



# SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES

## Aquatic Saltwater Resources of the Pee Dee Basin

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Marine Resources Research Institute  
Inshore Fisheries Research Section

*Live Life Outdoors*



# SCDNR Marine Resources Research Institute

**Mission:** Conduct research and monitoring programs to assess the condition of our coastal resources and provide data required to address policy and management issues related to those resources

# Presentation Roadmap

## Estuarine Finfish Research Section

### Species Monitoring (Inshore Fisheries)

Trammel Net Survey

Electrofishing Survey

Adult Red Drum & Shark Longline Survey

Cooperative Atlantic States Shark Pupping And Nursery (COASTSPAN) Survey

Estuarine Trawl Survey

Stock Enhancement (Mariculture) – Impacts of Tropical Systems

## Crustacean & Mollusk Research Section

Oyster Demographics Project

## Environmental Research Section

South Carolina Estuarine and Coastal Assessment Program (SCECAP)





# SCDNR Inshore Fisheries Research Section

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# Two Primary Species Interest Groups

## Estuarine Finfish



Sheepshead

## Small and Large Coastal Sharks



Atlantic Sharpnose



Sand Tiger Shark



Scalloped/Carolina Hammerhead



Bull Shark



Tiger Shark

# Trammel Net Survey

## Sampling Areas

Lower estuary, salt-marsh edge habitats

Five target estuarine systems

Port Royal Sound, ACE Basin, Charleston Harbor, Cape Romain, and Winyah Bay

## Target Species

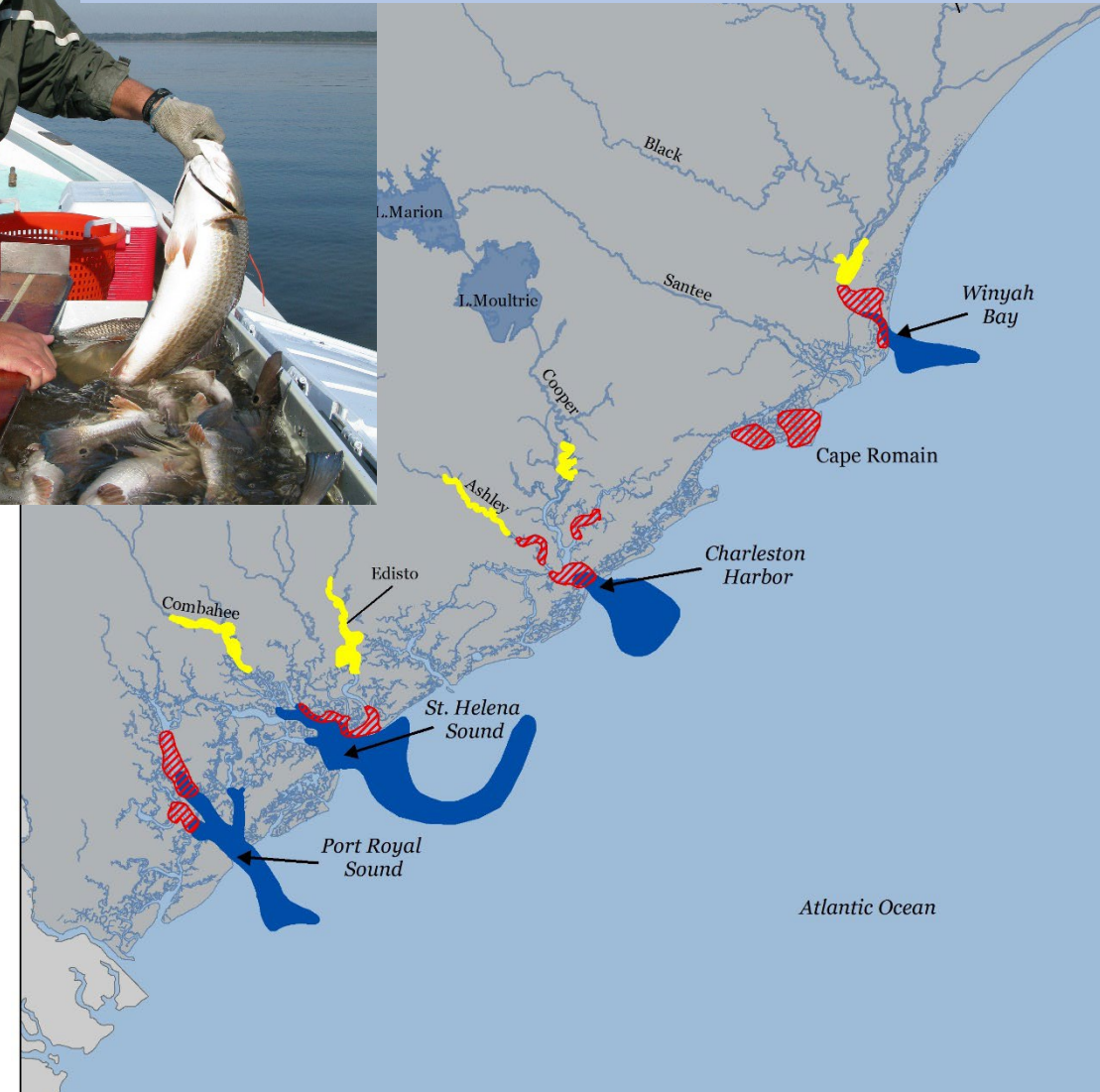
Red Drum, Spotted Seatrout, Spot, Southern Flounder, Atlantic Croaker, & Black Drum

>130 species encountered

>460,000 organisms encountered



Measuring, tagging and releasing red drum caught by the trammel net survey in Port Royal Sound.



## Trammel Net Survey

Monthly sampling as early as 1991

10-14 sites/sampling period/stratum

# Electrofishing Survey

## Sampling Areas

Brackish (salinity < 8 ppt) upper estuarine creeks and riverbanks

Five target rivers

Combahee, Edisto, Ashley, Cooper and Sampit/Waccamaw/Winyah Bay Rivers

## Target Species

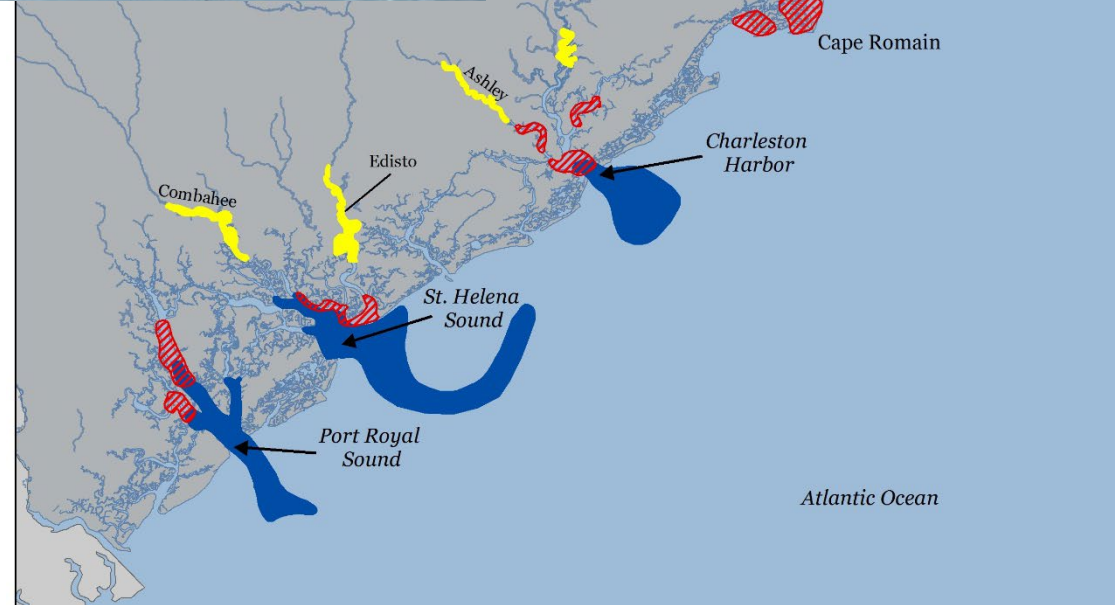
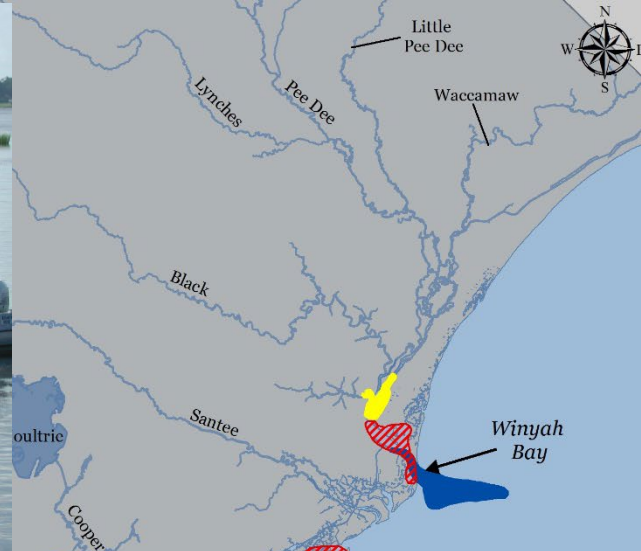
Red Drum, Southern Flounder, Spot, American eel, Atlantic Croaker, and Spotted Seatrout

>120 species encountered

>450,000 organisms encountered



Electrofishing in the Ashley River



## Electrofishing

Monthly sampling since May 2001

5-6 sites/sampling day/stratum

# Adult Red Drum & Shark Longline Survey

## Sampling Gear

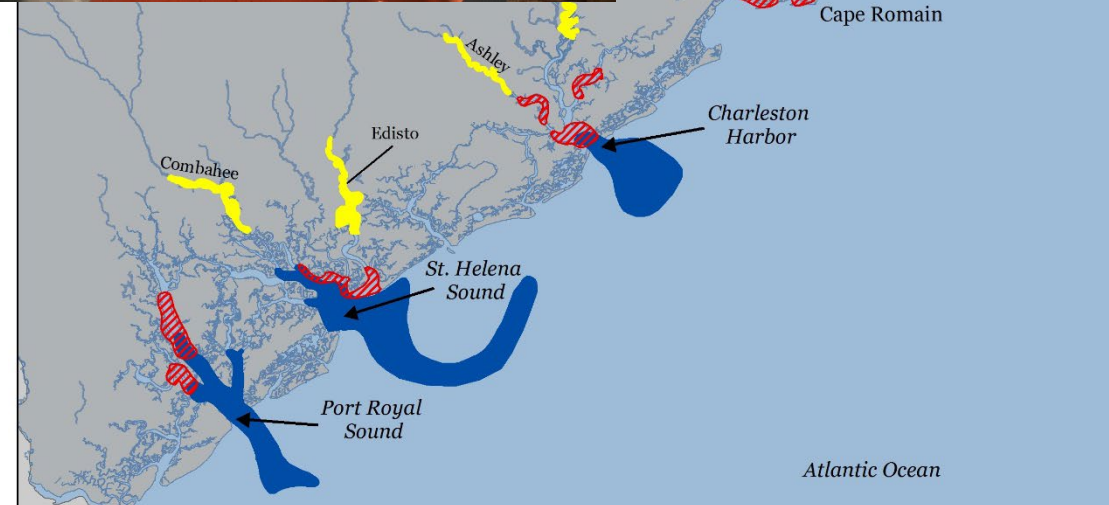
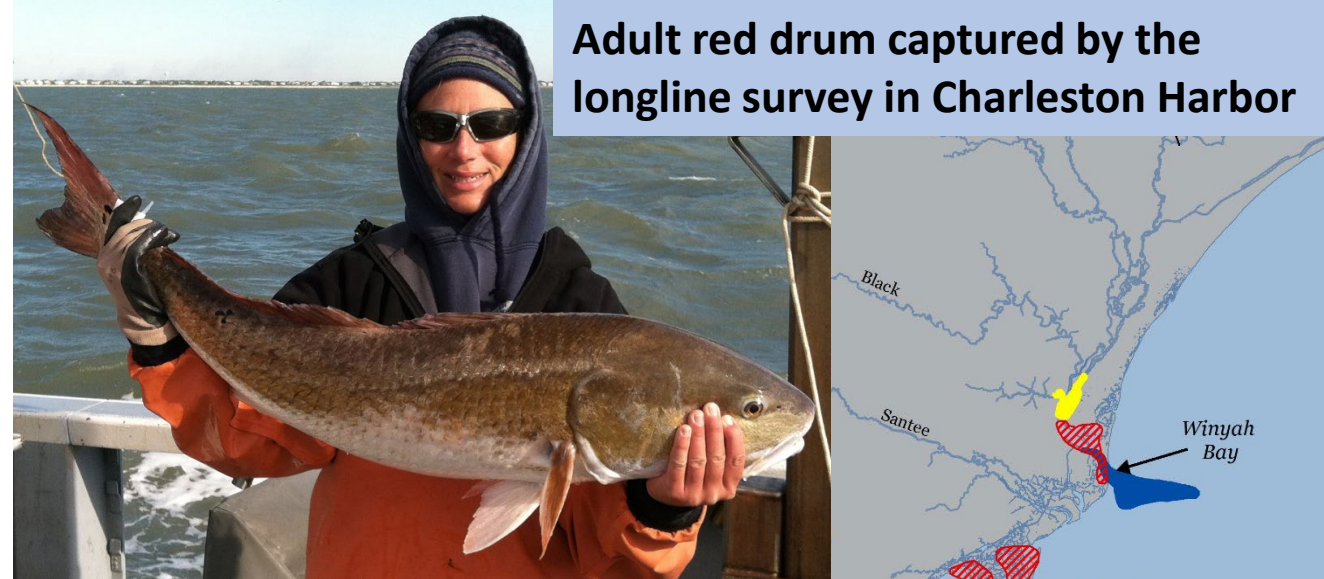
1/3 mile monofilament longlines  
40 hooks set<sup>-1</sup>

## Habitat

Channel at the entrances of estuaries and adjacent near-shore waters  
Port Royal Sound, St. Helena Sound, Charleston Harbor, and Winyah Bay

## Target Species

Adult Red Drum and coastal sharks  
> 50 species encountered  
> 1,500 animals caught year<sup>-1</sup>



