Reef fish trends in relative abundance from a fishery-independent survey in waters off the southeastern United States

Standardized Abundance Based on the
Southeast Reef Fish Chevron Trap
Survey (1990-2019, 2021-2025)

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MARMAP/SEAMAP-SA Reef Fish Survey Technical Report 2026-002

Contents

Introduction

This annual report is intended to serve as an overview of catches and abundance trends of selected species from a collaborative fishery-independent survey using standardized gears. It should not be considered an update of stock status, as it lacks various other stock assessment metrics such as landings, other indices of abundance, age compositions, and life history parameters. Abundance indices developed for this report are standardized to account for factors that may affect abundance and may have varied over the years such as temperature, depth of sampled stations, location, etc. (see details below). Note that constraints, stratification, units, years used, and models for standardization of abundance used in this report may be different from those used in stock assessments. For ease of visualization and consistency purposes, abundance indices developed for this report are standardized using similar procedures among species. In addition, it is worth noting that the status of many of the species in this report have not been assessed or updated recently via stock assessment processes, which means there is no pre-existing assessment framework for their indices of abundance.

Fishery-Independent Monitoring

Fishery-dependent (FD) measures of abundance, such as fishery landings, are affected by management actions and industry practices, making it difficult to separate population level responses from changes in fishery behavior and management actions in FD data (Williams and Carmichael 2009). Fishery-independent (FI) data are collected in a way that is independent of regulations such as minimum size limits, seasons, and quotas imposed on industries for managed species. When fisheries are highly regulated, FI surveys often become the only method available to adequately characterize population size, age and length compositions, and reproductive parameters, all of which are needed to assess the status of stocks. The use of adequate FI data also decreases assessment uncertainty over FD information alone.

The Marine Resources Monitoring, Assessment, and Prediction (MARMAP) program has conducted FI research on ground fish, reef fish, ichthyoplankton, and coastal pelagic fishes of the continental shelf and shelf edge between Cape Hatteras, North Carolina, and St. Lucie Inlet, Florida, since 1972. A major component of MARMAP activities has always been standardized sampling of fish populations over time and the development of a historical base for comparisons of long-term trends in abundance and size compositions. Housed at the Marine Resources Research Institute (MRRI) at the South Carolina Department of Natural Resources (SCDNR), the overall mission of the MARMAP program has been to determine the distribution, relative abundance, critical habitat, and life history parameters of economically and ecologically important fishes off the southeastern U.S. Atlantic coast and relate this information to environmental factors. In 1990, MARMAP began using a consistent deployment strategy including the use of chevron trap gear to sample a variety of species and fish sizes throughout the southeastern continental shelf.

Until 2009, MARMAP was the only long-term, fishery-independent program that collected data to develop regional indices of relative abundance and life history analyses for species in the South Atlantic Fisheries Management Council's (SAFMC) snapper-grouper complex. In 2009 and 2010, two complementary fishery-independent programs, the Southeast Area Monitoring and Assessment Program – South Atlantic (SEAMAP-SA) Reef Fish Survey and the Southeast Fishery-Independent Survey (SEFIS), respectively, began cooperating with MARMAP (both in terms of sampling efforts and funding) to enhance MARMAP's sampling into a more comprehensive regional survey using the standardized sampling protocols developed by MARMAP.

Beginning in 2009, the SEAMAP-SA Reef Fish Survey (housed at MRRI) has allowed SERFS to identify and document additional hard-bottom habitat on the fringes of the historic survey area, which, in turn, allowed for the inclusion of additional chevron trap sampling sites to the survey. In addition, the SEAMAP-SA Reef Fish Survey allows for more extensive sampling in marine protected areas (MPAs) for monitoring purposes and, for a time, supported both short and long bottom longline sampling.

In 2010, the National Oceanographic and Atmospheric Administration's Fisheries program (NOAA Fisheries) initiated the SEFIS program, housed at the Southeast Fishery Science Center (SEFSC) laboratory in Beaufort, NC. This fishery-independent program was designed to complement the MARMAP/SEAMAP-SA Reef Fish Survey, becoming the third SERFS partner. SEFIS has been pivotal in the further identification of previously un-surveyed hard-bottom habitats for chevron traps, primarily off the coast of Florida, Georgia, and North Carolina. Hard-bottom areas identified during SEFIS and SEAMAP-SA cruises have been added to the universe of sites available for sampling. In addition, the supplemental funding for reef fish monitoring through SEFIS allowed the introduction of underwater video for enumerating species that tend to be trap averse.

Currently, the chevron-video trap (CVT; 1990-present) is the primary fish sampling gear for SERFS (chevron trap with cameras attached), while short bottom longline (SBLL; 1996-2019, 2021-2022) and the long bottom longline (LBLL; 1996-2007, 2009-2011, 2015-2016, and 2019) also have been used by SCDNR. Data from SBLL and LBLL can be found in previous reports and by request. CVT deployment is standardized across the various vessels utilized by SERFS, and staff are cross-trained to limit differences in deployment methods. In conjunction with all fish sampling gear deployments, conductivity, temperature, and depth (CTD) recorders are deployed simultaneously to record temperature and salinity (i.e. hydrographic variables).

Of note, 2020 sampling was severely limited due to the Coronavirus-2019 (COVID-19) pandemic. Therefore, 2020 was not included in CVT analyses presented here.

Survey Region

The continental shelf off the southeastern U.S. Atlantic coast extends from West Palm Beach, FL to Cape Hatteras, NC, comprising a total area of approximately 90,600 km^2 (Menzel 1993; Fautin et al. 2010). Shelf width varies from 5 km off Palm Beach, FL, and Cape Hatteras, NC, to 150 km off Georgia and South Carolina. Despite the generally subtle slope (~ 1 m/km), ridges and depressions often lead to localized high relief areas (Menzel 1993; Fautin et al. 2010). Hydrographically, the dominant feature of the region is the Gulf Stream, which allows a mix of cold-temperate, warm-temperate, and tropical species to co-exist within the region (Fautin et al. 2010). Immediately inshore of the shelf break, bottom waters are relatively warm (18-22°C) and saline (36.0-36.2 psu) year round, whereas coastal waters and waters offshore of the shelf break vary seasonally due to cool-water upwelling events and warm Gulf Stream intrusions (Fautin et al. 2010).

The dominant geological feature of the continental shelf is soft-bottom habitat (mud and sand < 1 m deep) underlain by carbonate sandstone (Henry et al. 1981; Riggs et al. 1996). Secondary to wide expanses of soft-bottom habitat are patchy areas of sand-veneered and rocky outcrop, hard-bottom areas (Powles and Barans 1980; Sedberry and Van Dolah 1984), including hard grounds, reefs, and rock outcroppings (Riggs et al. 1996). Hard-bottom is prominent along the shelf break in depths from 45 to 60 m relative to the remainder of the shelf (Fautin et al. 2010). Hard-bottom areas provide substrate for benthic communities, such that hard-bottom habitats often are synonymized with “live-bottom” habitats (Riggs et al. 1996). The term “live-bottom” was first used by Cummins et al. (1962) to describe the most productive trawling areas of hard-bottom between Cape Lookout, NC, to Cape Canaveral, FL. The habitat in these areas was composed of many species of invertebrates, including cnidarians, poriferans, bryozoans and ascidians, attached to naturally occurring hard formations of varying relief and type (Struhsaker 1969; Wenner et al. 1983; Barans and Henry 1984; Sedberry and Van Dolah 1984; Thompson et al. 1999). Though the true percentage of hard-bottom area within the region is unknown, various authors have estimated its extent as 4 to 30% of the total shelf area (Fautin et al. 2010).

Hard-bottom areas are ecologically important resources in that they are necessary to the life history of many ecologically- and economically-important fish communities (Powles and Barans 1980; Grimes et al. 1982; Barans and Henry 1984; Collins and Sedberry 1991; Sedberry et al. 2001; Sedberry et al. 2006). These fish assemblages include economically-valuable snappers (Lutjanidae), groupers (Serranidae), grunts (Haemulidae), and porgies (Sparidae; Fautin et al. 2010). Many of these species are, or have been, subjected to intense fishing pressure (SAFMC 1991). Due to the extent of management actions in this region, fishery-independent monitoring for these species is essential for assessments.

Objective

This report presents a summary of the fishery-independent monitoring and analyses for 20 species in the region (**Table 1**) derived from CVT catch data collected from 1990 through 2025 by the three monitoring programs (MARMAP, SEAMAP-SA, and SEFIS) involved in SERFS. Specifically, it presents updated annual standardized abundance for CVTs (referred to as an index of abundance). Standardization is applied to account for the effects of potential covariates on abundance. Species distribution maps and annual length information of captured fish are also provided. Data presented in this report are based on a database maintained by SCDNR which houses data from all SERFS partners that was accessed in February 2026.

Table 1. Species included in this report.

Common Name	Scientific Name
Gray Triggerfish	*Balistes capriscus*
Knobbed Porgy	*Calamus nodosus*
Blueline Tilefish*	*Caulolatilus microps*
Bank Sea Bass	*Centropristis ocyurus*
Black Sea Bass	*Centropristis striata*
Sand Perch	*Diplectrum formosum*
Spottail Pinfish	*Diplodus holbrookii*
Red Grouper	*Epinephelus morio*
Tomtate	*Haemulon aurolineatum*
White Grunt	*Haemulon plumierii*
Speckled Hind*	*Hyporthodus drummondhayi*
Snowy Grouper*	*Hyporthodus niveatus*
Red Snapper	*Lutjanus campechanus*
Gag	*Mycteroperca microlepis*
Scamp	*Mycteroperca phenax*
Red Porgy	*Pagrus pagrus*
Vermilion Snapper	*Rhomboplites aurorubens*
Greater Amberjack*	*Seriola dumerili*
Almaco Jack	*Seriola rivoliana*
Stenotomus spp.	*Stenotomus* spp.

* - Did not meet criteria to create an index of abundance or the index could not be developed due to limited data. For these species raw catch information is provided.

Methods

Sample Collection

Given the close coordination and consistent sampling methodology used by each of the FI sampling programs involved in SERFS, no adjustments to raw catch, effort, or length data were conducted prior to the analyses presented in this report. Note that the number of CVTs deployed in recent years is on average two to three more times higher than historical numbers (**Table 2**).

The current SERFS CVT sampling area includes waters of the continental shelf and shelf edge between Cape Hatteras, NC, and St. Lucie Inlet, FL (**Figure 1**). Throughout this range, randomly selected monitoring stations (confirmed hard bottom) are sampled by CVT from mid-April through mid-October each year, depending on weather conditions. Criteria for random selection include that no selected station is closer than 200 m to any other selected station that year. Non-selected stations can be sampled as alternates if a selected station is not available or accessible, under the condition that the 200 m buffer remains in place. Additionally, reconnaissance locations (suspected hard bottom) are sampled as time and funding allows. If catch or videos indicate hard bottom at reconnaissance locations, these deployments can be converted to sampling stations in subsequent years and are treated identically to all other stations in the sampling universe in terms of selection, sampling, and analyses.

Chevron-Video Traps

Background

The MARMAP program began using chevron traps without cameras in 1988 after a commercial fisherman introduced the use of this trap design in the Atlantic waters off the Southeastern United States (Collins 1990). Subsequently, in 1988 and 1989, Chevron Traps were used simultaneously with blackfish and Florida Antillean traps to compare the efficiency of the three different trap designs at capturing reef fishes on hard-bottom habitats (Collins 1990). The Chevron Trap was considered most effective overall for species of commercial and recreational interest in terms of both total weight and numbers of individuals (Collins 1990).

Beginning in 1990, MARMAP used CHVs for reef fish monitoring purposes with between 500 and 700 stations selected annually to be sampled. The substantial increase in overall survey funding with the addition of the two additional fishery-independent groups composing SERFS allowed for an increase in the number of stations selected (the universe of available trap stations has grown to approximately 4,300) as well as cameras to be added to all CHVs (creating CVT). Station depths range between 14 and 110 m. In the most recent years, the R/V *Palmetto,* R/V *Savannah,* and NOAA Ship *Pisces* serve as the research platforms for CVT deployment. In 2025, for the second year, SCDNR used the R/V Lady Lillian and CVTs were deployed during two cruise legs.

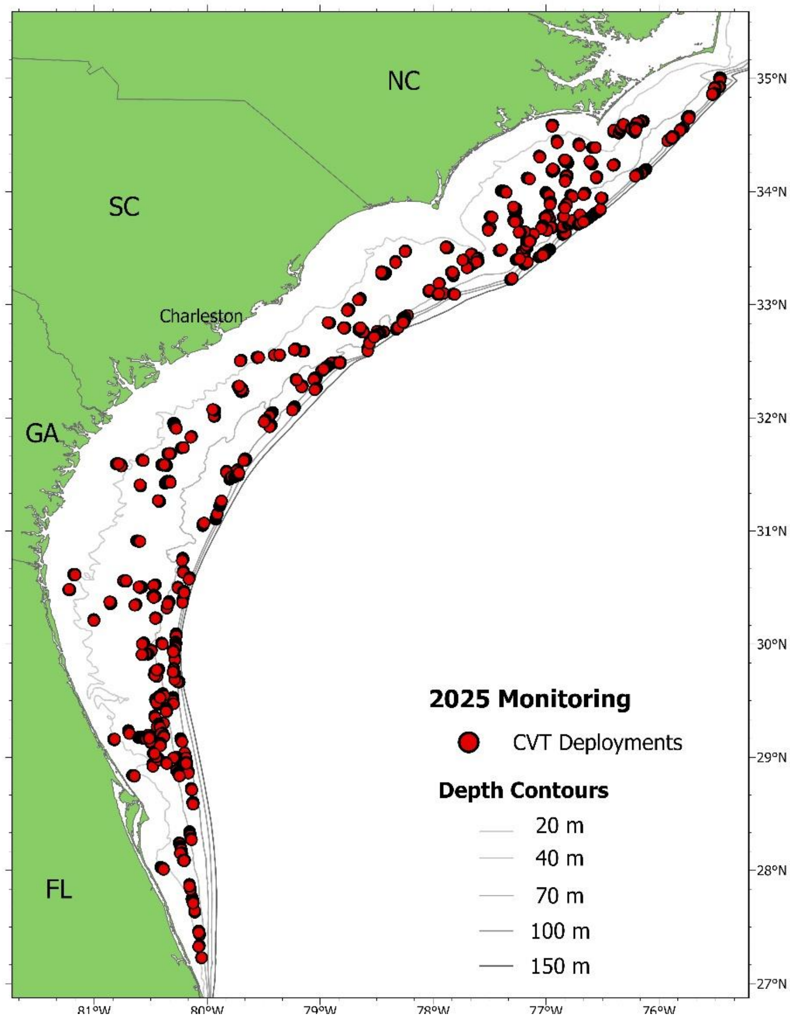


Figure 1. Map of all monitoring stations sampled in 2025, the most recent sampling year. Note that each symbol may represent multiple sampling events due to proximity of locations and scale of the map.

Gear Description

CVTs are arrowhead shaped, with a total interior volume of 0.91 m^3, constructed using 35 x 35 mm square mesh plastic-coated wire, and possess a single entrance funnel (“horse neck”), one release panel to remove the catch, and one release panel with dissolvable (“7-day pop-up”) zinc fasteners to prevent ghost fishing (**Figure 2**; Collins 1990, MARMAP 2009).

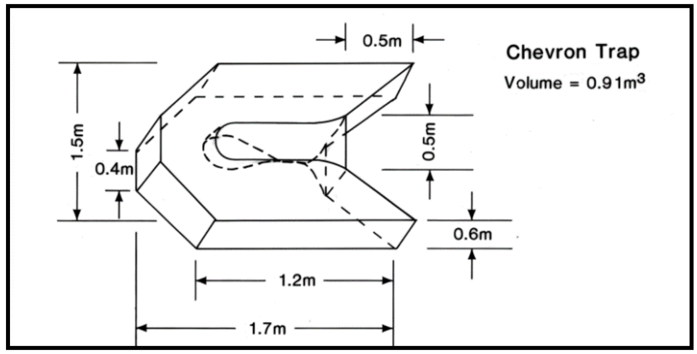


Figure 2. Diagram of the chevron trap (CHV) used for monitoring purposes by MARMAP/SERFS from 1990-present (from Collins 1990).

Prior to deployment, CVTs are baited with a combination of whole and cut clupeids (*Brevoortia* or *Alosa* spp., family Clupeidae), with menhaden most often used. To bait, four whole clupeids are suspended on each of four stringers within the trap and 8 additional clupeids, with their abdomen sliced open, are placed loose in the trap (**Figure 3**). Subsequently, an appropriate length of 8 mm (5/16 in) polypropylene anchor line is attached to an individual trap and buoyed to the surface using a polyball buoy. A 10 m trailer line is attached to this anchor line on one end and to a Hi-Flyer or second polyball buoy on the other. Traps are deployed generally six at a time, but are considered independent units (MARMAP 2009). Traps are retrieved in chronological order of deployment, using a hydraulic pot hauler, after an approximately 90-minute soak time.

From 1990 to 2008, MARMAP intermittently used cameras (still and video) mounted on top of Chevron Traps to document bottom habitat, trap behavior, and to observe reef fish species. Beginning in 2009, all survey traps were fitted with at least one camera and from 2011 on, all traps included at least one video camera. Catch data from CVTs were treated the same as data from Chevron Traps without cameras, as it is assumed that the cameras do not impact catchability.

Figure 3. CHV equipped with cameras (chevron-video trap, CVT) and baited with menhaden, ready for deployment. Note, iron sashes were used to weigh the trap down, thus promoting the proper orientation, and stabilizing the trap, on the bottom.

Hydrographic Data

CTD casts record water column depth, temperature, and salinity. Typically, a CTD cast is conducted while CVTs soak. Data obtained from the single CTD cast is associated with all concurrently deployed capture gear (usually sets of 6 CVTs in relative proximity).

From 1990 through 1992, an Applied Microsystem's STD-12 model CTD was employed (depth, temperature, salinity, and dissolved oxygen). From 1993 through the current sampling year (2025), we used Sea-Bird models SBE-19 or SBE-25 Plus. All CTD's are calibrated by authorized dealers/personnel according to the manufacturer's guidelines annually. For this report, only temperature was included in the analyses as it displayed substantial variability across the region and seasonally. Specifically for temperature, the value at the deepest point of the cast is included here (bottom temperature). While depth was included in the analyses, it was taken from vessel fathometer readings for each individual gear deployment. Since 2012, Vemco or Star Oddi temperature loggers were attached to 2 or 3 CVTs per set as a backup source of bottom temperature data in the event of CTD failure.

Nominal Abundance Estimation

After capture, all fish are sorted to species, weighed (total weight in grams, per species, per trap), and all individuals are measured. Fish lengths are presented in mm maximum total length (TL), meaning that the caudal fin is "pinched" while measuring the fish length. The number of individuals per species per deployment is summed. Estimates of abundance included only gear deployments with a soak time between 45 and 150 minutes. Data from monitoring stations or reconnaissance collections converted to monitoring stations were included, but if a gear malfunctioned or the catch was otherwise compromised, that collection was excluded. As such, collections with no catch, catch with finfish, catch with no finfish but other organisms, and catch sub-sampled for abundance processing were used. The first year that samples from reconnaissance converted collections were included in the indices for the report was 2015 and those nominal abundance values from 1990-2014 have been re-calculated to include converted stations as well. Tagging efforts in which the full length-frequency work-up was not performed were also excluded from analyses. Continuing quality assurance/quality control of historical data resulted in some adjustments to the database over time to account for data collected during activities other than monitoring, such as these tagging studies, and uncertainties regarding the catch composition of certain collections. Some of these data were included in previous trends reports for abundance calculations, meaning that some minor differences can be found between values found in this report and values in prior reports. Finally, collections which were missing covariate information were excluded from analyses (e.g. depth or bottom temperature). The collections under these constraints/criteria are referred to as, "included collections" below (**Table 2**). The unit of effort for nominal abundance for each species is # fish* trap^{-1} *hour^{-1} with annual nominal mean abundance calculated by Equation 1.

Equation 1.

$$\text{Annual abundance} = \sum \frac{\#\, fish\ caught * 60\ minutes}{deployment\ duration\ (minutes)} / \#\ included\ collections$$

Abundance Standardization

Species selected for abundance standardization had a proportion positive ≥ 1.5% and no more than 3 years with zero catch over the time series. Previous trends reports have utilized a delta-Generalized Linear Model (delta-GLM) standardization method (Lo et al. 1992), but as with many ecological count data sets (Zuur et al. 2009), abundance data from FI surveys are often zero-inflated. Zero-inflated (ZI) model structures may improve fit, reduce bias in the standard errors, and reduce overdispersion caused by excessive zeros (Zuur et a. 2009). Model structures considered included zero-inflated Poisson GLM (ZIP), and zero-inflated negative binomial GLM (ZINB; Ballenger et al. 2014, Ballenger et al. 2017). Through preliminary analyses, the ZINB performed better than any other model structure in terms of fit and limiting overdispersion in most species, so CVT abundance was standardized among years with the ZINB method unless otherwise noted.

Standardization procedures were based on Ballenger et al. (2017), using modified R scripts and methodology. The abundance was modeled as catch per deployment. The natural log of the time the gear was fishing in the water (soak time), was included as an offset term to account for effort. Year was included in the model, as this was the desired response variable to examine temporal trends. The covariates examined were depth, latitude, bottom temperature, and day of year (**Table 2**). They were included in the models as continuous variables modeled with polynomials. The maximum allowed order for each polynomial was based on preliminary generalized additive models (GAMs). Unless noted otherwise, the polynomial order was limited to a maximum fourth order under the assumption that higher order polynomials would not have biological relevance based on the covariates in this analysis. Because of widely differing scales of the covariates, they were centered by subtracting the individual covariate mean and scaled, by dividing the centered values by their standard deviation prior to the GAMs. This was done to improve model stability for fitting purposes. There were two components of the model: presence/absence and abundance.

Catch abundance was modeled versus all covariates to inform the polynomial order for the count sub-model of the standardization model. The presence/absence data also was modeled versus all covariates for the zero-inflation sub-model. Model selection was based on Bayesian information criteria to increase the penalty associated with adding parameters to the model. A two-step optimization process was utilized due to computational demands. All covariates were removed from the zero-inflation sub-model and the count sub-model was optimized for all covariates. Then, the count sub-model optimal values were fixed, and the covariate structure of the zero-inflation sub-model was optimized. We allowed for the possibility that different covariates can be included in the zero-inflated sub-model and catch sub-model. All analyses were performed in R (R Development Core Team 2025). The zero-inflated models in R were developed using the function zeroinfl available in the package *pscl* (Jackman 2011; Zeileis et al. 2008). Annual year effect coefficients of variation (CVs) were computed using bootstrapping procedures of ~5,000 iterations. Confidence intervals for figures are plotted using CVs, but in rare cases (years with zero catch) those CVs are extremely high and are not represented in the plots because they are applied to a value of 0.

