

# Update on island apple snail research in South Carolina, USA



Photo credit: Mobile Paddler

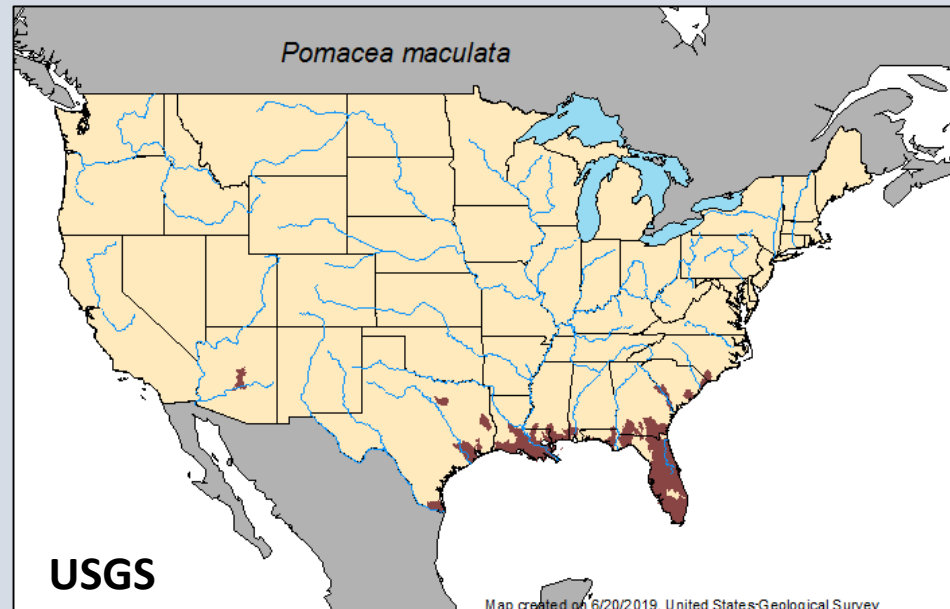


**Elizabeth Gooding\*, Michael Kendrick,  
and Peter Kingsley-Smith**



# Origins and distribution

- Native to South America
- Introduced to United States via aquarium trade
- First introduced to US in Florida in 2002
- Reported in SC in 2008 (Socastee, SC)
- Now established in Texas, Louisiana, Alabama, Florida, Georgia, South Carolina, and North Carolina



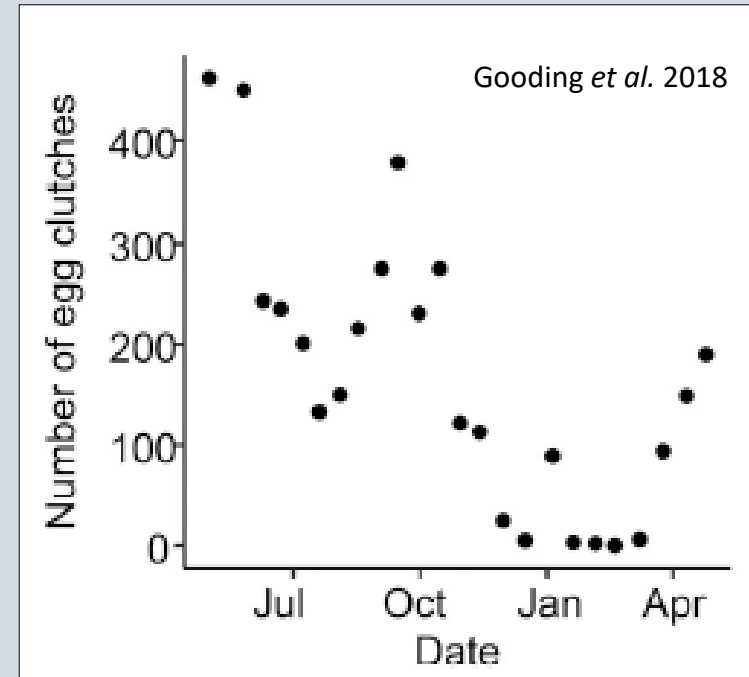


# Impacts on Vegetation

- Consume a wide variety of aquatic vegetation (Baker et al. 2010)
- Higher rates of feeding and growth than most native freshwater snails (Kwong *et al.* 2010)
- Cause shifts from macrophyte to algal based systems (Horgan *et al.* 2014)
- Agricultural pests on rice and taro in Asia (Cowie 2002)

# Fecundity

- Maturity at approx. 4-5 months
- Observed reproducing year-round in SC (Gooding *et al.* 2018)
- Deposit clutches above water line
- Each clutch contains approx. 2000 eggs, yielding 10-140 snails
- Clutches hatch over two weeks