## Adult Red Drum & Shark Longline Survey

Seasonal (late-summer/fall) since 2007

~360 sets/year



# Processing of Captured Fish

Fish brought on board and when possible placed in live well

- All fish identified and counted

- Most fish measured to nearest mm

Some fish tagged

- Red drum, black drum, sheepshead, southern flounder, most shark species

Water conditions recorded

- Tidal stage, water temp., salinity, dissolved oxygen

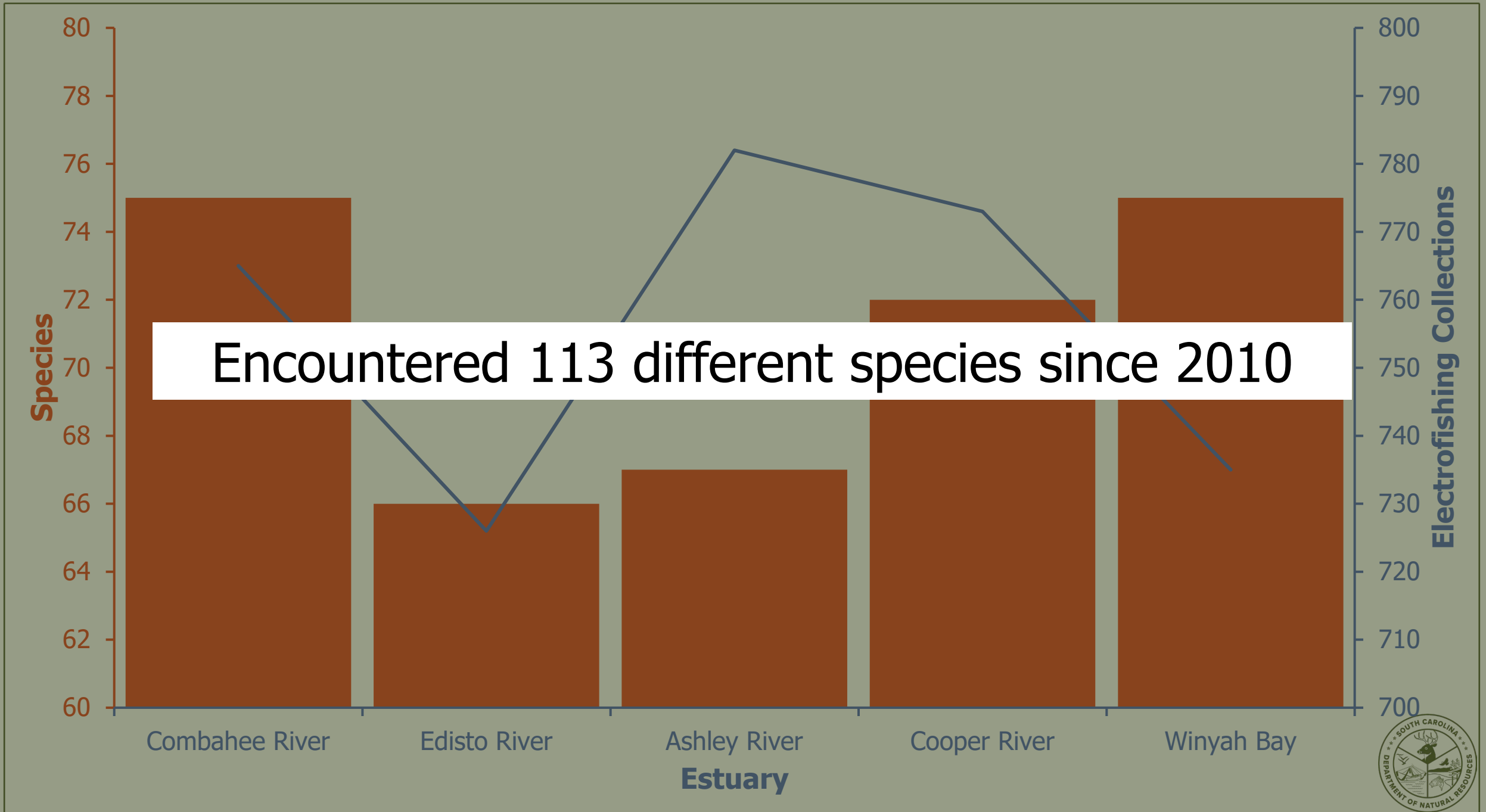


# Some Example Data Products

Trammel Net & Electrofishing Surveys

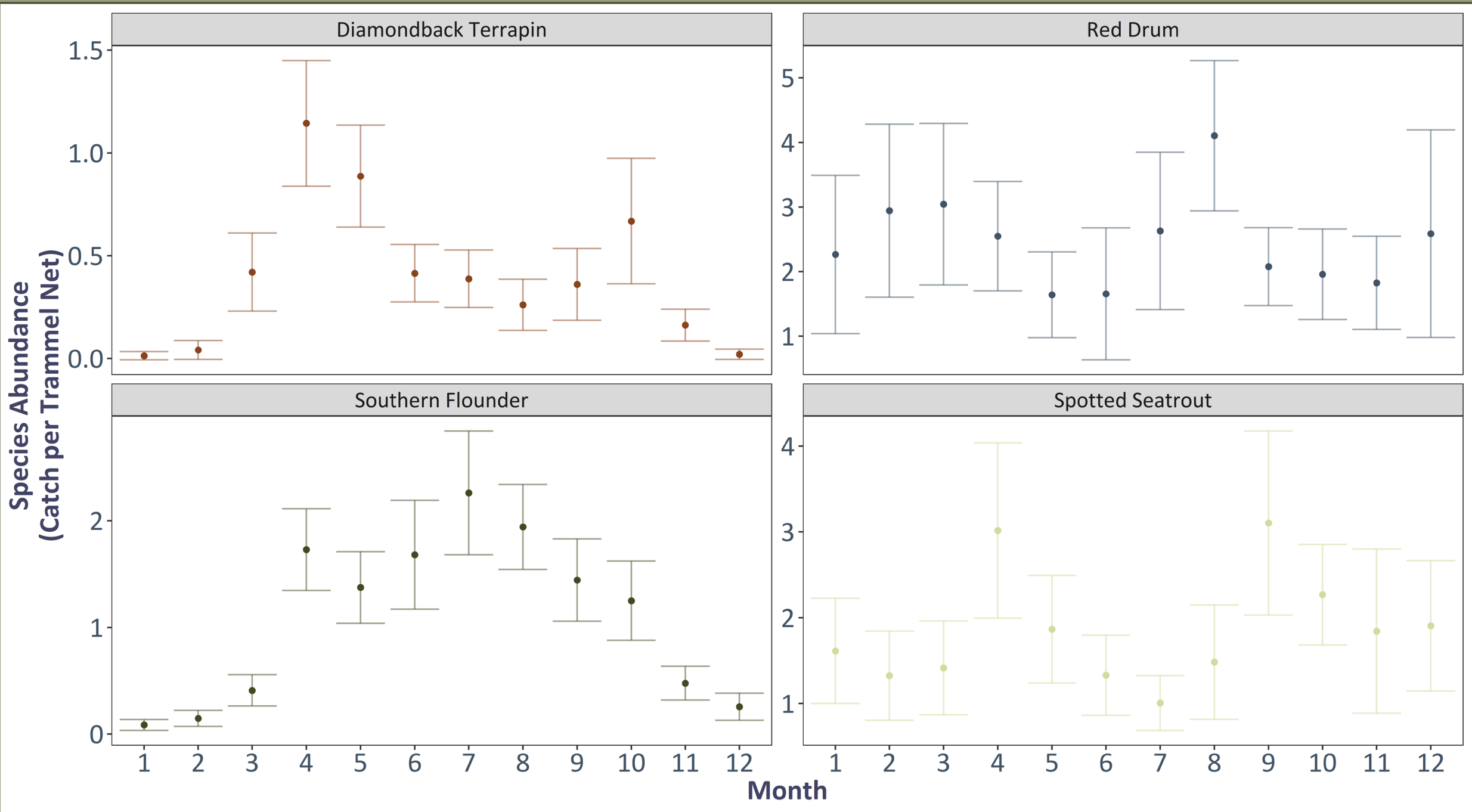




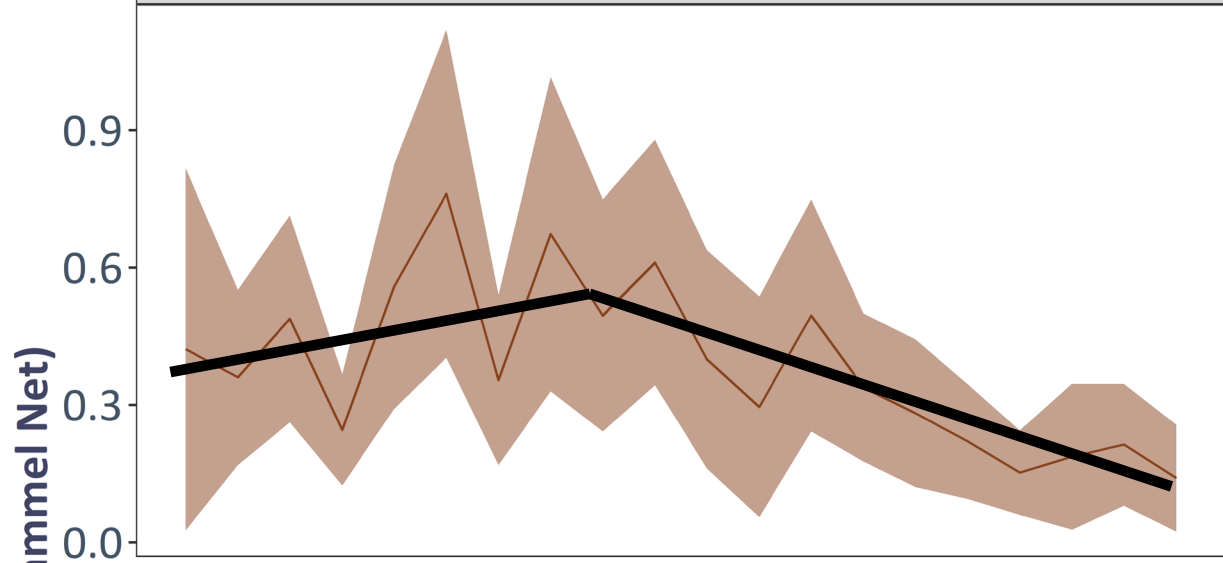


Encountered 113 different species since 2010

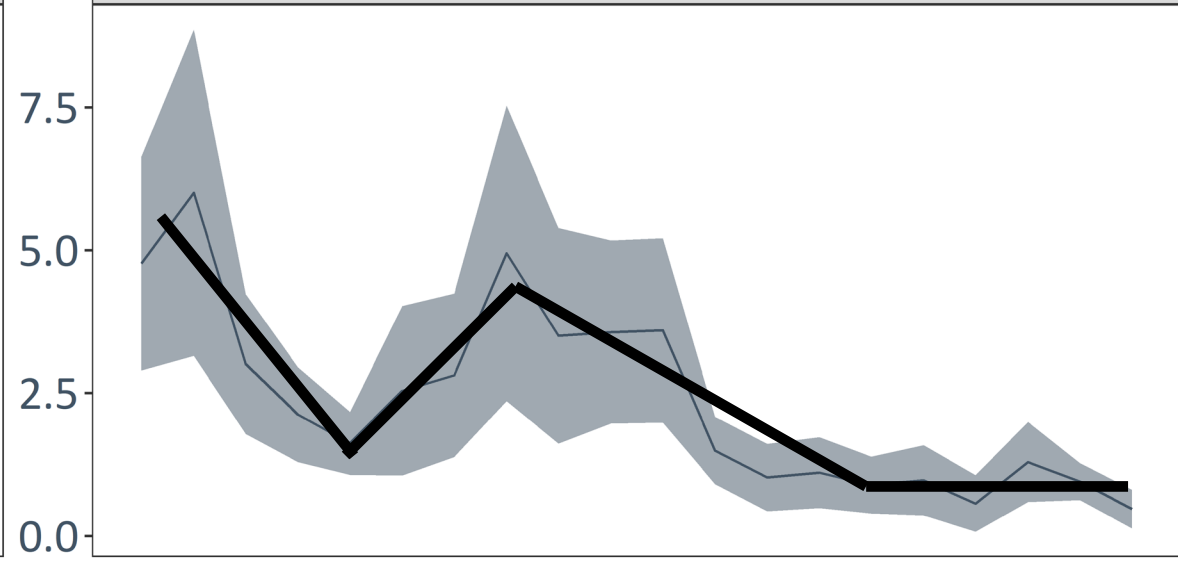




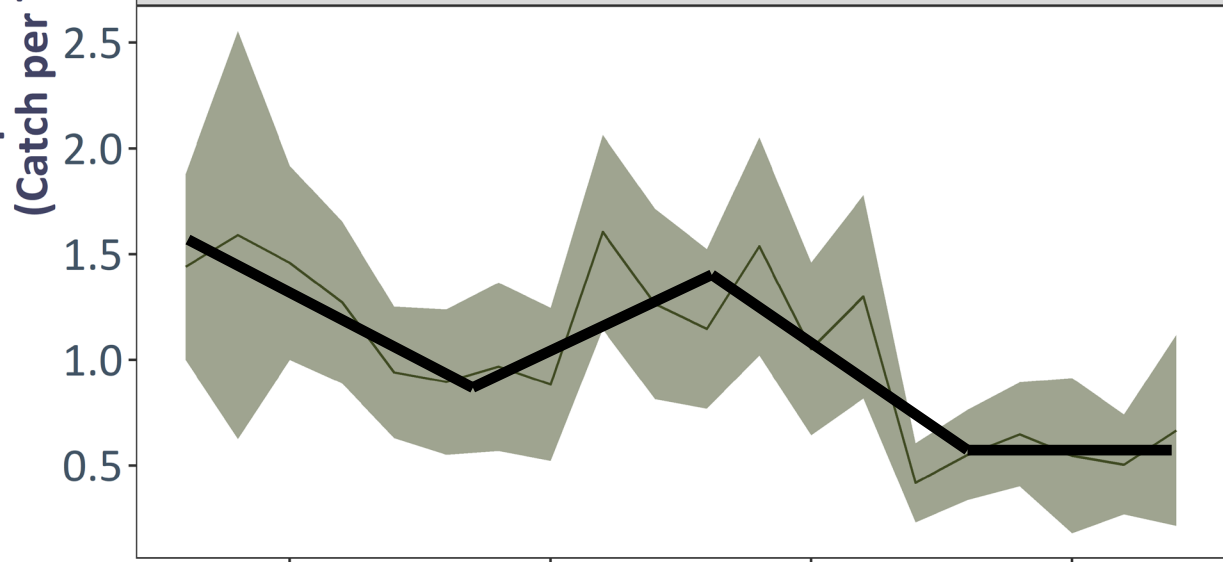
Diamondback Terrapin



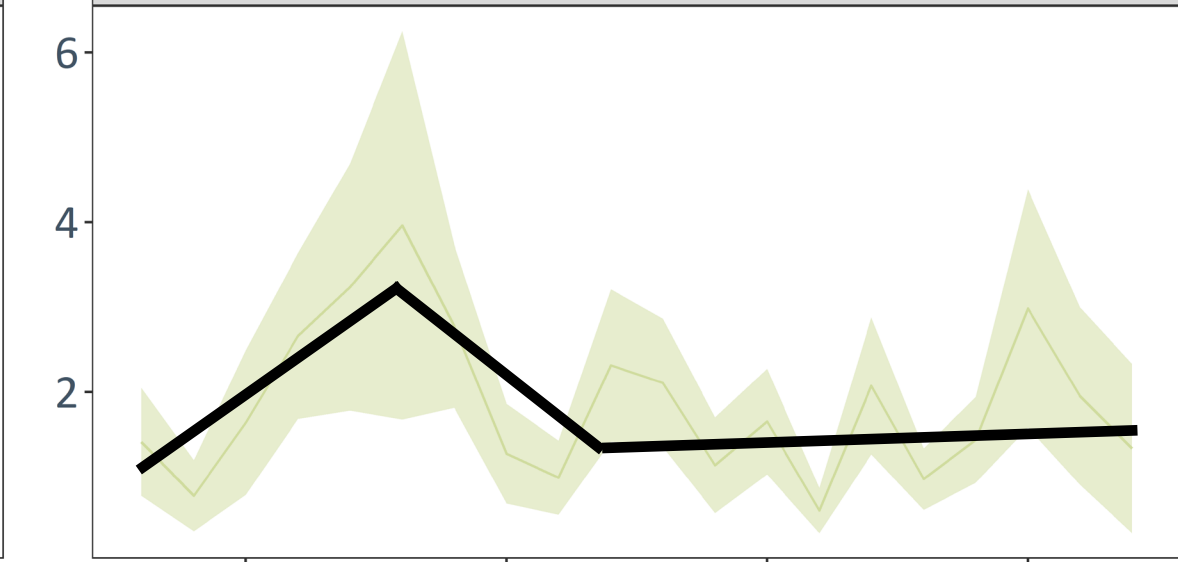
Red Drum



Southern Flounder

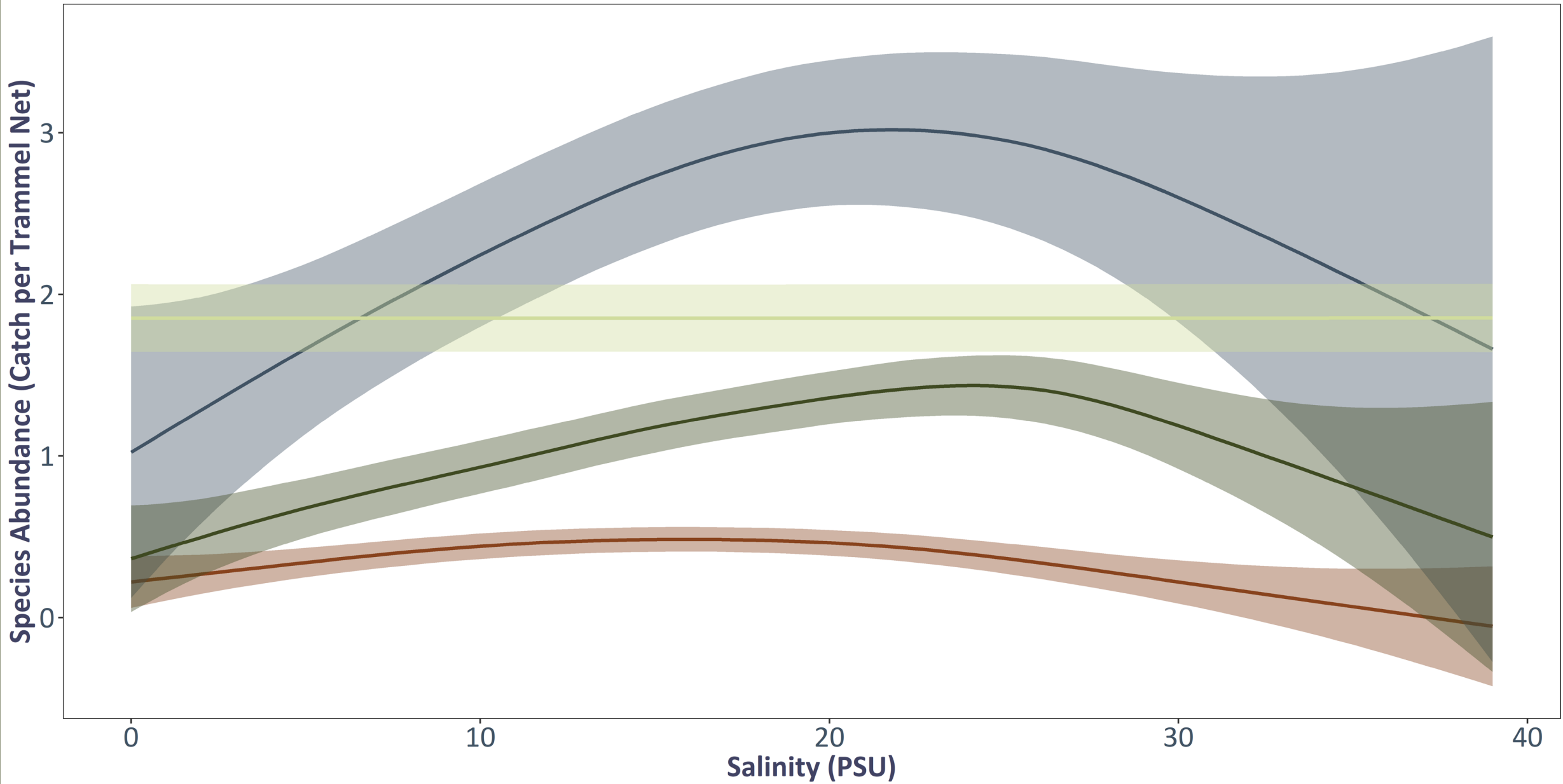


Spotted Seatrout



Year

Species Diamondback Terrapin Red Drum Southern Flounder Spotted Seatrout



