

Ontogenetic shifts in habitat use by endangered smalltooth sawfish in southwest Florida nurseries

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Outline

A large sawfish is the central focus of the image, swimming horizontally across the frame. Its long, serrated rostrum extends to the right. The background is a vibrant blue underwater scene with a diverse coral reef. Various types of coral, including branching and table corals, are visible on the seabed. Several small, silvery fish are scattered throughout the water column. The lighting is bright and clear, highlighting the textures of the coral and the sleek body of the sawfish.

- **Introduction**

- Smalltooth sawfish
- Charlotte Harbor work

- **Methods**

- Sampling and tagging
- Acoustic telemetry

- **Preliminary results**

Smalltooth Sawfish (*Pristis pectinata*)

- 1992: Protected in Florida (only one species in Florida)
- 2003: U.S. Endangered Species Act
- 2009: NMFS Recovery Plan published



- Critically Endangered
- Historically found in the US from Texas to North Carolina
- Currently limited to Florida, mainly Southwest Florida

Small juveniles



YOY STL = ~0.7 m (~2 ft)



Age 1 = ~1.5 m (~5 ft)

Large juvenile



Age ~2+ = ≥ 2 m (~7–10 ft)

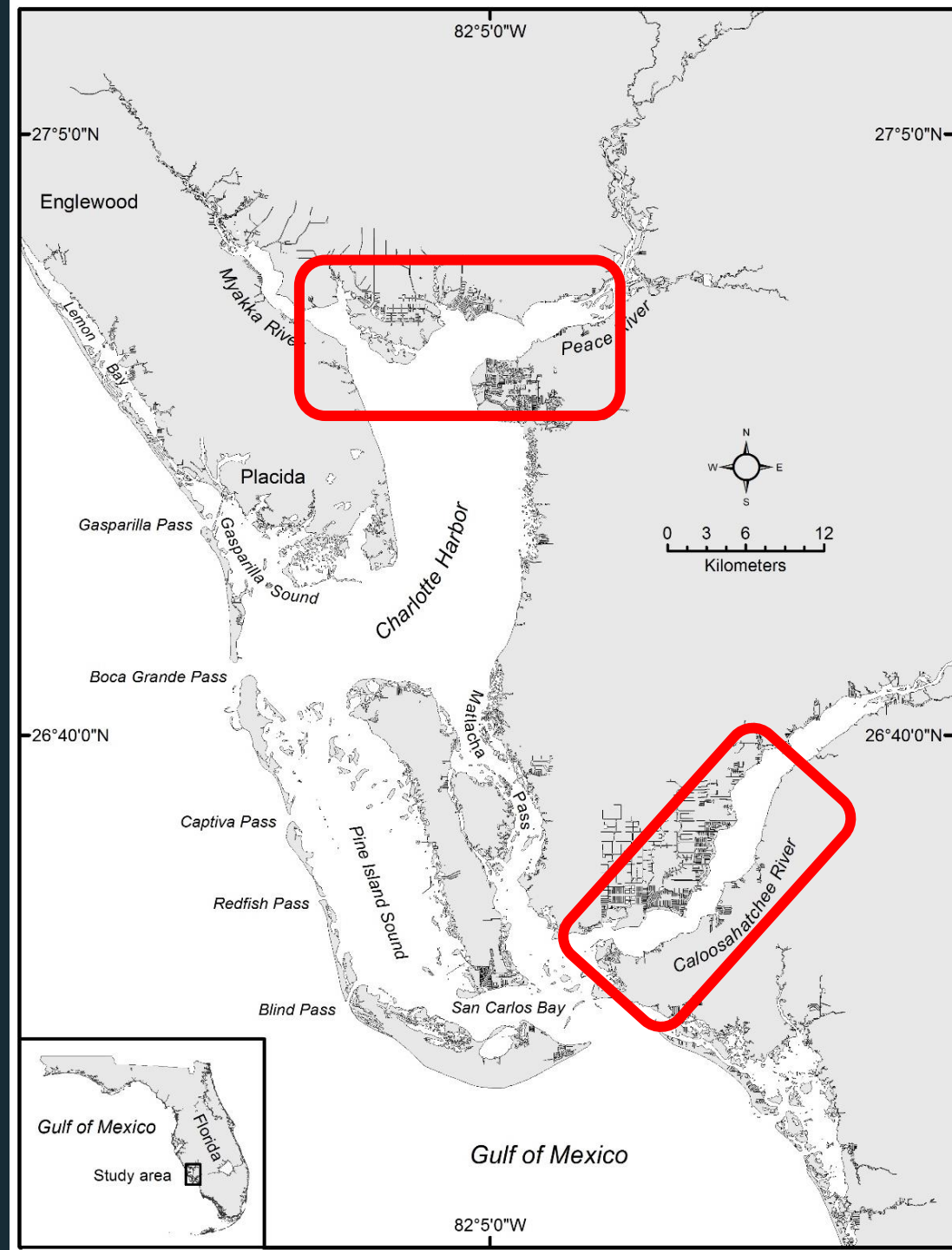
Objectives

This study aims to:

- (1) Identify ontogenetic shifts in habitat use related to sex and size.**
- (2) Evaluate residency of juveniles in Charlotte Harbor by quantifying changes in movement and home range.**

Sawfish in Charlotte Harbor

- 2004–2017:
 - Primarily using **gill nets**
 - Mostly targeting small juveniles in the rivers
 - External V9 acoustic tags
 - Short battery life
- 2017-2021:
 - Received permission to internally tag fish
 - V13 & V16 tags with longer battery life
 - Continued gillnet sampling
 - Implemented hooked gear sampling
 - Drumlines
 - Hook and line