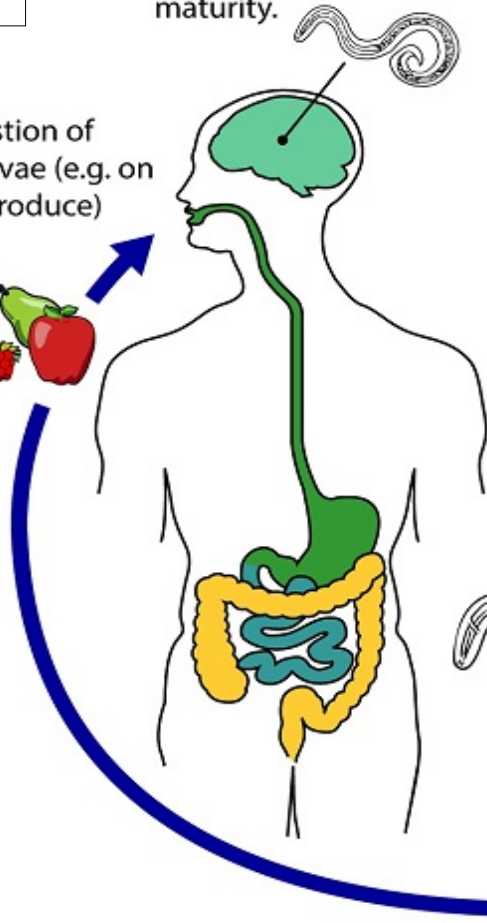
Can cause eosinophilic meningitis

6 Larvae migrate to brain (occasionally eyes or lungs) in aberrant human host, and do not reach reproductive maturity.

Adults in pulmonary arteries



5 Accidental ingestion of gastropod or larvae (e.g. on contaminated produce)



1 Eggs hatch in the lungs, and first-stage larvae are passed in rodent feces



4 Third-stage larvae are ingested by definitive host.

2 First-stage larvae shed from definitive host are ingested by gastropod intermediate host.



Third-stage (L3) larva



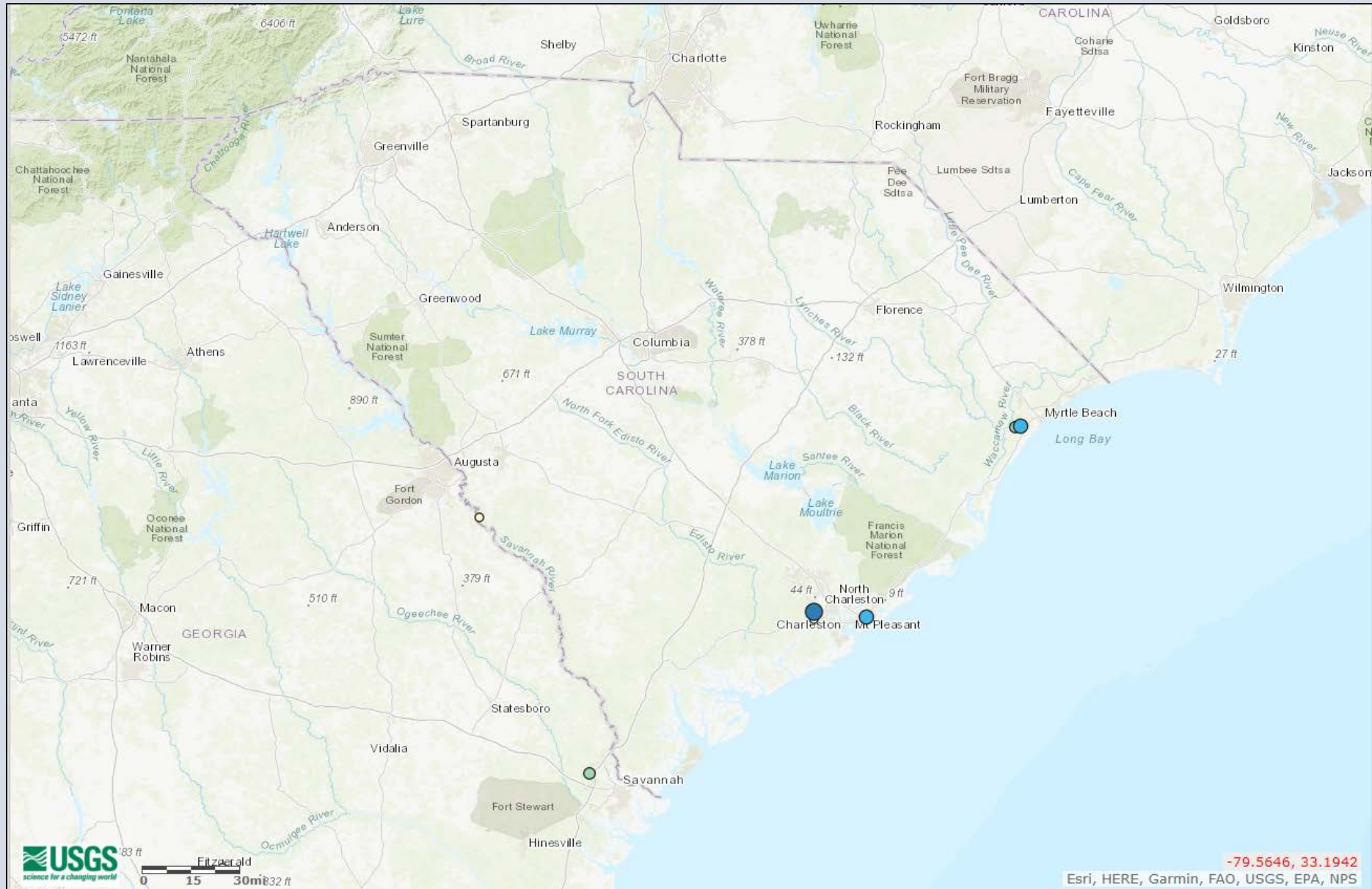
3 Larvae reach the infective (L3) stage after two molts in the intermediate host.

SC **NOT DETECTED**  
(Underwood *et al.* 2019)  
LA **DETECTED**  
(Teem *et al.* 2013)

