

ASMFC
Red Drum Benchmark Assessment
Review Workshop:
Fishery-Independent Data

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GA DNR

8/12/24

Fishery-Independent Data Sources

Northern Region

YOY

- NC Bag Seine Survey

Subadult

- NC Gill Net Survey

Adult

- NC Longline Survey

Southern Region

YOY

- SC Rotenone Survey
- GA Gill Net Survey
- FL 21.3m Seine Survey

Subadult

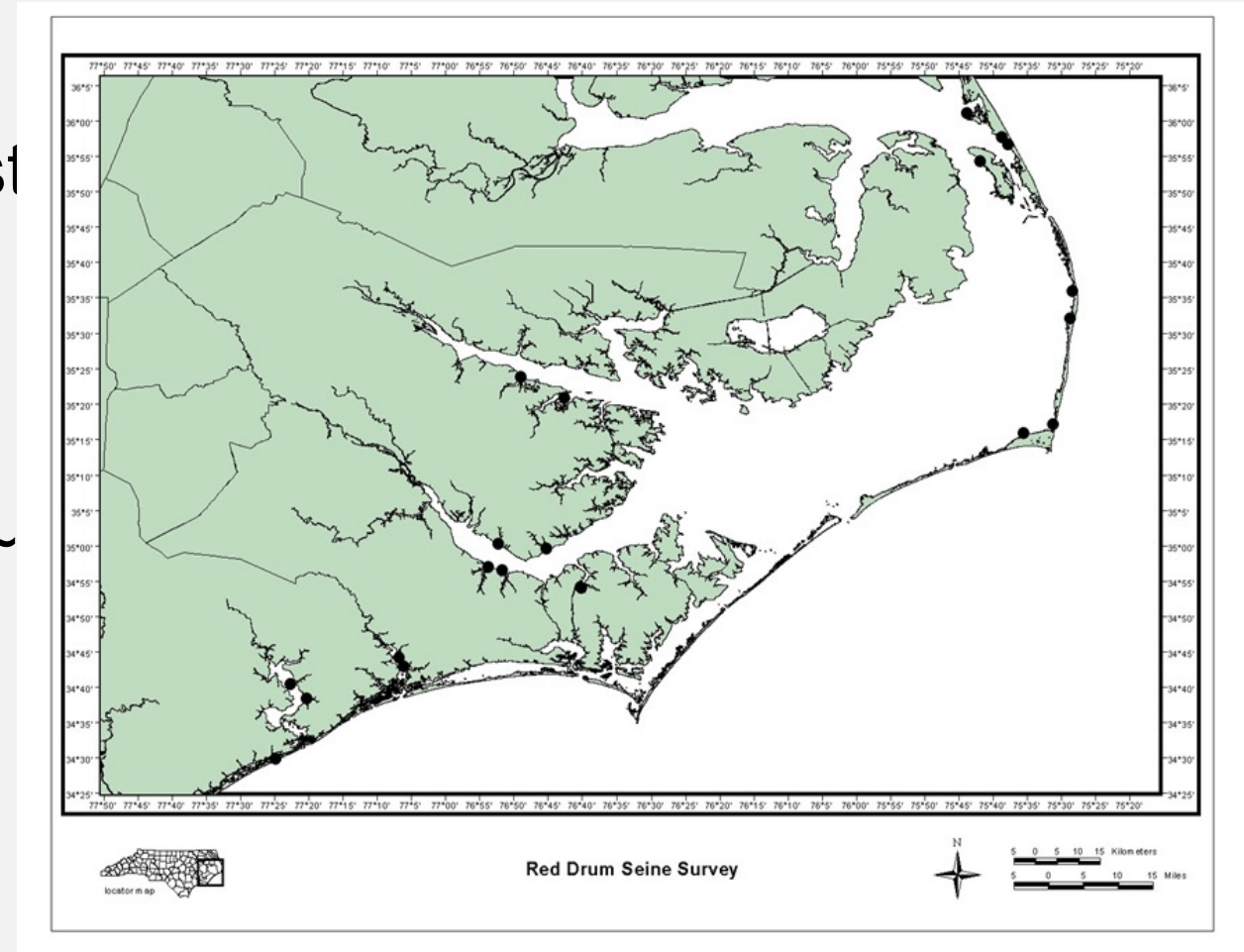
- SC Stop net survey
- SC Trammel net survey
- SC Electrofishing Survey
- FL 183m Seine Survey

Adult

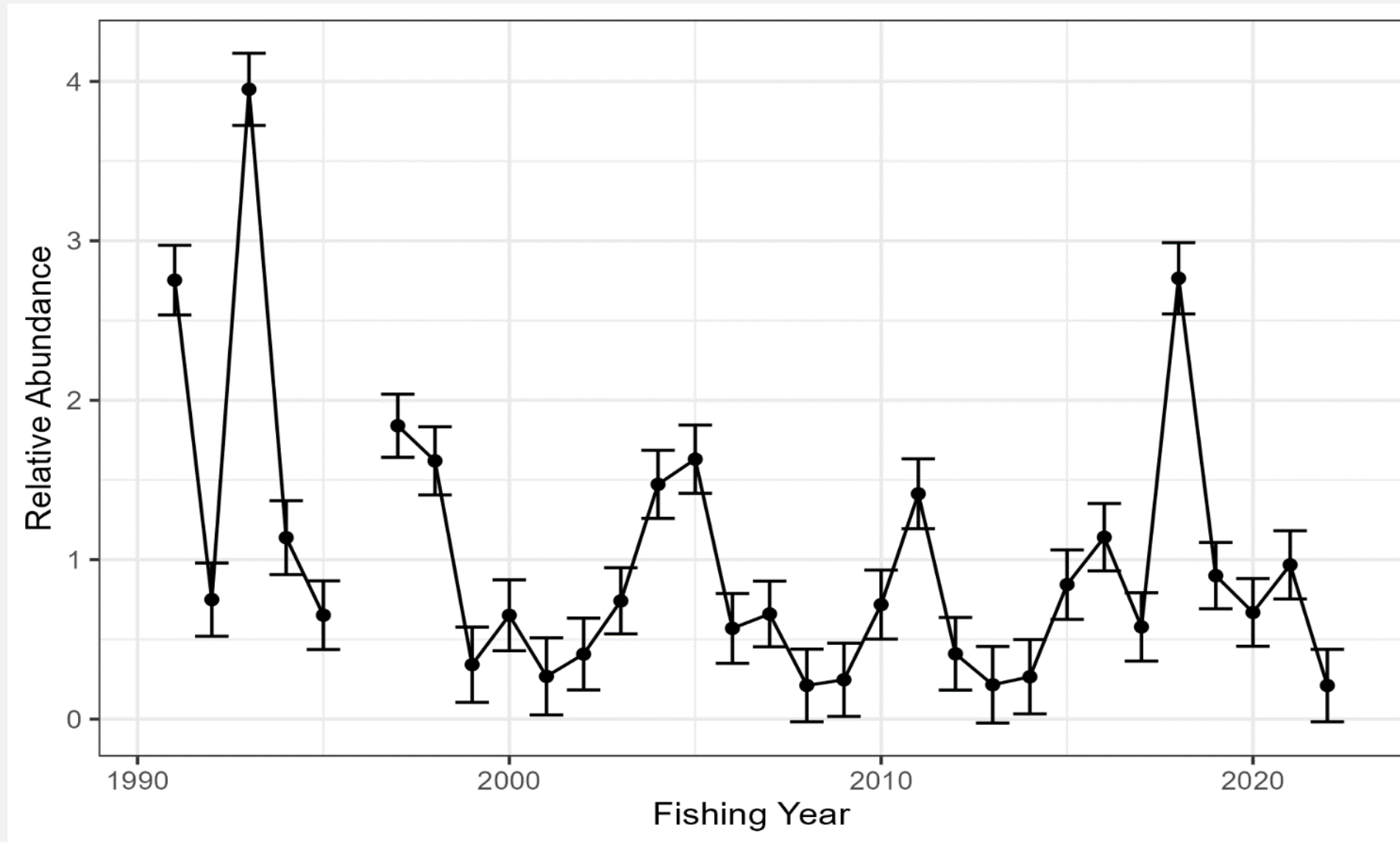
- GA Longline Survey
- SC Longline Survey (historic)
- SC Longline Survey (contemporary)

North Carolina: Bag Seine Survey

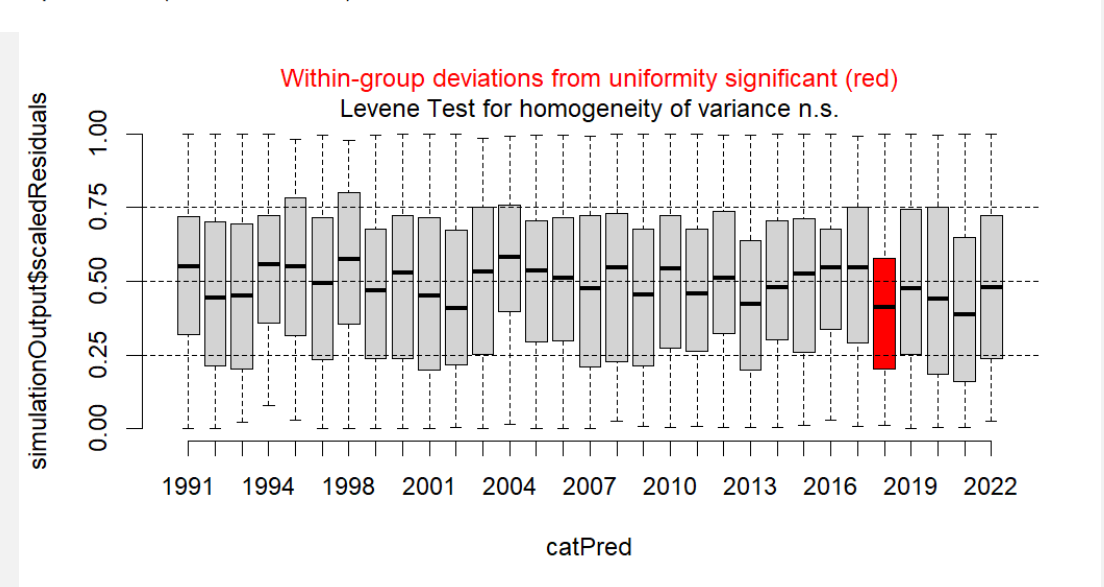
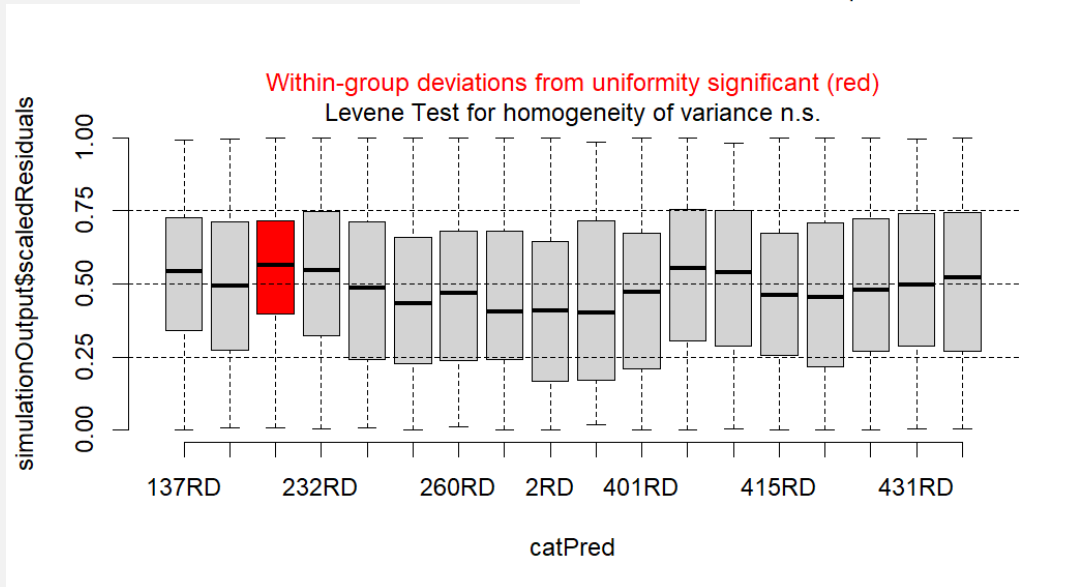
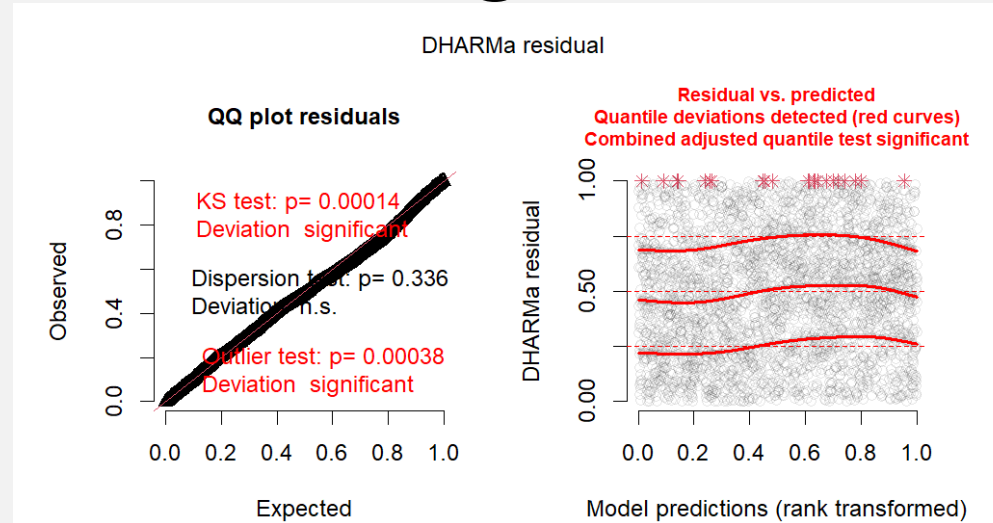
- 18.3 m bag seine
- 21 fixed stations along the coast
 - Chosen based on previous catch rates and practicality for beach seining
- 1991 – 2022
 - Stations (black dots) sampled in ~ weeks intervals from Sept – Nov
 - Hurricane disruption in 1996
- Young-of-year
 - <100 mm



North Carolina: Bag Seine Survey

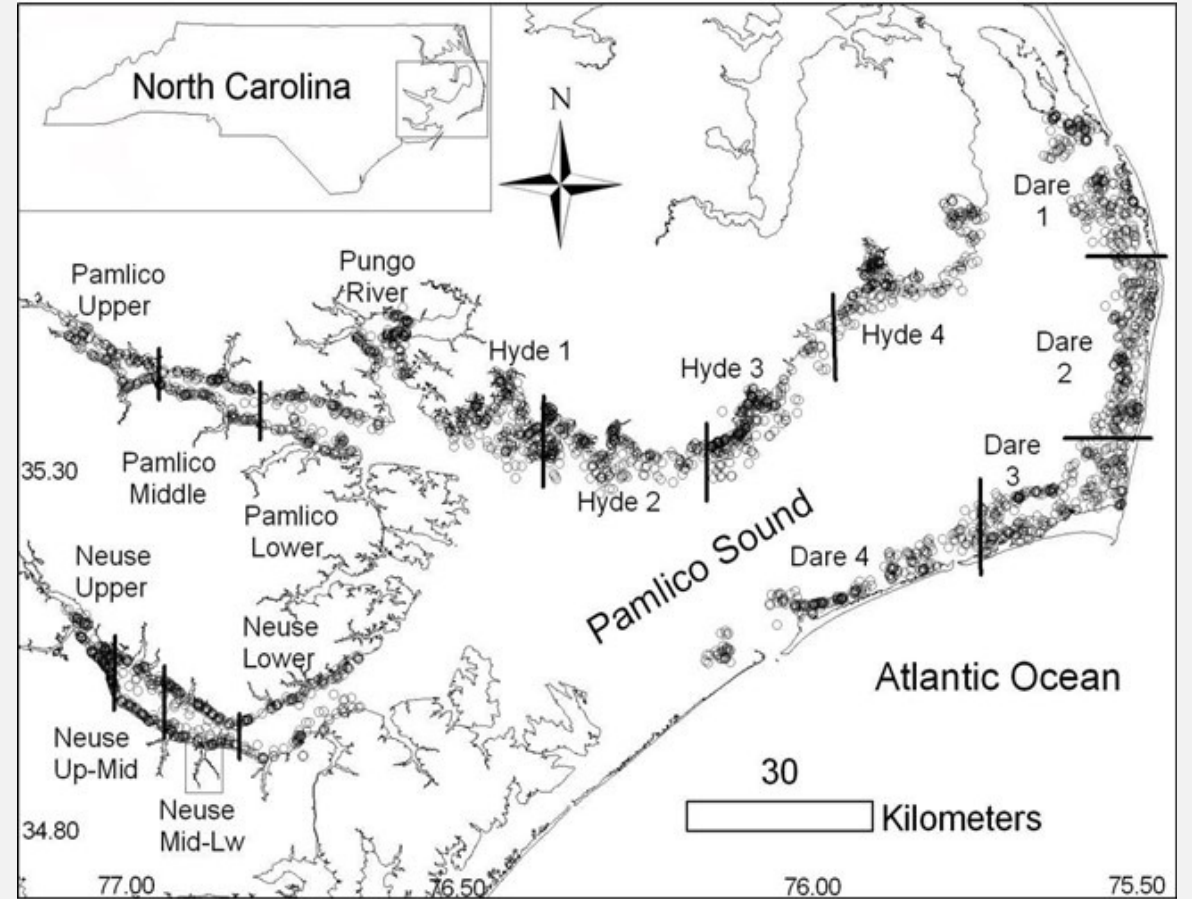


North Carolina: Bag Seine Survey

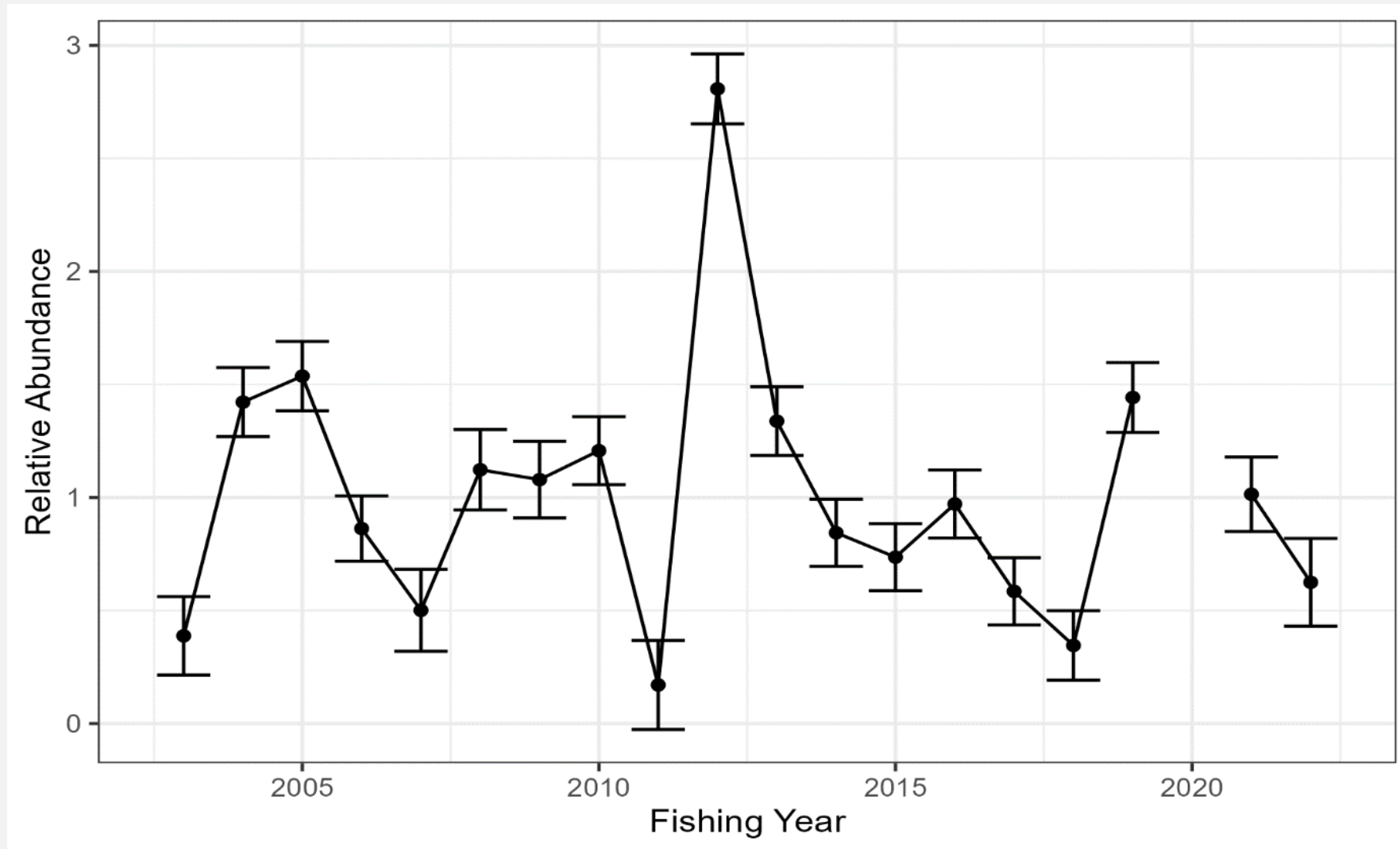


North Carolina: Independent Gill Net Survey

- 240-yard gill net
 - 8 sections each 30 yards
 - 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5 in. stretch mesh sizes
 - 12-hour soak
- Pamlico Sound; Rivers
 - Stratified-random based on area and depth
 - Each area sampled twice a month Feb – Dec
 - Both shallow and deep sample taken
 - 2001 – 2022: Pamlico Sound
 - 2003 – 2022: Rivers (*not used in index*)
 - No sampling in 2020 due to COVID-19
- Subadult (age-1 and age-2)
 - Based on season ALKs

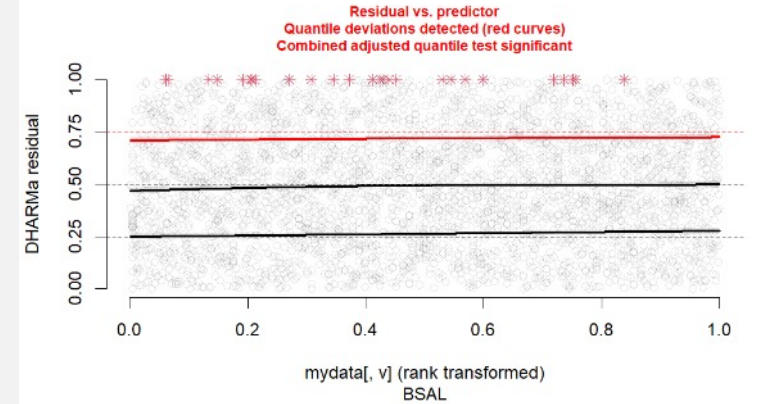
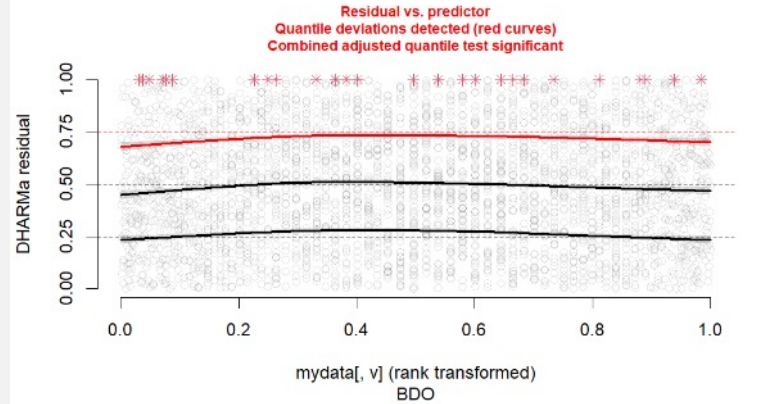
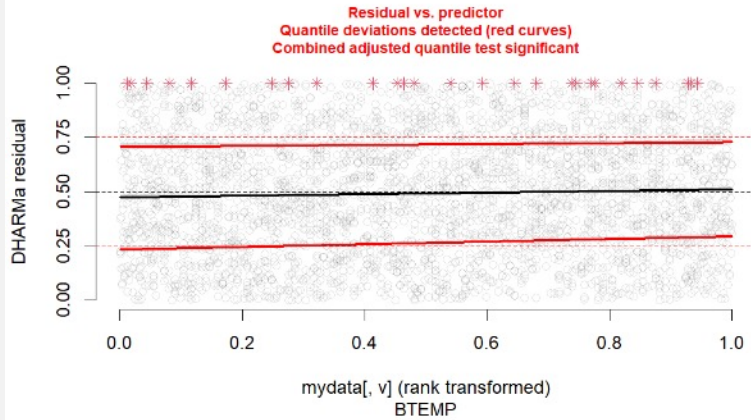
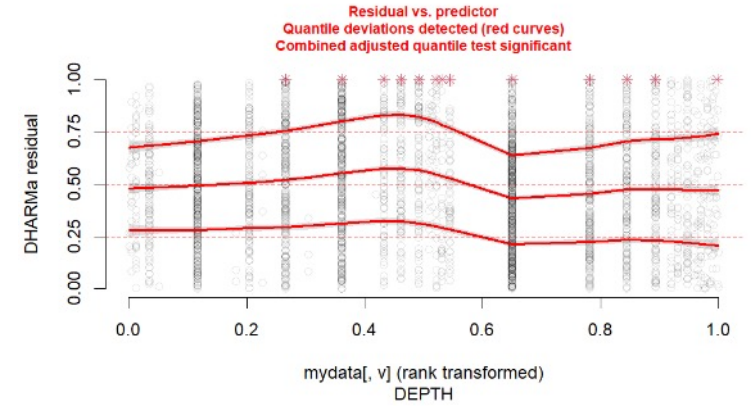
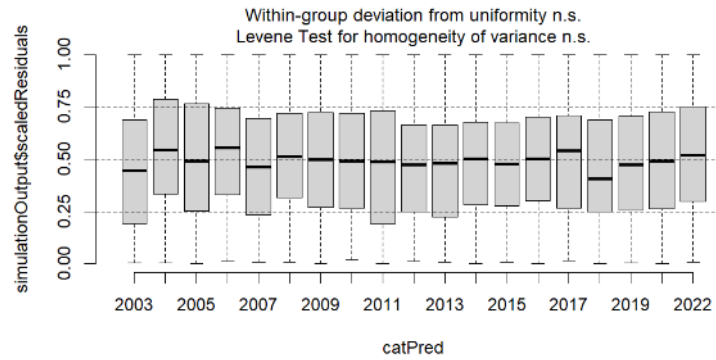
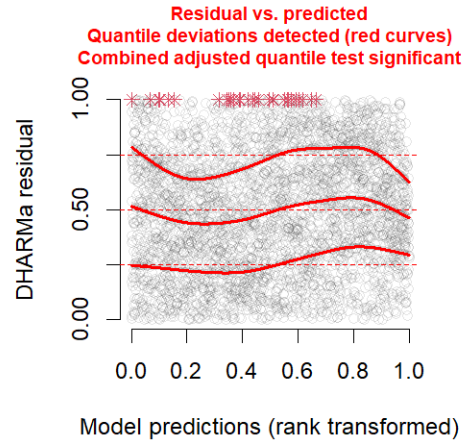
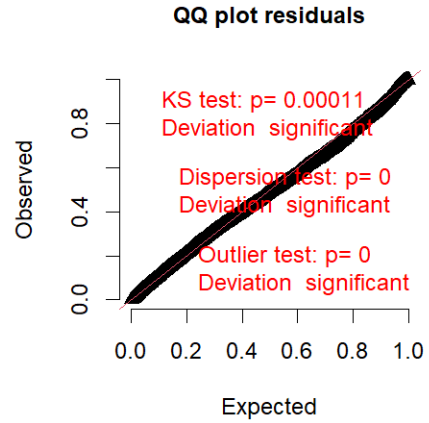