The standardized index also was normalized by dividing the annual standardized abundance by the mean standardized abundance for the time series. This not only normalized trends among species but also provides a reference point for individual years in relation to the time series, with a value of 1 being the mean.

Table 2. Chevron Trap sampling efforts for all collections included in abundance analyses.

Year	Included Collections	Depth Range (m)	Latitude Range (°N)	Temperature Range (°C)	Day of Year Range
1990	313	17-93	30.4-33.8	18.2-27.8	113-221
1991	272	17-95	30.8-34.6	15.9-27.5	162-267
1992	288	17-62	30.4-34.3	15.3-24.5	91-226
1993	392	16-94	30.4-34.3	17.7-28.5	130-225
1994	387	16-93	30.7-33.8	18.2-26.9	129-299
1995	361	16-60	29.8-33.7	20.1-28.3	123-298
1996	361	14-100	27.9-34.3	14.2-27.0	120-260
1997	406	15-97	27.9-34.6	15.0-28.0	125-272
1998	426	14-92	27.4-34.6	9.5-28.6	125-230
1999	230	15-75	27.3-34.6	17.9-28.8	152-271
2000	298	15-101	29.0-34.3	18.0-28.5	137-293
2001	245	14-91	27.9-34.3	16.0-29.2	143-297
2002	238	13-94	27.9-34.0	15.2-28.3	168-267
2003	224	16-92	27.4-34.3	13.4-25.1	154-265
2004	282	14-91	29.0-34.0	16.7-25.8	126-302
2005	303	15-69	27.3-34.3	18.0-28.5	123-272
2006	297	15-94	27.3-34.4	15.0-26.7	157-271
2007	337	15-92	27.3-34.3	15.3-28.9	141-267
2008	303	15-92	27.3-34.6	15.2-27.2	126-274
2009	404	14-91	27.3-34.6	15.4-27.2	126-281
2010	731	14-92	27.3-34.6	12.3-29.4	124-300
2011	731	14-93	27.2-34.5	14.8-28.8	139-299
2012	1174	15-106	27.2-35.0	12.9-27.8	115-284
2013	1358	15-110	27.2-35.0	12.4-28.1	114-277
2014	1473	15-110	27.2-35.0	16.1-29.3	113-294
2015	1464	16-110	27.3-35.0	13.6-28.5	111-295
2016	1485	17-115	27.2-35.0	15.5-29.3	125-300
2017	1538	15-114	27.2-35.0	14.8-28.2	116-272
2018	1736	16-114	27.2-35.0	13.6-28.3	115-277
2019	1665	16-113	27.2-35.0	15.0-29.5	120-268
2020	0	-	-	-	-
2021	1882	16-110	27.2-35.0	16.5-28.1	118-273
2022	1648	17-113	27.2-35.0	14.6-32.5	116-270
2023	1516	15-110	27.2-35.0	15.8-28.5	136-284
2024	1507	15-102	27.2-36.5	11.3-29.6	106-277
2025	1534	15-107	27.2-35.0	11.4-29.8	120-269

Length Compositions

Species mean length, as well as length frequency distribution for each gear were determined using the included collections only. Historically, fish lengths were measured in either TL or fork length (FL), depending on species. Beginning in 2012, all fish were measured in TL. For any species for which measurement type changed, lengths were converted to TL based on FL/TL conversion equations compiled from the Reef Fish Survey database at SCDNR in 2019 (**Table 3**). Because of this conversion, resolution of cm size bins, and rounding, these species contain some empty size bins during years that are converted from FL to TL.

Table 3. Length-length conversion equations by species. All conversions are based on individual specimen data from the combined MARMAP and SERFS database (1973-2018). TL = total length (cm) and FL = fork length (cm). Note that Bank Sea Bass, Black Sea Bass, and Snowy Grouper do not have a forked tail, and so there is no conversion for those species.

Species	Equation	n	r^2
	Balistidae		
Gray Triggerfish	TL = 1.111 * FL - 1.799	17,321	0.964
	Carangidae		
Almaco Jack	TL = 1.142 * FL + 0.266	112	0.996
Greater Amberjack	TL = 1.103 * FL + 4.037	2,057	0.975
	Haemulidae		
Tomtate	TL = 1.109 * FL + 0.772	4,391	0.983
White Grunt	TL = 1.115 * FL +0.307	13,912	0.995
	Lutjanidae		
Red Snapper	TL = 1.070 * FL + 0.155	9,324	0.999
Vermilion Snapper	TL = 1.110 * FL + 0.044	32,557	0.996
	Malacanthidae		
Blueline Tilefish	TL = 1.047 * FL + 0.680	1,419	0.991
	Serranidae		
Bank Sea Bass	N/A	-	-
Black Sea Bass	N/A	-	-
Gag Grouper	TL = 1.036 * FL - 0.126	4,125	0.998
Red Grouper	TL = 1.058 * FL - 0.978	1,906	0.997
Sand Perch	TL = 1.110 * FL + 0.679	1,448	0.974
Scamp Grouper	TL = 1.126 * FL - 2.021	5,143	0.990
Snowy Grouper	N/A	-	-
Speckled Hind	TL = 1.018 * FL + 0.187	1,026	0.998
	Sparidae		
Knobbed Porgy	TL = 1.086 * FL + 1.910	2,000	0.985
Red Porgy	TL = 1.132 * FL + 0.719	38,358	0.993
Spottail Pinfish	TL = 1.139 * FL + 0.207	61	0.995
Stenotomus spp.	TL = 1.162 * FL - 0.250	366	0.994

Species Distributions

Individual species catch distributions within the survey for the most recent 5 years of sampling were produced by inverse-distance weighted interpolation in ArcGIS Pro 3.4.0. Interpolations were fit to nominal abundance by inverse distance weighting. To minimize representing unsampled areas as sampled, interpolations were fit to a mask developed for the CVT station universe by applying a 10-km buffer around stations and then dissolving connected buffers. This method still over-represents the sampled area but is needed to allow visualization of the abundance distribution. If species did not occur in high enough frequency to develop an index of abundance, a distribution was not developed for that species. Interpolated abundance is represented as quintiles to allow for comparison among species and with previous years' reports, effectively creating a relative heat map of abundance where abundance is scaled relative to the highest catch for each species.

Results

Gear Summary

Chevron Trap

From 1990 to 2025 there were a total of 27,809 CVT deployments included in analyses representing an average of 794 collections per year (range: 224 – 1,882, **Table 2**). Due to COVID-19 restrictions in 2020 on SCDNR scientific vessels, overnight trips were not permitted, which limited spatial extent of sampling. For this reason, no data were included from 2020.

The additions of SEAMAP-SA and SEFIS emphasized the identification of previously unsampled reef fish habitats and expanded the geographic and depth range of the survey for several years. After a period of extensive reconnaissance, the sampling universe has remained relatively stable since ~2017 (**Figure 1**).

Of the 20 species considered in this report, 16 were caught in numbers sufficient to develop an index of abundance from CVTs (**Table 1**). We provide individual abundance and length summaries for each of these species below. Details and discussion of individual covariates included in the final ZINB models and diagnostic plots are available upon request.

Gray Triggerfish (*Balistes capriscus*)

The nominal and standardized abundance of Gray Triggerfish caught with CVTs in 2025 decreased relative to 2024 and both values remained below the time series mean (**Table 4 and Figure 4A**). Mean lengths of Gray Triggerfish caught in CVTs in 2025 were slightly decreased relative to 2024 (**Figure 4B**). The spatial distribution of Gray Triggerfish catches from CVTs is widespread and relatively homogeneous throughout the region (**Figure 5**).

Table 4. Chevron trap nominal abundance and zero-inflated negative binomial (ZINB) standardized abundance for Gray Triggerfish and information associated with deployments included in standardized abundance calculation. Positive = number of included collections positive for the species of interest, Proportion Positive = proportion of included collections positive for the species of interest, Normalized = abundance (number of fish*trap^{-1}*hr^{-1}) normalized to its mean value over the time series, and CV = coefficient of variation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	35	0.112	70	0.25	0.26	0.2
1991	272	125	0.460	372	1.51	1.32	0.13
1992	288	84	0.292	192	0.73	0.84	0.14
1993	392	114	0.291	284	0.8	0.83	0.11
1994	387	153	0.395	446	1.27	1.23	0.11
1995	361	155	0.429	668	2.04	1.48	0.1
1996	361	144	0.399	729	2.23	1.74	0.1
1997	406	166	0.409	715	1.94	2.33	0.12
1998	426	123	0.289	517	1.34	1.96	0.13
1999	230	60	0.261	188	0.9	0.93	0.16
2000	298	83	0.279	247	0.91	0.75	0.19
2001	245	86	0.351	229	1.03	0.98	0.11
2002	238	92	0.387	297	1.38	1.44	0.14
2003	224	29	0.130	53	0.26	0.61	0.23
2004	282	74	0.262	184	0.72	1.22	0.14
2005	303	93	0.307	331	1.2	0.85	0.13
2006	297	66	0.222	150	0.56	0.69	0.16
2007	337	106	0.315	315	1.03	0.87	0.12
2008	303	65	0.215	323	1.17	0.89	0.15
2009	404	80	0.198	257	0.7	0.63	0.14
2010	731	174	0.238	468	0.71	0.62	0.12
2011	731	149	0.204	537	0.81	0.8	0.11
2012	1174	326	0.278	1082	1.02	1	0.08
2013	1358	361	0.266	1250	1.01	1.24	0.08
2014	1473	457	0.310	1647	1.23	1.35	0.07
2015	1464	409	0.279	1100	0.83	0.95	0.08
2016	1485	510	0.343	2101	1.56	1.34	0.08
2017	1538	450	0.293	1557	1.12	1.21	0.07
2018	1736	396	0.228	1263	0.8	0.9	0.09
2019	1665	365	0.219	1408	0.93	0.87	0.09
2020	-	-	-	-	-	-	-
2021	1882	291	0.155	865	0.51	0.49	0.08
2022	1648	325	0.197	1082	0.72	0.74	0.09
2023	1516	358	0.236	1223	0.89	0.77	0.1
2024	1507	268	0.178	706	0.52	0.48	0.1
2025	1534	170	0.111	530	0.38	0.41	0.11

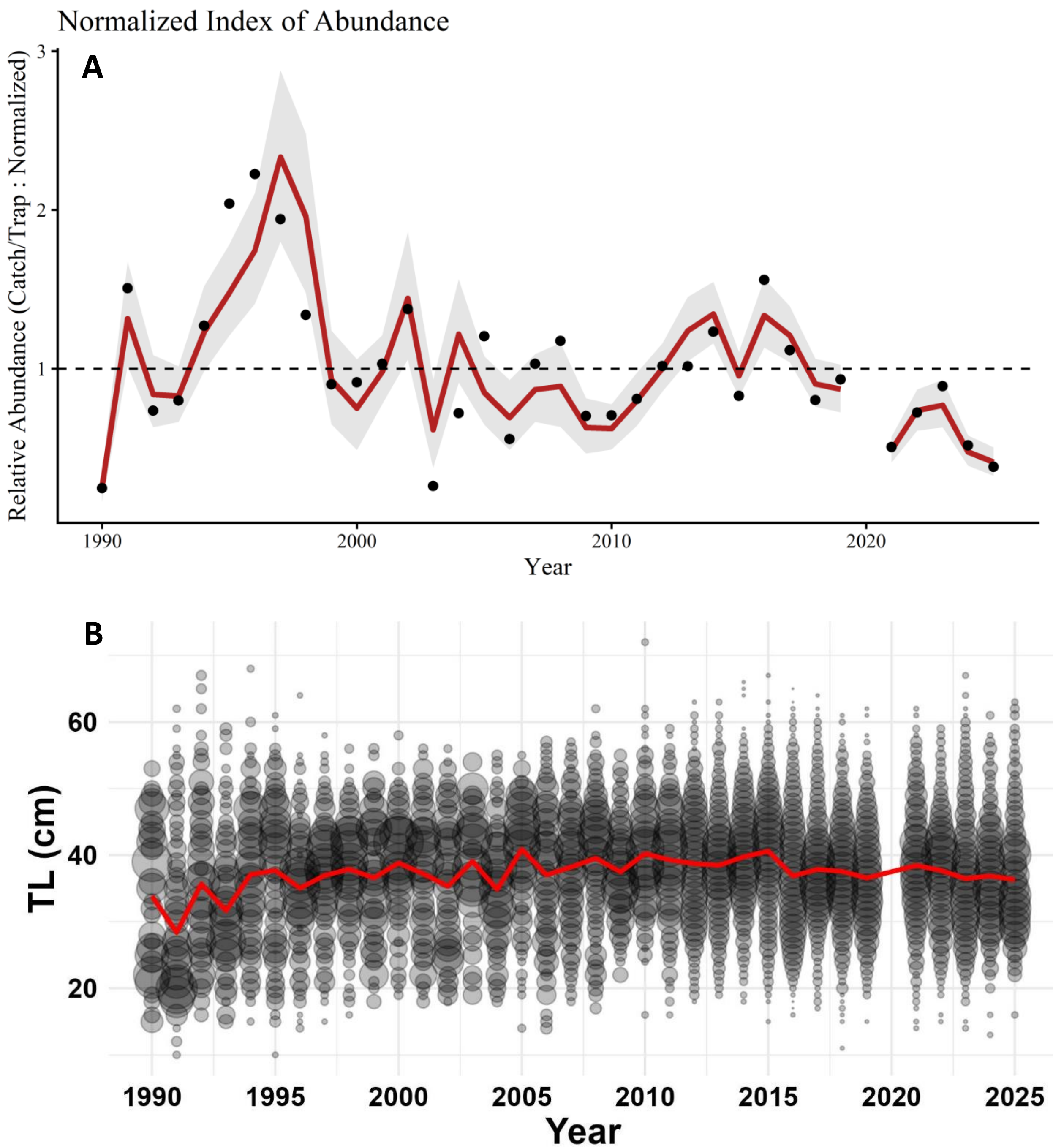


Figure 4. Chevron trap index of abundance and length compositions for Gray Triggerfish. A) Normalized nominal (black dot) and ZINB standardized (red line) abundance with 95 % confidence intervals (CI, gray area). B) Total lengths (cm) by year. Red line represents annual mean length. Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

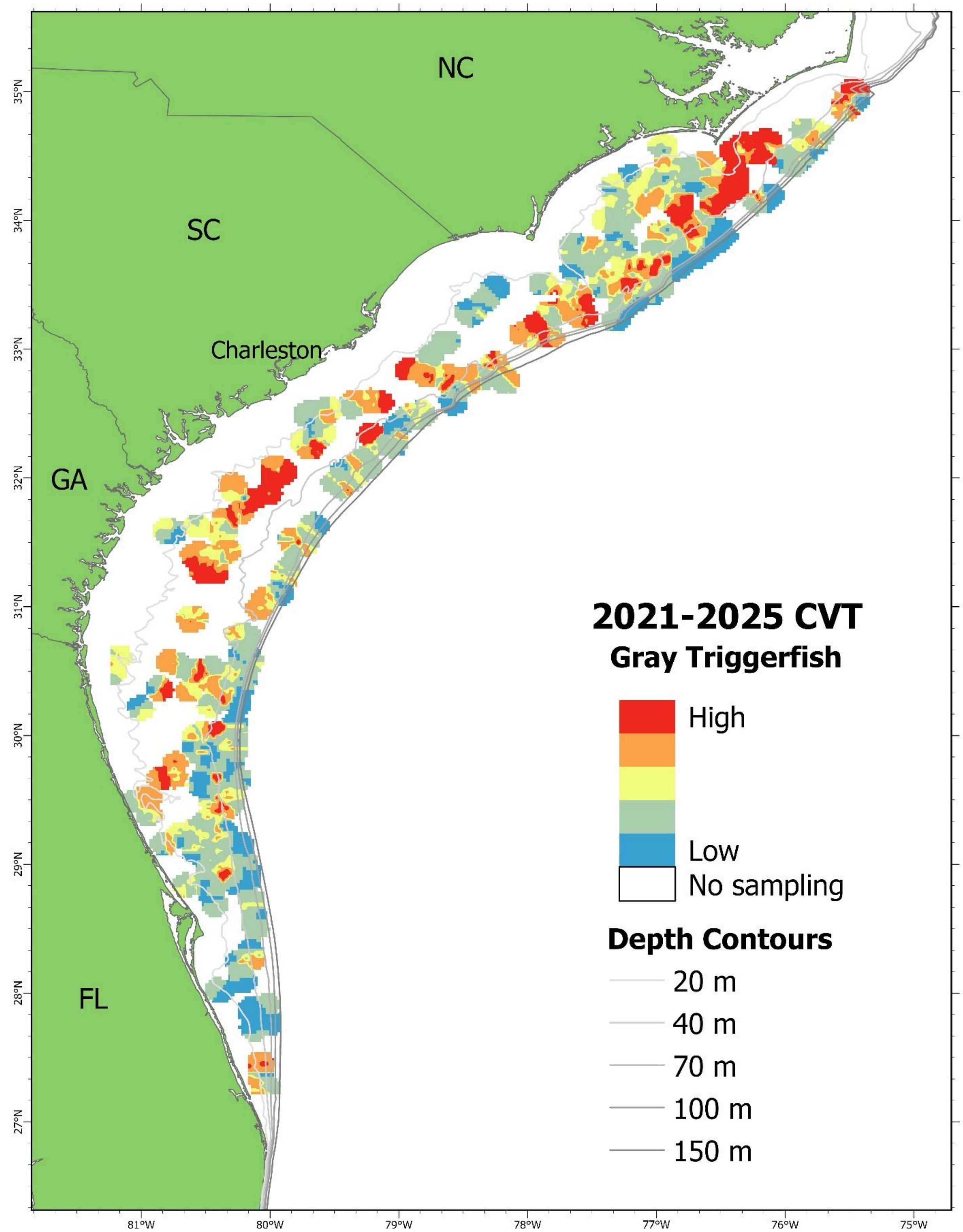


Figure 5. Distribution map of Gray Triggerfish catches from chevron-video traps (CVT) from 2021-2025. Colors indicate quintiles of catch per trap hour and white indicates areas not sampled. The map smoothing was accomplished with inverse distance weighting.

Knobbed Porgy (*Calamus nodosus*)

The nominal and standardized abundance of Knobbed Porgy caught with CVTs in 2025 decreased relative to 2024 and both values remained below the time series mean (**Table 5** and **Figure 6A**). Knobbed Porgy mean lengths caught in CVTs in 2025 decreased slightly relative to 2024 (**Figure 6B**). The spatial distribution of Knobbed Porgy catches from CVTs is centered in the northern portion of the region in deeper waters and is relatively limited in the southern portion of the region (**Figure 7**).