Infective stage

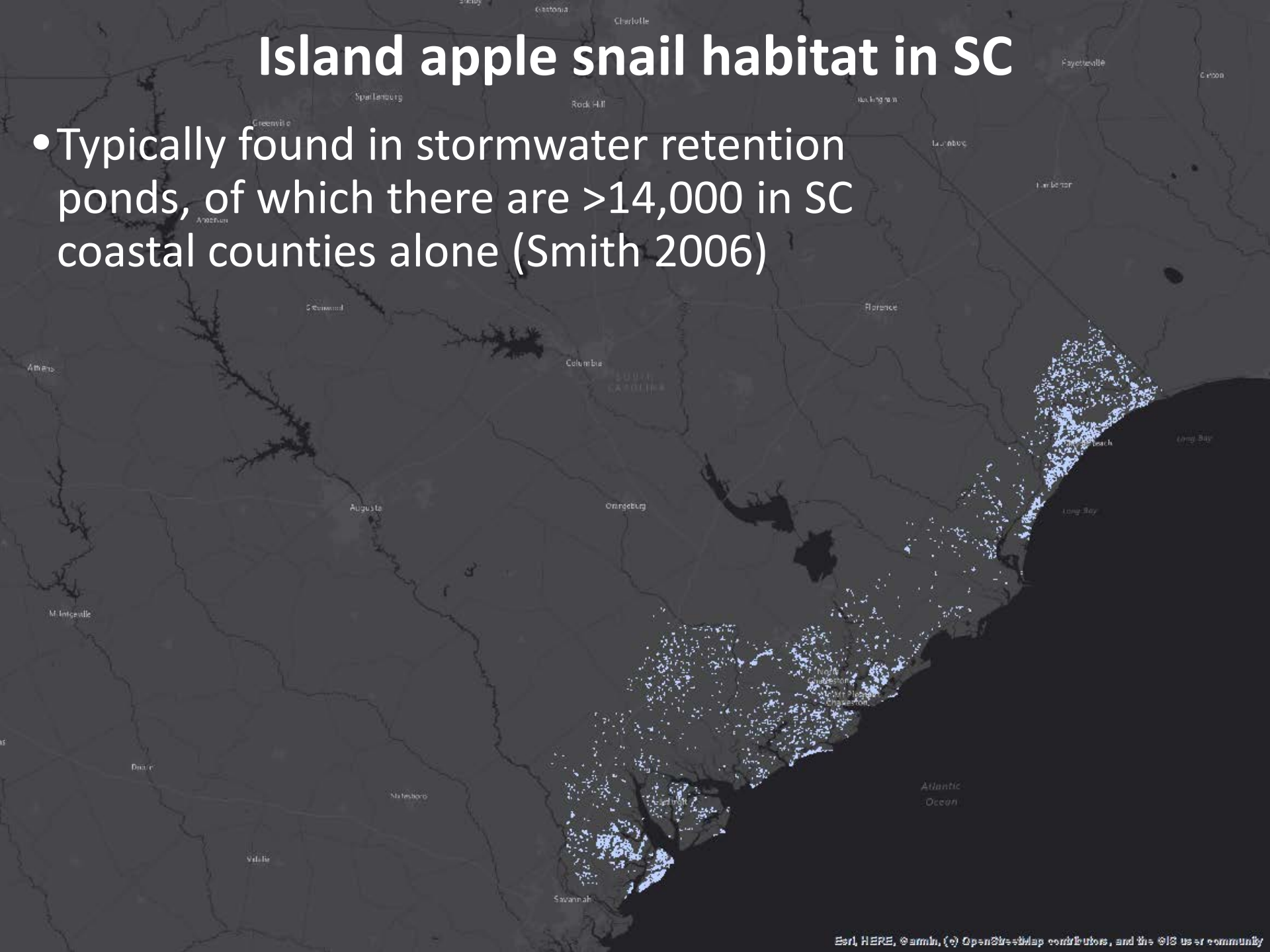
Diagnostic stage

# SC island apple snail distribution



# Island apple snail habitat in SC

- Typically found in stormwater retention ponds, of which there are >14,000 in SC coastal counties alone (Smith 2006)