North Carolina: Independent Gill Net Survey

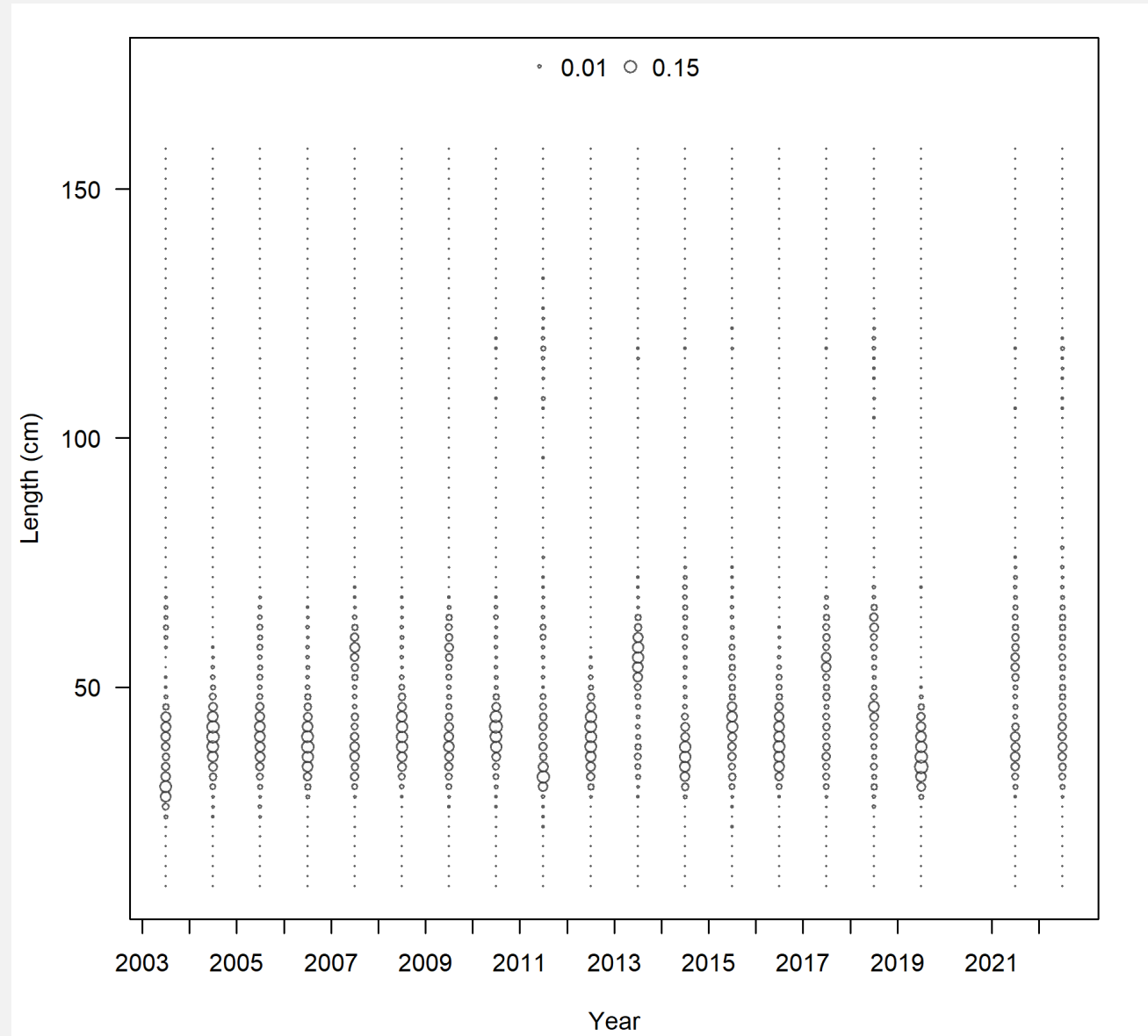


North Carolina: Independent Gill Net Survey

DHARMa residual

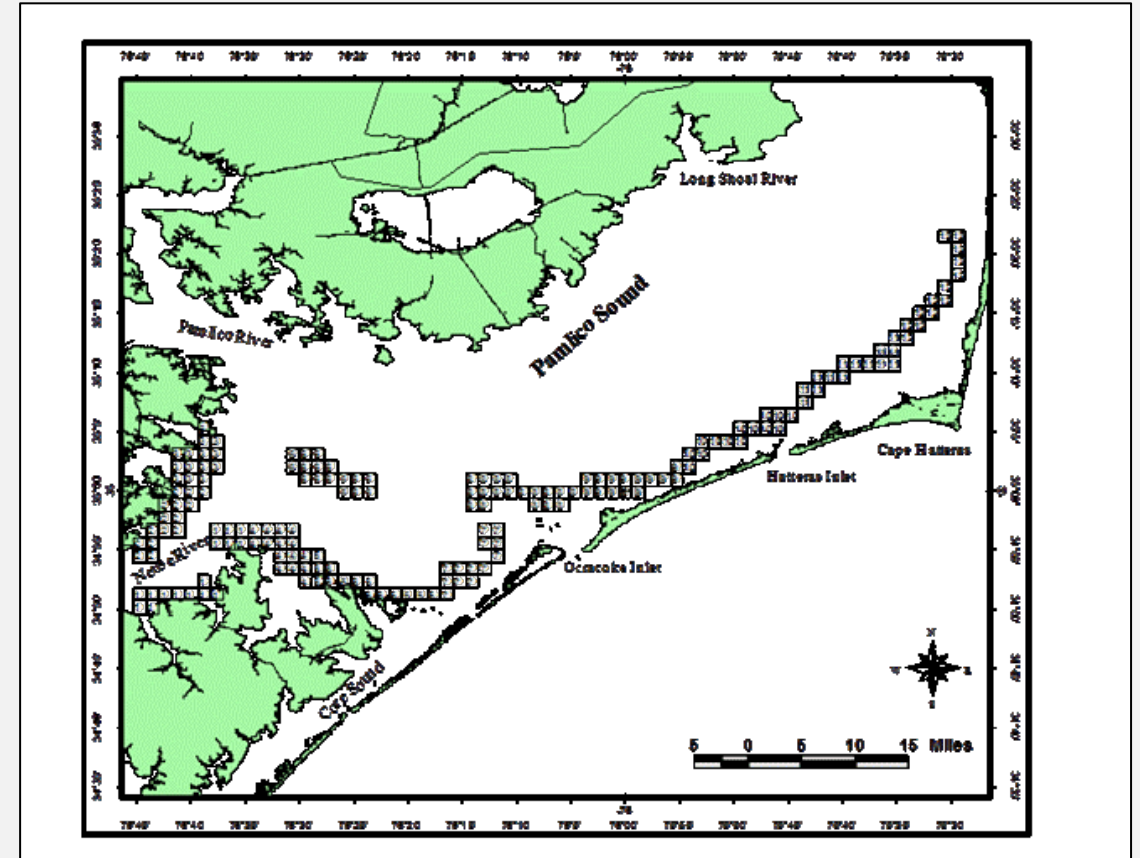


North Carolina: Independent Gill Net Survey

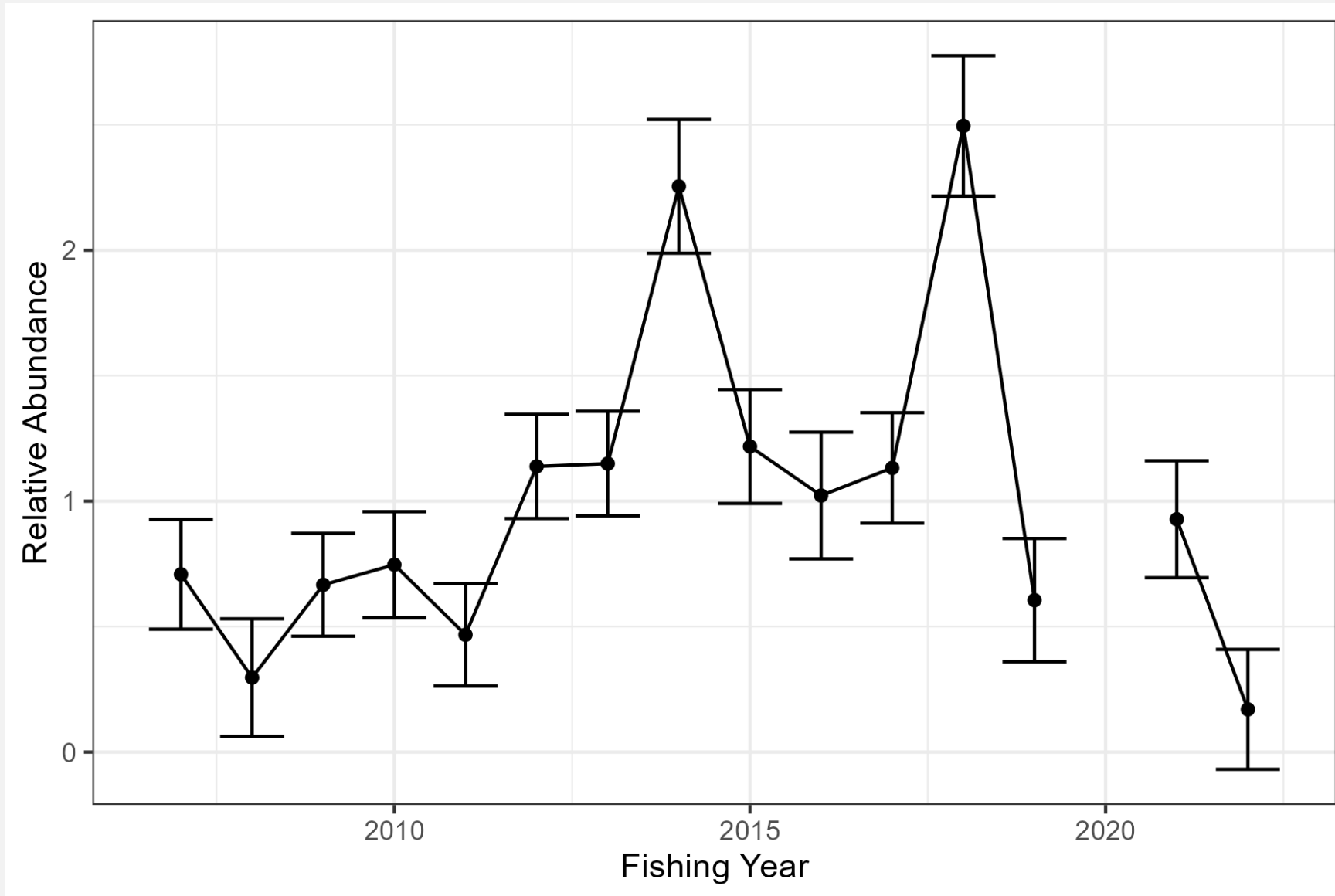


North Carolina: Adult Longline Survey

- Bottom longline
 - 1,500 m mainline; gangions every 15m intervals (100 hooks/set)
 - Stop sleeves placed at 30m intervals
 - 30 min. soak
- Pamlico Sound
 - Stratified-random based on area and time
 - 72 total samples taken from 12 regions and 3 time periods (mid-July to mid-Oct) at night
 - Sampling around 1.8m depth contour
- 2007 – 2022: Pamlico Sound
 - Significant hurricane disruption in 2019
 - No sampling in 2020 due to COVID-19
- Adult (ages 3 – 43)



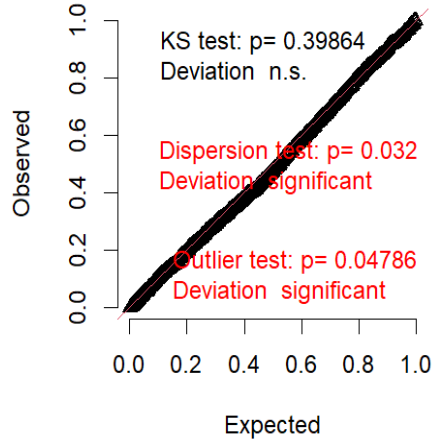
North Carolina: Adult Longline Survey



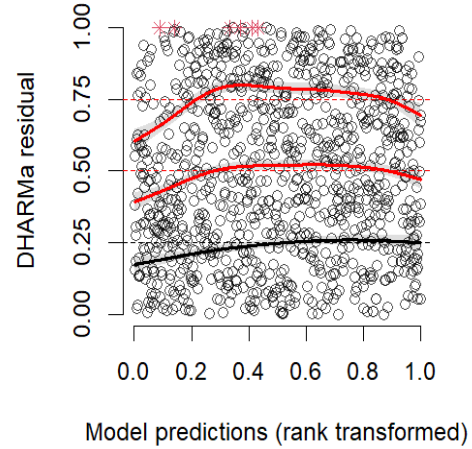
North Carolina: Adult Longline Survey

DHARMa residual

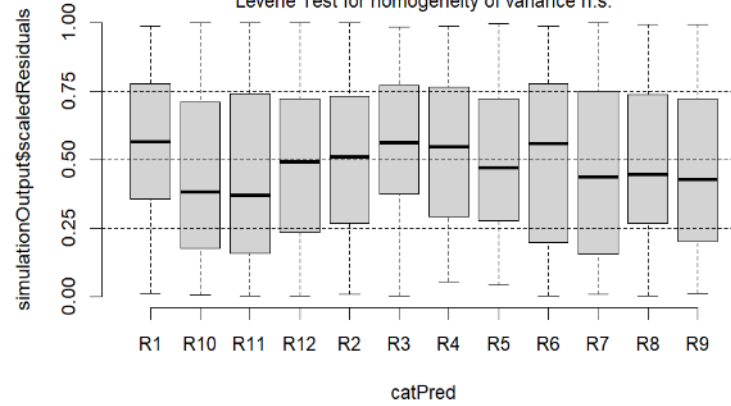
QQ plot residuals



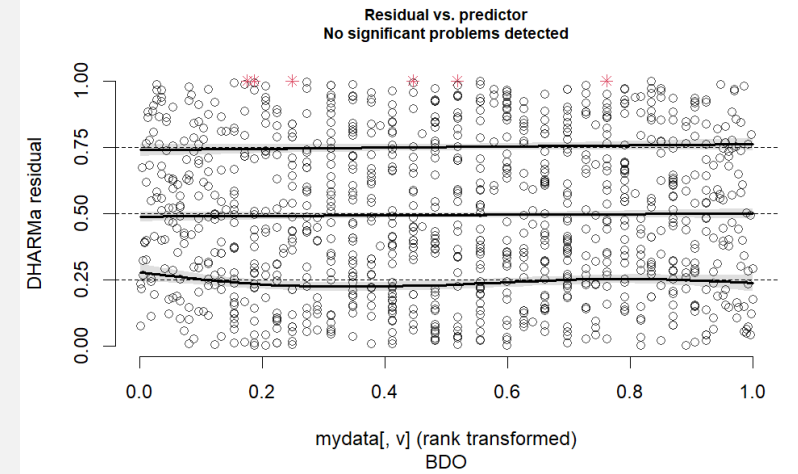
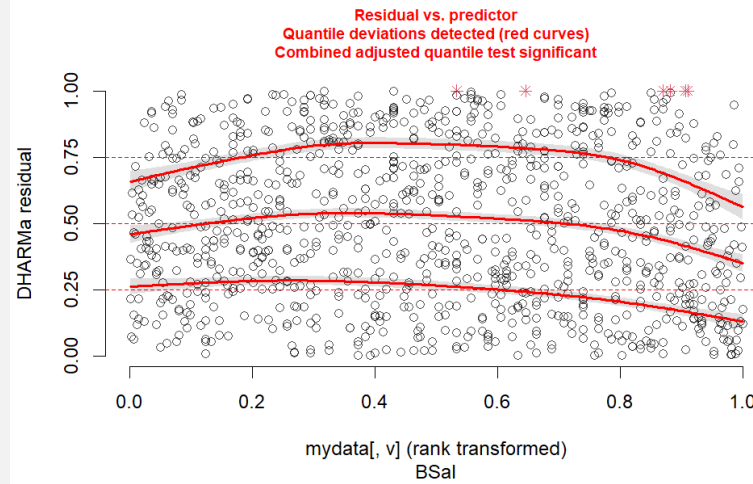
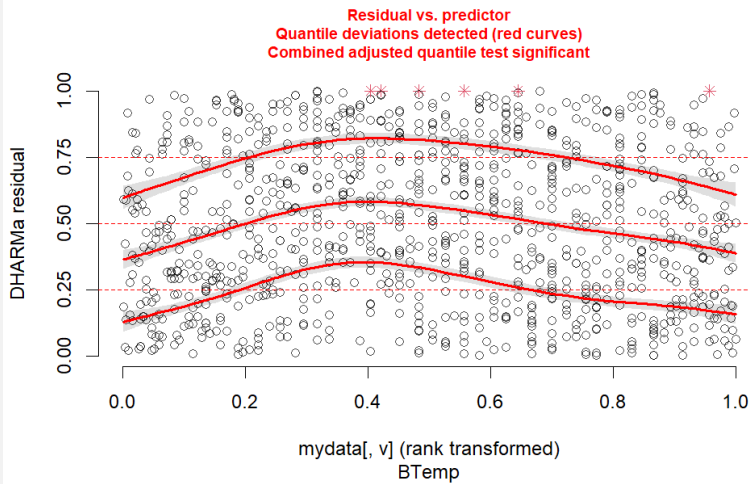
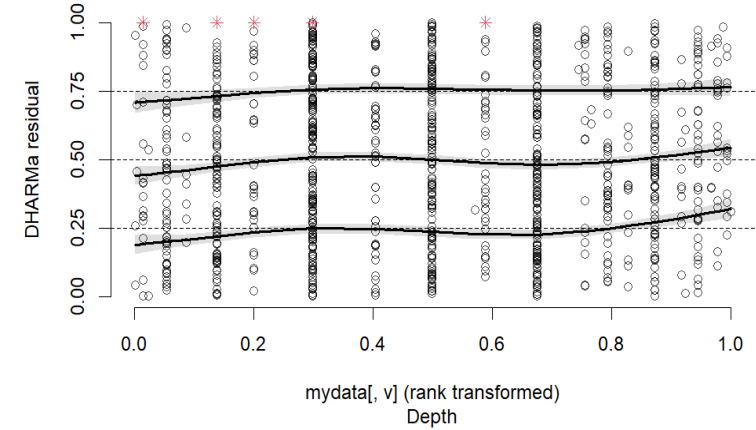
Residual vs. predicted
Quantile deviations detected (red curves)
Combined adjusted quantile test significant



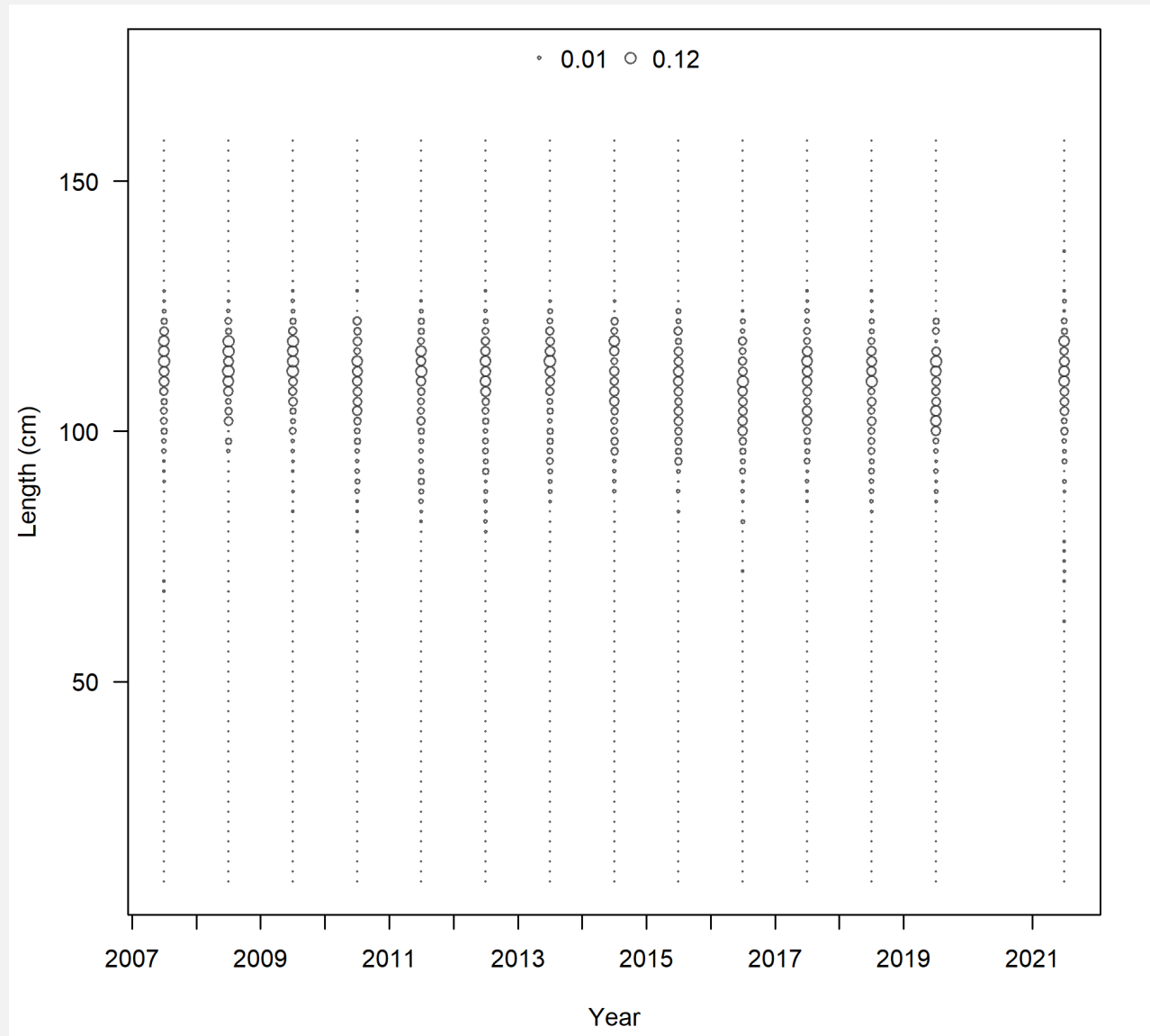
Within-group deviation from uniformity n.s.
Levene Test for homogeneity of variance n.s.



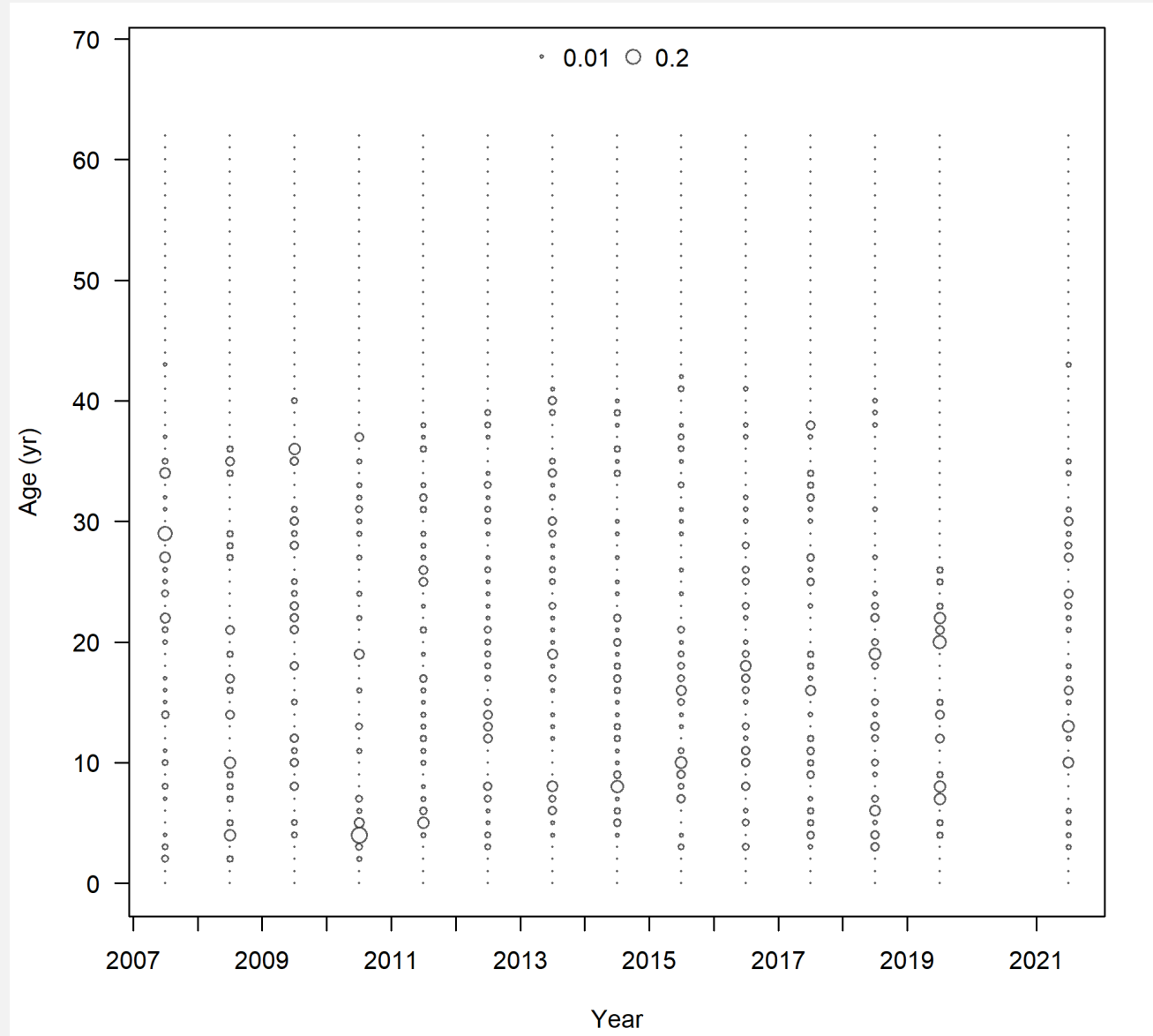
Residual vs. predictor
No significant problems detected



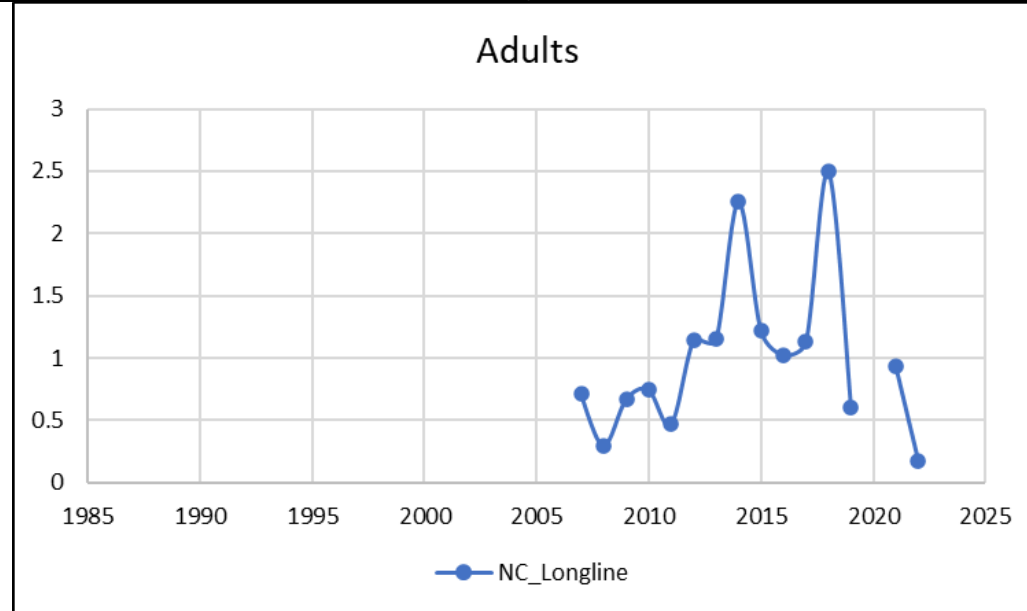
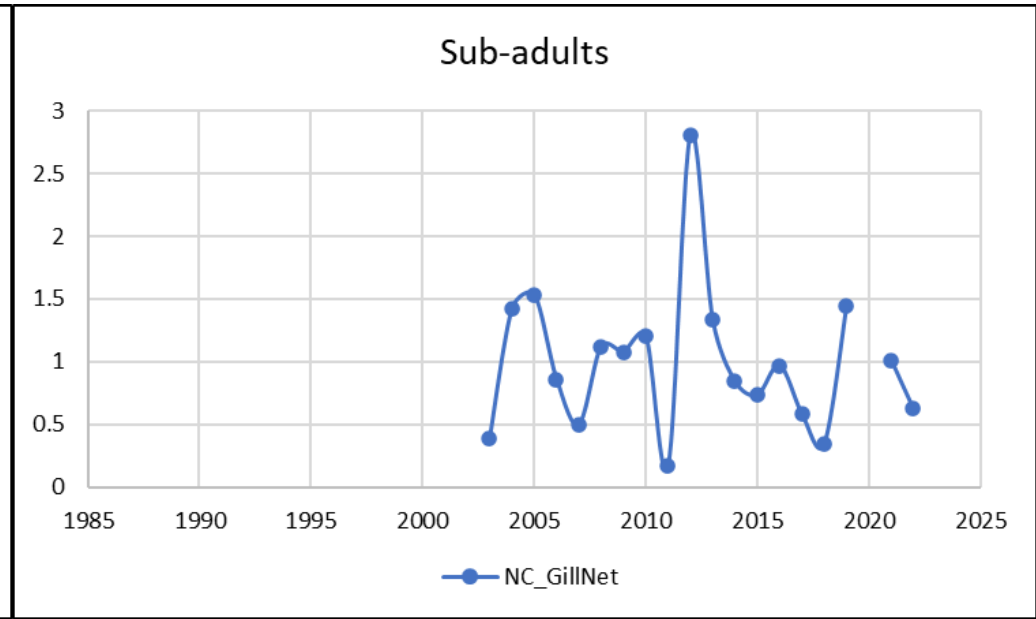
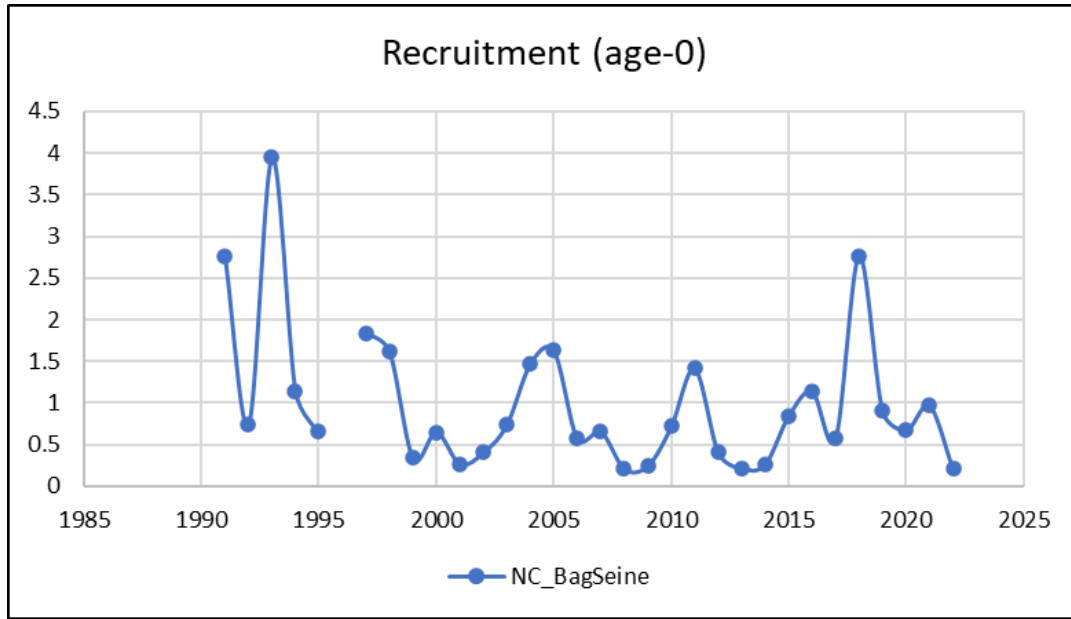
North Carolina: Adult Longline Survey