Table 5: Chevron trap nominal abundance and ZINB standardized abundance for Knobbed Porgy and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	27	0.086	42	0.7	0.9	0.25
1991	272	60	0.221	156	2.97	2.5	0.15
1992	288	62	0.215	148	2.66	2.28	0.16
1993	392	73	0.186	155	2.05	2.14	0.16
1994	387	74	0.191	144	1.93	1.5	0.14
1995	361	59	0.163	116	1.67	2.35	0.18
1996	361	45	0.125	81	1.16	1.07	0.17
1997	406	51	0.126	175	2.23	2.08	0.15
1998	426	70	0.164	134	1.63	2.02	0.14
1999	230	35	0.152	82	1.85	1.3	0.17
2000	298	33	0.111	69	1.2	1.27	0.2
2001	245	50	0.204	141	2.98	1.72	0.16
2002	238	15	0.063	32	0.7	0.81	0.24
2003	224	32	0.143	67	1.55	0.84	0.18
2004	282	25	0.089	58	1.07	1.3	0.23
2005	303	35	0.116	56	0.96	0.77	0.18
2006	297	18	0.061	29	0.51	0.4	0.26
2007	337	35	0.104	64	0.98	0.88	0.15
2008	303	22	0.073	44	0.75	0.58	0.24
2009	404	21	0.052	34	0.44	0.45	0.23
2010	731	20	0.027	35	0.25	0.4	0.33
2011	731	16	0.022	30	0.21	0.33	0.27
2012	1174	36	0.031	61	0.27	0.55	0.17
2013	1358	28	0.021	36	0.14	0.27	0.2
2014	1473	58	0.039	92	0.32	0.37	0.16
2015	1464	73	0.050	118	0.42	0.62	0.14
2016	1485	86	0.058	129	0.45	0.51	0.14
2017	1538	60	0.039	71	0.24	0.45	0.14
2018	1736	65	0.037	92	0.27	0.49	0.15
2019	1665	109	0.066	204	0.64	0.92	0.19
2020	-	-	-	-	-	-	-
2021	1882	90	0.048	140	0.39	0.55	0.13
2022	1648	78	0.047	122	0.38	0.67	0.14
2023	1516	93	0.061	148	0.51	0.71	0.17
2024	1507	68	0.045	98	0.34	0.73	0.14
2025	1534	42	0.027	54	0.18	0.28	0.16

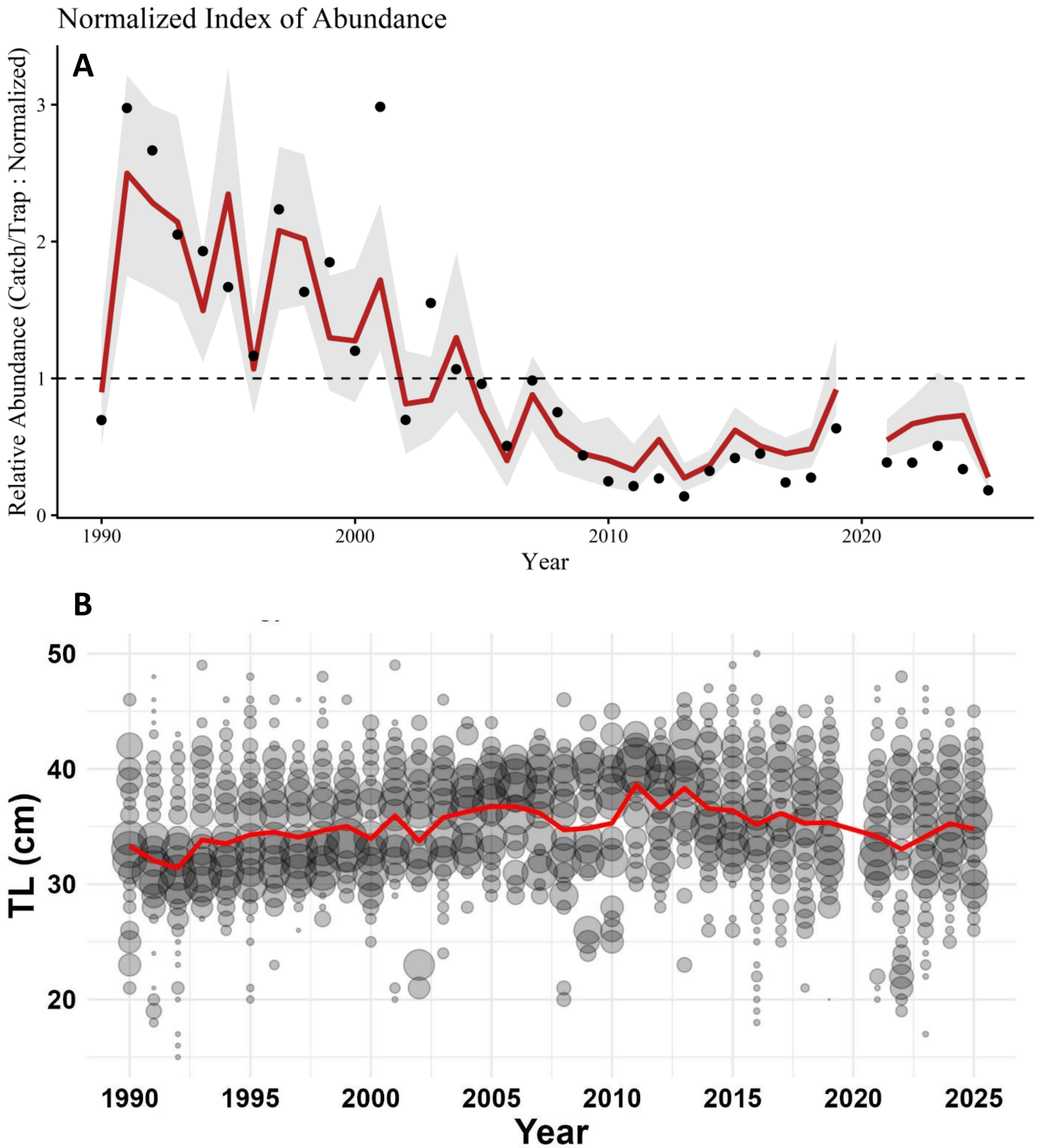


Figure 6. Chevron trap index of abundance and length compositions for Knobbed Porgy. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

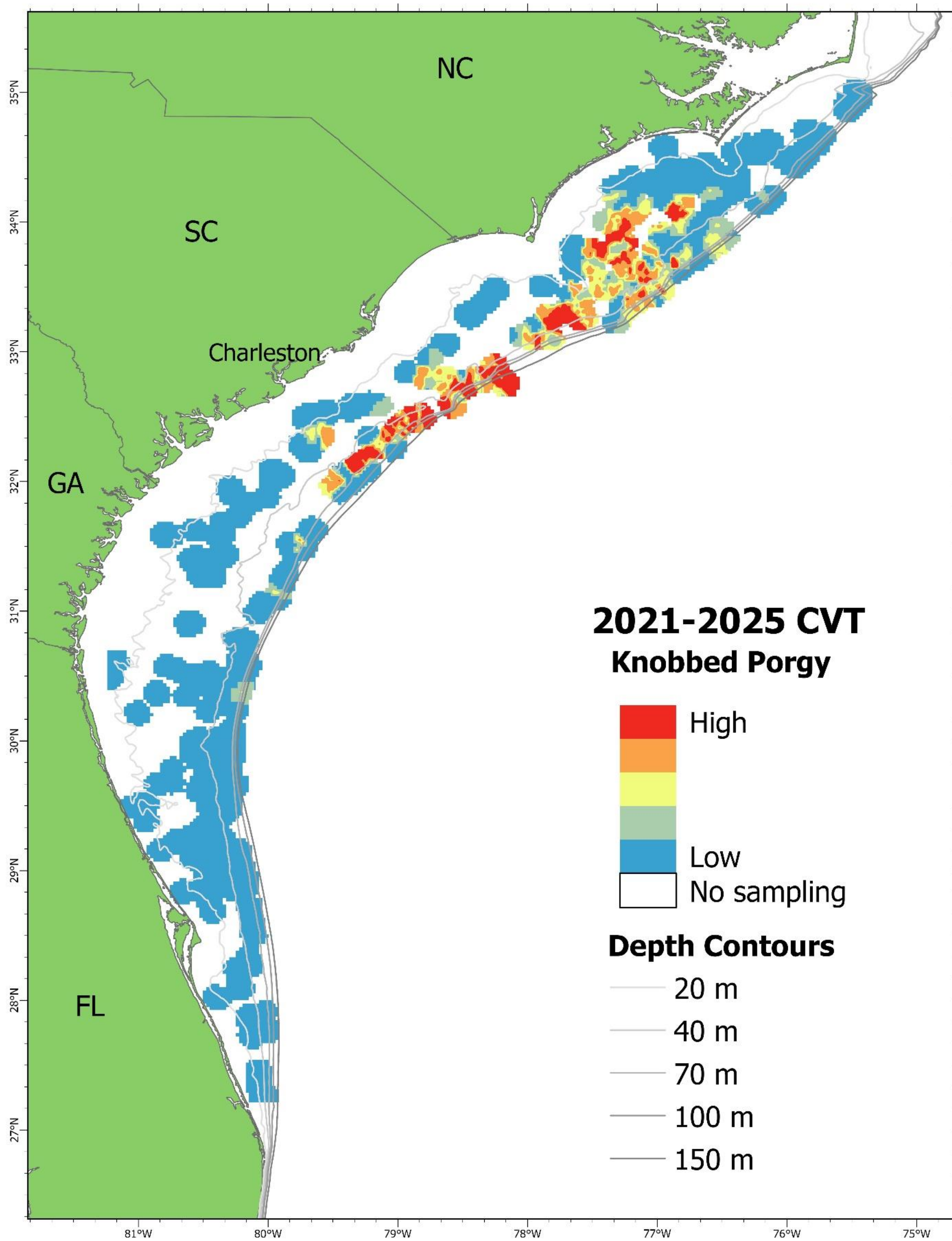


Figure 7. Distribution map of Knobbed Porgy catches from CVTs from 2021-2025.

Blueline Tilefish (Caulolatilus microps)

Blueline Tilefish were not caught with CVTs in large enough numbers or consistently enough for development of an index of relative abundance. Here we provide proportion positive and total fish by year (**Table 6**). The mean length of Blueline The size of Blueline Tilefish caught in CVTs in 2025 increased relative to 2024, but only 2 fish were captured (**Figure 8**).

Table 6. Chevron trap catch of Blueline Tilefish and information associated with deployments.

Year	Collections	Positive	Proportion Positive	Total Fish
1990	313	2	0.006	2
1991	272	1	0.004	1
1992	288	0	0.000	0
1993	392	0	0.000	0
1994	387	2	0.005	2
1995	361	0	0.000	0
1996	361	3	0.008	6
1997	406	0	0.000	0
1998	426	1	0.002	1
1999	230	0	0.000	0
2000	298	1	0.003	1
2001	245	2	0.008	4
2002	238	1	0.004	2
2003	224	2	0.009	3
2004	282	2	0.007	3
2005	303	0	0.000	0
2006	297	2	0.007	2
2007	337	3	0.009	5
2008	303	0	0.000	0
2009	404	1	0.002	1
2010	732	1	0.001	1
2011	731	7	0.010	11
2012	1174	17	0.014	32
2013	1358	9	0.007	13
2014	1473	17	0.012	30
2015	1464	5	0.003	12
2016	1485	13	0.009	31
2017	1538	22	0.014	36
2018	1736	11	0.006	16
2019	1665	6	0.004	11
2020	-	-	-	-
2021	1882	2	0.001	4
2022	1648	3	0.002	3
2023	1516	2	0.001	2
2024	1507	3	0.002	4
2025	1534	2	0.001	2

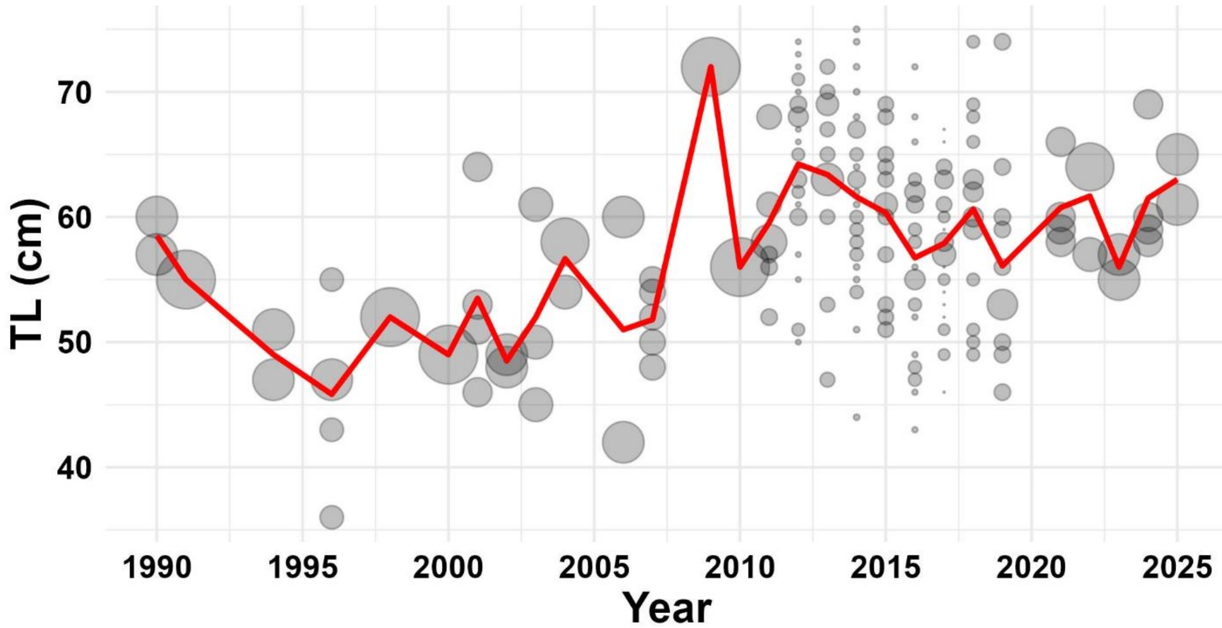


Figure 8. Blueline Tilefish total lengths (cm) caught with chevron trap by year.

Bank Sea Bass (*Centropristis ocyurus*)

Nominal and standardized abundance of Bank Sea Bass caught with CVTs in 2025 increased slightly relative to 2024 but are still below the time series mean (**Table 7** and **Figure 9A**). Bank Sea Bass mean lengths caught in CVTs remained constant from 2024 to 2025 (**Figure 9B**). The spatial distribution of Bank Sea Bass catches from CVTs is relatively homogeneous in the shallow waters throughout the survey range, but less frequent in the most southern portion of the sampling region (**Figure 10**).

Table 7. Chevron trap nominal abundance and ZINB standardized abundance for Bank Sea Bass and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	138	0.441	834	2.48	1.69	0.51
1991	272	133	0.489	571	1.95	1.16	0.22
1992	288	121	0.420	430	1.39	0.79	0.19
1993	392	154	0.393	678	1.61	1.15	0.2
1994	387	169	0.437	798	1.92	1.55	0.13
1995	361	114	0.316	550	1.42	1.47	0.11
1996	361	166	0.460	1010	2.6	1.87	0.1
1997	406	149	0.367	771	1.77	1.9	0.12
1998	426	118	0.277	505	1.1	1.36	0.17
1999	230	74	0.322	315	1.27	1.98	0.22
2000	298	83	0.279	386	1.2	1.8	0.19
2001	245	63	0.257	238	0.9	0.94	0.15
2002	238	48	0.202	117	0.46	0.46	0.19
2003	224	62	0.277	316	1.31	1.24	0.19
2004	282	77	0.273	226	0.75	0.98	0.15
2005	303	79	0.261	275	0.84	1.03	0.18
2006	297	84	0.283	401	1.26	1.06	0.18
2007	337	68	0.202	275	0.76	0.98	0.2
2008	303	71	0.234	224	0.69	0.65	0.15
2009	404	113	0.280	532	1.22	1.12	0.14
2010	731	231	0.316	1096	1.39	1.73	0.14
2011	731	253	0.346	1438	1.83	2.57	0.11
2012	1174	280	0.239	977	0.77	0.84	0.1
2013	1358	216	0.159	641	0.44	0.48	0.1
2014	1473	220	0.149	587	0.37	0.44	0.11
2015	1464	256	0.175	741	0.47	0.46	0.09
2016	1485	225	0.152	719	0.45	0.57	0.13
2017	1538	254	0.165	704	0.43	0.49	0.12
2018	1736	246	0.142	774	0.41	0.53	0.11
2019	1665	222	0.133	500	0.28	0.32	0.11
2020	-	-	-	-	-	-	-
2021	1882	176	0.094	391	0.19	0.24	0.11
2022	1648	222	0.135	610	0.34	0.33	0.1
2023	1516	134	0.088	368	0.23	0.28	0.15
2024	1507	154	0.102	382	0.24	0.24	0.12
2025	1534	177	0.115	442	0.27	0.28	0.09

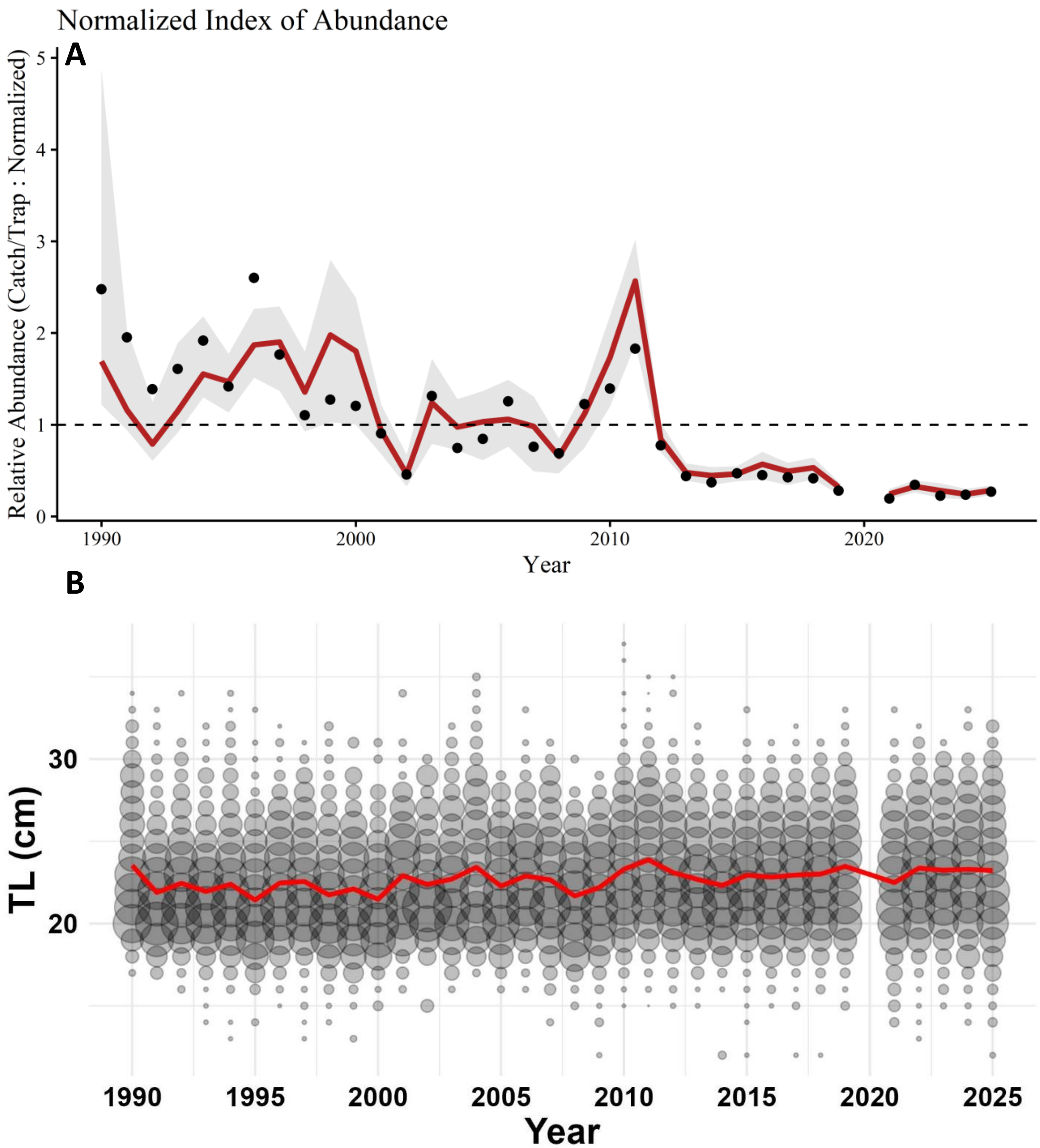


Figure 9. Chevron trap index of abundance and length compositions for Bank Sea Bass. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught in chevron traps by year.

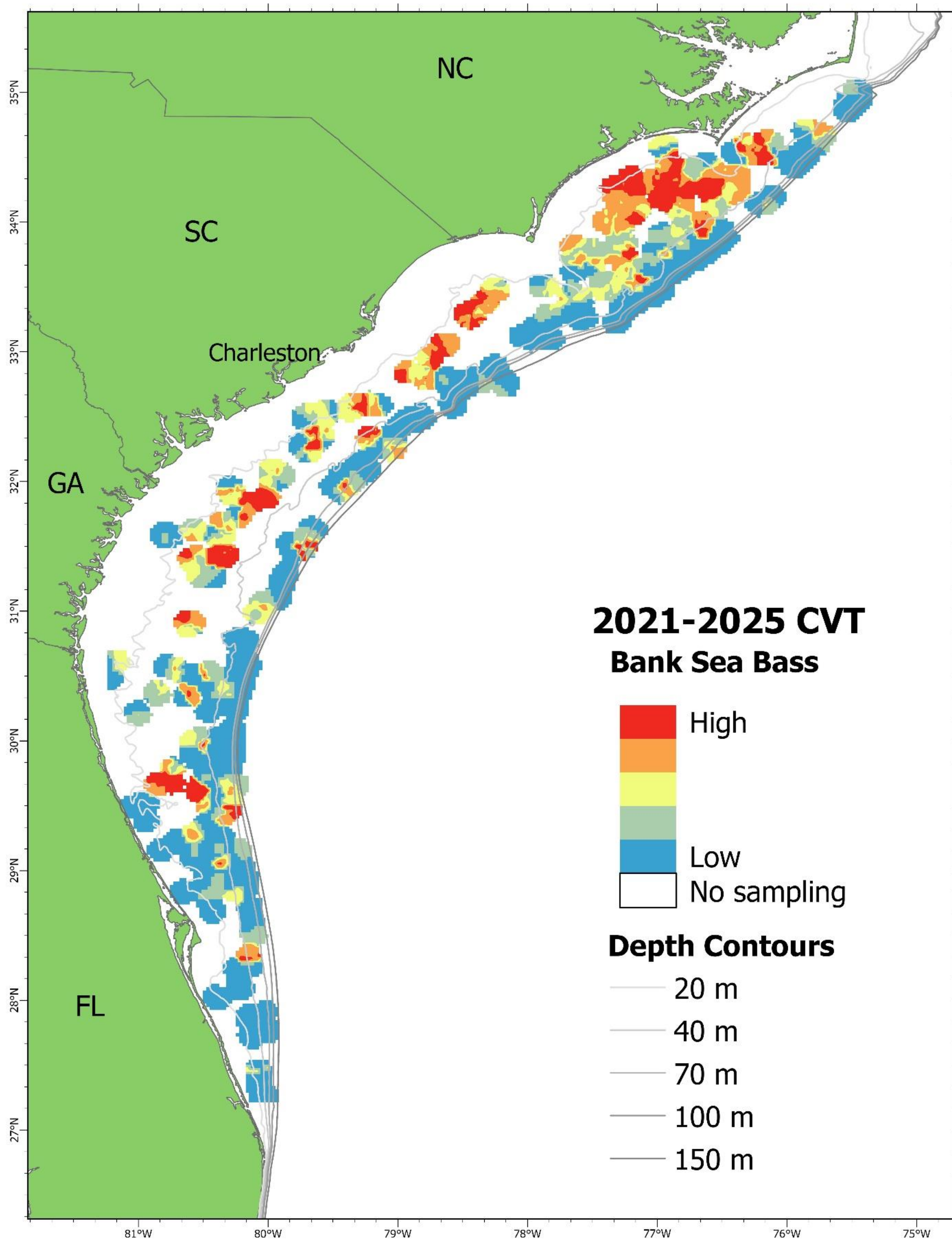


Figure 10. Distribution map of Bank Sea Bass catches from CVTs from 2021-2025.

Black Sea Bass (*Centropristis striata*)

Nominal and standardized abundance of Black Sea Bass caught with CVTs in 2025 decreased slightly relative to 2024 and is the lowest value recorded during the time series (**Table 8** and **Figure 11A**). Mean lengths of Black Sea Bass caught in CVTs in 2025 increased slightly compared to 2024 (**Figure 11B**). The spatial distribution of Black Sea Bass catches from CVTs is relatively homogeneous in the shallow waters throughout the range in recent years but is slightly more common to the northern portion of the study area (**Figure 12**).