# Abundance of Data

Inshore Fisheries has an abundance of data useful for looking at relationship between estuarine communities and environmental variables

Just provided a snapshot of the type of questions that could be investigated here, using some examples from the trammel net and electrofishing surveys

Not fully investigated the relationship between survey abundance and environmental conditions to date

If there are specific questions, we are happy to investigate further





# Estuarine Finfish Research Section

Tropical System Affects on Hatchery Contribution, Wild Recruitment, and Distribution of Juvenile Red Drum



# Marine Stock Enhancement Research

Began in SC in 1988 with Red  
Drum to investigate alternatives  
to harvest reductions

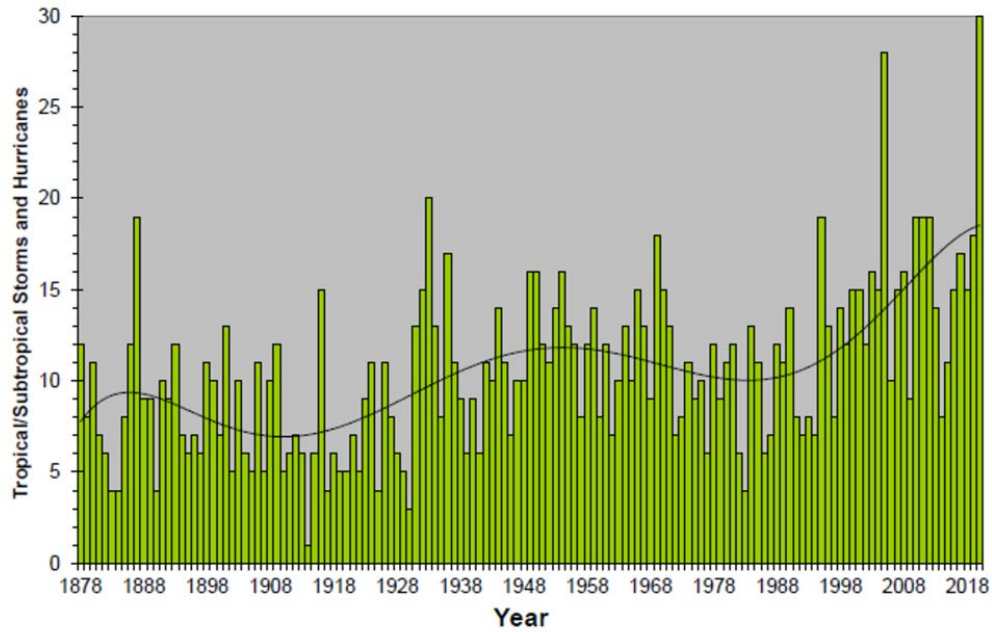
Opportunity to use cultured  
animals to answer questions  
about wild populations

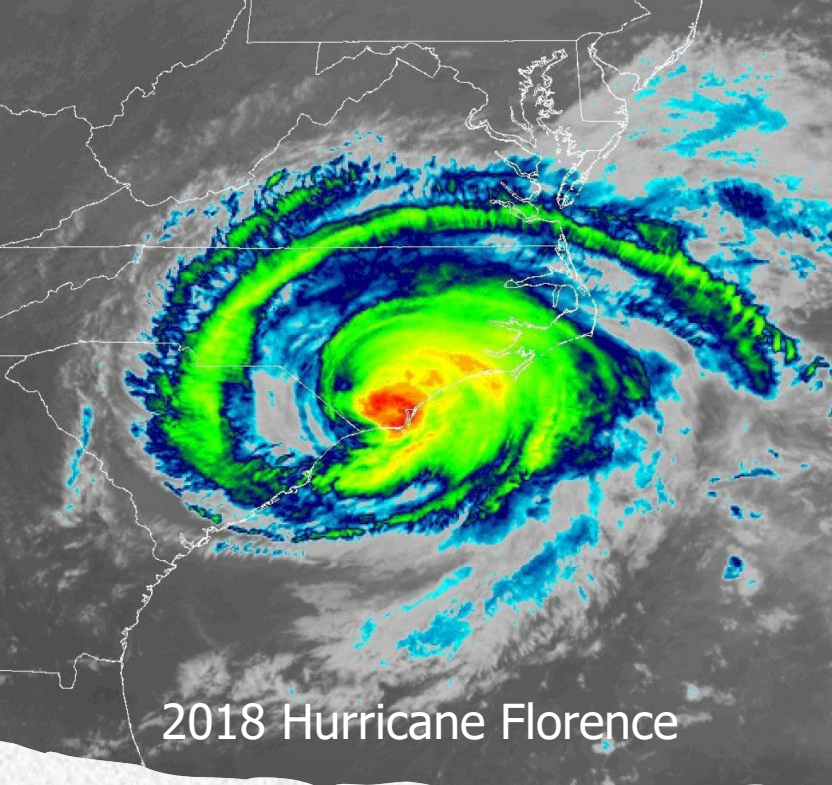
Hatchery fish identified from wild  
fish using genetic markers



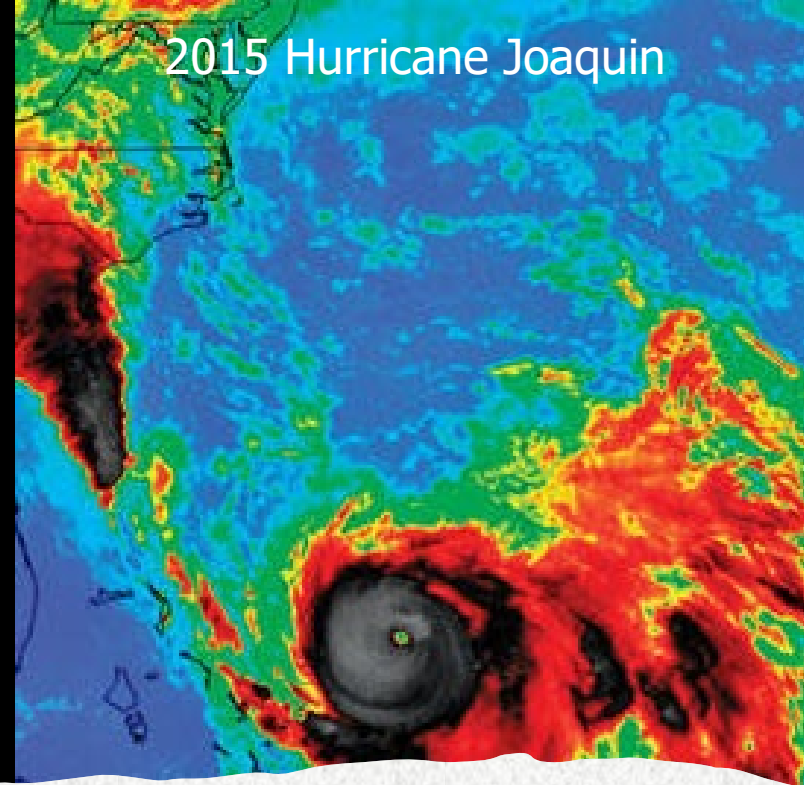
# Climate Change and Increased Tropical Activity in the Western Atlantic