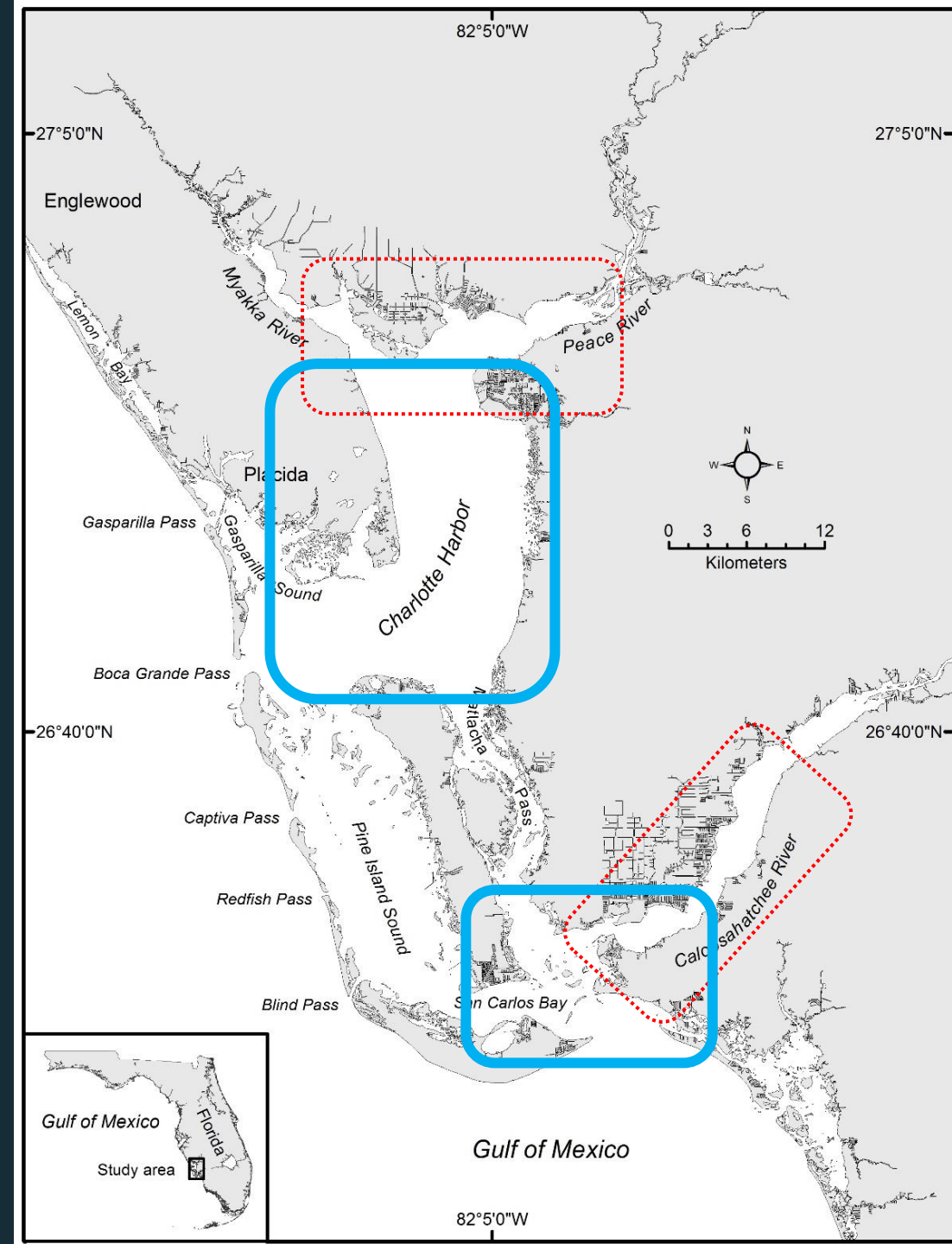
Gill net sampling

- 1143 gill net sets
- Random and directed sampling
- 4" and 6" mesh nets
- Typically set in shallow shoreline habitats
 - 0.0–2.6 m depths (mean = 0.5 m)