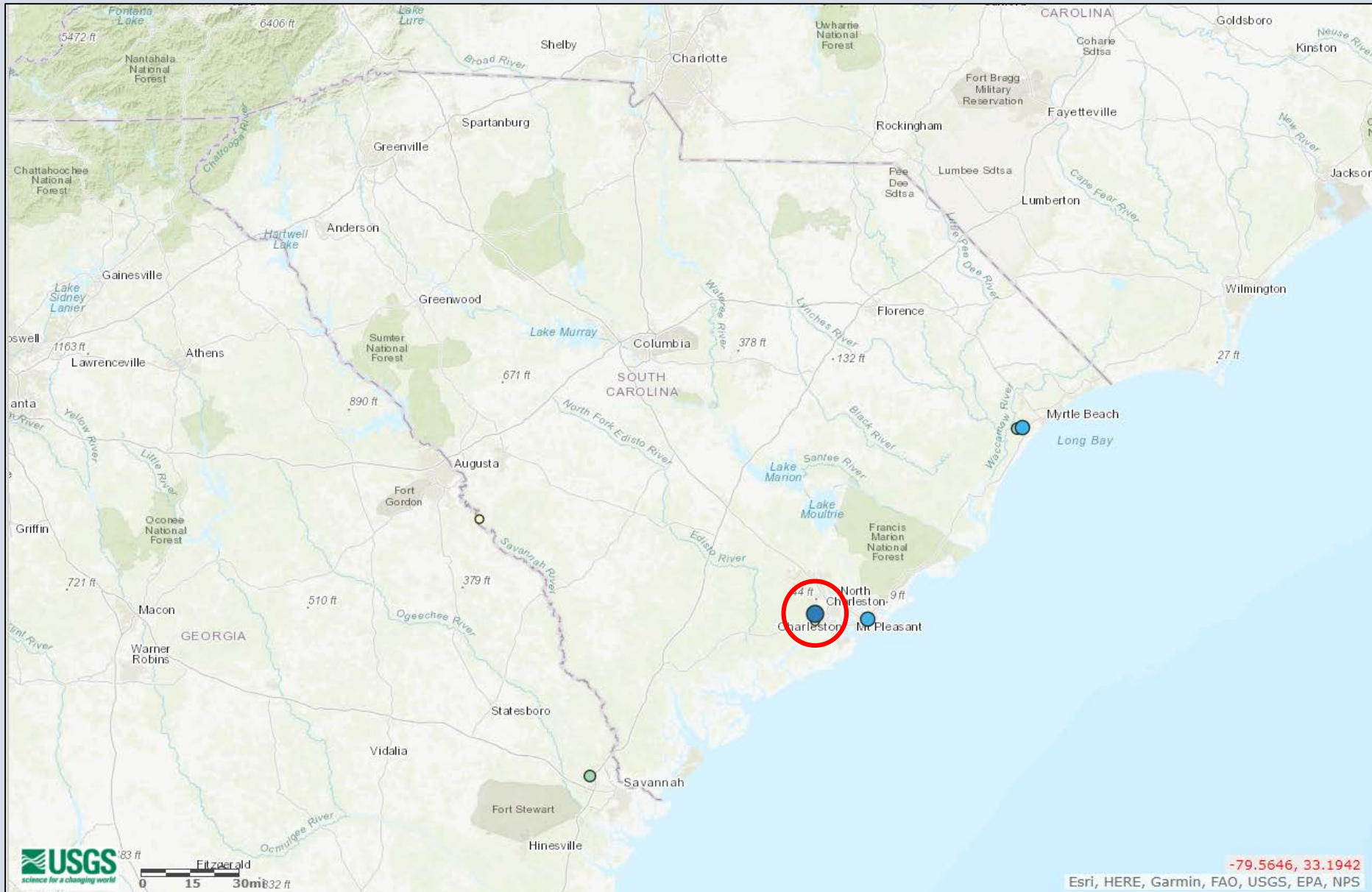


# Island apple snail habitat in SC

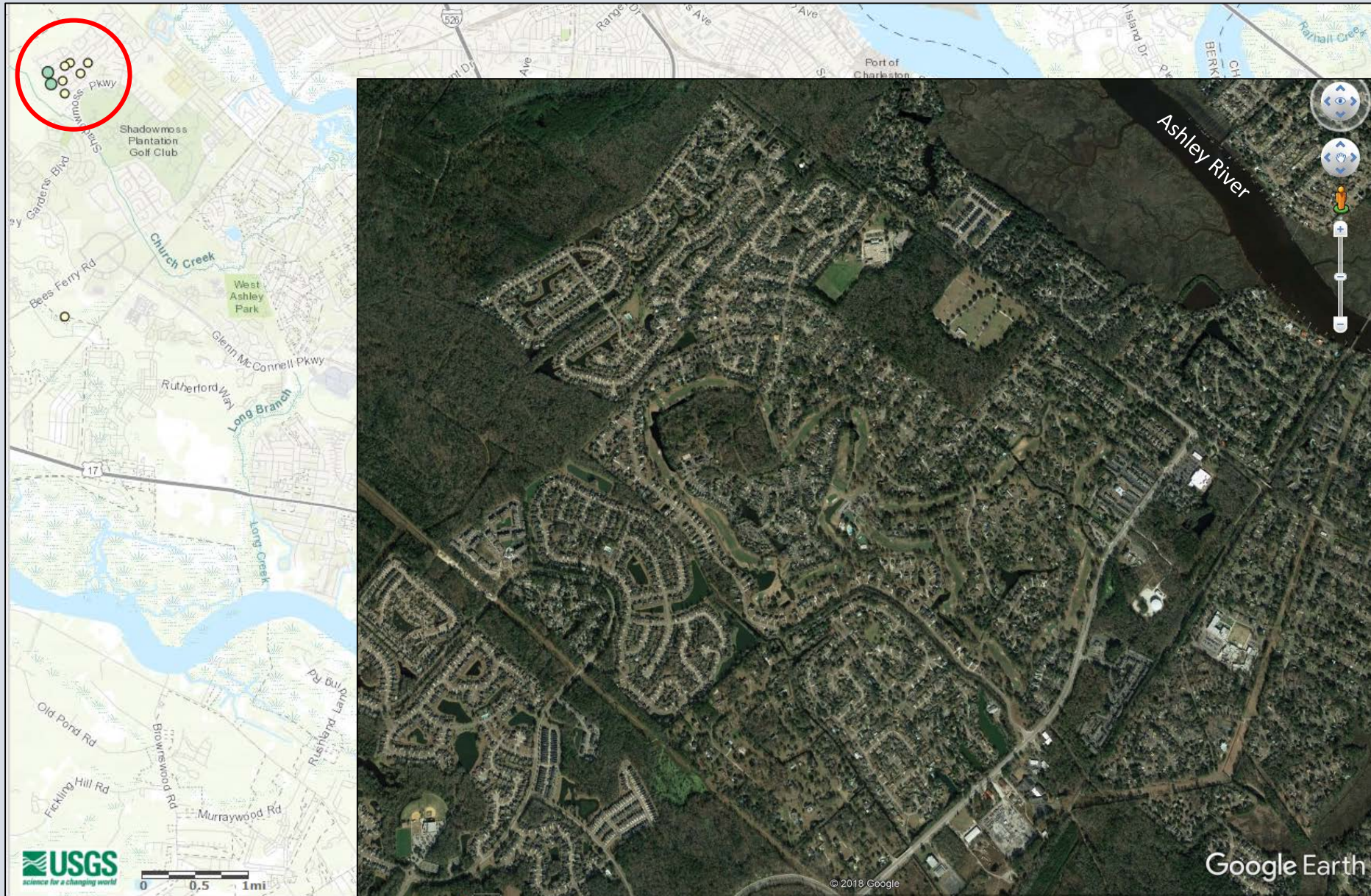




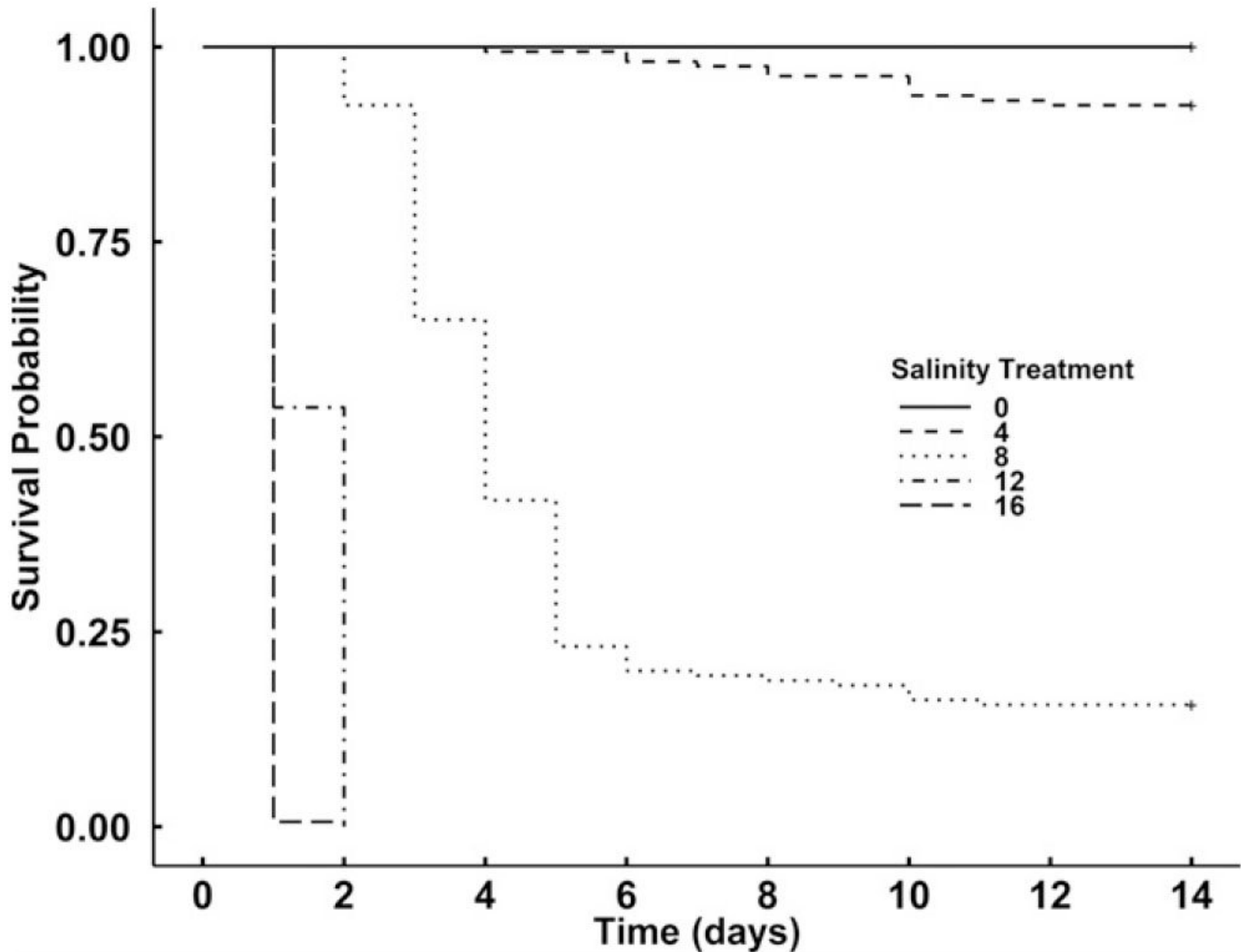
# SC island apple snail distribution



# SCDNR island apple snail surveys



# Salinity curves for island apple snail hatchlings from Underwood *et al.* (2019)



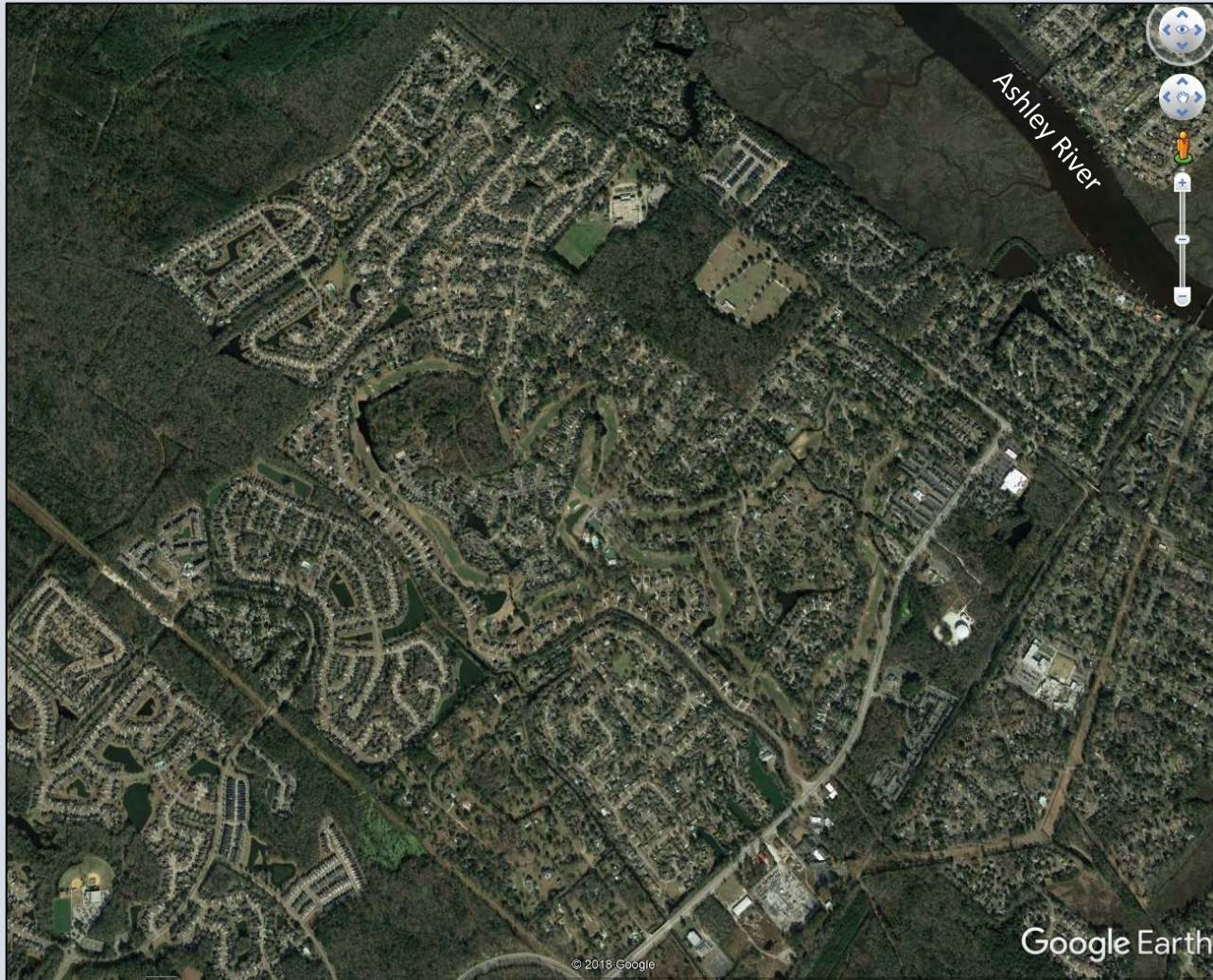
# Mechanisms for spread

- Flooding, large rain events
- Pond connectivity
- Predators



# Current Project Objective

- Determine the extent of the island apple snail invasion in West Ashley, SC



# Survey methods

- Survey pond perimeters
- Count egg clutches, single island apple snails, and copulating pairs
- Water quality



# Survey methods

- Document specific locations of island apple snails in more natural environments



