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# Extensive Field Effort Using a Novel Gear Type to Detect Recruitment of American Eel (*Anguilla rostrata*) in Texas

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Texas Academy of Science

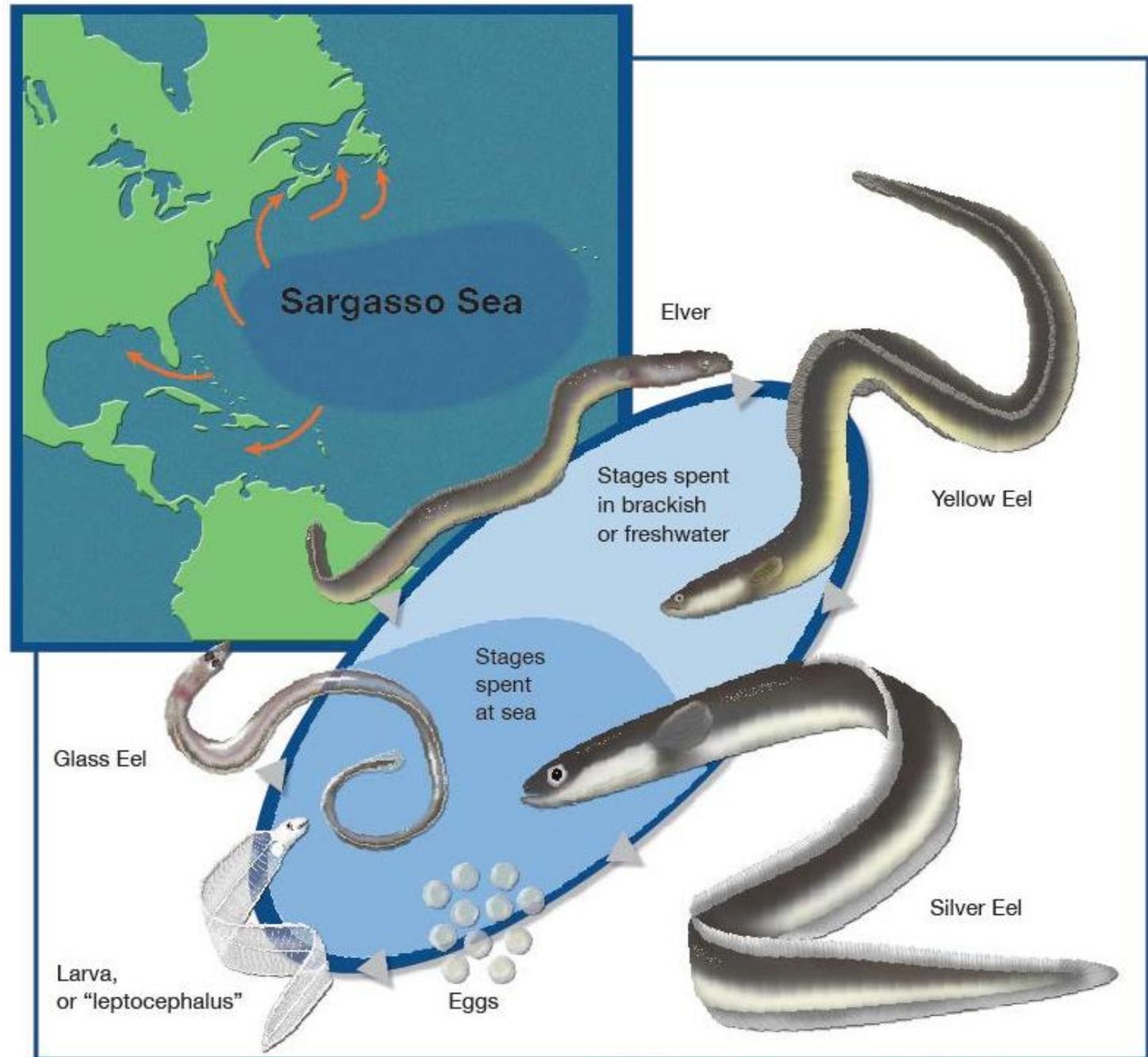
Houston, TX

February 26, 2022



# American Eel (*Anguilla rostrata*)

- Superorder: Elopomorpha
- Catadromous
- Semelparous
- Distinct life stages
  - Larval: Leptocephalus
  - Juvenile: Glass → Elver
  - Sub-Adult: Yellow Eel
  - Breeding Adult: Silver Eel
- IUCN: Endangered
- Texas: SGCN (Species of Greatest Conservation Need)



