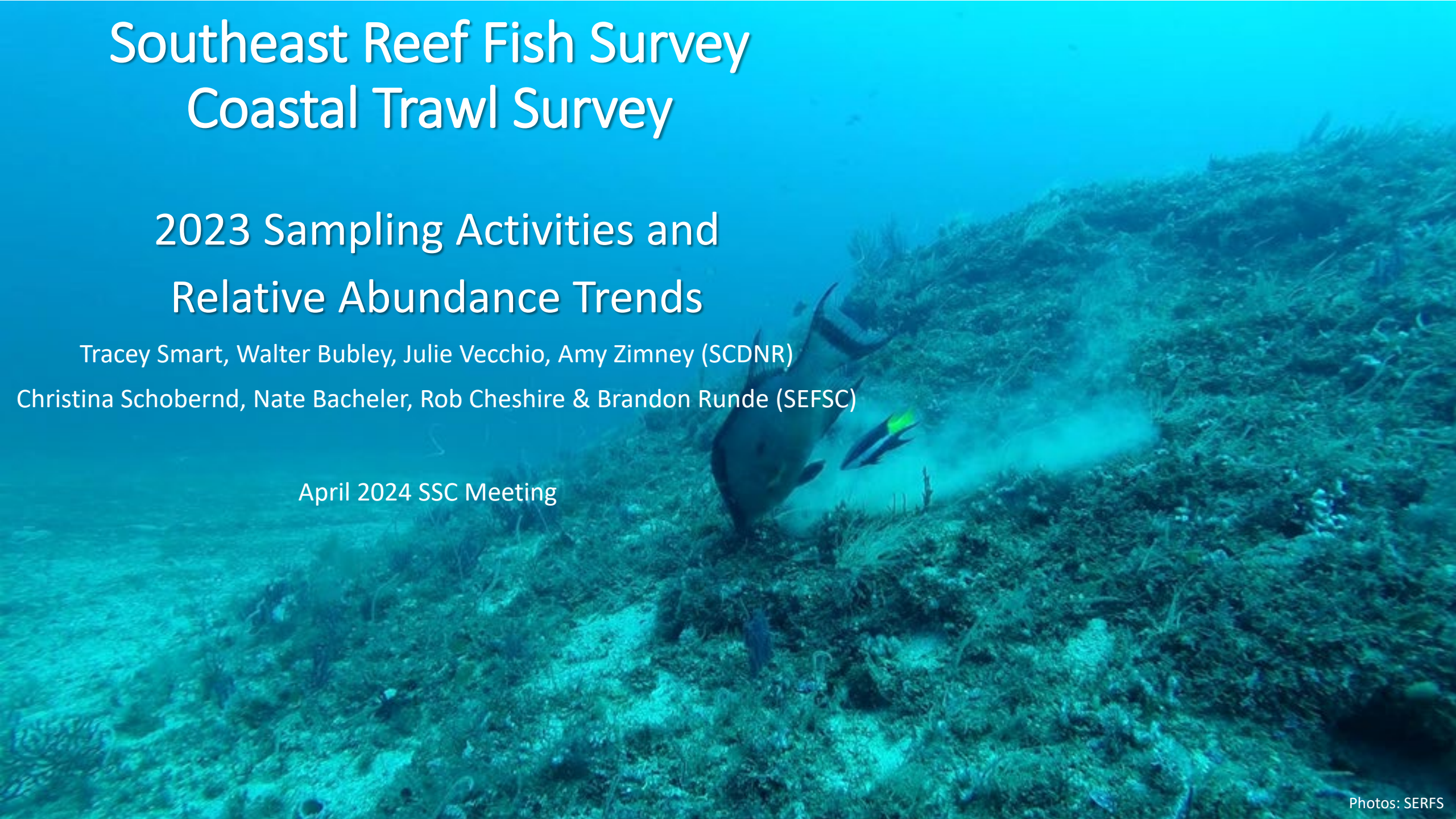
# Southeast Reef Fish Survey
# Coastal Trawl Survey

## 2023 Sampling Activities and Relative Abundance Trends

Tracey Smart, Walter Bubley, Julie Vecchio, Amy Zimney (SCDNR)

Christina Schobernd, Nate Bacheler, Rob Cheshire & Brandon Runde (SEFSC)

April 2024 SSC Meeting



Photos: SERFS

# Presentation Overview

SERFS then CTS

Survey Design

2023 Activities

Abundance, Length & Distribution for Selected Spp.

2024 Planned Activities

Photos: SERFS

# Relative Abundance Overview Caveats

- Not an update of stock status
- Constraints, stratification, units, and models may be different from those used in (SEDAR) stock assessments
- May not have been reviewed in a SEDAR or other assessment framework

# Southeast Reef Fish Survey (SERFS)

Current Funding & Sampling:

MARMAP + SEAMAP-SA + SEFIS

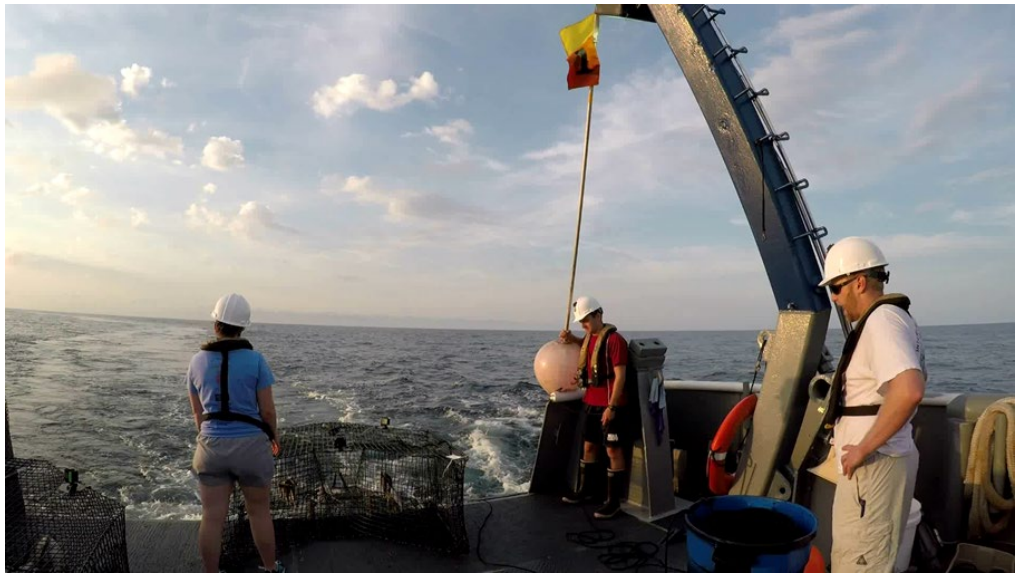
Historical Funding & Sampling:

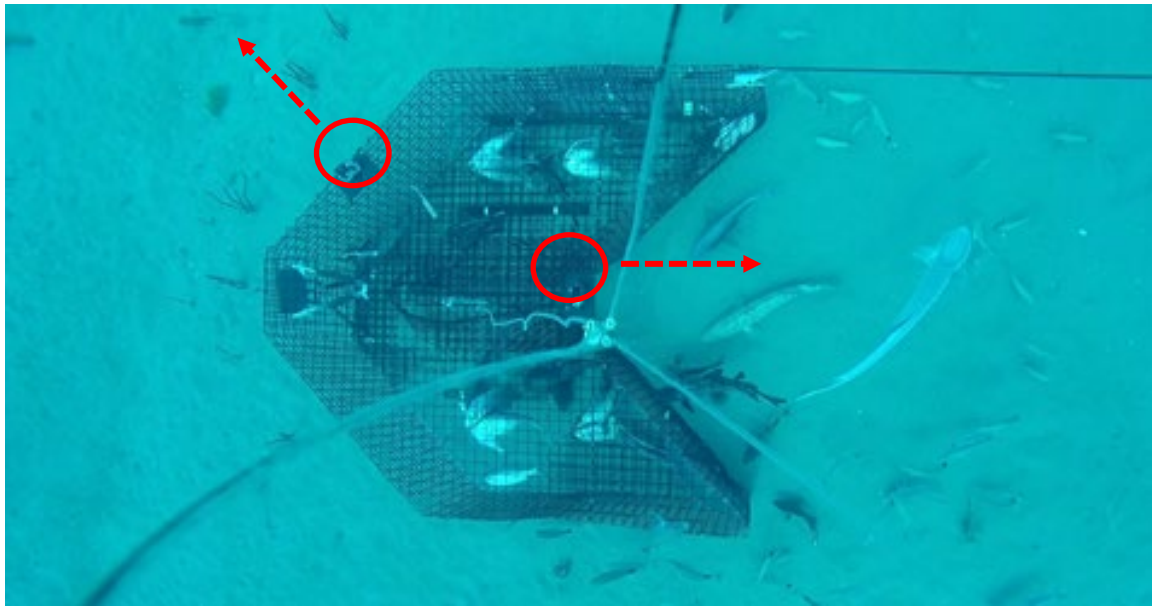
MARMAP

Marine Resources Monitoring, Assessment & Prediction Program (SCDNR)
Southeast Area Monitoring & Assessment Program - South Atlantic (SCDNR)
Southeast Fishery-Independent Survey (SEFSC)

# Chevron Video Trap (CVT) Sampling

- Target low to medium relief, hard-bottom habitats
- Depths ~15-110 m
- April 15 - Oct. 14
- Trap used consistently and standardized since 1990
- Baited with menhaden, soak time ≈90 minutes
- Since 2011: all traps have 2 video cameras





# CVT Universe

- ~ 4,300 trap sampling stations (NC-FL)
- Simple, random selection
- ~ 1,500 targeted in 2023

**Sample and data processing & analyses**

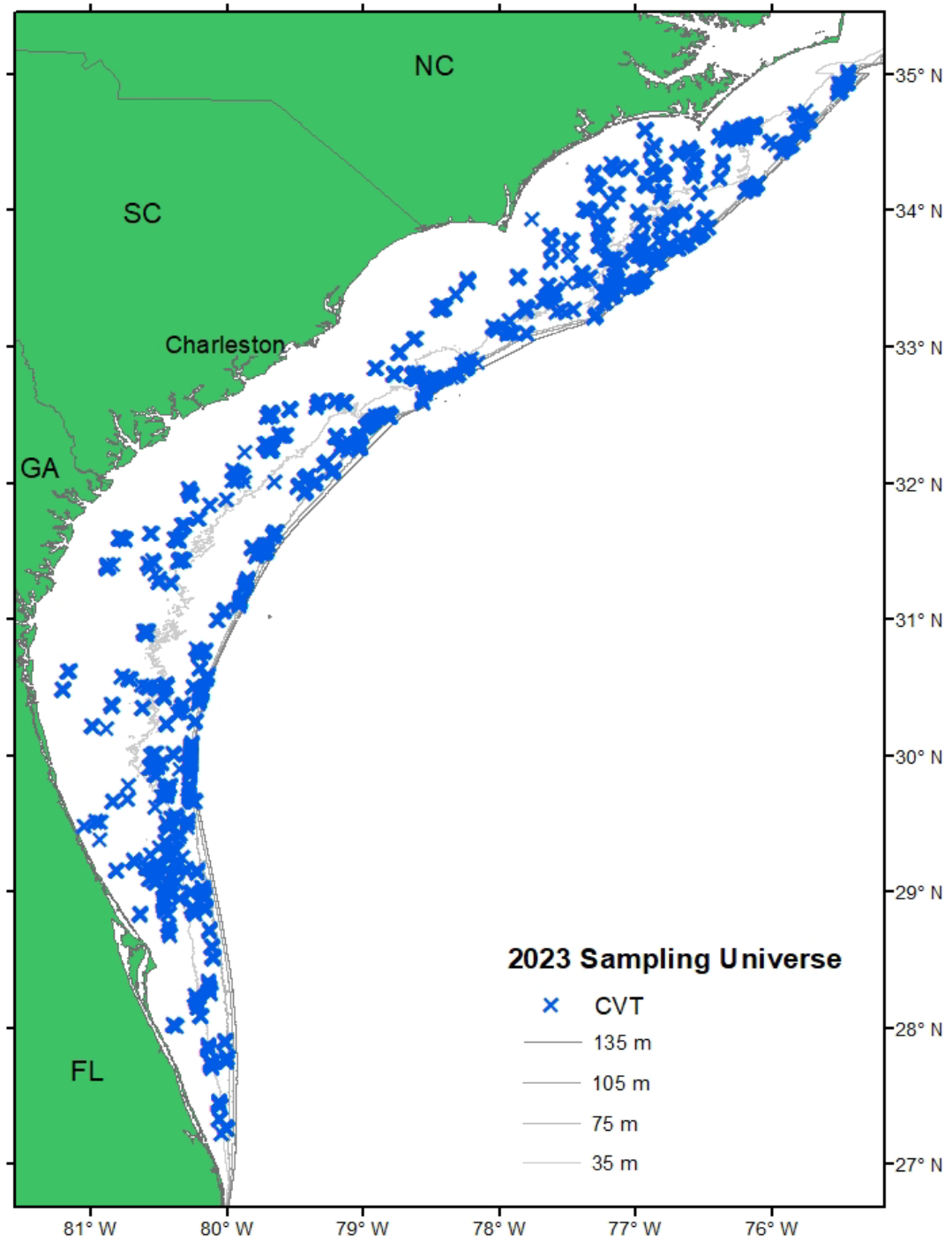
MARMAP/SEAMAP-SA (SCDNR):

- Catch indices
- Life history

SEFIS (SEFSC)

- Video indices

Publicly-available data SEAMAP.ORG

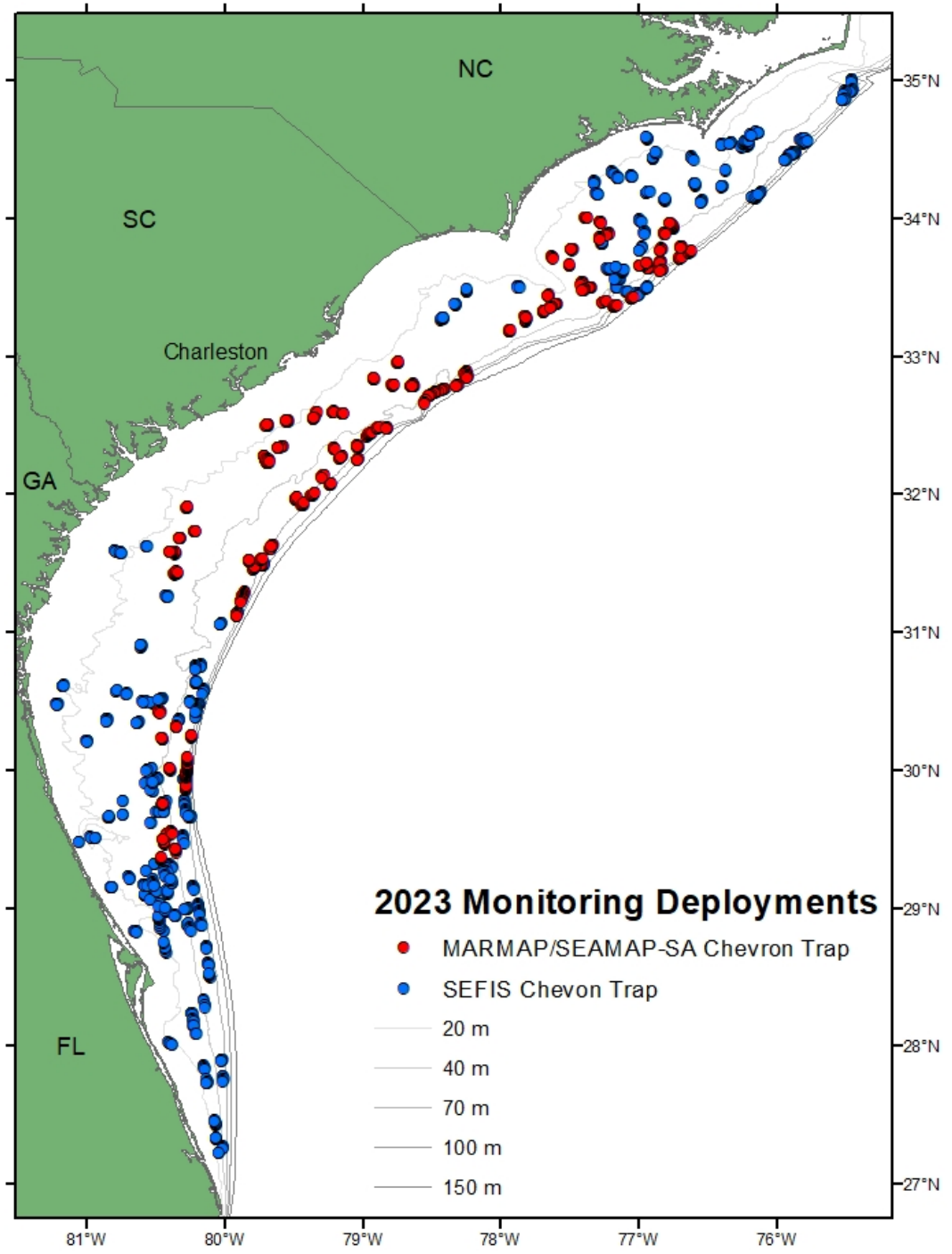


# 2023 SERFS Activities

- **86** days at sea (+ 5 mapping days)
- **1,825** gear deployments

  **1,547** CVTs

  **278** CTD casts
- **CVTs = 38,454** fish (**83** species) collected, measured, weighed
- **9,755** fish (**31** species) retained for life history (age, maturity, DNA)



# Overview of CVT Relative Abundance

- Catch index (1990-2023)
- Video index (2011-2022)
- No sampling in 2020 (COVID-19)
- Standardized using Zero-Inflated Negative Binomial model (ZINB)

  Most appropriate method, reduces uncertainty

Catch:

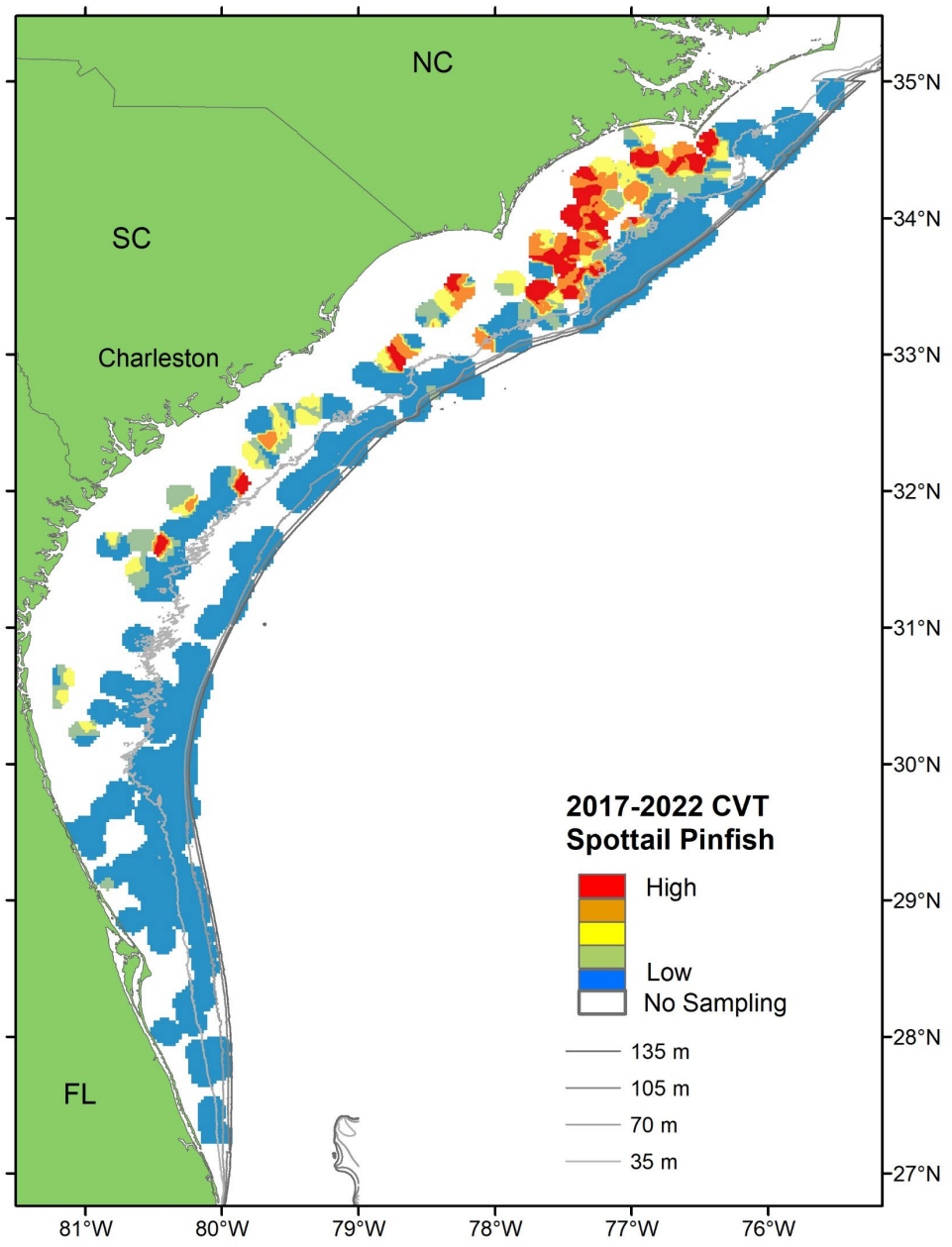
- Number of fish
- Trap soak time

Video:

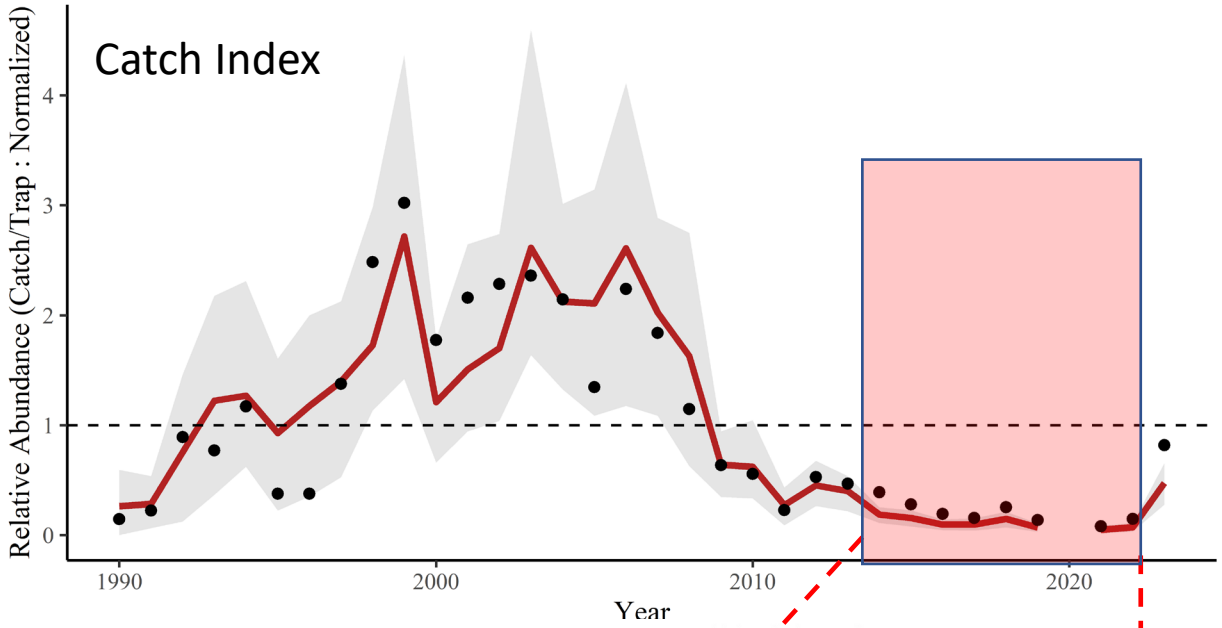
- MeanCount
- 10 min after trap lands on bottom
- One snapshot every 30 s for 20 min

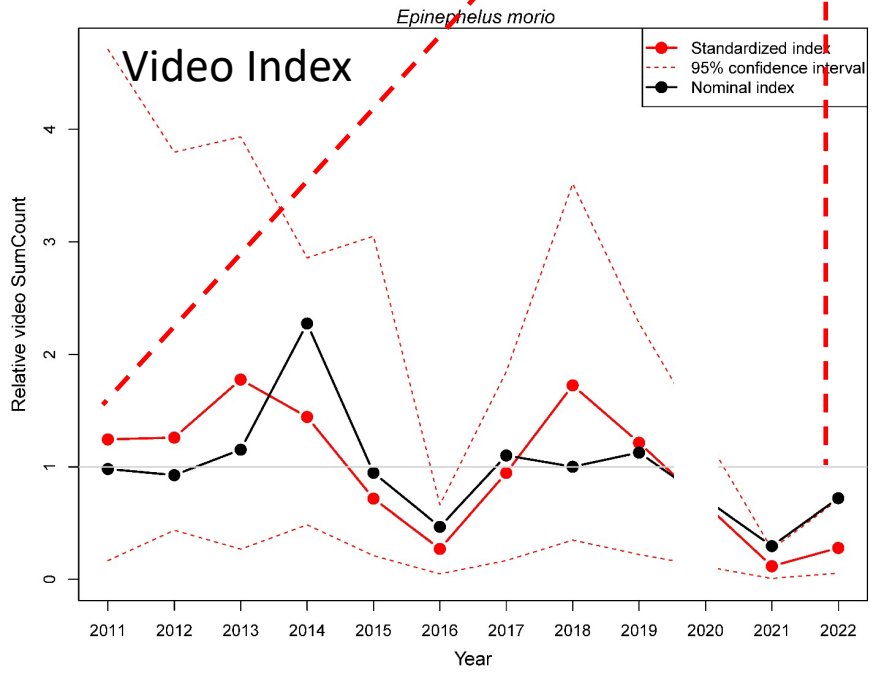
# SERFS Distributions- Example

- Only CVT catch
- Catch abundance in quintiles (5 bins)
  - # fish / trap hour
- 5 most recent years: 2018-2019 & 2021-2023
- Cooler colors => lower nominal abundance
- Warmer colors => higher nominal abundance
- White => no sampling