North Carolina: Adult Longline Survey

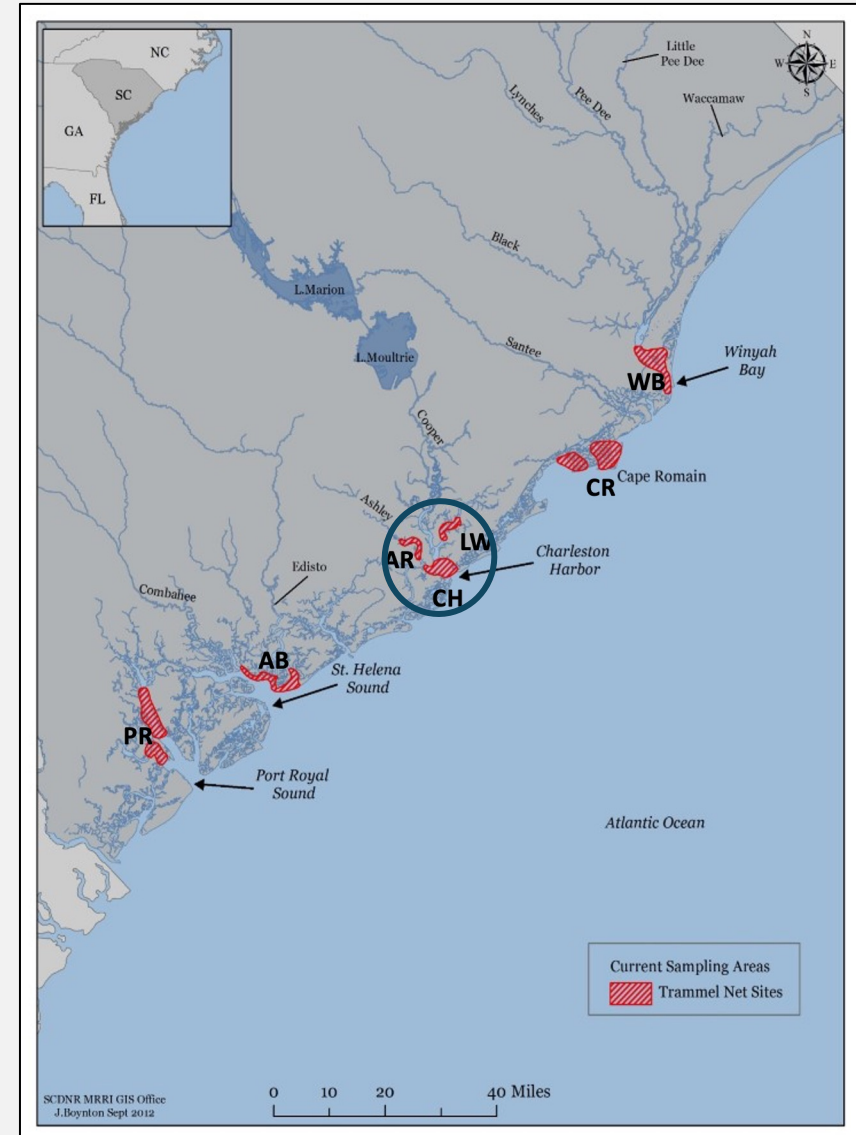


Northern Stock Indices

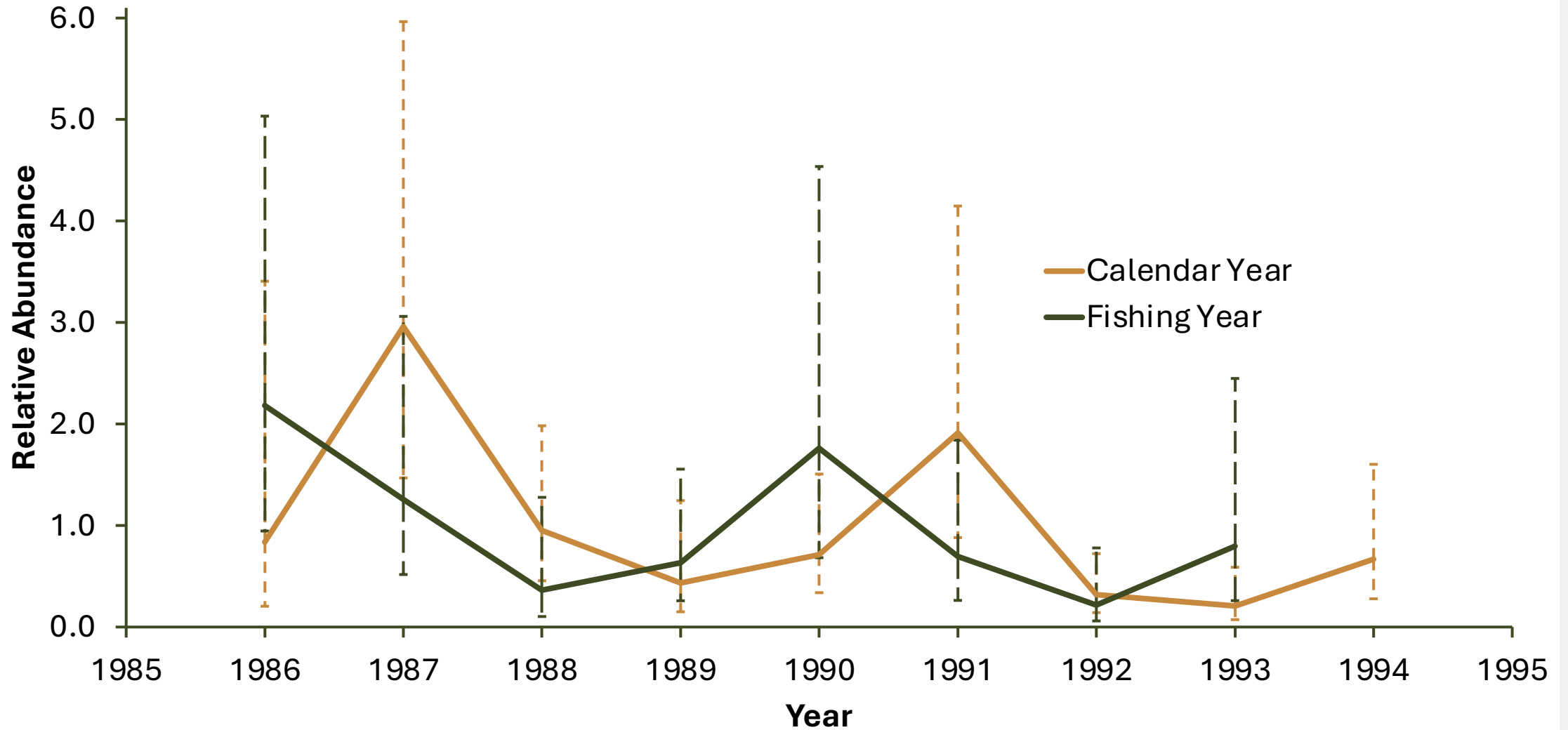


South Carolina: Rotenone Survey

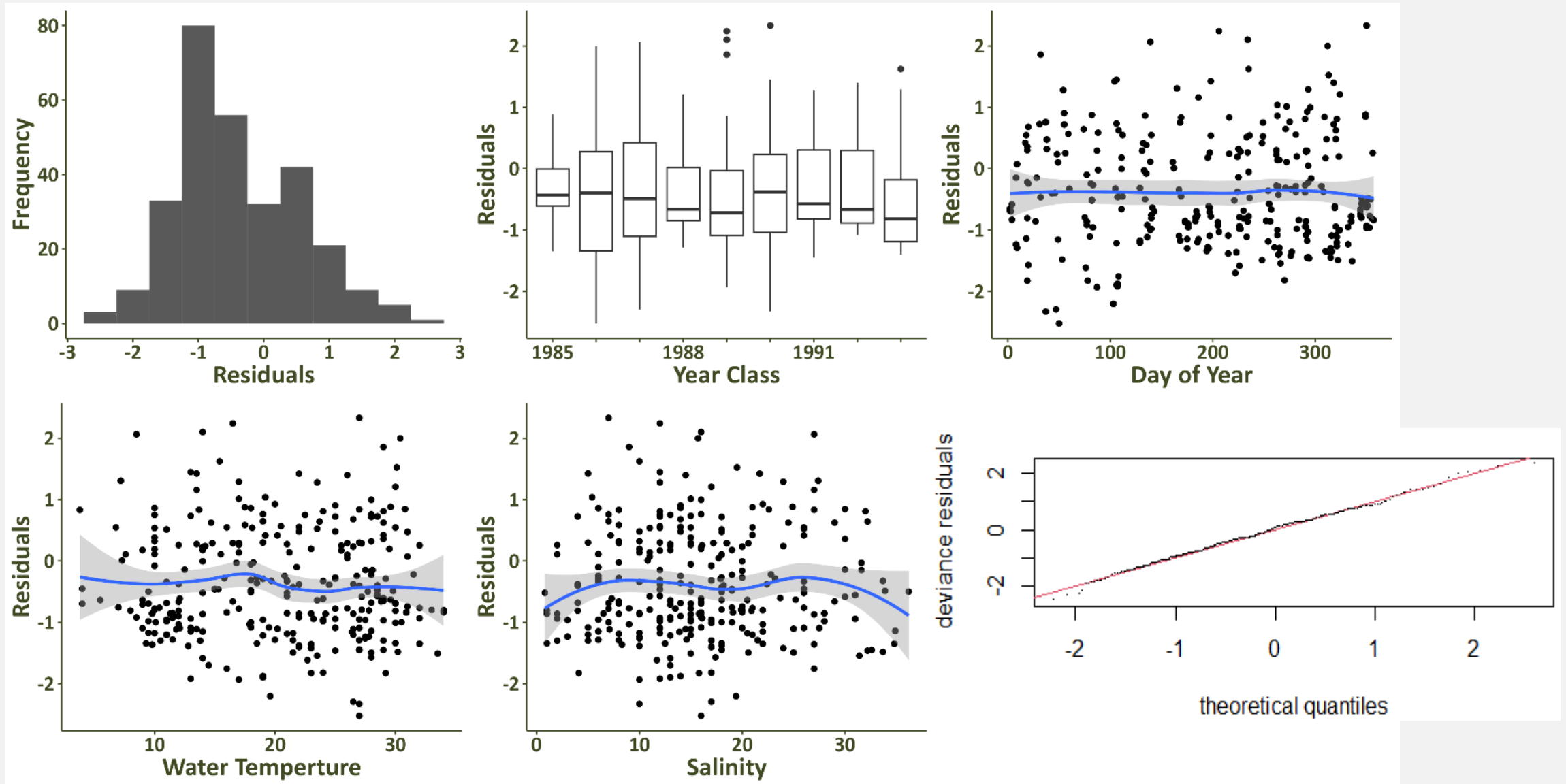
- Two mesh block nets
 - Block a 50 m section of estuarine, sub-tidal saltmarsh creek < 5 m wide and <1 m deep an hour before low tide
 - Two 0.88 mm square mesh block nets employed – one upstream and one downstream
 - Rotenone added upstream and fish collected using dip nets and 3 pulls of a 3.2 bar mesh seine
- 1986 – 1988
 - 9 fixed stations sampled monthly along the entire coast
- 1989 – 1994
 - Reduced to 4 fixed stations sampled monthly in Wando River drainage in Charleston county (blue circle)
- Ages 0 – 1
 - Sep – Dec (age-0)
 - Mar – Jul (age-1)



South Carolina: Rotenone Survey

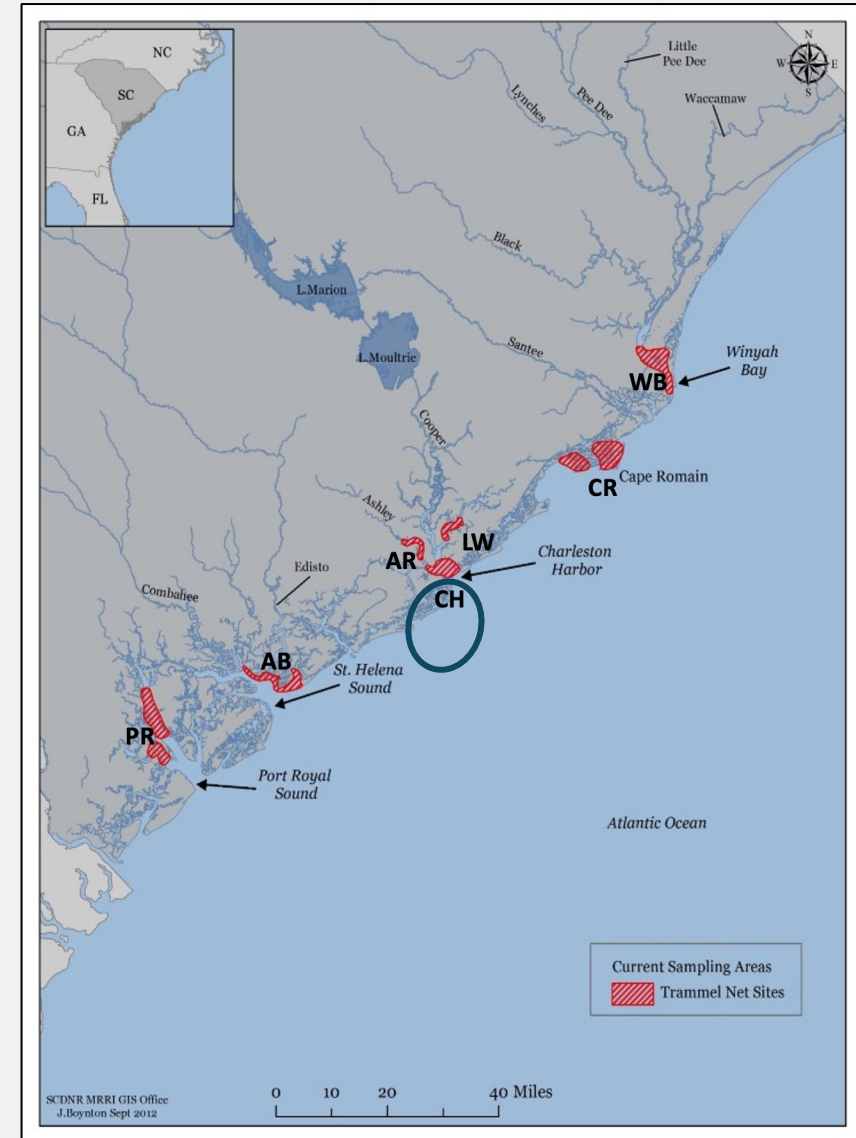


South Carolina: Rotenone Survey

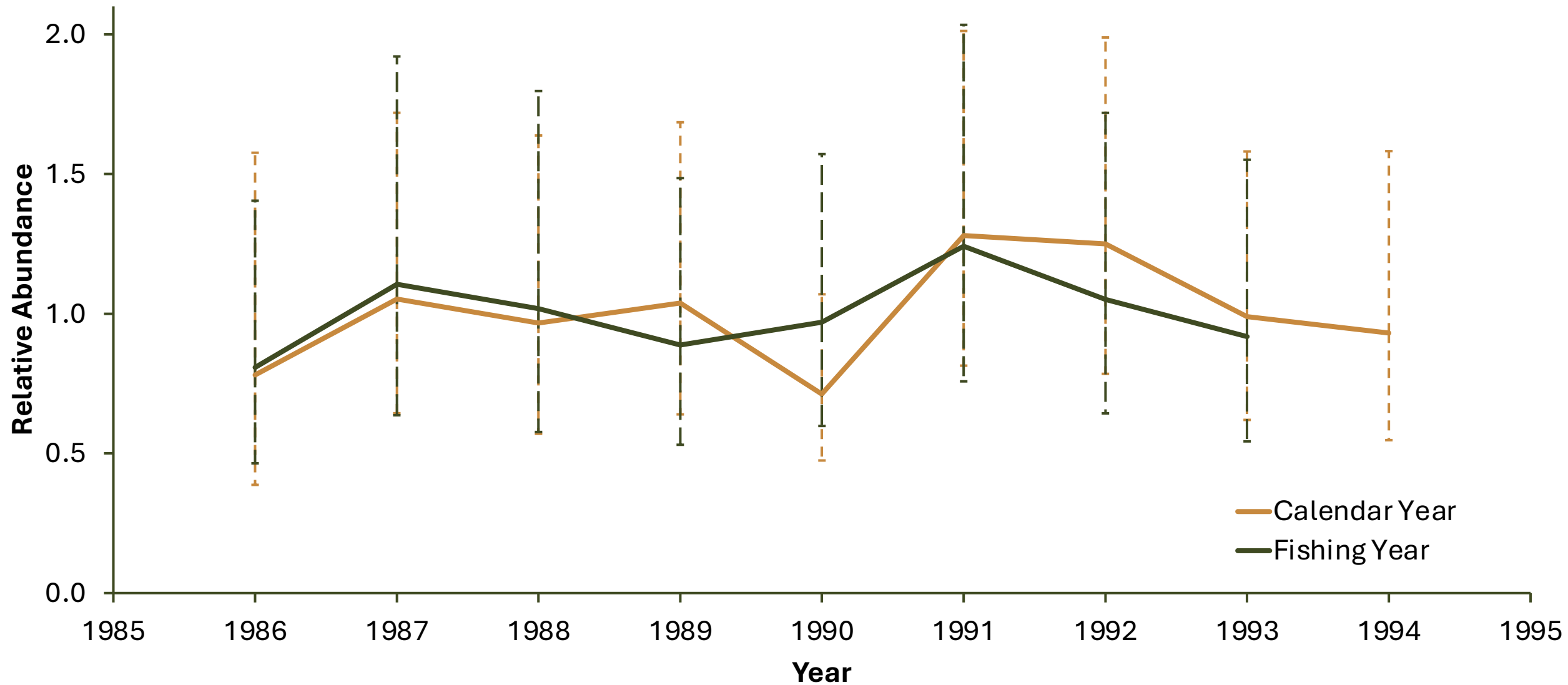


South Carolina: Stop Net Survey

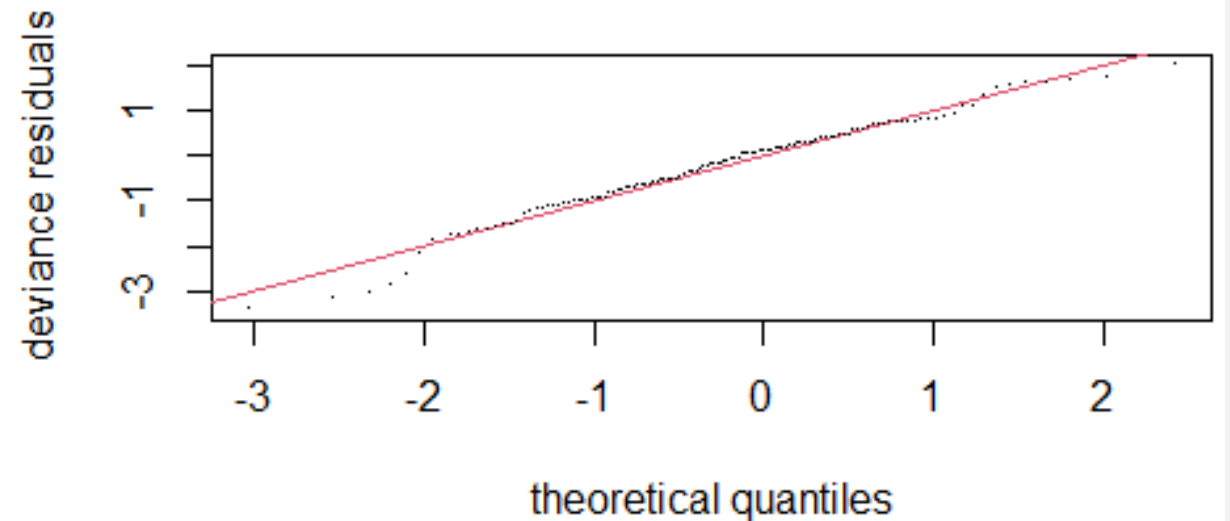
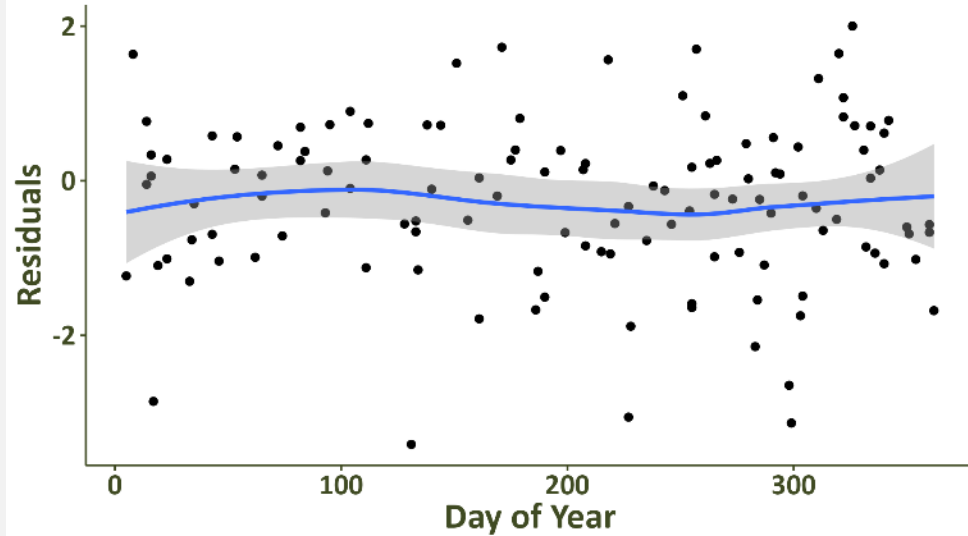
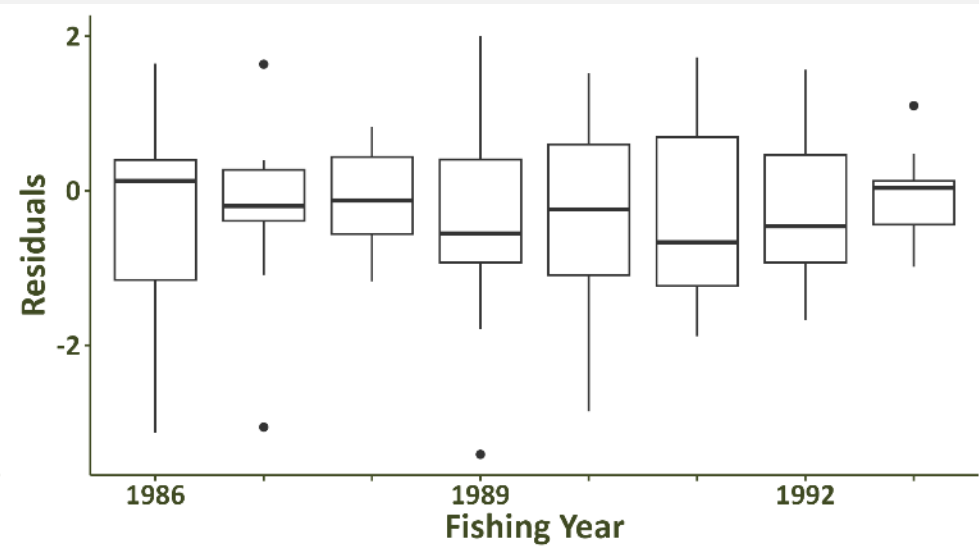
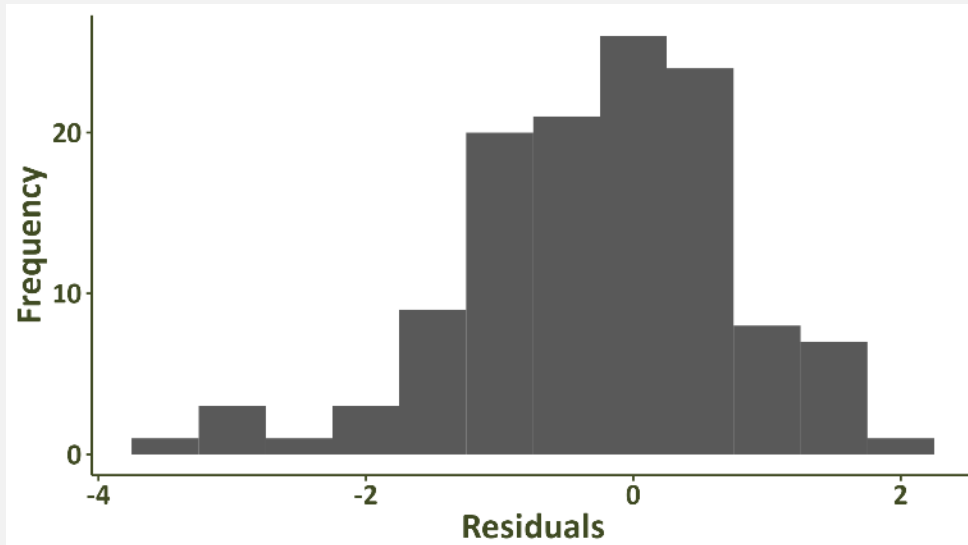
- Stop net
 - 366 m long by 3 m deep with 51 mm stretch mesh block set at high tide
 - Fish collected via dip nets as the tide dropped
- 1986 – 1994
 - Monthly sampling primarily from a single fixed station in Charleston harbor (~blue circle)
 - 8 other stations explored in survey history but not included in index
- Subadult
 - Mostly ages 1 – 3