**Tropical/Subtropical Storms and Hurricanes**  
1878 to 2020

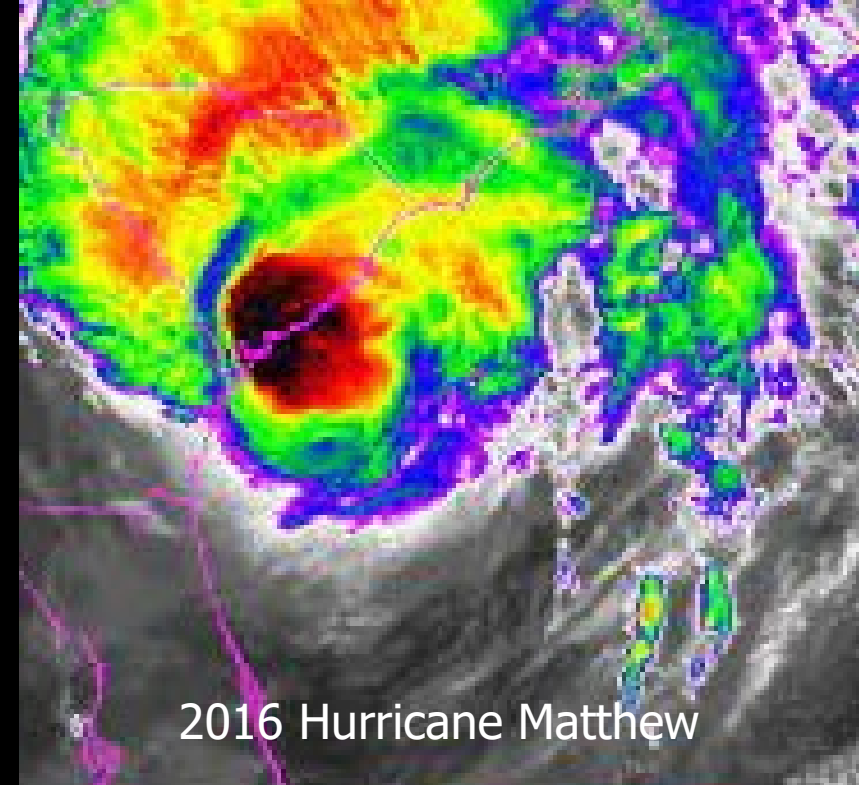




2018 Hurricane Florence

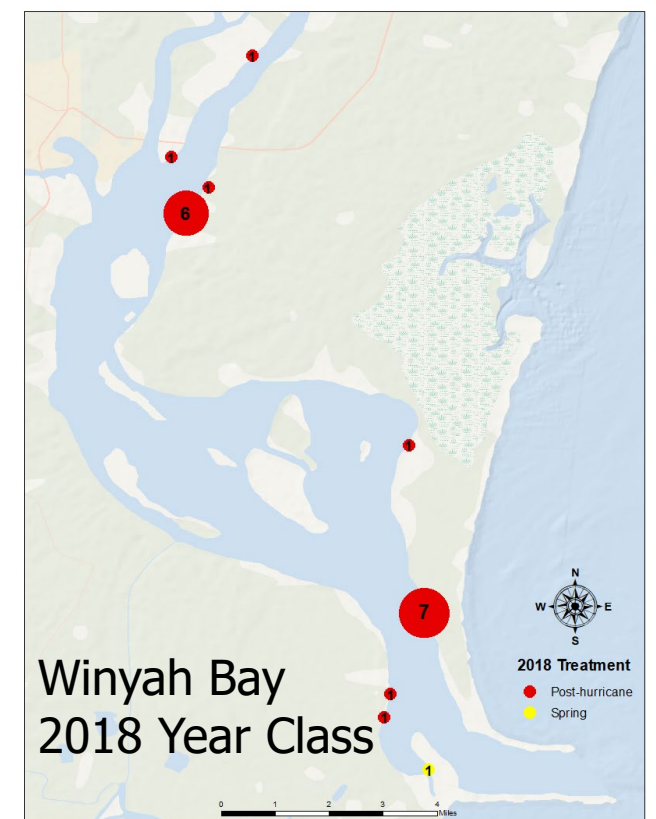
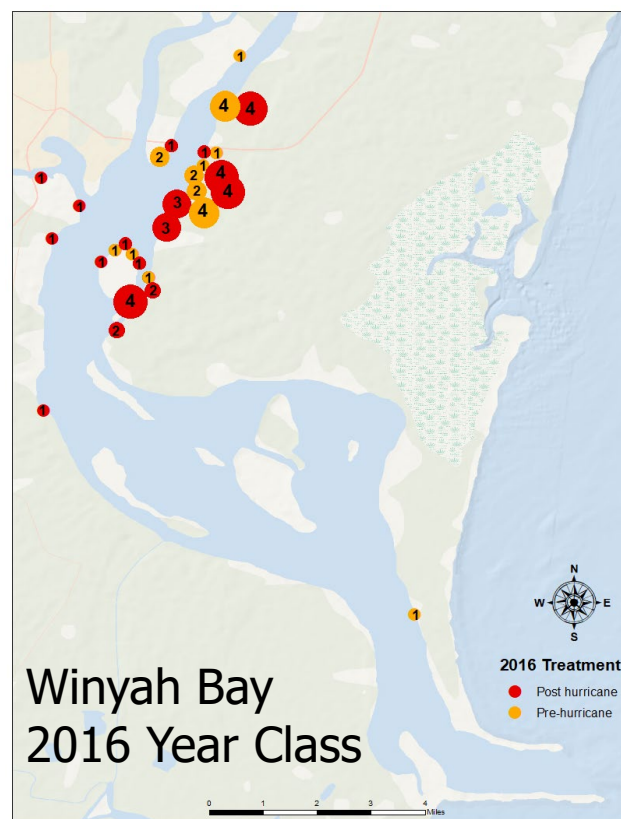
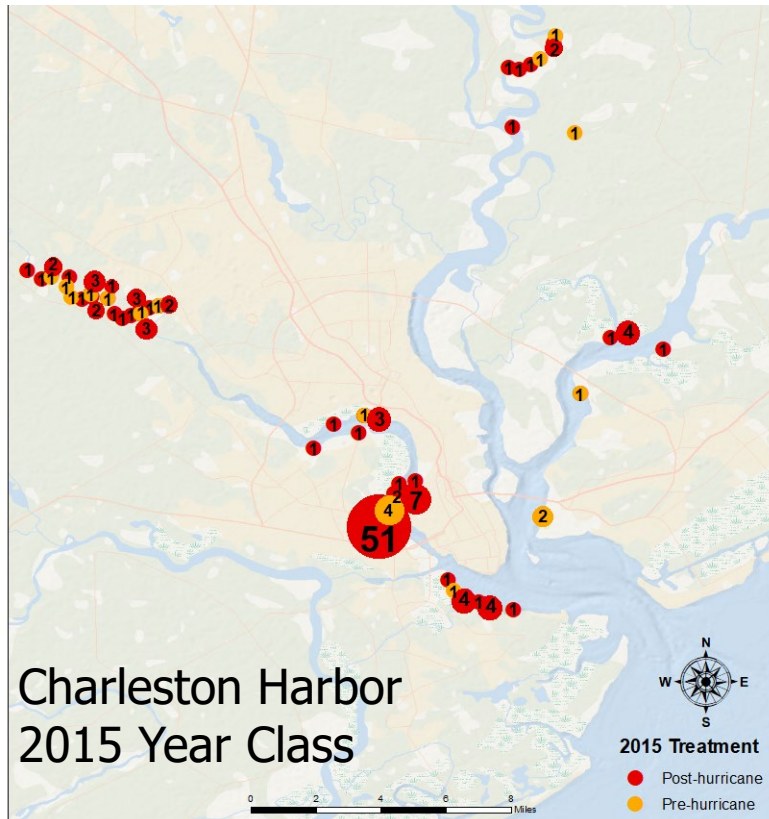


2015 Hurricane Joaquin



2016 Hurricane Matthew

Tropical Systems  
Evaluated



## Storms Impact Recruitment Success

Post-hurricane stocking performed better than pre-hurricane stocking  
 Poor survival of natural recruits?

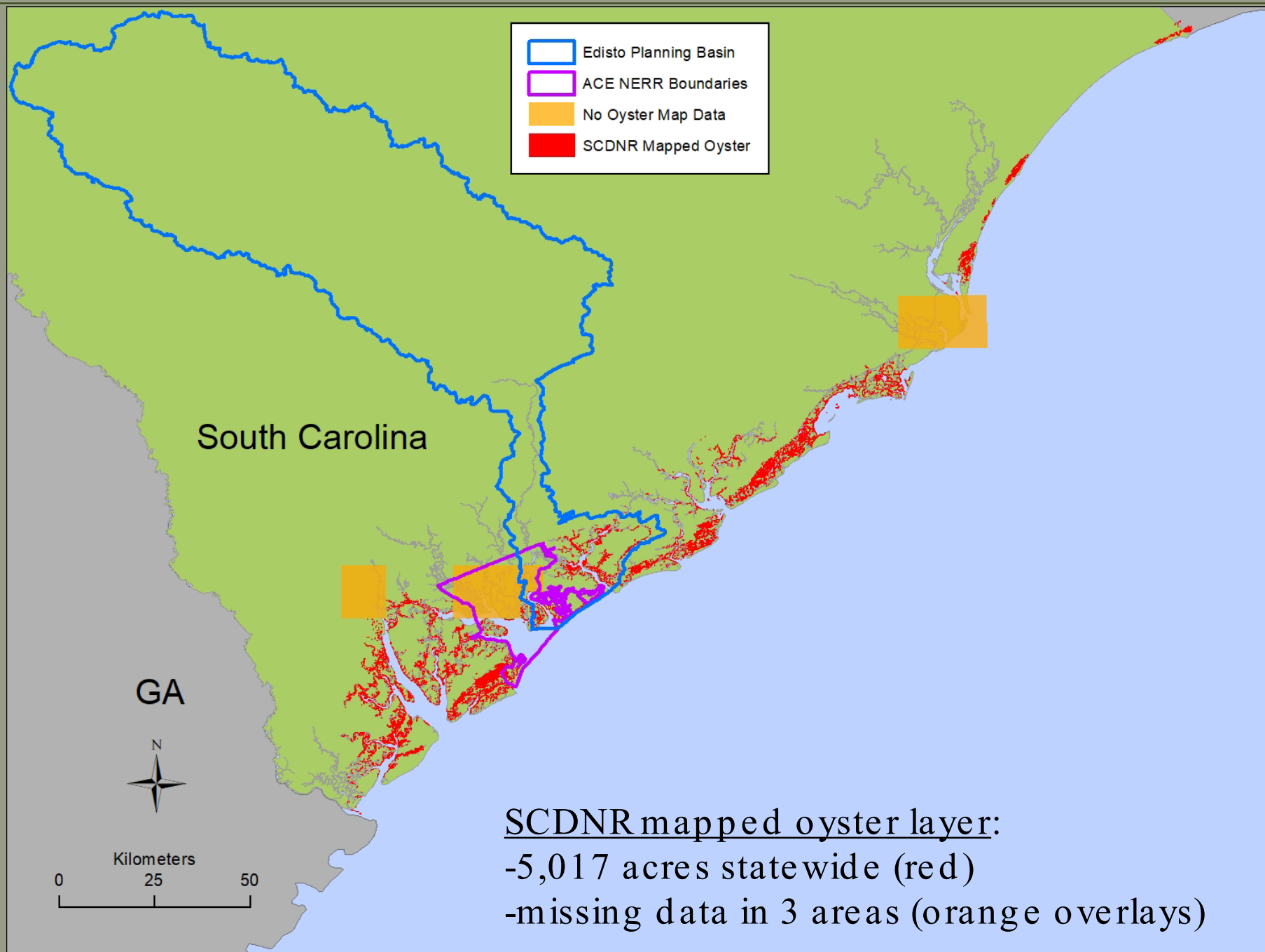
Increased tropical activity, especially during the peak reproductive time for Red Drum could be a major player in larval recruitment

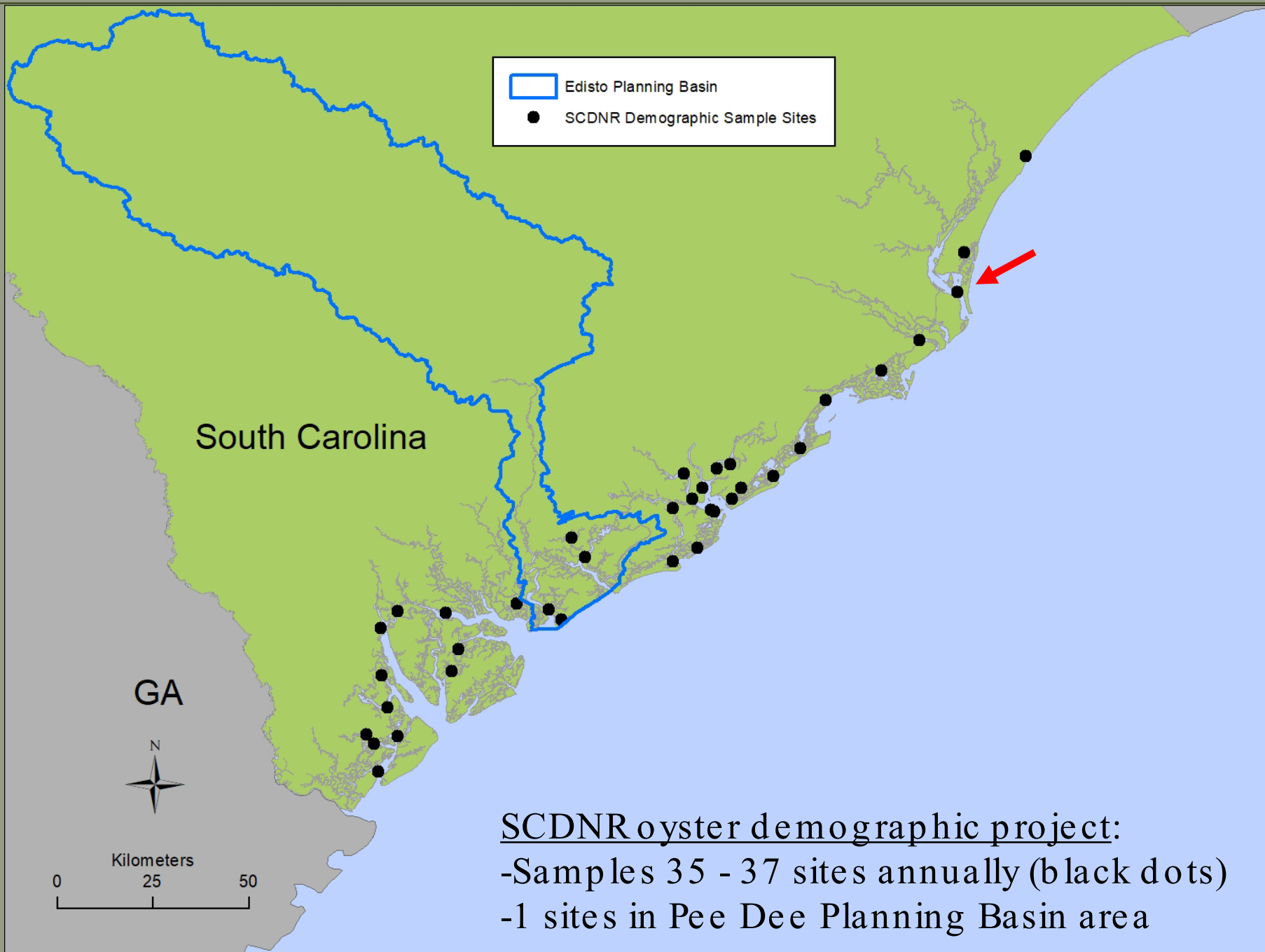
Salinity change, anoxic conditions, reduction in food availability, physically being washed out of system

# Crustacean & Mollusk Research Section

Oyster Demographic Project









# Survey Methods

Collect representative oysters

Measure salinity, temperature, and dissolved oxygen

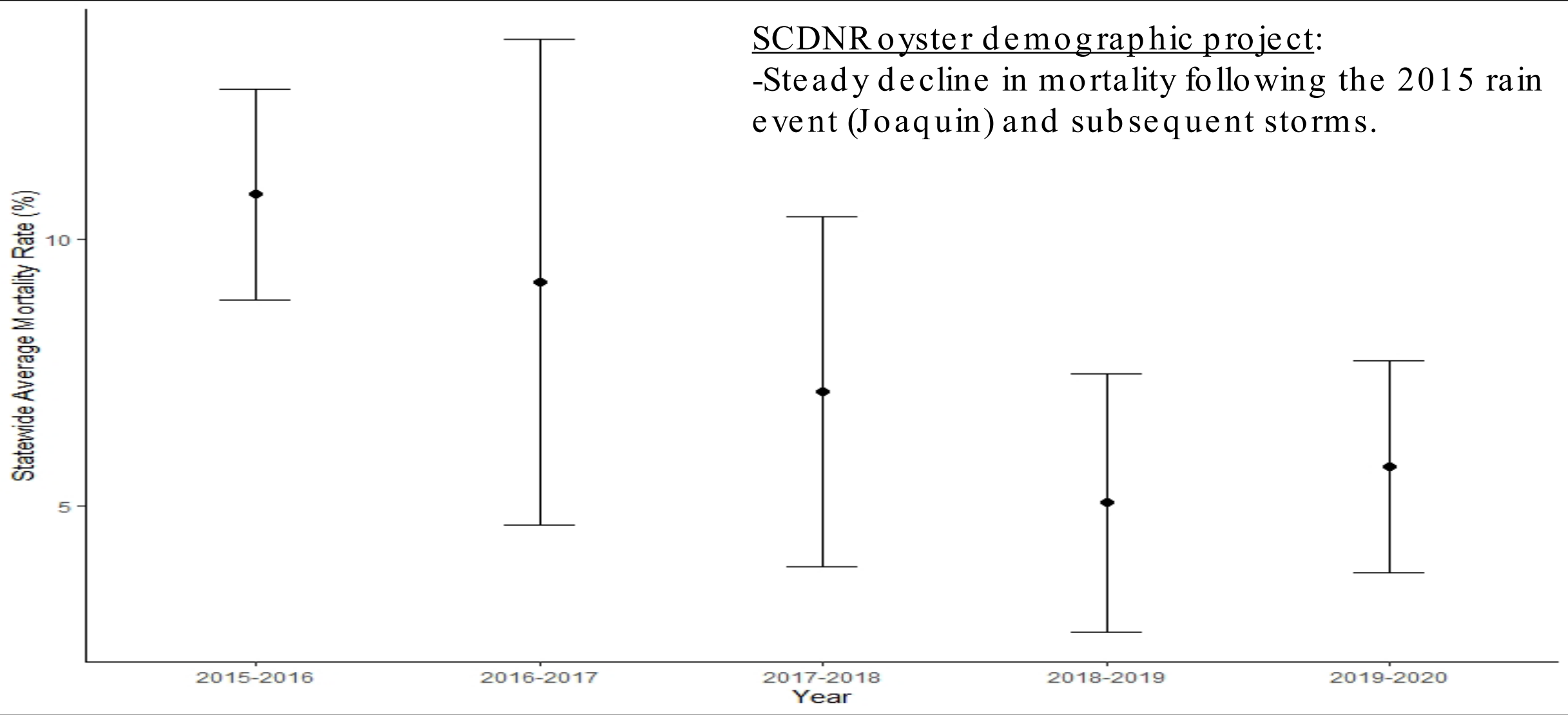
Assess oysters as living or "boxes"