# SERFS Indices- Example



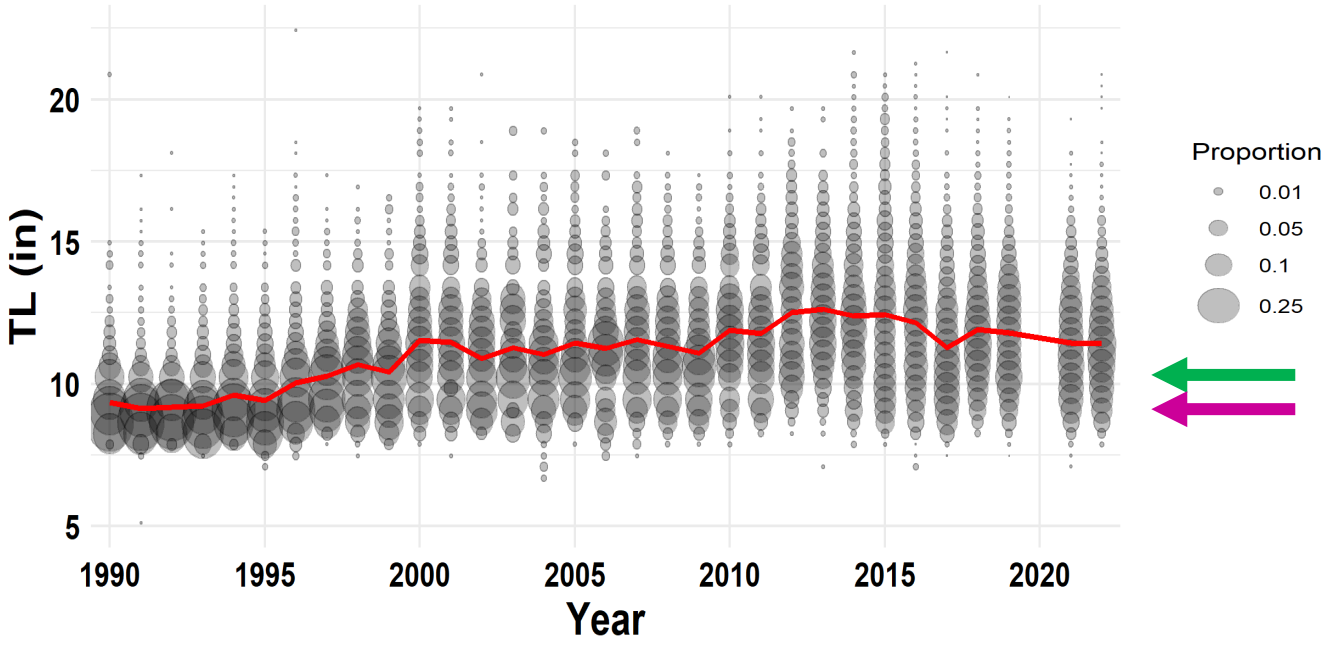




Normalized to long-term average (dashed or solid line at 1)

- 2 = twice long-term average
- 0.5 = half long-term average

| Gear | ZINB Index | 95% C.I. | Nominal Values |
|---|---|---|---|
| CHV | Red Line | Gray Shading | Black Dots |

# SERFS Length Compositions- Example




- Catch Only
- Maximum (Pinched) Total Length (in)
- 1-in Length Bins
- Bubble size = # fish in length bin / # fish measured in a year
- Red Line = Average TL
- Green Arrow = Commercial MSL
- Pink Arrow = TL at 50% Maturity, Female
- "Missing" length bins in some graphs are result of converting between FL & TL and rounding

# Selected Species
# 2023 CVT Catch Rankings

1. Tomtate*

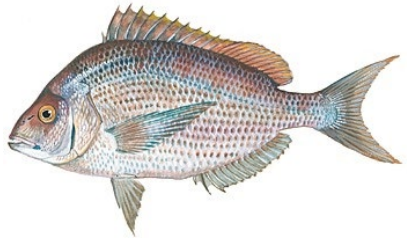
2. Vermilion Snapper

3. Black Sea Bass

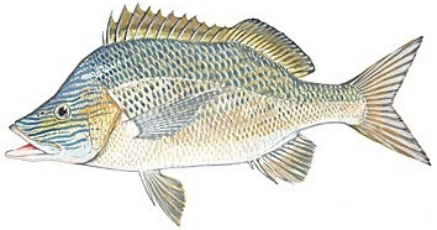
4. Red Snapper

5. Gray Triggerfish

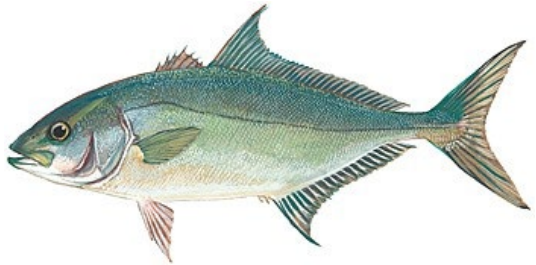
6. Red Porgy



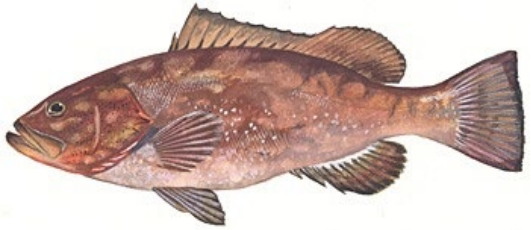
7. *Stenotomus* spp.*



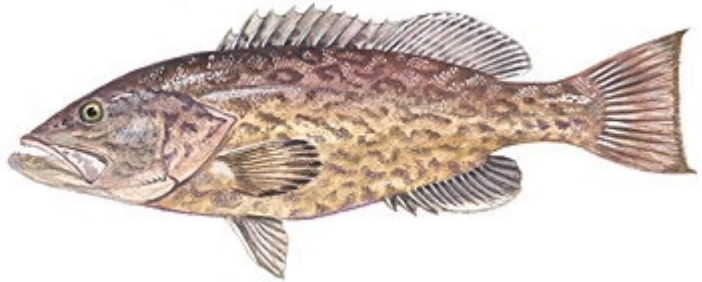
8. White Grunt



16. Almaco Jack



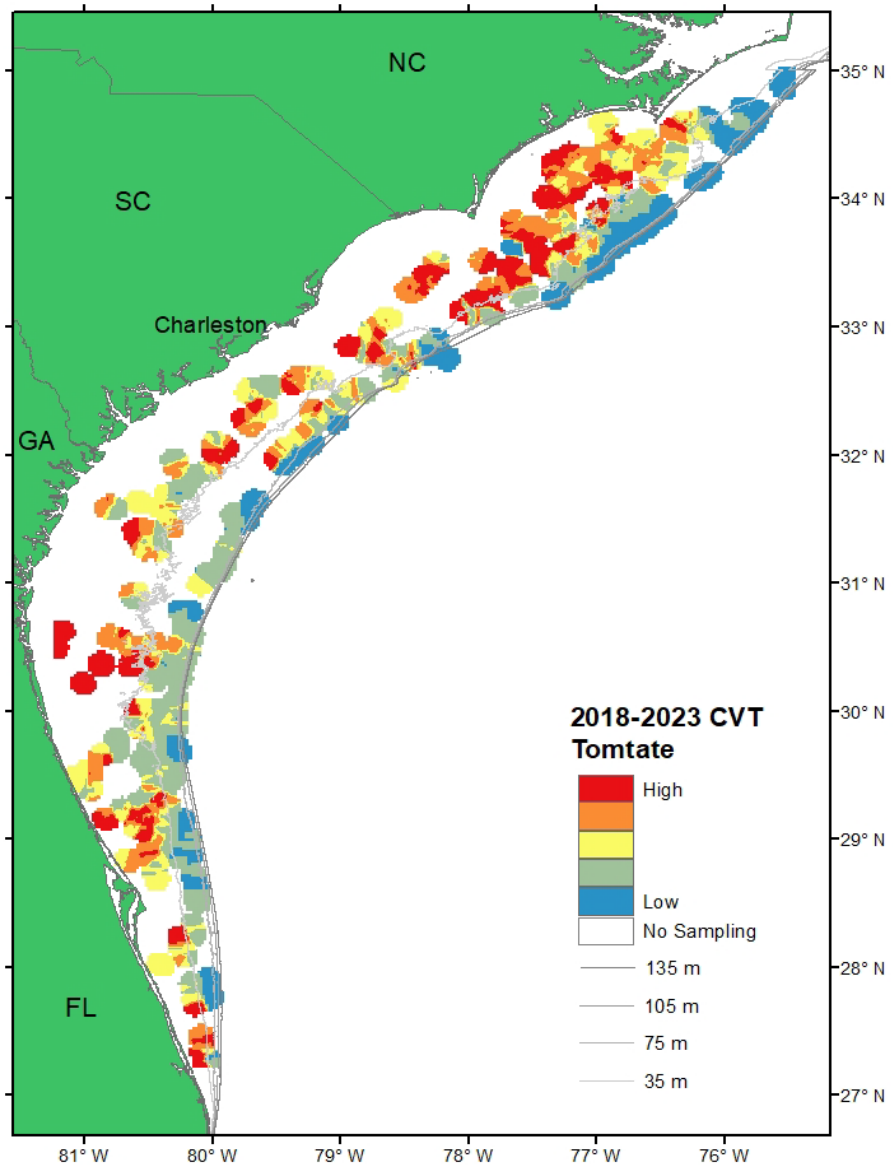
17. Red Grouper

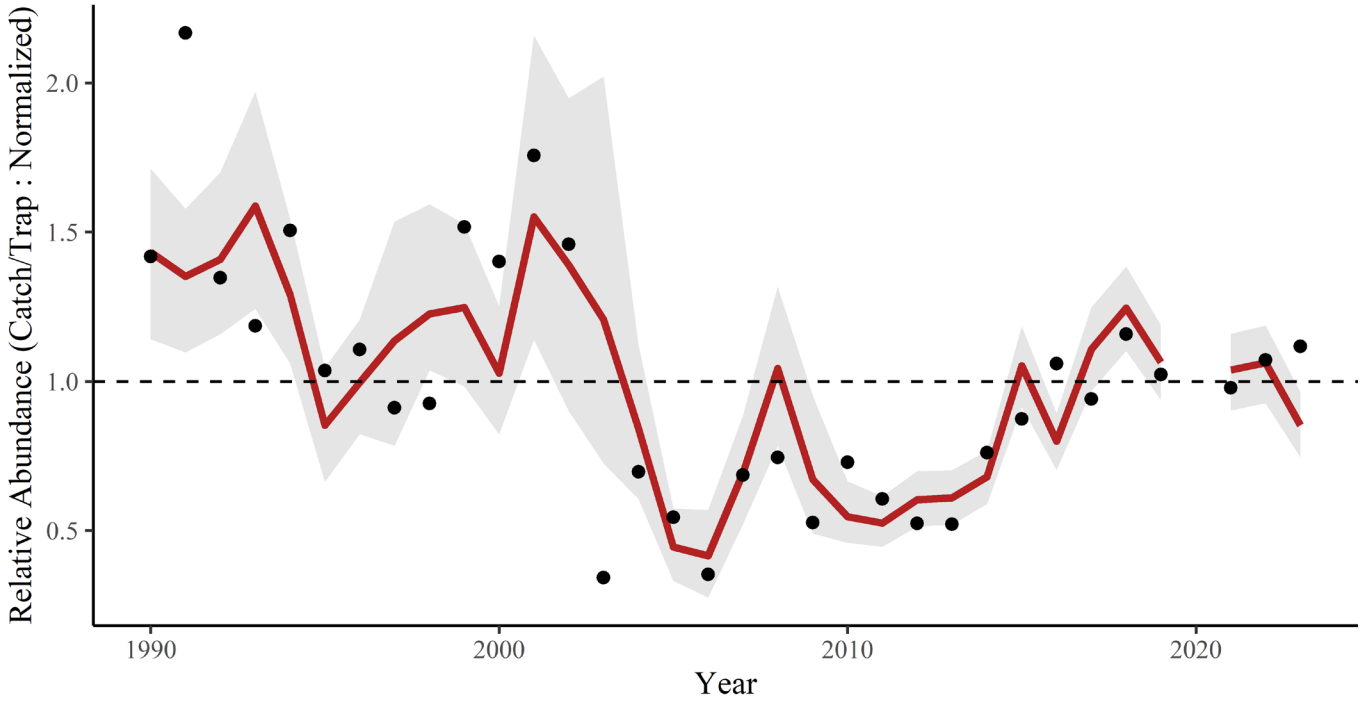


21. Gag

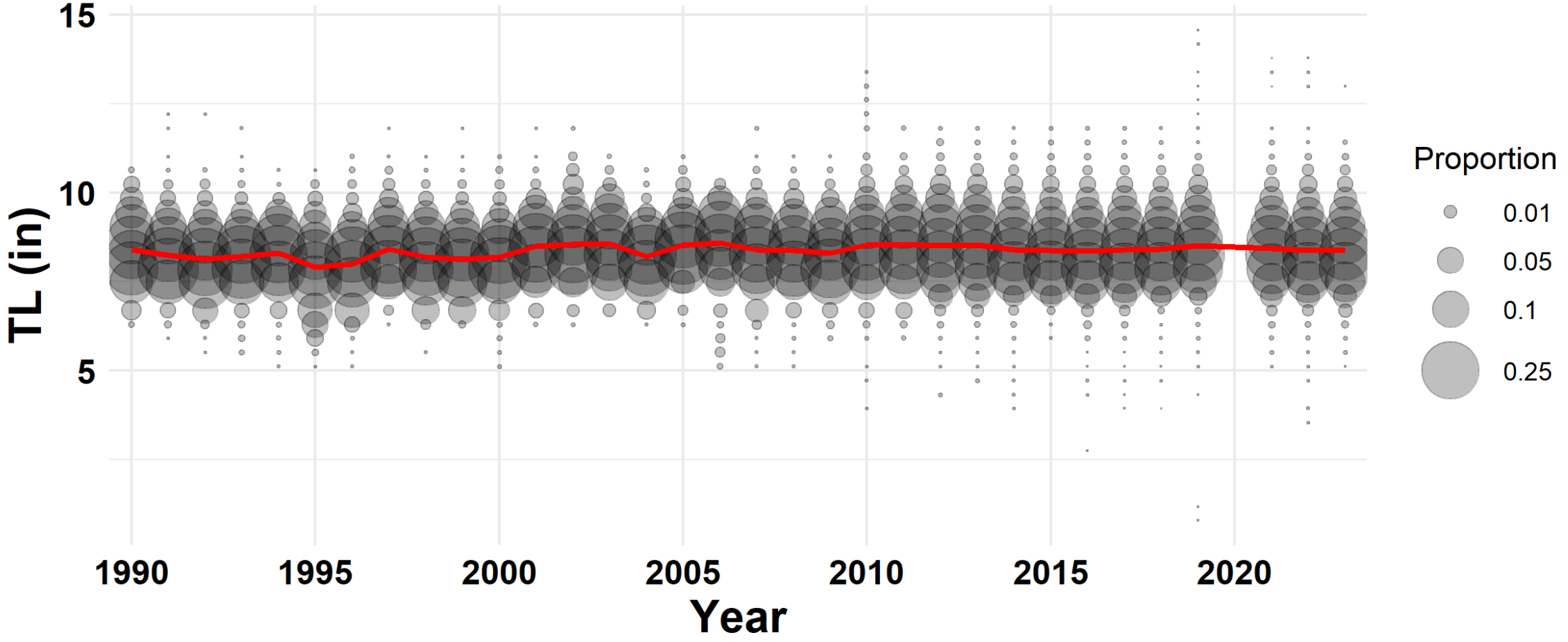
23. Scamp

# Tomtate

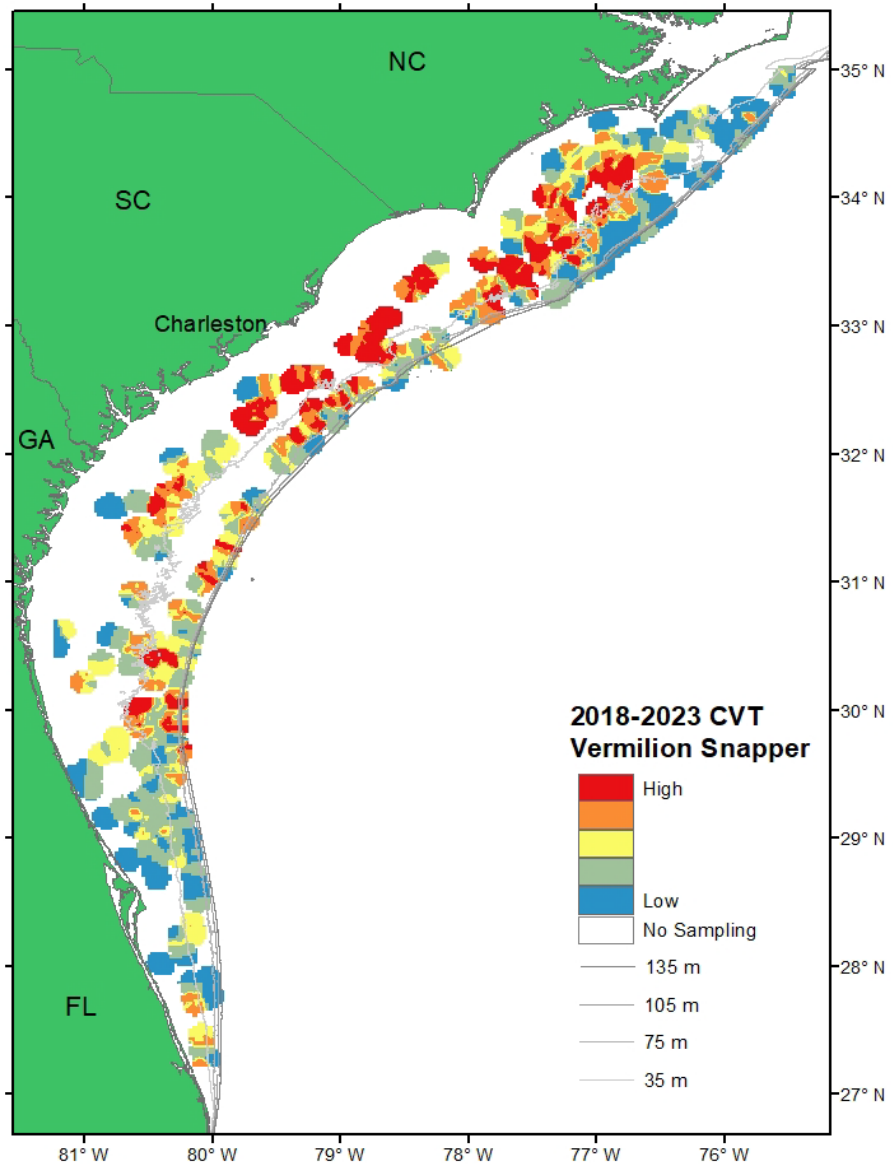

NC
SC
Charleston
GA
FL
2018-2023 CVT
Tomtate
High
Low
No Sampling
135 m
105 m
75 m
35 m
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W

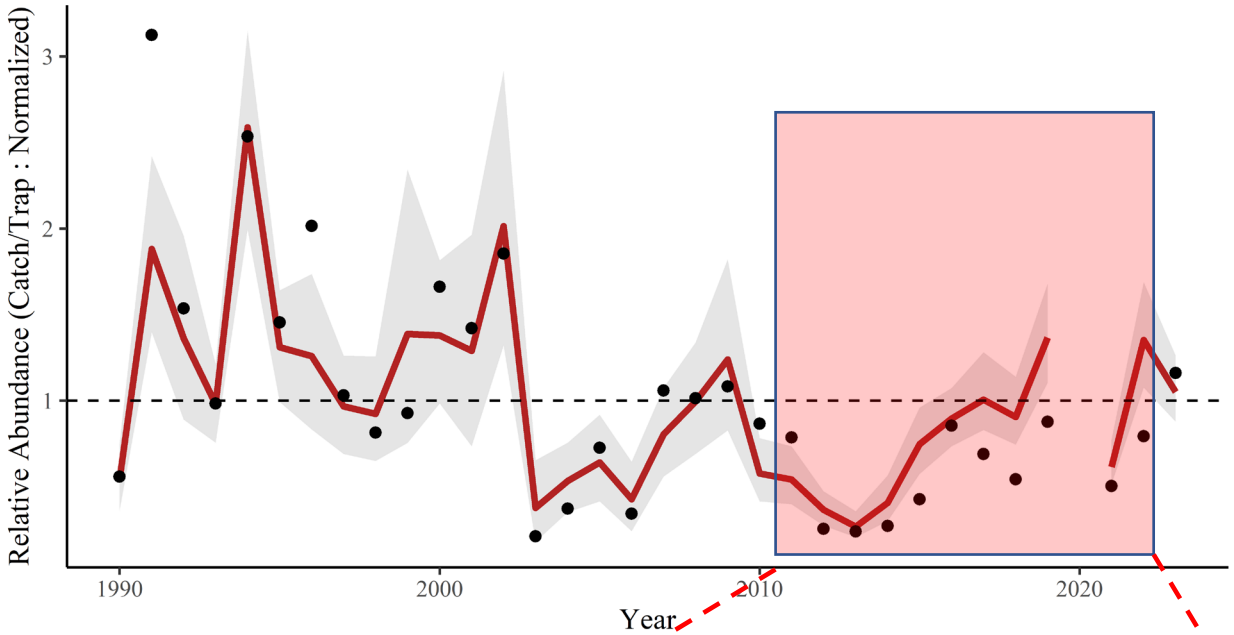

Relative Abundance (Catch/Trap : Normalized)
2.0
1.5
1.0
0.5
1990
2000
2010
2020
Year

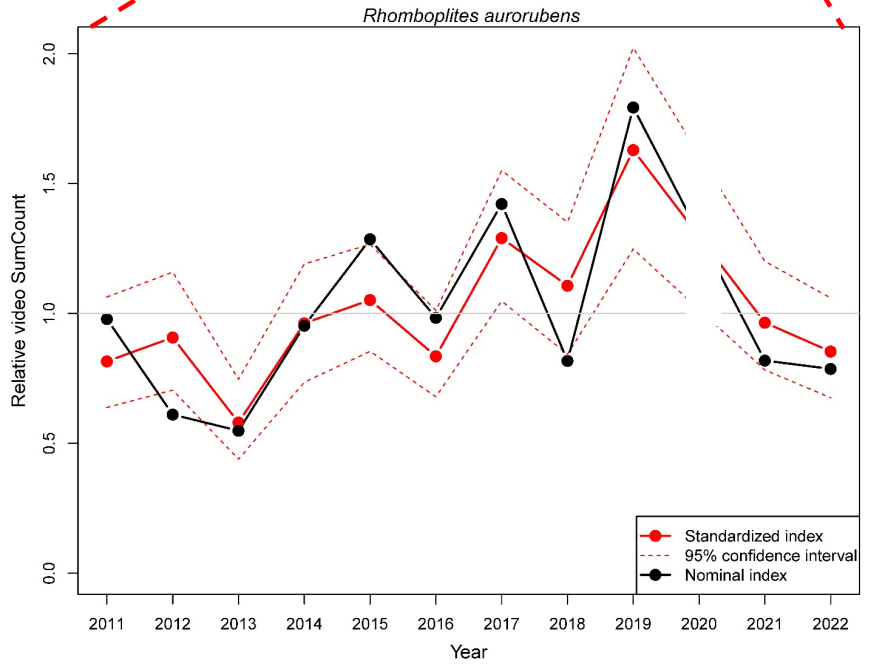
# Tomtate


15
10
5
TL (in)
1990
1995
2000
2005
2010
2015
2020
Year
Proportion
0.01
0.05
0.1
0.25