# Commercial Fishery for American Eel

- Bait
- Sushi
  - Unagi (freshwater eel)

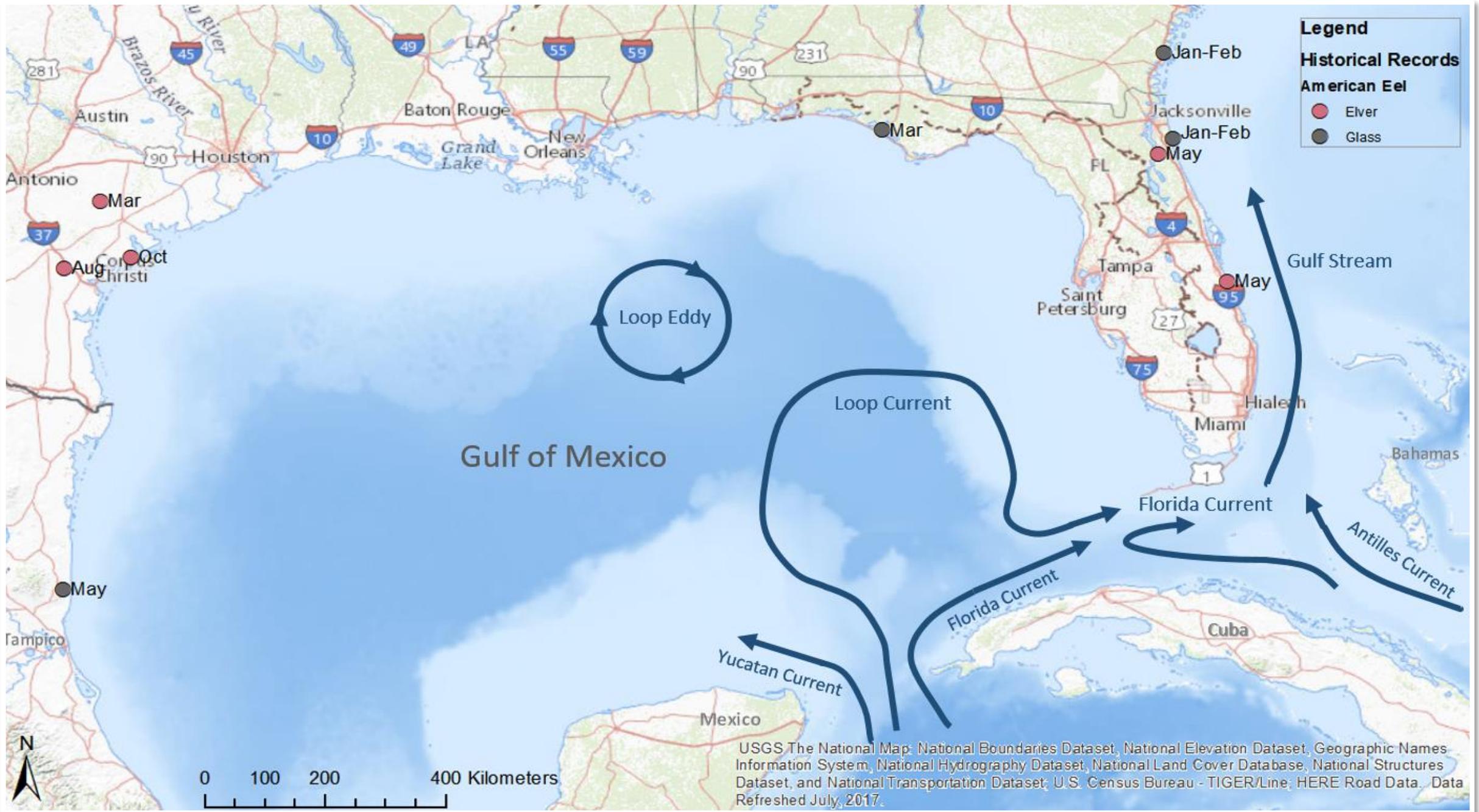


# Commercial Fishery for American Eel

- Bait
- Sushi
  - Unagi (freshwater eel)
- Aquaculture
  - Juvenile (glass and elver eels)
  - \$1,849/lb
  - Black market/poaching
  - YouTube: America's Hottest Black Market: Inside the Eel Gold Rush