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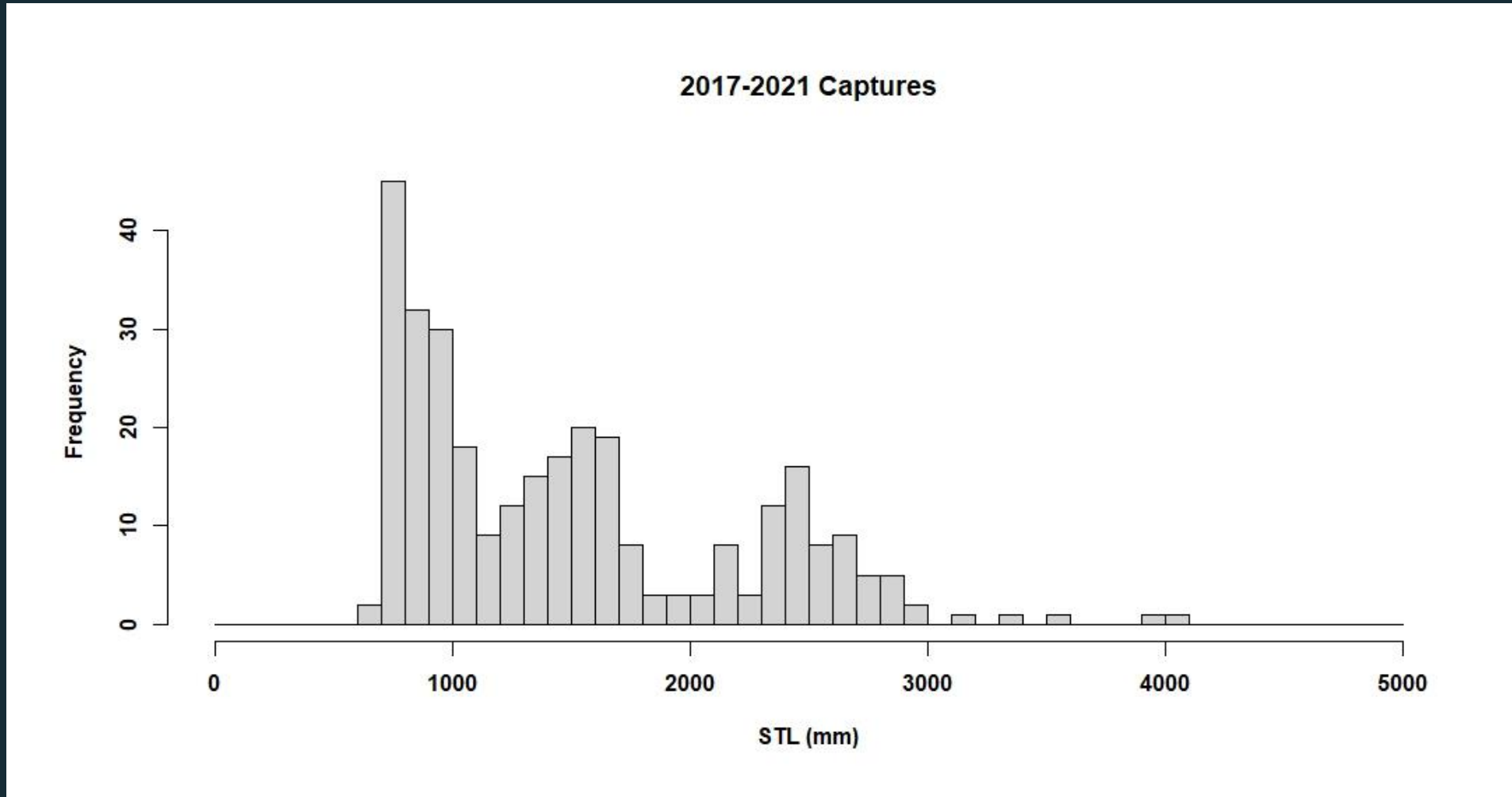


Hooked gear sampling

- **970 hooked gear sets (2017–2021)**
 - Drumlines
 - Hook and line
- **Directed sampling**
- **Typically set in deeper water away from shore**
 - 0.4–7.7 m depths (mean = 4.0 m)



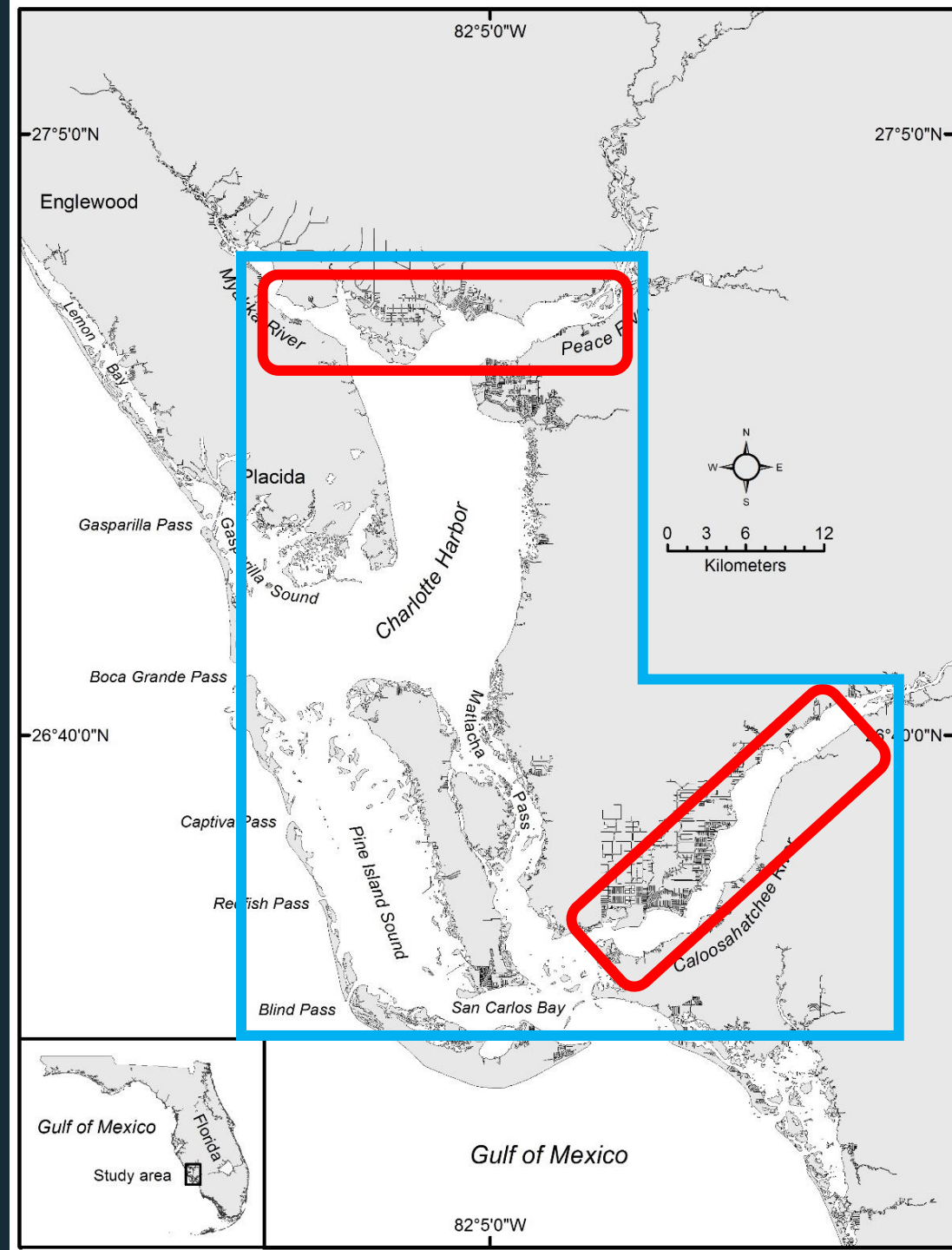
Sawfish in Charlotte Harbor



- 309 total sawfish captured in CH
- 10 from atypical gears
- 677–4035 mm STL
- Mean STL: 1496 mm