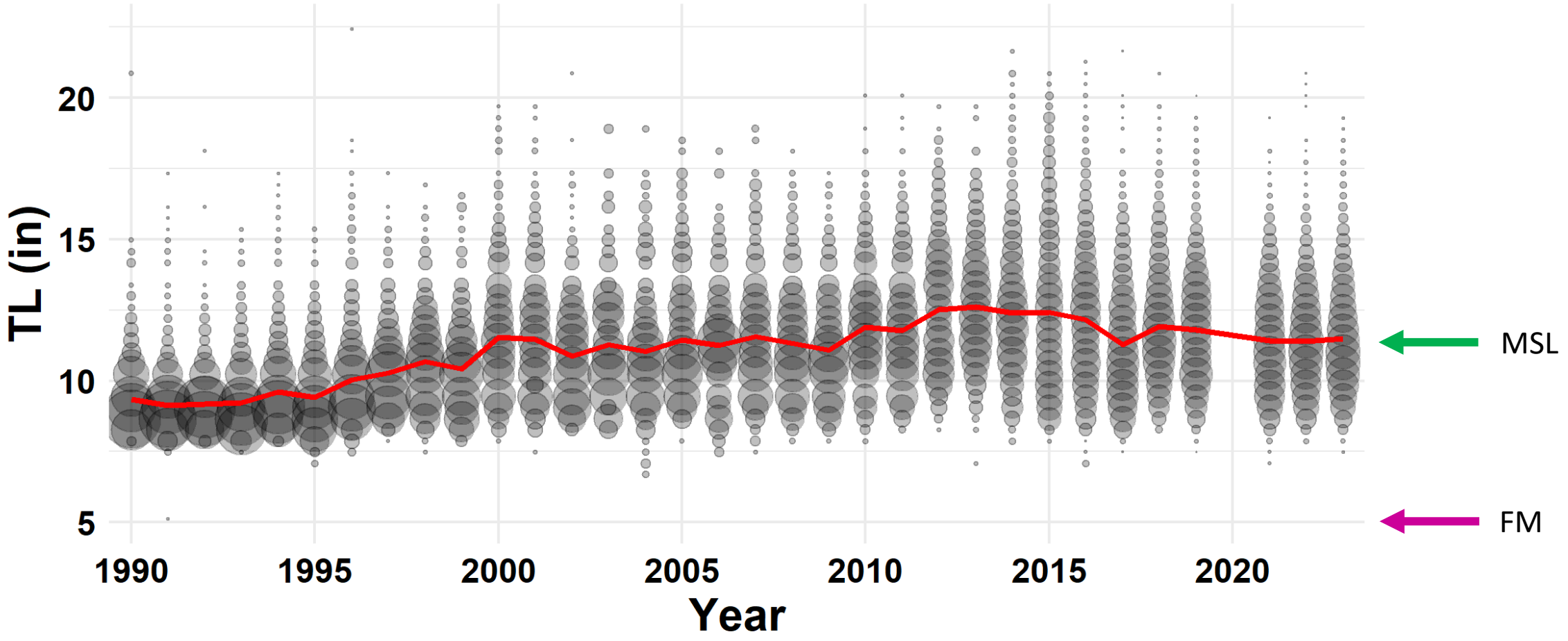
# Vermilion Snapper



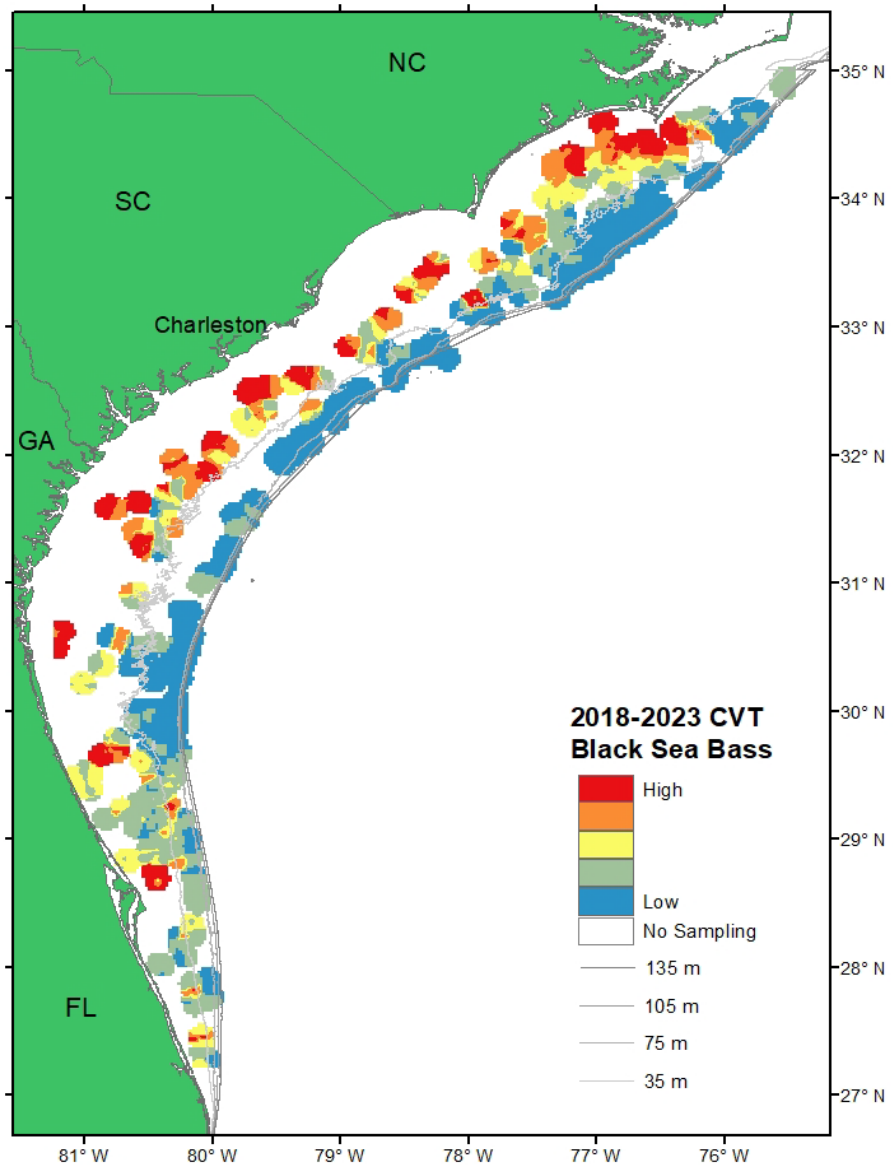



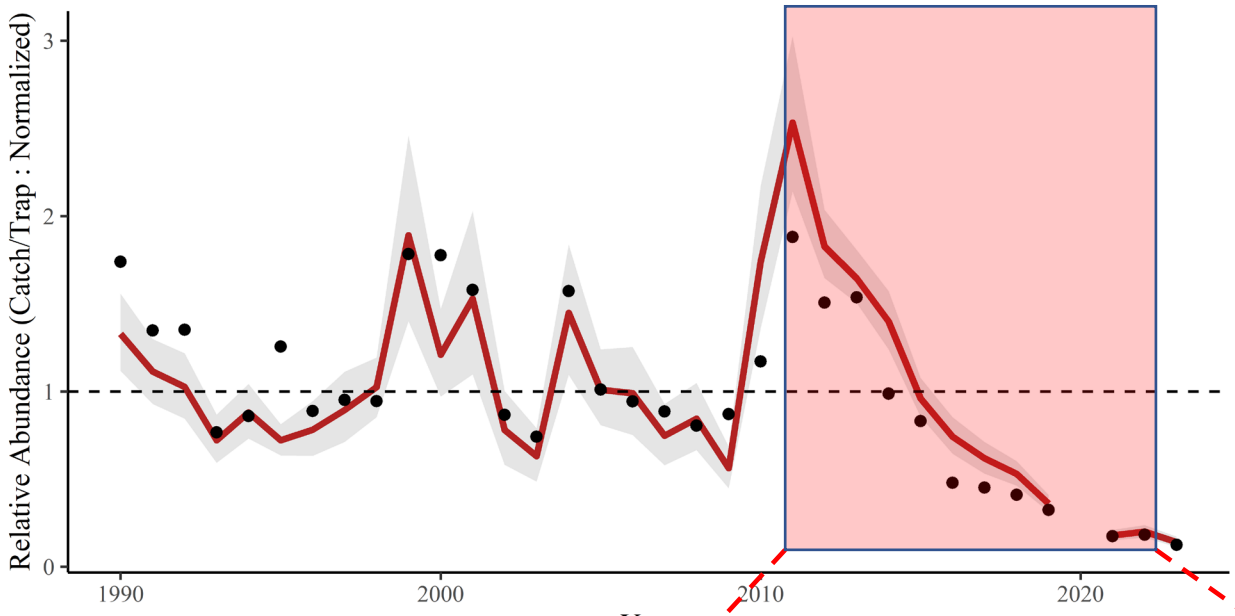



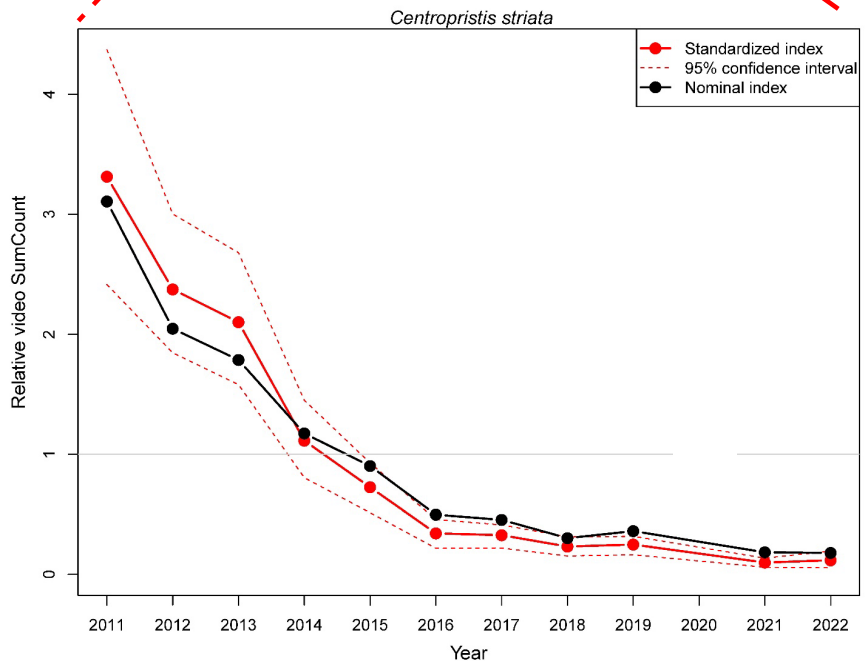
# Vermilion Snapper



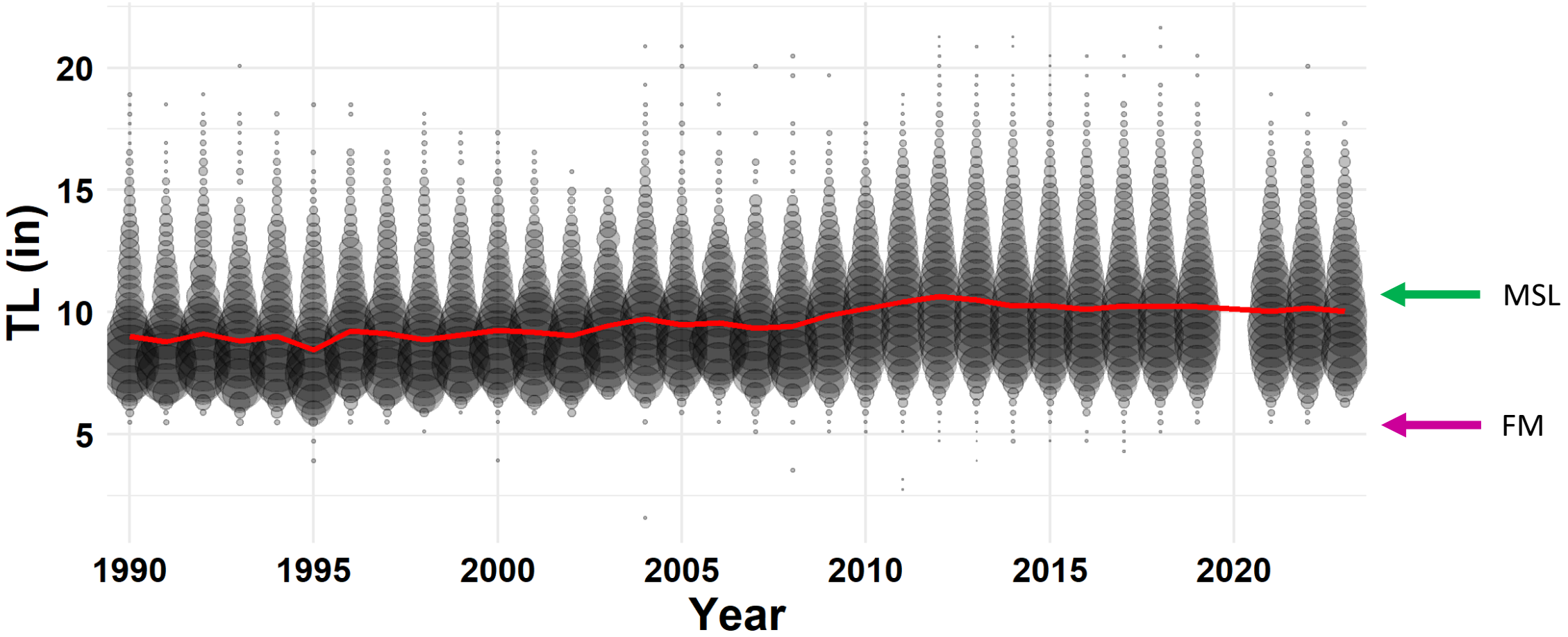
# Black Sea Bass



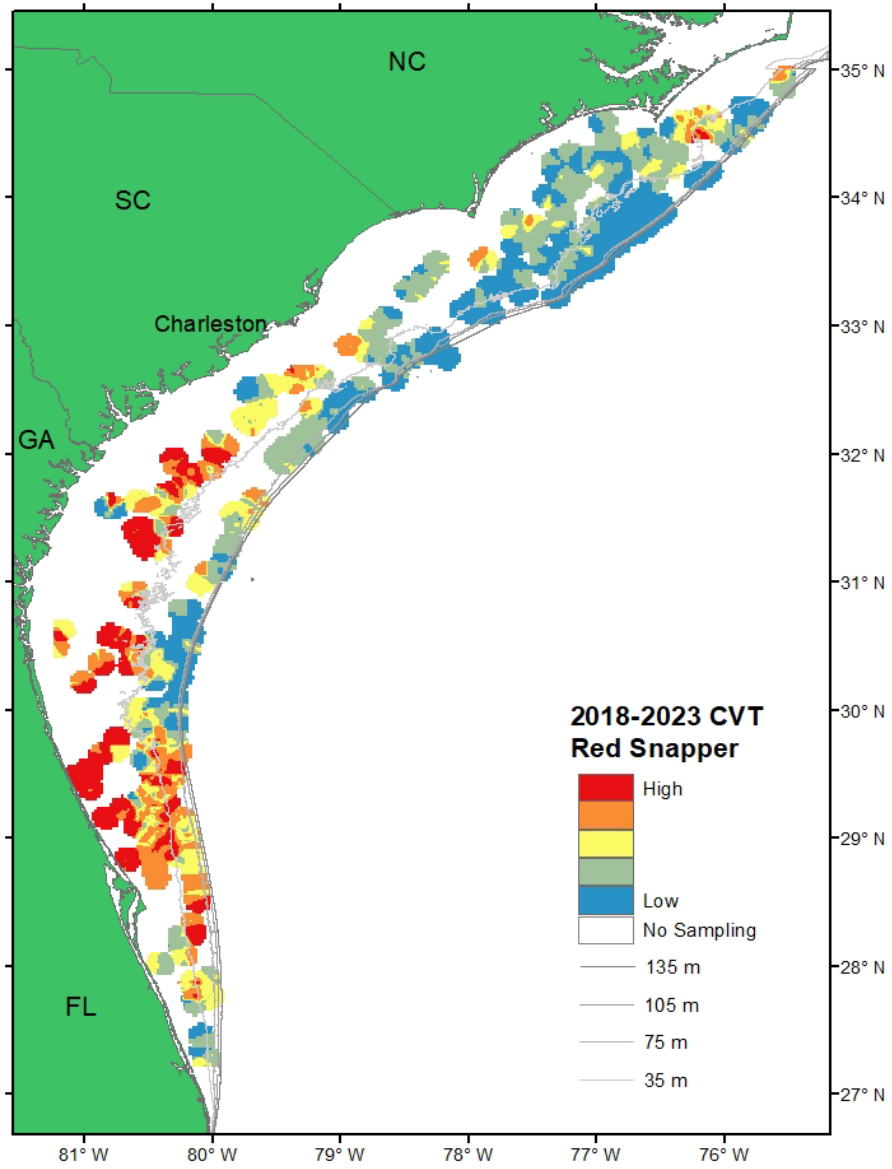



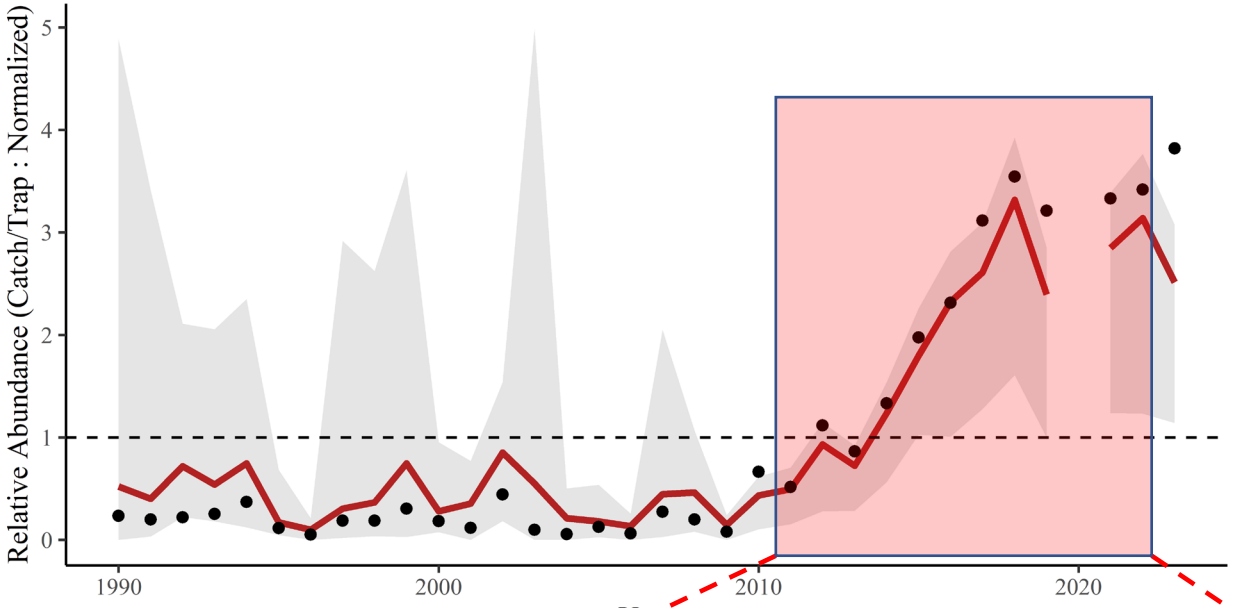



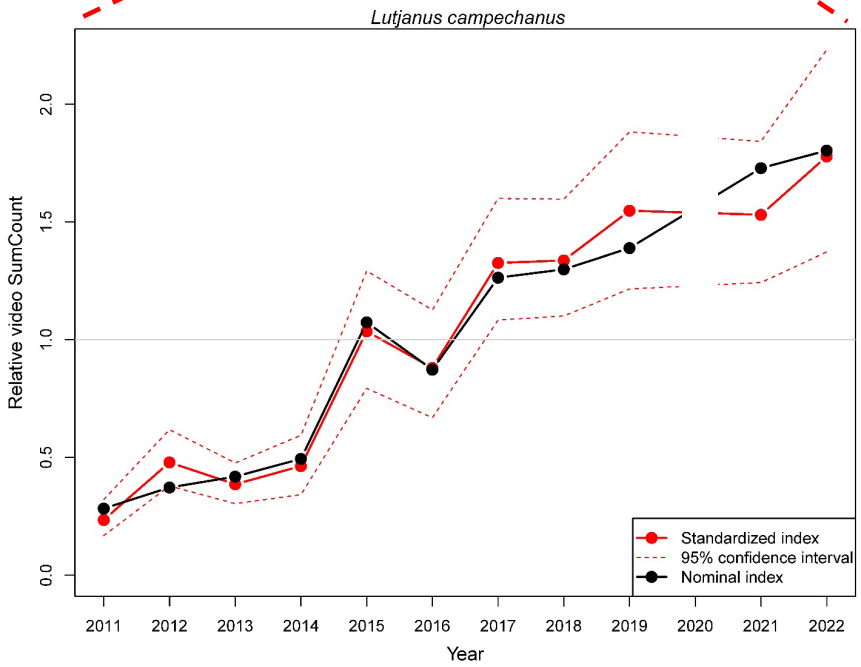
# Black Sea Bass



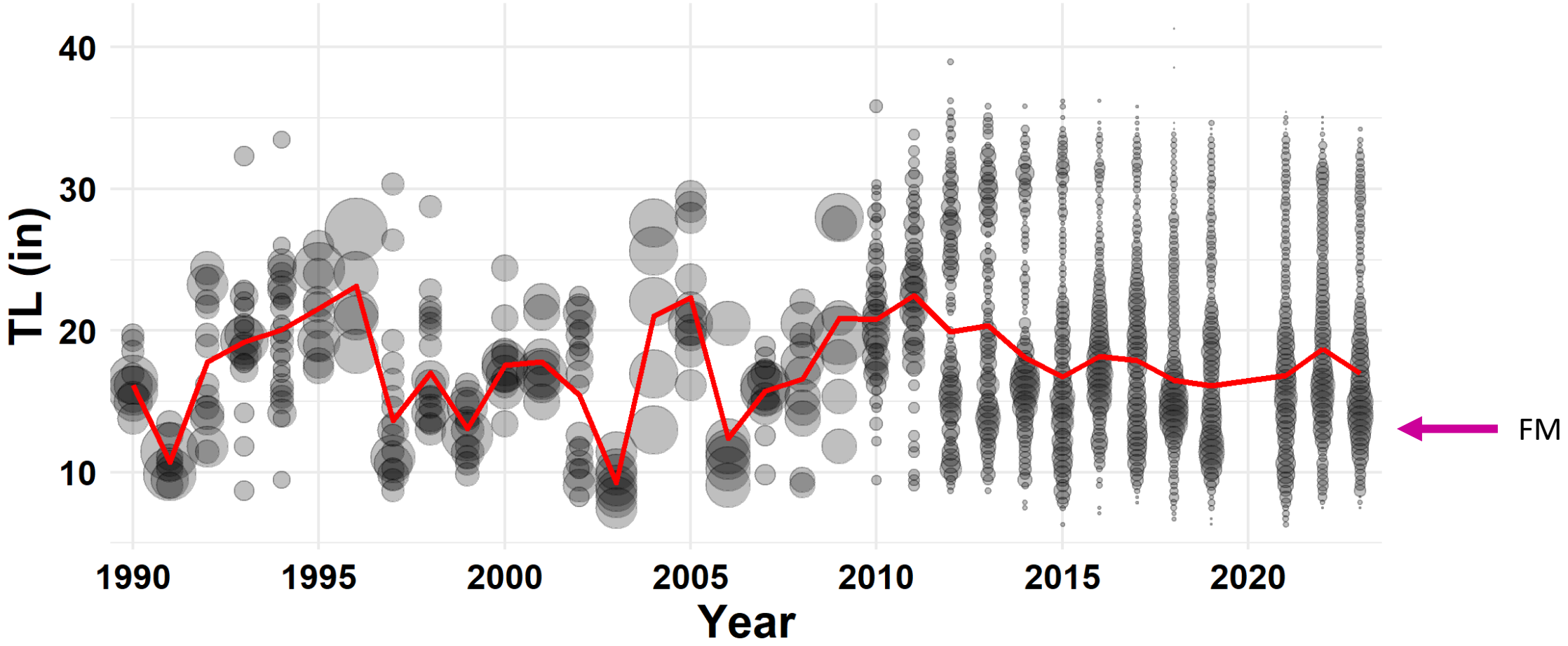
# Red Snapper

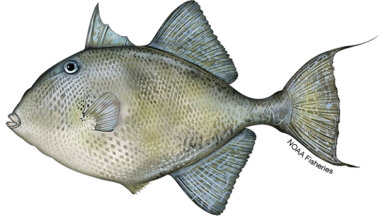

NC
SC
Charleston
GA
FL
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W
2018-2023 CVT
Red Snapper
High
Low
No Sampling
135 m
105 m
75 m
35 m


Relative Abundance (Catch/Trap : Normalized)
0
1
2
3
4
5
1990
2000
2010
2020
Year

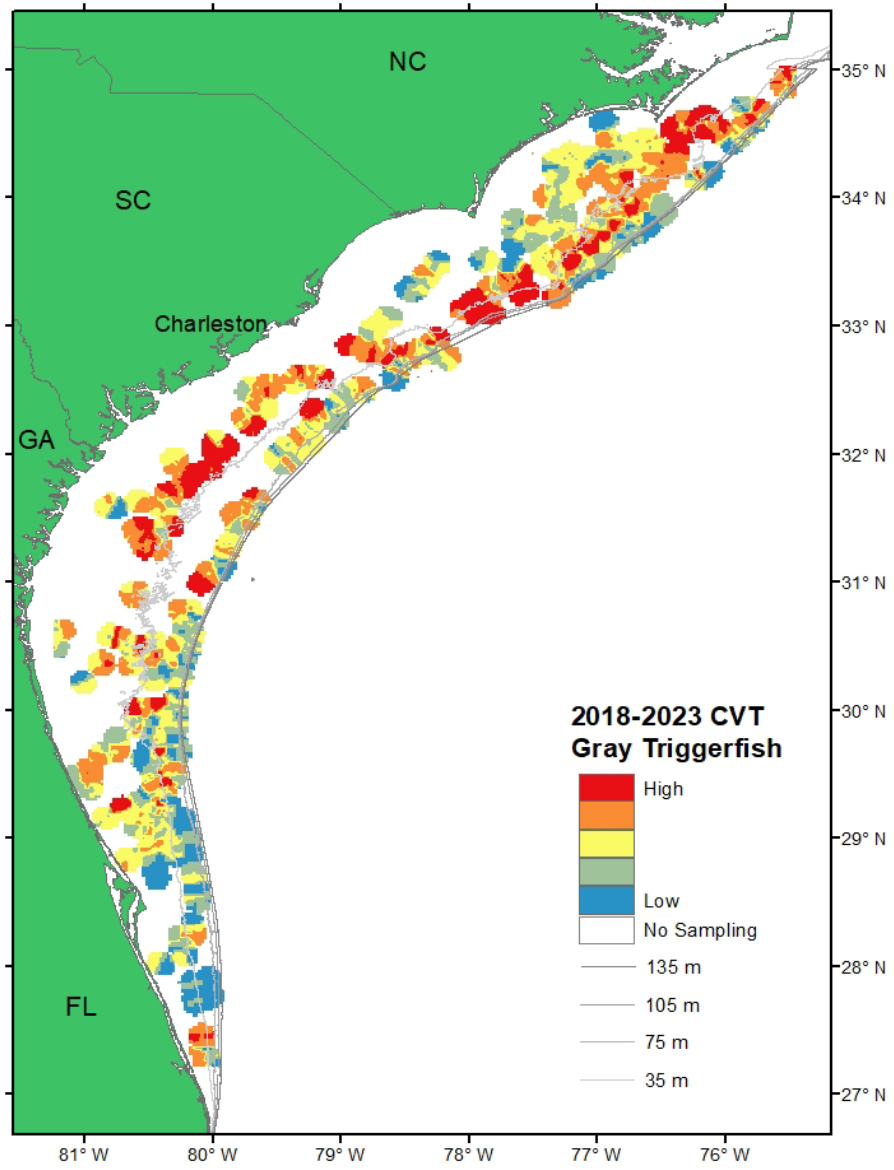

Lutjanus campechanus
Relative video SumCount
0.0
0.5
1.0
1.5
2.0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Standardized index
95% confidence interval
Nominal index