Image Credit: Robert F. Bukaty/Associated Press



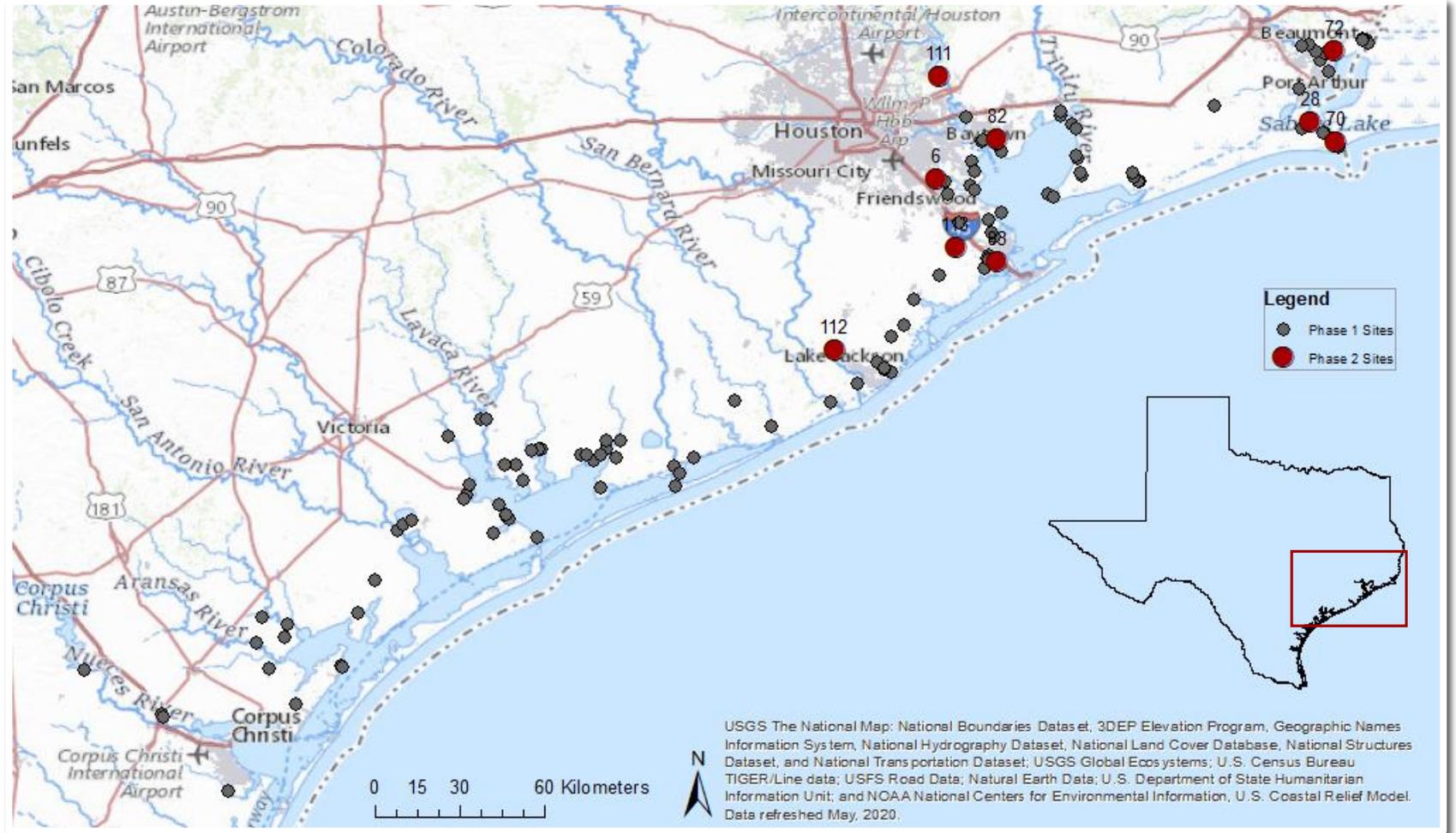
# Objectives

- 1) Distribution and abundance
- 2) Habitat use and associated water quality needs
- 3) Identify temporal recruitment window



# Sampling Events

- Bi-Weekly sampling
- Phase 1 (2018-19)
  - Year-round
  - 127 sites
- Phase 2 (2020)
  - 5-month window
  - 9 sites



# Sampling Events

- Bi-Weekly Sampling
- Phase 1 (2018-19)
  - Year-round
  - 127 sites
- Phase 2 (2020)
  - 5-month window
  - 9 sites
- Site selection
  - Impediment
  - Tidal
  - <5 ft depth