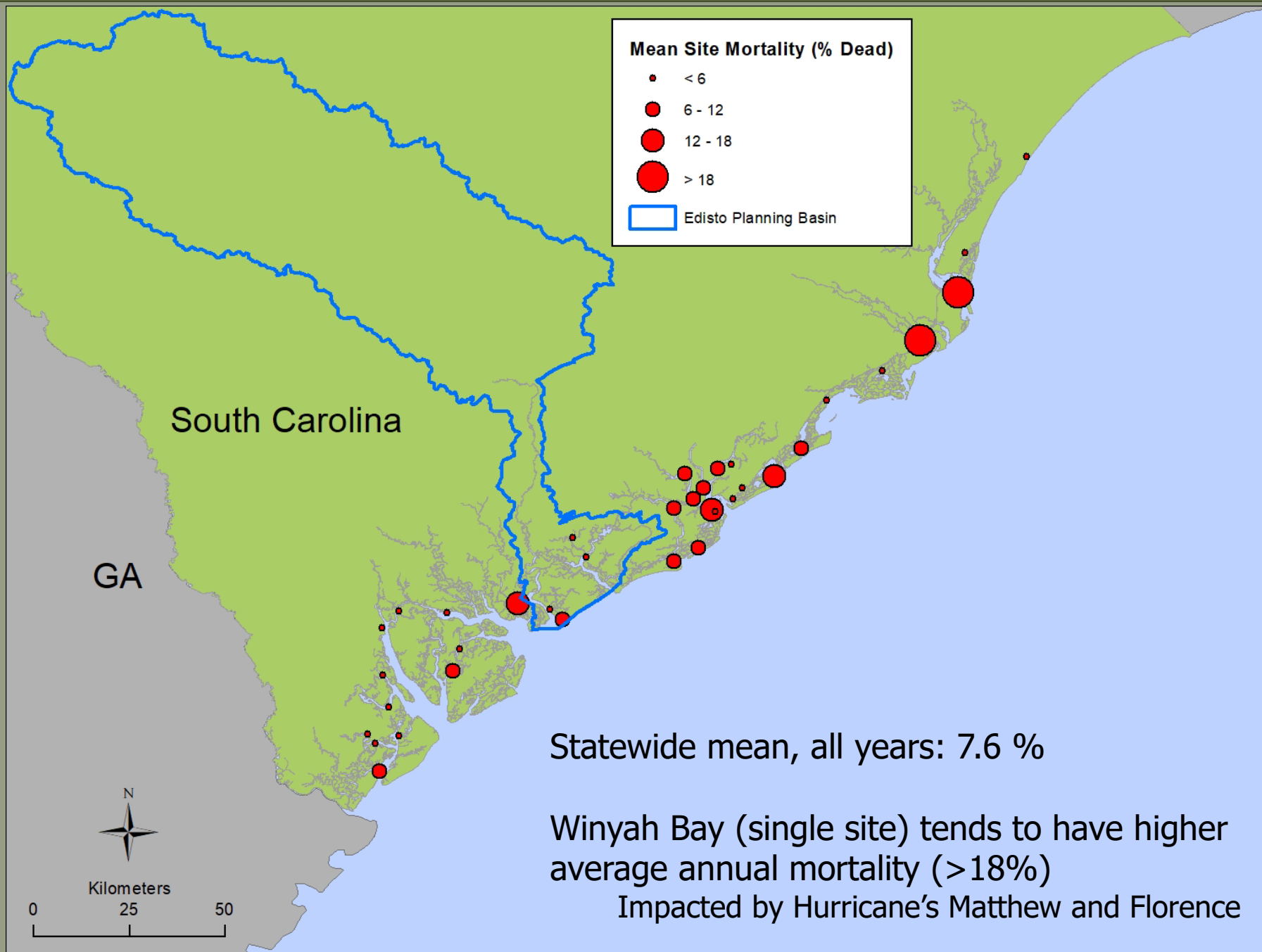
Measure all live oysters and boxes



# Statewide Average Natural Mortality

SCDNR oyster demographic project:  
-Steady decline in mortality following the 2015 rain event (Joaquin) and subsequent storms.





# Environmental Research Section

South Carolina Estuarine and Coastal Assessment Program (SCECAP)



# SCECAP Winyah Bay Data

## Sampling Frame

Time frame

1999-2022

Summer (July and August) sampling

Sites

RT = tidal creek sites

RO = open water sites

## Data Collected

Water Quality Data

Basic water quality

Bacteria

Nutrients

Sediment Data

Sediment quality

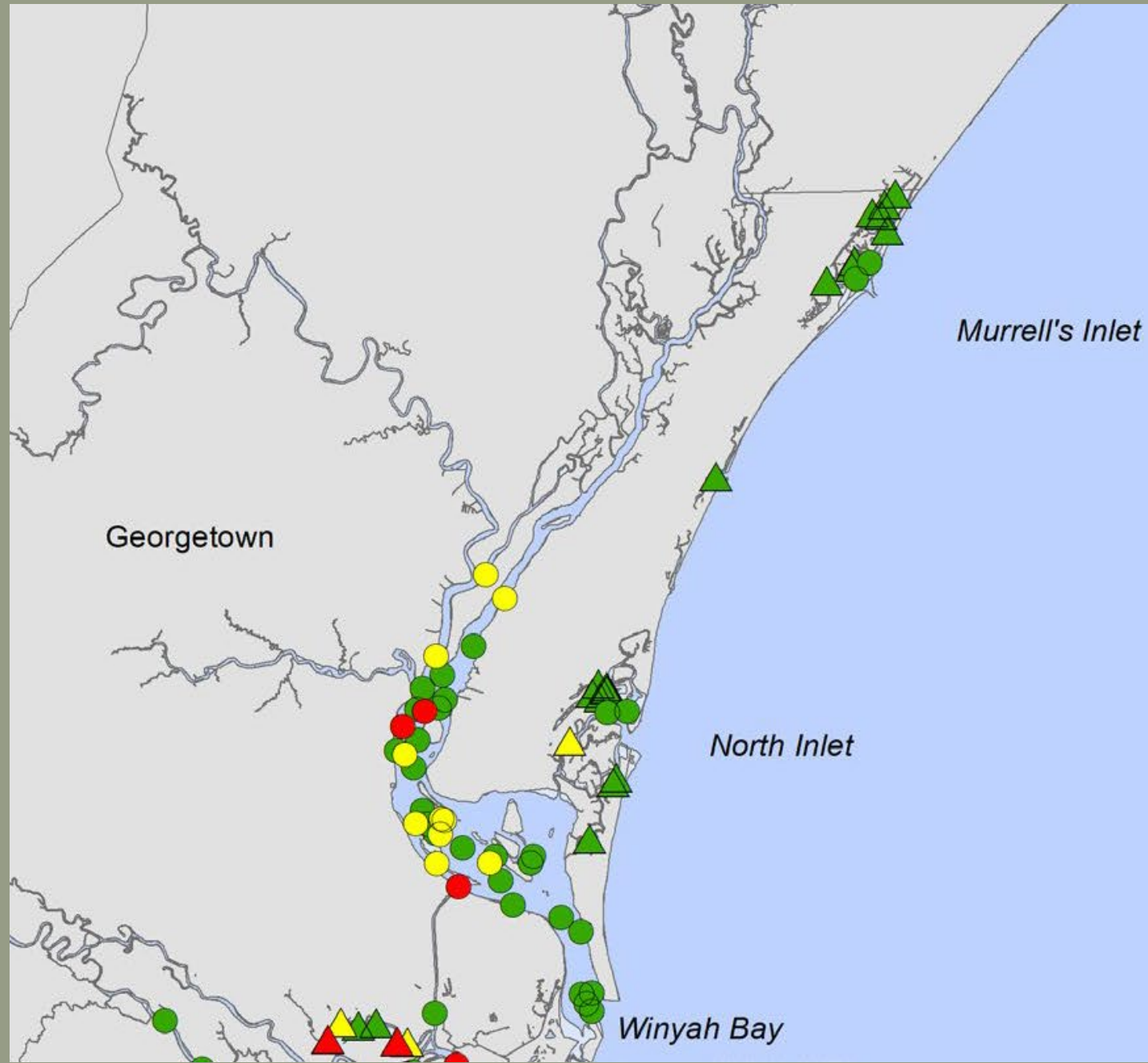
Biological Data

Benthic infauna

Nekton

- NIWB NERR collects a variety of water quality and marsh data (not shown here)
  - Late 1990s-present
  - 5 continuous water quality stations throughout estuary
  - Monthly nutrient information