Sawfish in Charlotte Harbor

- **Small juveniles:**
 - 2 distinct nurseries (Poulakis et al. 2011)
 - Peace River
 - Caloosahatchee River
 - High site fidelity (Poulakis et al. 2016, Scharer et al. 2017)
 - Nursery hotspots
- **Large juveniles:**
 - Found throughout the harbor
 - Eventually leave
 - Move throughout Florida (Graham et al. 2021)



Total internal tags deployed in Charlotte Harbor

2017 = 8

2018 = 23

2019 = 37

2020 = 53

2021 = 59

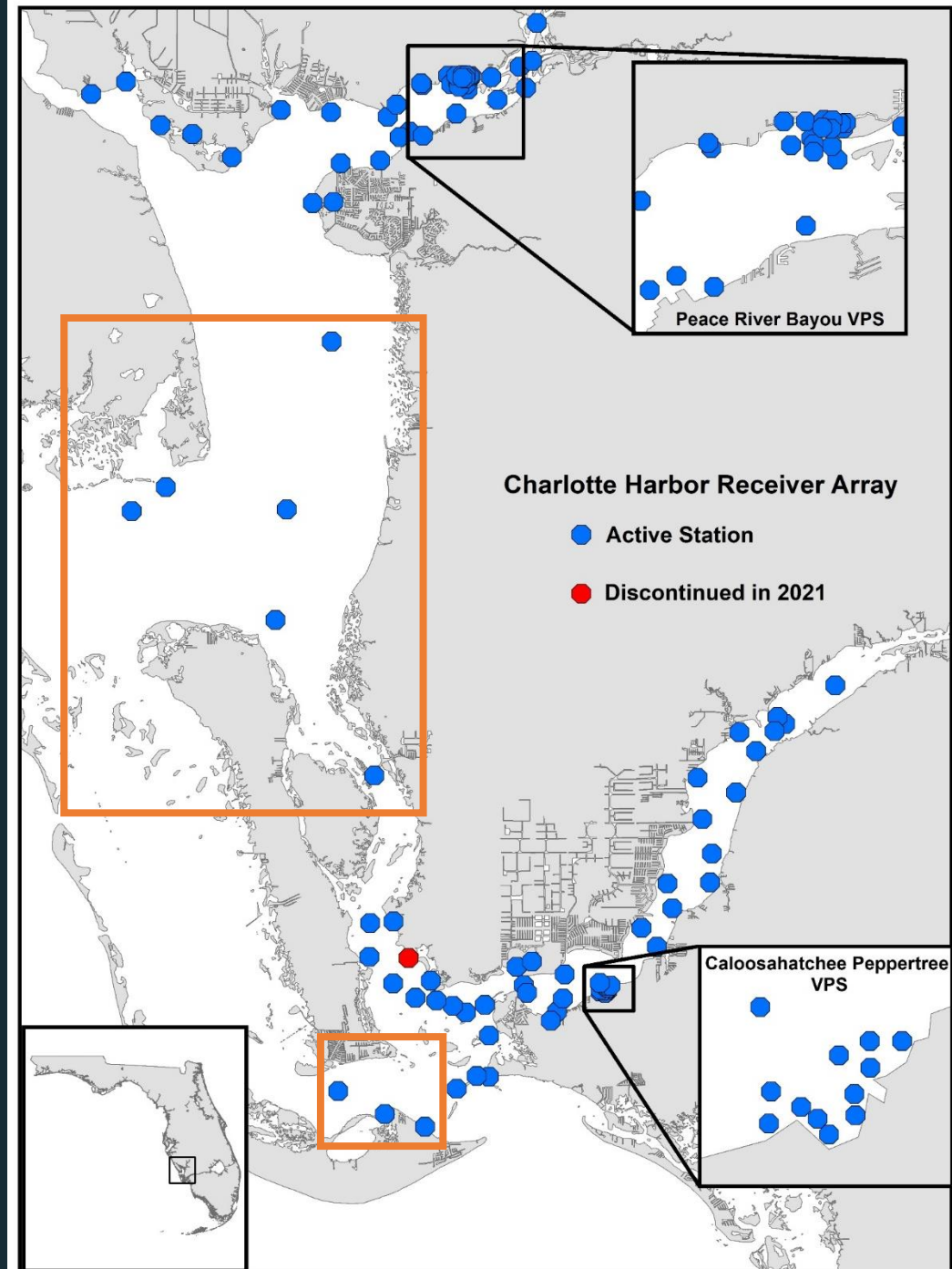
Total = 180 internal tags