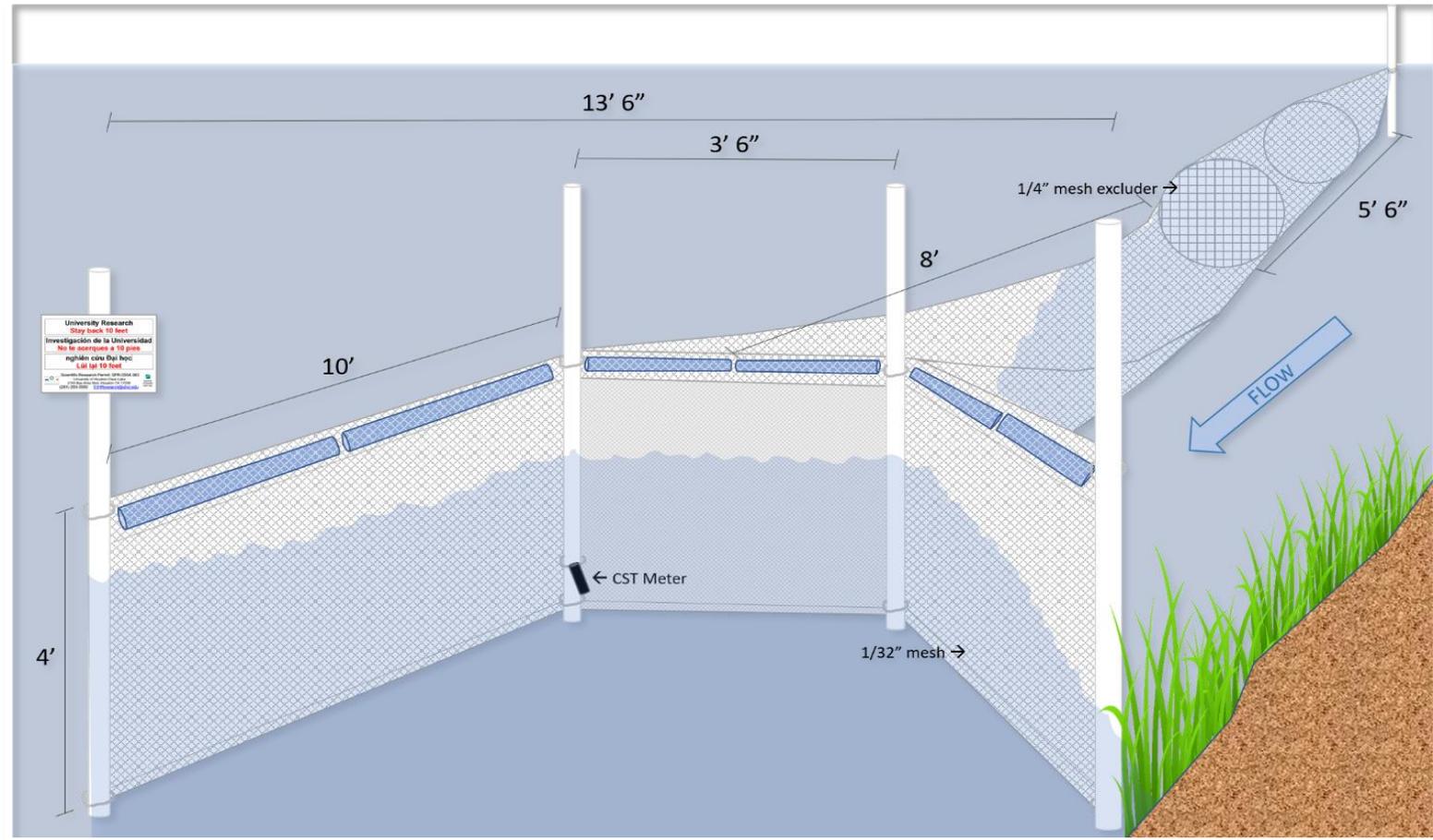
# Sampling Gear

- Fyke Nets

- Both phases
- Downstream orientation
- One wing adjacent to bank
- Soak overnight
- Full tidal cycle

- Water Quality/Habitat

- Temp ( $^{\circ}\text{C}$ )
- DO (mg/L)
- Conductivity ( $\mu\text{S}/\text{cm}$ )
- Salinity (psu)
- pH (standard units)
- Shoreline and in-water habitat

