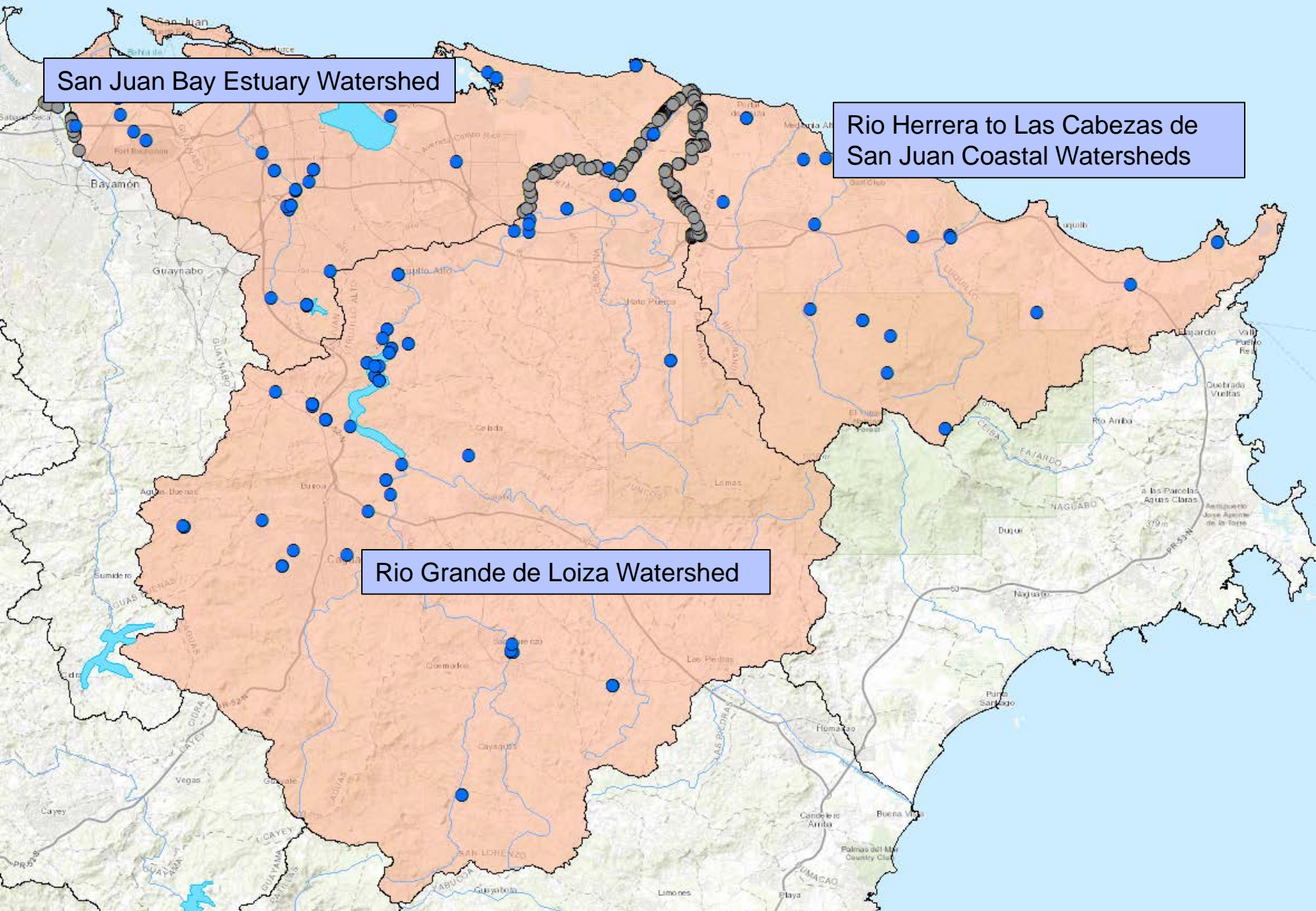


Picture from Twitter showing the Colorado River flooding into the San Bernard River