Table 8. Chevron trap nominal abundance and ZINB standardized abundance for Black Sea Bass and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	193	0.617	5837	1.83	1.4	0.09
1991	272	158	0.581	3929	1.42	1.13	0.08
1992	288	179	0.622	4176	1.43	1.02	0.1
1993	392	197	0.503	3220	0.81	0.75	0.1
1994	387	164	0.424	3570	0.91	0.92	0.09
1995	361	211	0.585	4862	1.32	0.72	0.07
1996	361	169	0.468	3437	0.94	0.81	0.1
1997	406	167	0.411	4143	1	0.93	0.11
1998	426	175	0.411	4318	1	1.08	0.09
1999	230	105	0.457	4399	1.88	1.91	0.15
2000	298	128	0.430	5678	1.87	1.24	0.11
2001	245	94	0.384	4150	1.67	1.58	0.15
2002	238	81	0.340	2211	0.91	0.79	0.15
2003	224	68	0.304	1781	0.78	0.67	0.13
2004	282	104	0.369	4755	1.66	1.51	0.14
2005	303	112	0.370	3281	1.06	1.05	0.11
2006	297	123	0.414	3005	0.99	1	0.13
2007	337	125	0.371	3199	0.93	0.77	0.12
2008	303	112	0.370	2614	0.85	0.88	0.12
2009	404	162	0.401	3771	0.92	0.57	0.11
2010	731	335	0.458	9170	1.23	1.95	0.12
2011	731	403	0.551	14736	1.98	2.93	0.1
2012	1174	678	0.578	18967	1.59	1.96	0.06
2013	1358	767	0.565	22368	1.62	1.79	0.05
2014	1473	705	0.479	15603	1.04	1.51	0.06
2015	1464	651	0.445	13046	0.88	1.01	0.06
2016	1485	537	0.362	7624	0.5	0.79	0.07
2017	1538	545	0.354	7434	0.48	0.66	0.08
2018	1736	567	0.327	7636	0.43	0.56	0.07
2019	1665	496	0.298	5789	0.34	0.37	0.07
2020	-	-	-	-	-	-	-
2021	1882	394	0.209	3520	0.18	0.19	0.09
2022	1648	324	0.197	3233	0.19	0.21	0.09
2023	1516	216	0.143	1996	0.13	0.14	0.11
2024	1507	261	0.173	1950	0.13	0.11	0.09
2025	1534	226	0.147	1388	0.09	0.09	0.09

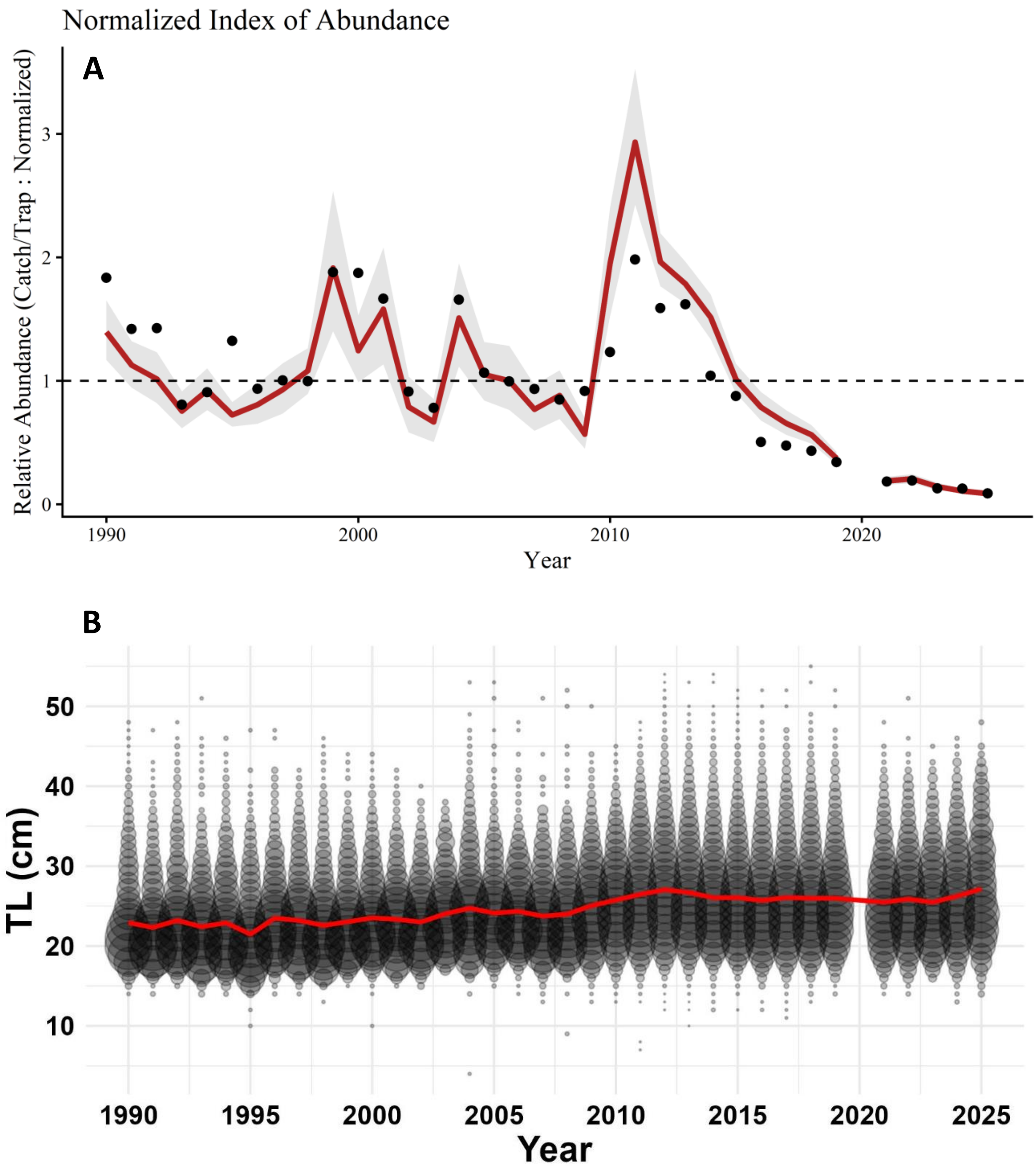


Figure 11. Chevron trap index of abundance and length compositions for Black Sea Bass. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

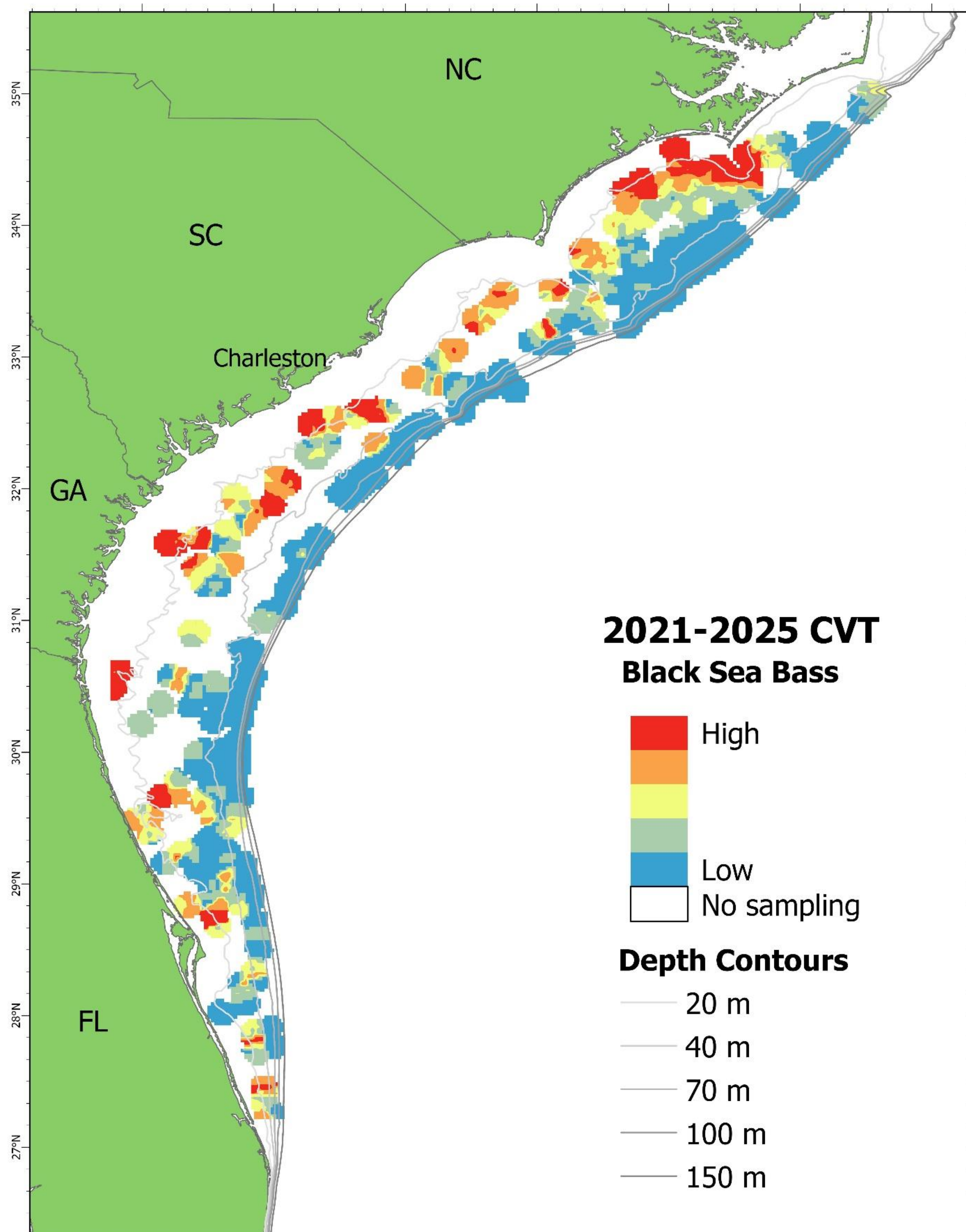


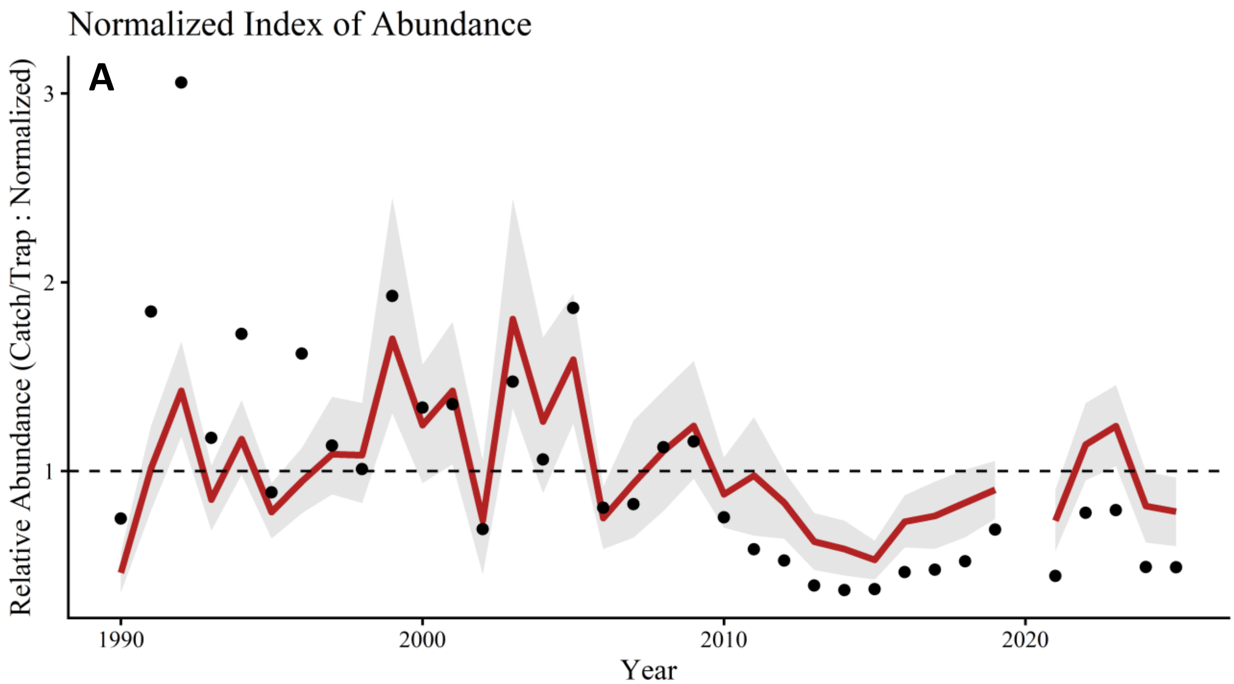
Figure 12. Distribution map of Black Sea Bass catches from CVTs from 2021-2025.

Sand Perch (*Diplectrum formosum*)

Nominal abundance of Sand Perch caught with CVTs stayed constant from 2024 to 2025, and standardized abundance in 2025 decreased relative to 2024 with both values being below the time series mean (**Table 9** and **Figure 13A**). Mean lengths of Sand Perch caught in CVTs in 2025 increased slightly relative to 2024 (**Figure 13B**). The spatial distribution of Sand Perch catches from CVTs is patchy in the shallow waters throughout the region (**Figure 14**).

Table 9. Chevron trap nominal abundance and ZINB standardized abundance for Sand Perch and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	63	0.201	145	0.75	0.46	0.12
1991	272	82	0.302	310	1.84	1.02	0.11
1992	288	109	0.379	544	3.06	1.42	0.09
1993	392	95	0.242	285	1.18	0.85	0.1
1994	387	111	0.287	413	1.73	1.17	0.09
1995	361	77	0.213	198	0.89	0.78	0.09
1996	361	105	0.291	362	1.62	0.95	0.09
1997	406	95	0.234	285	1.14	1.09	0.12
1998	426	84	0.197	266	1.01	1.08	0.12
1999	230	59	0.257	274	1.93	1.7	0.17
2000	298	69	0.232	246	1.34	1.24	0.13
2001	245	45	0.184	205	1.35	1.43	0.13
2002	238	36	0.151	102	0.69	0.74	0.21
2003	224	44	0.196	204	1.47	1.81	0.16
2004	282	49	0.174	185	1.06	1.26	0.17
2005	303	76	0.251	349	1.86	1.59	0.11
2006	297	58	0.195	148	0.81	0.75	0.11
2007	337	55	0.163	172	0.83	0.94	0.17
2008	303	60	0.198	211	1.13	1.11	0.15
2009	404	79	0.196	289	1.16	1.24	0.13
2010	731	111	0.152	341	0.75	0.88	0.11
2011	731	68	0.093	265	0.59	0.98	0.16
2012	1174	110	0.094	382	0.53	0.83	0.11
2013	1358	120	0.088	331	0.39	0.63	0.12
2014	1473	132	0.090	337	0.37	0.59	0.13
2015	1464	139	0.095	340	0.38	0.53	0.1
2016	1485	156	0.105	427	0.47	0.73	0.1
2017	1538	133	0.087	455	0.48	0.76	0.12
2018	1736	171	0.099	561	0.52	0.83	0.11
2019	1665	205	0.123	710	0.69	0.9	0.09
2020	-	-	-	-	-	-	-
2021	1882	182	0.097	518	0.45	0.74	0.11
2022	1648	238	0.144	794	0.78	1.14	0.09
2023	1516	190	0.125	743	0.79	1.24	0.09
2024	1507	154	0.102	459	0.49	0.81	0.12
2025	1534	146	0.095	466	0.49	0.79	0.12



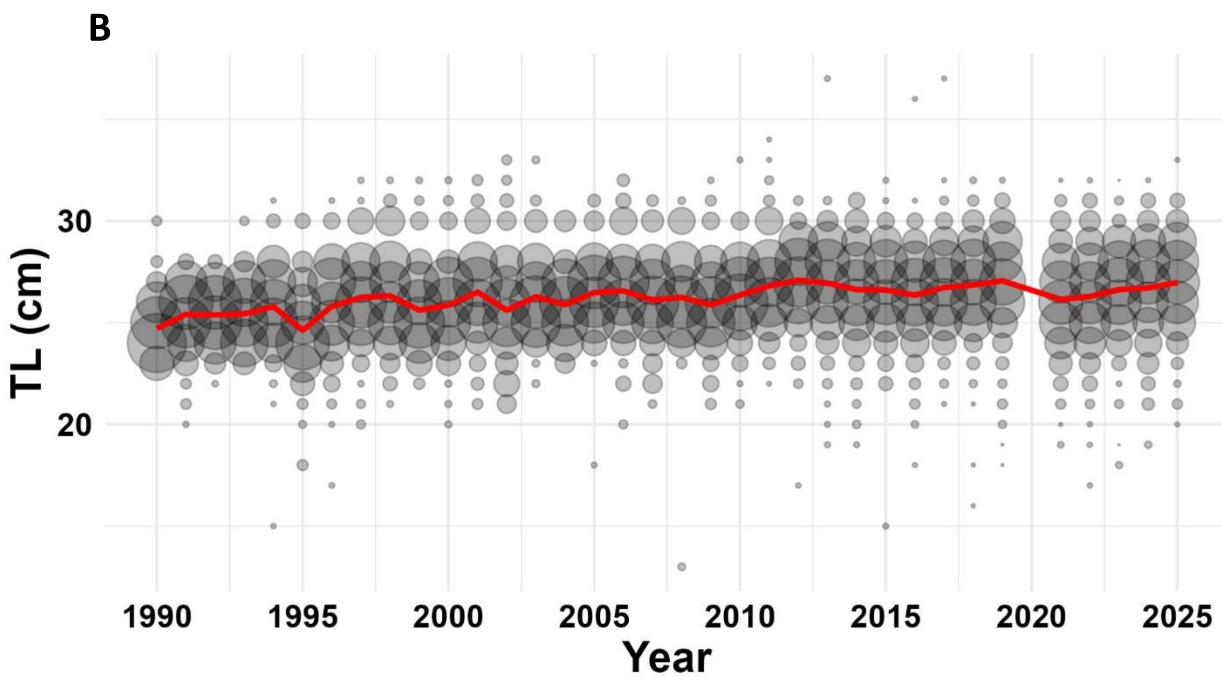


Figure 13. Chevron trap index of abundance and length compositions for Sand Perch. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

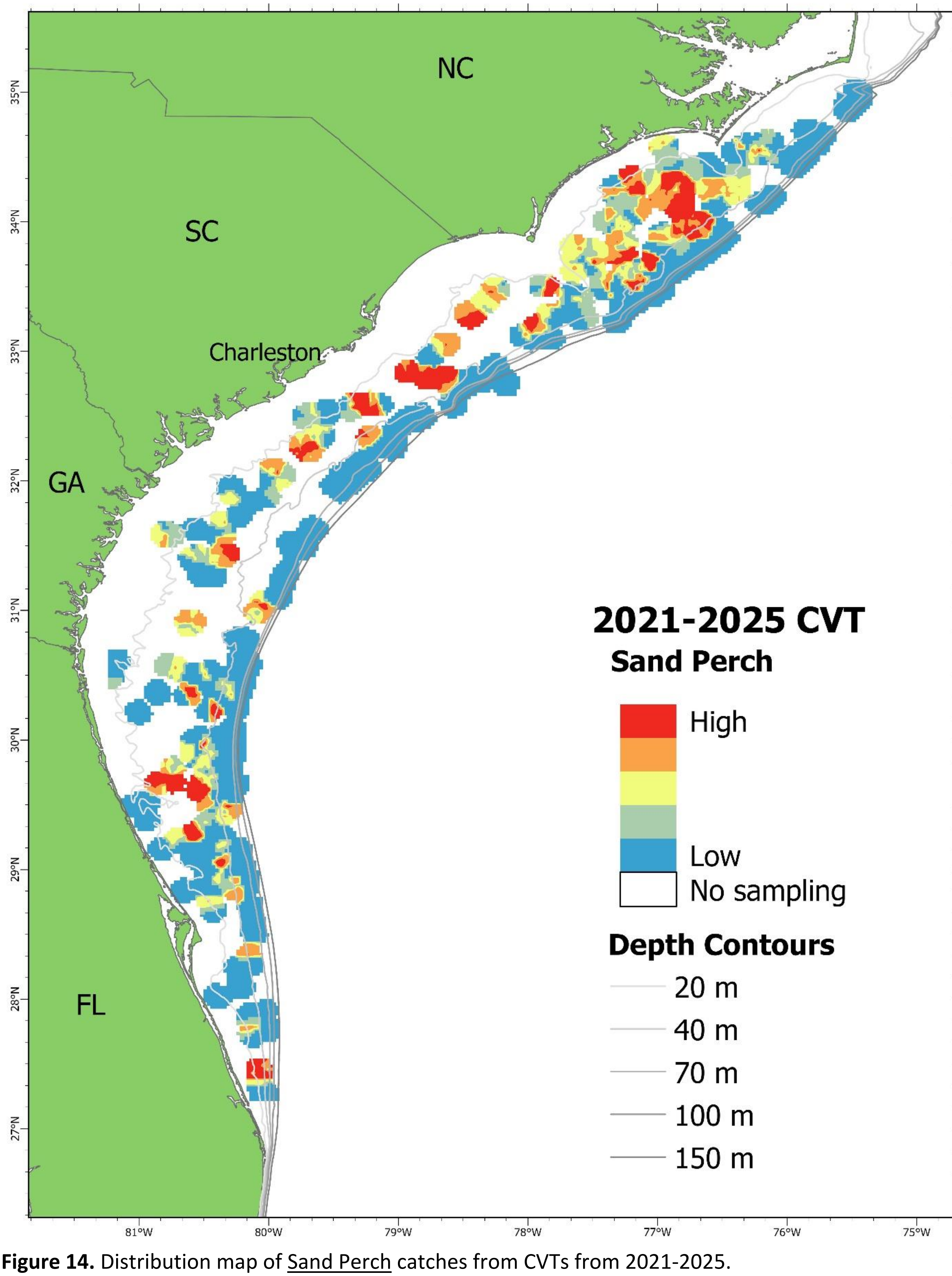


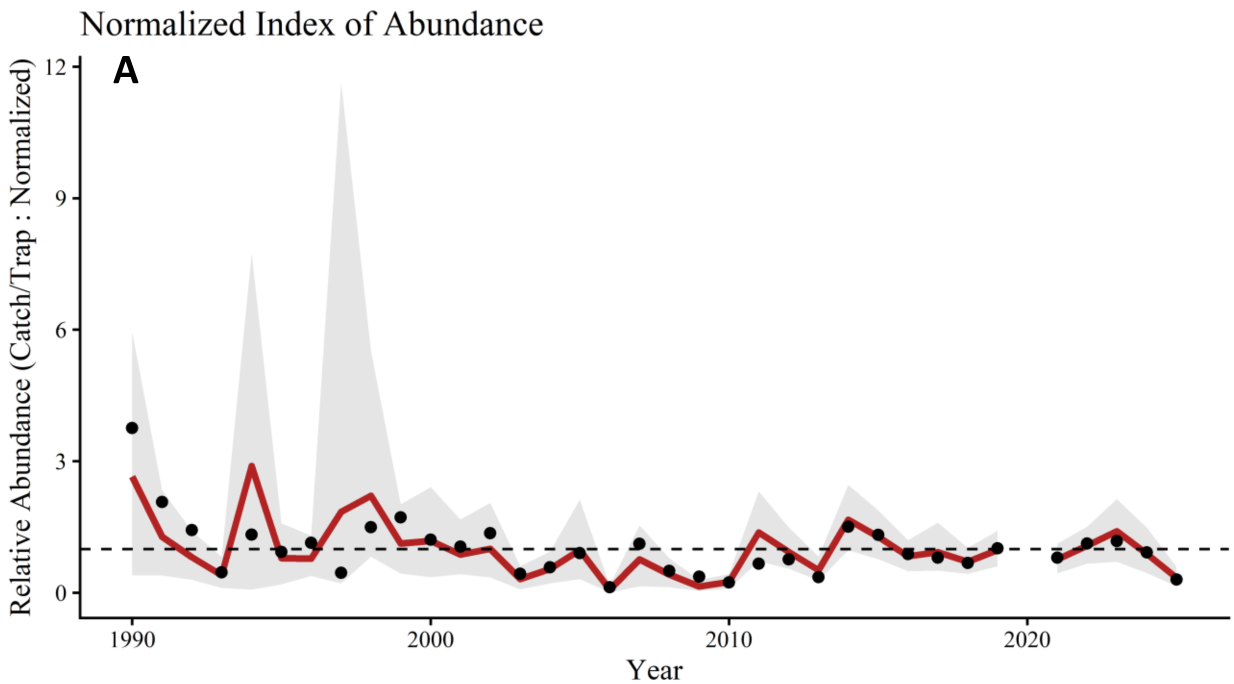
Figure 14. Distribution map of Sand Perch catches from CVTs from 2021-2025.