Ashley River

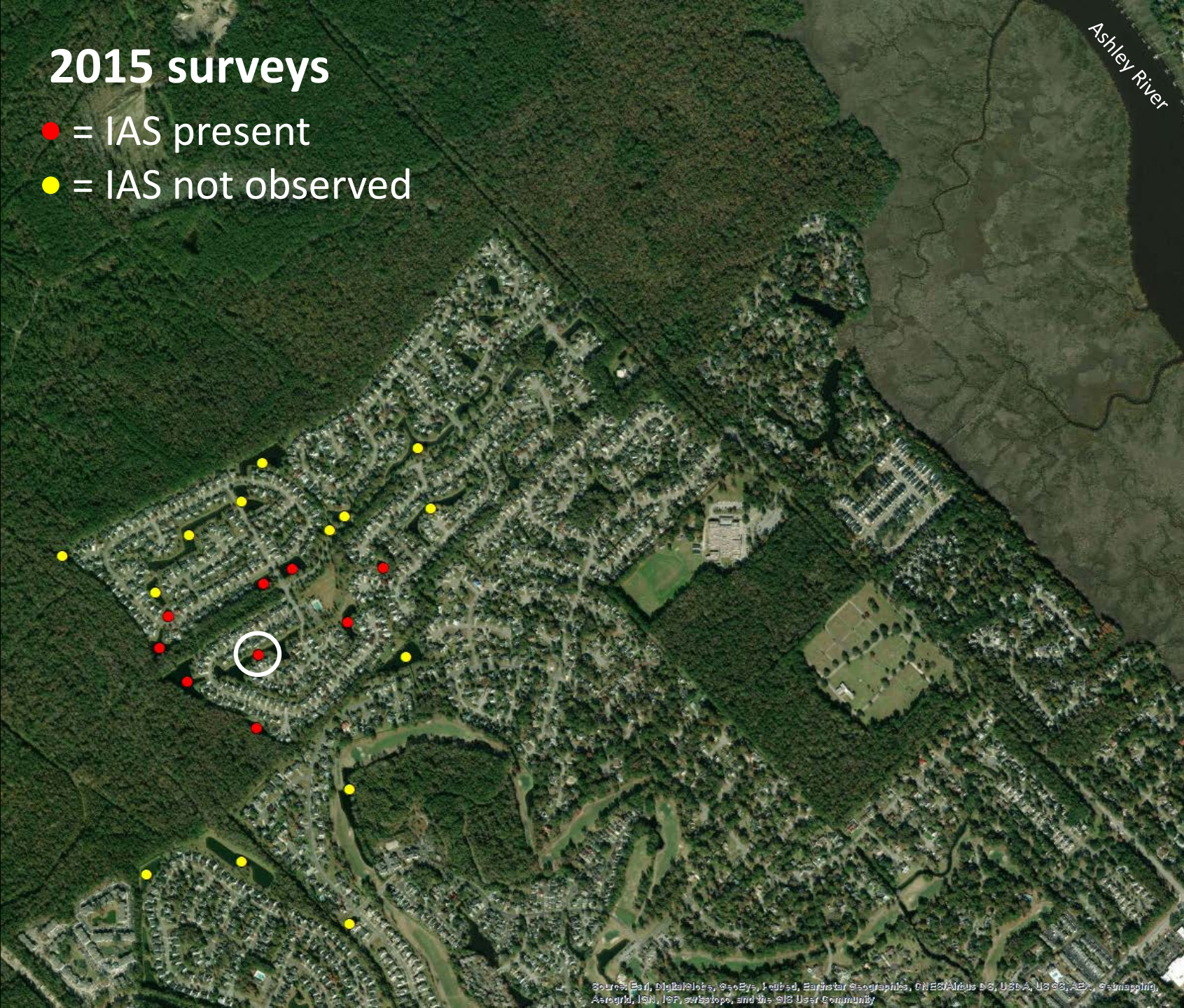




Ashley River

# 2015 surveys

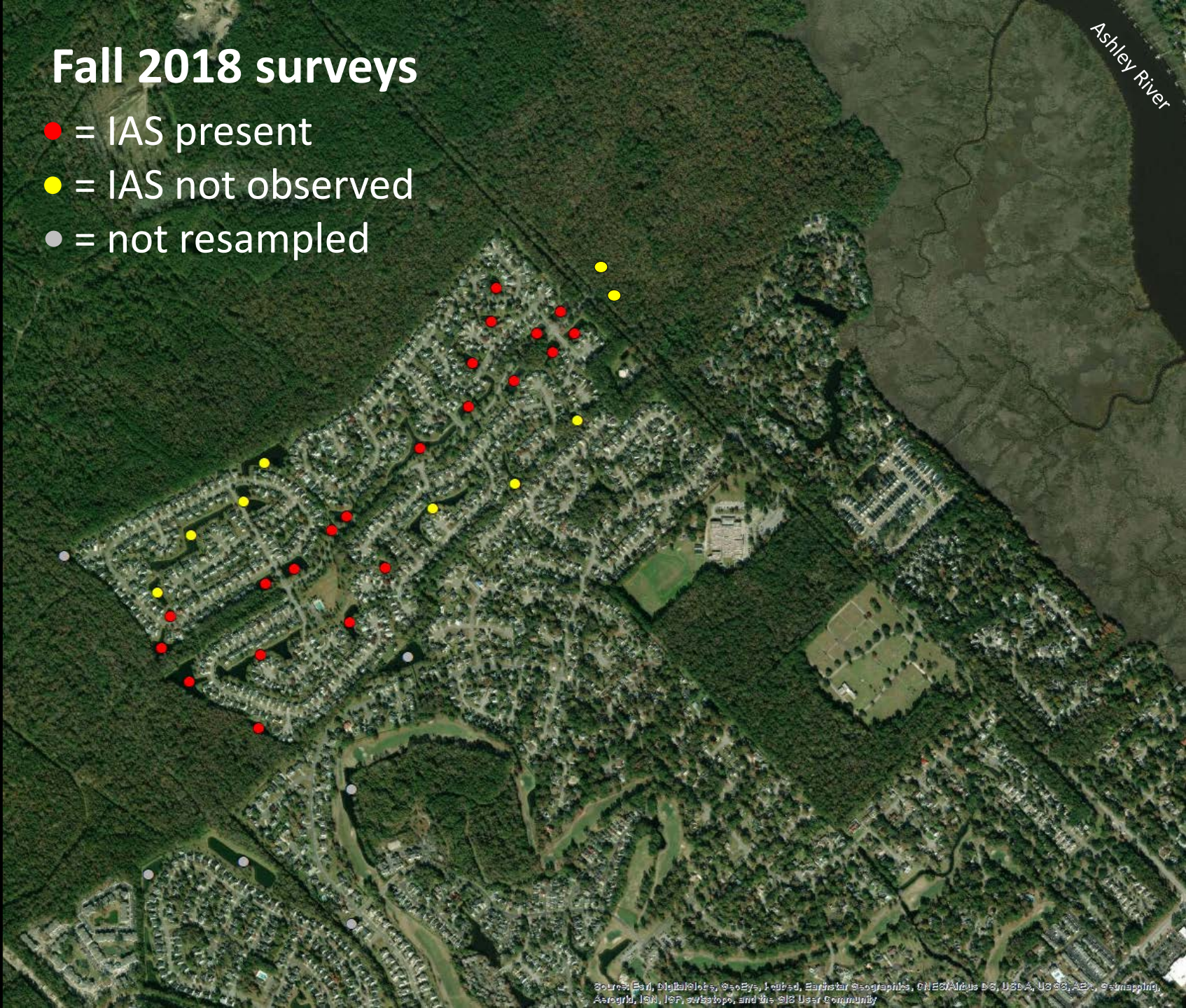
- = IAS present
- = IAS not observed



# Fall 2018 surveys

- = IAS present
- = IAS not observed
- = not resampled

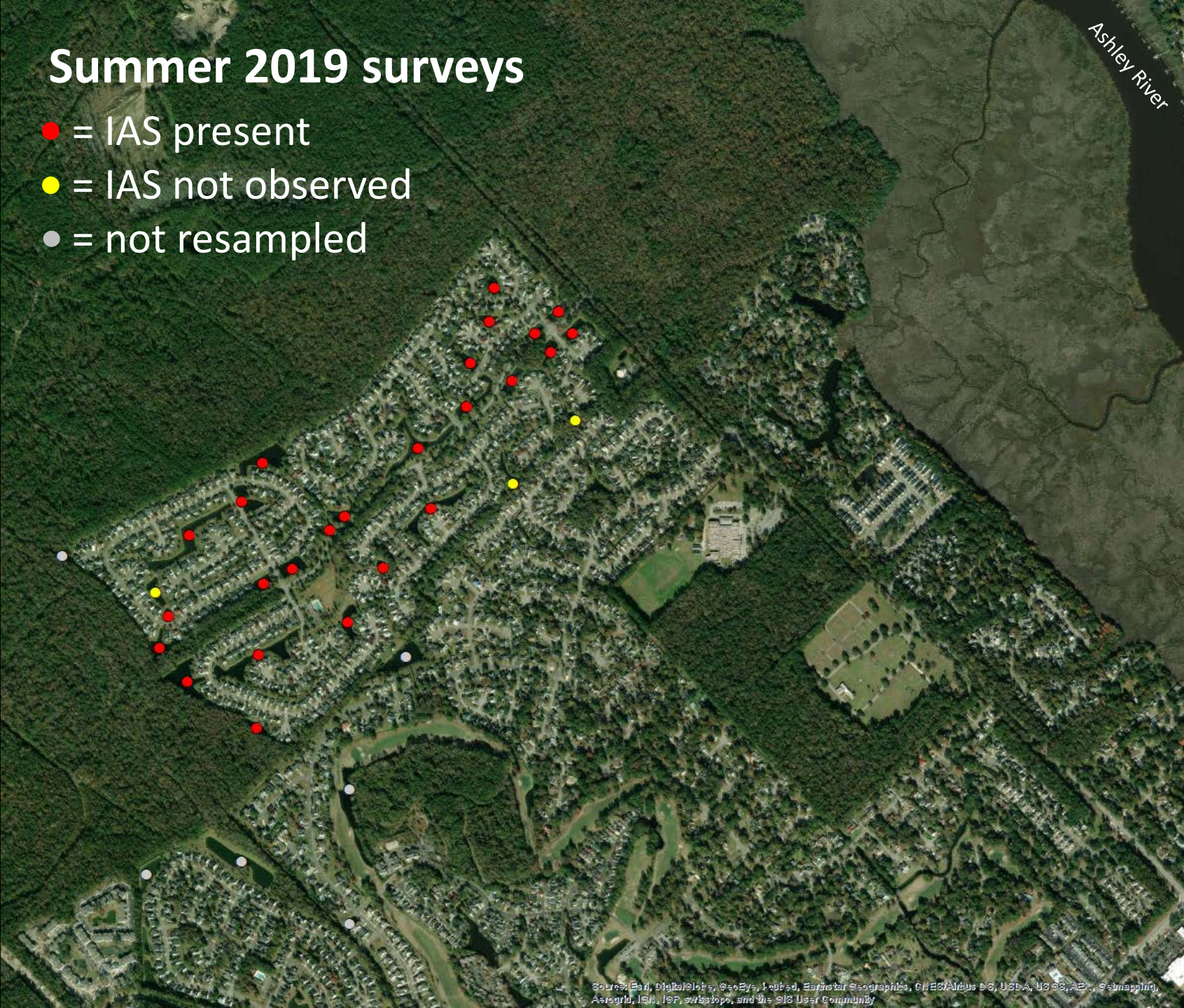
Ashley River



Ashley River

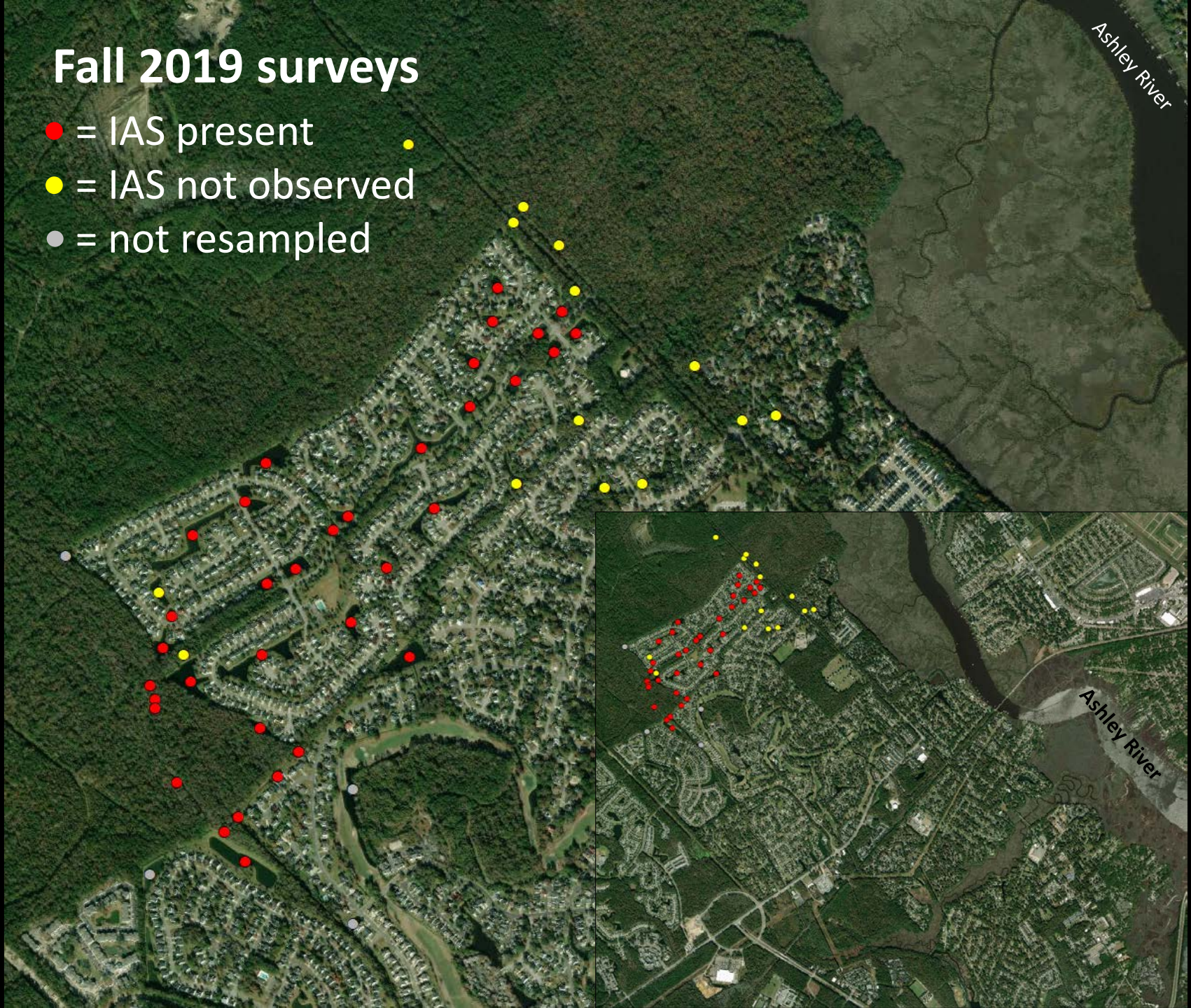
# Summer 2019 surveys

- = IAS present
- = IAS not observed
- = not resampled



# Fall 2019 surveys

- = IAS present
- = IAS not observed
- = not resampled



# Future survey plans

- EDRR
- Re-survey Village Green neighborhood retention ponds in spring/summer 2020
- Continue expanding survey efforts to be on the lookout for further spread
- How will new areas to be surveyed be determined?



# FaST map following Hurricane Dorian (Sept. 2019)



## NAS - Nonindigenous Aquatic Species

Home Alert System Database & Queries Taxa Information **Report a Sighting**

Query

### Hurricane Dorian - Revised map

Click on a drainage in the map or select a species from below.

Select a species:

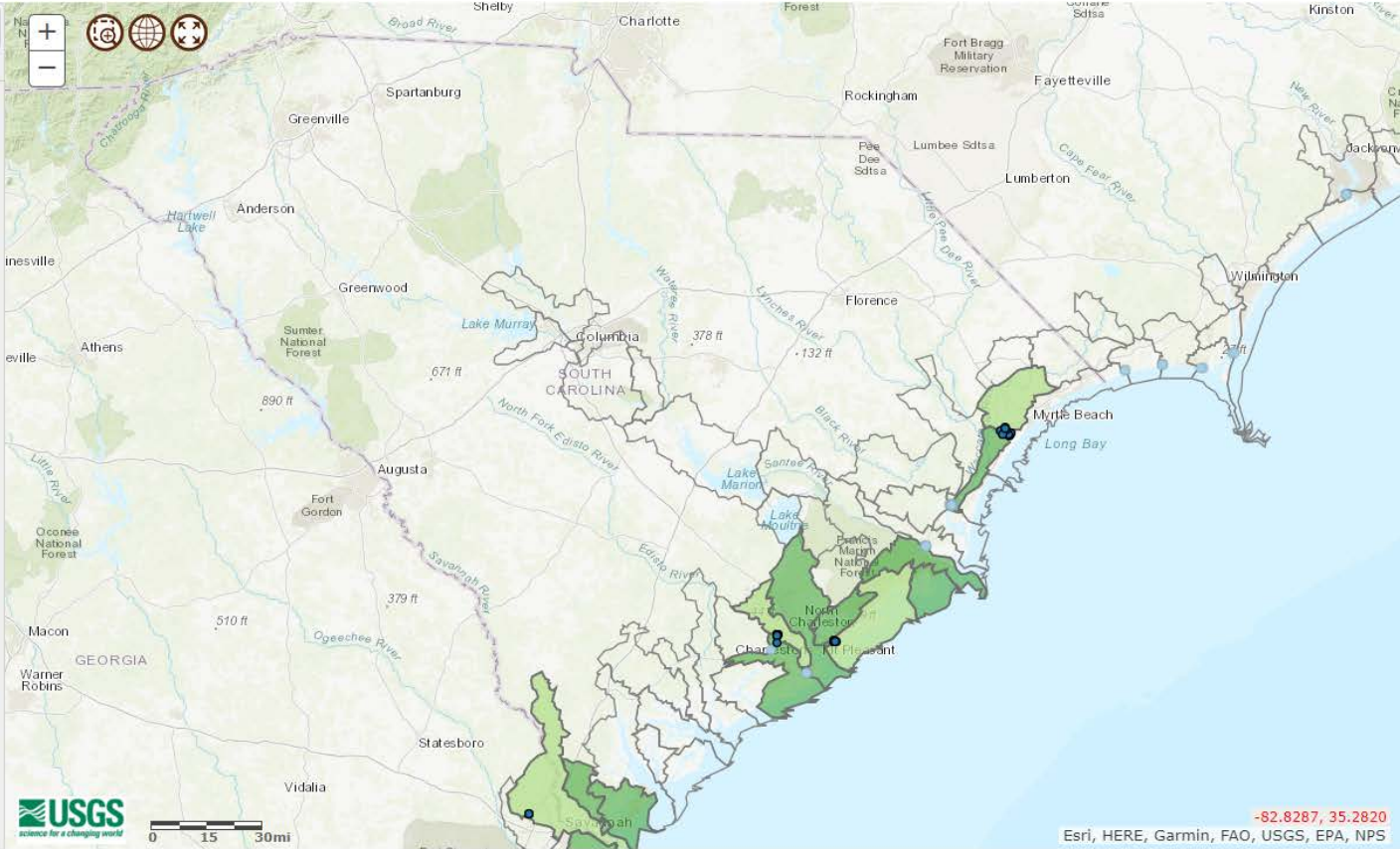
giant applesnail (*Pomacea maculata*)

Map updated 10/24/2019



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

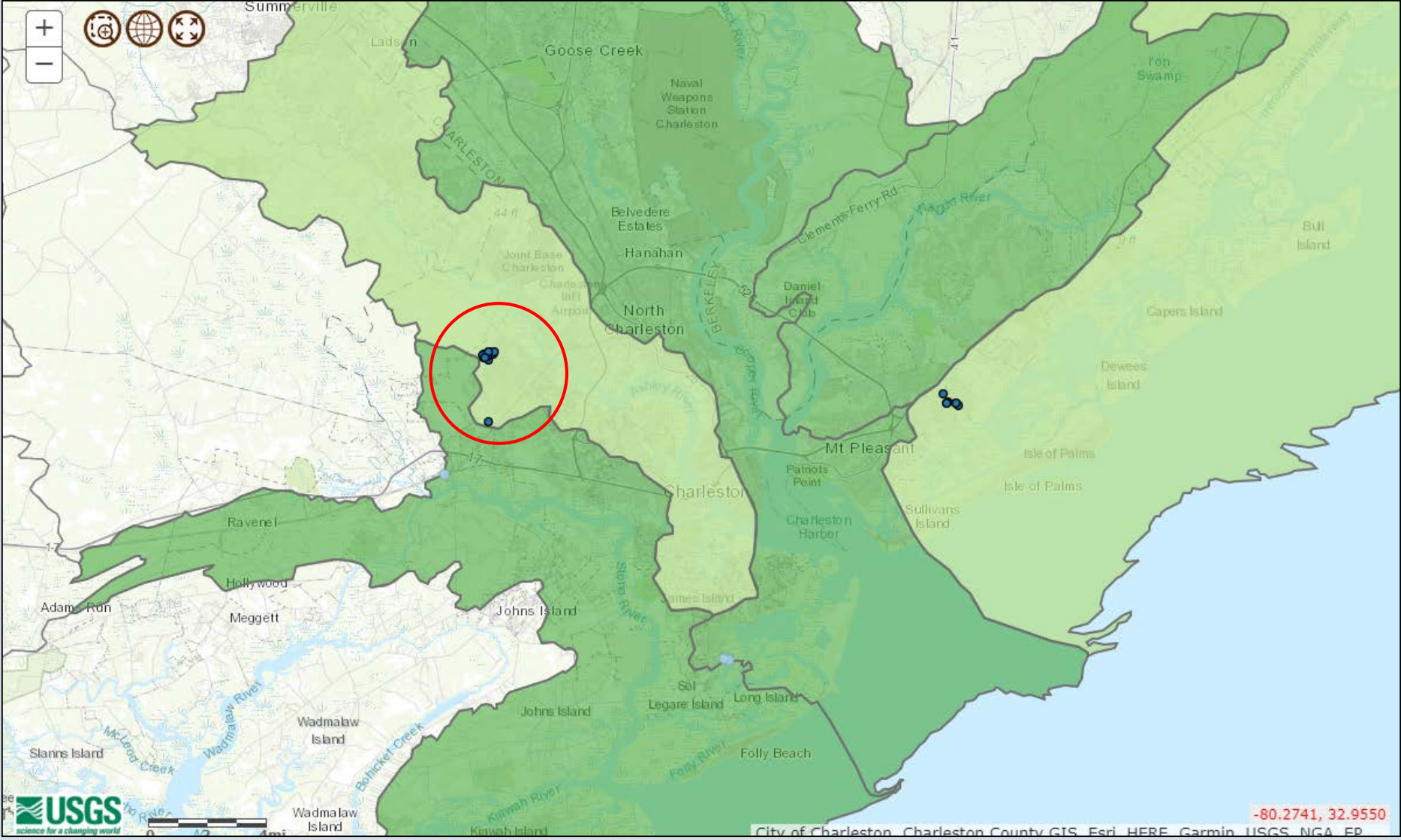
- Present in watershed
- Potential spread due to flooding
- Connection points
- Species Observations



0 15 30mi

-82.8287, 35.2820  
Esri, HERE, Garmin, FAO, USGS, EPA, NPS

# FaST map following Hurricane Dorian (Sept. 2019)





# Acknowledgements



- SC Department of Natural Resources
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## Questions?

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