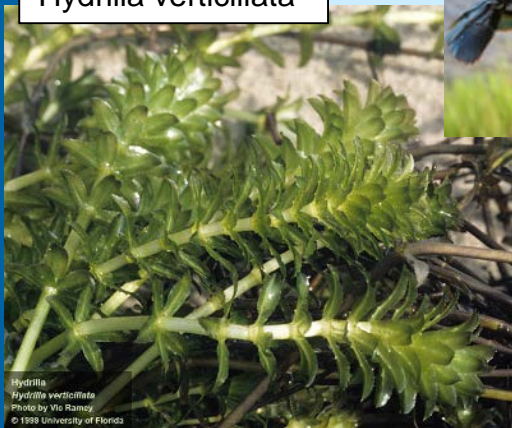
San Juan Bay Estuary Watershed

Rio Herrera to Las Cabezas de
San Juan Coastal Watersheds

Rio Grande de Loiza Watershed



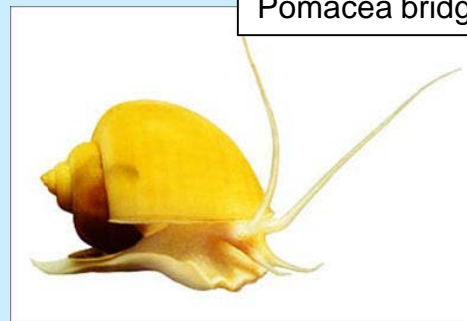
Hydrilla verticillata



Cherax quadricarinatus



Pomacea bridgesi



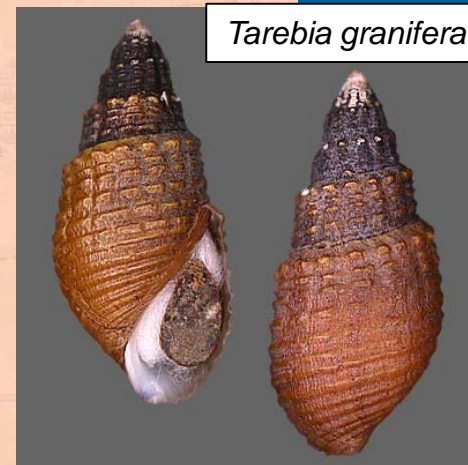
San Juan Bay Estuary Watershed

Rio Herrera to Las
Cabezas de San Juan
Coastal Watersheds

Rio Grande de Loiza Watershed



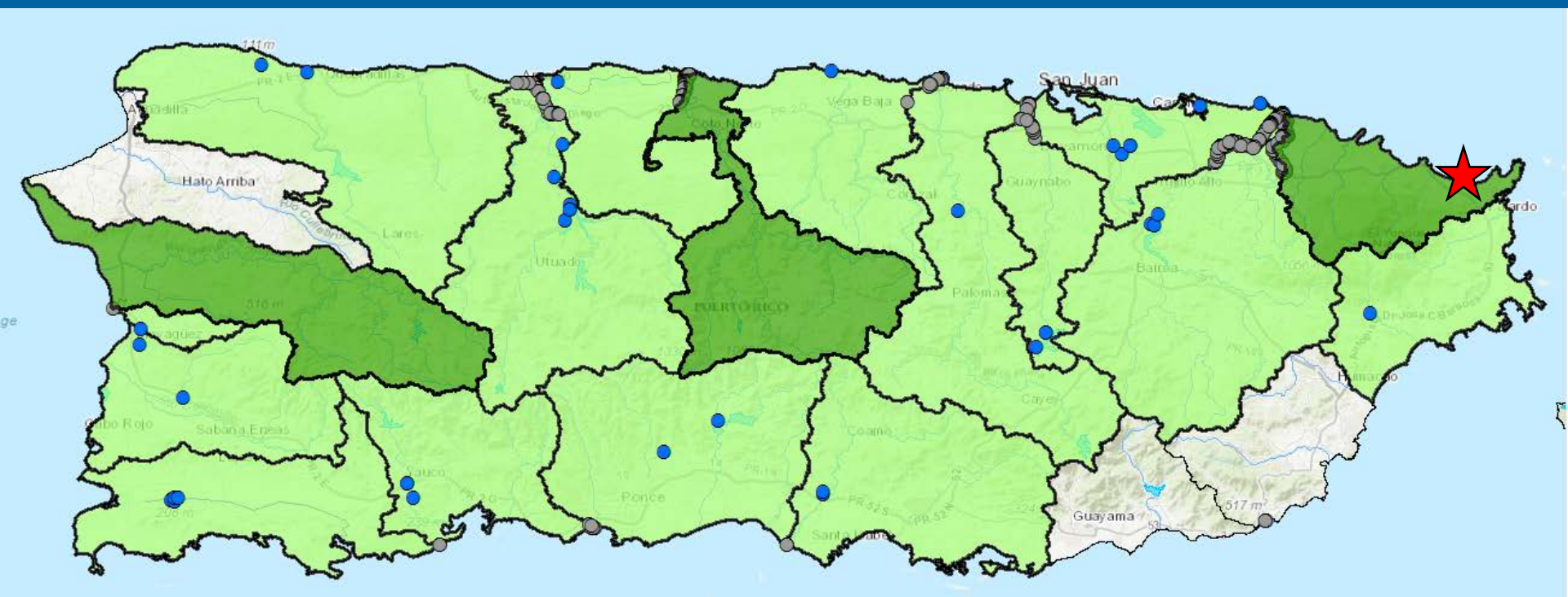
Tarebia granifera



Floating waterhyacinth

(*Eichhornia crassipes*)

*Potential evidence of movement
(Step 3)



Questions?

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- **Matthew Neilson**- Fishes and Technical details
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- **Wesley Daniel**- Inverts, Herps, and Mammals
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