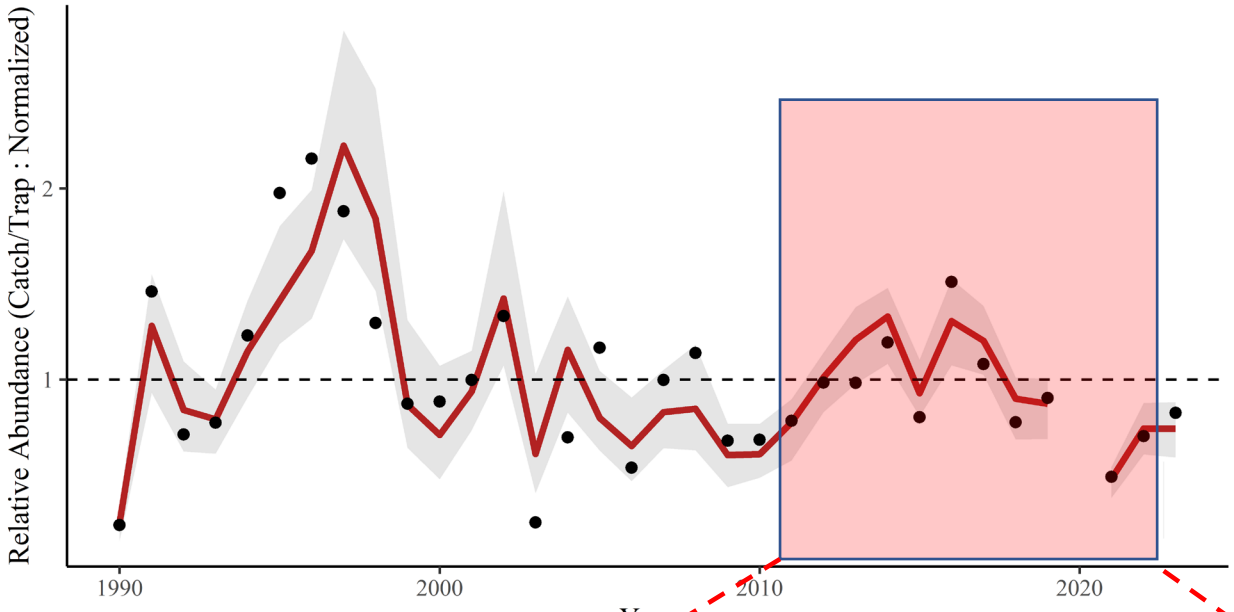
# Red Snapper

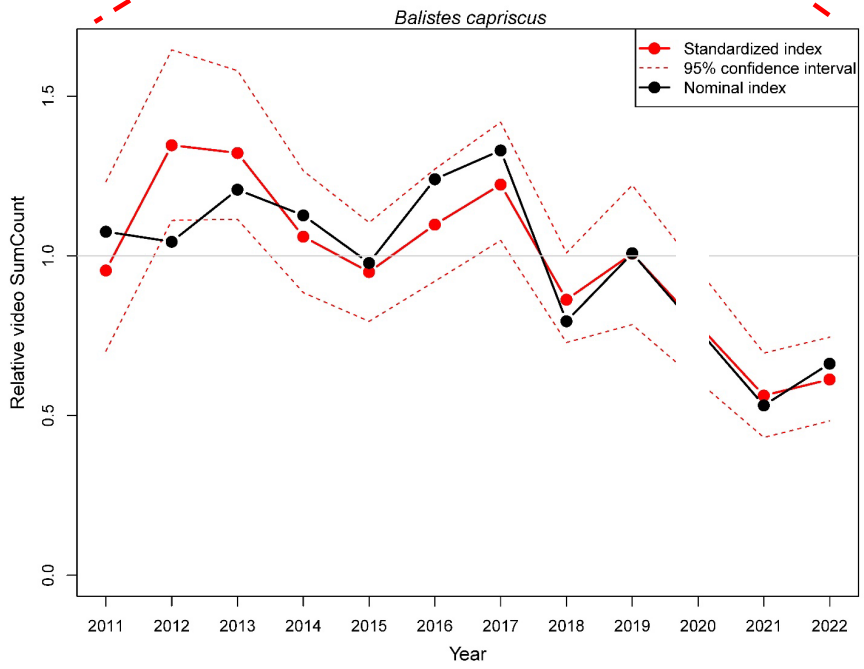


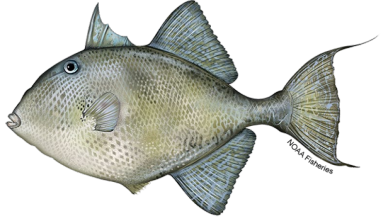


# Gray Triggerfish

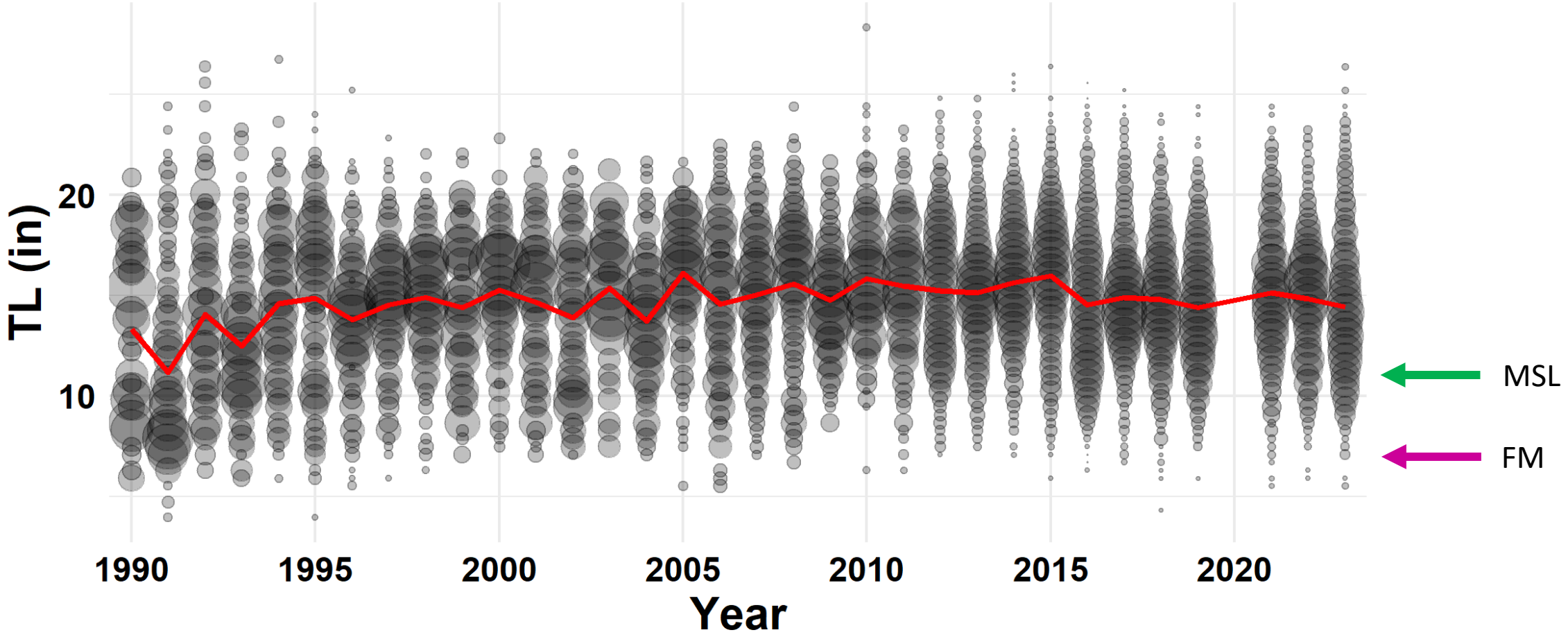


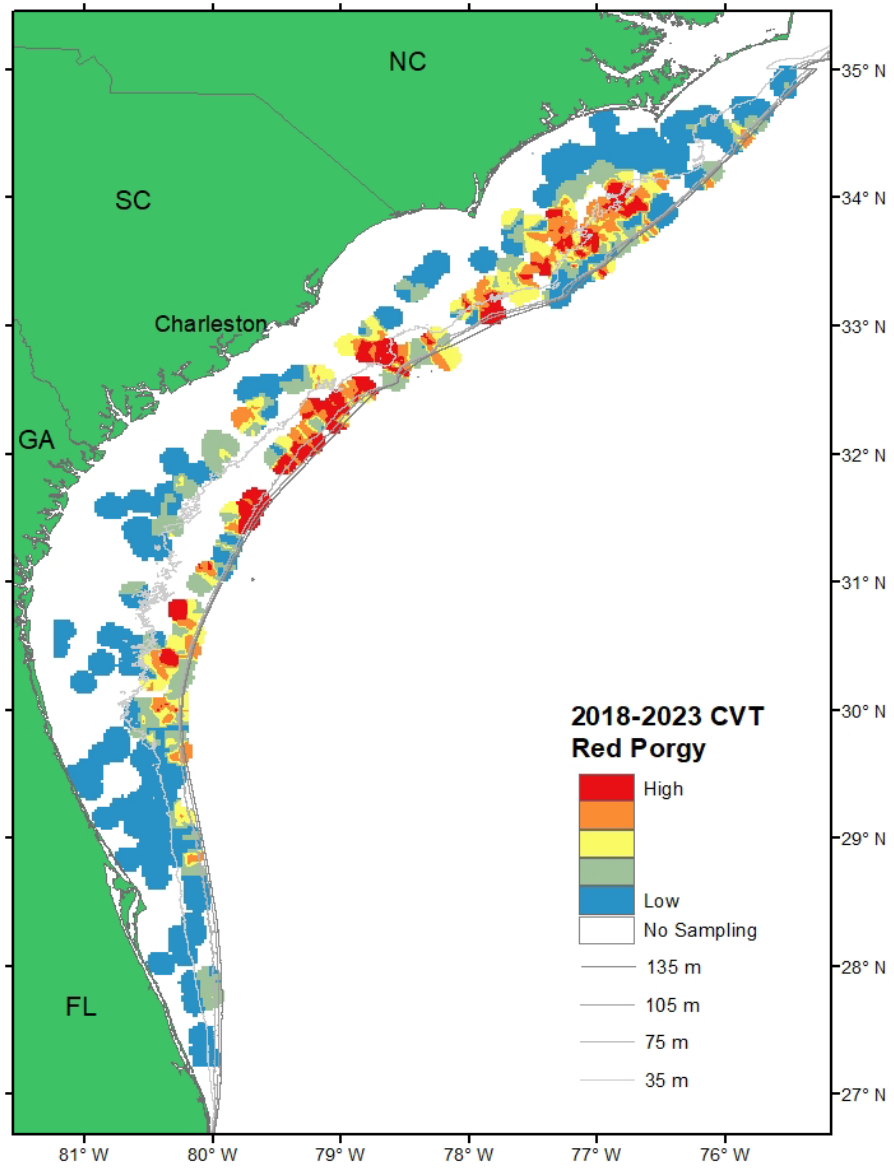



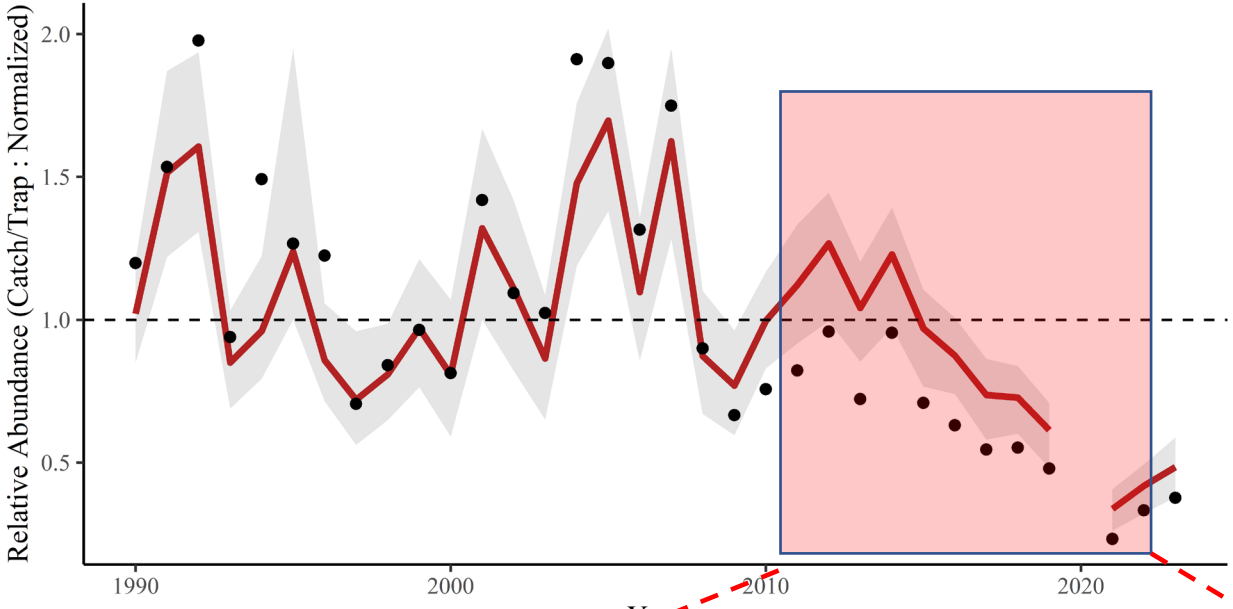


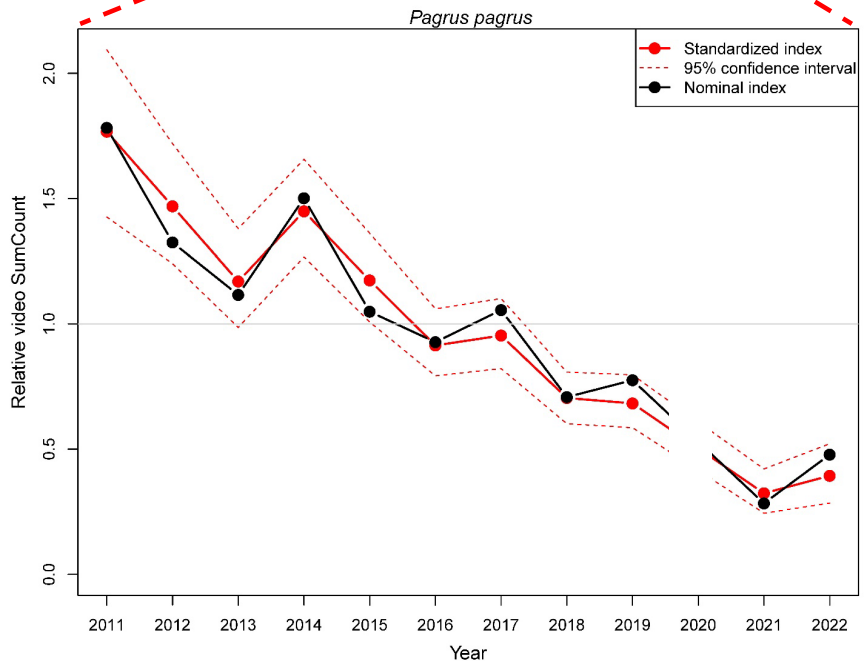
# Gray Triggerfish



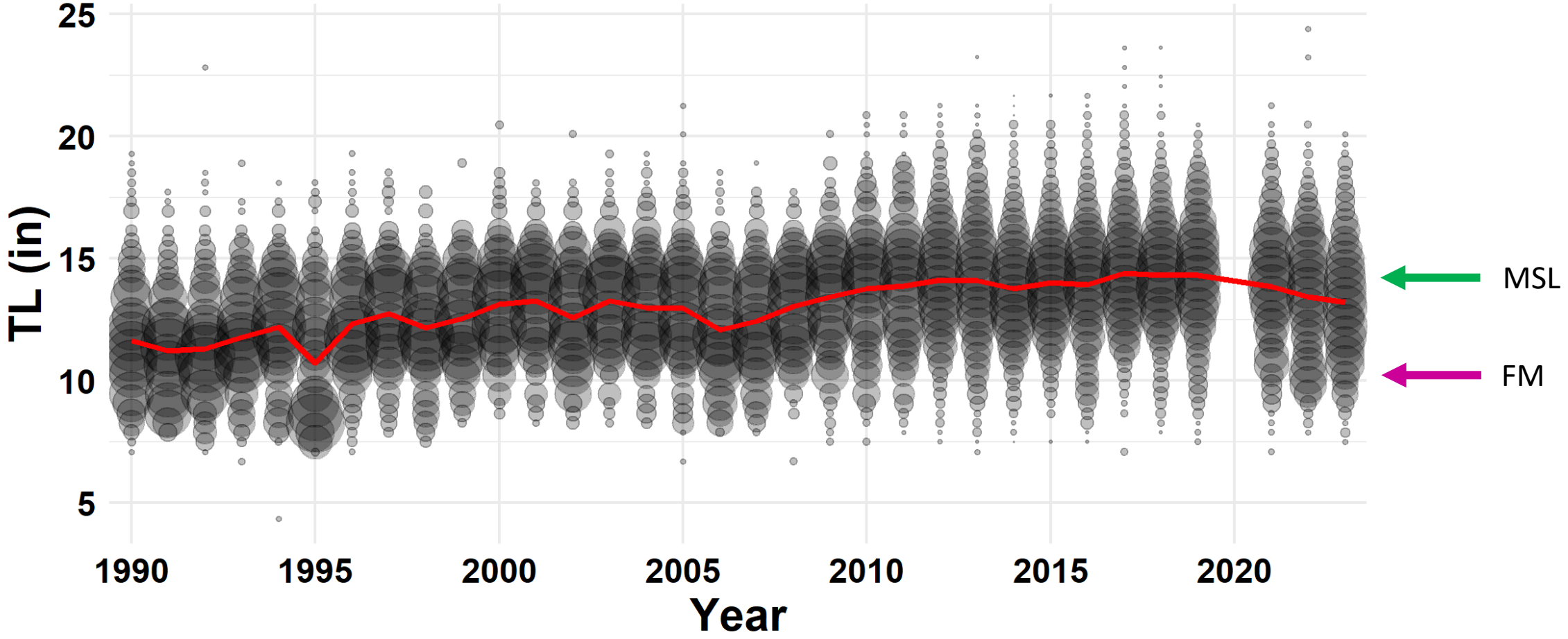
# Red Porgy

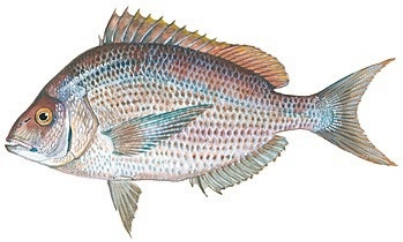

NC
SC
Charleston
GA
FL
2018-2023 CVT
Red Porgy
High
Low
No Sampling
135 m
105 m
75 m
35 m
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W


Relative Abundance (Catch/Trap : Normalized)
2.0
1.5
1.0
0.5
1990
2000
2010
2020
Year

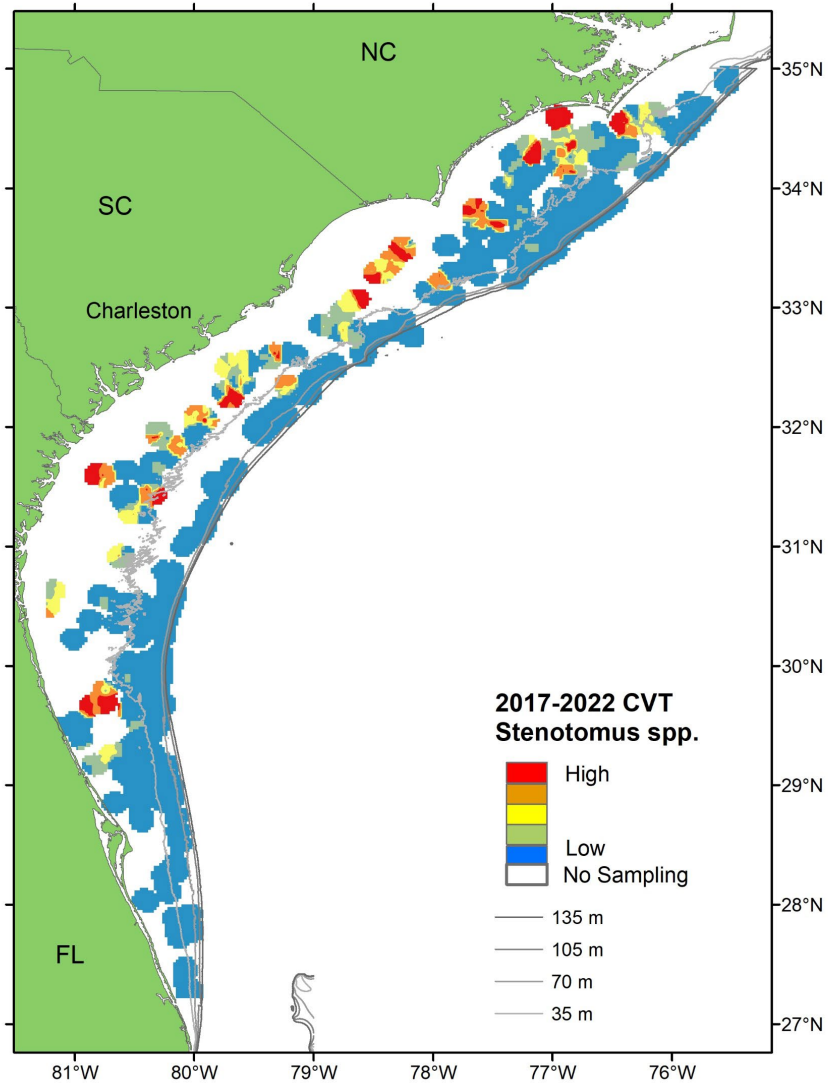

Pagrus pagrus
Standardized index
95% confidence interval
Nominal index
Relative video SumCount
2.0
1.5
1.0
0.5
0.0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

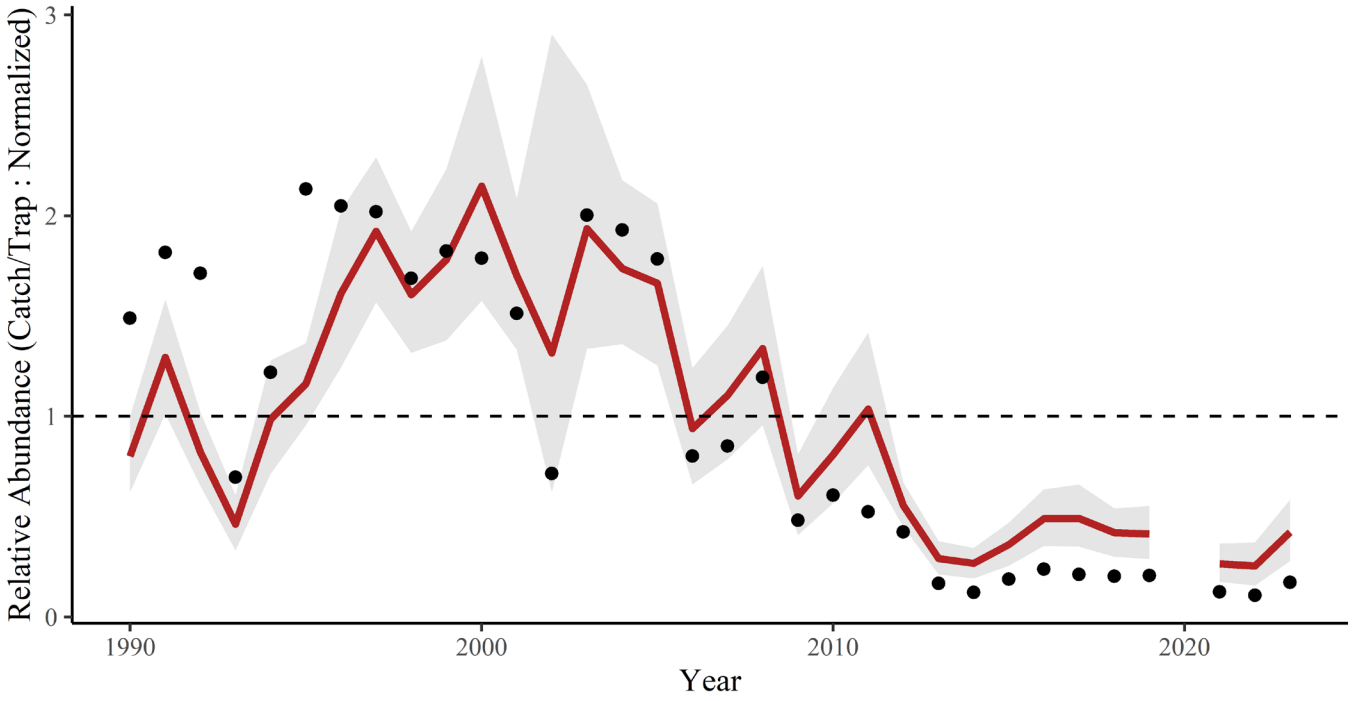
# Red Porgy

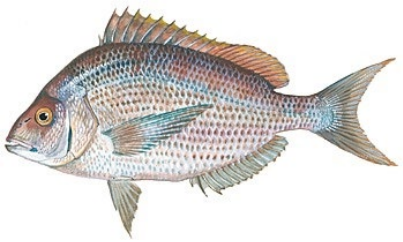

25
20
15
10
5
TL (in)
1990
1995
2000
2005
2010
2015
2020
Year
MSL
FM



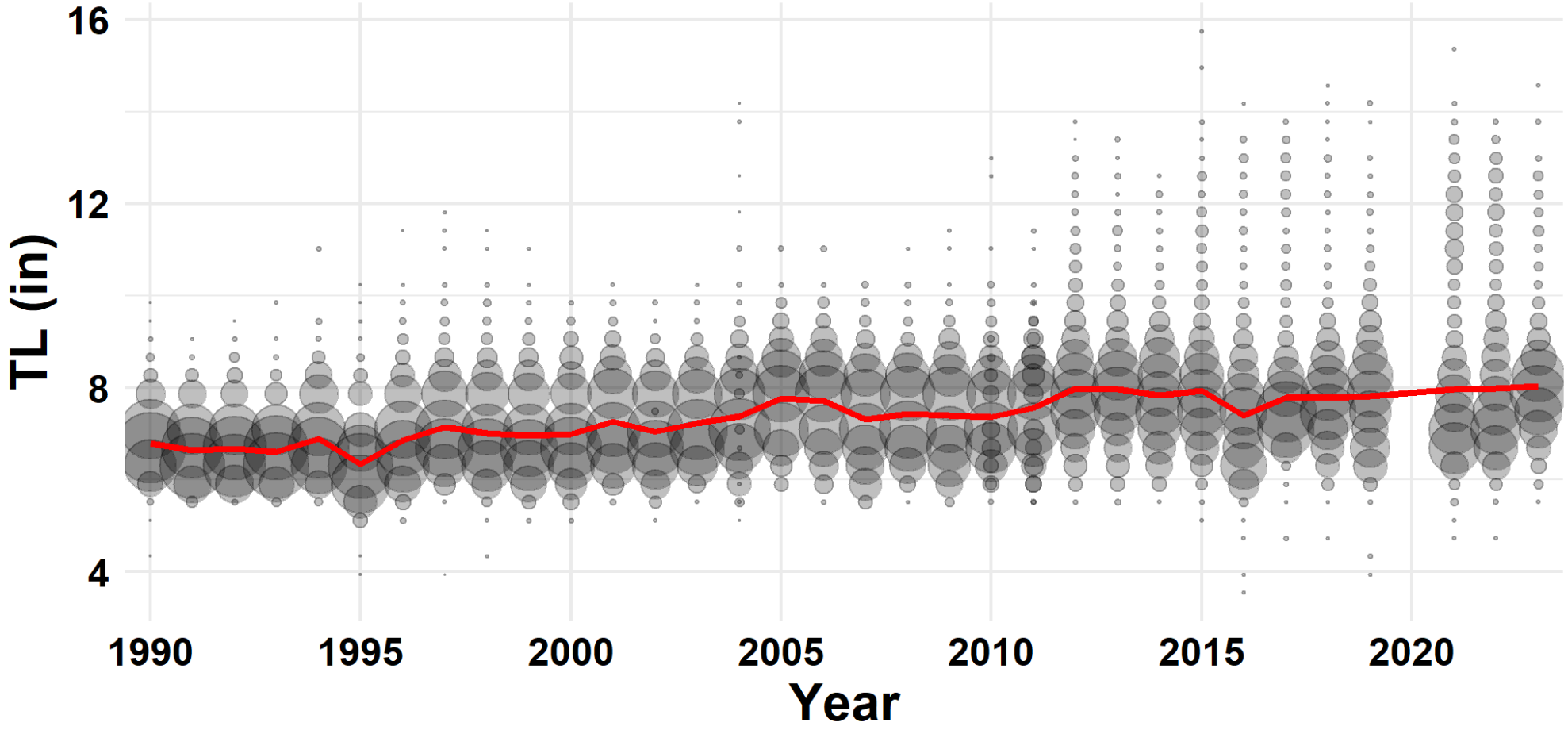
# *Stenotomus* spp.