124 V16 (10-year battery)

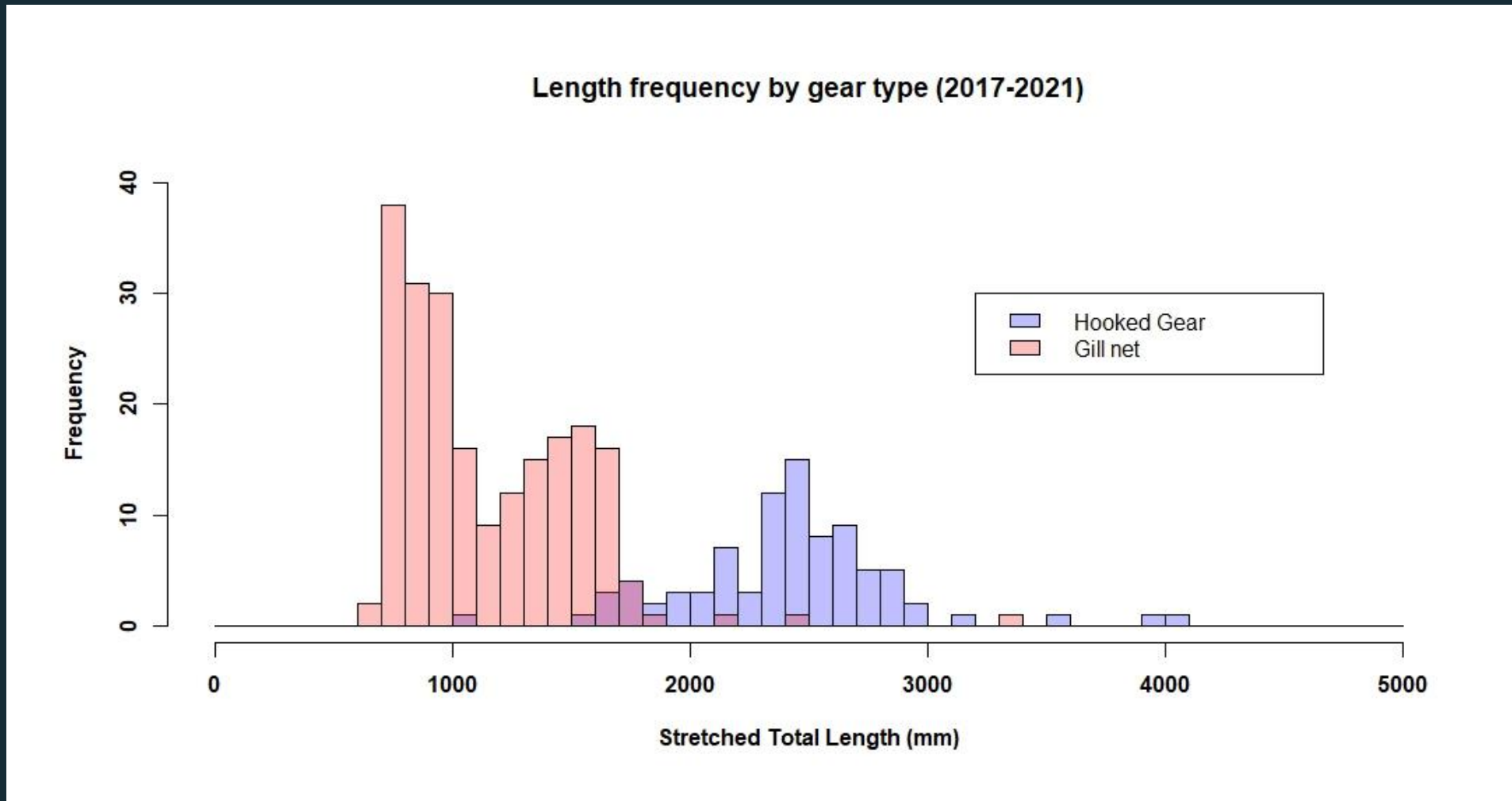
56 V13 (5-year battery)

Expanded array coverage since 2017

- We deployed 9 receivers in areas where we expected to hear large juveniles and adults
- Extended array coverage anticipating increased movement and space use
- Three Vemco Positioning System (VPS) arrays
 - 2 in the Peace River
 - 1 in the Caloosahatchee River



Sawfish in Charlotte Harbor



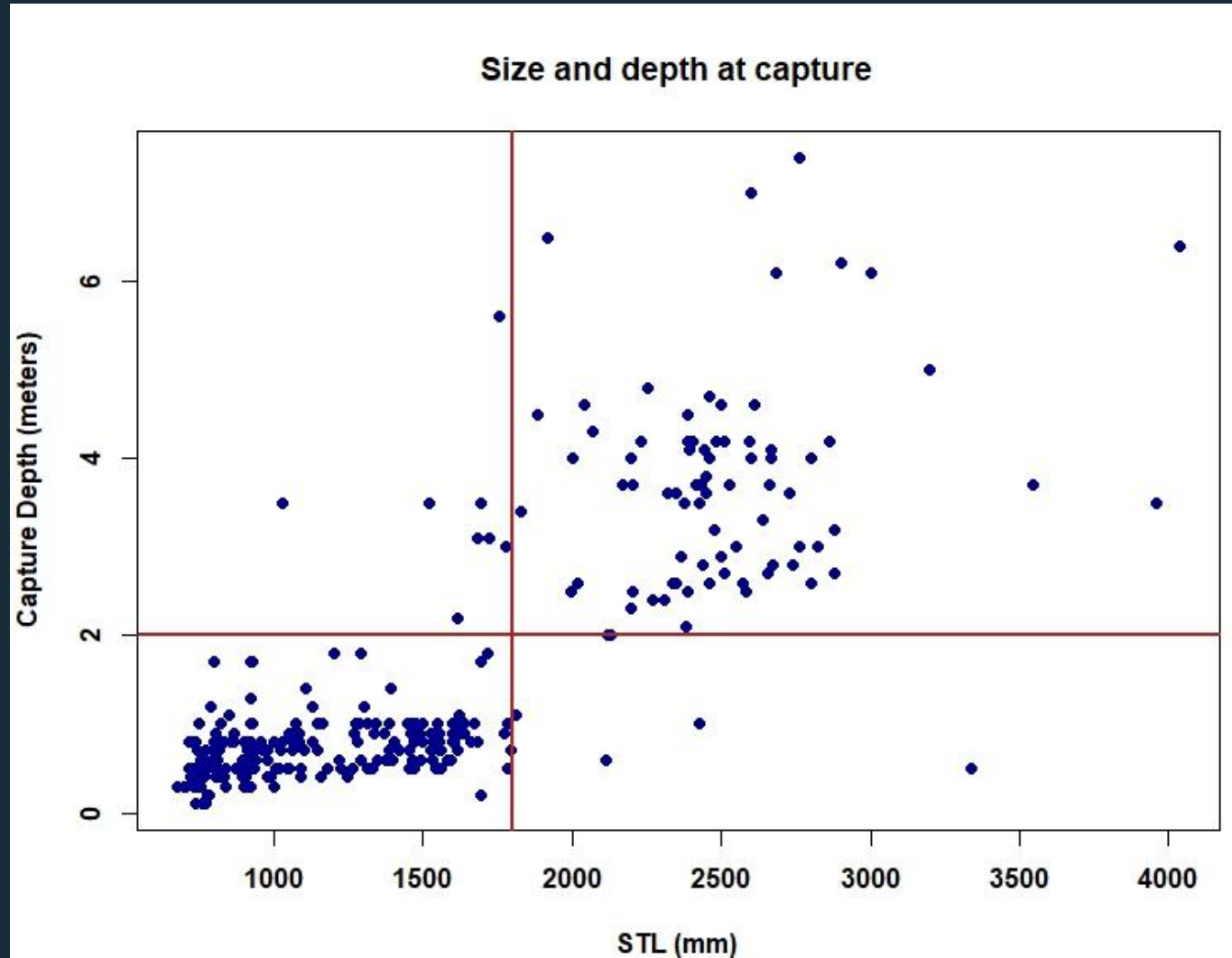
- 212 from gill nets
- Mean STL: 1146 mm