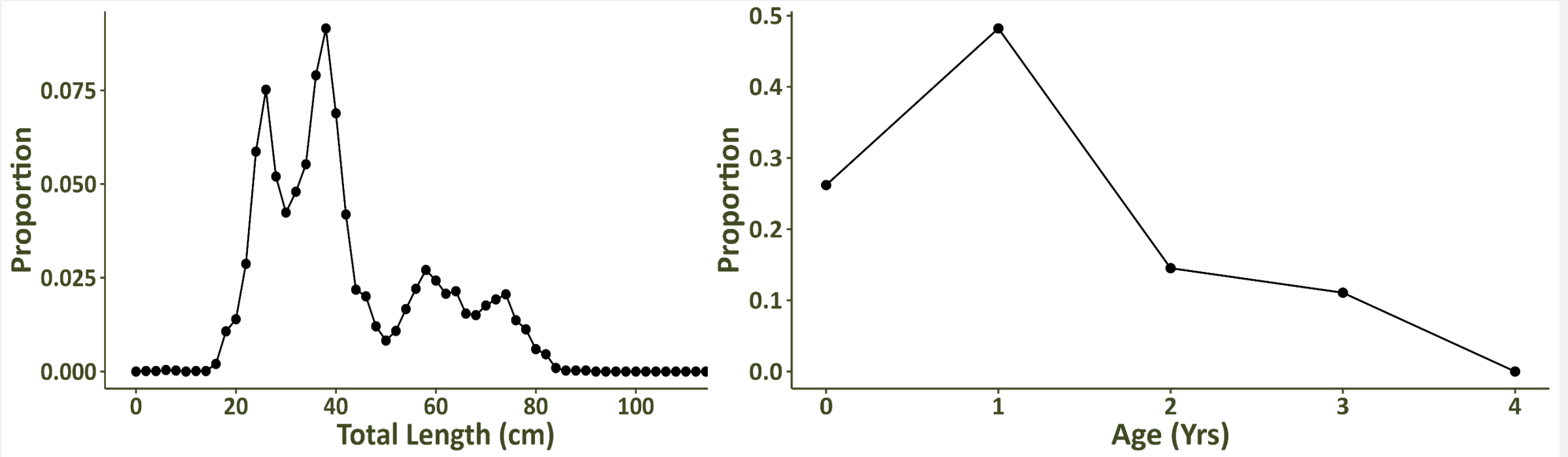
South Carolina: Stop Net Survey



South Carolina: Stop Net Survey

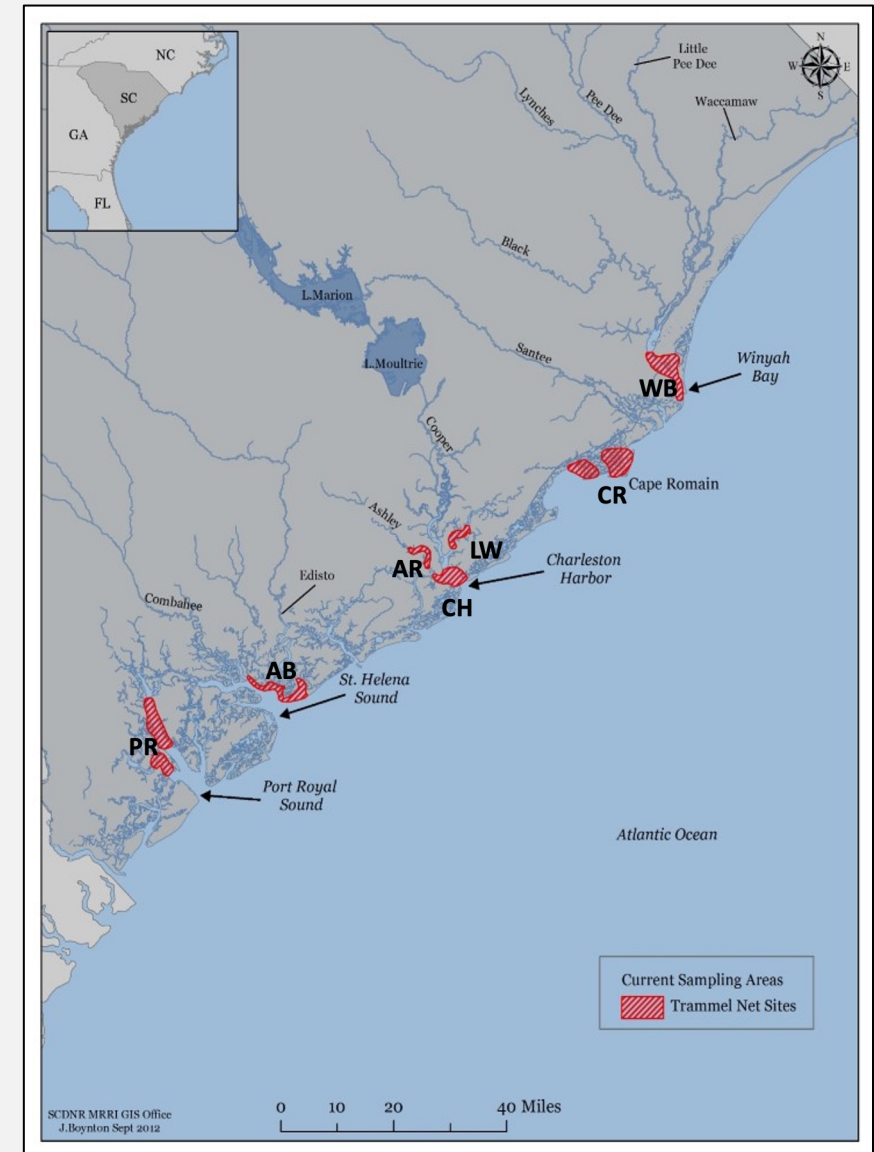


South Carolina: Stop Net Survey

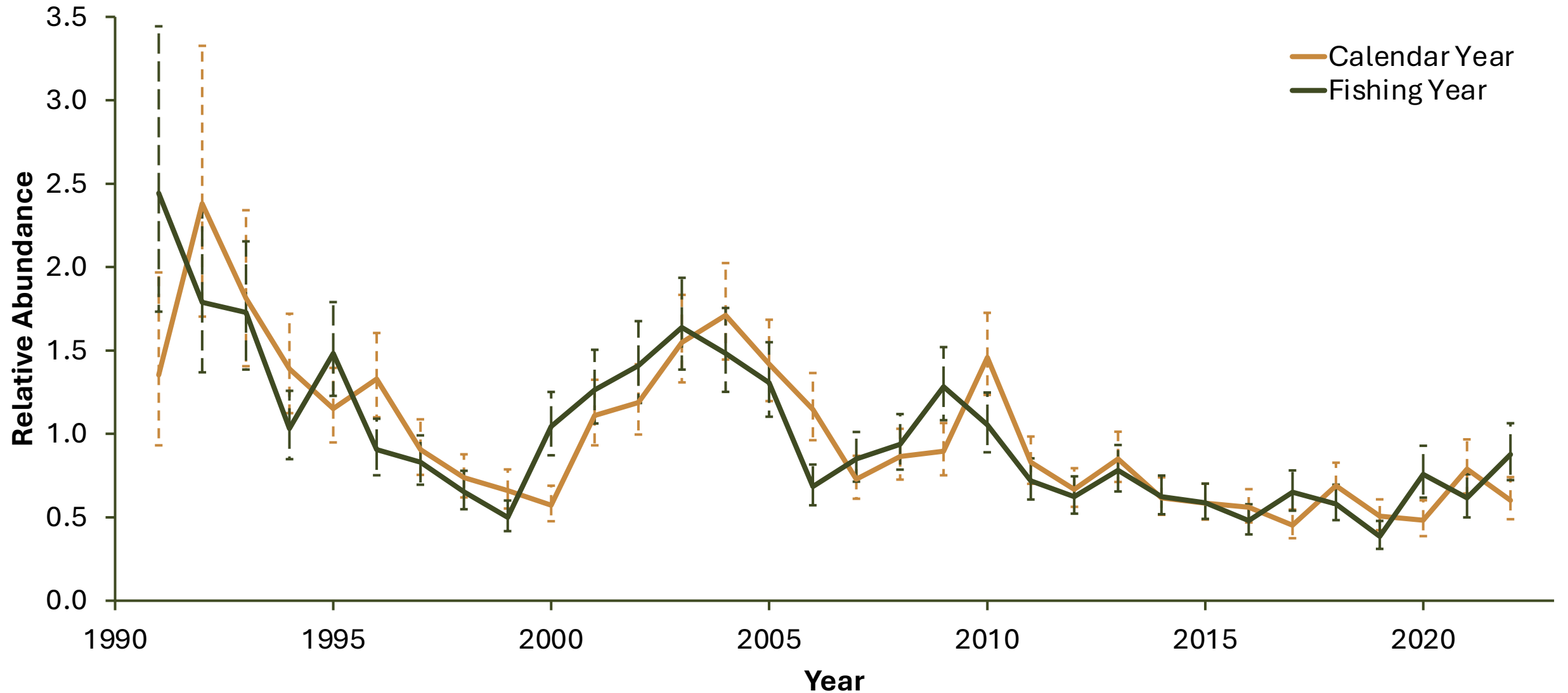


South Carolina: Trammel Net Survey

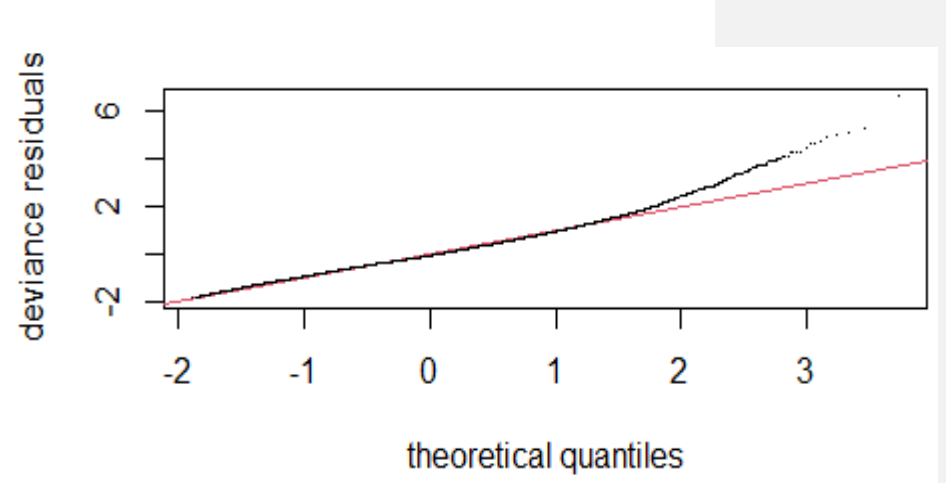
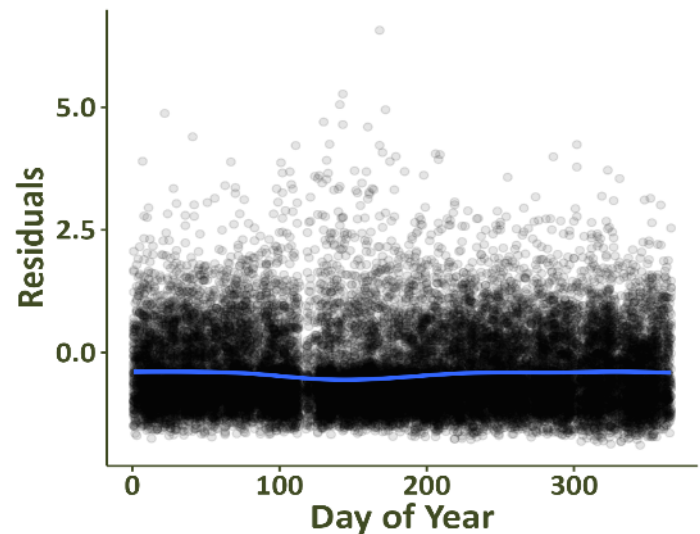
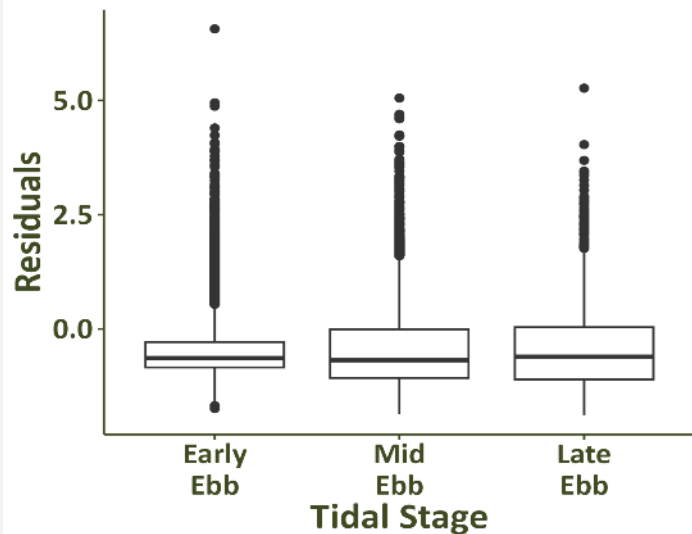
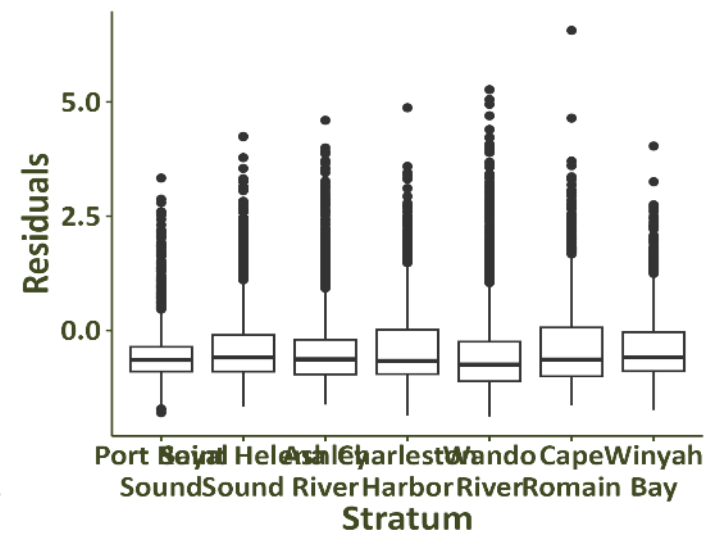
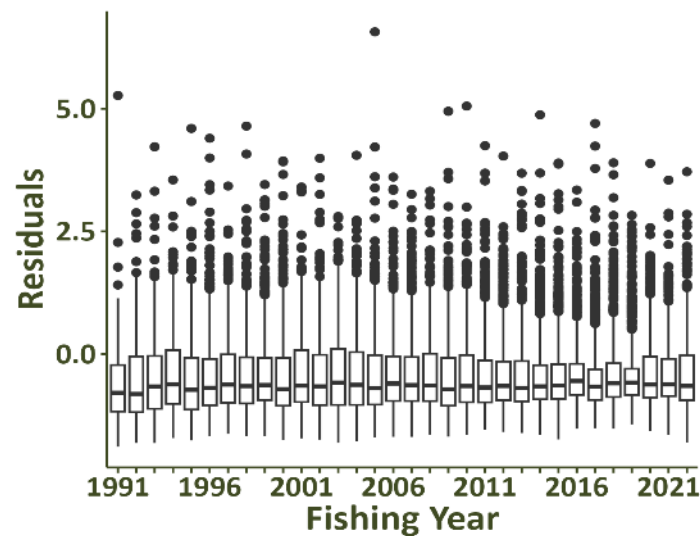
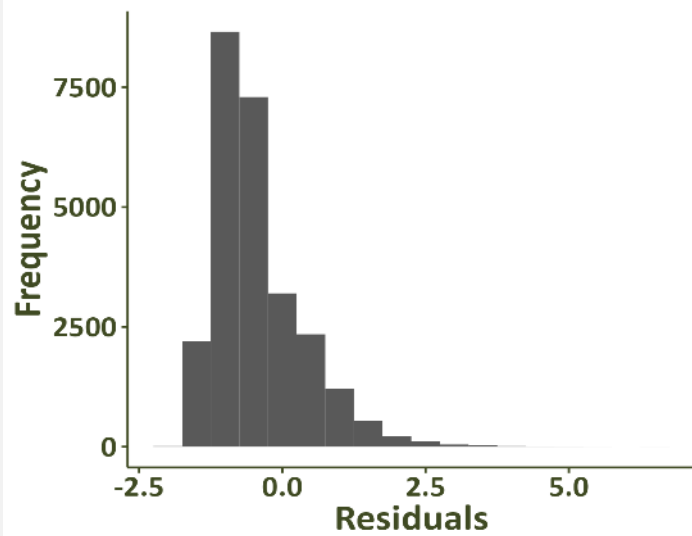
- 183 x 2.1mm trammel net
 - 3 panels: inner panel (63.5mm stretch mesh) between two outer panels (355.6mm stretch mesh)
 - Set along the shoreline during an ebbing tide
 - ~10 minute soak depending on catch amount
- 1991 – 2022
 - Stratified-random design by 7 areas
 - 10 – 12 sites randomly sampled monthly within each area
- Subadult
 - Mostly ages 1 – 4
 - ALK developed to produce annual age compositions from the length data



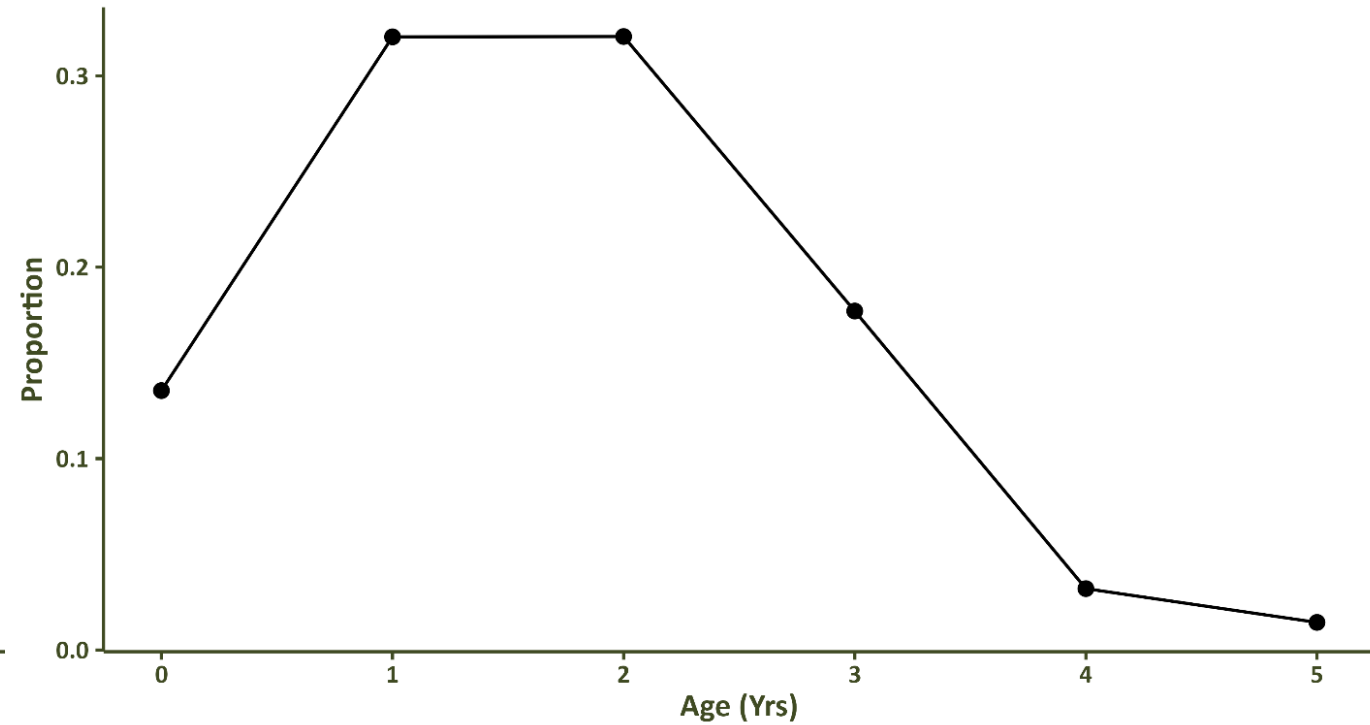
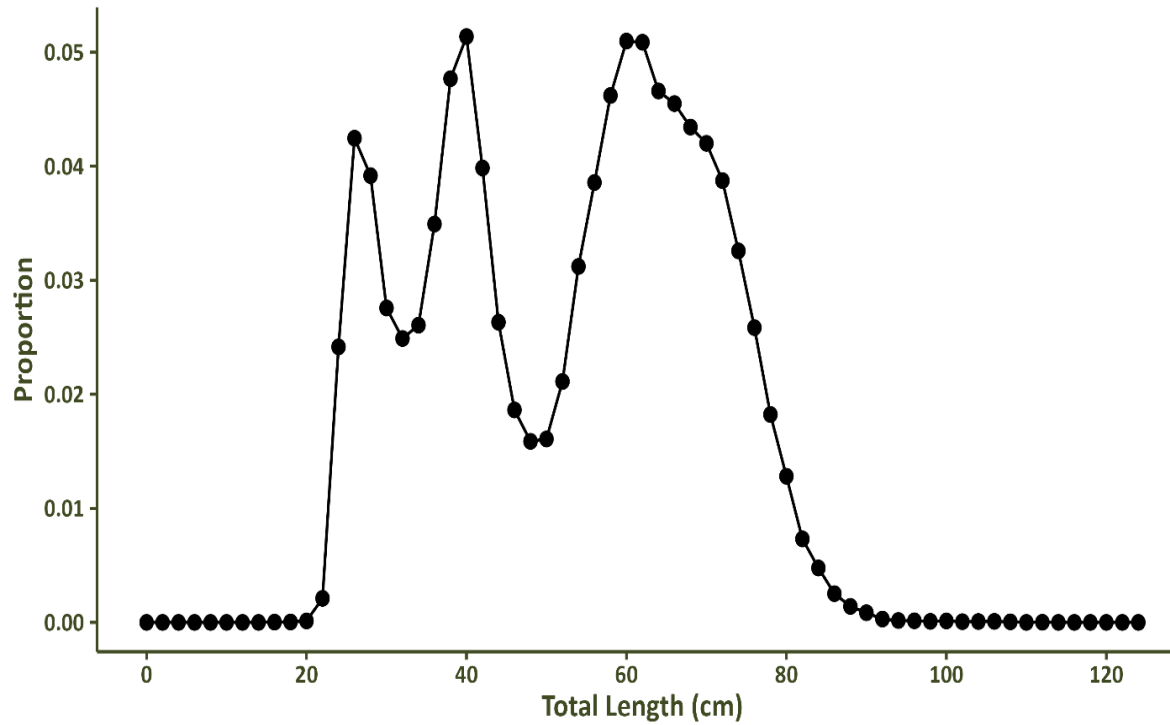
South Carolina: Trammel Net Survey



South Carolina: Trammel Net Survey

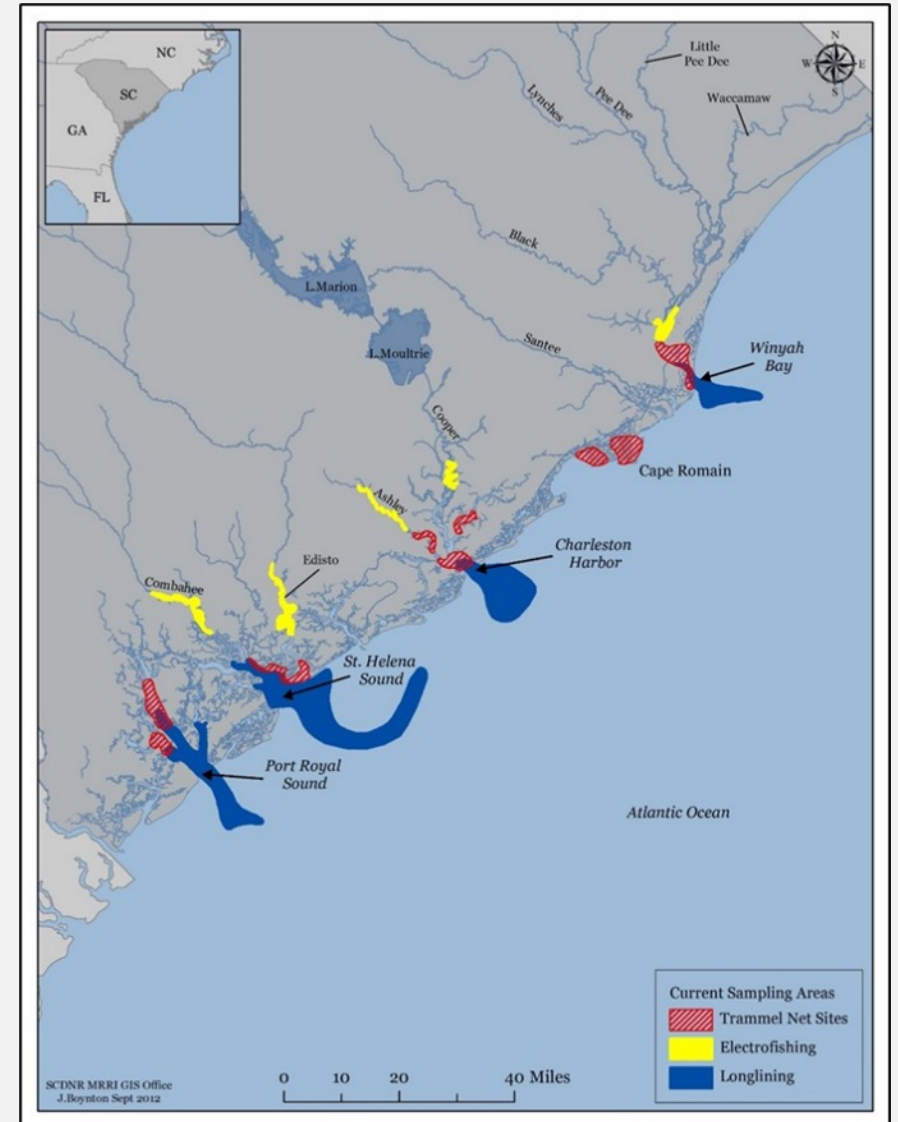


South Carolina: Trammel Net Survey

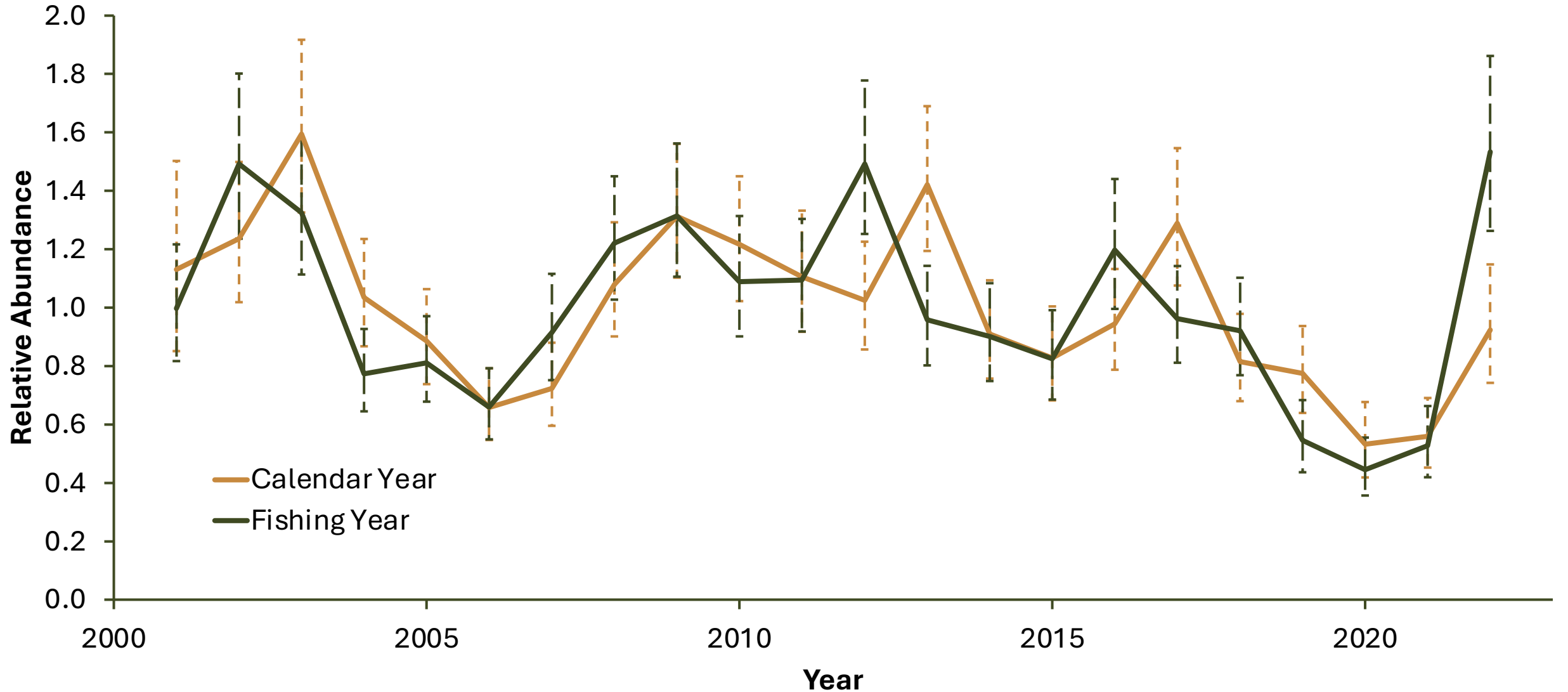


South Carolina Electrofishing Survey

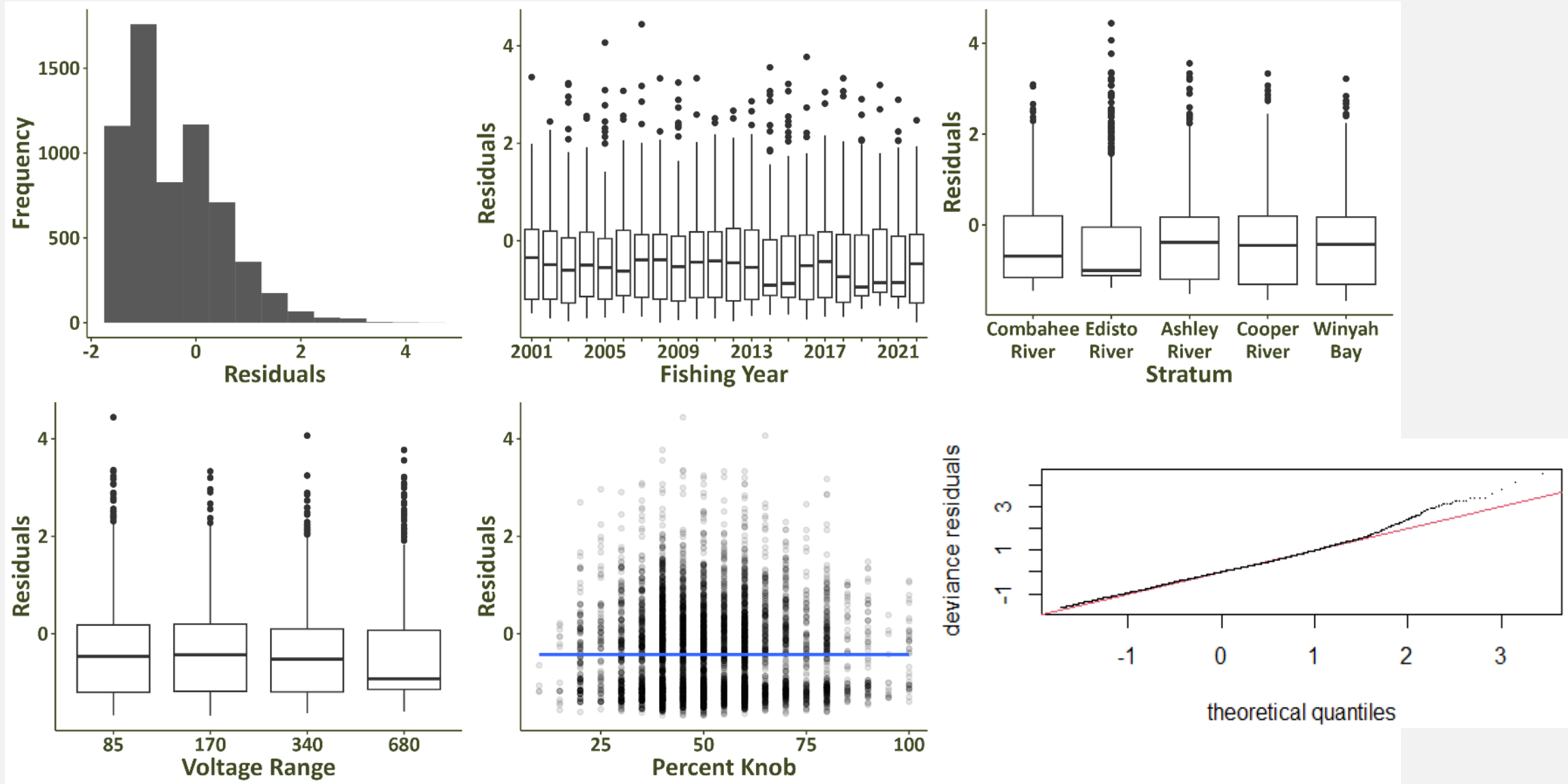
- Boat Electrofishing
 - ~3,000 W @ 120 Hz
 - 15-minute passes along shore
- 2001-2022
 - Stratified random fixed stations
 - 6-8 stations selected per sampling day
 - Selection affected by riverine conditions
 - 5 strata (rivers) in 3 different estuarine systems
- Subadult
 - Primarily age-1