Spottail Pinfish (*Diplodus holbrookii*)

Nominal and standardized abundance of Spottail Pinfish caught with CVTs in 2025 decreased relative to 2024 and both were just below the time series mean (**Table 10** and **Figure 15A**). Mean lengths of Spottail Pinfish caught in CVTs in 2025 decreased relative to 2024 (**Figure 15B**). The spatial distribution of Spottail Pinfish catches from CVTs is focused in the northern portion of the region in shallower waters, with limited catches in the southern portion of the study area (**Figure 16**).

Table 10. Chevron trap nominal abundance and ZINB standardized abundance for Spottail Pinfish and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	**Included Collections**	**Positive**	**Proportion Positive**	**Total Fish**	**Normalized**	**Normalized**	**CV**
1990	313	20	0.064	374	3.76	2.65	0.56
1991	272	16	0.059	179	2.07	1.28	0.39
1992	288	18	0.063	131	1.43	0.81	0.36
1993	392	13	0.033	58	0.47	0.4	0.46
1994	387	7	0.018	163	1.32	2.89	0.76
1995	361	15	0.042	107	0.93	0.79	0.46
1996	361	24	0.067	131	1.14	0.78	0.3
1997	406	16	0.039	59	0.46	1.84	1.66
1998	426	27	0.063	203	1.5	2.21	0.57
1999	230	14	0.061	126	1.72	1.13	0.36
2000	298	15	0.050	115	1.21	1.19	0.44
2001	245	22	0.090	82	1.05	0.87	0.4
2002	238	14	0.059	103	1.36	1.01	0.44
2003	224	8	0.036	31	0.43	0.31	0.44
2004	282	14	0.050	52	0.58	0.54	0.34
2005	303	14	0.046	87	0.9	0.98	0.49
2006	297	4	0.014	12	0.13	0.07	0.66
2007	337	8	0.024	120	1.12	0.76	0.47
2008	303	11	0.036	48	0.5	0.42	0.41
2009	404	14	0.035	47	0.37	0.14	0.48
2010	731	17	0.023	55	0.24	0.25	0.35
2011	731	38	0.052	155	0.67	1.38	0.3
2012	1174	68	0.058	284	0.76	0.93	0.26
2013	1358	41	0.030	155	0.36	0.52	0.27
2014	1473	111	0.075	707	1.51	1.66	0.23
2015	1464	115	0.079	615	1.32	1.28	0.22
2016	1485	100	0.067	418	0.88	0.83	0.21
2017	1538	85	0.055	392	0.8	0.92	0.31
2018	1736	89	0.051	376	0.68	0.71	0.21
2019	1665	113	0.068	538	1.02	0.98	0.21
2020	-	-	-	-	-	-	-
2021	1882	91	0.048	478	0.8	0.76	0.23
2022	1648	124	0.075	589	1.12	1.08	0.2
2023	1516	77	0.051	569	1.18	1.4	0.26
2024	1507	67	0.045	442	0.92	0.89	0.3
2025	1534	43	0.028	148	0.3	0.34	0.34



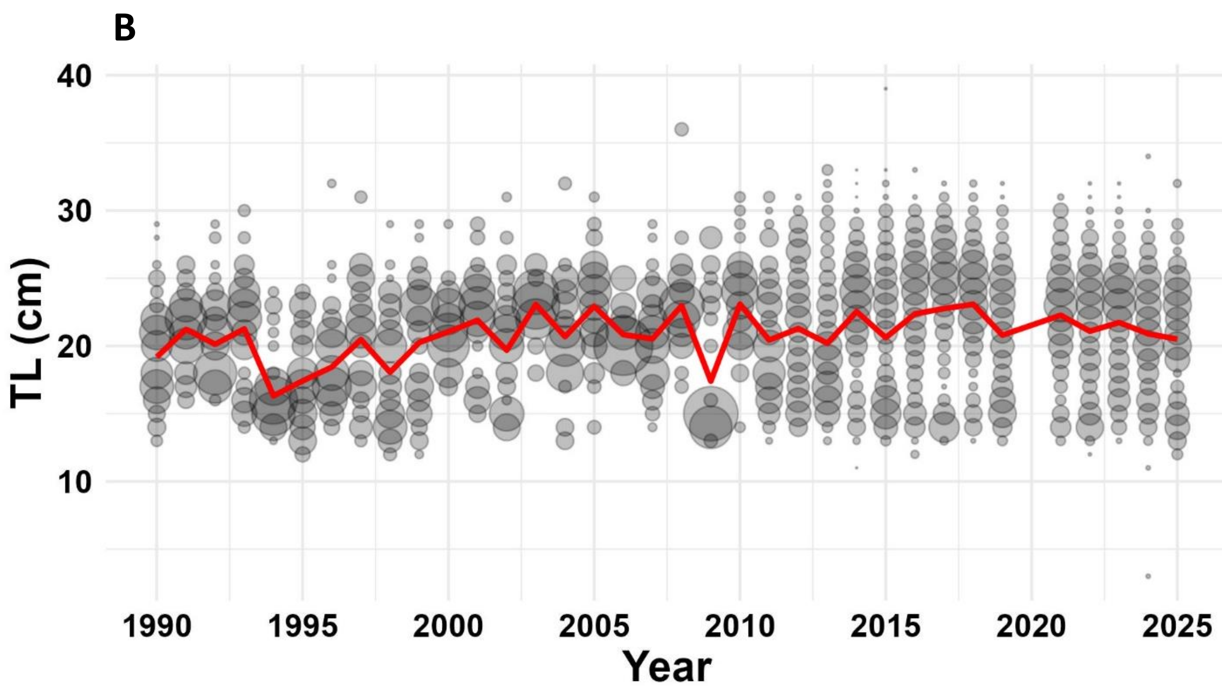


Figure 15. Chevron trap index of abundance and length compositions for Spottail Pinfish. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught in chevron traps by year.

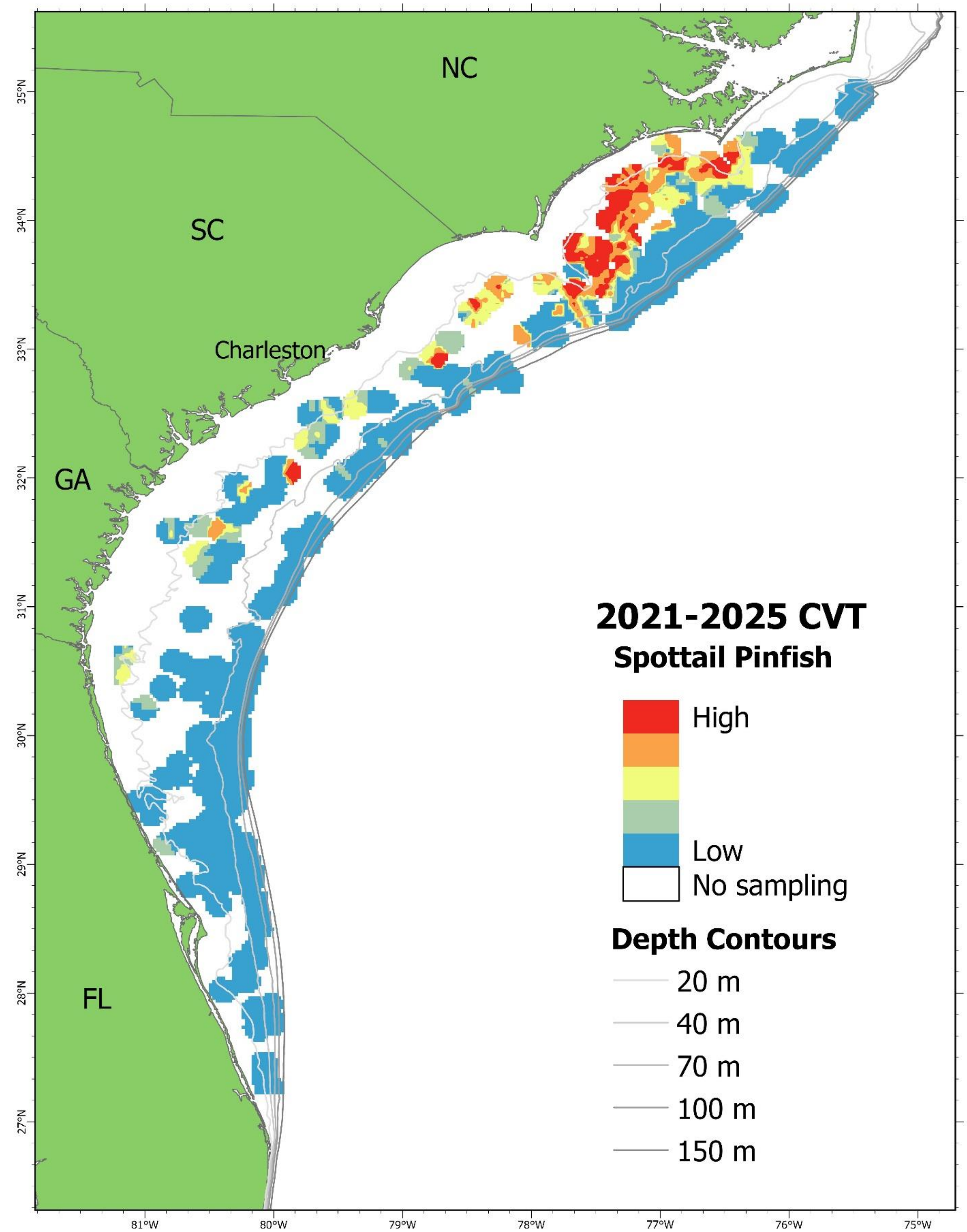


Figure 16. Distribution map of Spottail Pinfish catches from CVTs from 2021-2025.

Red Grouper (*Epinephelus morio*)

Nominal and standardized abundance of Red Grouper caught with CVTs decreased in 2025 compared to 2024, and are well below the time series mean (**Table 11** and **Figure 17A**). Mean lengths of Red Grouper caught in CVTs increased slightly in 2025 relative to 2024 (**Figure 17B**). The spatial distribution of Red Grouper catches from CVTs shows a disjunct population in the region with nearly all catches occurring off North Carolina and Florida (**Figure 18**).

Table 11. Chevron trap nominal abundance and ZINB standardized abundance for Red Grouper and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	3	0.010	3	0.15	0.27	0.56
1991	272	4	0.015	4	0.23	0.32	0.42
1992	288	5	0.017	17	0.93	0.77	0.46
1993	392	8	0.020	20	0.8	1.23	0.42
1994	387	10	0.026	30	1.22	1.31	0.43
1995	361	6	0.017	9	0.39	0.93	0.37
1996	361	8	0.022	9	0.39	1.15	0.34
1997	406	19	0.047	37	1.43	1.37	0.29
1998	426	25	0.059	70	2.58	1.82	0.33
1999	230	19	0.083	46	3.14	3.01	0.26
2000	298	22	0.074	35	1.85	1.27	0.25
2001	245	18	0.074	35	2.25	1.59	0.31
2002	238	20	0.084	36	2.38	1.74	0.26
2003	224	17	0.076	35	2.46	2.79	0.27
2004	282	21	0.075	40	2.23	2.23	0.21
2005	303	23	0.076	27	1.4	2.15	0.25
2006	297	18	0.061	44	2.33	2.92	0.27
2007	337	19	0.056	41	1.91	2.09	0.24
2008	303	12	0.040	23	1.19	1.66	0.32
2009	404	16	0.040	17	0.66	0.69	0.23
2010	731	21	0.029	27	0.58	0.63	0.29
2011	731	11	0.015	11	0.24	0.28	0.32
2012	1174	37	0.032	41	0.55	0.48	0.21
2013	1358	39	0.029	42	0.49	0.41	0.2
2014	1473	37	0.025	38	0.41	0.2	0.18
2015	1464	21	0.014	27	0.29	0.17	0.23
2016	1485	18	0.012	19	0.2	0.1	0.25
2017	1538	15	0.010	16	0.16	0.11	0.27
2018	1736	27	0.016	29	0.26	0.16	0.23
2019	1665	15	0.009	15	0.14	0.08	0.27
2020	-	-	NA	-	-	-	-
2021	1882	9	0.005	10	0.08	0.05	0.35
2022	1648	16	0.010	16	0.15	0.08	0.25
2023	1516	59	0.039	81	0.84	0.49	0.18
2024	1507	39	0.026	48	0.5	0.31	0.2
2025	1534	17	0.011	17	0.17	0.13	0.26

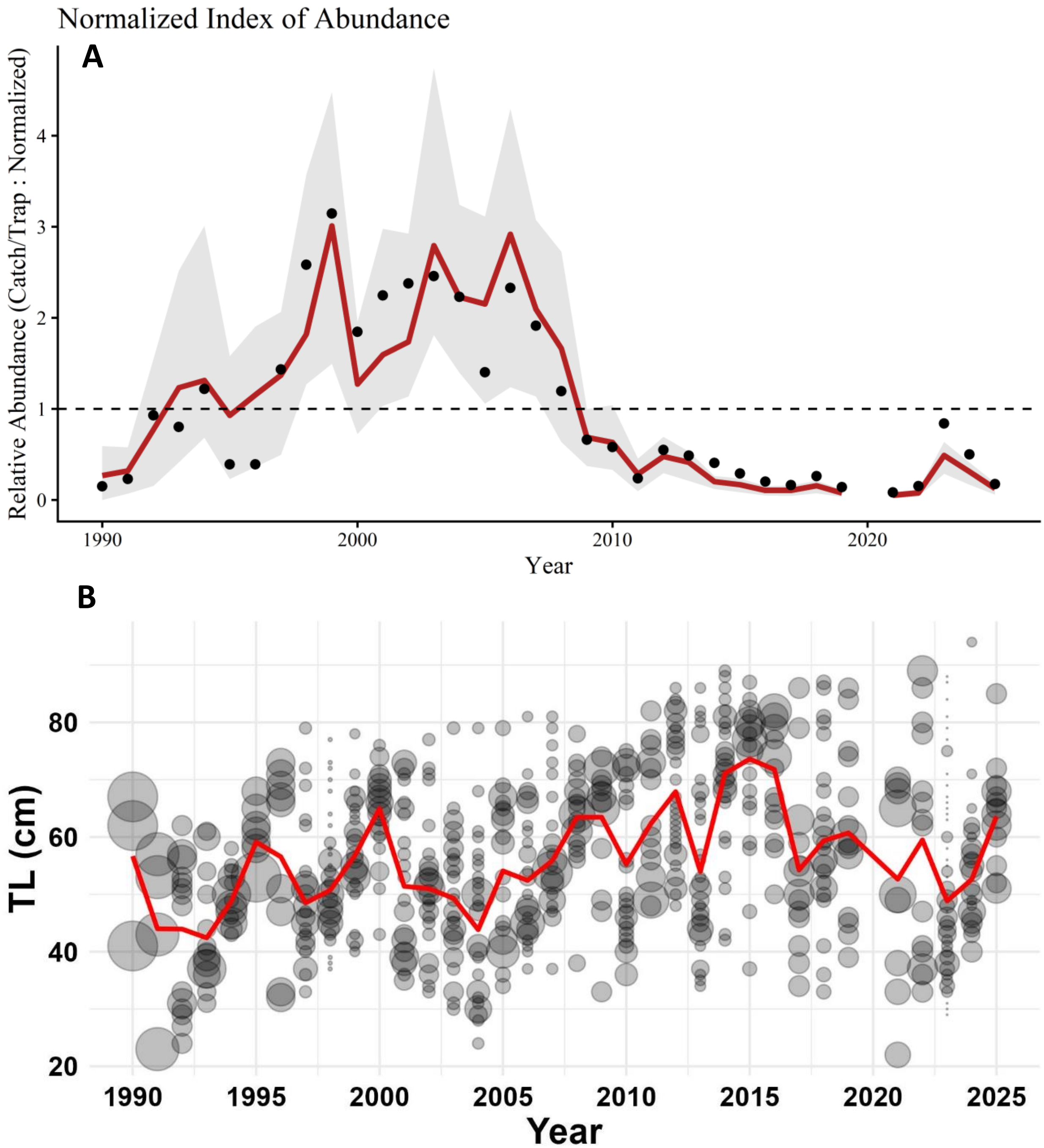


Figure 17. Chevron trap index of abundance and length compositions for Red Grouper. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

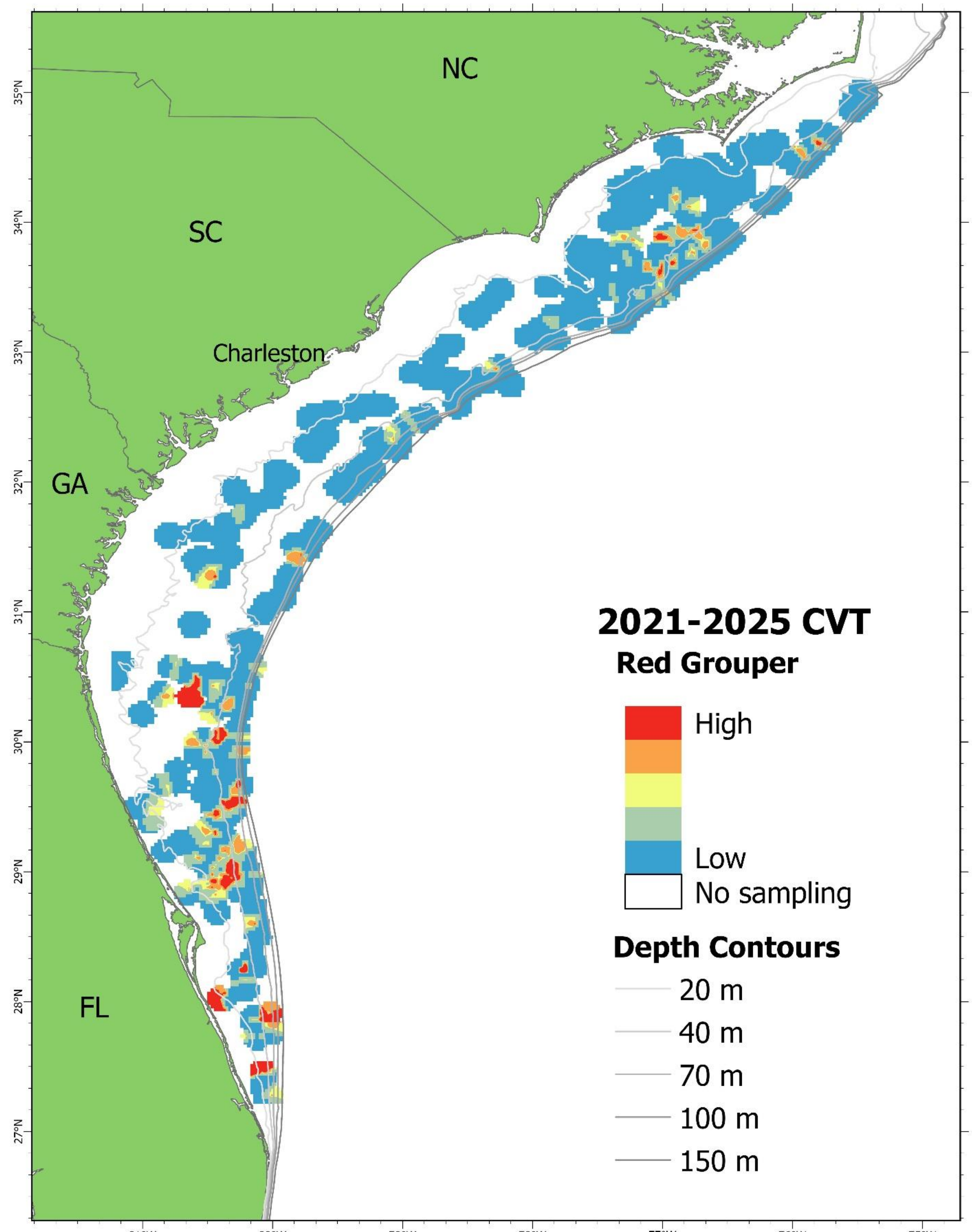


Figure 18. Distribution map of <u>Red Grouper</u> catches from CVTs from 2021-2025.

Tomtate (*Haemulon aurolineatum*)

Nominal and standardized abundance of Tomtate caught with CVTs in 2025 decreased relative to 2024 with both values being below the time series mean (**Error! Not a valid bookmark self-reference. 12** and **Figure 19A**). Mean lengths of Tomtate caught in CVTs has remained relatively consistent throughout the time series. The core length composition has not varied since 2010 (**Figure 19B**). The spatial distribution of Tomtate catches from CVTs is widespread and relatively homogeneous throughout the shallower depths of the region (**Figure 20**).