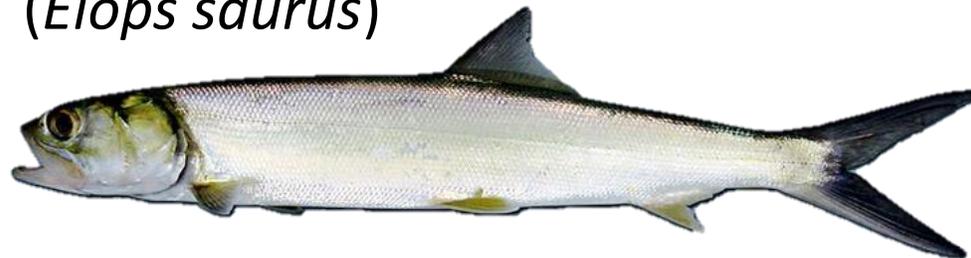


# Data Analysis

- Catch Per Unit Effort (CPUE)
  - # of individuals/hour soak time
- CPUE & presence/absence with water quality and habitat variables.

← Elopomorphs

Ladyfish  
(*Elops saurus*)



Speckled Worm Eel  
(*Myrophis punctatus*)



# Results

Top 10 fish species caught in fyke nets

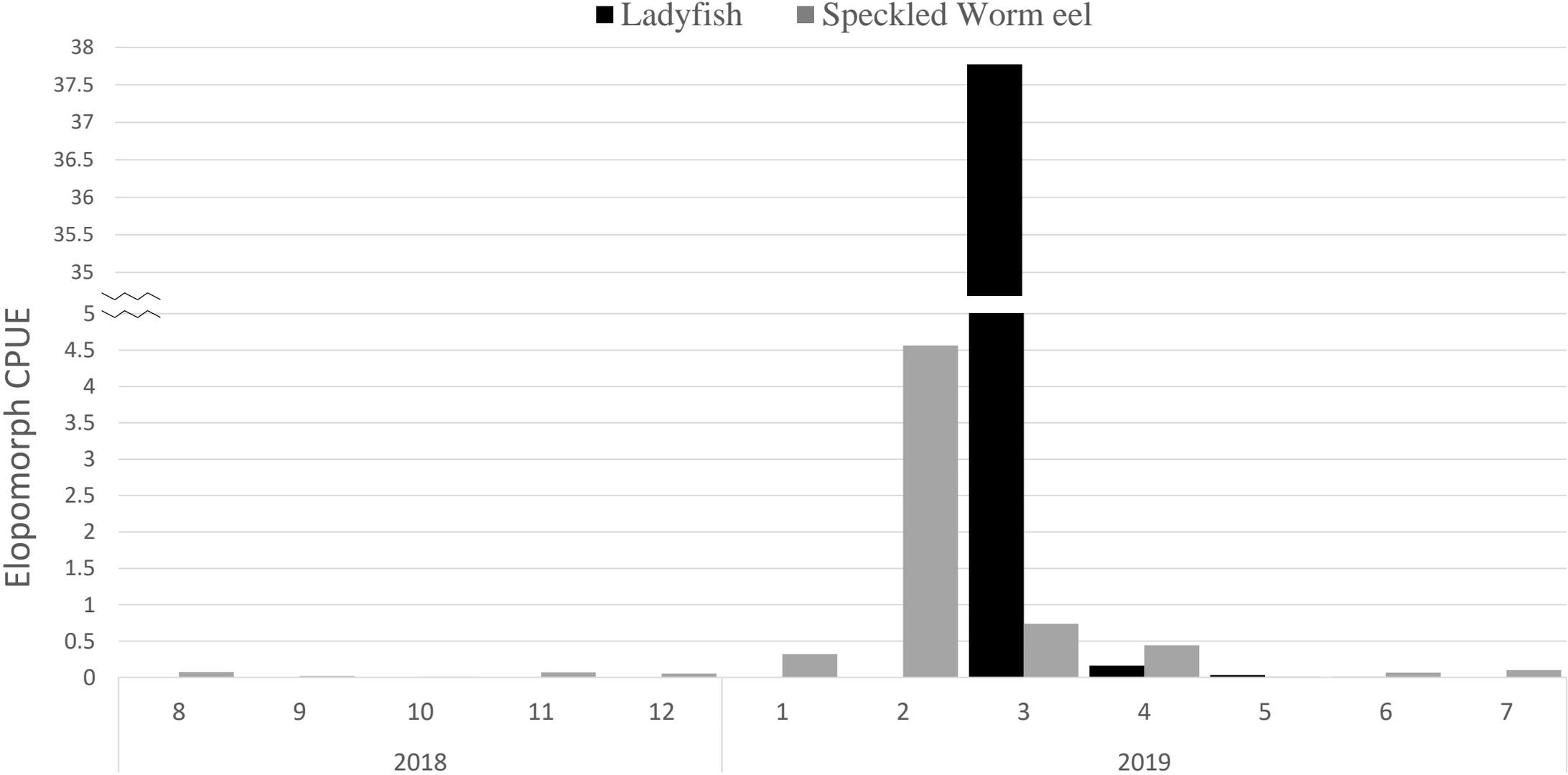
- Fyke Nets
  - 330 net sets
  - 6,852 hours
  - 93 species of nekton
  - 51 families
  - 130,860 fishes
  - CPUE 19.1 fish/hour