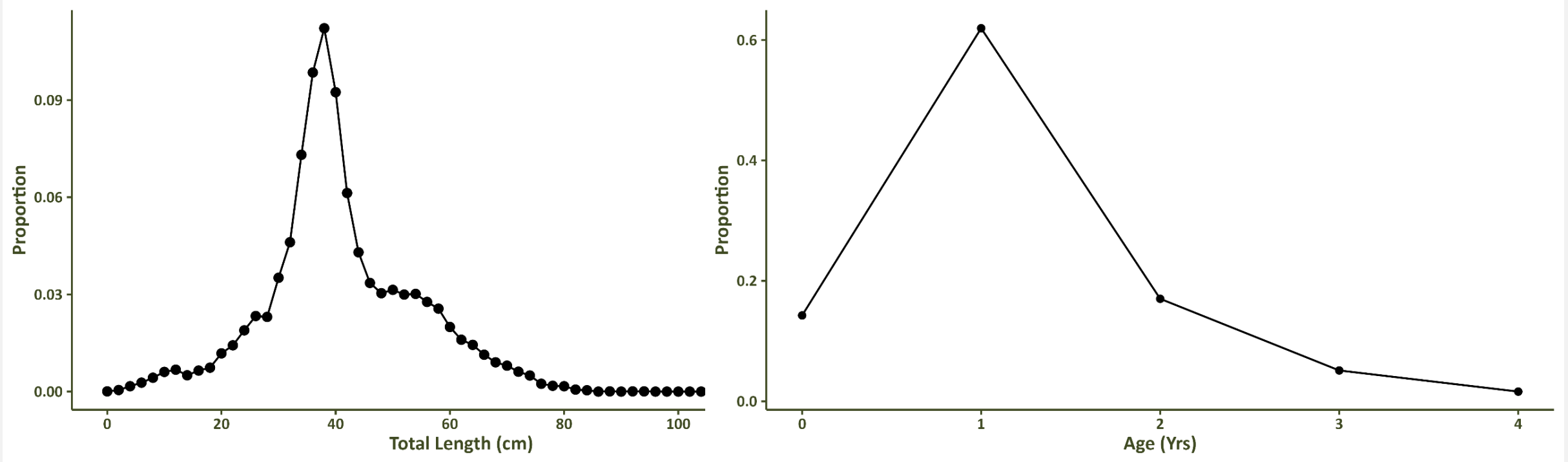
South Carolina Electrofishing Survey



South Carolina Electrofishing Survey

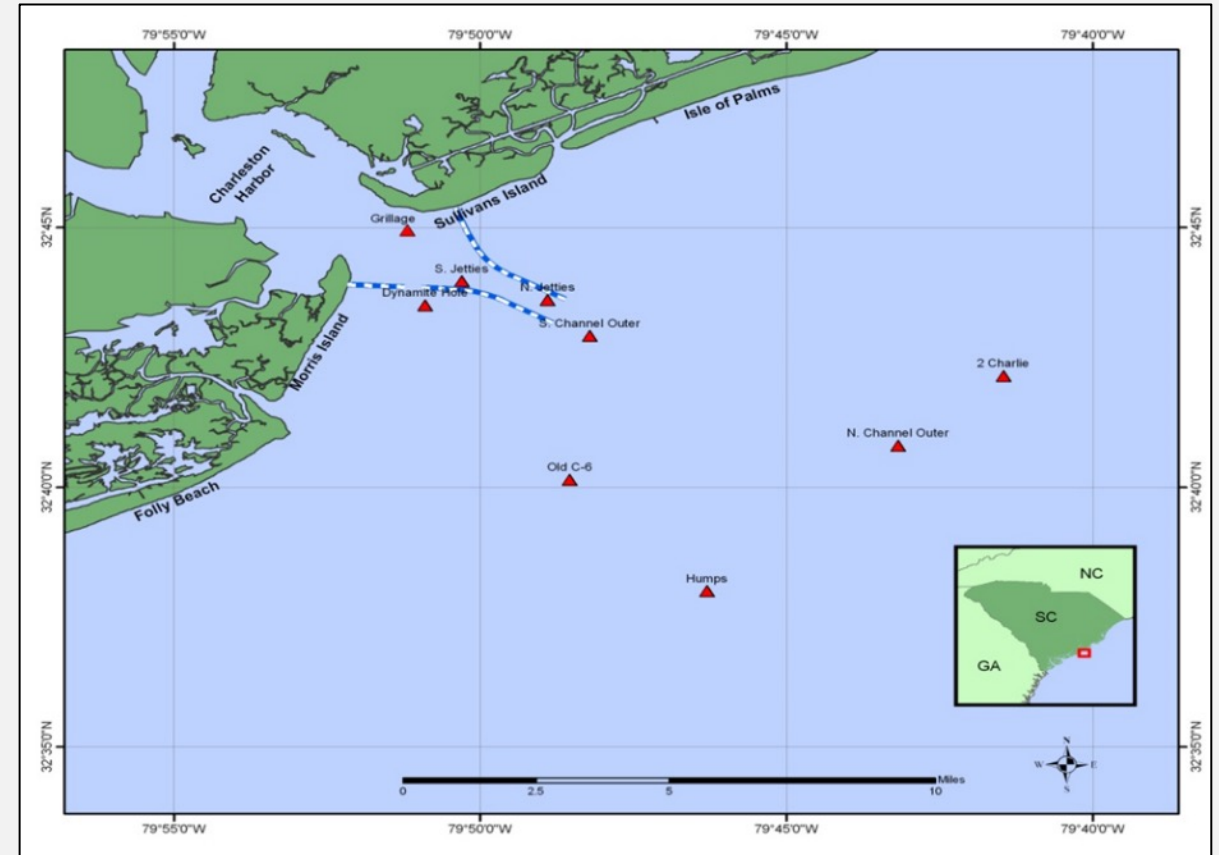


South Carolina Electrofishing Survey

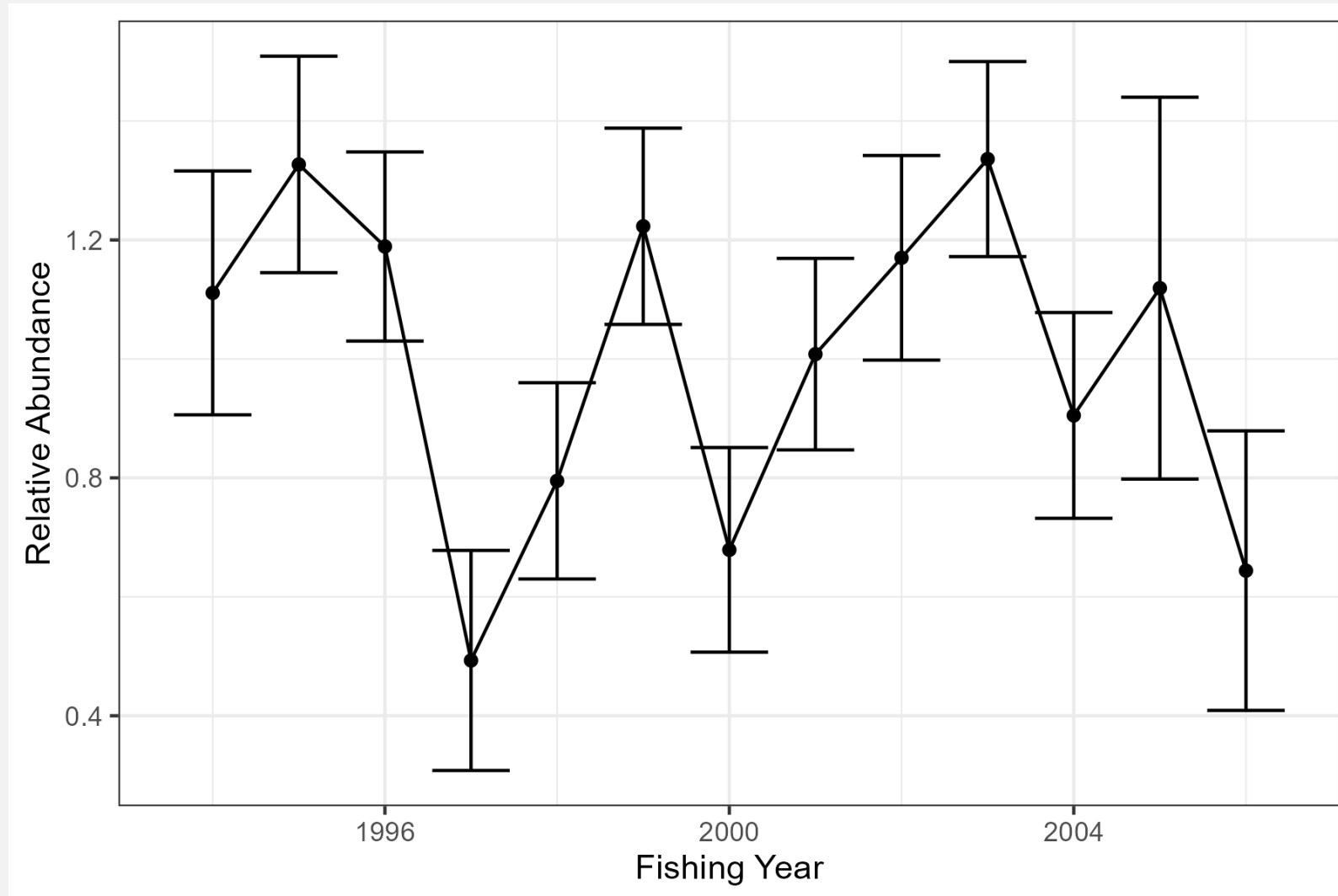


South Carolina: Historic Longline Survey

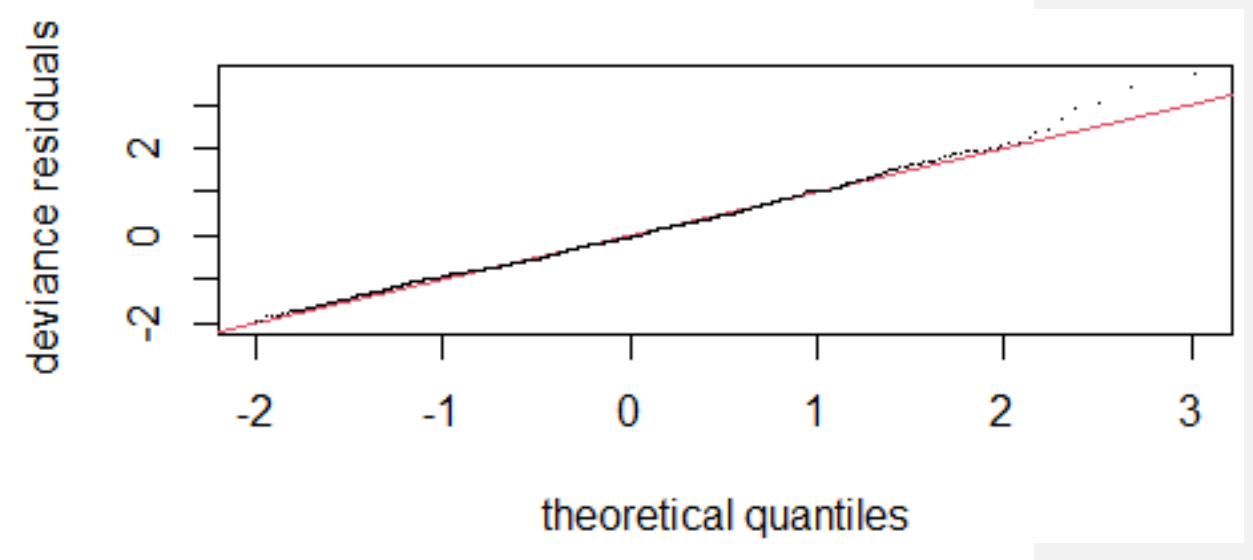
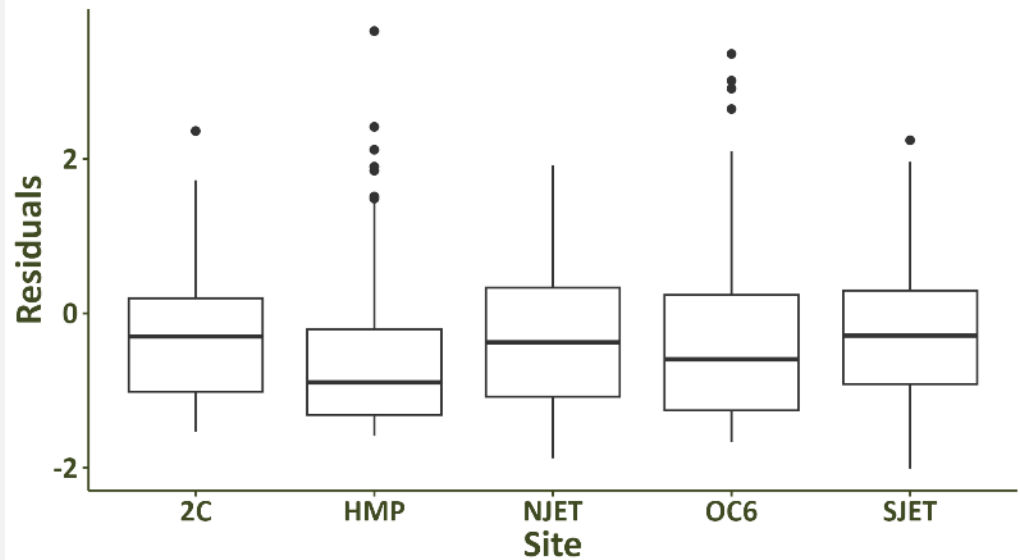
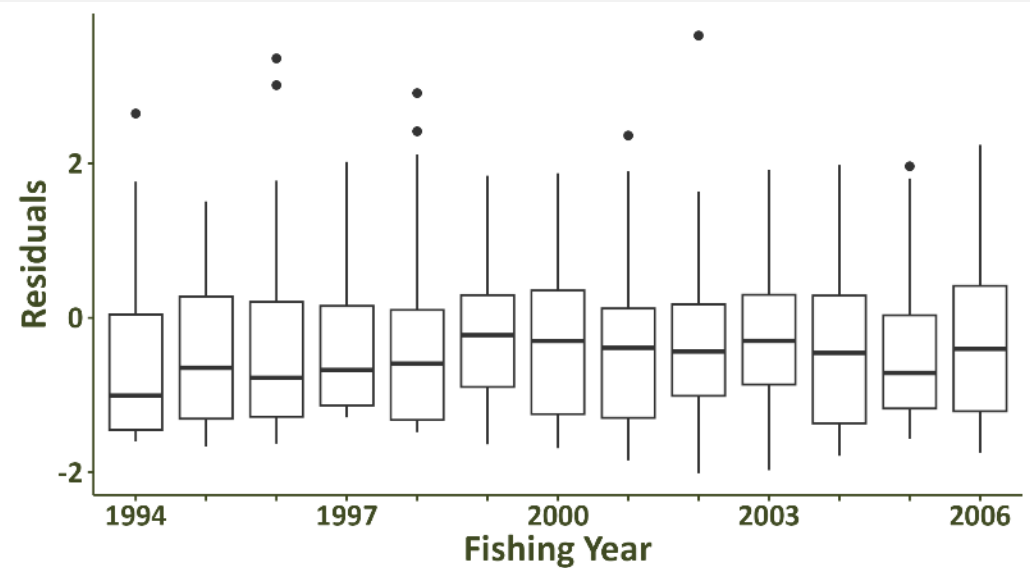
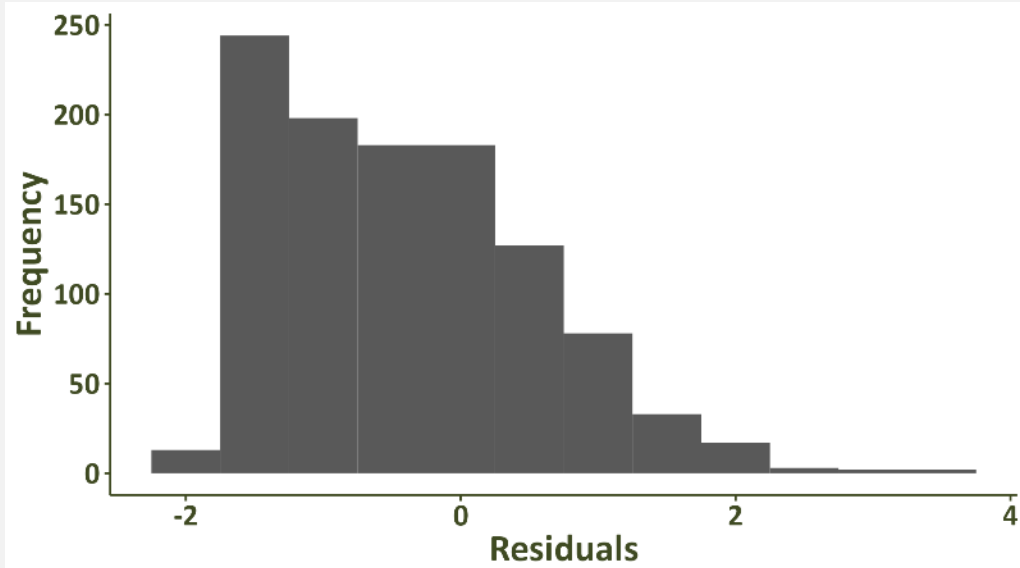
- Longline
 - 1,829 m long mainline with 120 hooks
 - 30 min soak
- 1994 – 2006
 - Sampling primarily at 7 fixed stations at Charleston jetties or nearshore habitats off the harbor
 - Monthly sampling during early years of survey but became limited to Aug – Dec
 - 2005 – 2006: removed from prior assessment due to vessel breakdowns and reduced sampling
- Adult
 - Lengths measured with limited age samples



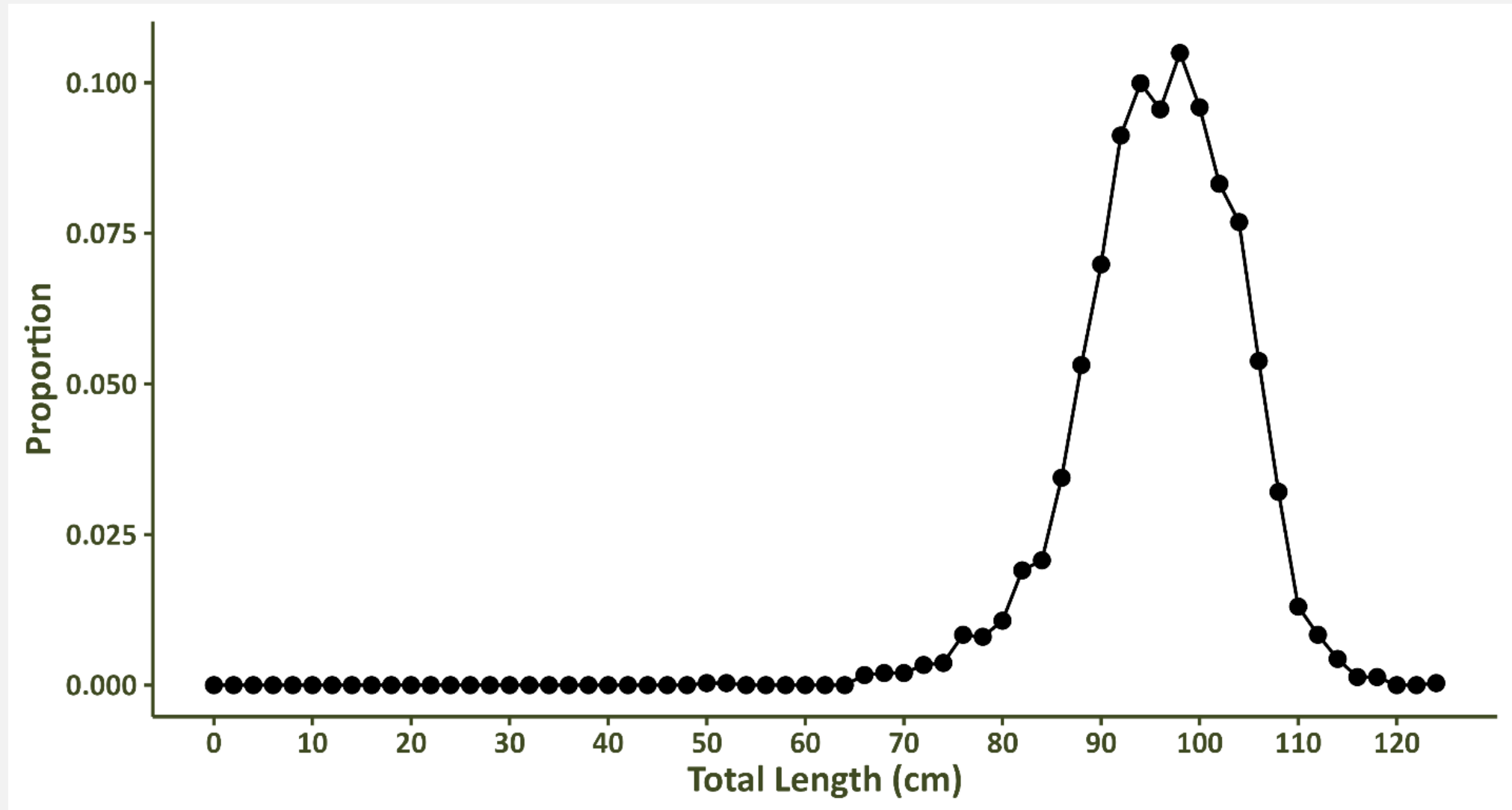
South Carolina: Historic Longline Survey



South Carolina: Historic Longline Survey

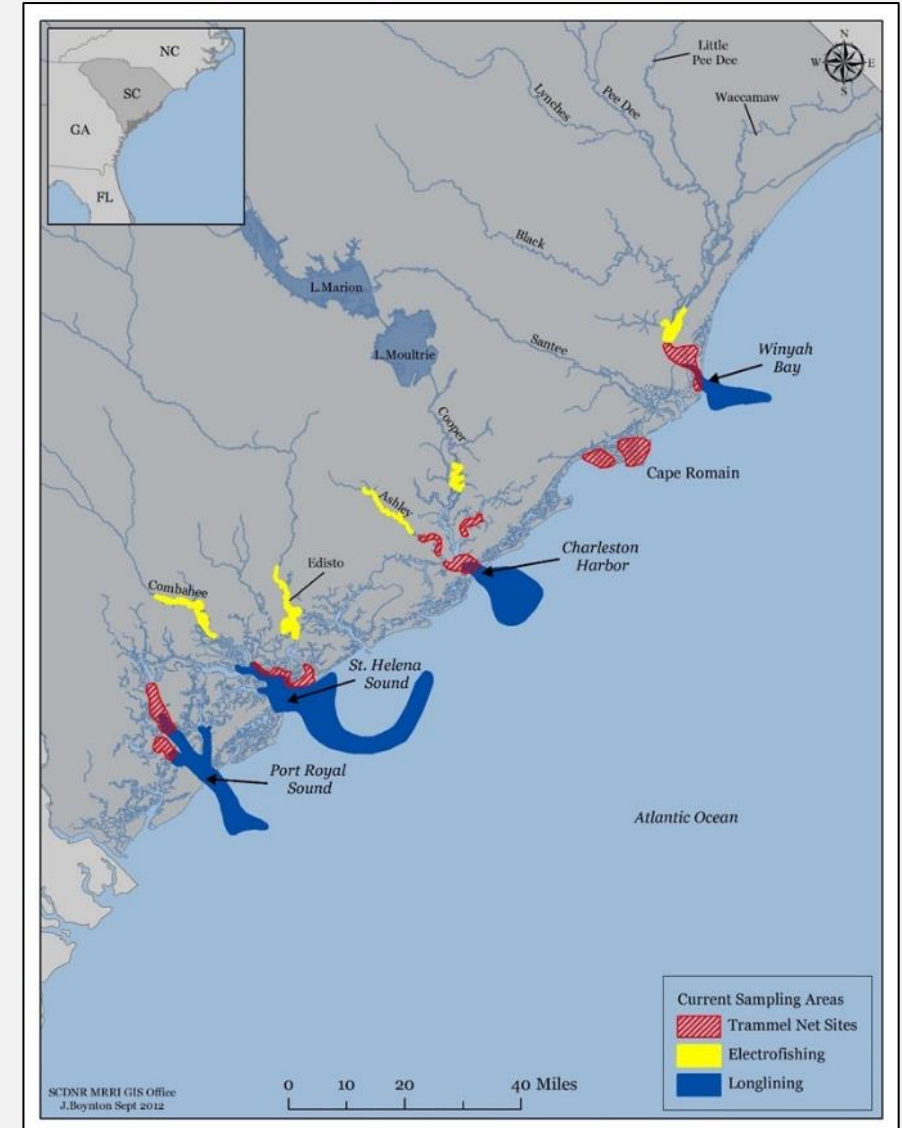


South Carolina: Historic Longline Survey

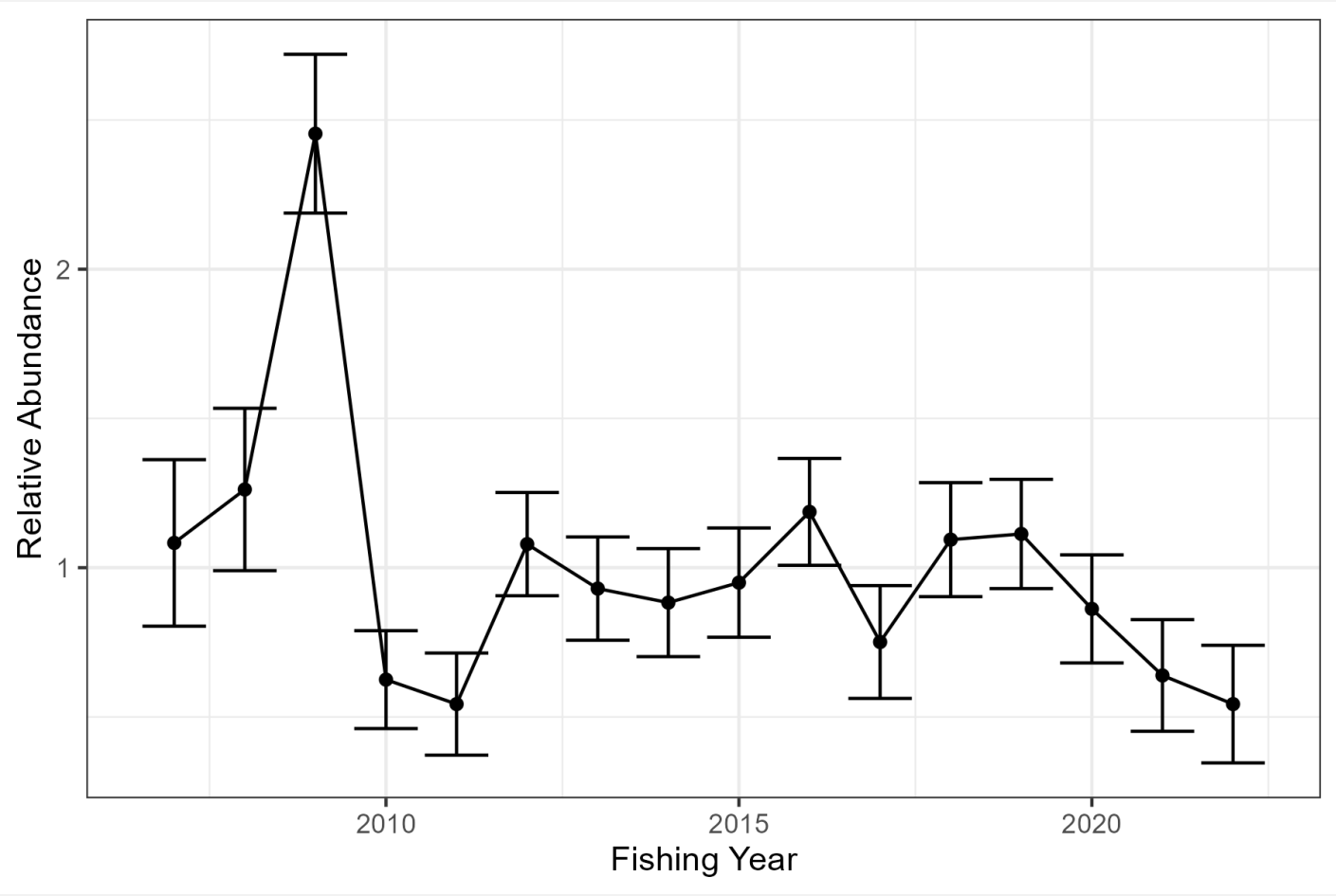


South Carolina: Contemporary Longline Survey

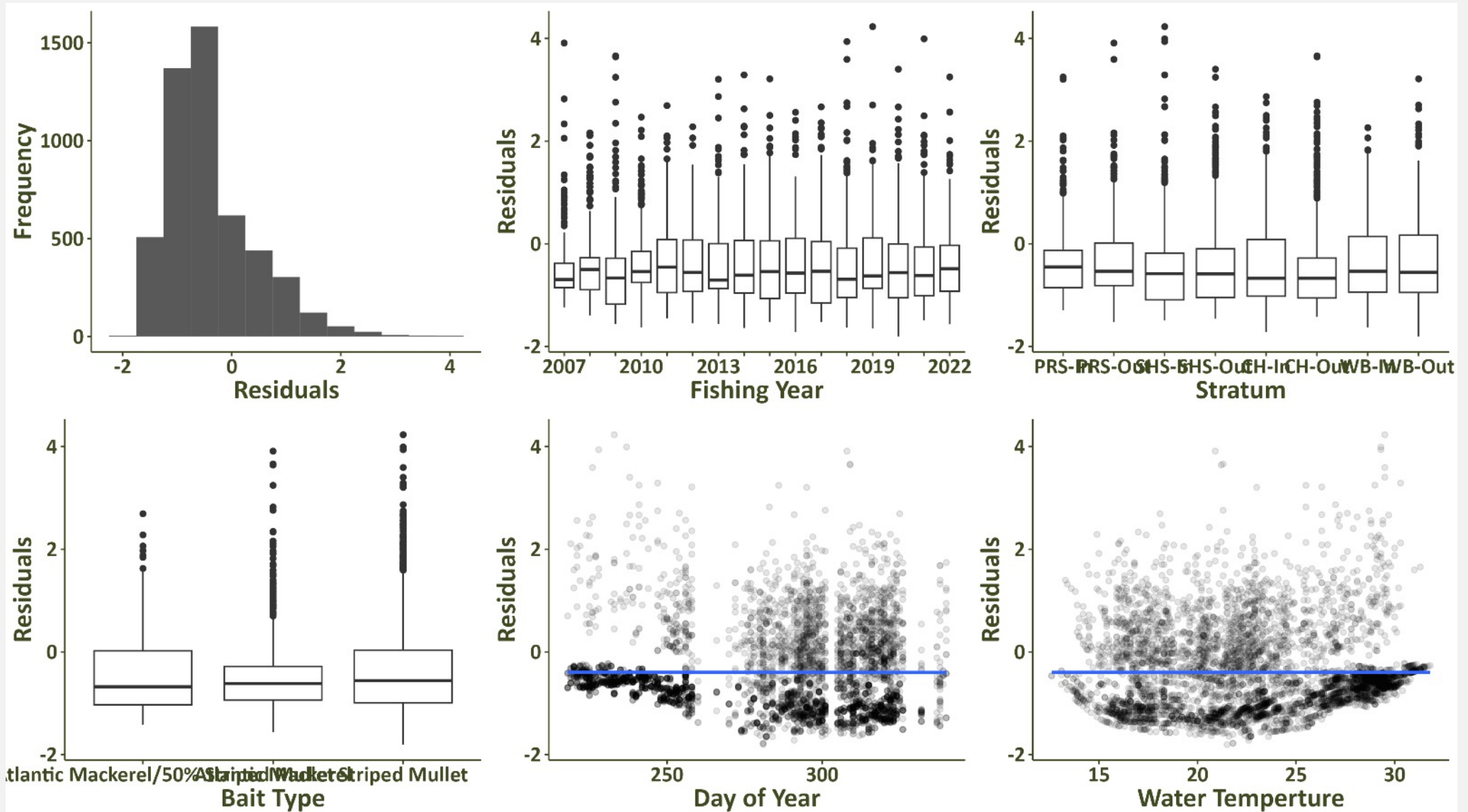
- Modified from the historic survey
- Longline
 - 610 m long mainline with 40 gangions; stop sleeves every 30 m
 - 45 min soak
 - Varying baits used in early years of study
- 2007 – 2022
 - Stratified-random design by 4 areas and 3 time periods (Aug. 1 – Dec. 15)
 - 30 stations sampled monthly along the coast (blue areas) from each area each 6-week period
- Adult (ages 3 – 40)
 - Lengths measured with every 3rd fish kept for aging and life history work-up (up to 10 fish total)