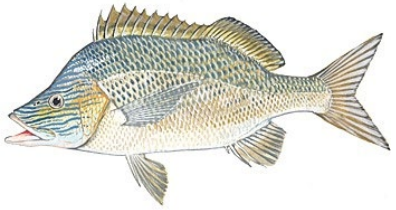


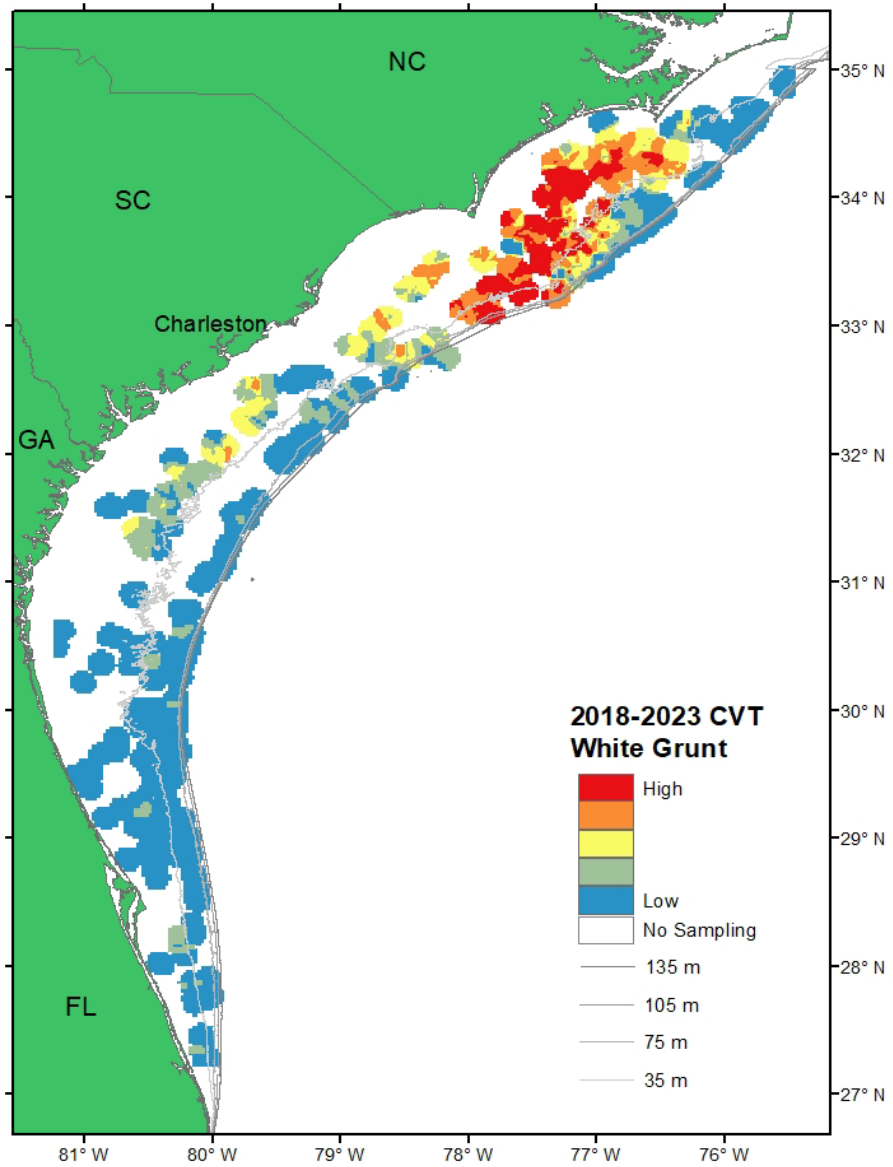


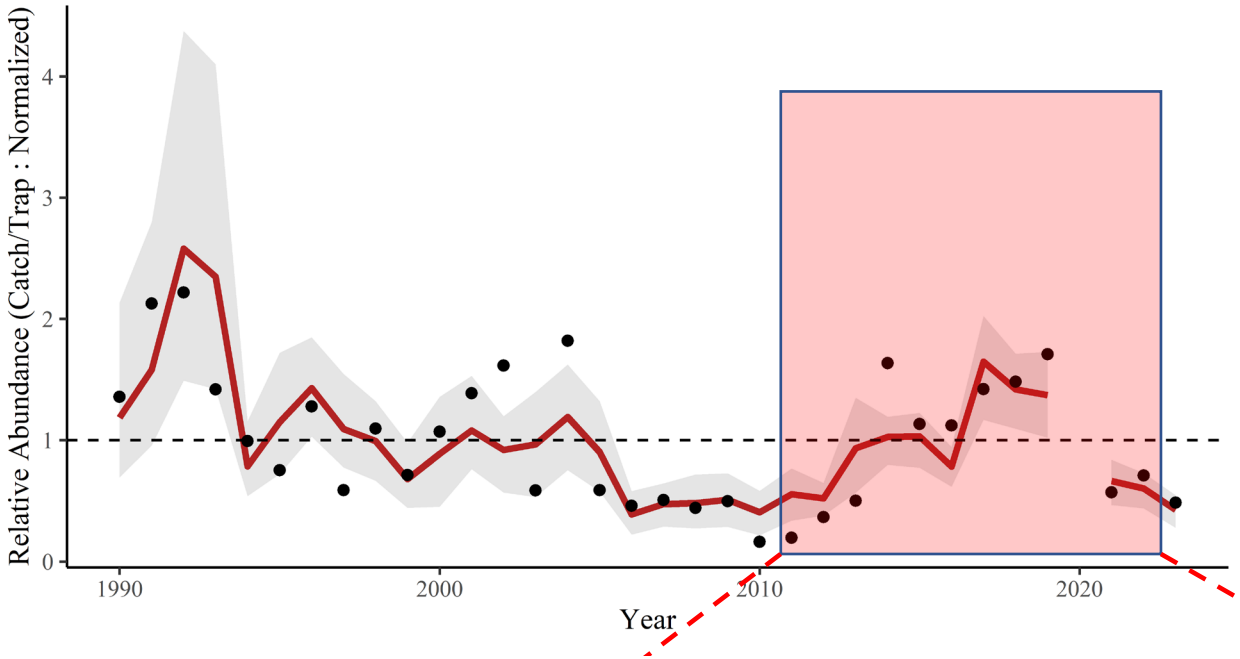
# *Stenotomus* spp.

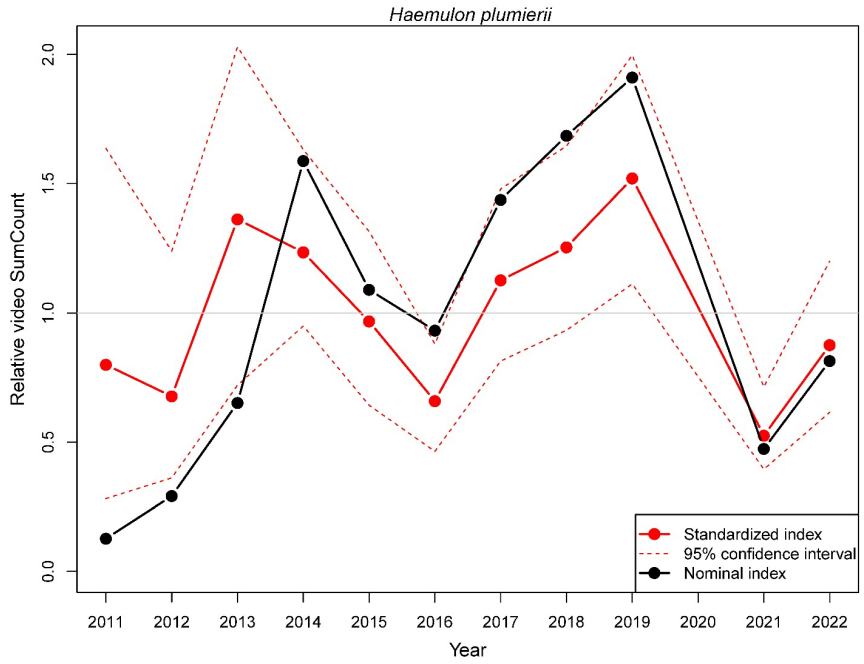


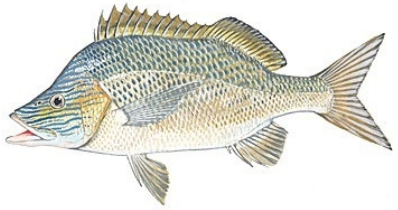


# White Grunt

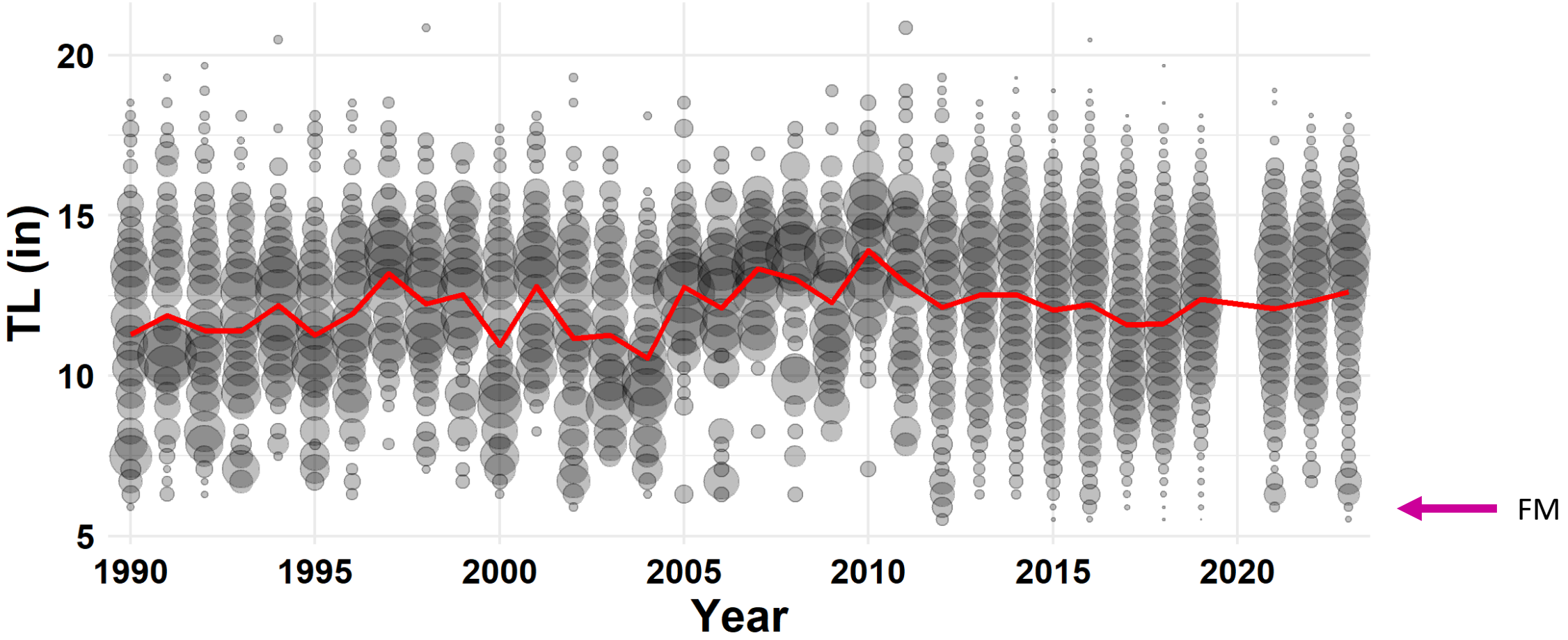

NC
SC
Charleston
GA
FL
2018-2023 CVT
White Grunt
High
Low
No Sampling
135 m
105 m
75 m
35 m
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W

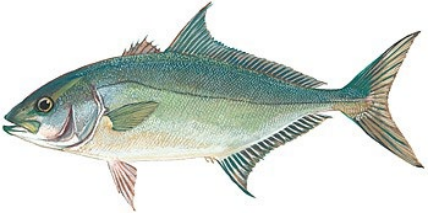

Relative Abundance (Catch/Trap : Normalized)
0
1
2
3
4
1990
2000
2010
2020
Year


Haemulon plumierii
Relative video SumCount
0.0
0.5
1.0
1.5
2.0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Standardized index
95% confidence interval
Nominal index

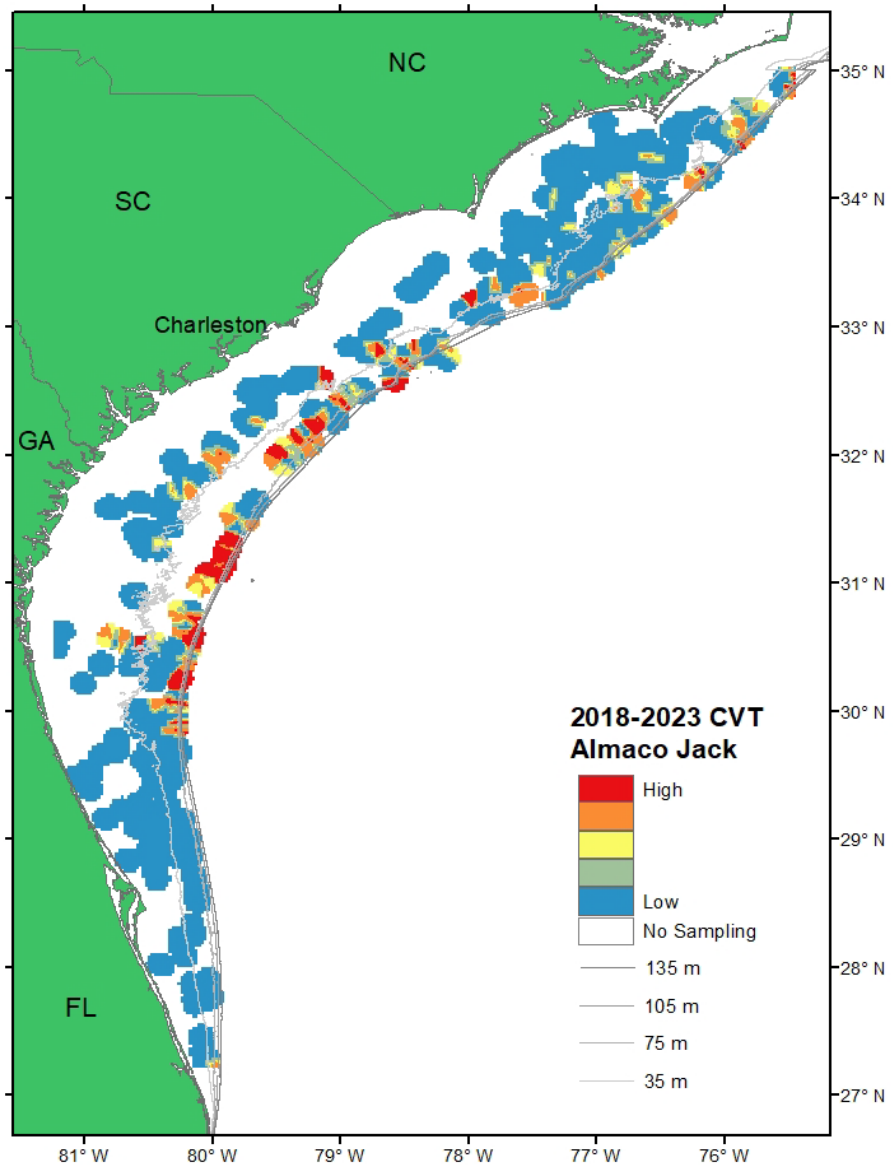


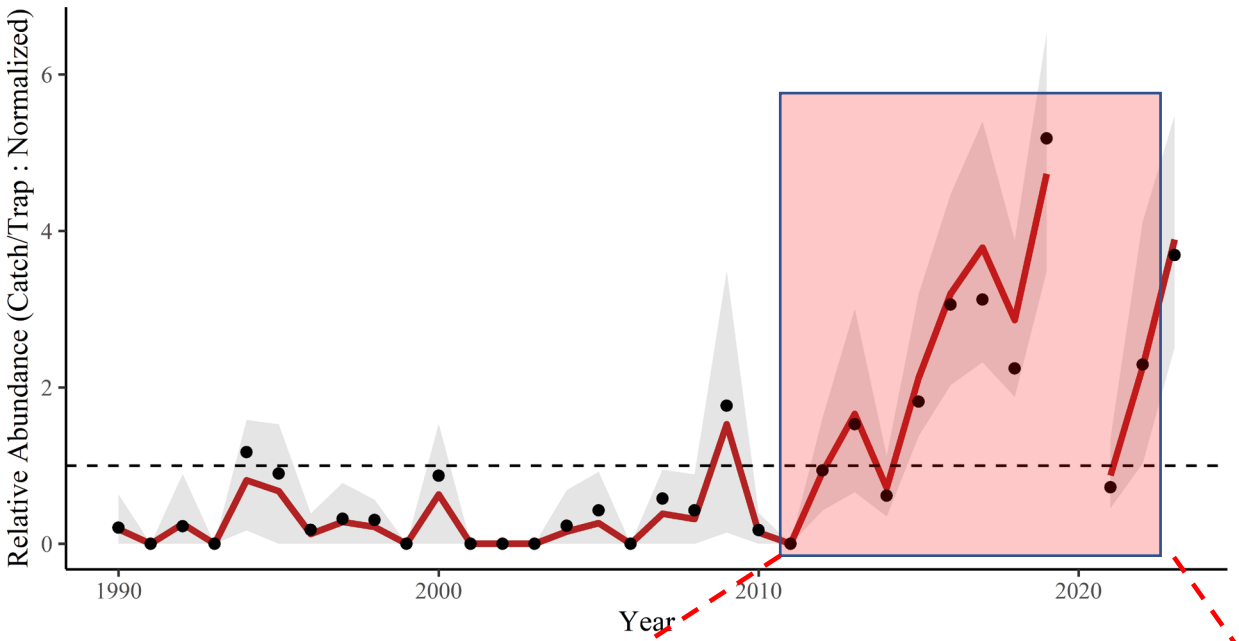
# White Grunt

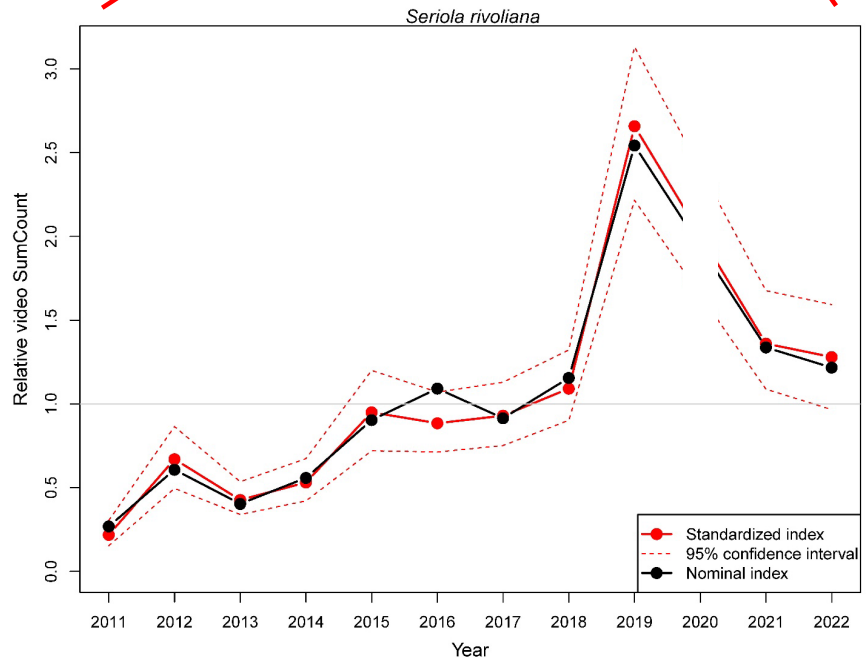


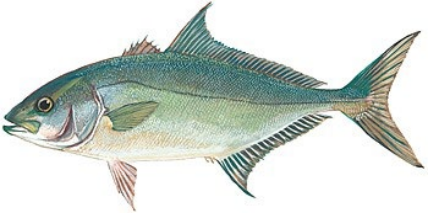


# Almaco Jack

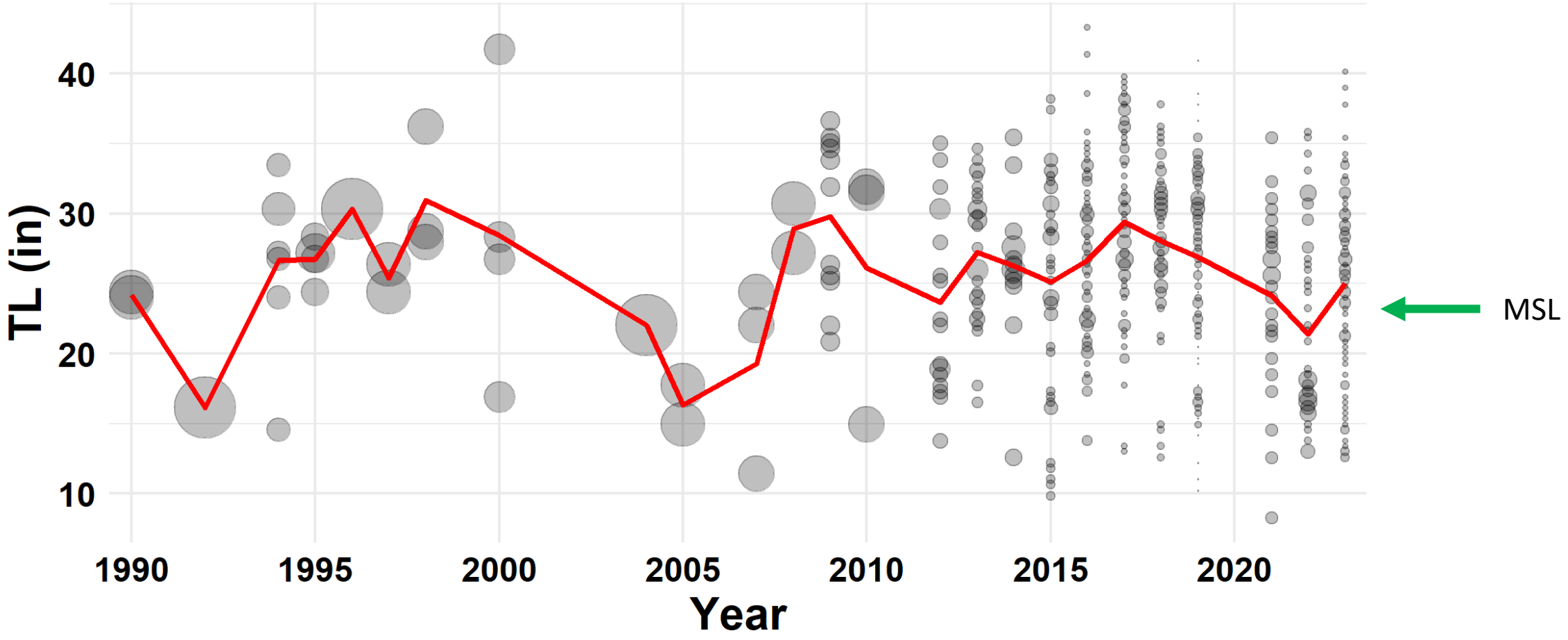

NC
SC
Charleston
GA
FL
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W
2018-2023 CVT
Almaco Jack
High
Low
No Sampling
135 m
105 m
75 m
35 m

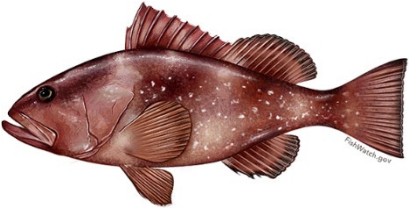

Relative Abundance (Catch/Trap : Normalized)
0
2
4
6
1990
2000
2010
2020
Year


Seriola rivoliana
Relative video SumCount
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Standardized index
95% confidence interval
Nominal index