Scientific Name	Common Name	Count	Relative Abundance	CPUE
<i>Brevoortia patronus</i>	Gulf Menhaden	39,795	31.52	7.82
<i>Anchoa mitchilli</i>	Bay Anchovy	23,880	18.91	4.69
<i>Elops saurus</i>	<b>Ladyfish</b>	<b>18,115</b>	<b>14.35</b>	<b>3.56</b>
<i>Cyprinodon variegatus</i>	Sheepshead Minnow	12,501	9.90	2.46
<i>Micropogonias undulatus</i>	Atlantic Croaker	6,624	5.25	1.30
<i>Lucania parva</i>	Rainwater Killifish	4,802	3.80	0.94
<i>Gambusia affinis</i>	Western Mosquitofish	2,484	1.97	0.49
<i>Myrophis punctatus</i>	<b>Speckled Worm Eel</b>	<b>2,272</b>	<b>1.80</b>	<b>0.45</b>
<i>Poecilia latipinna</i>	Sailfin Molly	2,096	1.66	0.41
<i>Dorosoma petenense</i>	Threadfin Shad	1,877	1.49	0.37

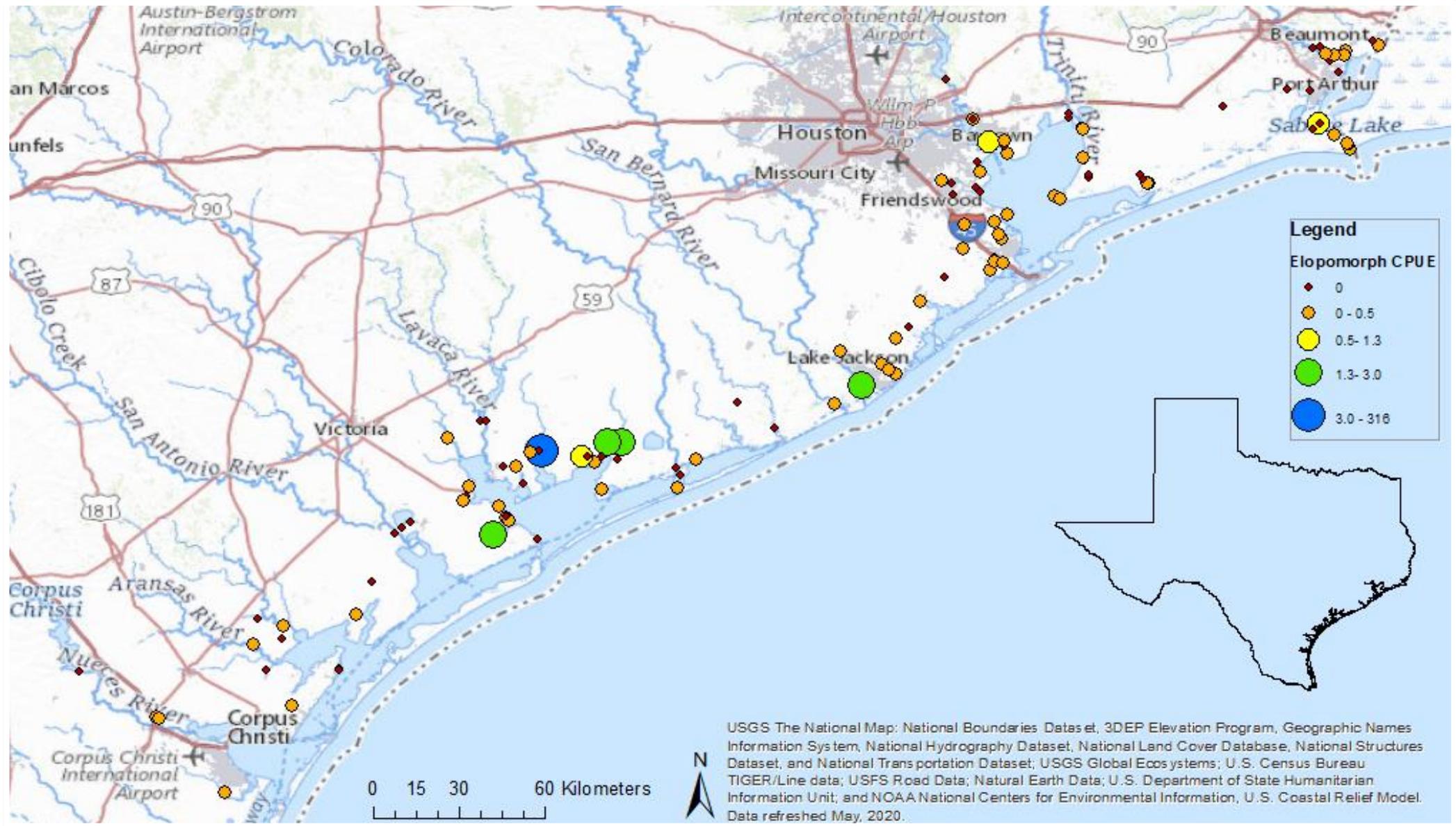
**No American Eel Captured**

# Results

## Elopomorph recruitment window

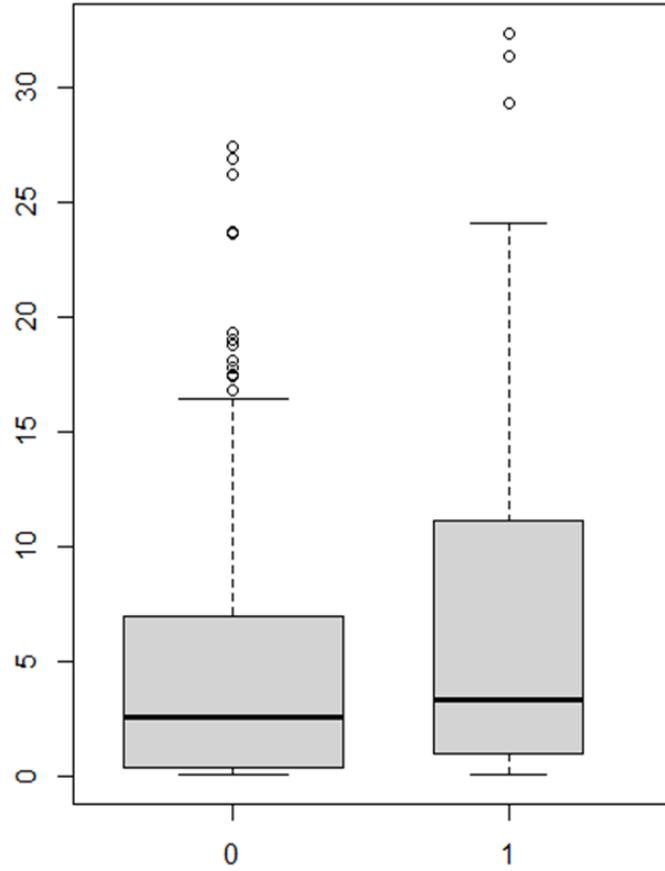


# Results



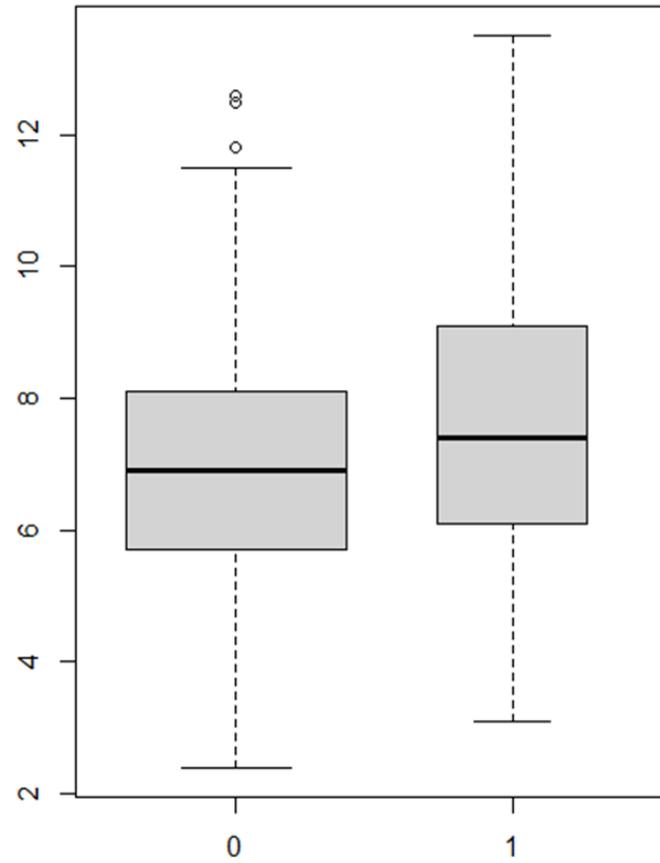
# Results

Salinity (psu)