- 87 from hooked gear
- Mean STL: 2418 mm

Primary habitat shift

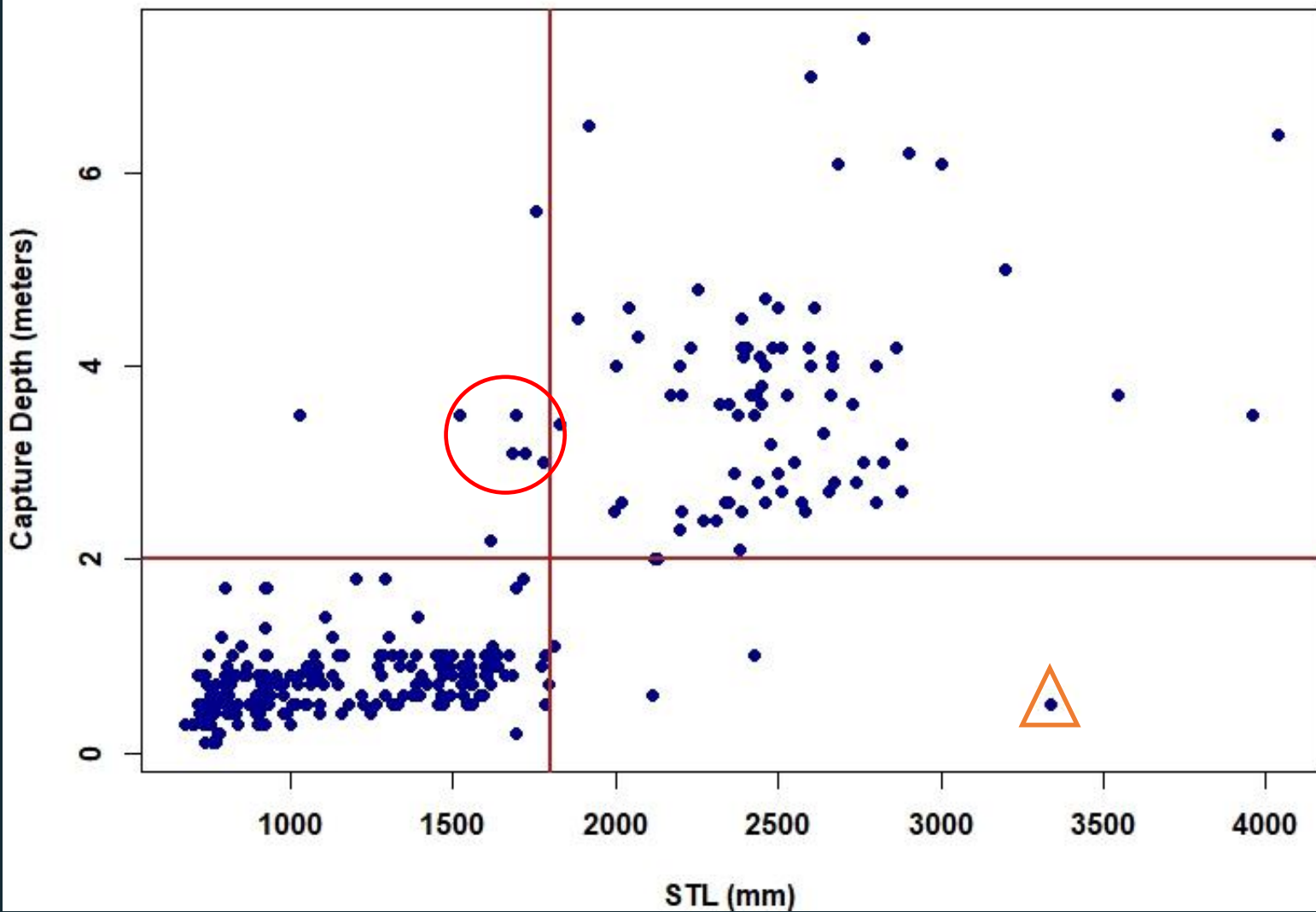
Habitat shift associated with size and depth

- Shallow habitats for the first year to avoid predators
- Shift to deeper waters by age 2