Murrell's Inlet

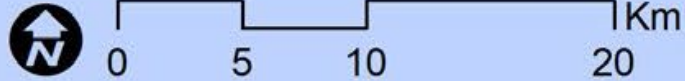
Georgetown

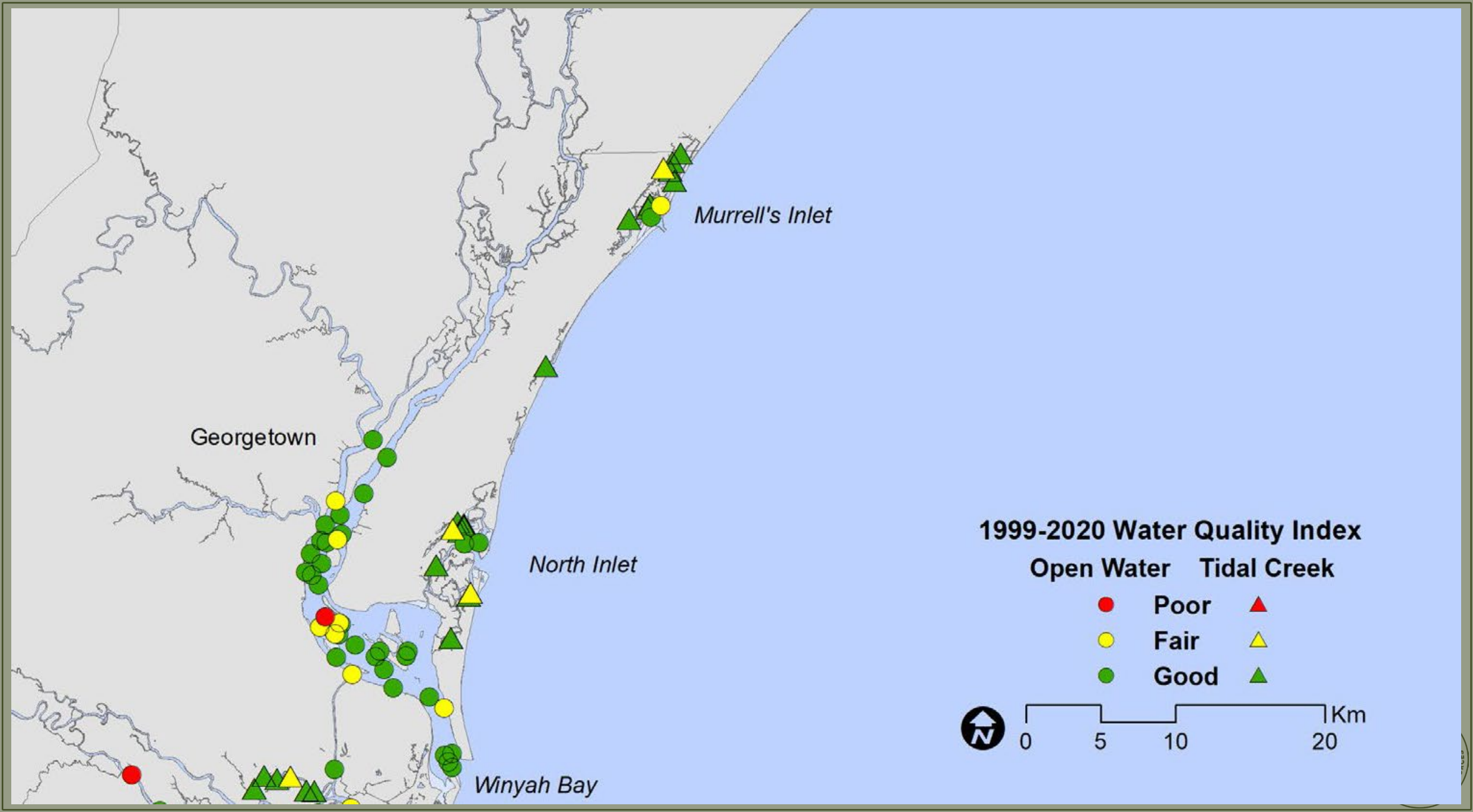
North Inlet

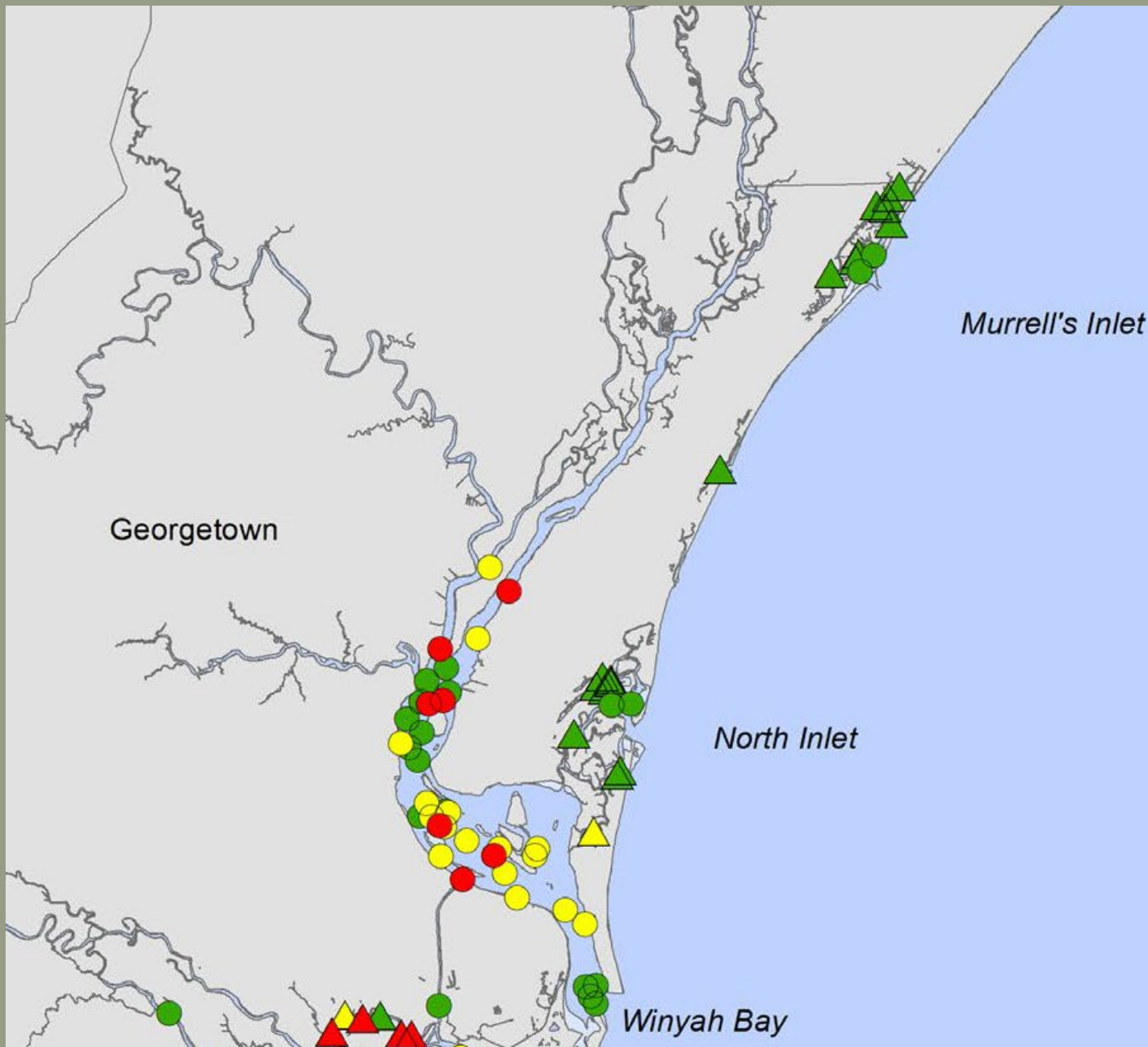
Winyah Bay

**1999-2020 Sediment Quality Score**  
Open Water Tidal Creek

- Poor ▲
- Fair ▲
- Good ▲







Murrell's Inlet

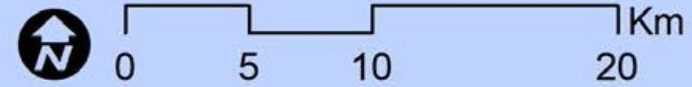
Georgetown

North Inlet

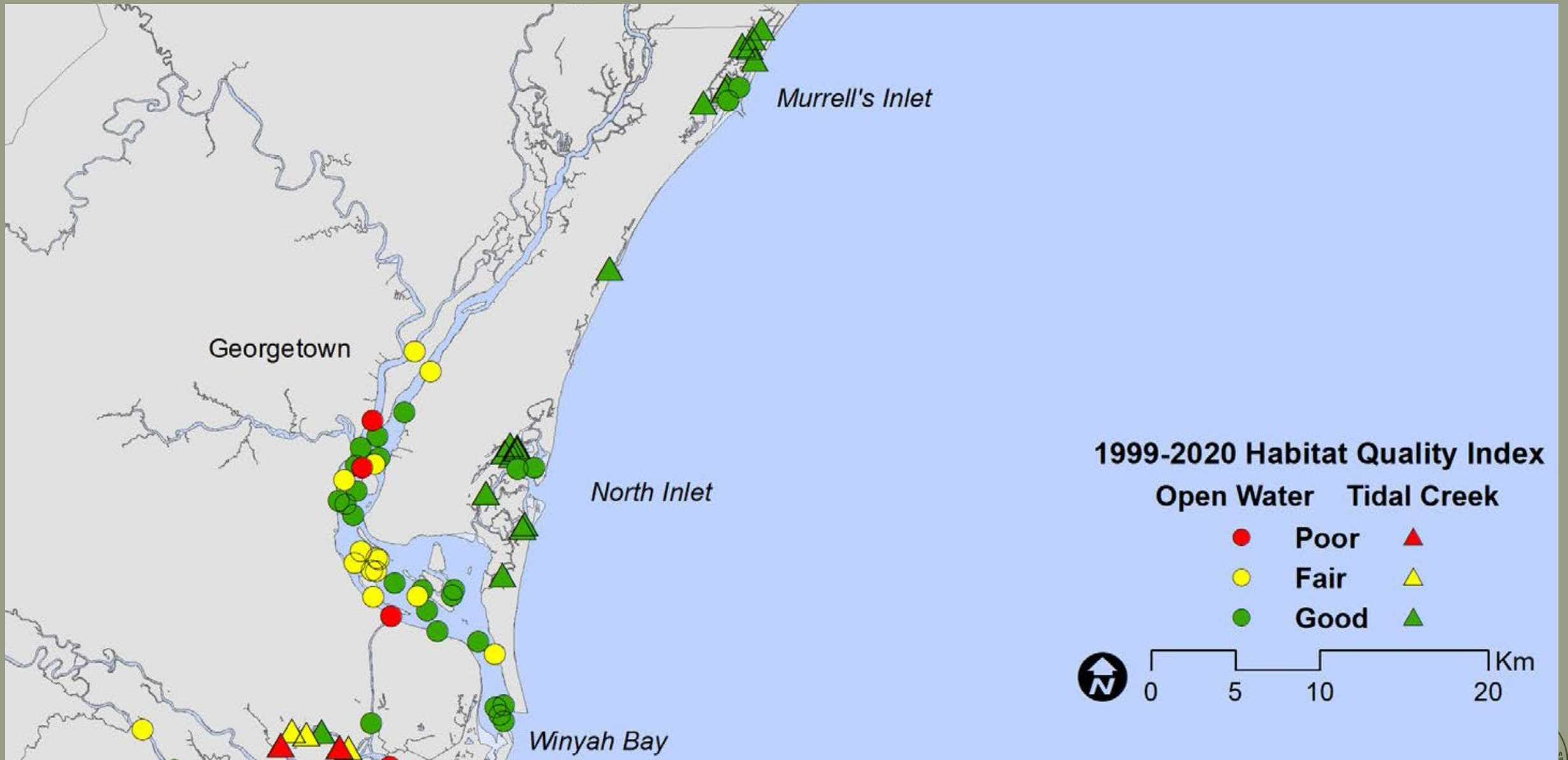
Winyah Bay

**1999-2020 Biological Condition Score**  
Open Water Tidal Creek

- |        |   |
|--------|---|
| ● Poor | ▲ |
| ● Fair | ▲ |
| ● Good | ▲ |

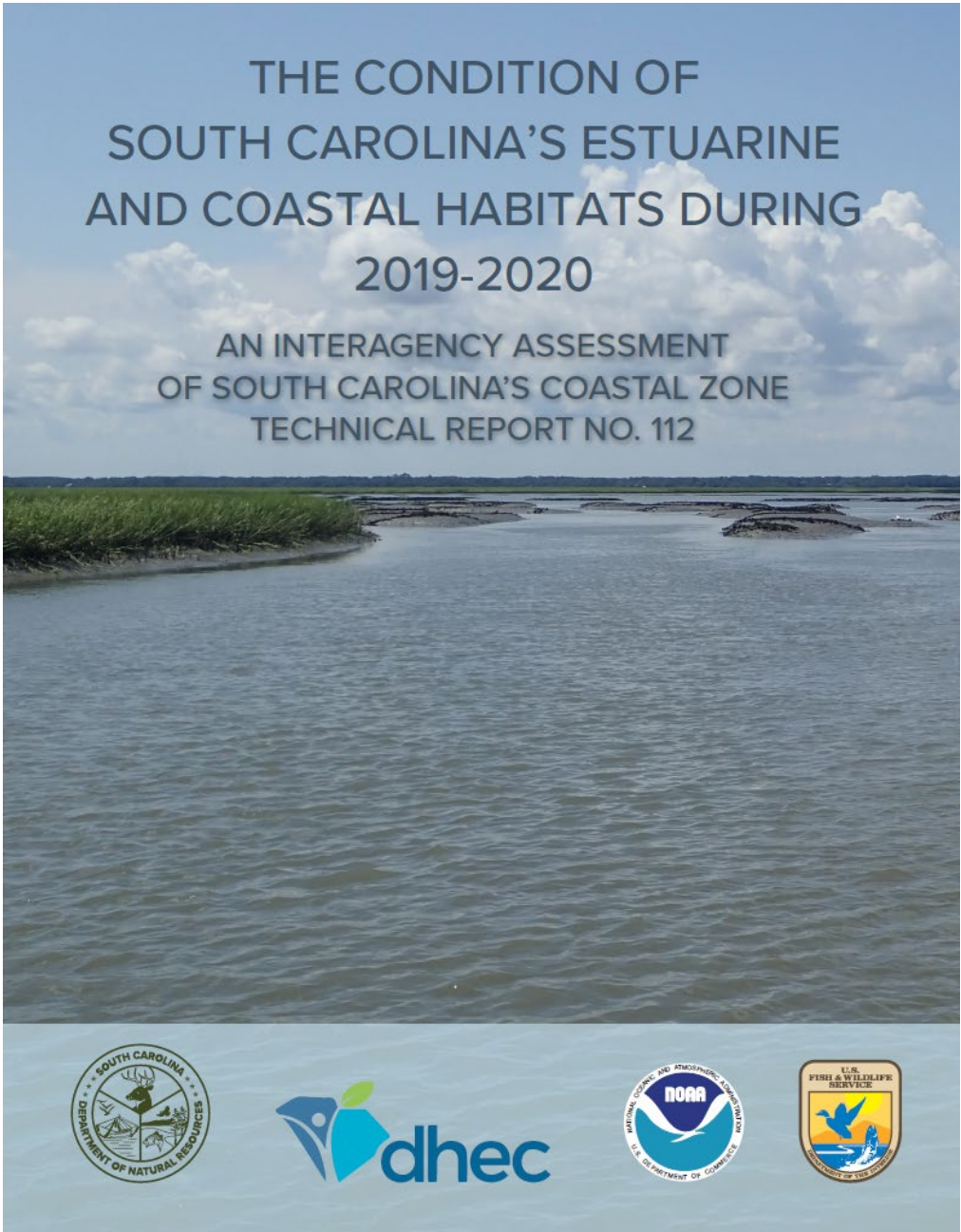






# SCECAP Report

New report available, summarizing findings from 1999-2020 coastwide



<https://www.dnr.sc.gov/marine/scecap/reports.html>

# Point of Contacts



# Point of Contacts

## Marine Resources Research Institute

Dr. Tanya Darden ([dardent@dnr.sc.gov](mailto:dardent@dnr.sc.gov))

## Estuarine Finfish Research Section

### Section Coordinator

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### Section Coordinator

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## Environmental Research Section

### Section & ACE NERR Coordinator

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### SCECAP Program

Dr. Andrew Tweel ([tweela@dnr.sc.gov](mailto:tweela@dnr.sc.gov))





They can be used to clean fishing gear and equipment.

# COASTSPAN Survey

## Sampling Gear

Monofilament gill net (755' x 10')

Longlines (1000', 50 hooks/set)

Drum lines (20/0 hooks)

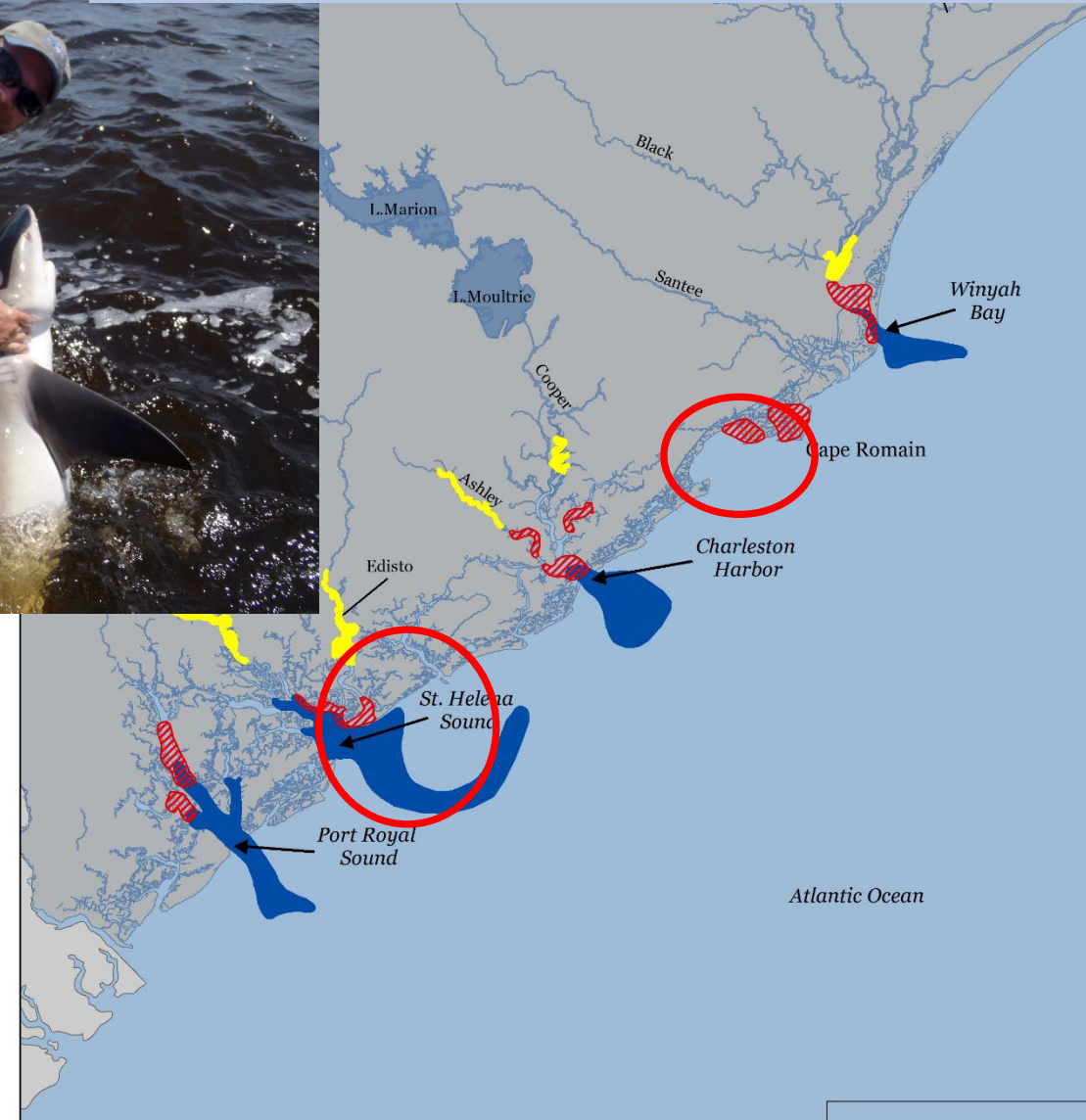
## Target Species

Coastal Sharks

Bonnethead, Scalloped Hammerhead, Atlantic Sharpnose, Finetooth, Sandbar, Blacktip, Lemon, and Bull Sharks