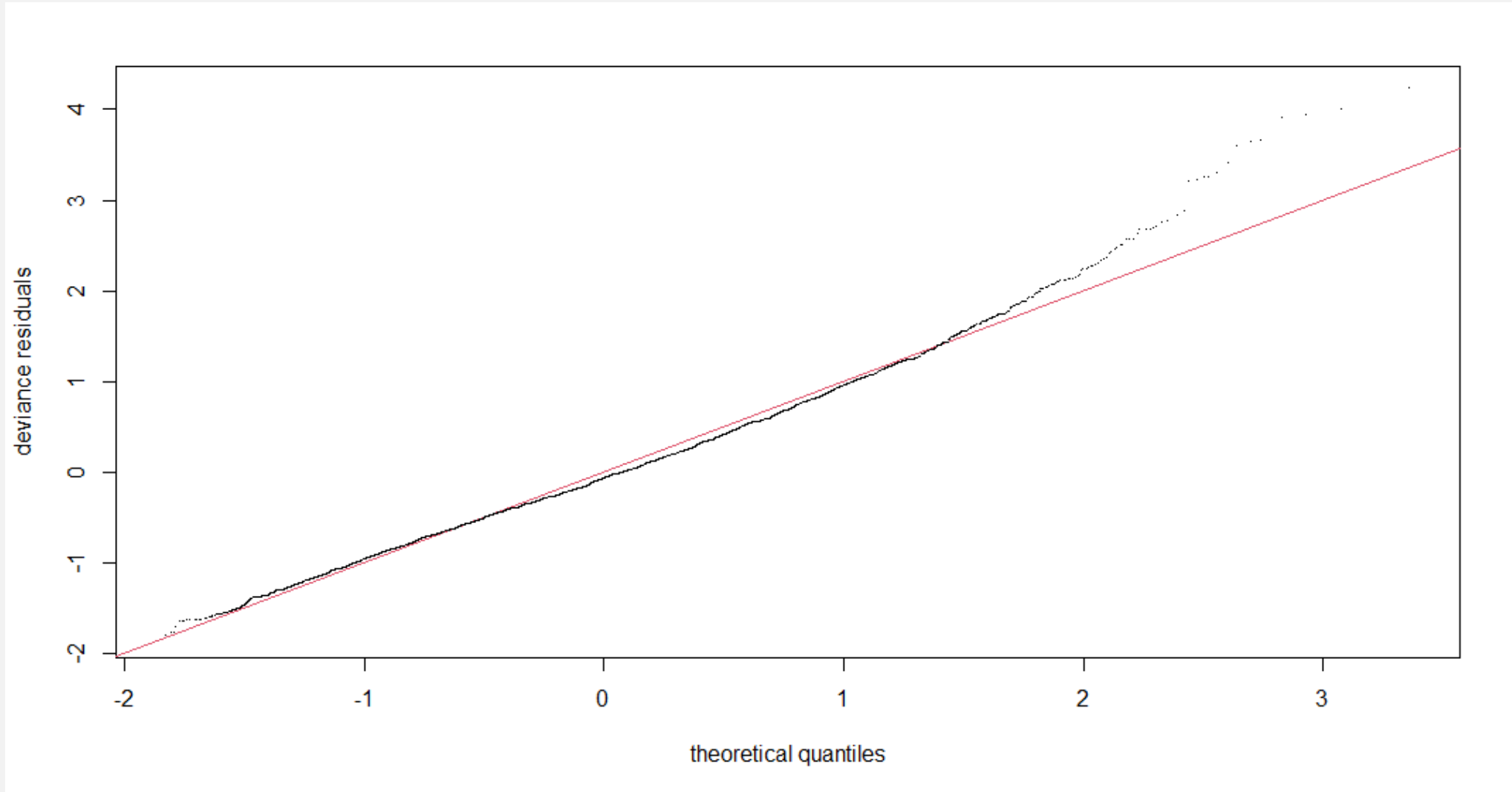
South Carolina: Contemporary Longline Survey



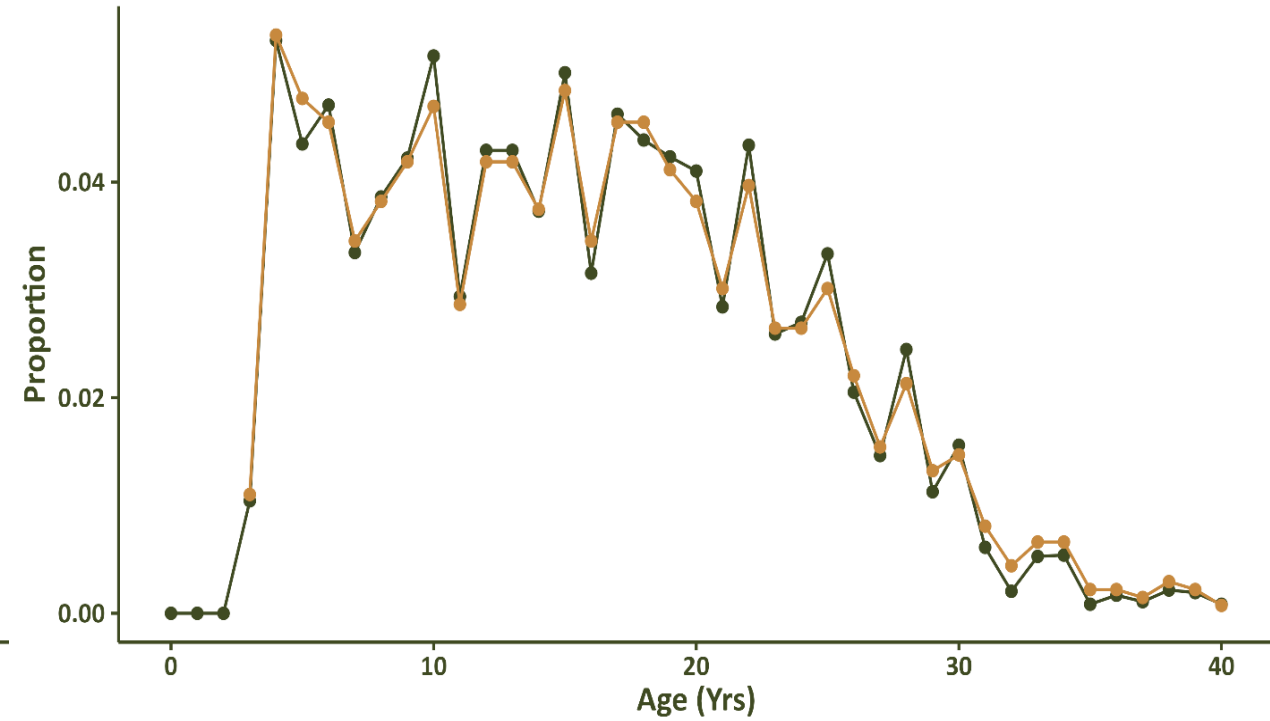
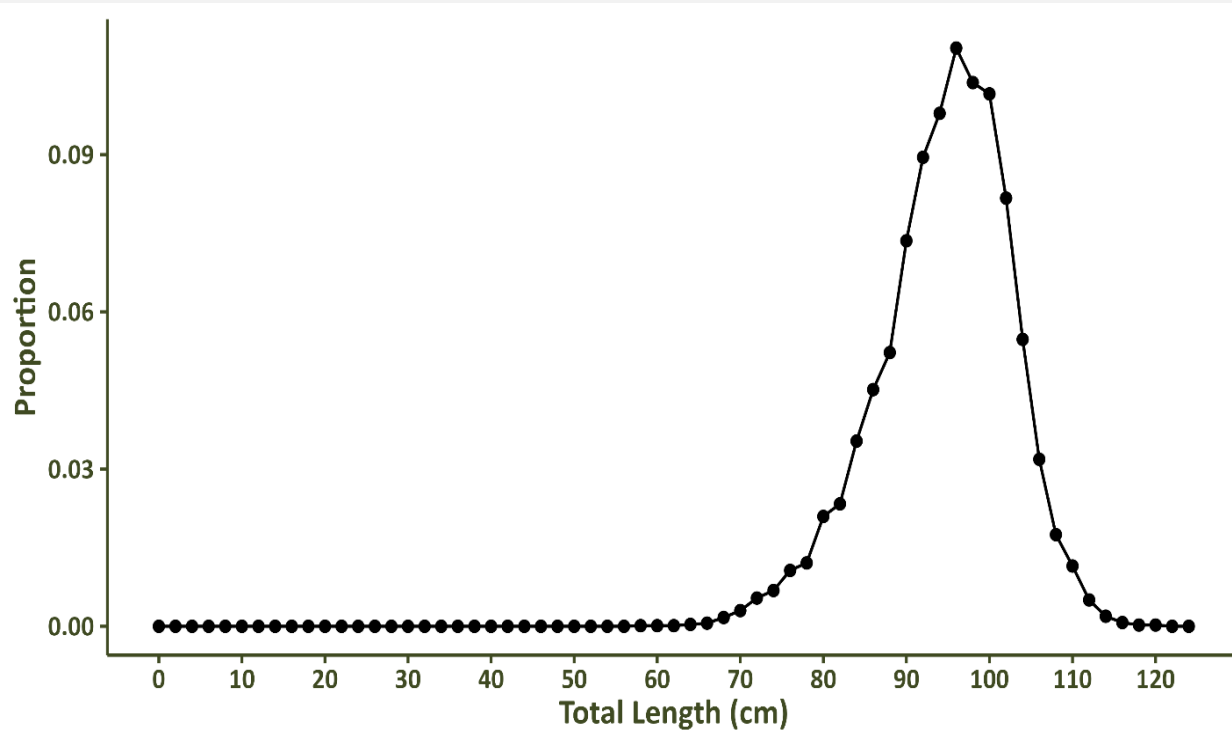
South Carolina: Contemporary Longline Survey



South Carolina: Contemporary Longline Survey



South Carolina: Contemporary Longline Survey

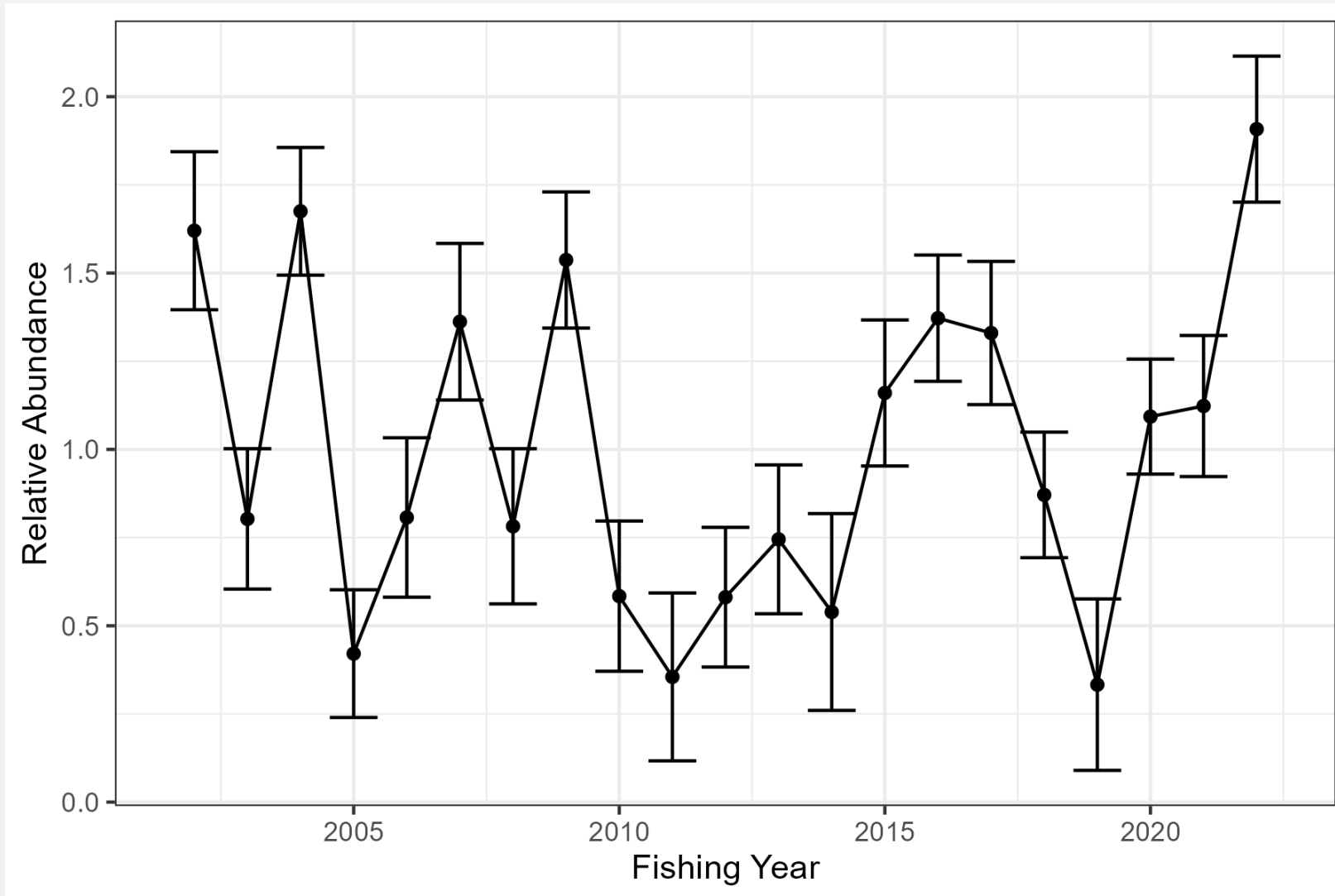


Georgia: Gill Net Survey

- 91.4 m long by 2.7 m deep
 - Single panel
 - 6.4 cm (2.5 in) stretch mesh sizes
 - Soak time based on 2 – 3 boat passes
- **Wassaw and Altamaha Sounds**
 - Stratified-random based on area
 - 36 stations sampled each month in each area
 - June - August
 - 2003 – 2022
 - Samples taken during last 3 hours of ebbing tide during daylight hours
- **Mostly age-1 fish**
 - 220 – 350 mm FL



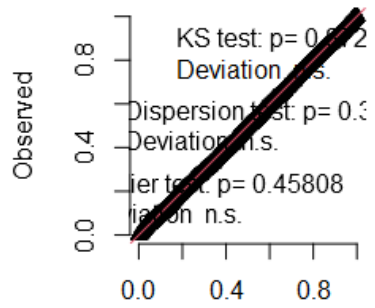
Georgia: Gill Net Survey



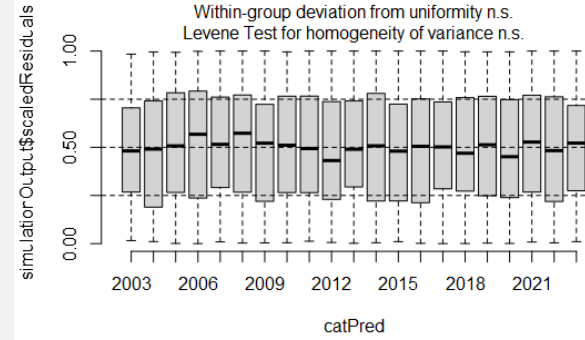
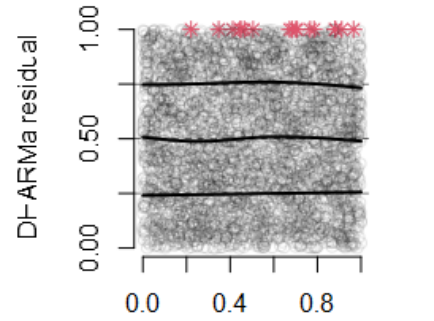
Georgia: Gill Net Survey

DHARMA residual

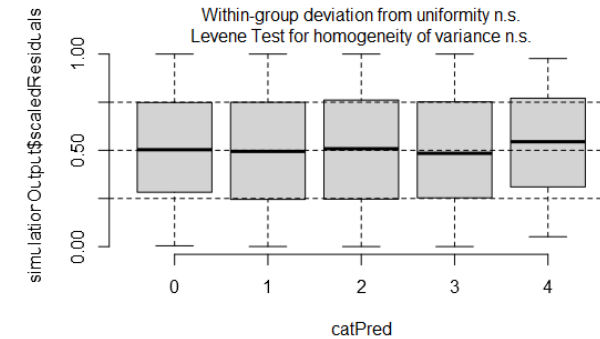
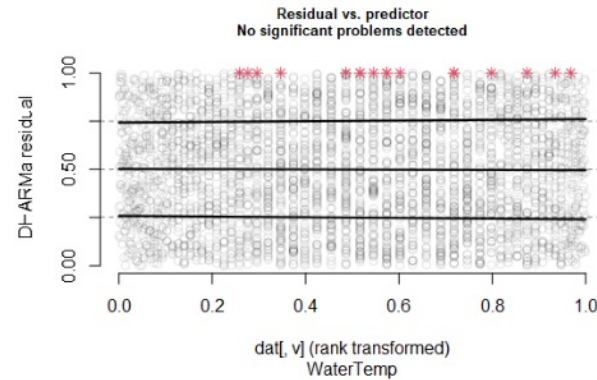
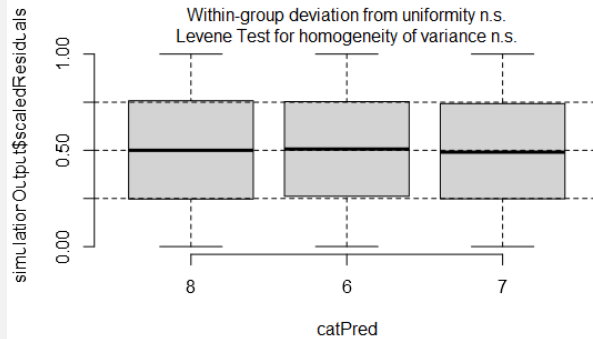
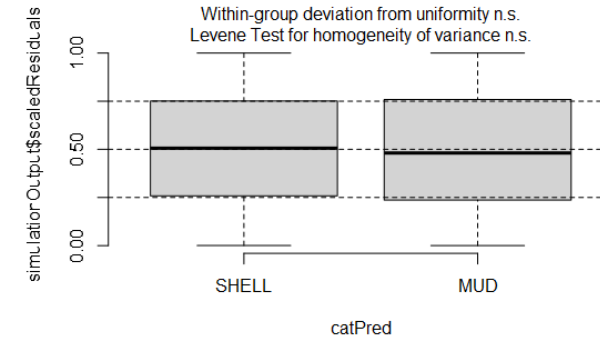
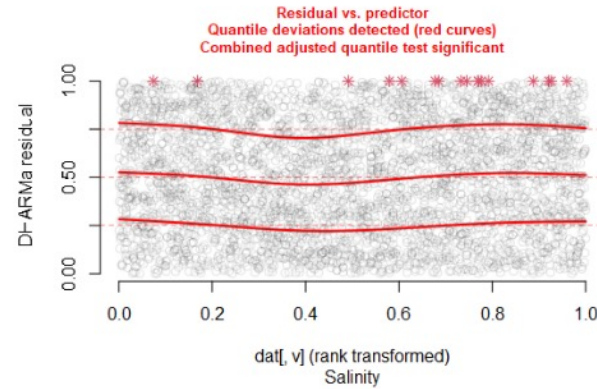
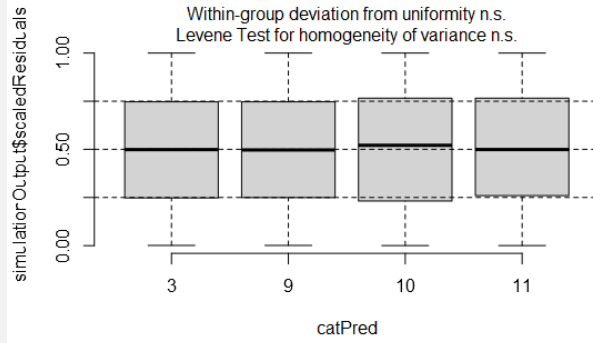
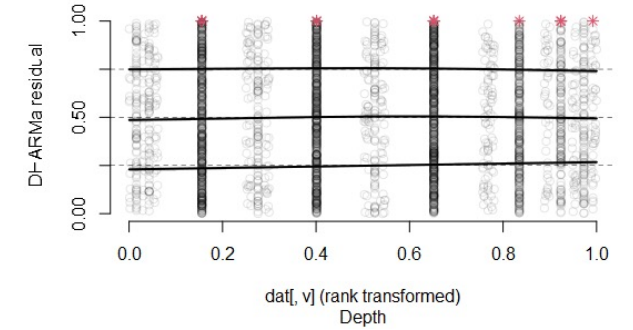
QQ plot residuals



Residual vs. predicted
No significant problems detected

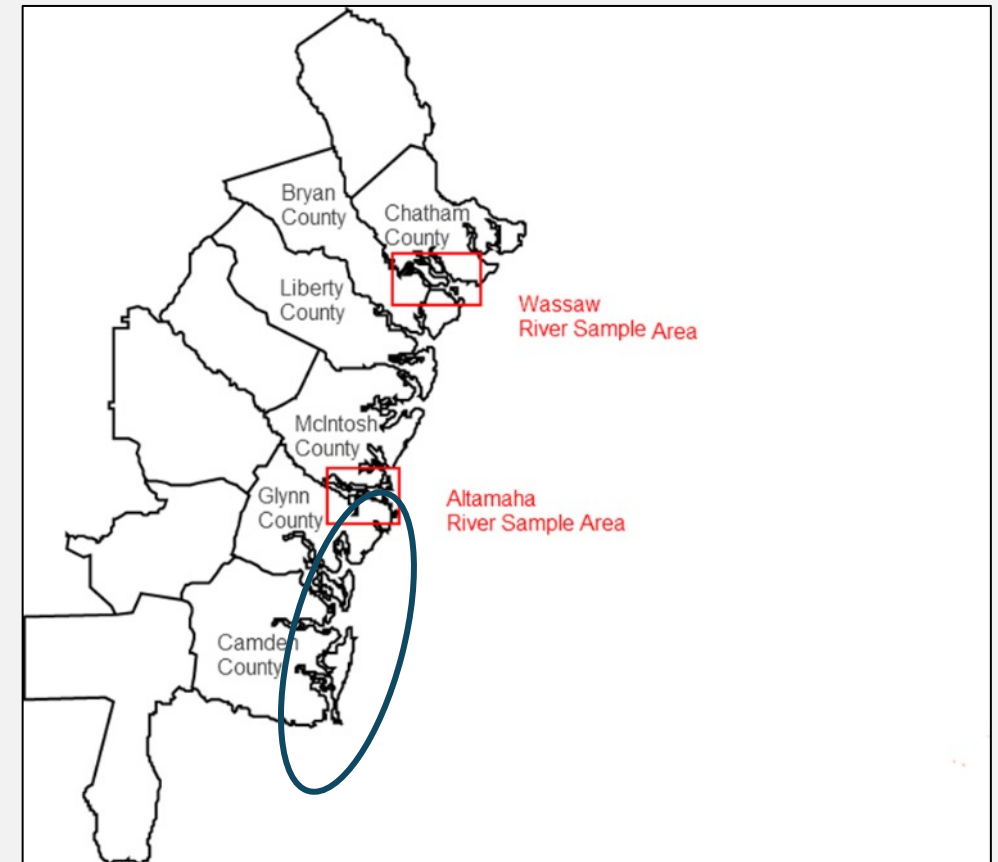


Residual vs. predictor
No significant problems detected

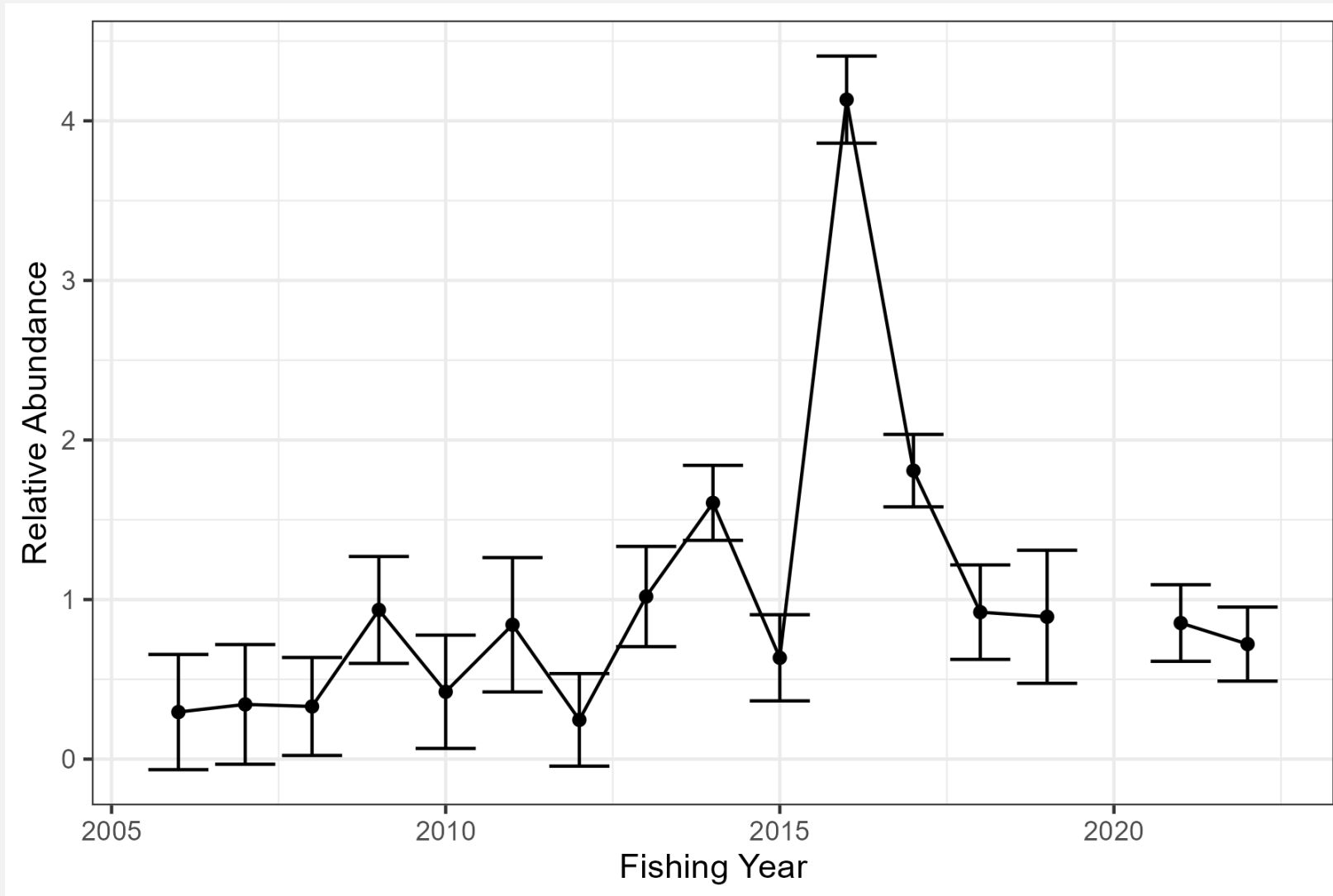


Georgia: Longline Survey

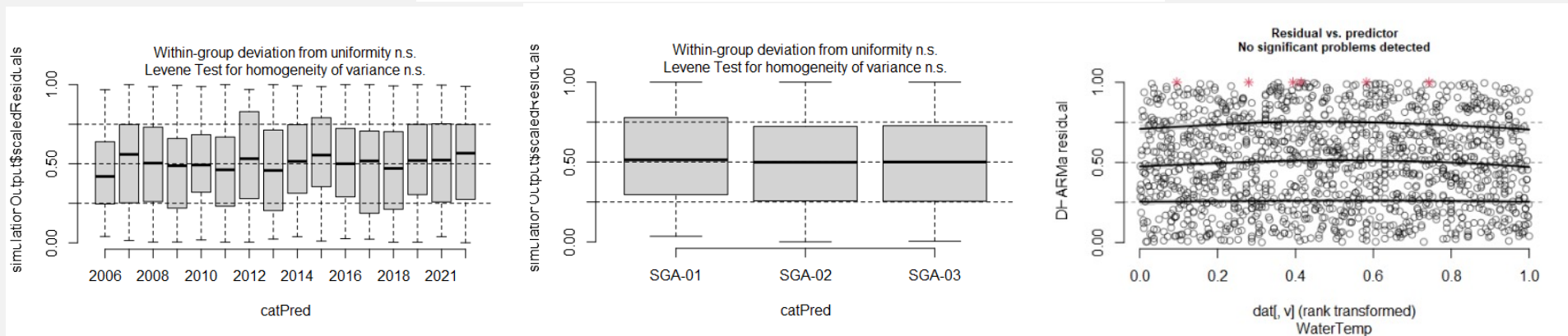
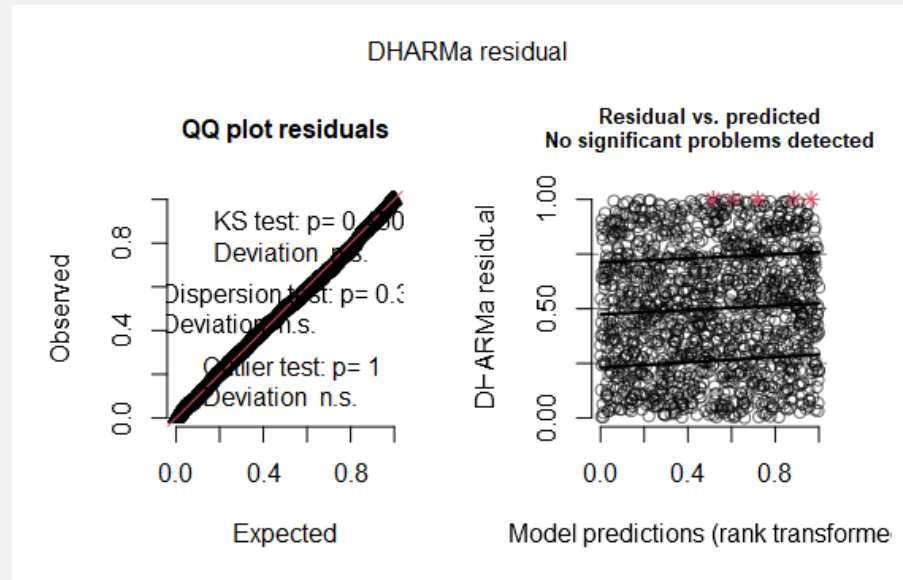
- Bottom longline
 - 926 m long (0.5 naut mile) mainline with 60 droplines
 - 30 min soak
 - Varying baits and hook sizes tested in early years of survey
- 2006 – 2022
 - Doboy Sound to St. Mary's (blue oval)
 - Stratified-random design by 3 areas (inshore, nearshore, offshore)
 - 25 stations sampled per month from May – Dec in 2007 – 2017. 10 stations in FL added from Sept – Dec 2010 – 2017
 - In 2018, sampling becomes stratified into 4 six-week quarters where 35 stations (all in GA) are sampled each quarter from June – Dec
 - No sampling in 2020 due to vessel issues
- Adult
 - > 675 mm FL