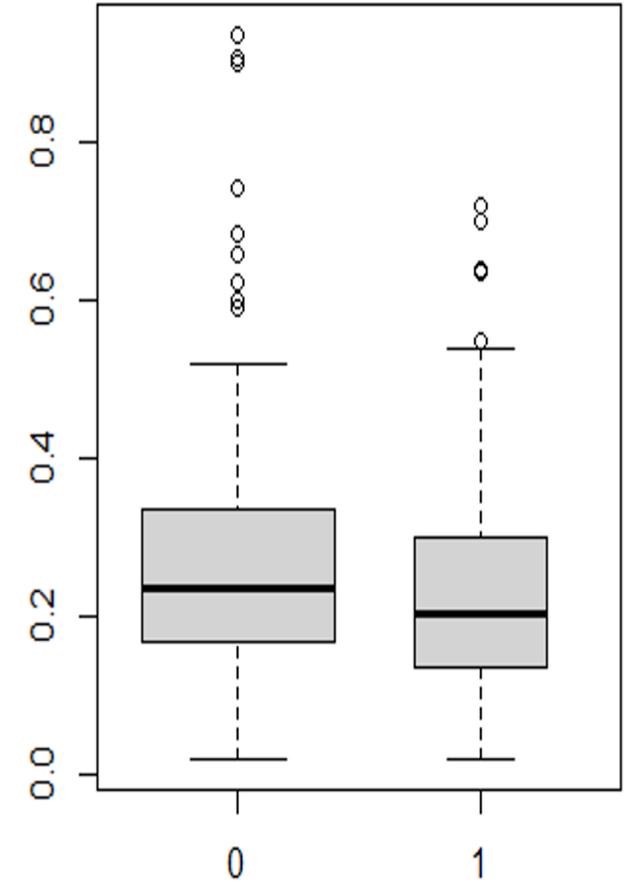
$p = 0.0269$

Dissolved Oxygen (mg/L)



$p = 0.0313$

Secchi Depth (m)



$p = 0.0333$

Elopomorphs: Not Detected (0) / Detected (1)



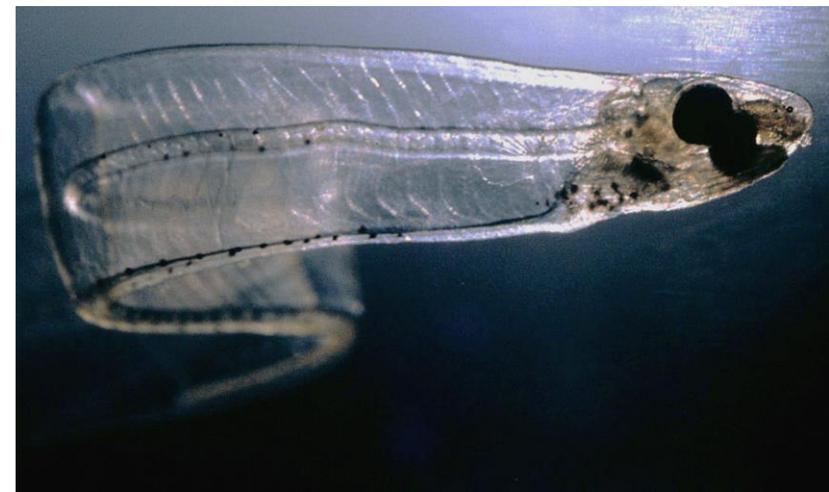
# Discussion



- No glass or elver American Eel were caught
- Fyke nets are effective at catching juvenile elopomorphs
  - Share general gross transport mechanisms (Munk et al. 2010)
  - Recruitment window overlap with American Eel in Florida (Bonvechio, 2016)
  - However, Speckled Worm Eels and Ladyfish are true estuarine/marine species.
- If glass or elver eels were present, we presume that we would have been able to detect their ingressions.

# Future Work

- 2022-23
  - Eel Ramps
  - eDNA
  - Plankton



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# Questions

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