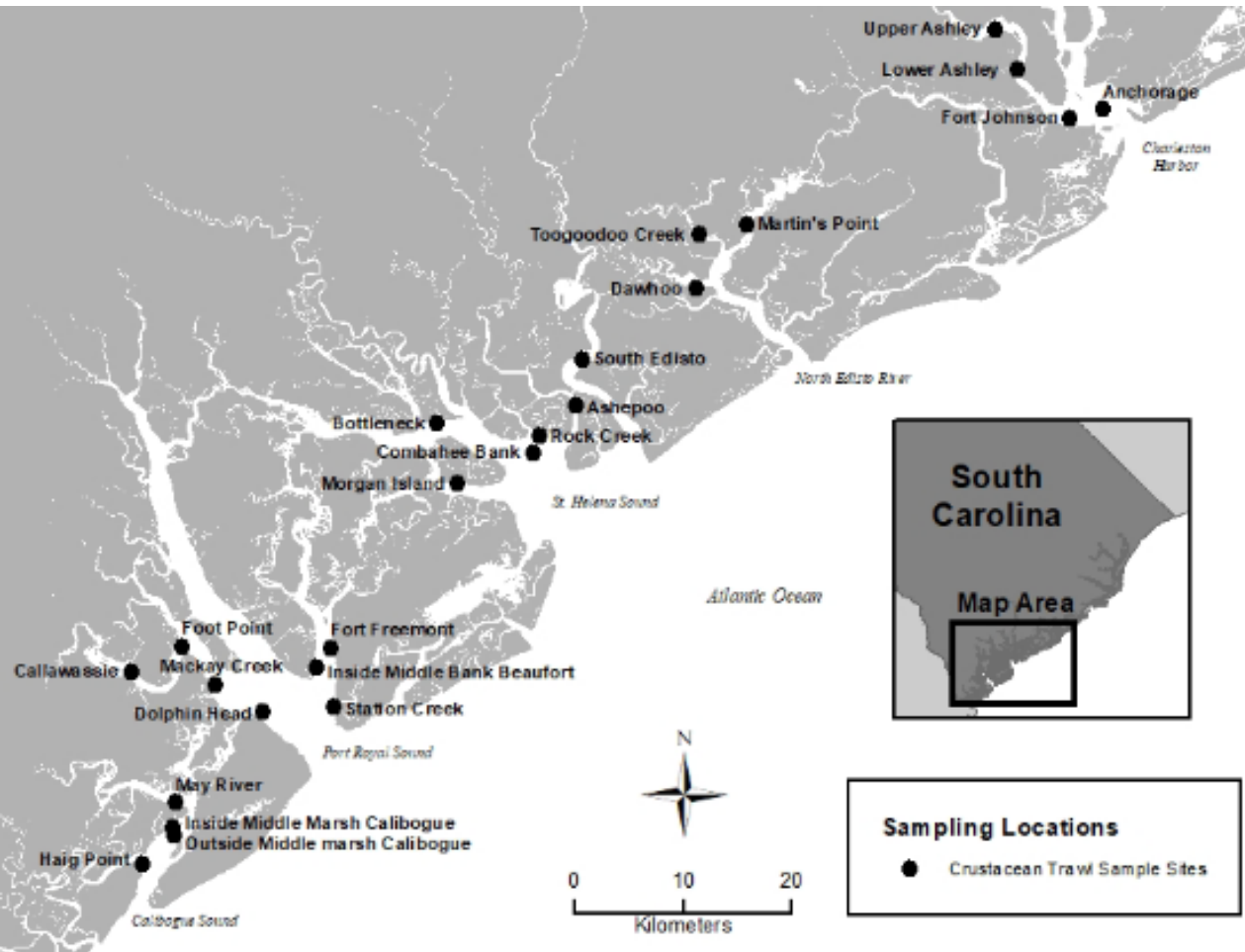


After being measured and tagged, a bull shark is readied for release.