Primary habitat shift

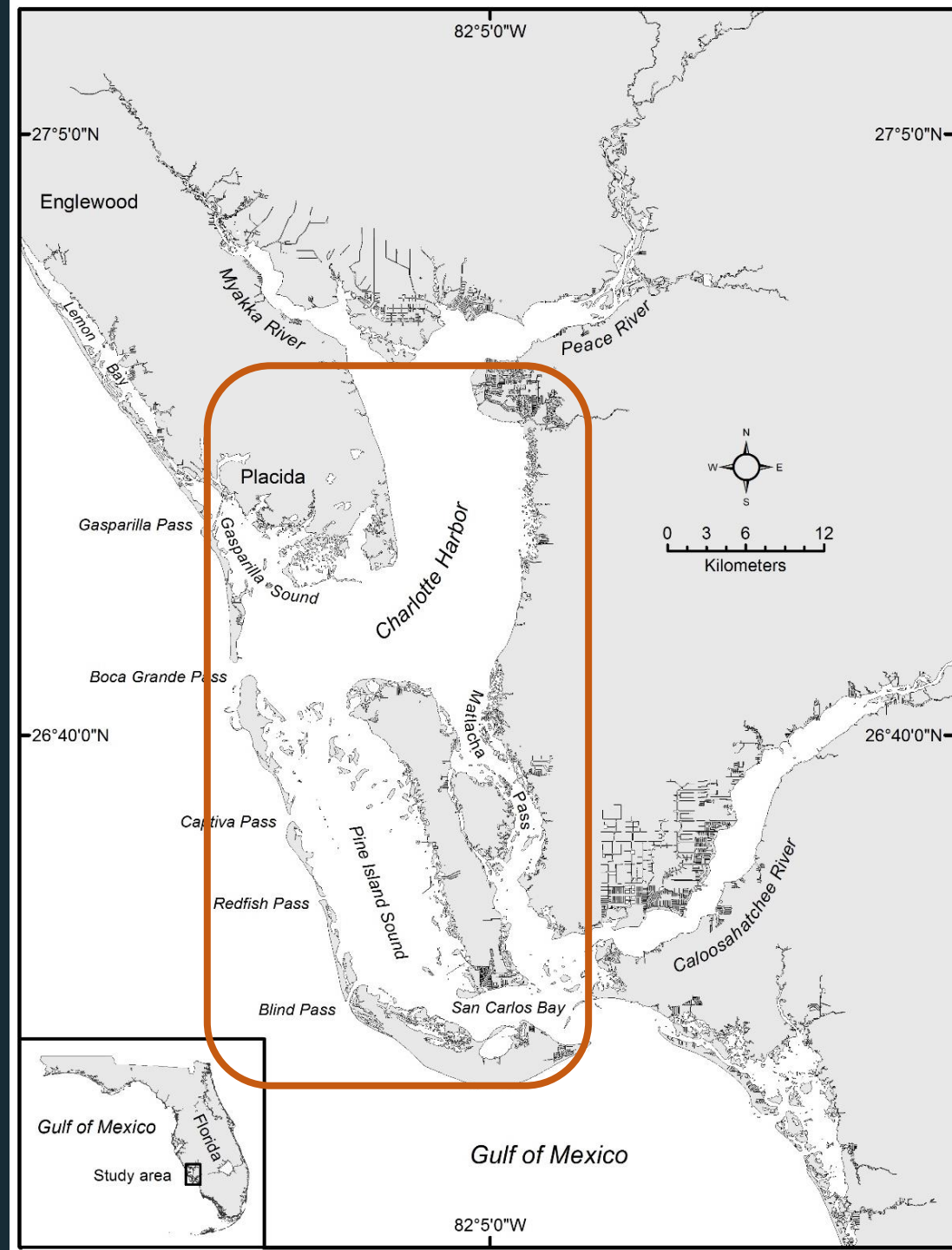
Size and depth at capture



Secondary habitat shift

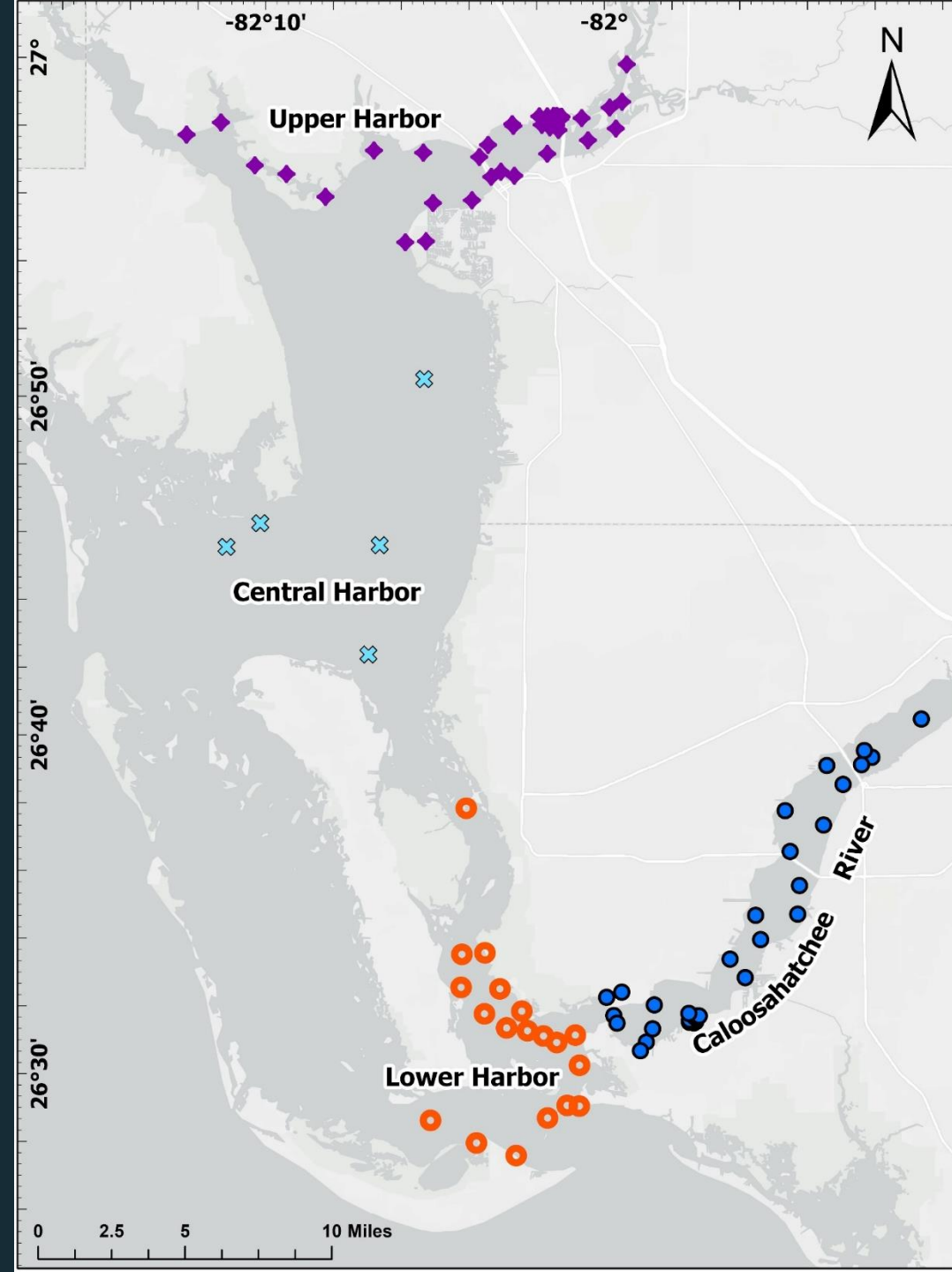
Change in home range and movement through time