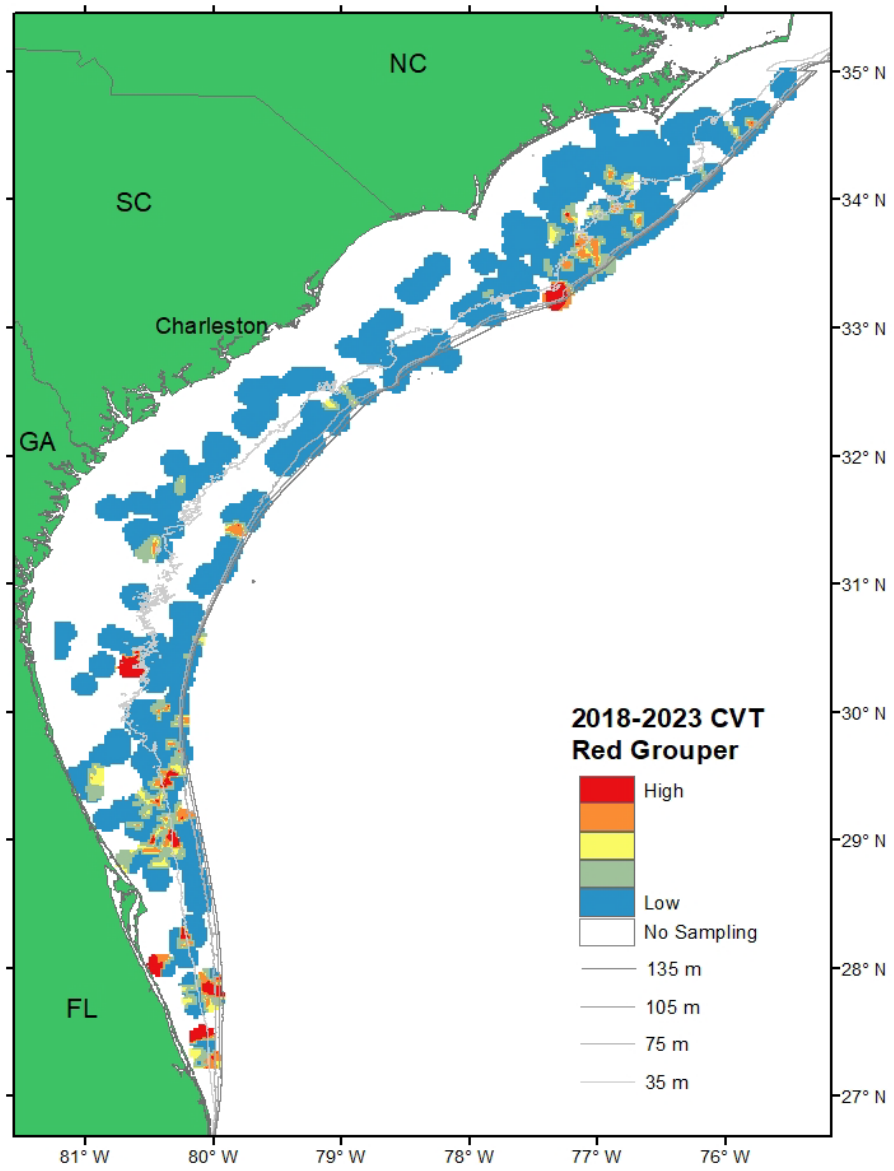


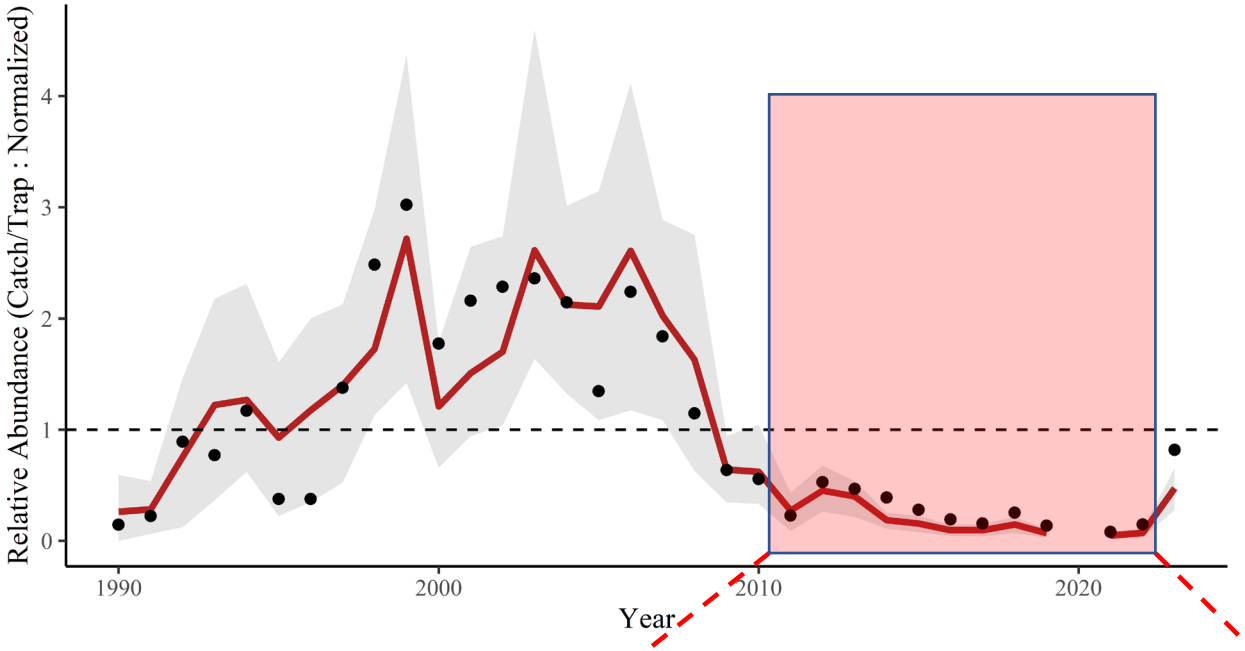
# Almaco Jack

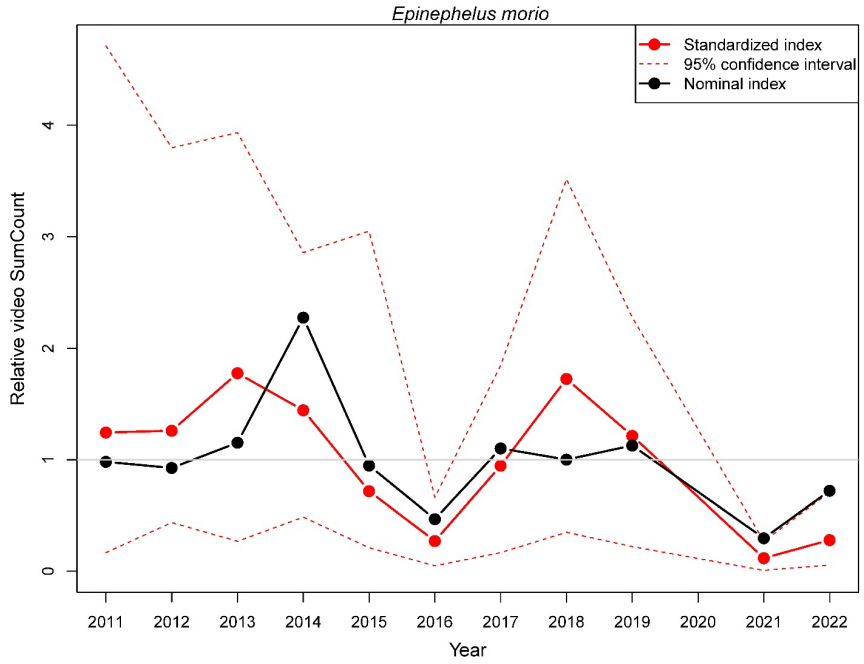


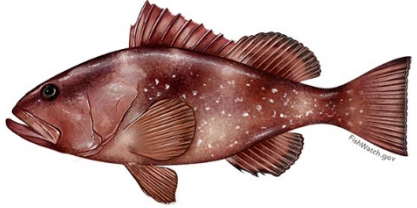


# Red Grouper

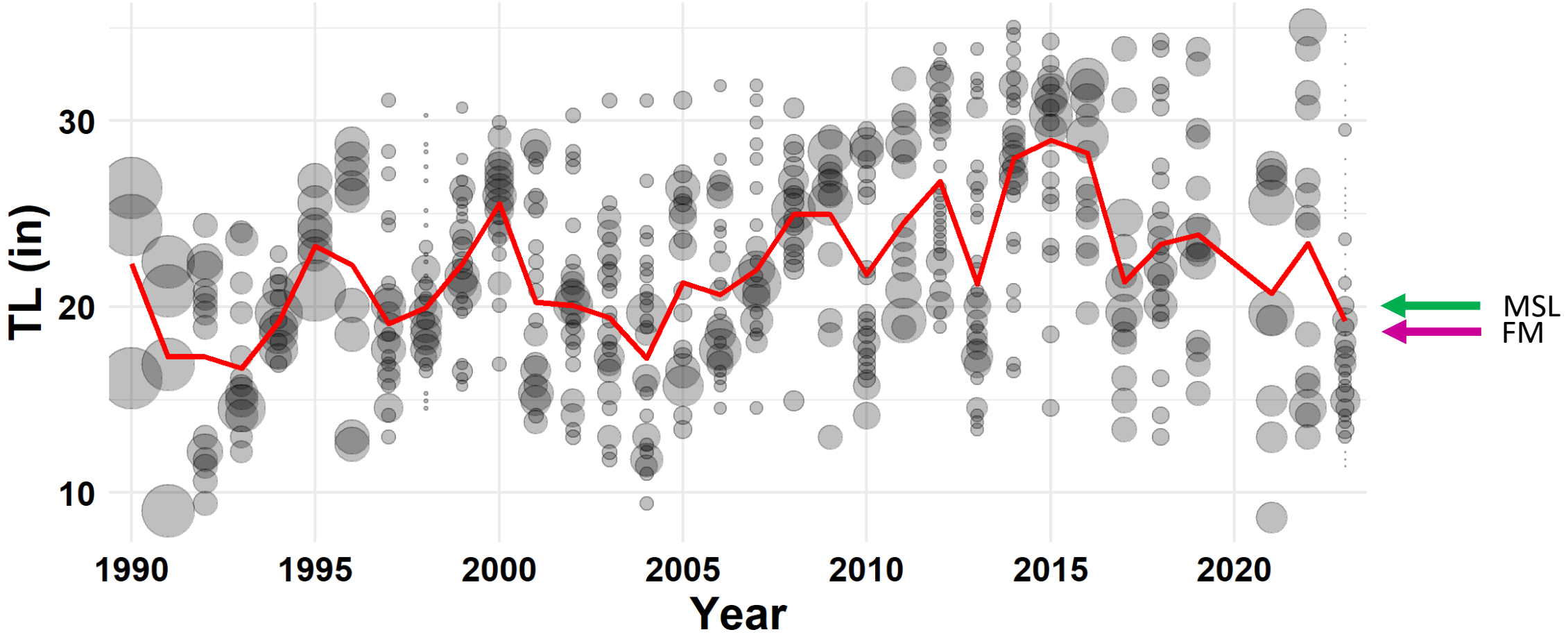

NC
SC
Charleston
GA
FL
2018-2023 CVT
Red Grouper
High
Low
No Sampling
135 m
105 m
75 m
35 m
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W

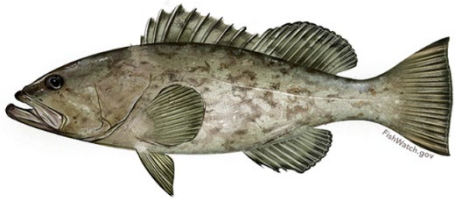

Relative Abundance (Catch/Trap : Normalized)
0
1
2
3
4
1990
2000
2010
2020
Year


Epinephelus morio
Standardized index
95% confidence interval
Nominal index
Relative video SumCount
0
1
2
3
4
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

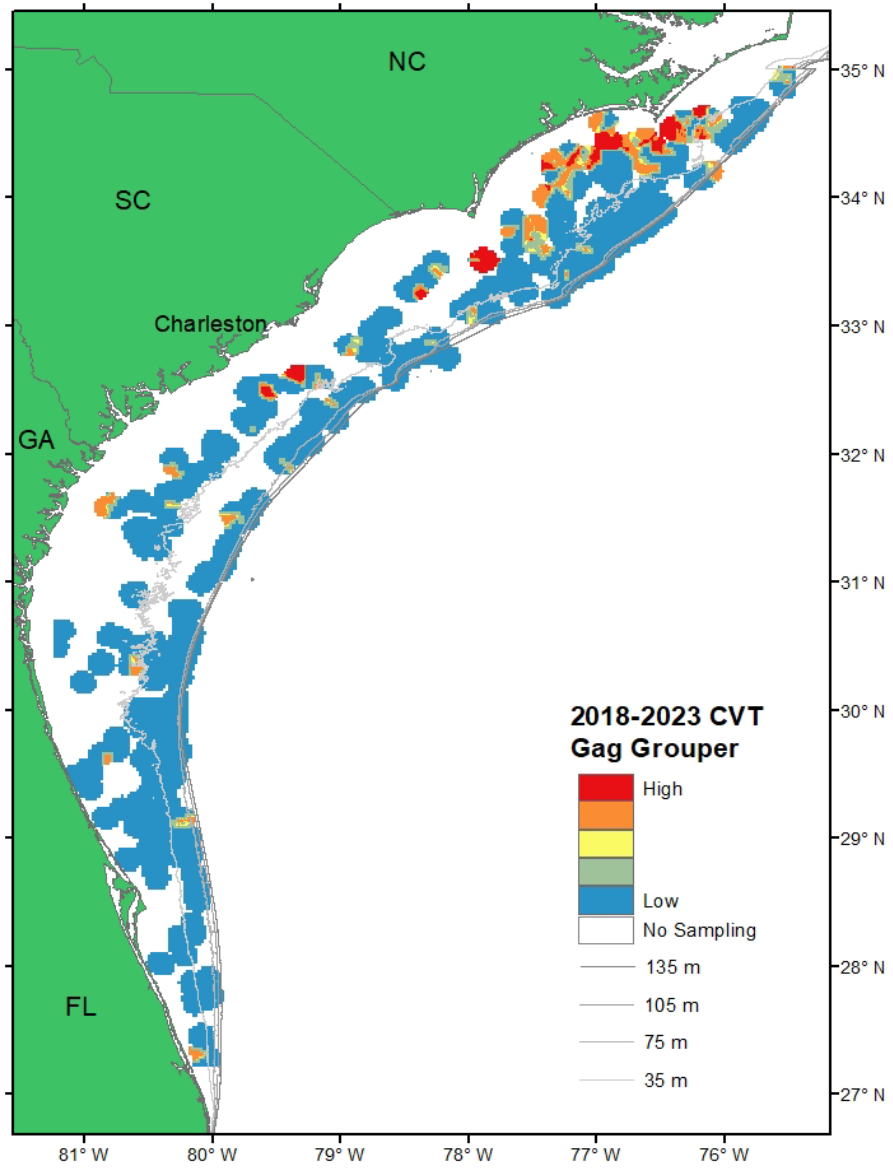


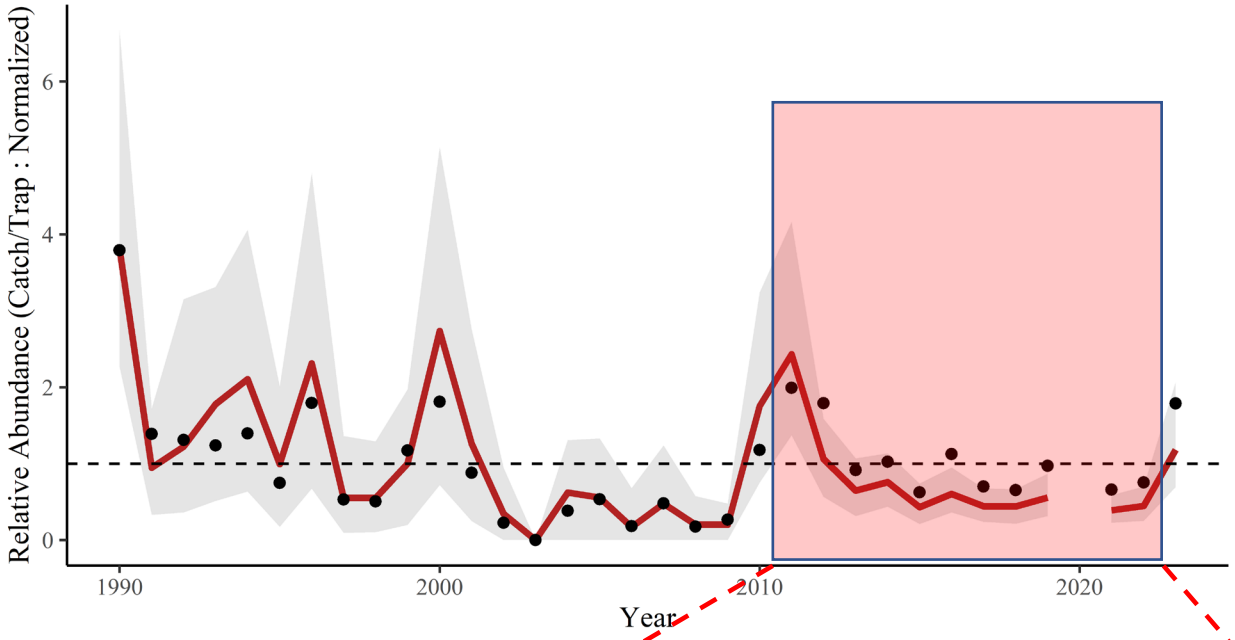
# Red Grouper

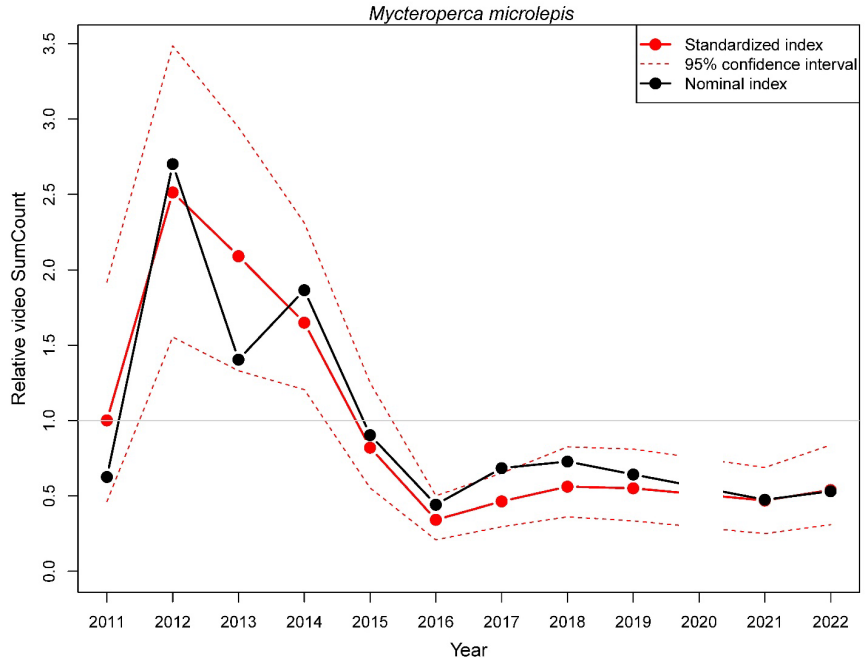


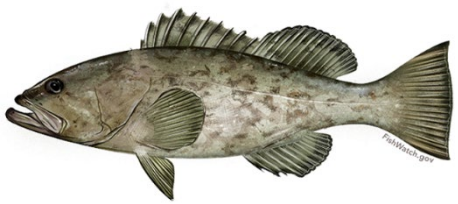


# Gag

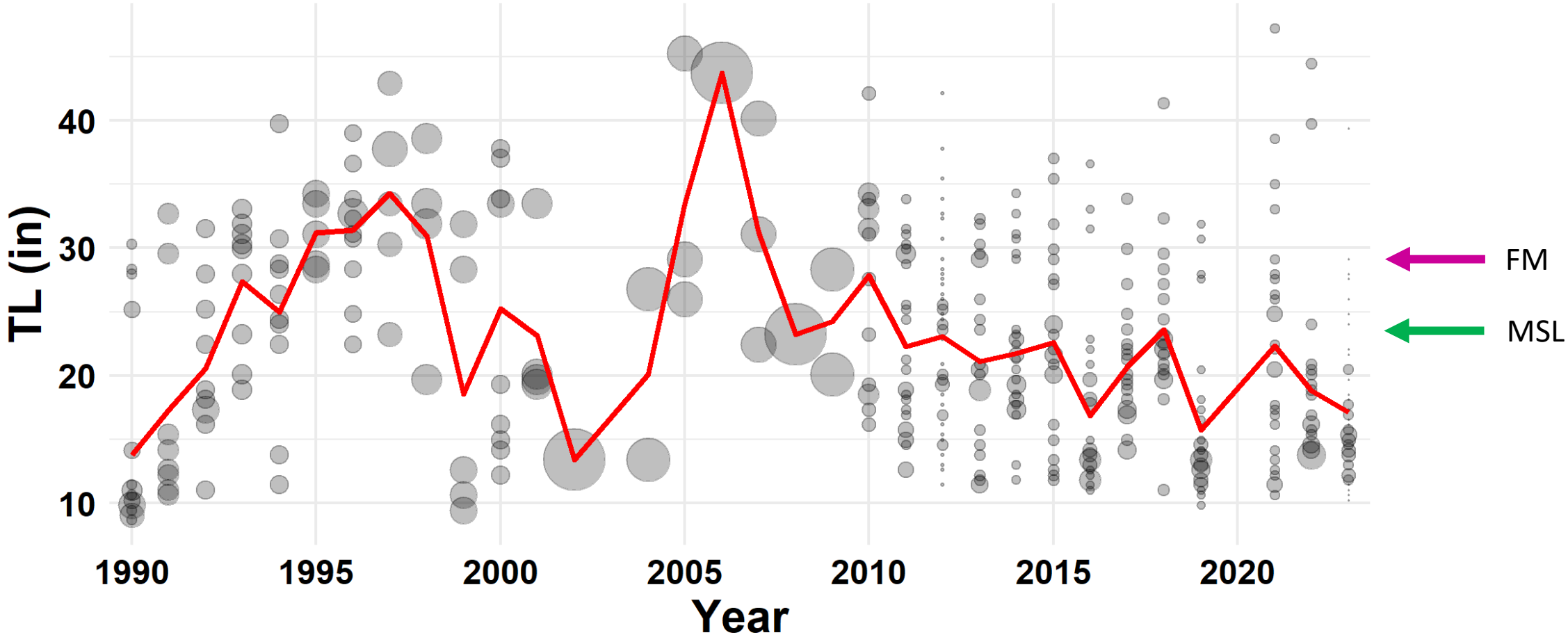

NC
SC
Charleston
GA
FL
2018-2023 CVT
Gag Grouper
High
Low
No Sampling
135 m
105 m
75 m
35 m
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W

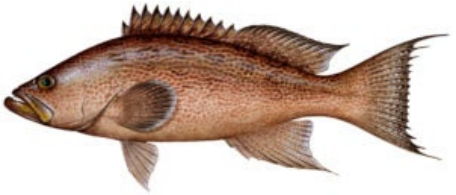

Relative Abundance (Catch/Trap : Normalized)
0
2
4
6
1990
2000
2010
2020
Year


Mycteroperca microlepis
Standardized index
95% confidence interval
Nominal index
Relative video SumCount
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