Seasonally (April-Sept.) from 1998-present

# Estuarine Trawl Survey

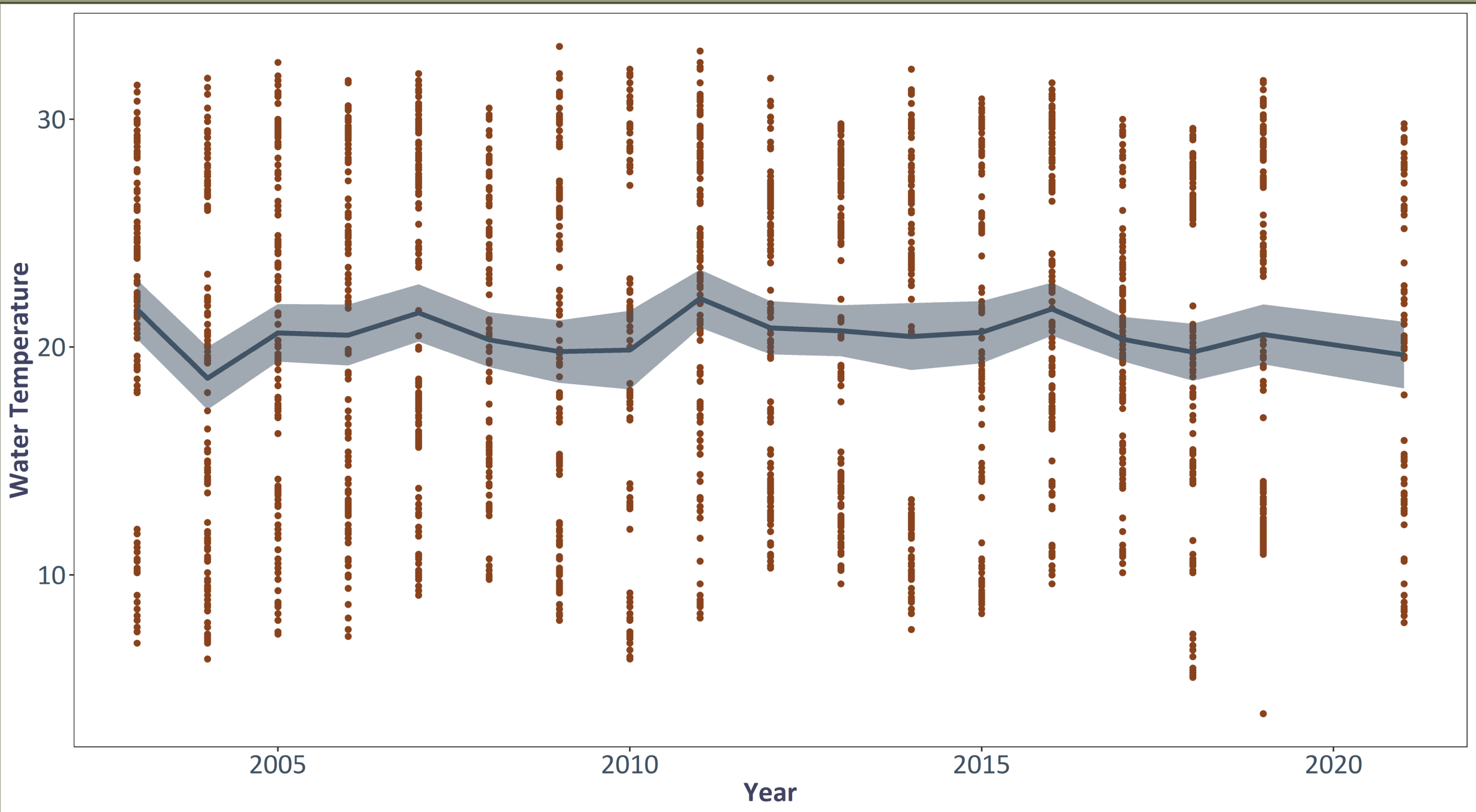


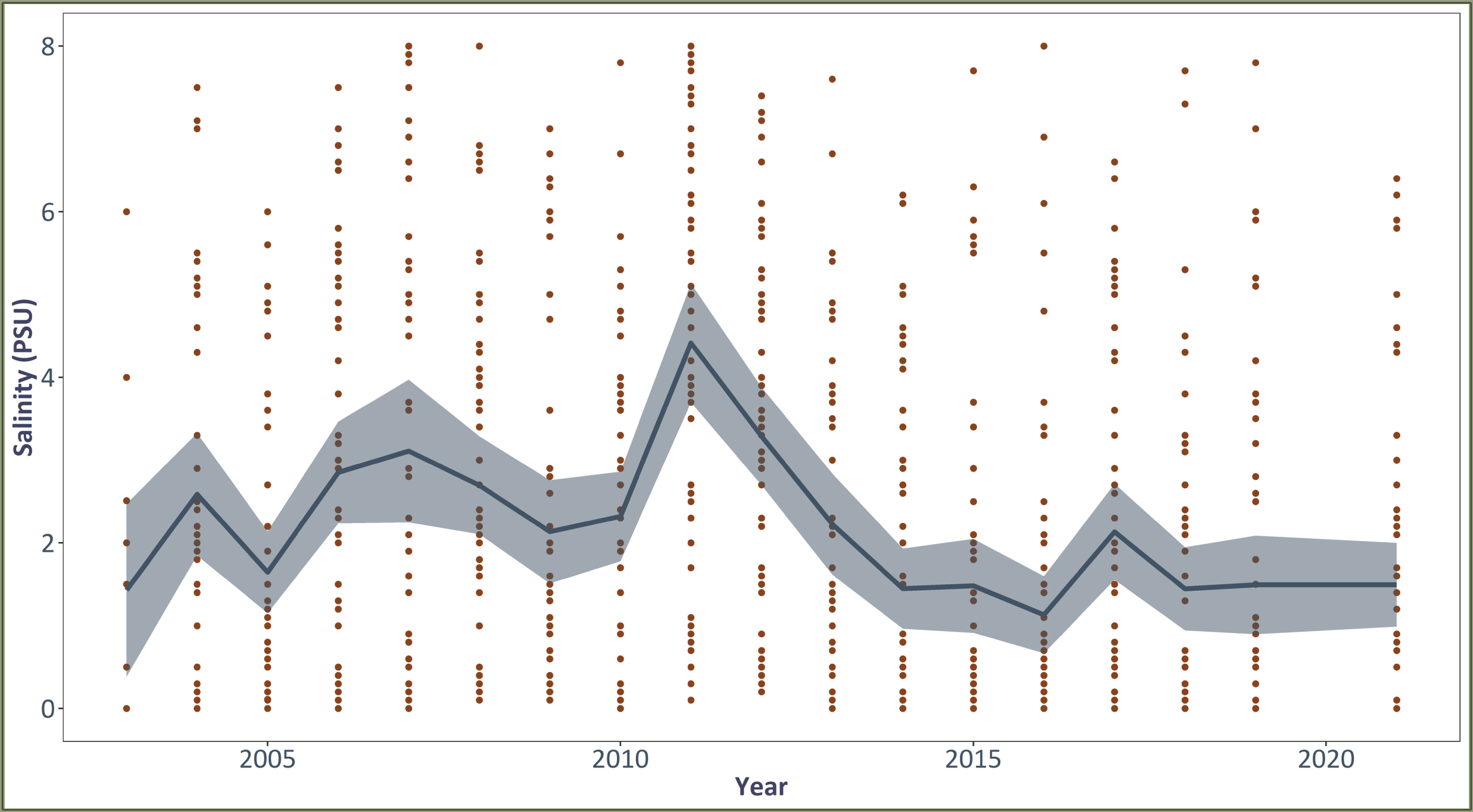
# Some Example Data Products

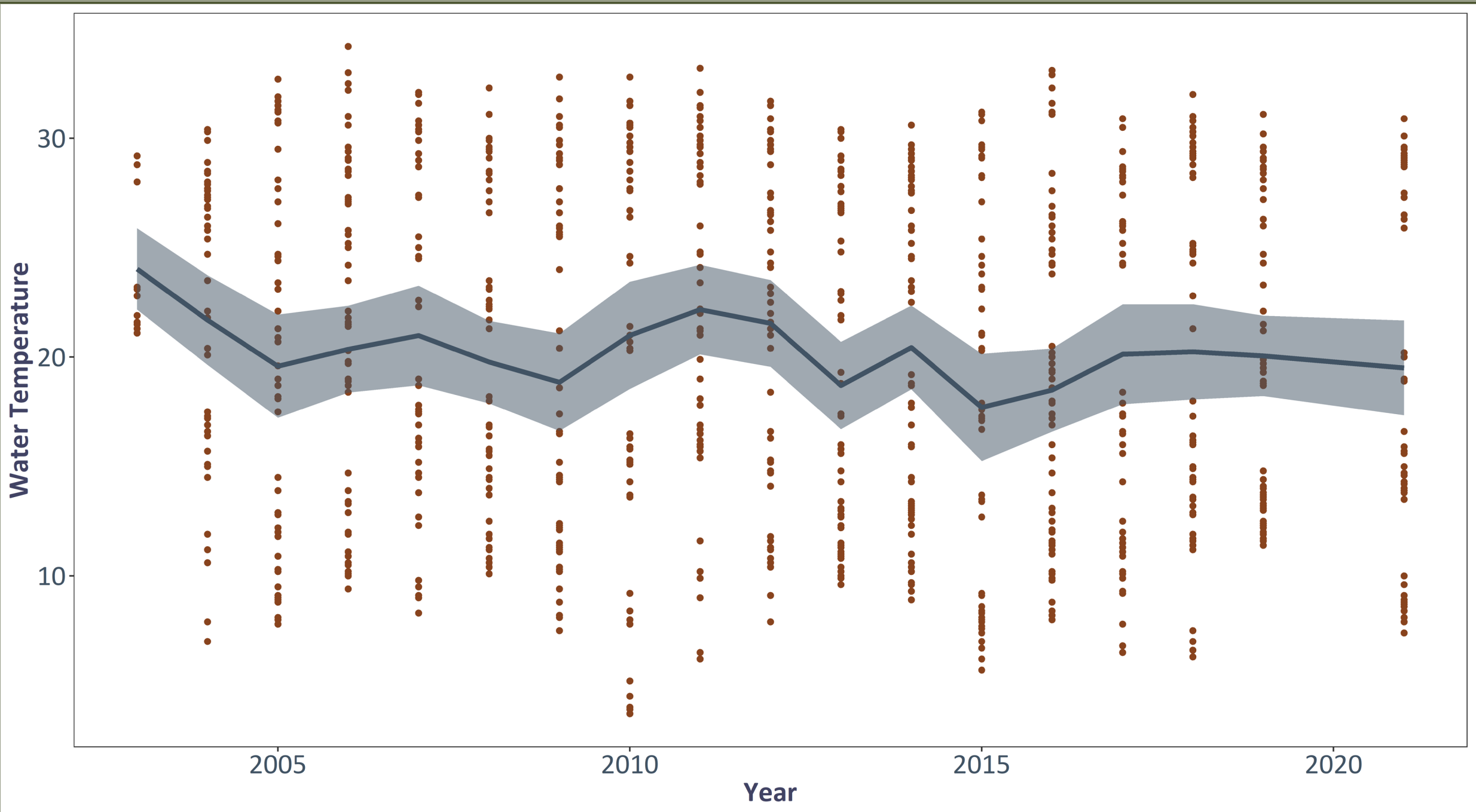
Trammel Net & Electrofishing Surveys

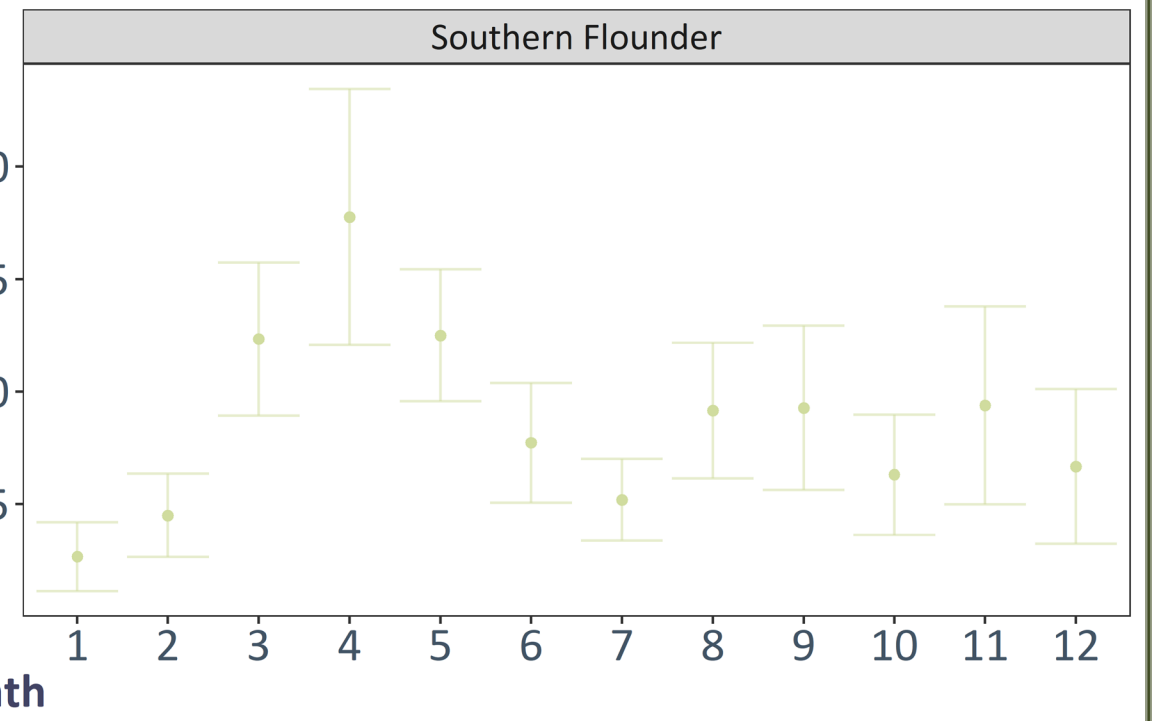
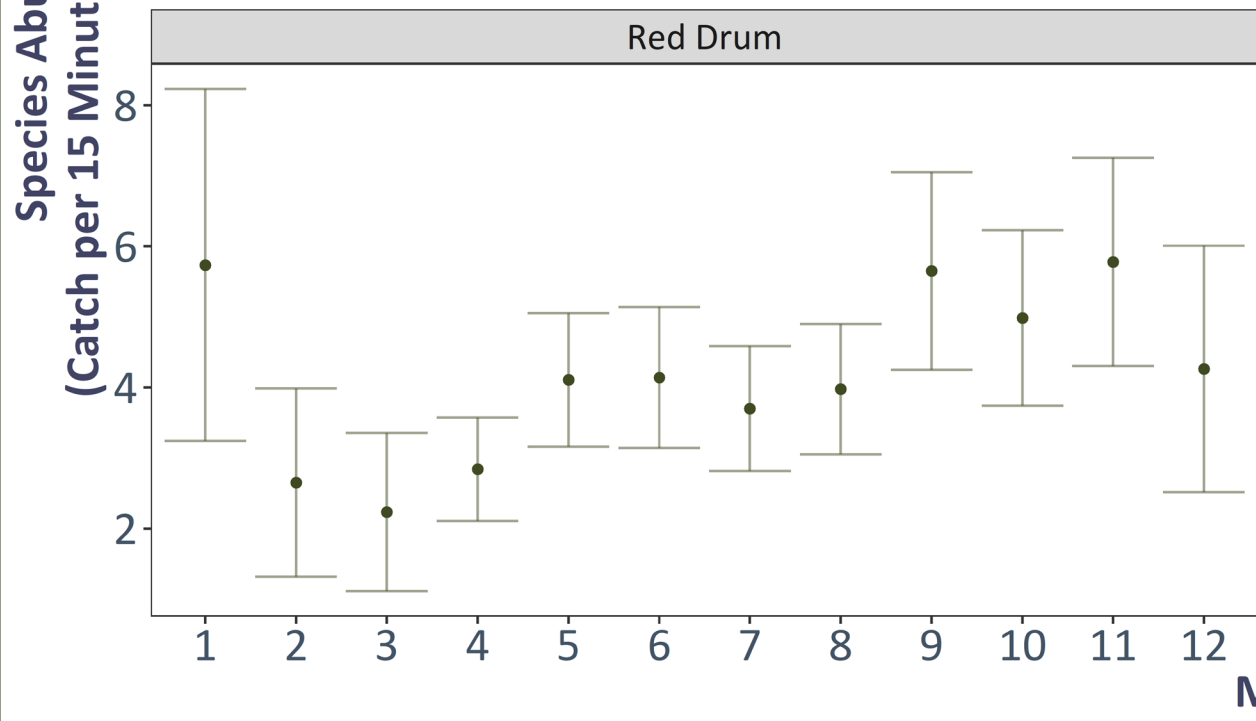
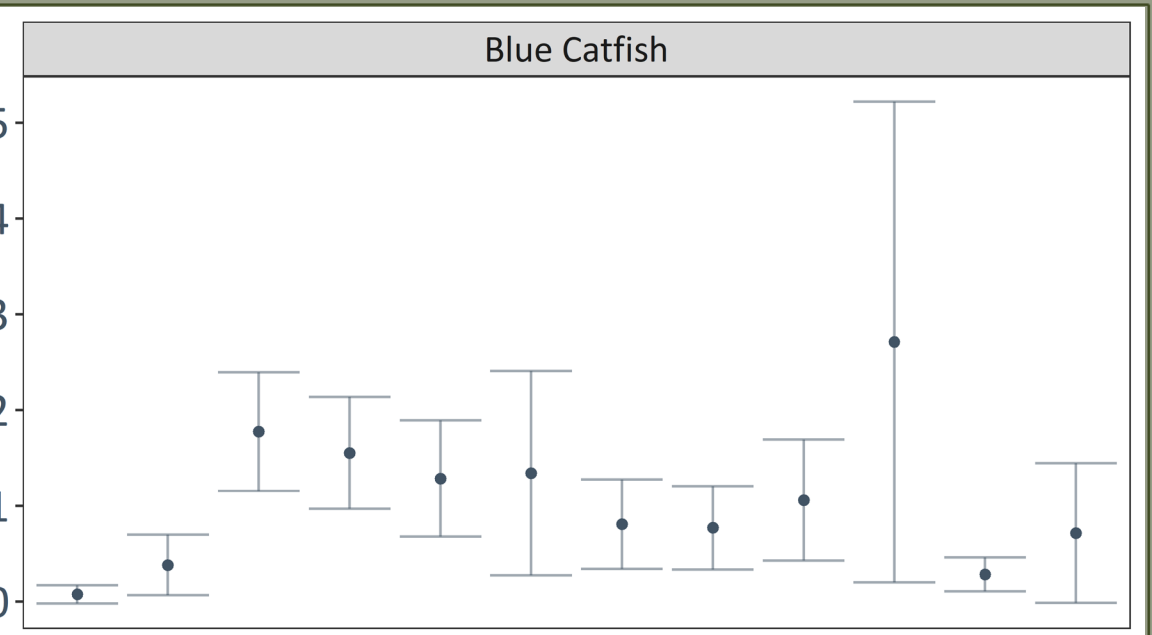
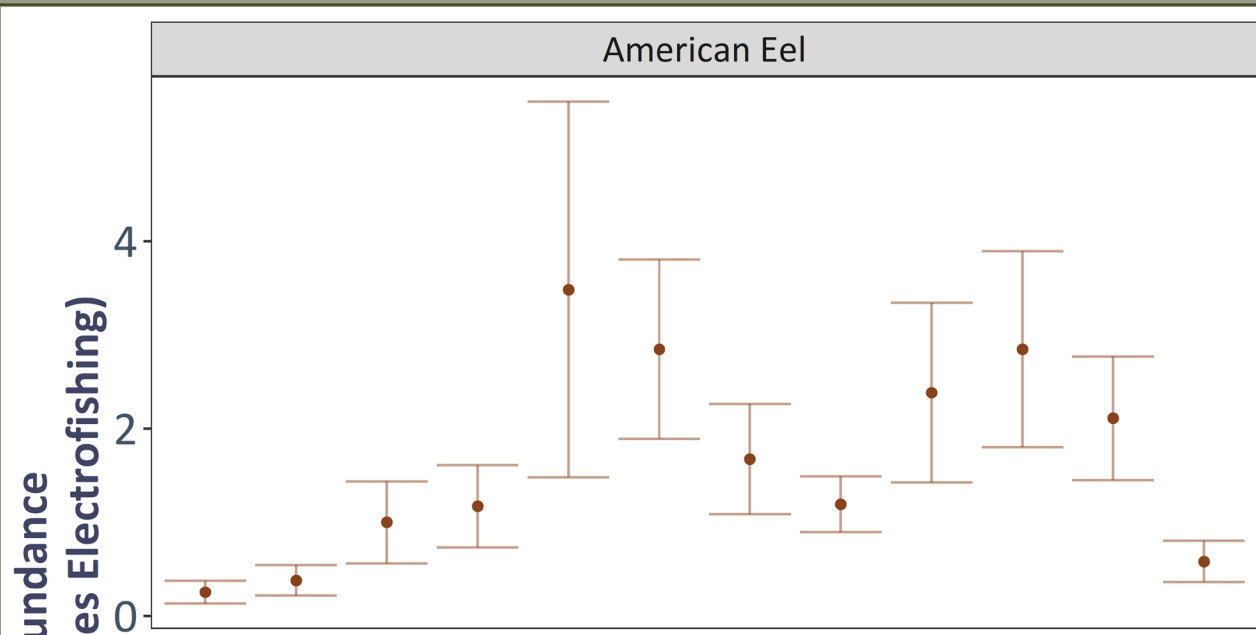


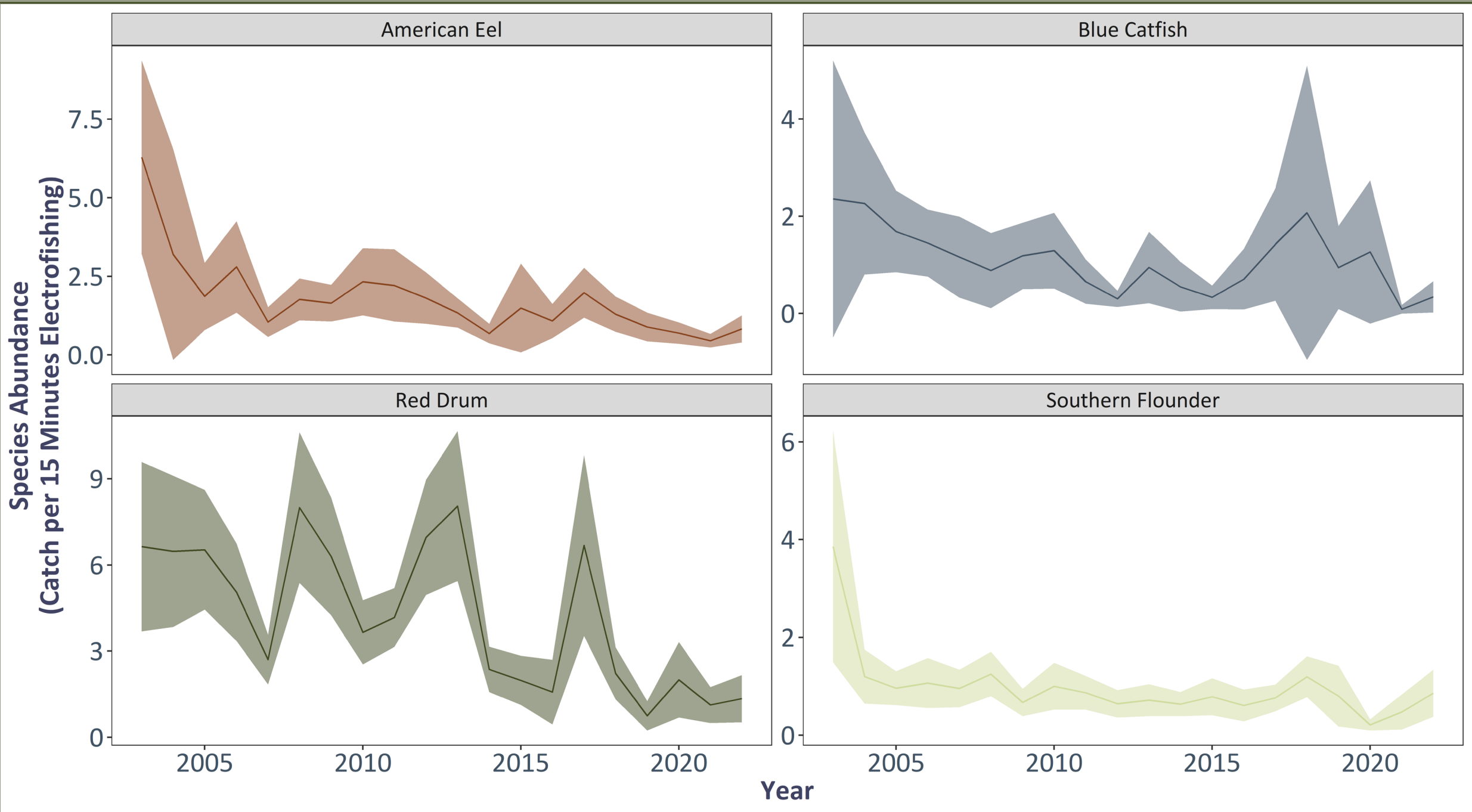












Species American Eel Blue Catfish Red Drum Southern Flounder

Species Abundance (Catch per 15 Minutes Electrofishing)