Table 12. Chevron trap nominal abundance and ZINB standardized abundance for Tomtate and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	152	0.486	5221	1.45	1.47	0.11
1991	272	167	0.614	6932	2.22	1.36	0.09
1992	288	167	0.580	4564	1.38	1.45	0.1
1993	392	207	0.528	5467	1.21	1.63	0.12
1994	387	218	0.563	6852	1.54	1.32	0.09
1995	361	203	0.562	4401	1.06	0.87	0.11
1996	361	199	0.551	4700	1.13	1.01	0.1
1997	406	163	0.402	4352	0.93	1.17	0.17
1998	426	201	0.472	4640	0.95	1.27	0.1
1999	230	120	0.522	4105	1.55	1.25	0.11
2000	298	143	0.480	4913	1.43	1.04	0.11
2001	245	128	0.522	5061	1.8	1.56	0.16
2002	238	136	0.571	4084	1.49	1.44	0.2
2003	224	79	0.353	903	0.35	1.27	0.31
2004	282	88	0.312	2313	0.71	0.84	0.16
2005	303	109	0.360	1940	0.56	0.45	0.14
2006	297	88	0.296	1235	0.36	0.42	0.19
2007	337	119	0.353	2720	0.7	0.68	0.13
2008	303	114	0.376	2656	0.76	1.05	0.14
2009	404	124	0.307	2504	0.54	0.66	0.18
2010	731	271	0.371	6279	0.75	0.55	0.1
2011	731	278	0.380	5211	0.62	0.53	0.08
2012	1174	385	0.328	7238	0.54	0.61	0.08
2013	1358	471	0.347	8330	0.53	0.63	0.07
2014	1473	599	0.407	13191	0.78	0.7	0.07
2015	1464	573	0.391	15054	0.89	1.09	0.07
2016	1485	588	0.396	18510	1.08	0.82	0.06
2017	1538	580	0.377	17016	0.96	1.14	0.06
2018	1736	634	0.365	23653	1.19	1.29	0.06
2019	1665	607	0.365	20029	1.05	1.09	0.06
2020	-	-	-	-	-	-	-
2021	1882	694	0.369	21653	1	1.07	0.06
2022	1648	645	0.391	21333	1.13	1.1	0.06
2023	1516	577	0.381	19962	1.15	0.87	0.06
2024	1507	505	0.335	14683	0.85	0.82	0.07
2025	1534	394	0.257	6259	0.35	0.45	0.08

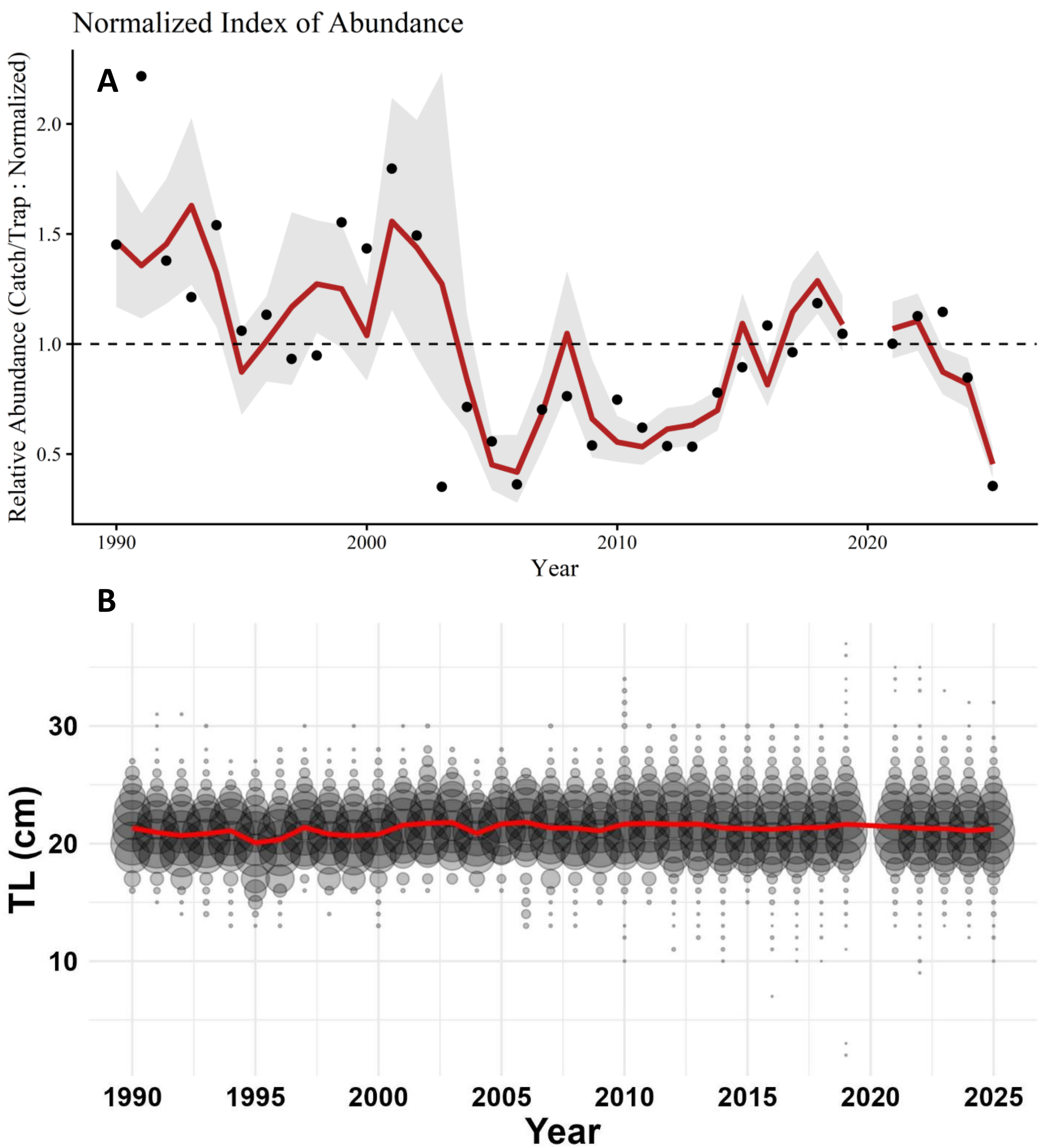


Figure 19. Chevron trap index of abundance and length compositions for Tomtate. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

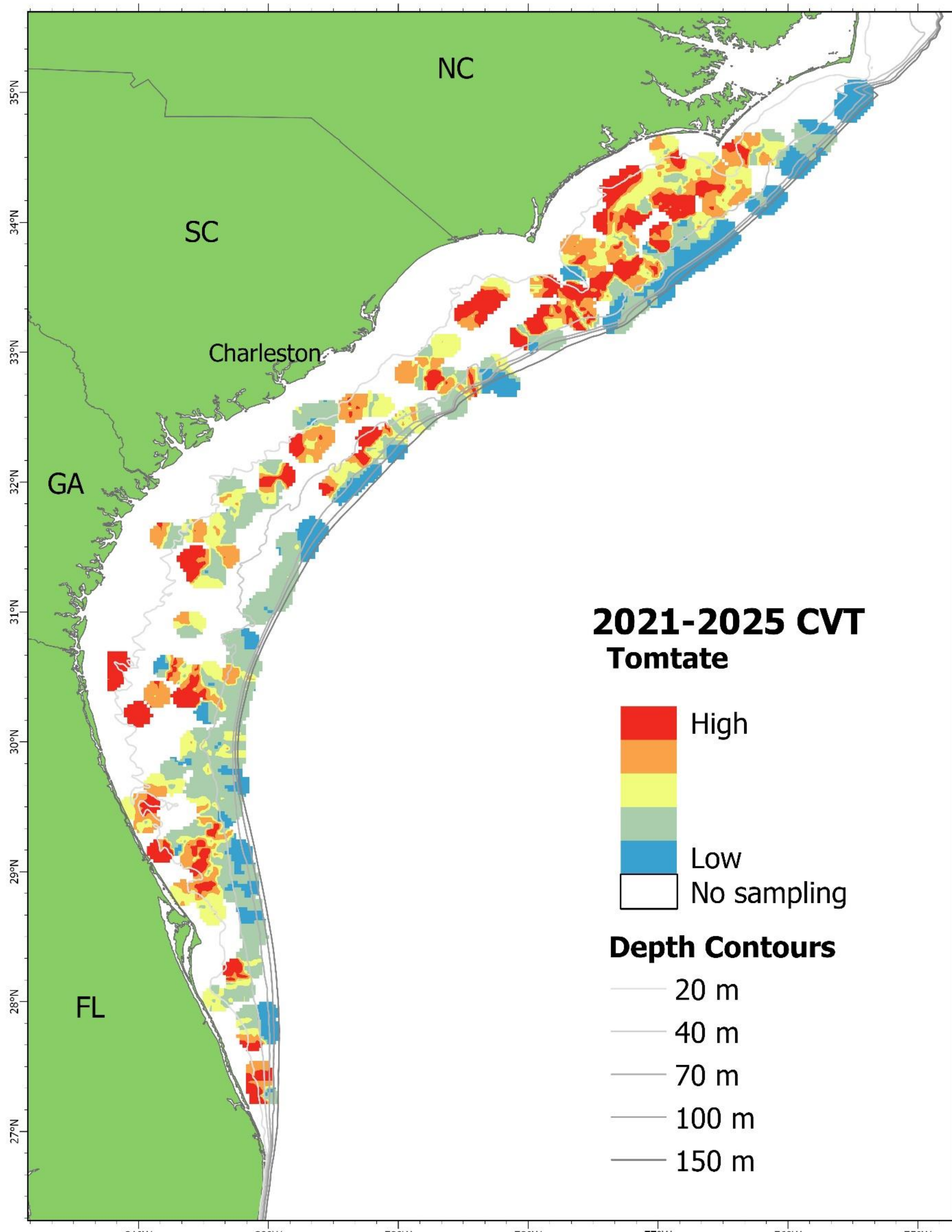


Figure 20. Distribution map of Tomtate catches from CVTs from 2021-2025.

White Grunt (*Haemulon plumierii*)

Nominal and standardized abundance of White Grunt caught with CVTs in 2025 decreased relative to 2024 with both values below the time series mean (**Table 13** and **Figure 21A**). Mean lengths of White Grunt caught in CVTs in 2025 increased slightly relative to 2024 (**Figure 21B**). The spatial distribution of White Grunt catches from CVTs is centered mainly in the shallower waters off the northern portion of the region, with highest abundances off North Carolina (**Figure 22**).

Table 13. Chevron trap nominal abundance and ZINB standardized abundance for White Grunt and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	41	0.131	324	1.42	1.2	0.25
1991	272	56	0.206	441	2.22	1.68	0.26
1992	288	82	0.285	487	2.31	2.65	0.28
1993	392	59	0.151	424	1.48	2.41	0.26
1994	387	44	0.114	293	1.04	0.83	0.19
1995	361	49	0.136	207	0.78	1.2	0.21
1996	361	75	0.208	352	1.33	1.47	0.14
1997	406	53	0.131	182	0.61	1.13	0.18
1998	426	68	0.160	356	1.14	1.05	0.16
1999	230	31	0.135	125	0.74	0.69	0.19
2000	298	38	0.128	243	1.11	0.93	0.24
2001	245	44	0.180	259	1.45	1.15	0.17
2002	238	42	0.177	293	1.68	0.99	0.17
2003	224	34	0.152	100	0.61	0.96	0.23
2004	282	37	0.131	391	1.9	1.26	0.18
2005	303	39	0.129	136	0.61	0.92	0.21
2006	297	35	0.118	104	0.48	0.4	0.23
2007	337	39	0.116	130	0.53	0.49	0.19
2008	303	31	0.102	102	0.46	0.49	0.23
2009	404	40	0.099	153	0.52	0.52	0.22
2010	731	38	0.052	90	0.17	0.41	0.22
2011	731	51	0.070	109	0.2	0.57	0.2
2012	1174	102	0.087	327	0.38	0.55	0.13
2013	1358	105	0.077	519	0.52	0.96	0.22
2014	1473	304	0.206	1836	1.7	1.1	0.09
2015	1464	220	0.150	1264	1.18	1.07	0.1
2016	1485	242	0.163	1270	1.17	0.83	0.1
2017	1538	242	0.157	1666	1.48	1.73	0.13
2018	1736	261	0.150	1962	1.55	1.47	0.11
2019	1665	267	0.160	2170	1.78	1.44	0.13
2020	-	-	-	-	-	-	-
2021	1882	184	0.098	819	0.59	0.7	0.14
2022	1648	217	0.132	888	0.74	0.63	0.11
2023	1516	160	0.106	606	0.55	0.46	0.15
2024	1507	130	0.086	464	0.42	0.45	0.16
2025	1534	77	0.050	163	0.15	0.19	0.2

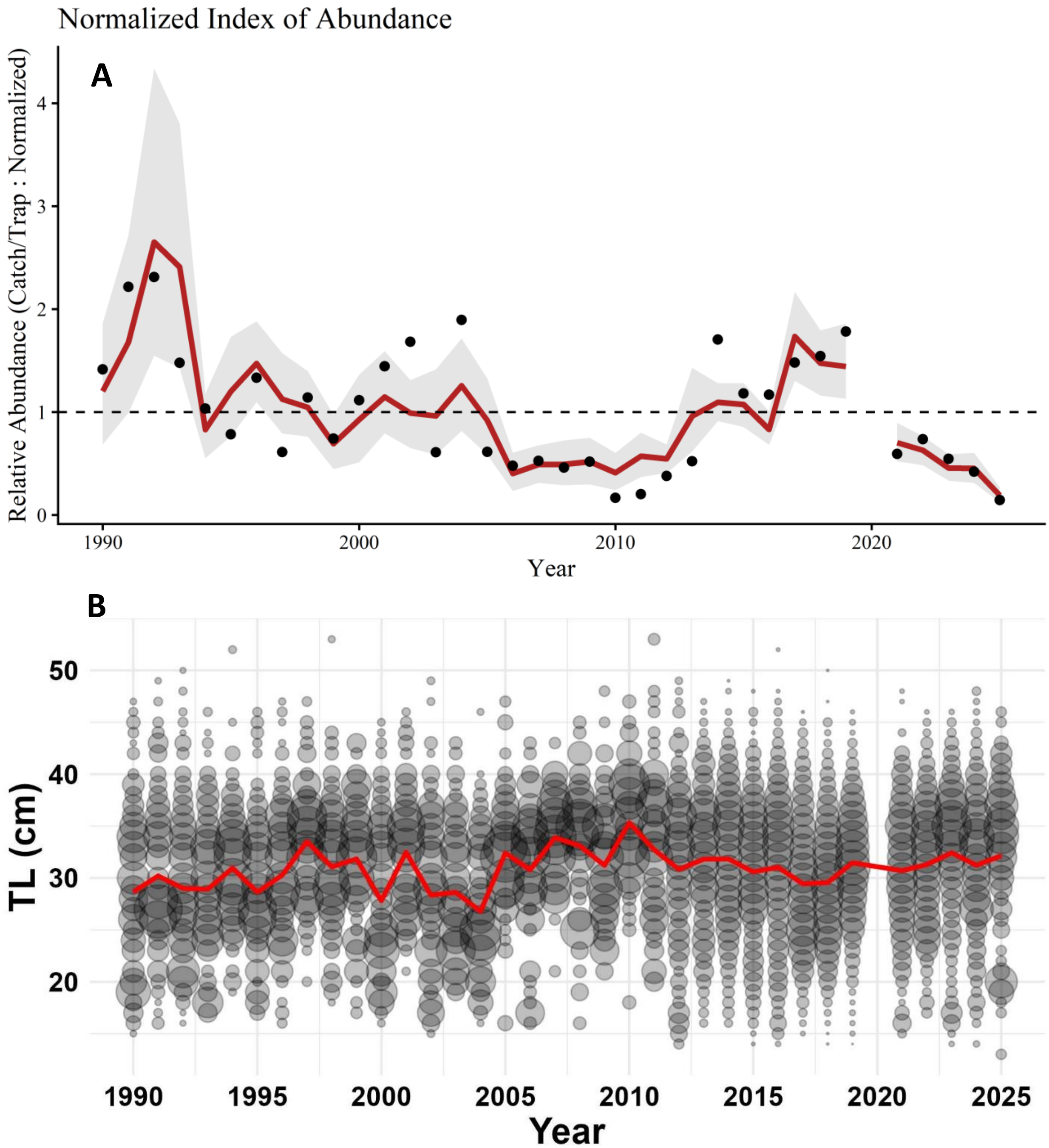


Figure 21. Chevron trap index of abundance and length compositions for White Grunt. A) Chevron trap normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught in chevron traps by year.

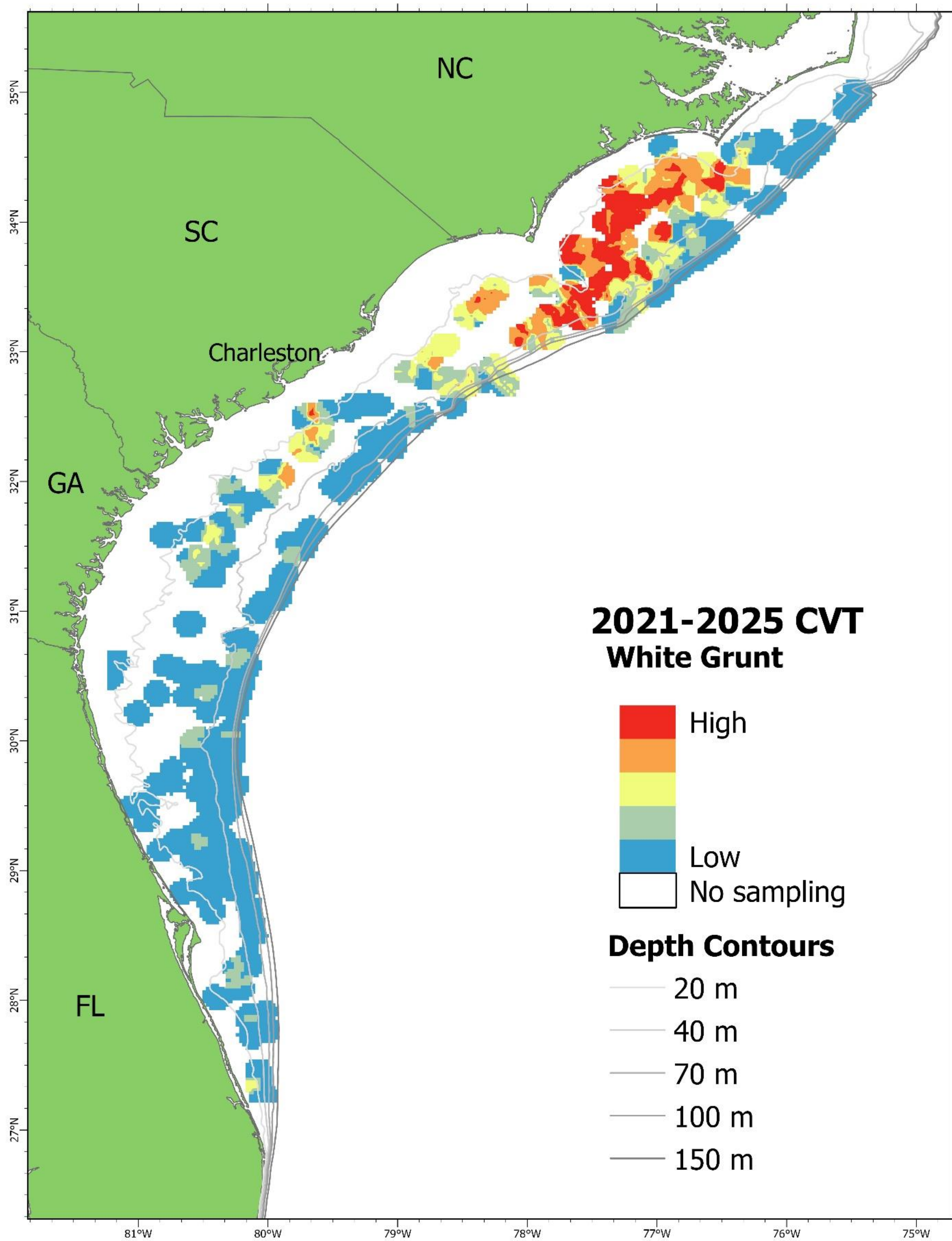


Figure 22. Distribution map of White Grunt catches from CVTs from 2021-2025.

Speckled Hind (*Hyporthodus drummondhayi*)

Speckled Hind were not caught with CVTs in large enough numbers or consistently enough for development of an index of relative abundance. Here we provide proportion positive and total fish by year (**Table 14**). Mean length of Speckled Hind caught in CVTs decreased in 2021 relative to the last year one was caught (2018), but these are individual fish, so caution should be taken in interpretation (**Figure 23**). No Speckled Hind were caught in 2025.

Table 14: Chevron Trap catch of Speckled Hind and information associated with deployments.