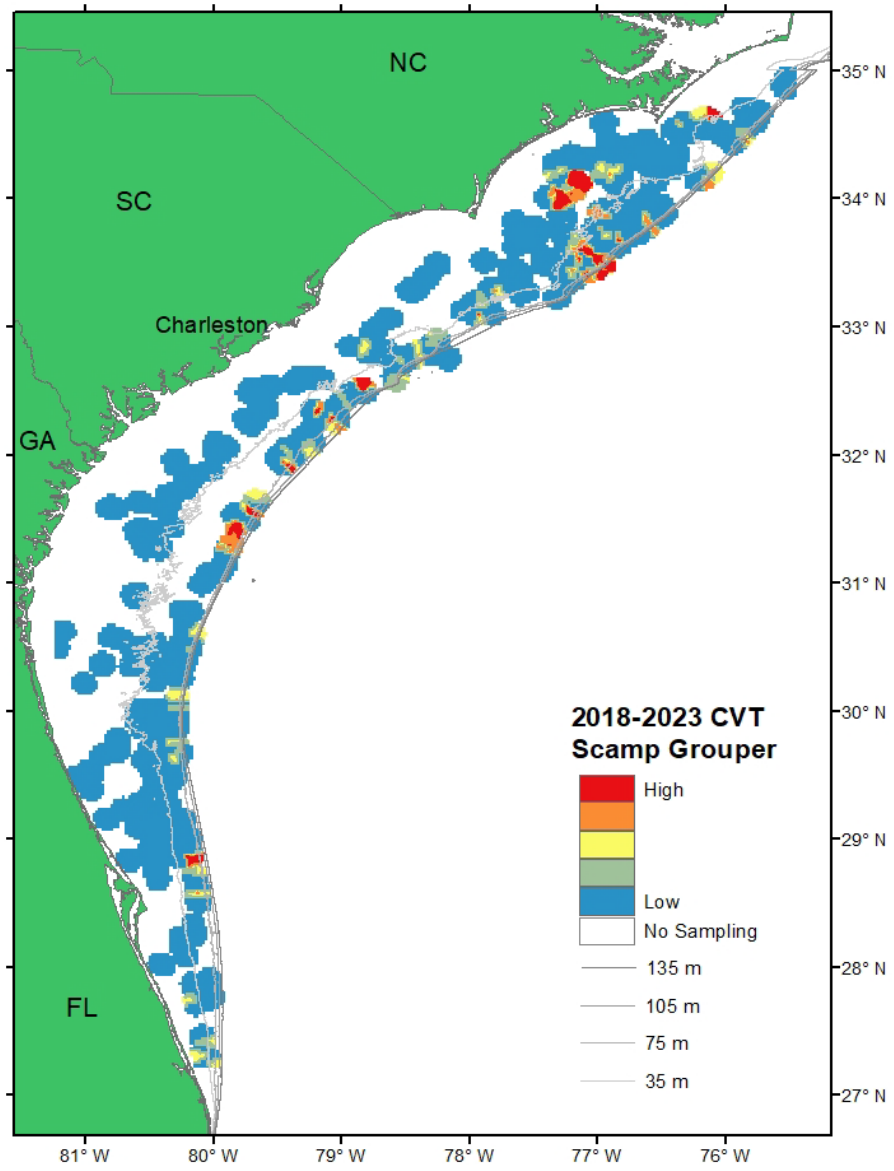


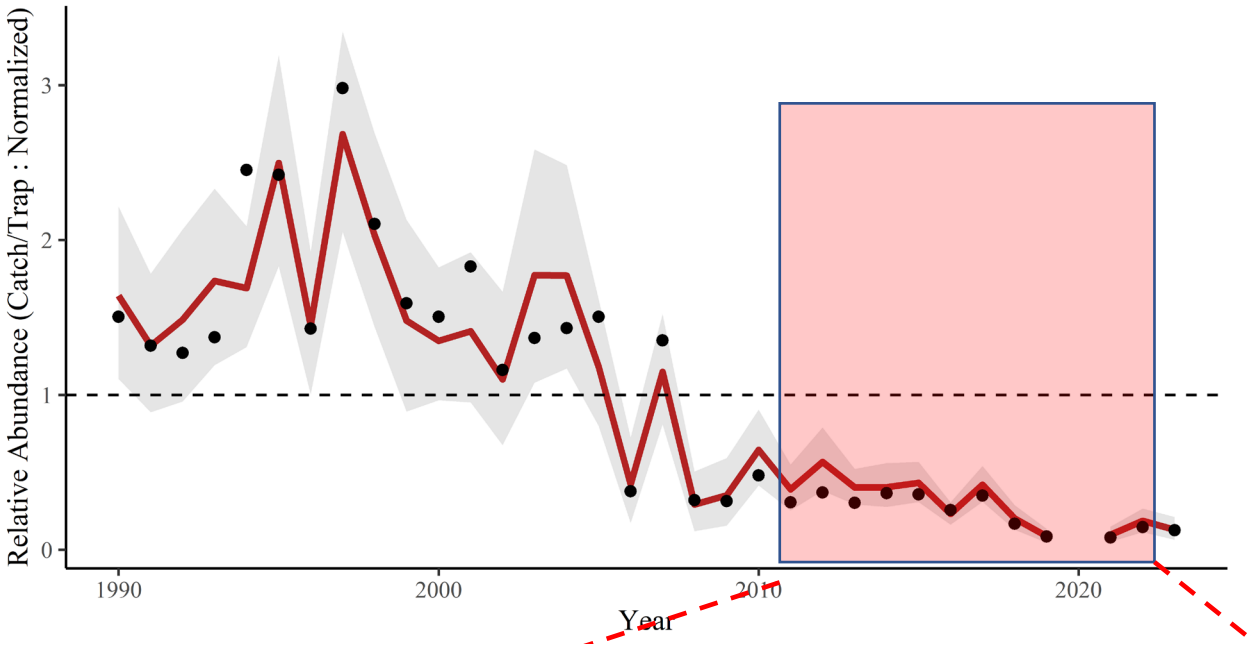
# Gag

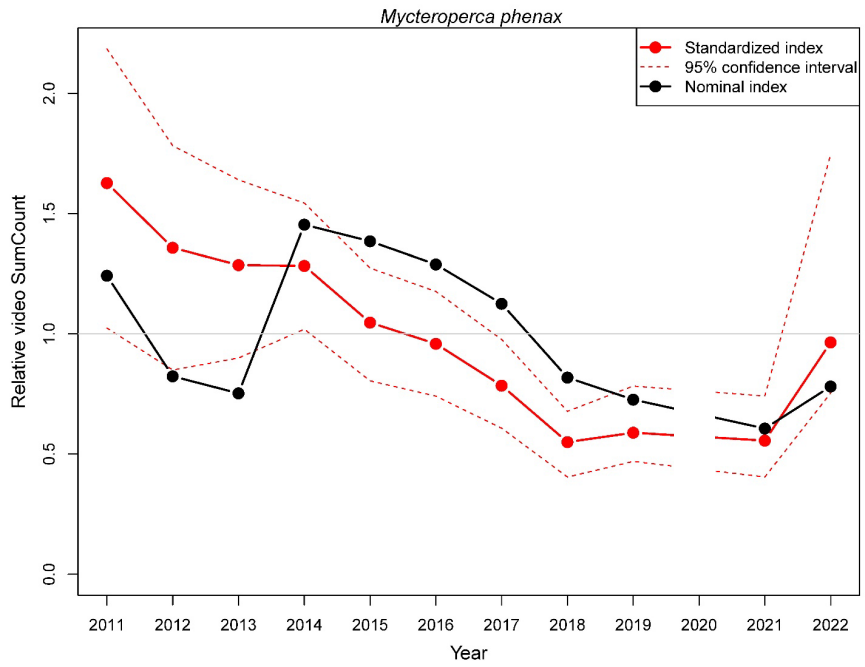


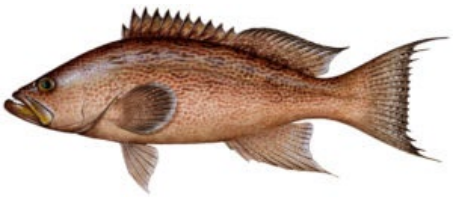


# Scamp

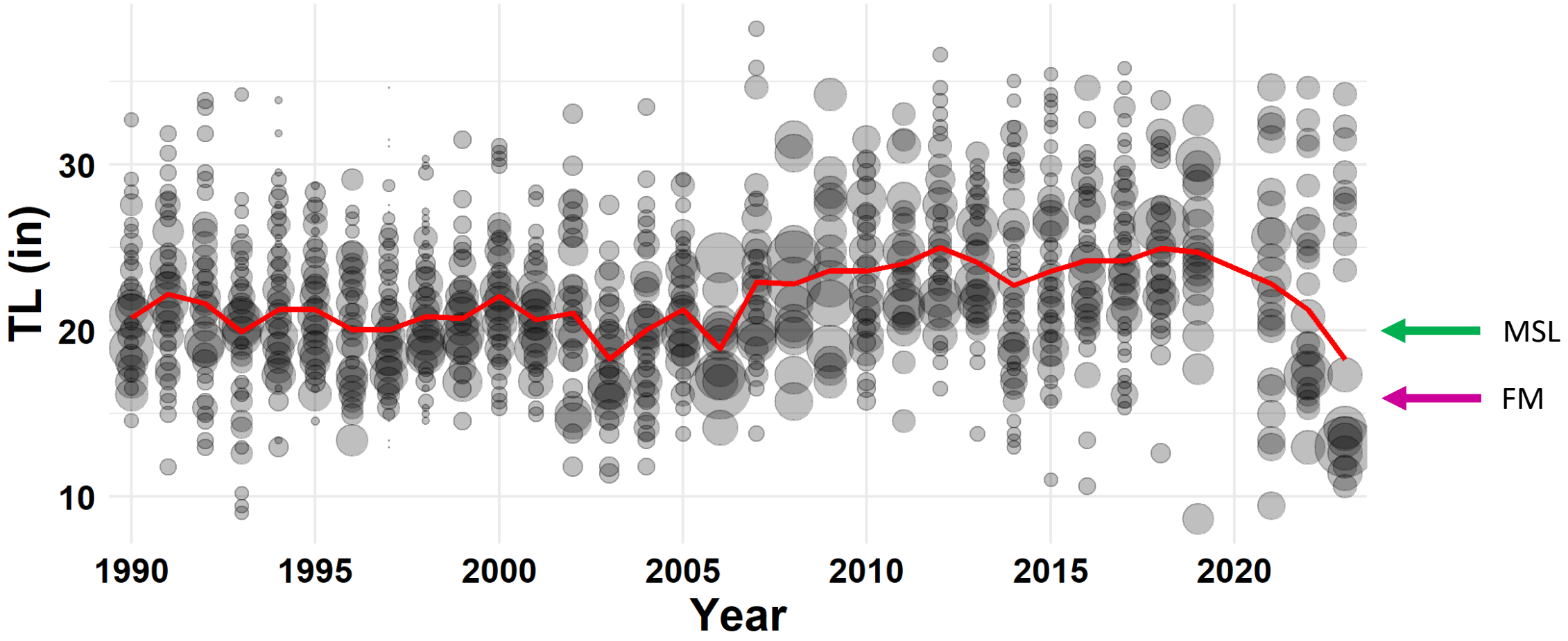

NC
SC
Charleston
GA
FL
35° N
34° N
33° N
32° N
31° N
30° N
29° N
28° N
27° N
81° W
80° W
79° W
78° W
77° W
76° W
2018-2023 CVT
Scamp Grouper
High
Low
No Sampling
135 m
105 m
75 m
35 m


Relative Abundance (Catch/Trap : Normalized)
0
1
2
3
1990
2000
2010
2020
Year


Mycteroperca phenax
Standardized index
95% confidence interval
Nominal index
Relative video SumCount
0.0
0.5
1.0
1.5
2.0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

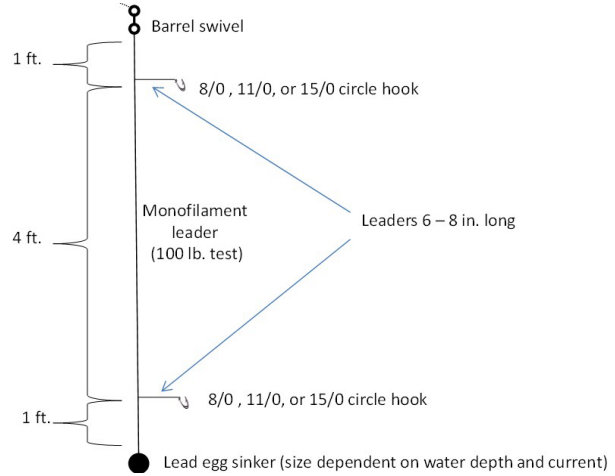


# Scamp



# Other Reef Fish Activities (SCDNR)

## Gear Selectivity




## Juvenile Snapper-Grouper Survey

MARFIN-funded

# 2024 SERFS Plans

Sampling Season:

Mid-April –> Mid-October

4 vessels- Chevron Video Trap

Northern Expansion

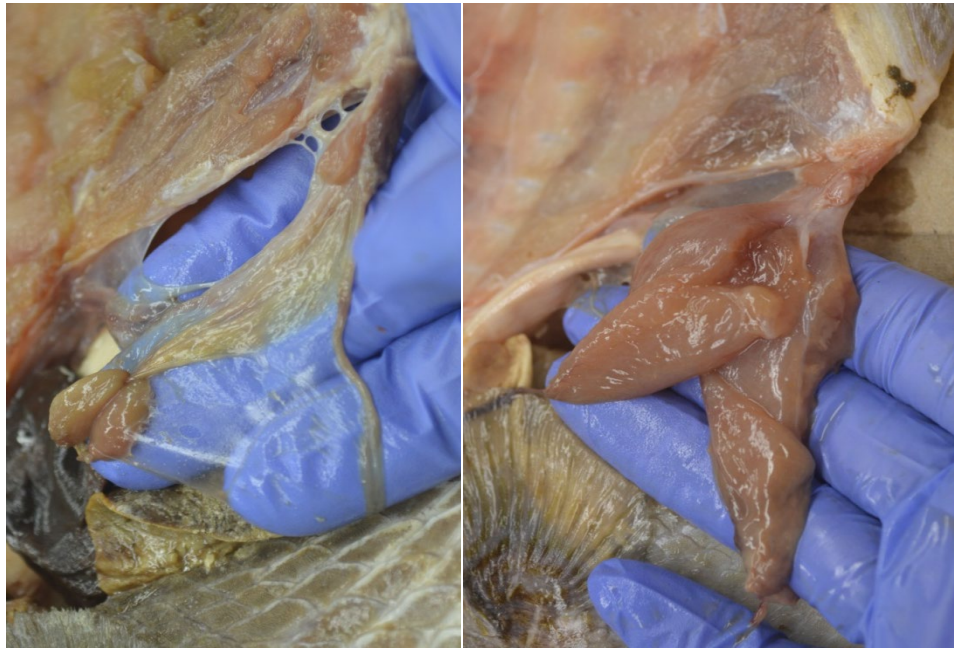
Carolina Long Bay Wind Energy

# 2024 SERFS Plans

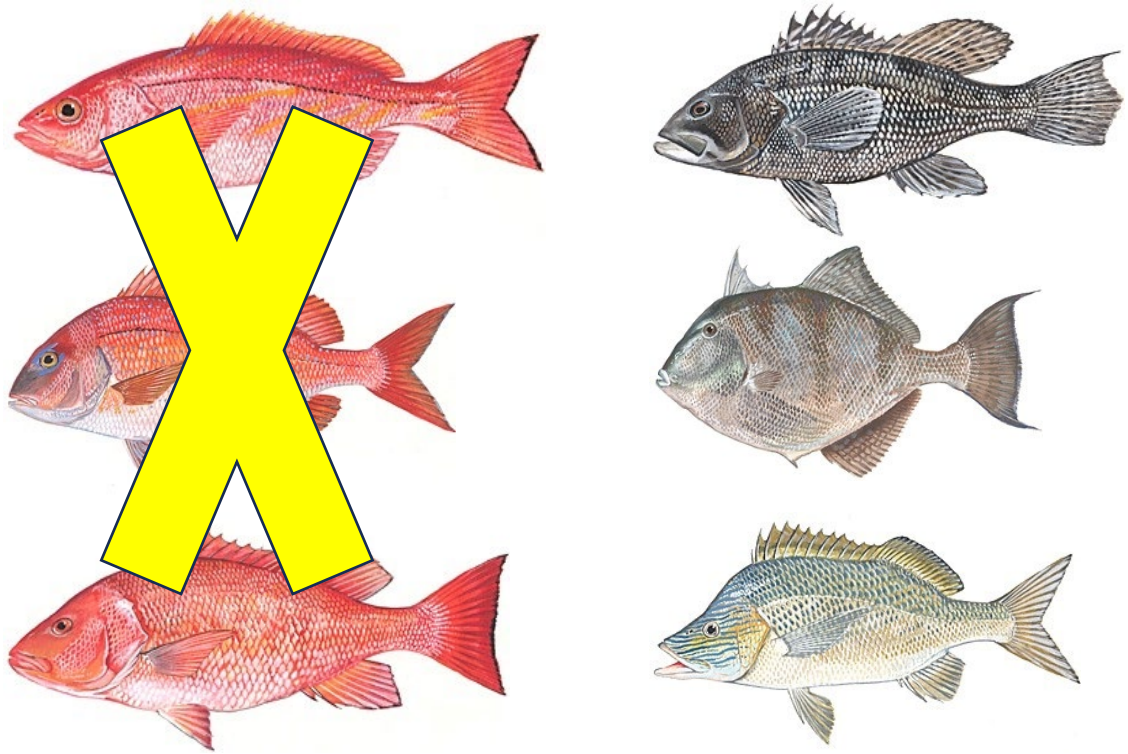
"Balanced" life history sampling

Needs vs fish in hand vs funding

No Male Maturity for
Gray Triggerfish, Red & Vermilion Snapper,
White Grunt

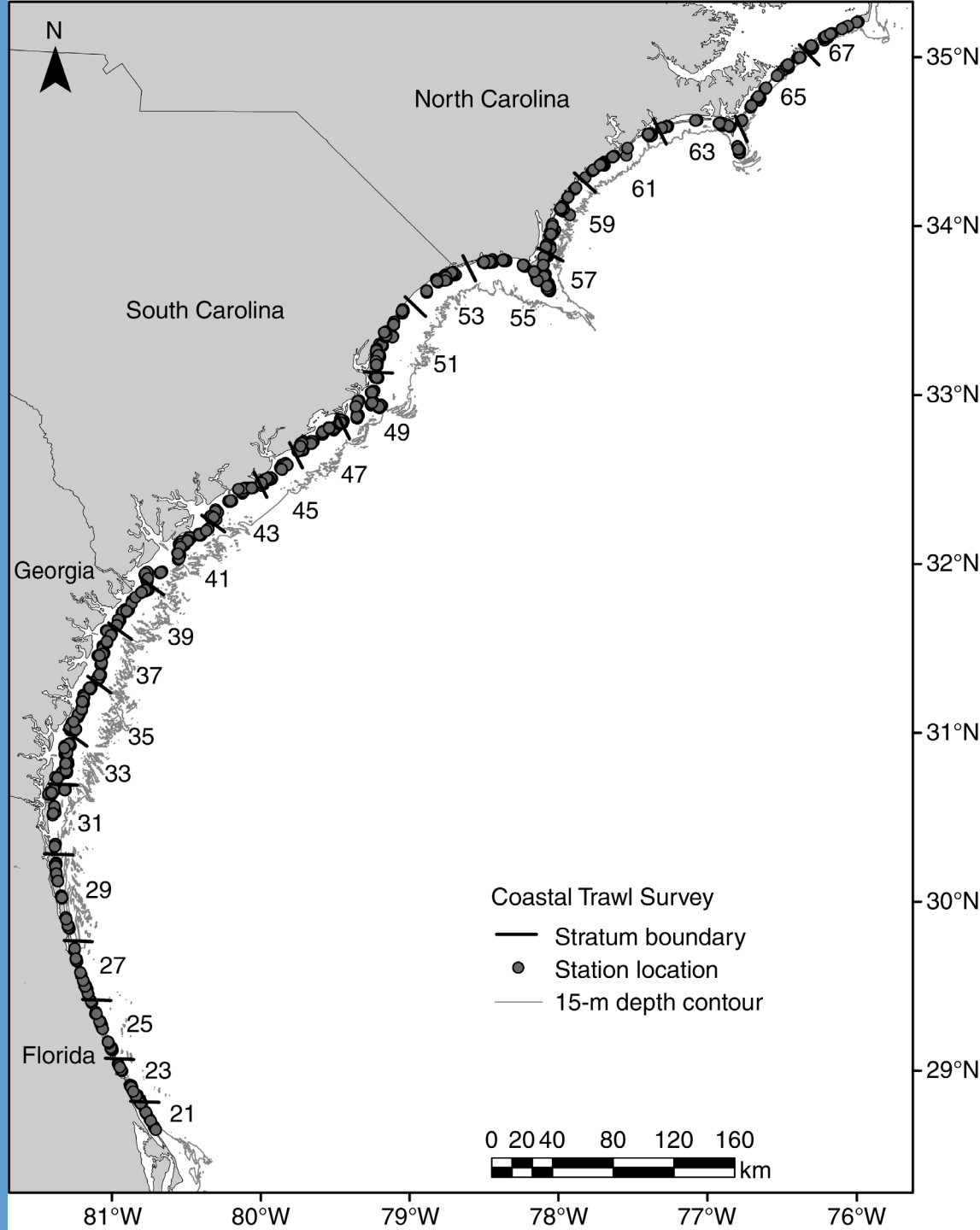


3-Year Maturity Rotation



# Coastal Trawl Survey

- Funded through SEAMAP-SA
- 1986-1989 experimental procedures
- 1990-present standardized procedures
- Stratified, random sampling design
  - 24 latitude-based strata
  - Fixed stations, annual random selection
- 3 Seasons (Spring, Summer, Fall)*
- Target stations 102 per season for 2023
  - Station allocation optimized to reduce variability



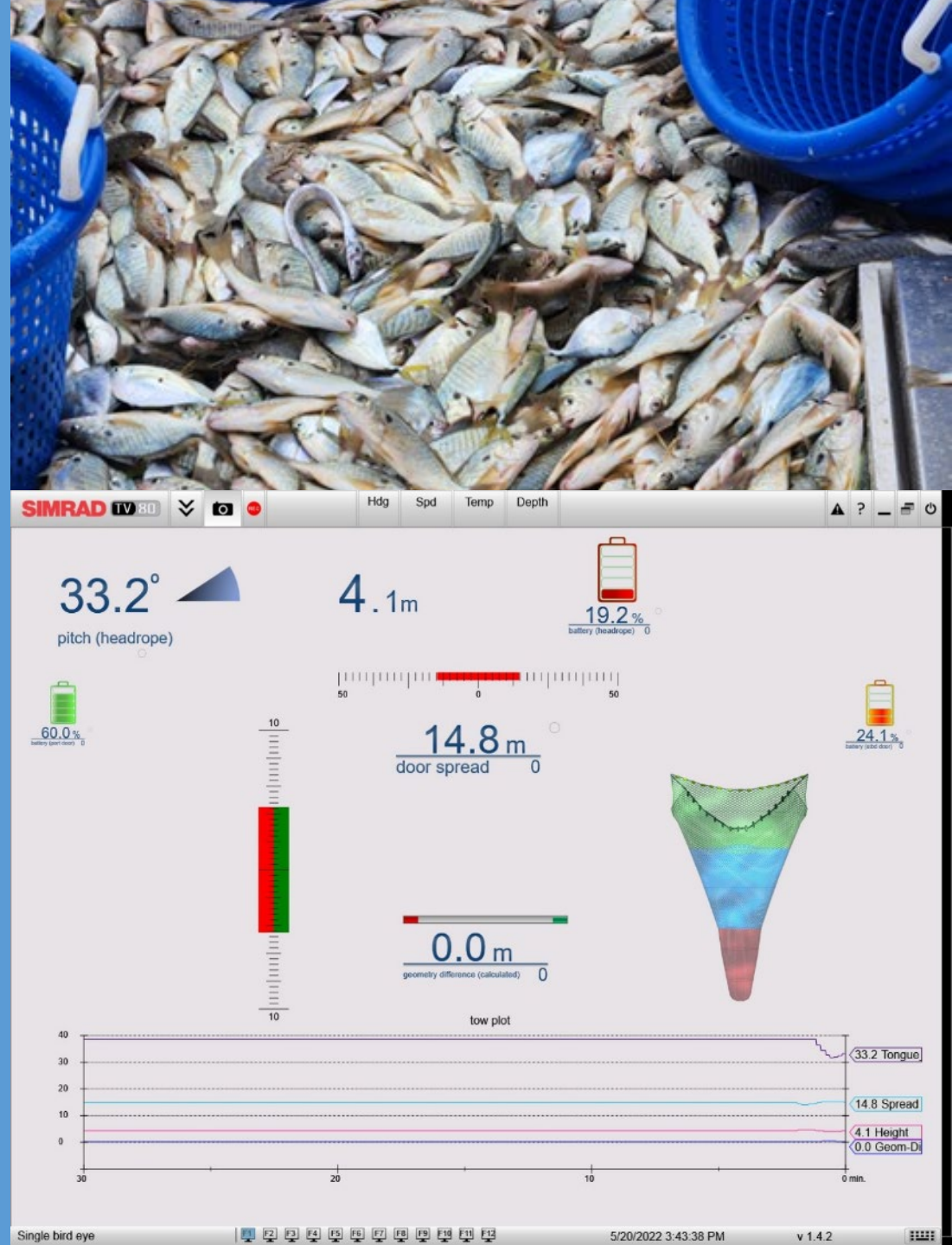
# Coastal Trawl Survey

- 75’ Mongoose-type Falcon nets
- Shallow-water, trawlable habitats
- 2020 no sampling due to COVID-19
- 2021 partial sampling due to COVID-19
- Abundance = #/hectare sampled

Lorraine Thompson

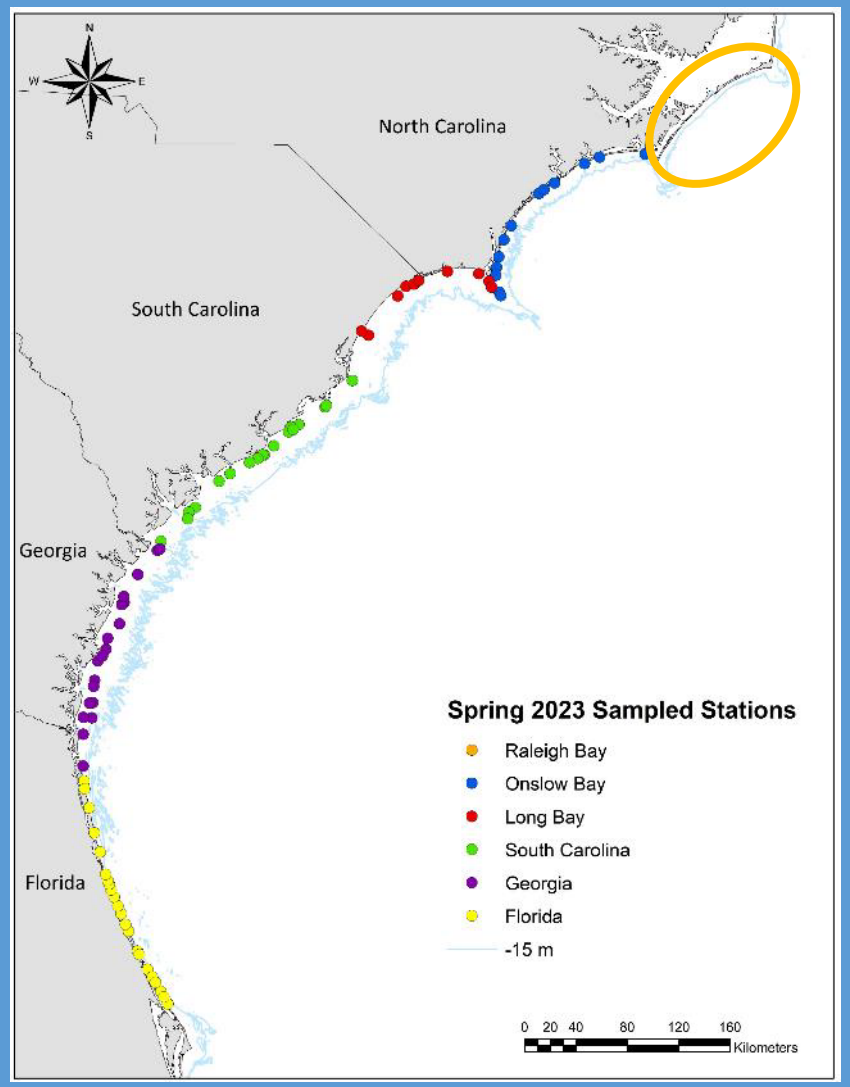
# CTS Method Changes

- Catch from one net processed
  - Net comparison analyses completed in 2020
- Season #/timing
  - Spring (April-June)
  - Fall (August-October)
- Standardization by ZINB, not dGLM
  - DOY, not Season
- 2024 new vessel, new nets, new doors
  - Mensuration for gear geometry
  - Area swept, volume swept corrections?