- Once juveniles shift to deeper water, they start expanding their range
 - Leave the rivers
 - Use both nursery areas

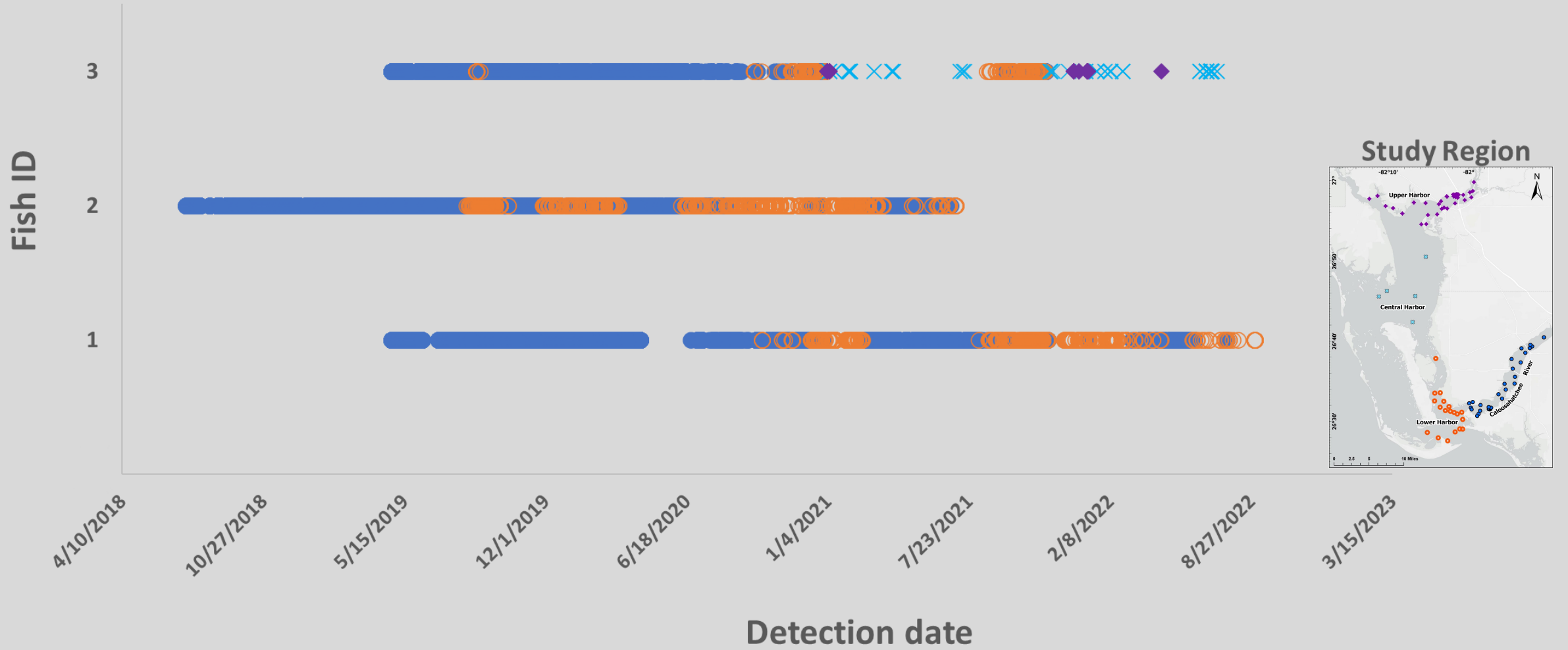


Secondary habitat shift

- Tagged fish remained in the estuary up to 1233 days (3.4 years)
- 106 of the 180 sawfish remained in the estuary for one year or more



Detections over time by region



Future Directions

Identify ontogenetic shifts in habitat use related to sex and size

- Compare mean depth by size, sex, and season
- Visualize and compare habitat use of different size classes

Evaluate residency of juveniles in Charlotte Harbor by quantifying changes in movement and home range

Thank you!



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Charlotte Harbor field lab staff