Year	Collections	Positive	Proportion Positive	Total Fish
1990	313	5	0.016	5
1991	272	1	0.004	1
1992	288	3	0.010	4
1993	392	4	0.010	5
1994	387	2	0.005	4
1995	361	0	0.000	0
1996	361	4	0.011	5
1997	406	5	0.012	8
1998	426	5	0.012	5
1999	230	6	0.026	6
2000	298	10	0.034	17
2001	245	5	0.020	7
2002	238	12	0.050	15
2003	224	4	0.018	6
2004	282	3	0.011	5
2005	303	1	0.003	2
2006	297	0	0.000	0
2007	337	3	0.009	8
2008	303	1	0.003	1
2009	404	0	0.000	0
2010	732	1	0.001	1
2011	731	2	0.003	2
2012	1174	2	0.002	2
2013	1358	5	0.004	5
2014	1473	6	0.004	7
2015	1464	3	0.002	3
2016	1485	0	0.000	0
2017	1538	2	0.001	2
2018	1736	0	0.000	0
2019	1665	0	0.000	0
2020	-	-	-	-
2021	1882	1	0.001	1
2022	1648	0	0.000	0
2023	1516	0	0.000	0
2024	1507	0	0.000	0
2025	1534	0	0.000	0

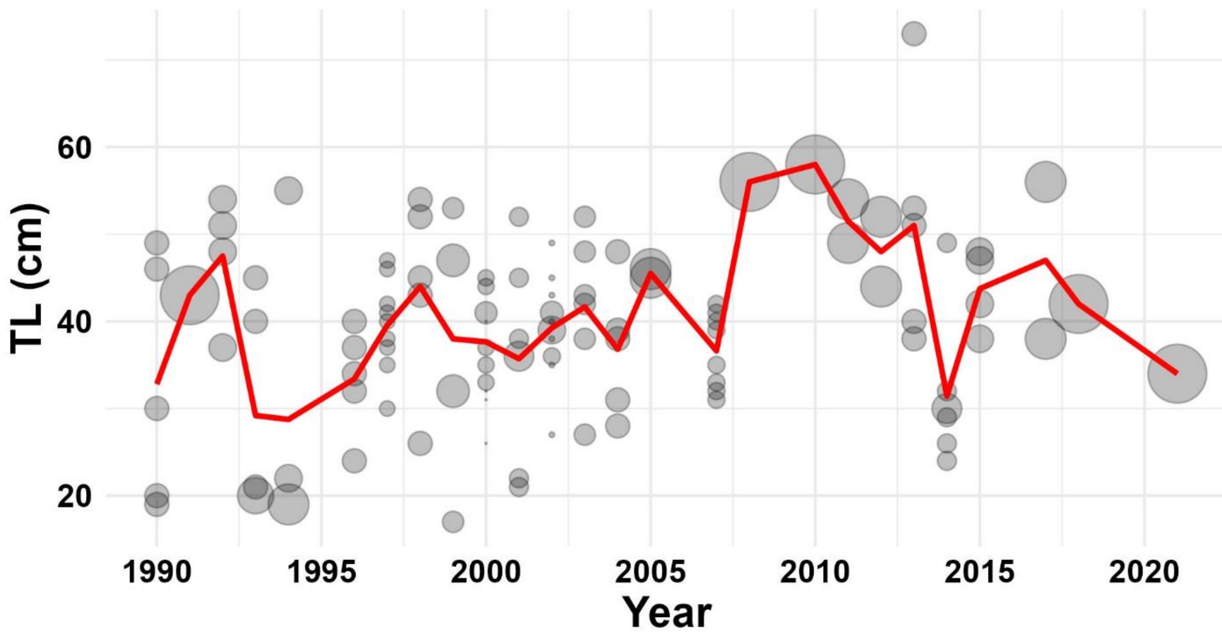


Figure 23. Speckled Hind total lengths (cm) caught in chevron traps by year.

Snowy Grouper (*Hyporthodus niveatus*)

Snowy Grouper were not caught with CVTs in large enough numbers or consistently enough for development of an index of relative abundance. Here we provide proportion positive and total fish by year (**Table 15**). The mean length of Snowy Grouper caught in CVTs in 2025 increased relative to 2024, but only 6 fish were captured (**Figure 24**).

Table 15. Chevron trap catch of Snowy Grouper and information associated with deployments.

Year	Collections	Positive	Proportion Positive	Total Fish
1990	313	5	0.016	9
1991	272	1	0.004	1
1992	288	0	0.000	0
1993	392	3	0.008	19
1994	387	9	0.023	59
1995	361	0	0.000	0
1996	361	12	0.033	40
1997	406	16	0.039	59
1998	426	8	0.019	22
1999	230	3	0.013	3
2000	298	2	0.007	4
2001	245	12	0.049	35
2002	238	5	0.021	18
2003	224	7	0.031	18
2004	282	13	0.046	22
2005	303	3	0.010	4
2006	297	8	0.027	10
2007	337	6	0.018	11
2008	303	2	0.007	2
2009	404	5	0.012	6
2010	732	9	0.012	13
2011	731	10	0.014	18
2012	1174	21	0.018	38
2013	1358	6	0.004	13
2014	1473	12	0.008	17
2015	1464	11	0.008	16
2016	1485	14	0.009	27
2017	1538	23	0.015	46
2018	1736	11	0.006	23
2019	1665	9	0.005	13
2020	-	-	-	-
2021	1882	11	0.006	12
2022	1648	11	0.007	19
2023	1516	8	0.005	20
2024	1507	5	0.003	6
2025	1534	5	0.003	6

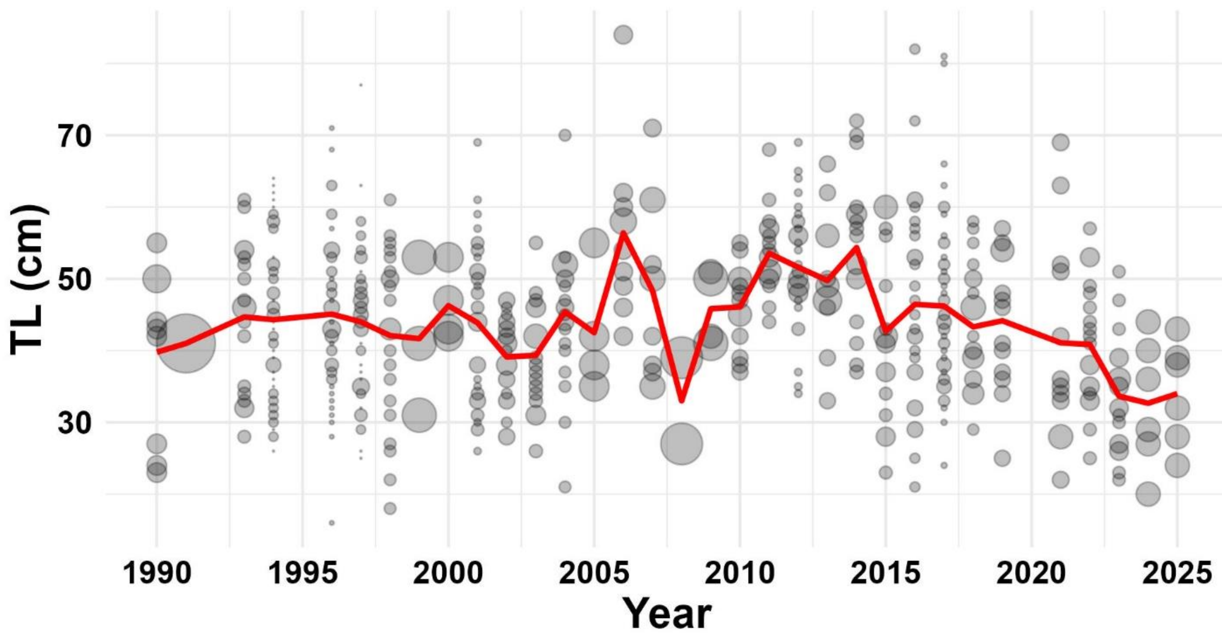


Figure 24. Snowy Grouper total lengths (cm) caught in chevron traps by year.

Red Snapper (*Lutjanus campechanus*)

Nominal and standardized abundance of Red Snapper caught with CVTs in 2025 decreased relative to 2024, but both values remained just above the time series mean (**Table 16** and **Figure 25A**). Mean lengths of Red Snapper caught in CVTs increased in 2025 relative to 2024 (**Figure 25B**). The spatial distribution of Red Snapper catches from CVTs is highest in the southern and northern portions of the study area and lower in the middle of the sampling region (**Figure 26**).

Table 16. Chevron trap nominal abundance and ZINB standardized abundance for Red Snapper and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	7	0.022	23	0.22	0.42	0.79
1991	272	6	0.022	17	0.19	0.32	0.74
1992	288	8	0.028	20	0.21	0.63	0.46
1993	392	12	0.031	31	0.24	0.41	0.56
1994	387	19	0.049	45	0.35	0.59	0.64
1995	361	7	0.019	13	0.11	0.13	0.62
1996	361	6	0.017	6	0.05	0.08	0.49
1997	406	6	0.015	24	0.18	0.26	0.7
1998	426	8	0.019	25	0.18	0.3	0.63
1999	230	4	0.017	22	0.29	0.68	0.55
2000	298	8	0.027	17	0.17	0.23	0.54
2001	245	7	0.029	9	0.11	0.28	0.52
2002	238	13	0.055	33	0.42	0.75	0.47
2003	224	1	0.005	7	0.09	0.53	0.96
2004	282	4	0.014	5	0.05	0.18	0.58
2005	303	7	0.023	12	0.12	0.16	0.49
2006	297	5	0.017	6	0.06	0.11	0.45
2007	337	8	0.024	29	0.26	0.37	0.58
2008	303	7	0.023	19	0.19	0.4	0.43
2009	404	8	0.020	10	0.07	0.13	0.35
2010	731	64	0.088	147	0.6	0.43	0.19
2011	731	67	0.092	118	0.48	0.46	0.19
2012	1174	145	0.124	410	1.05	0.98	0.14
2013	1358	140	0.103	367	0.81	0.7	0.15
2014	1473	150	0.102	614	1.25	1.16	0.14
2015	1464	159	0.109	905	1.86	1.78	0.14
2016	1485	213	0.143	1075	2.17	2.33	0.12
2017	1538	245	0.159	1499	2.93	2.59	0.12
2018	1736	275	0.158	1925	3.33	3.23	0.13
2019	1665	287	0.172	1673	3.02	2.32	0.1
2020	-	-	-	-	-	-	-
2021	1882	367	0.195	1962	3.13	2.79	0.1
2022	1648	316	0.192	1756	3.2	3.06	0.09
2023	1516	277	0.183	1774	3.51	2.36	0.11
2024	1507	287	0.190	1533	3.05	2.36	0.12
2025	1534	147	0.096	538	1.05	1.51	0.16

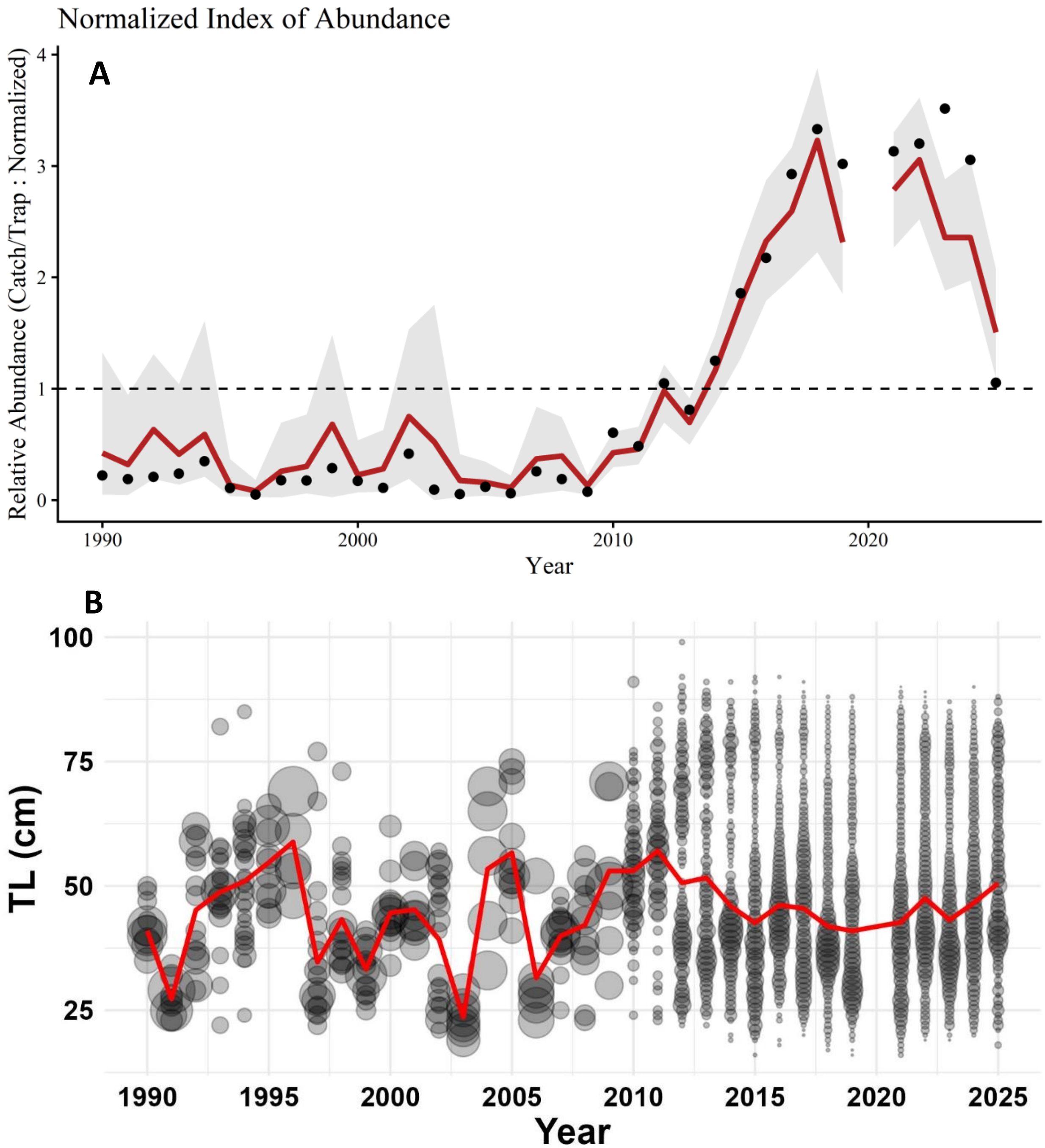


Figure 25. Chevron trap index of abundance and length compositions for Red Snapper A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught by year.

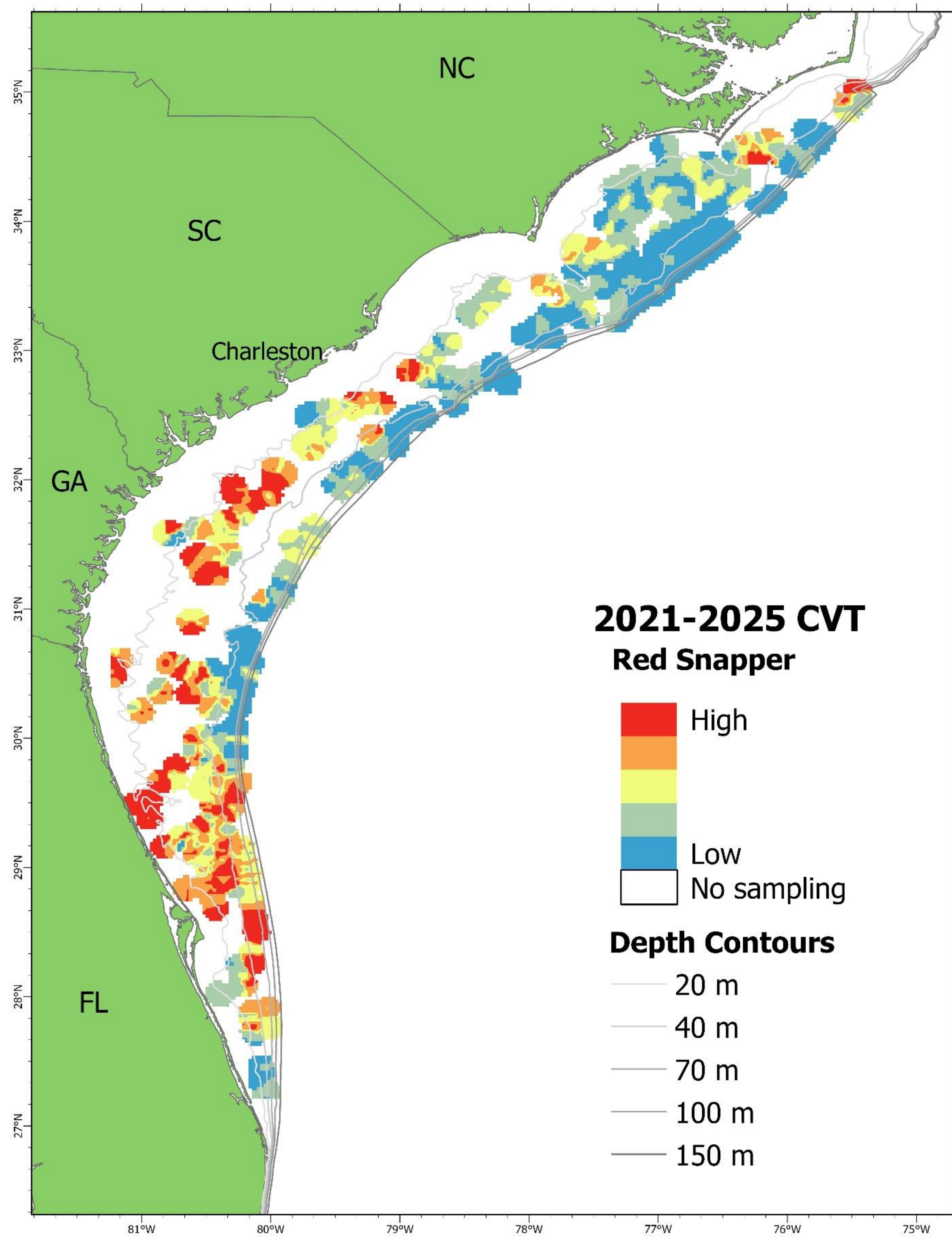


Figure 26. Distribution map of Red Snapper catches from CVTs from 2021-2025.

Gag (*Mycteroperca microlepis*)

Nominal and standardized abundance of Gag caught with CVTs in 2025 decreased compared to 2024. The nominal abundance remained just above the time series mean while the standardized abundance fell just below the time series mean (**Table 17** and **Figure 27A**). Mean lengths of Gag caught with CVTs in 2025 decreased relative to 2024 (**Figure 27B**). The spatial distribution of Gag catches from CVTs is mainly centered in the shallower waters off the northern portion of the region, with highest abundances off North Carolina (**Figure 28**).

Table 17: Chevron trap nominal abundance and ZINB standardized abundance for Gag and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	16	0.051	22	3.68	3.45	0.27
1991	272	7	0.026	7	1.35	0.98	0.41
1992	288	6	0.021	7	1.27	1.06	0.45
1993	392	7	0.018	9	1.2	1.55	0.43
1994	387	7	0.018	10	1.35	1.98	0.43
1995	361	5	0.014	5	0.73	1.07	0.52
1996	361	9	0.025	12	1.74	1.98	0.47
1997	406	4	0.010	4	0.52	0.51	0.66
1998	426	4	0.009	4	0.49	0.63	0.59
1999	230	5	0.022	5	1.14	0.86	0.48
2000	298	8	0.027	10	1.76	3.19	0.5
2001	245	4	0.016	4	0.86	1.45	0.52
2002	238	1	0.004	1	0.22	0.37	0.85
2003	224	0	0.000	0	0	0	0.28
2004	282	2	0.007	2	0.37	0.58	0.63
2005	303	3	0.010	3	0.52	0.59	0.57
2006	297	1	0.003	1	0.18	0.17	1.2
2007	337	3	0.009	3	0.47	0.55	0.68
2008	303	1	0.003	1	0.17	0.19	0.91
2009	404	2	0.005	2	0.26	0.19	0.71
2010	731	15	0.021	16	1.15	1.86	0.33
2011	731	21	0.029	27	1.93	2.2	0.32
2012	1174	30	0.026	39	1.74	1.15	0.26
2013	1358	16	0.012	23	0.89	0.67	0.3
2014	1473	23	0.016	28	1	0.86	0.25
2015	1464	15	0.010	17	0.61	0.47	0.31
2016	1485	24	0.016	31	1.09	0.69	0.24
2017	1538	19	0.012	20	0.68	0.51	0.26
2018	1736	17	0.010	21	0.63	0.51	0.28
2019	1665	21	0.013	30	0.94	0.68	0.24
2020	-	-	-	-	-	-	-
2021	1882	21	0.011	23	0.64	0.46	0.24
2022	1648	20	0.012	23	0.73	0.48	0.25
2023	1516	31	0.020	49	1.69	1.15	0.28
2024	1507	32	0.021	50	1.74	1.16	0.27
2025	1534	25	0.016	37	1.26	0.81	0.23

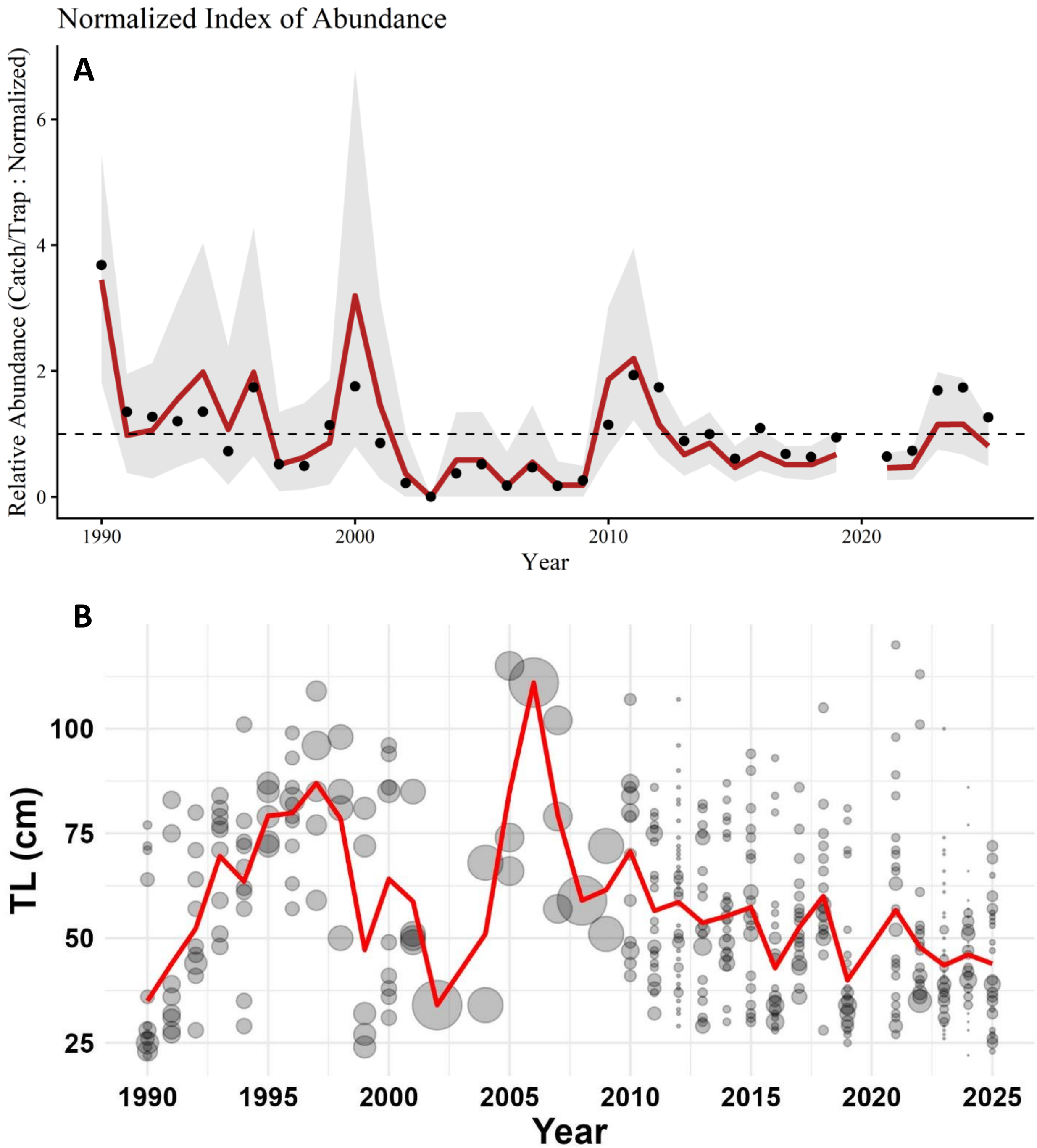


Figure 27. Chevron trap index of abundance and length compositions for Gag. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