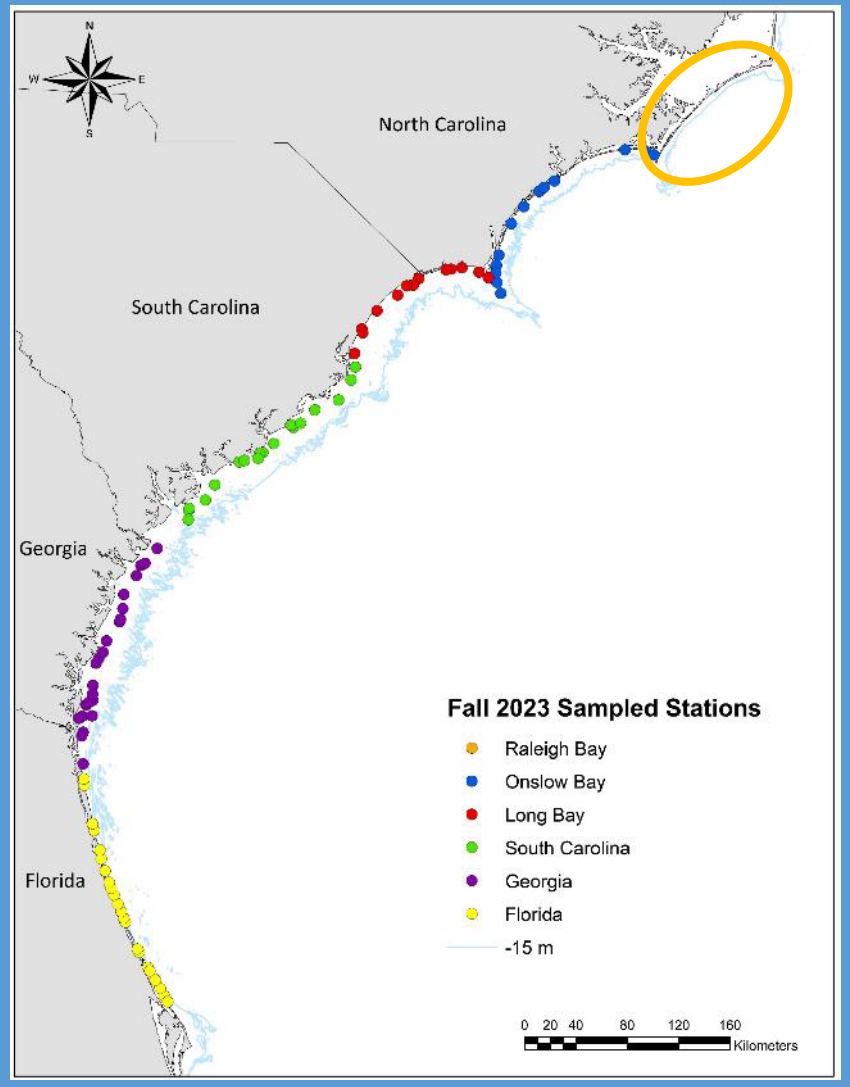


# Coastal Trawl Sampling Effort 2023

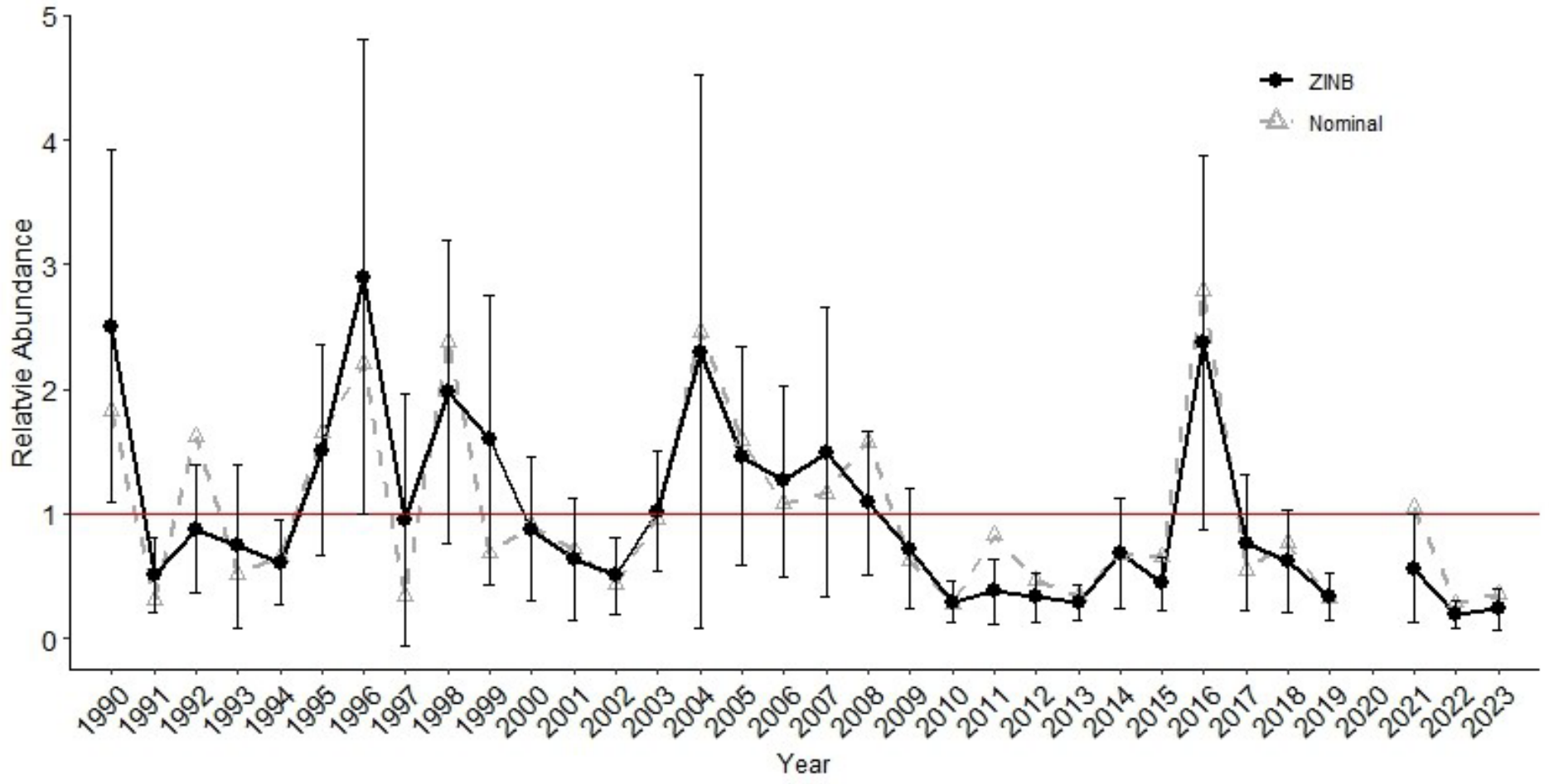
85 of 102 stations sampled in “Spring”



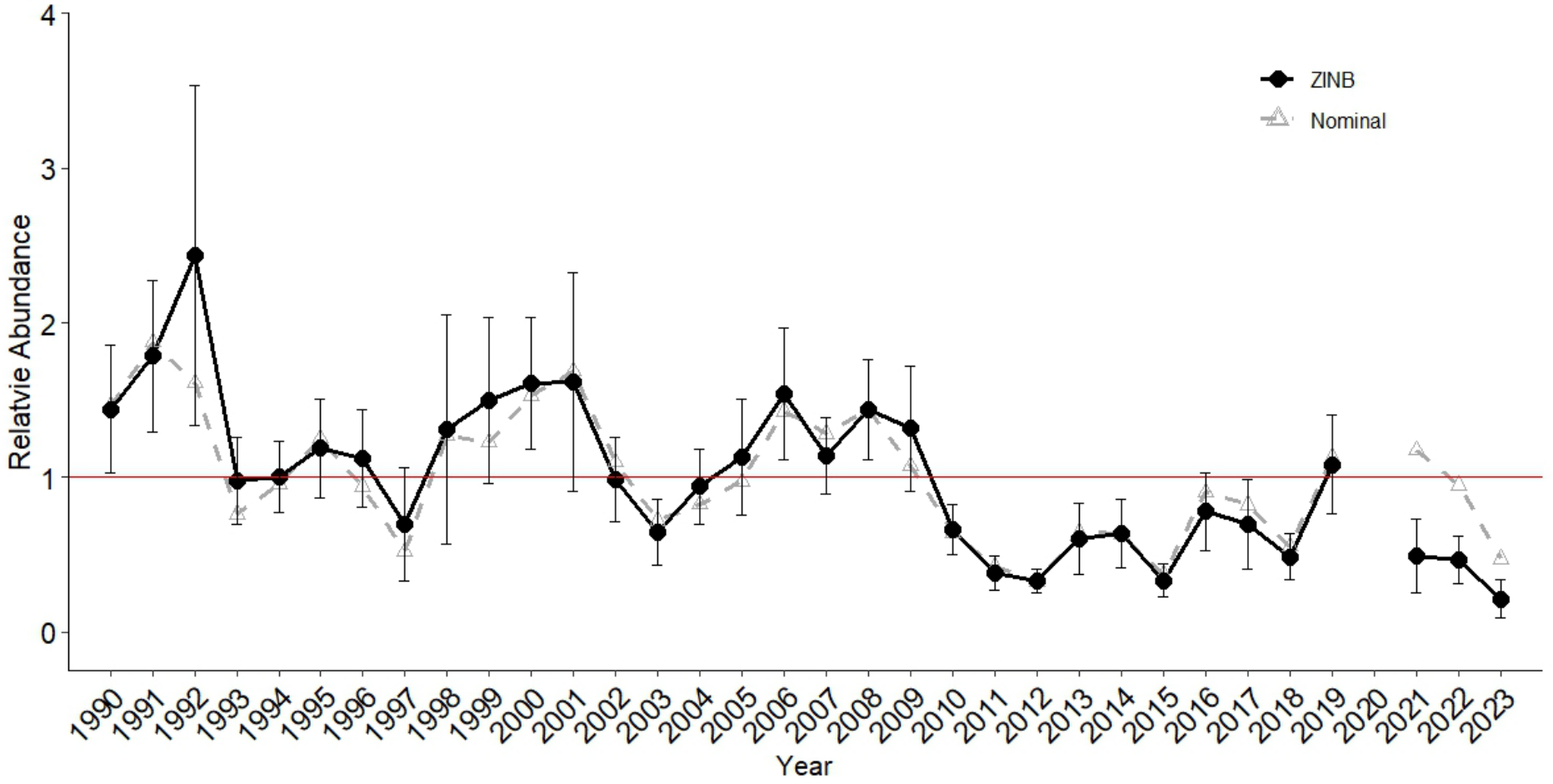

92 of 102 stations sampled in “Fall”



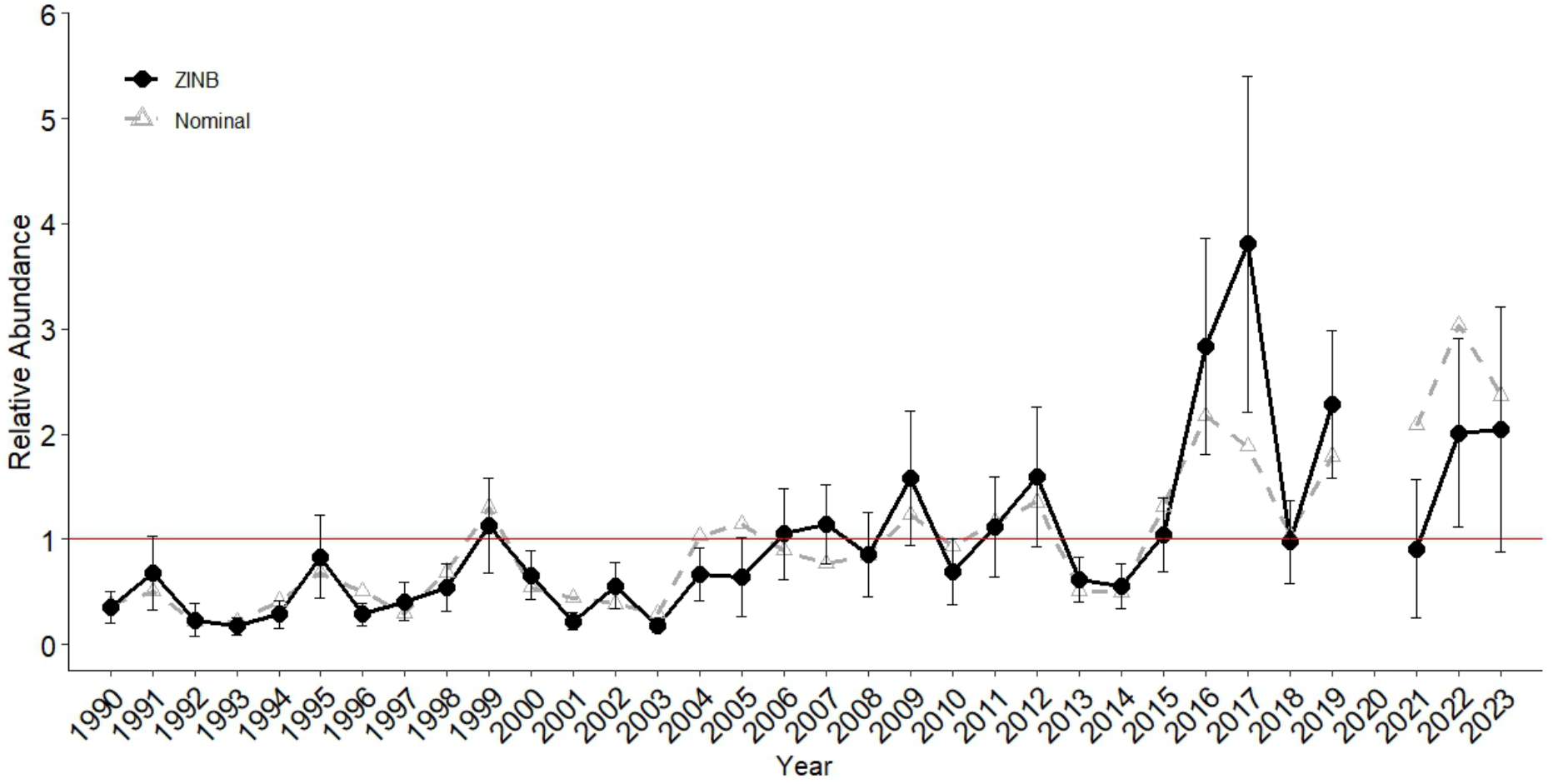
# King Mackerel (Age-0 +)



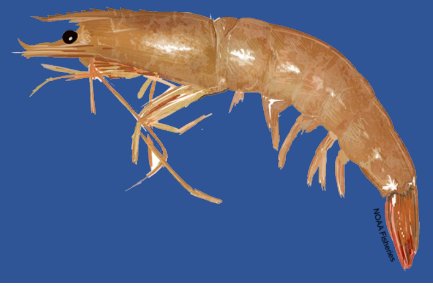
# Spanish Mackerel (Age-0 +)

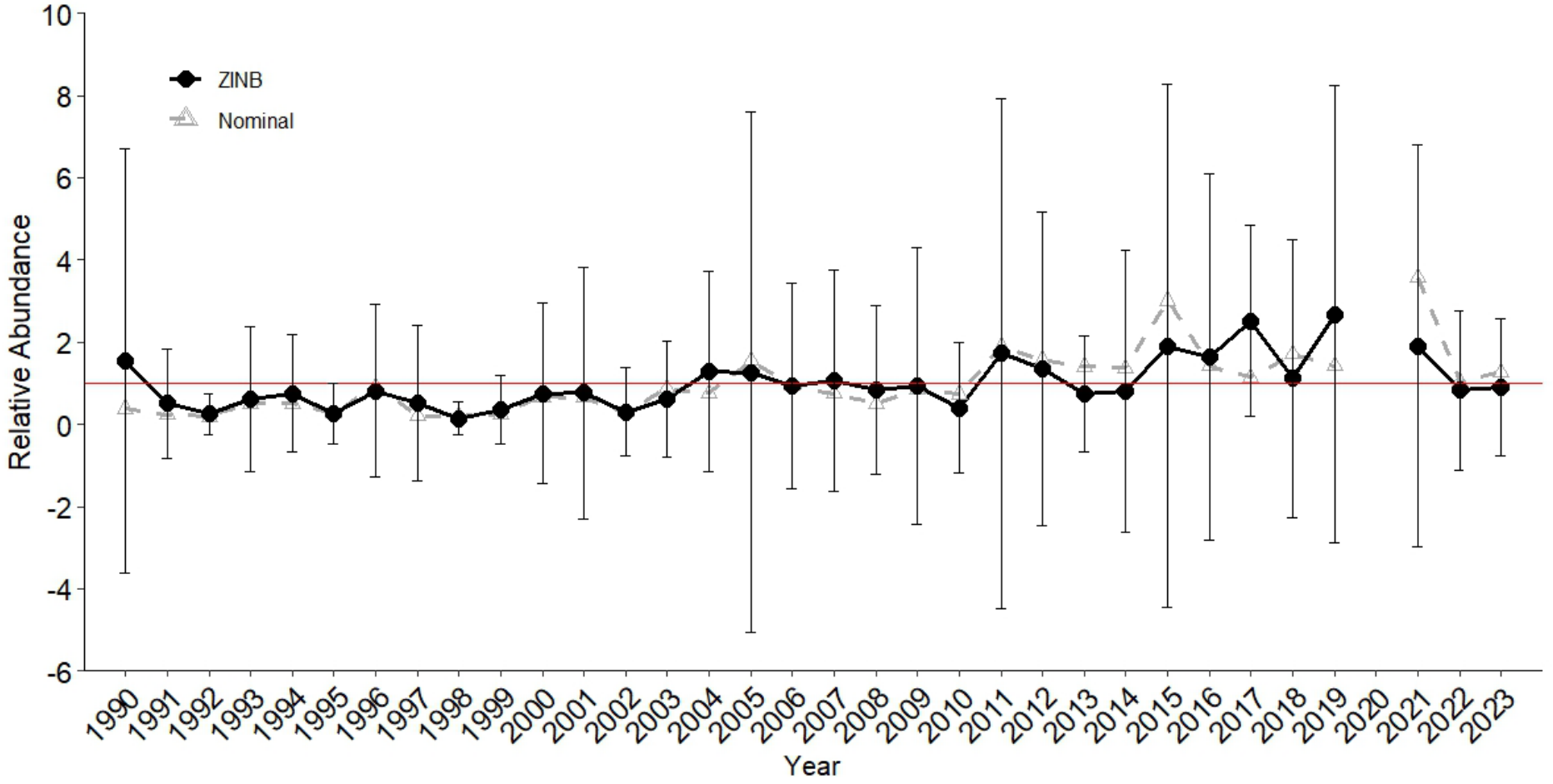


# White Penaeid Shrimp

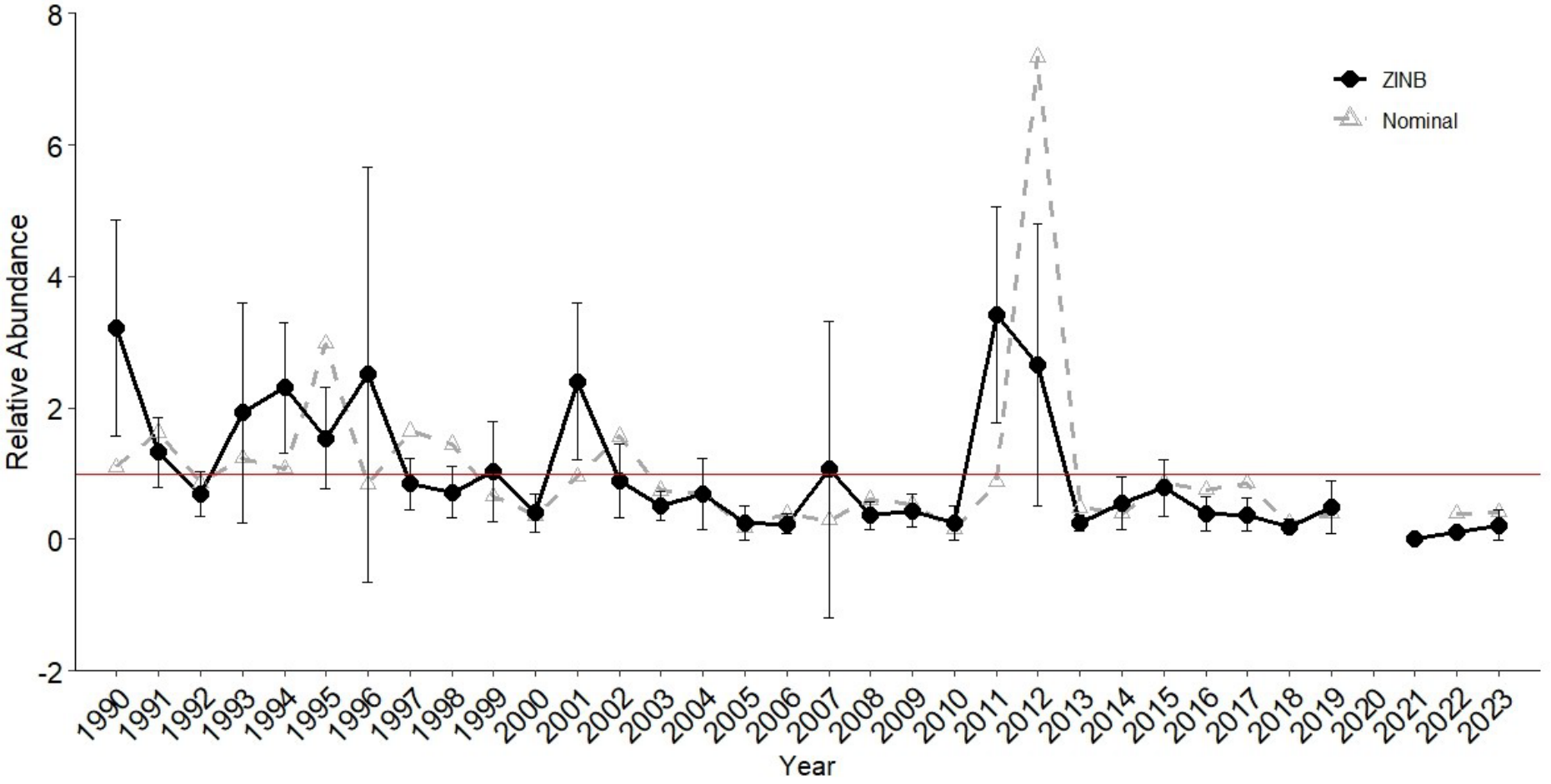


# Brown Penaeid Shrimp





# Pink Penaeid Shrimp



# 2024 CTS Plans

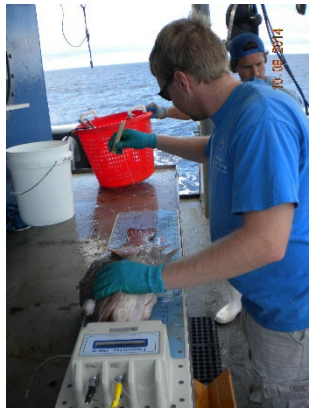
New Vessel
- Stern trawler

New Nets & Doors
- Designed to mimic historical geometry

2 Seasons
- “Spring” & “Fall”

Full spatial coverage

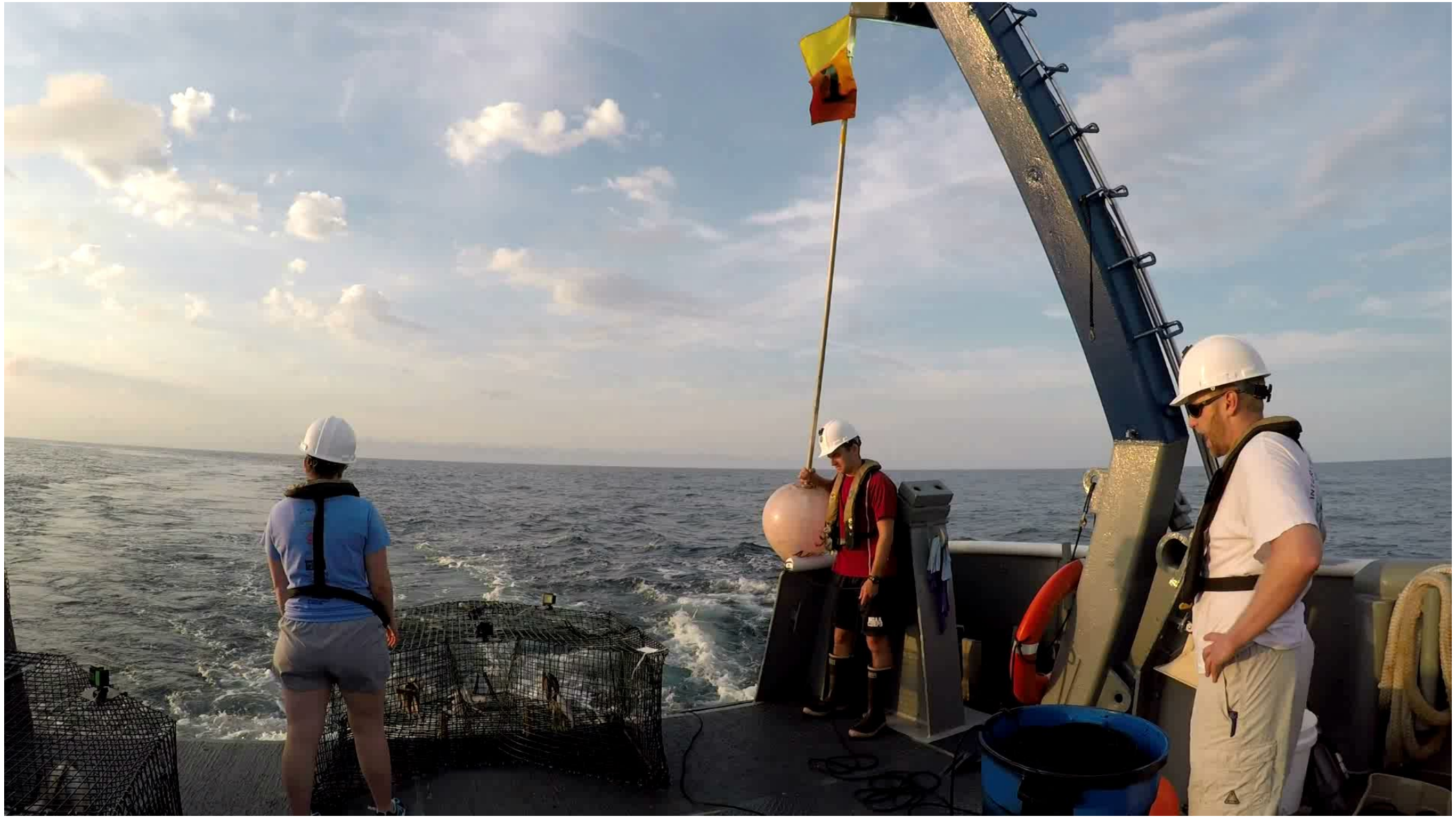
R/V *Lady Lillian*



**Acknowledgements:**

MARMAP/SEAMAP-SA/SEFIS
Staff & Students
Research Vessel Crews
*Past and Present*

NOAA funding
SCDNR support



Questions?