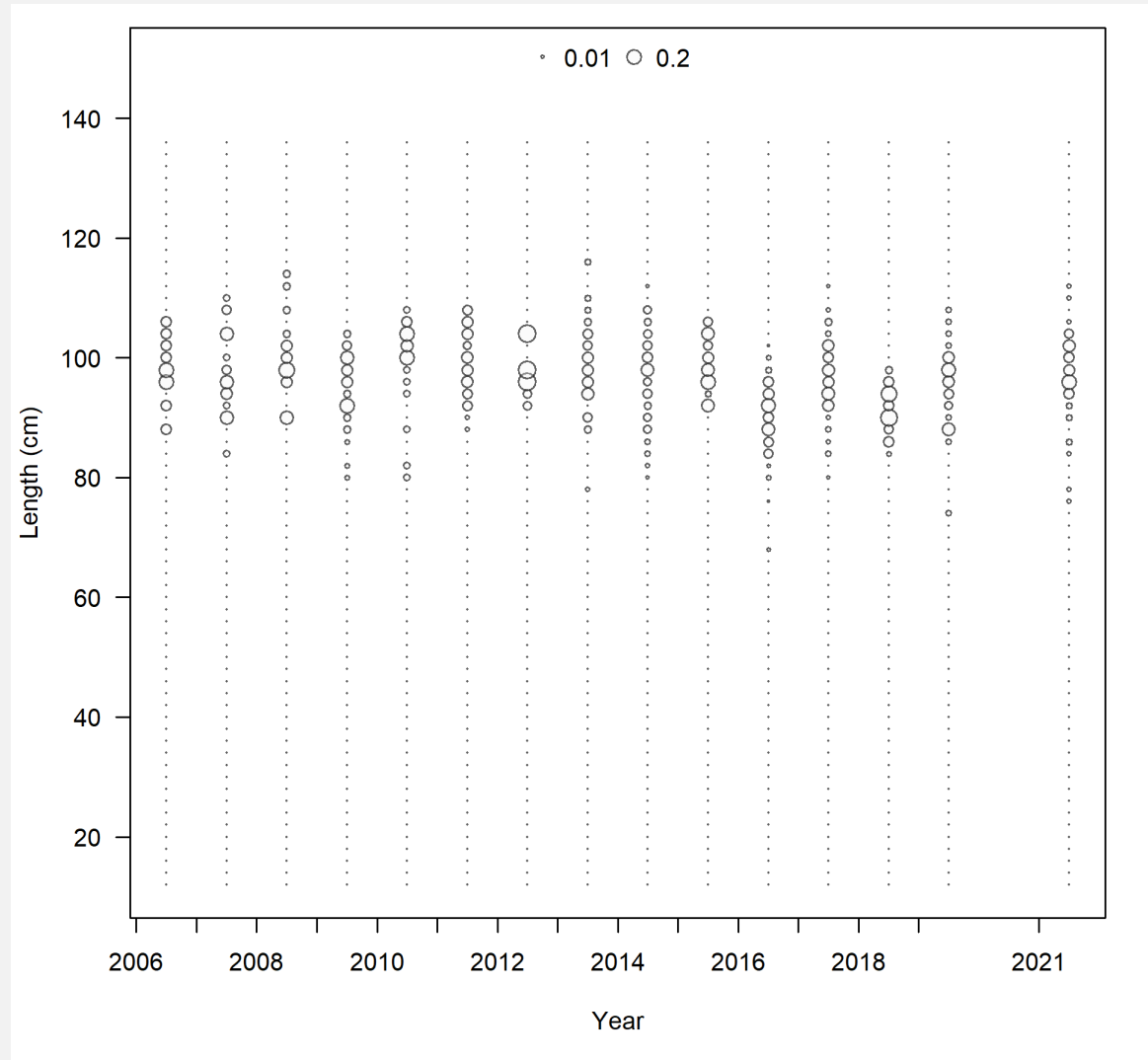
Georgia: Longline Survey



Georgia: Longline Survey

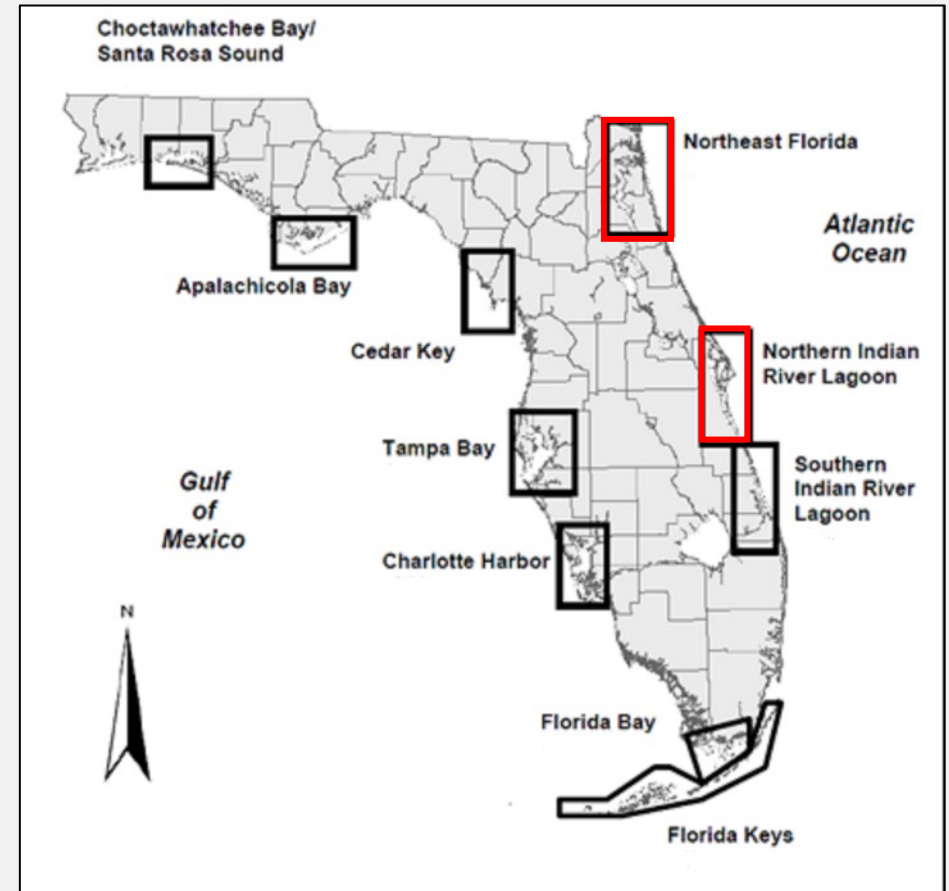


Georgia: Longline Survey

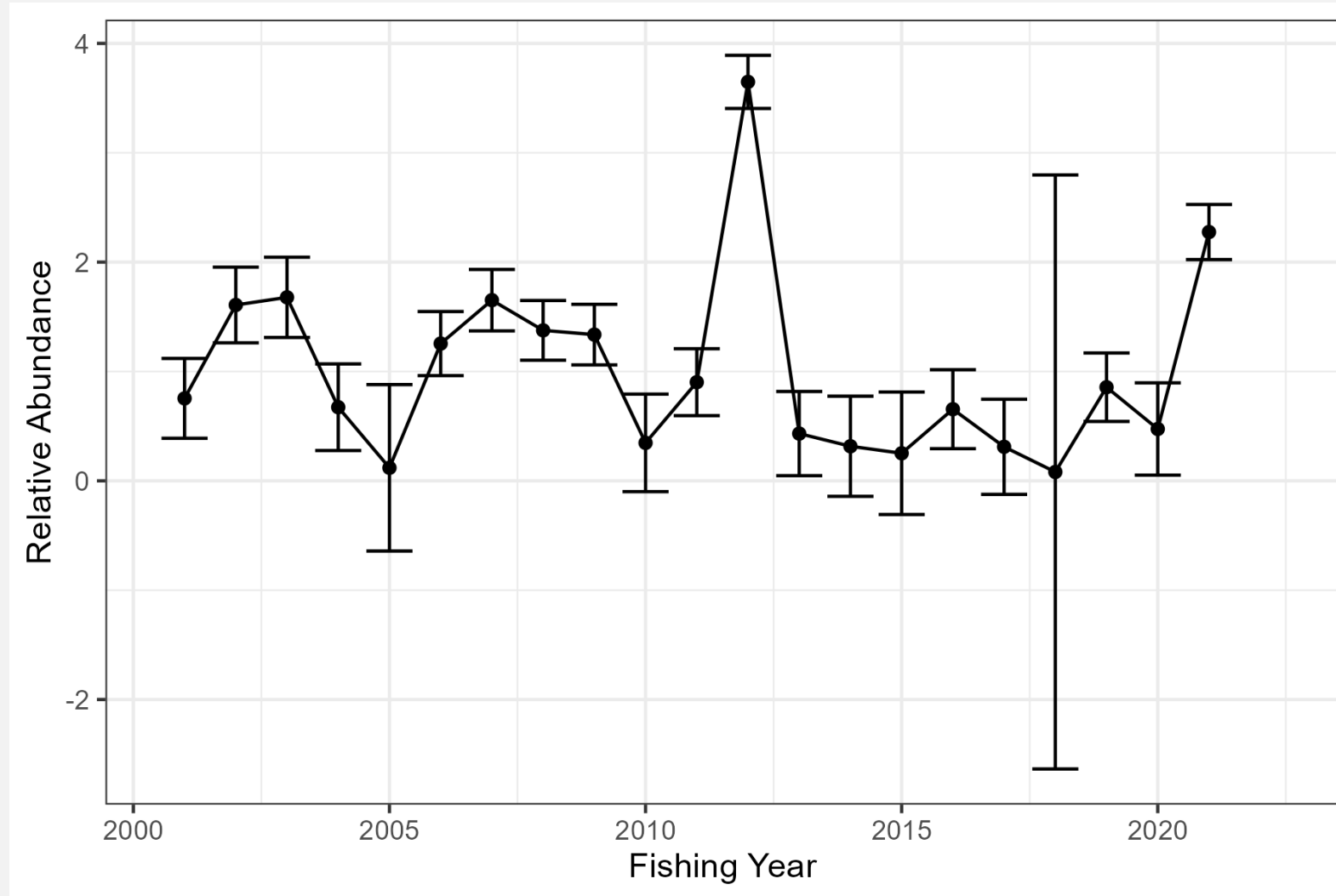


Florida: 21.3 m Haul Seine Survey

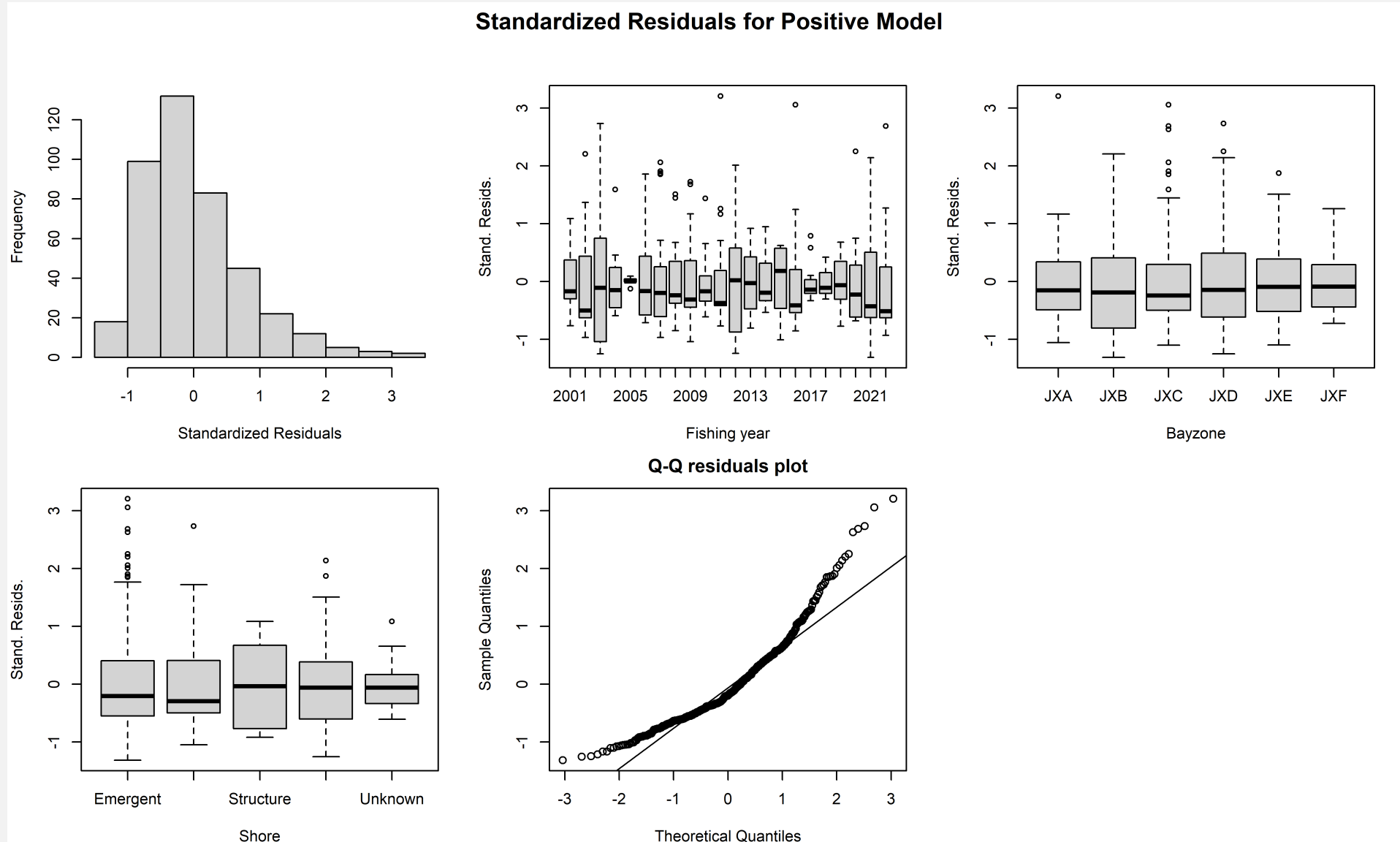
- 21.3 m center bag seine
- 1997 – 2022
 - Stratified-random design by area, depth ($\leq 1.8\text{m}$), habitat, and bottom vegetation
 - Samples collected monthly from Jan – Dec
 - Northern Indian River lagoon beginning in 1997
 - Northeast Florida beginning in 2001
- YOY
 - Age-0, <40 mm SL
 - Peak recruit season Sept-Mar



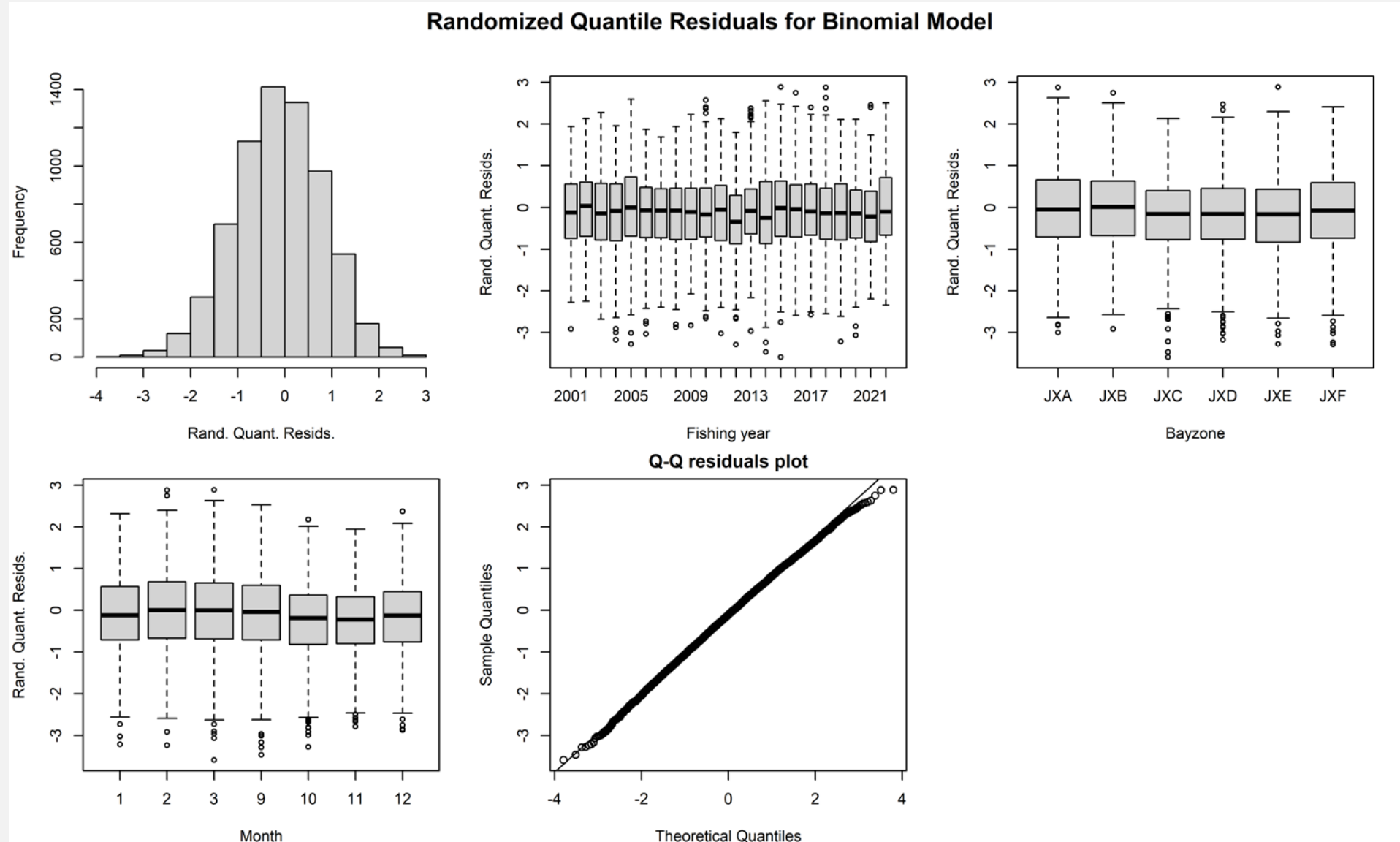
Florida: 21.3 m Haul Seine Survey



Florida FIM 21.3m seine

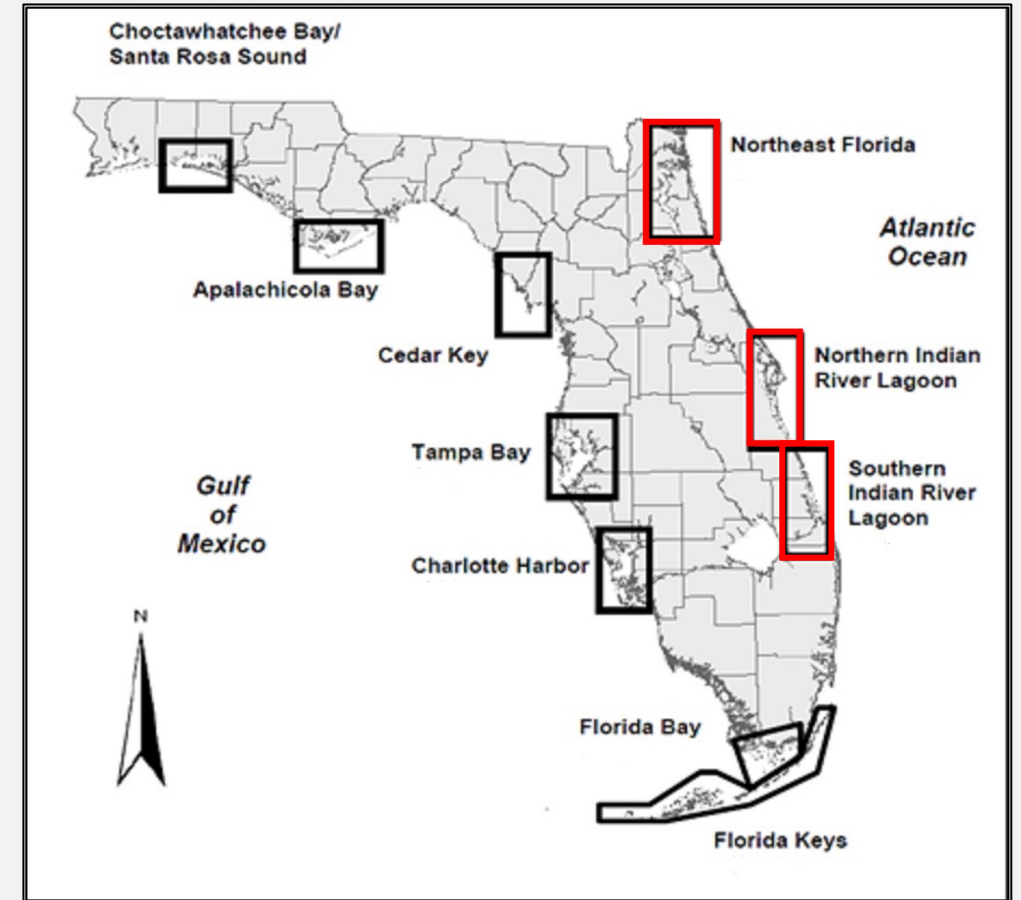


Florida FIM 21.3m seine

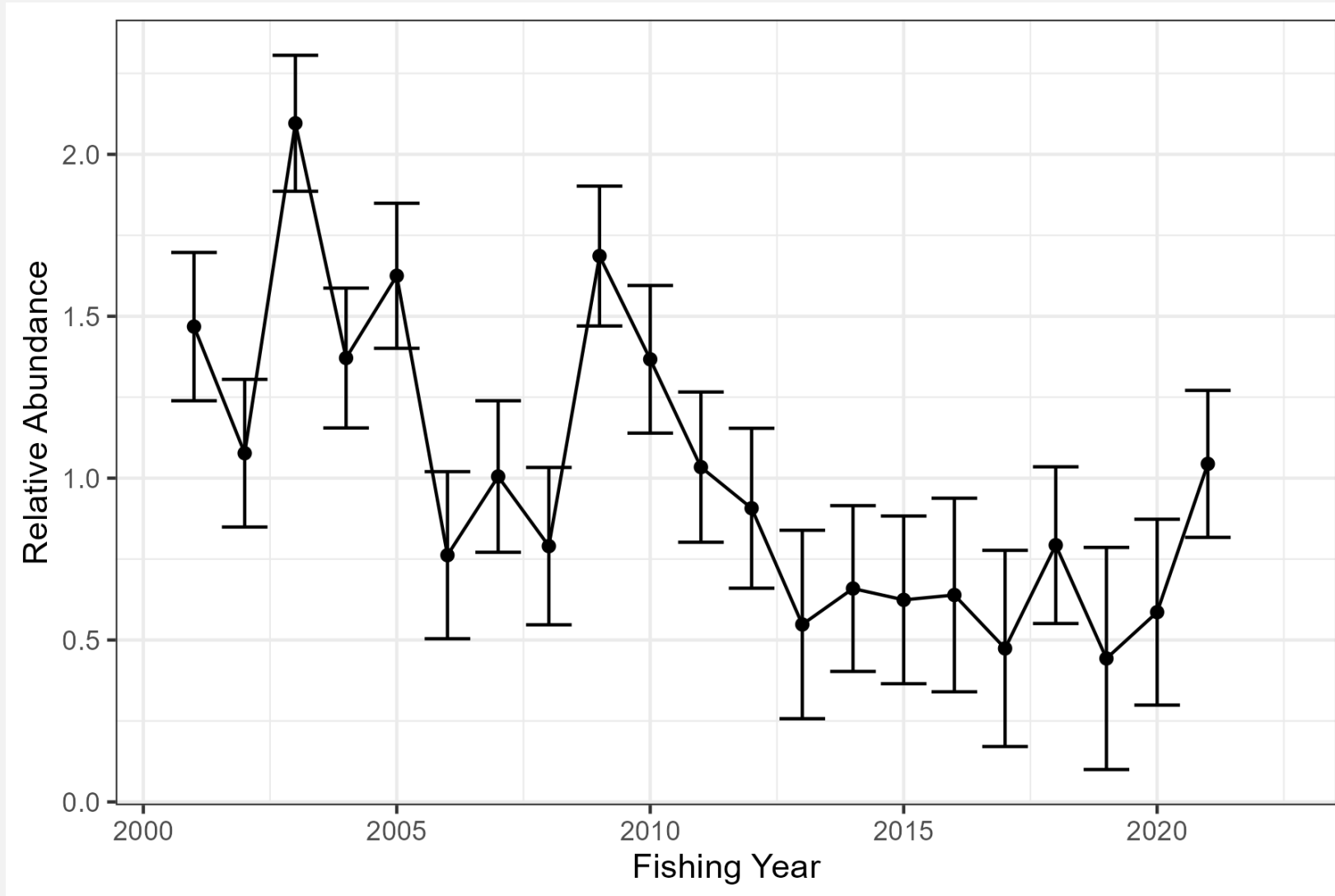


Florida: 183 m Haul Seine Survey

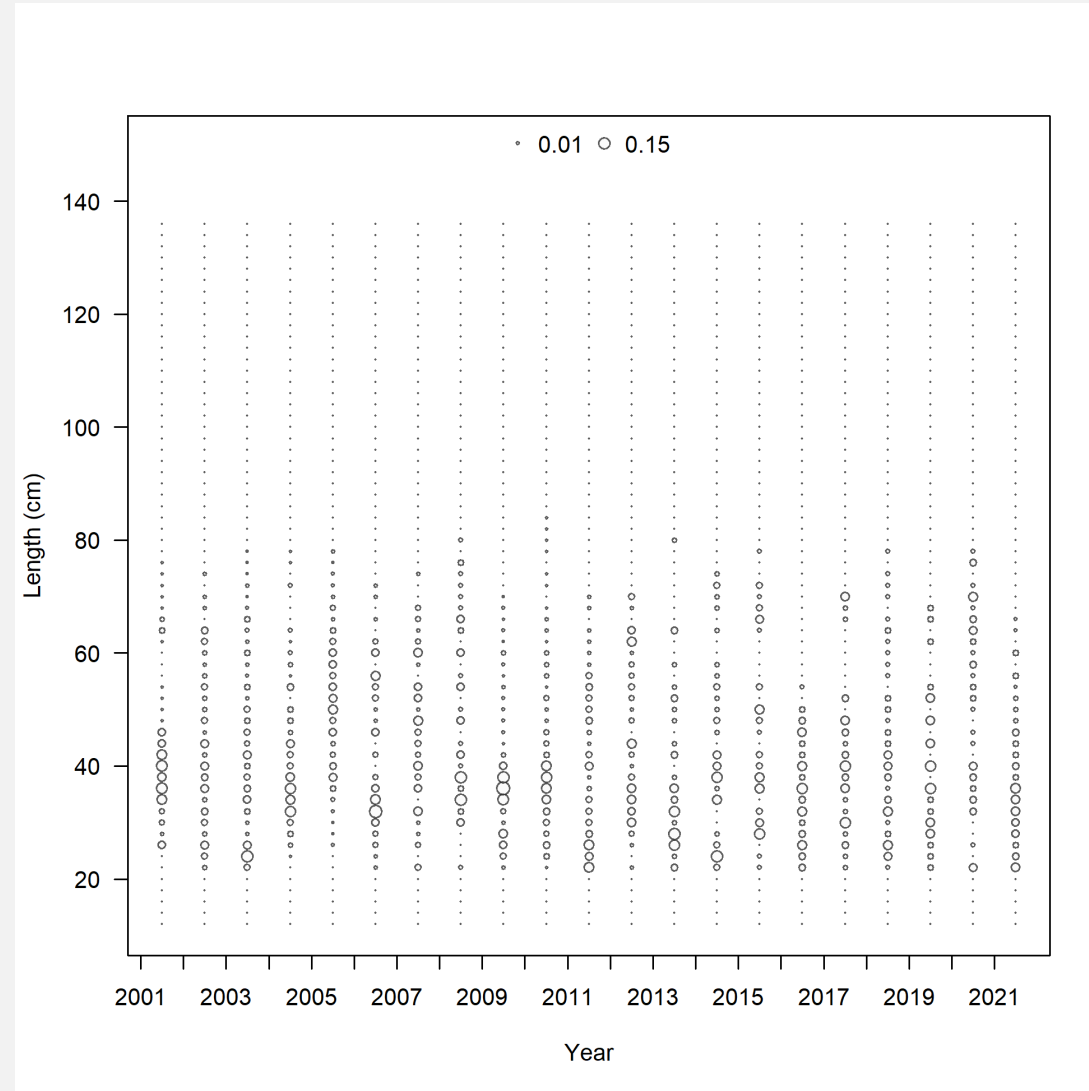
- 183 m center bag seine
- 1997 – 2022
 - Stratified-random design by area, depth ($\leq 1.8\text{m}$), habitat, and bottom vegetation
 - Samples collected monthly from Jan – Dec
 - Northern and Southern Indian River lagoon beginning in 1997
 - Northeast Florida beginning in 2001
- Subadult Index
 - Primarily ages 1-3 and > 300 mm SL
 - Jan - Dec



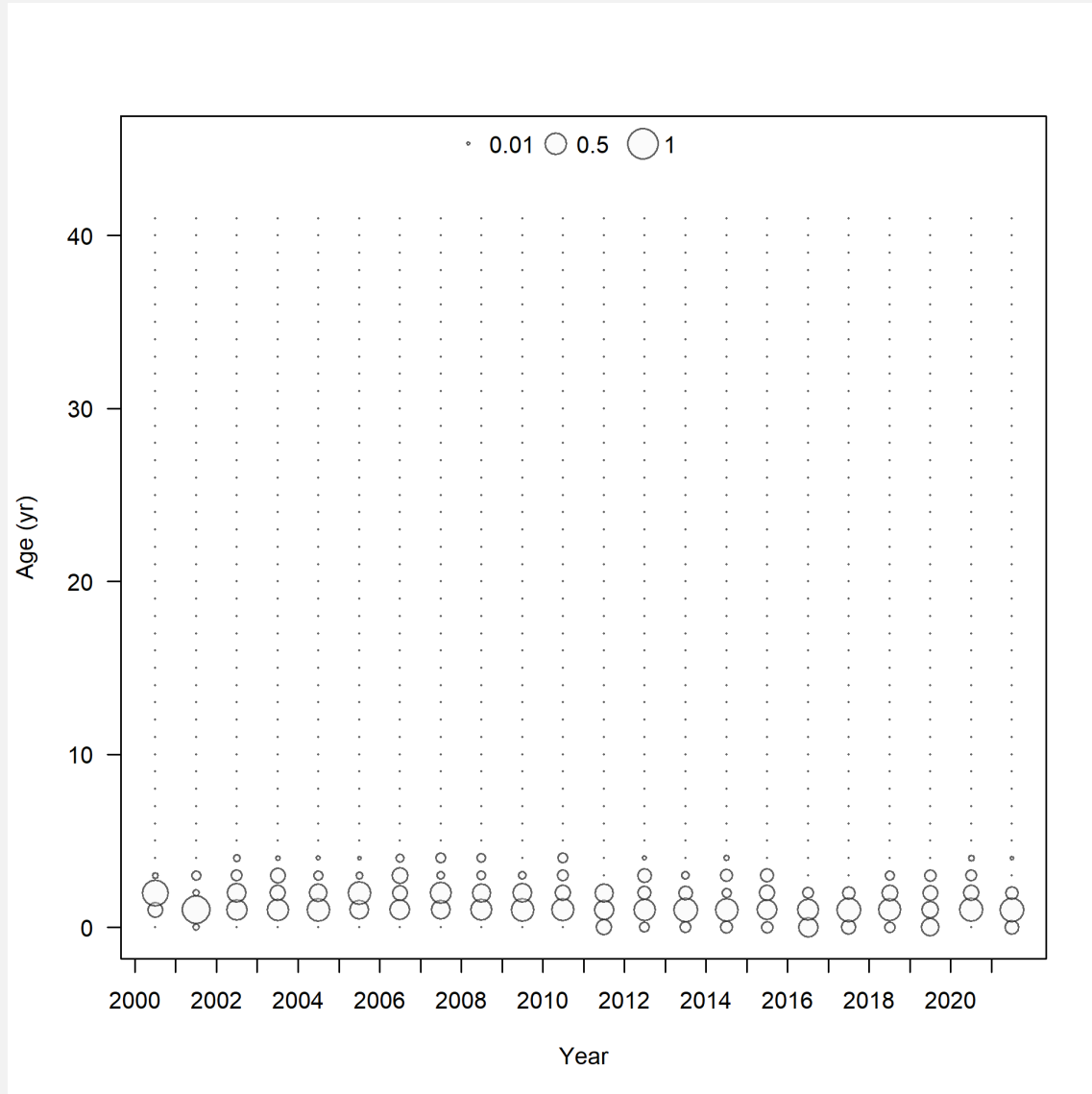
Florida: 183 m Haul Seine Survey



Florida: 183 m Haul Seine Survey

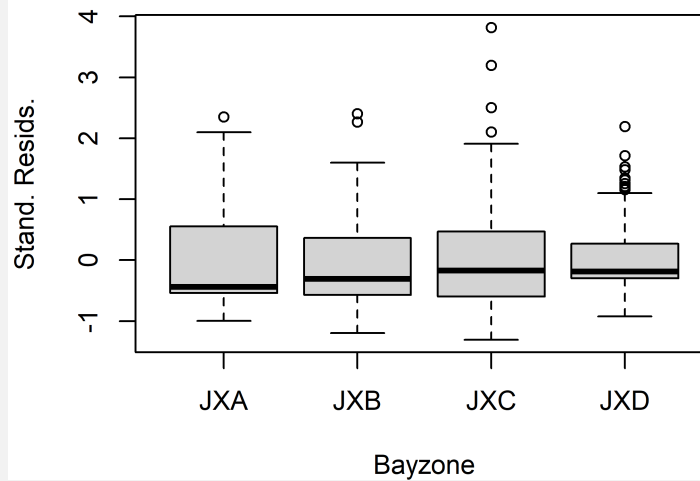
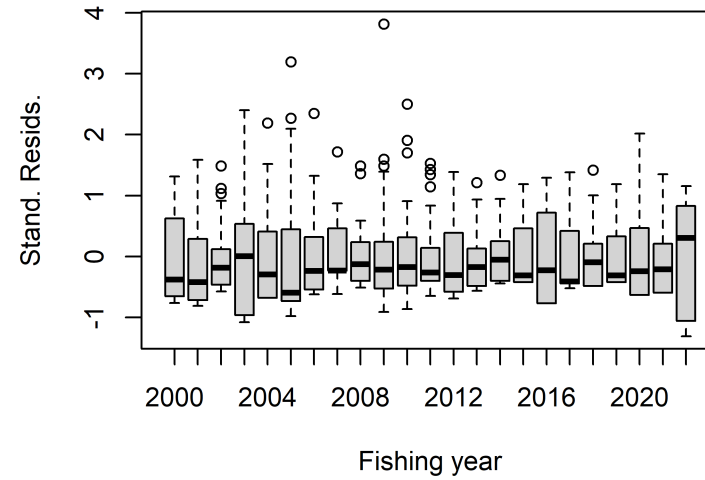
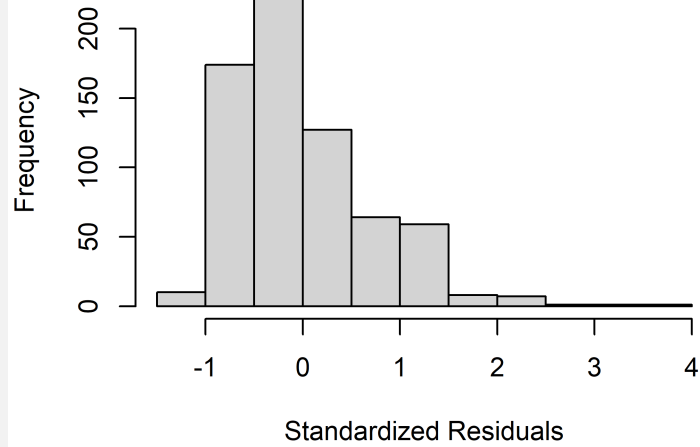


Florida: 183 m Haul Seine Survey

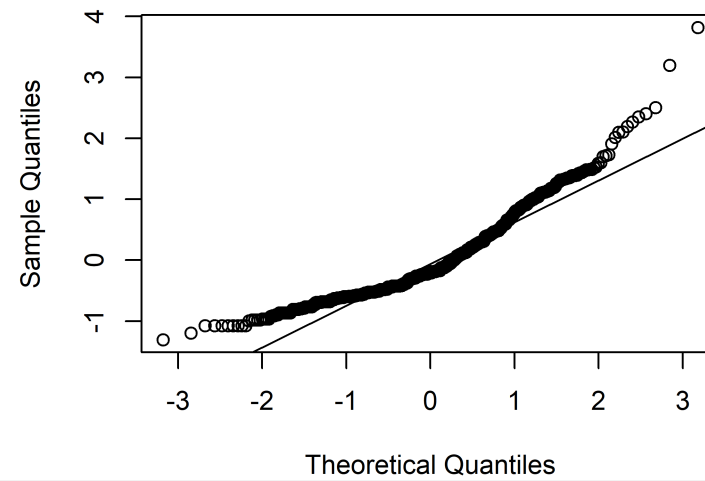


Florida FIM 183m seine

Standardized Residuals for Positive Model

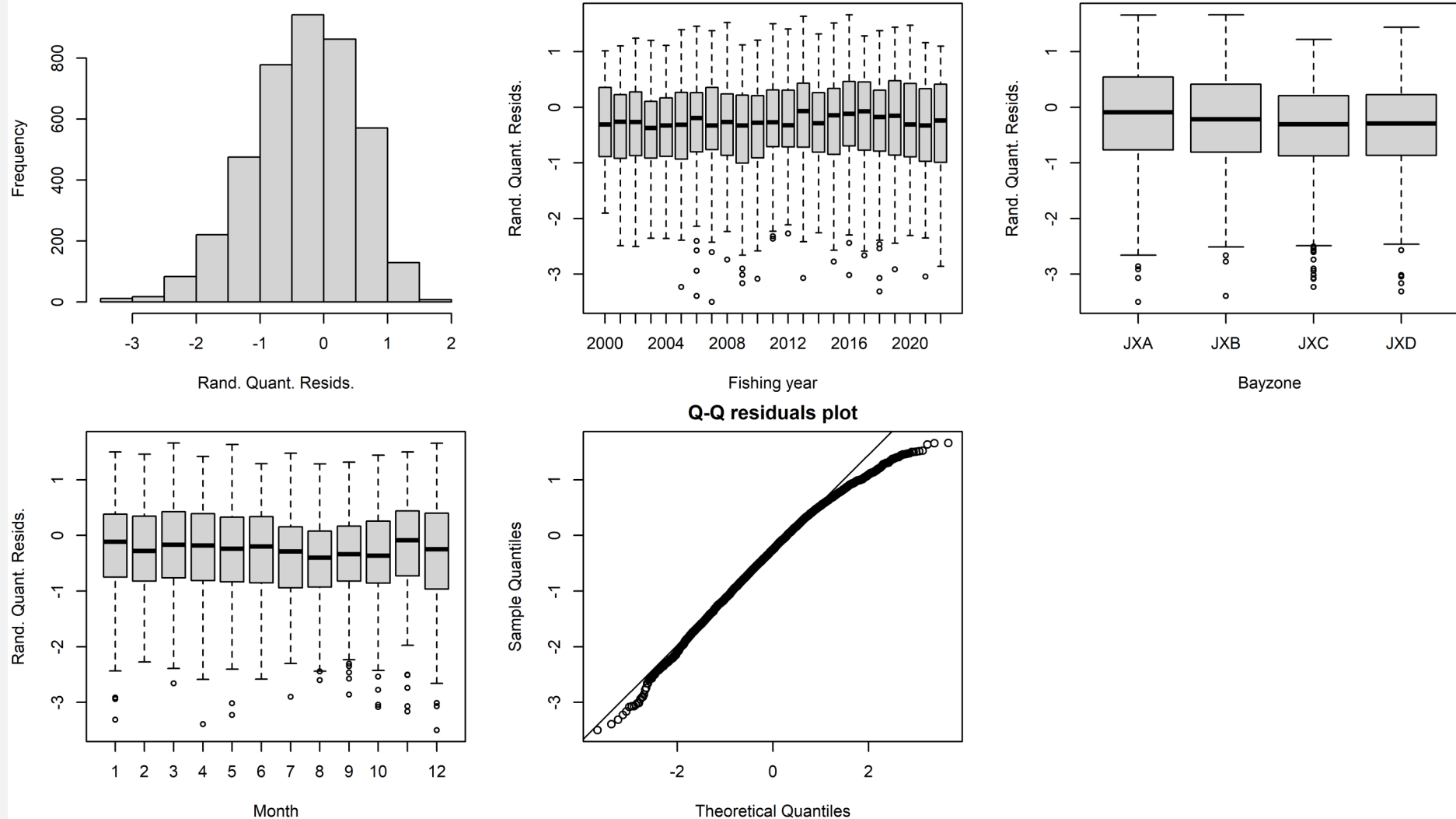


Q-Q residuals plot

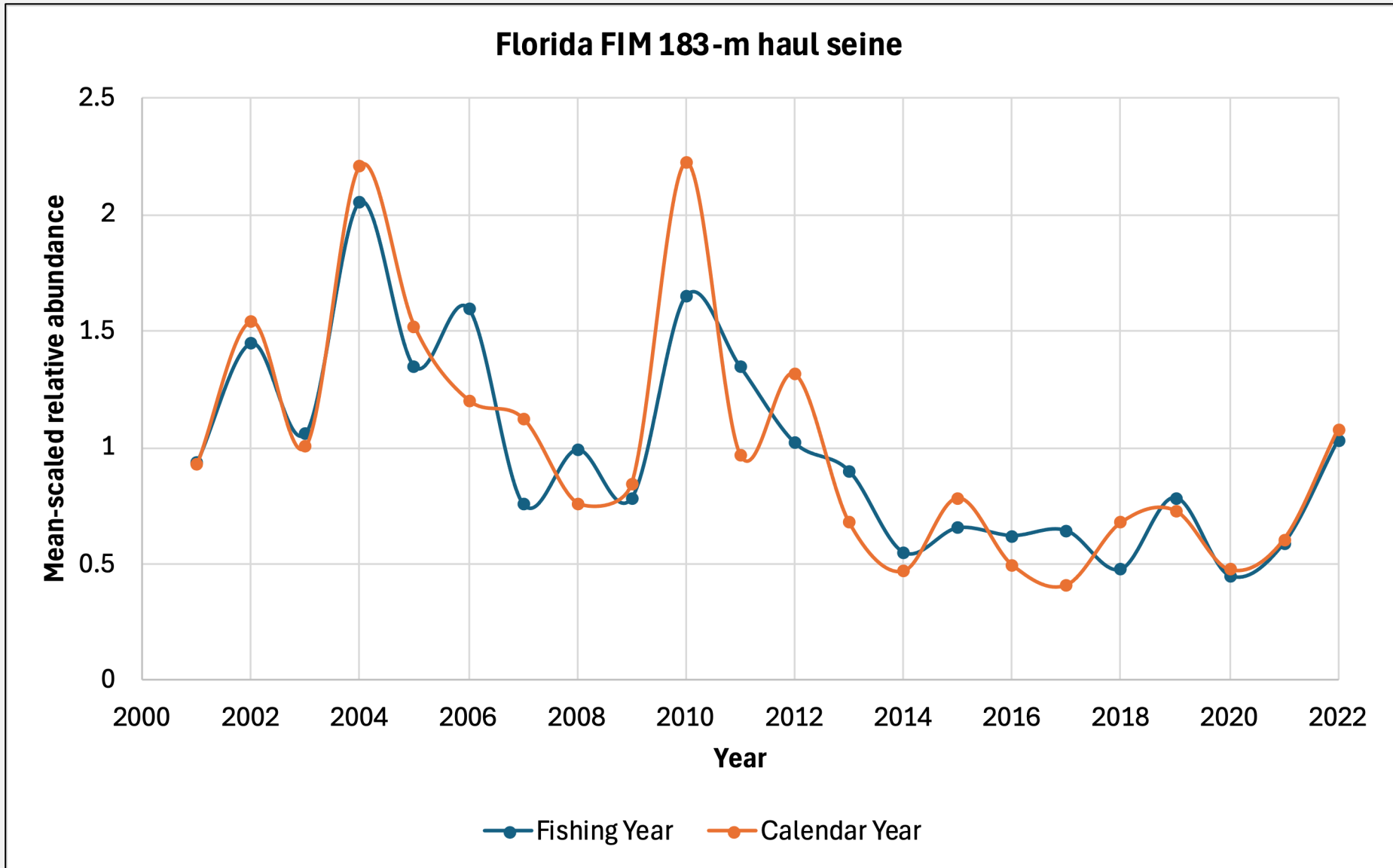


Florida FIM 183m seine

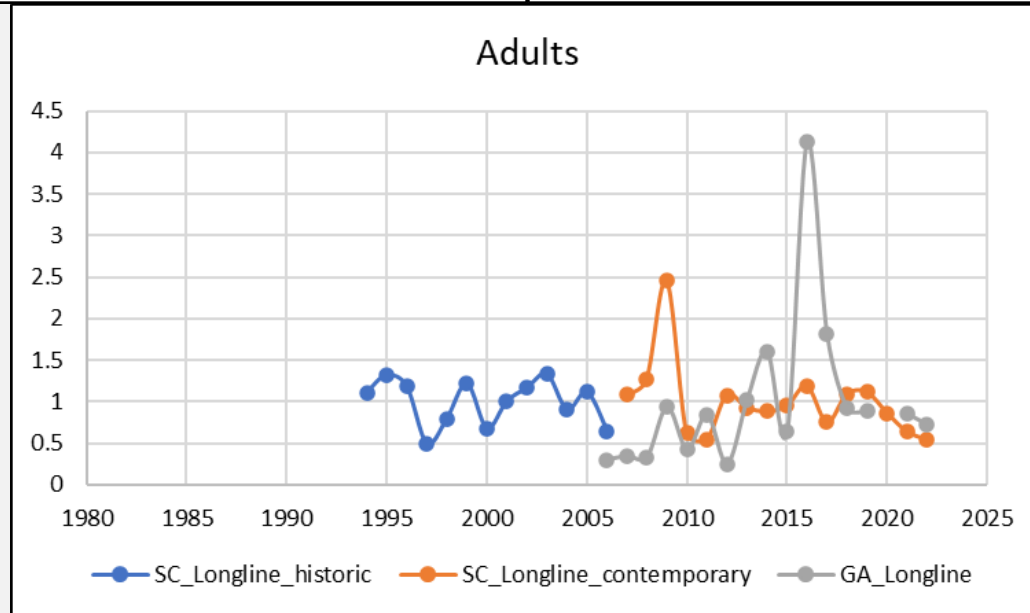
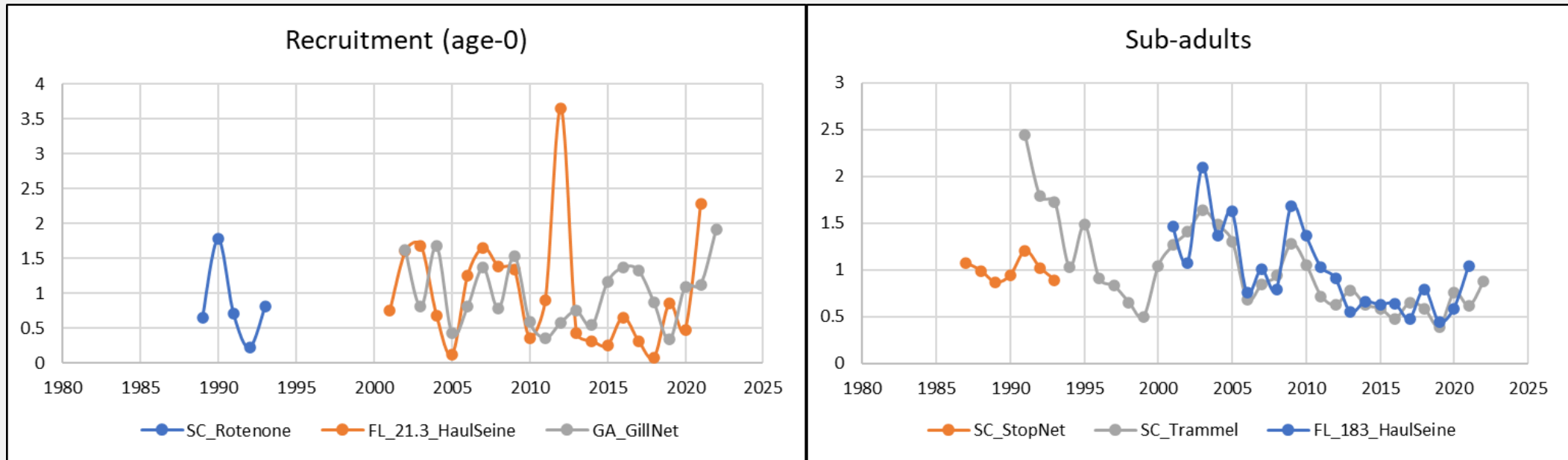
Randomized Quantile Residuals for Binomial Model



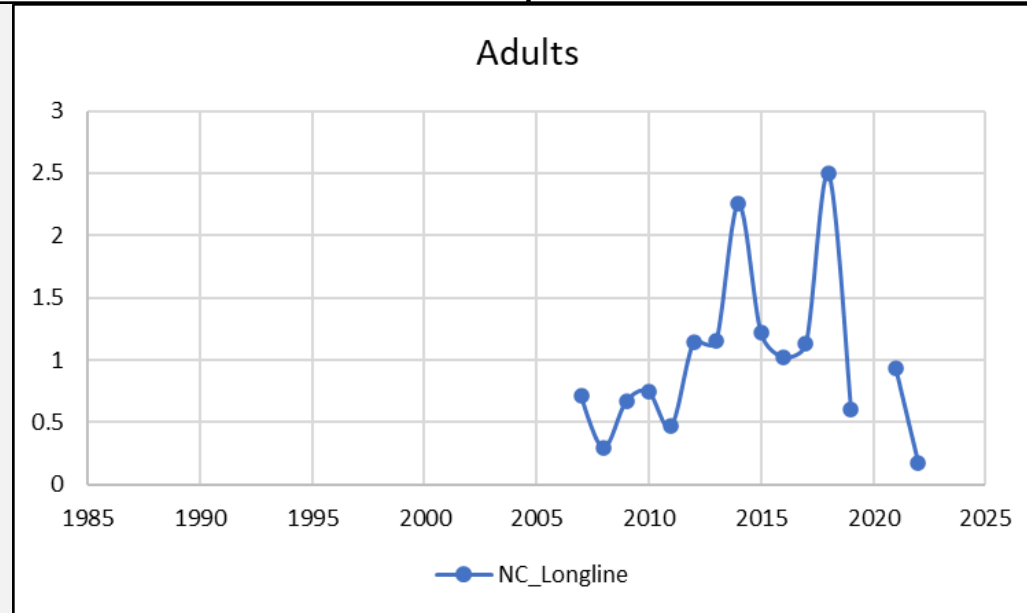
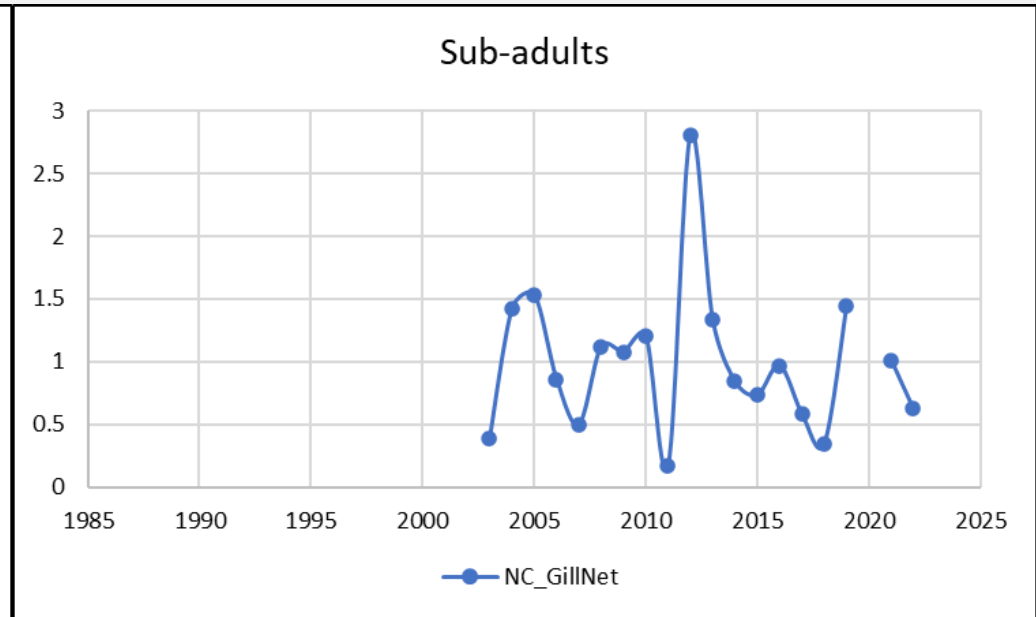
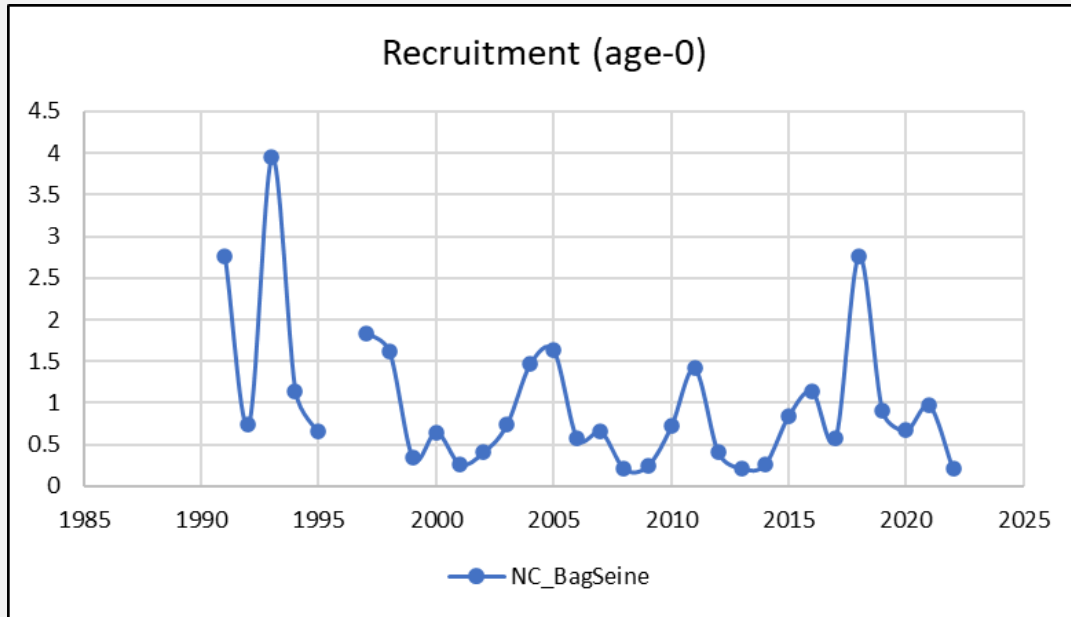
Florida FIM 183m seine comparison



Southern Stock Indices



Northern Stock Indices



Questions?