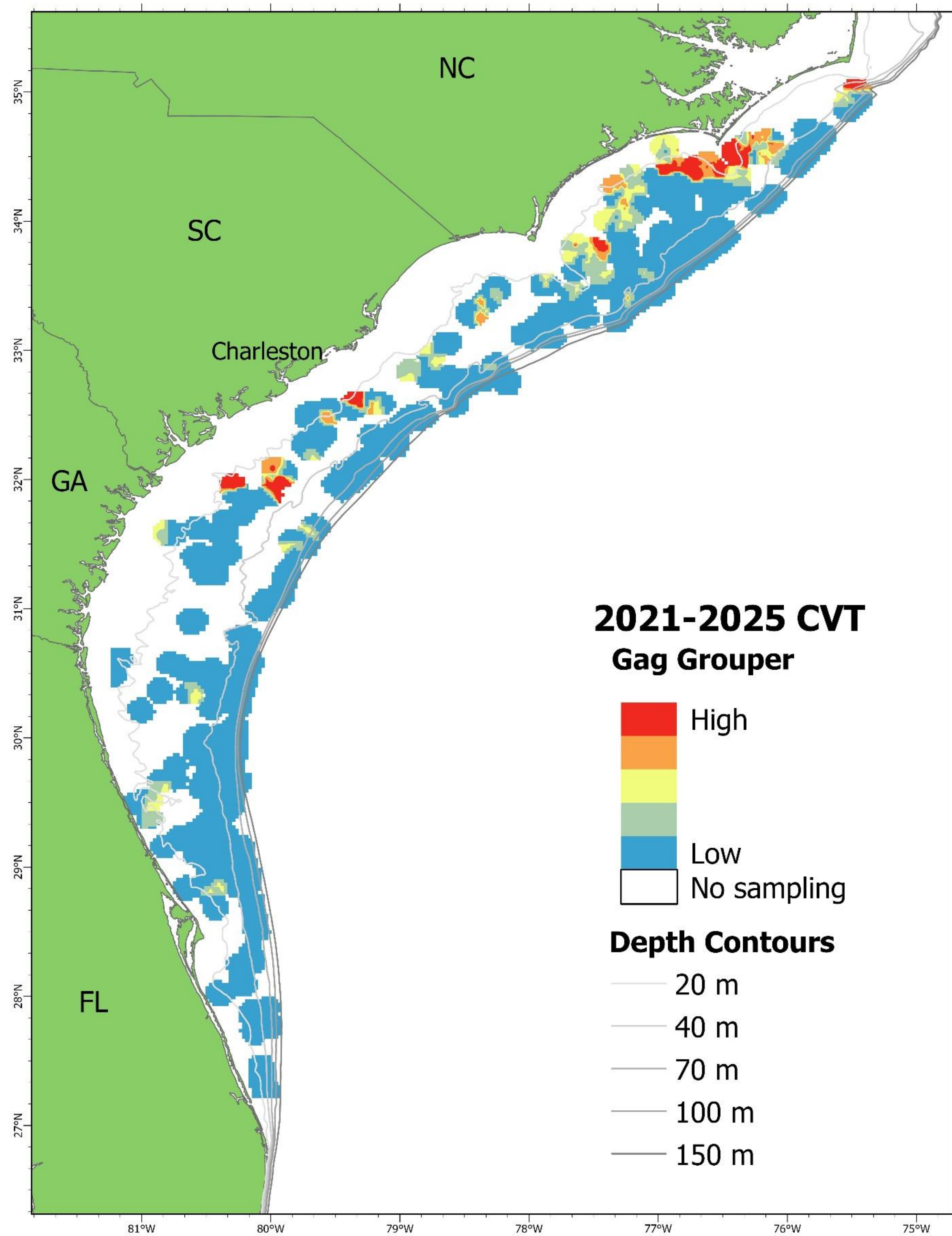


Figure 28. Distribution map of Gag catches from CVTs from 2021-2025.

Scamp (*Mycteroperca phenax*)

Nominal and standardized abundance of Scamp caught with CVTs in 2025 decreased slightly relative to 2024 and both values are well below the time series mean (**Table 18** and **Figure 29A**). Mean lengths of Scamp caught in CVTs in 2025 increased relative to 2024 (**Figure 29B**). The spatial distribution of Scamp catches from CVTs are highest in the central to northern portion of the region and in deeper waters while catches are more limited off the southern portion of the region (**Figure 30**).

Table 18. Chevron trap nominal abundance and ZINB standardized abundance for Scamp and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	32	0.102	63	1.58	1.71	0.17
1991	272	30	0.110	48	1.38	1.39	0.18
1992	288	29	0.101	49	1.33	1.54	0.19
1993	392	41	0.105	72	1.44	1.79	0.17
1994	387	71	0.184	127	2.57	1.78	0.12
1995	361	52	0.144	117	2.54	2.65	0.14
1996	361	41	0.114	69	1.5	1.51	0.17
1997	406	69	0.170	162	3.13	2.83	0.12
1998	426	51	0.120	120	2.21	2.1	0.15
1999	230	25	0.109	49	1.67	1.54	0.21
2000	298	43	0.144	60	1.58	1.42	0.17
2001	245	35	0.143	60	1.92	1.48	0.18
2002	238	25	0.105	37	1.22	1.16	0.22
2003	224	24	0.107	41	1.44	1.8	0.22
2004	282	36	0.128	54	1.5	1.82	0.19
2005	303	33	0.109	61	1.58	1.25	0.18
2006	297	10	0.034	15	0.4	0.43	0.34
2007	337	40	0.119	61	1.42	1.2	0.16
2008	303	10	0.033	13	0.34	0.31	0.32
2009	404	12	0.030	17	0.33	0.37	0.32
2010	731	31	0.042	47	0.5	0.69	0.2
2011	731	27	0.037	30	0.32	0.42	0.19
2012	1174	42	0.036	58	0.39	0.59	0.18
2013	1358	49	0.036	55	0.32	0.42	0.15
2014	1473	53	0.036	72	0.38	0.42	0.18
2015	1464	55	0.038	70	0.38	0.45	0.15
2016	1485	41	0.028	51	0.27	0.25	0.16
2017	1538	58	0.038	72	0.37	0.44	0.14
2018	1736	29	0.017	39	0.18	0.21	0.2
2019	1665	16	0.010	19	0.09	0.09	0.26
2020	-	-	-	-	-	-	-
2021	1882	18	0.010	20	0.08	0.1	0.26
2022	1648	28	0.017	33	0.16	0.2	0.21
2023	1516	19	0.013	33	0.17	0.18	0.29
2024	1507	26	0.017	36	0.19	0.27	0.22
2025	1534	20	0.013	24	0.12	0.17	0.24

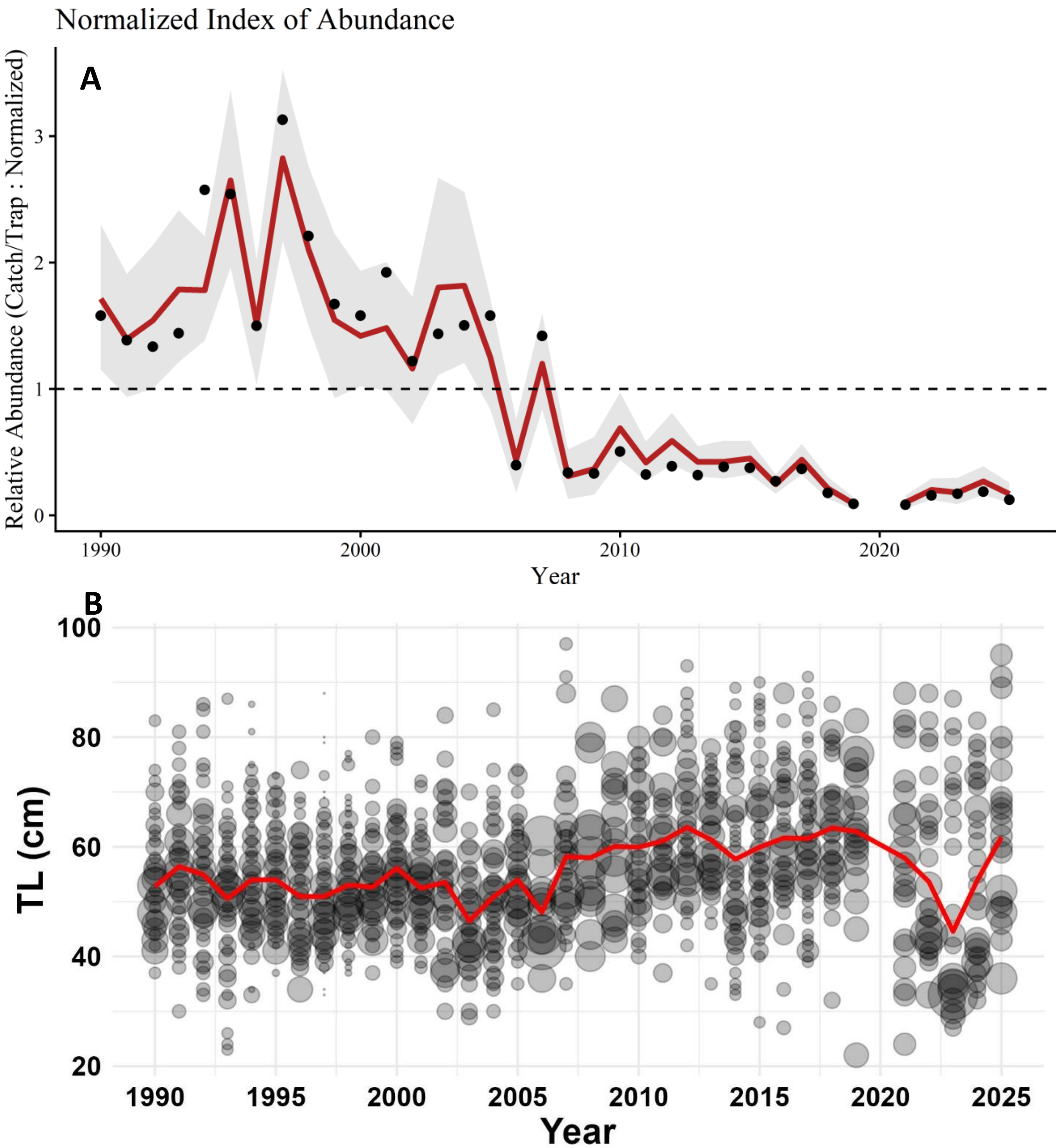


Figure 29. Chevron trap index of abundance and length compositions for Scamp. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

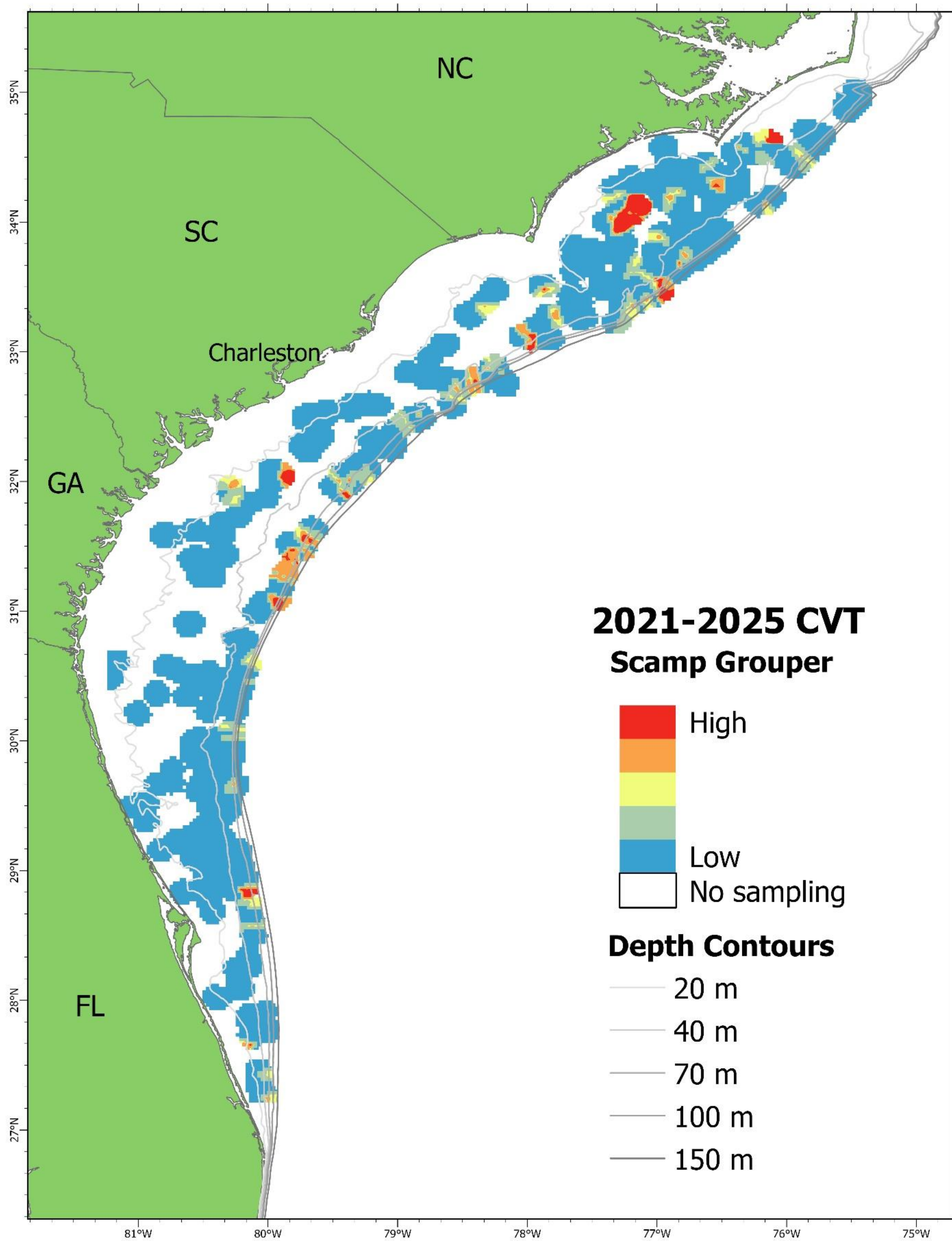


Figure 30. Distribution map of Scamp catches from CVTs from 2021-2025.

Red Porgy (*Pagrus pagrus*)

Nominal and standardized abundance of Red Porgy caught with CVTs in 2025 decreased slightly relative to 2024, and abundance remains below the time series mean since 2015 (**Table 19** and **Figure 31A**). Mean lengths of Red Porgy caught in CVTs in 2025 decreased slightly relative to 2024 (**Figure 31B**). The spatial distribution of Red Porgy catches from CVTs is focused in the mid to northern portion of the region in deeper waters, with limited catches in the southern portion of the region (**Figure 32**).

Table 19. Chevron trap nominal abundance and ZINB standardized abundance for Red Porgy and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	159	0.508	715	1.26	1.08	0.09
1991	272	135	0.496	796	1.61	1.56	0.11
1992	288	178	0.618	1086	2.08	1.72	0.1
1993	392	160	0.408	702	0.99	0.88	0.1
1994	387	166	0.429	1101	1.57	1.01	0.11
1995	361	148	0.410	872	1.33	1.27	0.15
1996	361	160	0.443	843	1.29	0.91	0.1
1997	406	126	0.310	546	0.74	0.78	0.14
1998	426	154	0.362	683	0.88	0.85	0.11
1999	230	98	0.426	423	1.01	1.01	0.12
2000	298	111	0.373	462	0.85	0.85	0.15
2001	245	100	0.408	663	1.49	1.38	0.13
2002	238	99	0.416	496	1.15	1.15	0.14
2003	224	94	0.420	437	1.08	0.9	0.13
2004	282	140	0.497	1028	2.01	1.55	0.1
2005	303	162	0.535	1097	2	1.77	0.09
2006	297	119	0.401	745	1.38	1.14	0.11
2007	337	153	0.454	1124	1.84	1.68	0.1
2008	303	100	0.330	520	0.95	0.92	0.13
2009	404	112	0.277	513	0.7	0.81	0.12
2010	731	212	0.290	1056	0.8	1.07	0.09
2011	731	204	0.279	1146	0.86	1.18	0.09
2012	1174	321	0.273	2146	1.01	1.34	0.08
2013	1358	331	0.244	1869	0.76	1.09	0.08
2014	1473	448	0.304	2680	1	1.27	0.07
2015	1464	395	0.270	1979	0.74	1.01	0.07
2016	1485	382	0.257	1786	0.66	0.91	0.08
2017	1538	337	0.219	1599	0.57	0.77	0.09
2018	1736	355	0.205	1828	0.58	0.76	0.08
2019	1665	341	0.205	1519	0.5	0.63	0.08
2020	-	-	-	-	-	-	-
2021	1882	203	0.108	833	0.24	0.35	0.1
2022	1648	216	0.131	1042	0.35	0.44	0.1
2023	1516	228	0.150	1099	0.4	0.5	0.1
2024	1507	149	0.099	487	0.18	0.27	0.12
2025	1534	109	0.071	384	0.14	0.17	0.15

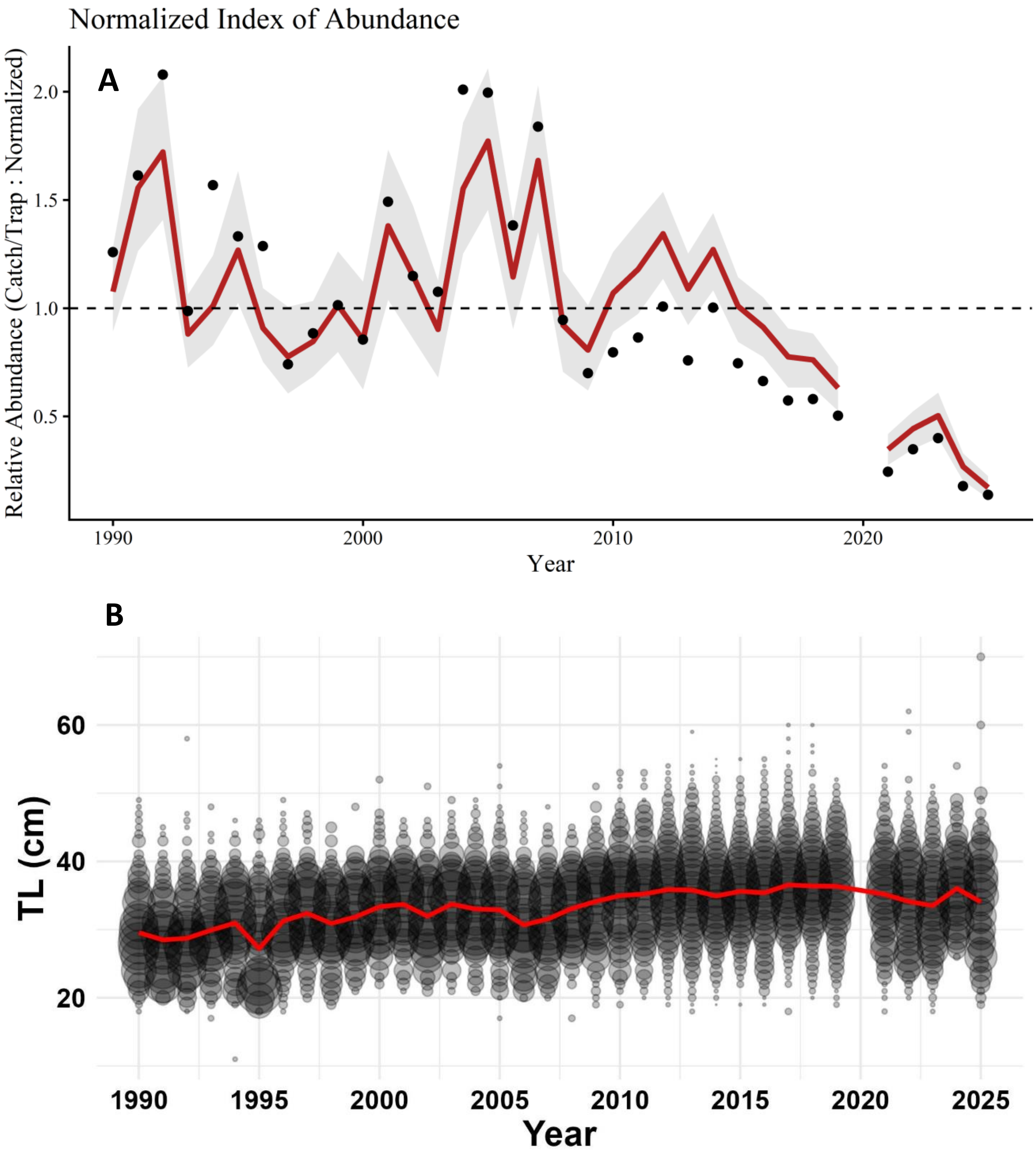


Figure 31. Chevron trap index of abundance and length compositions for Red Porgy. A) Normalized nominal and ZINB standardized abundance with 95% CI. B).

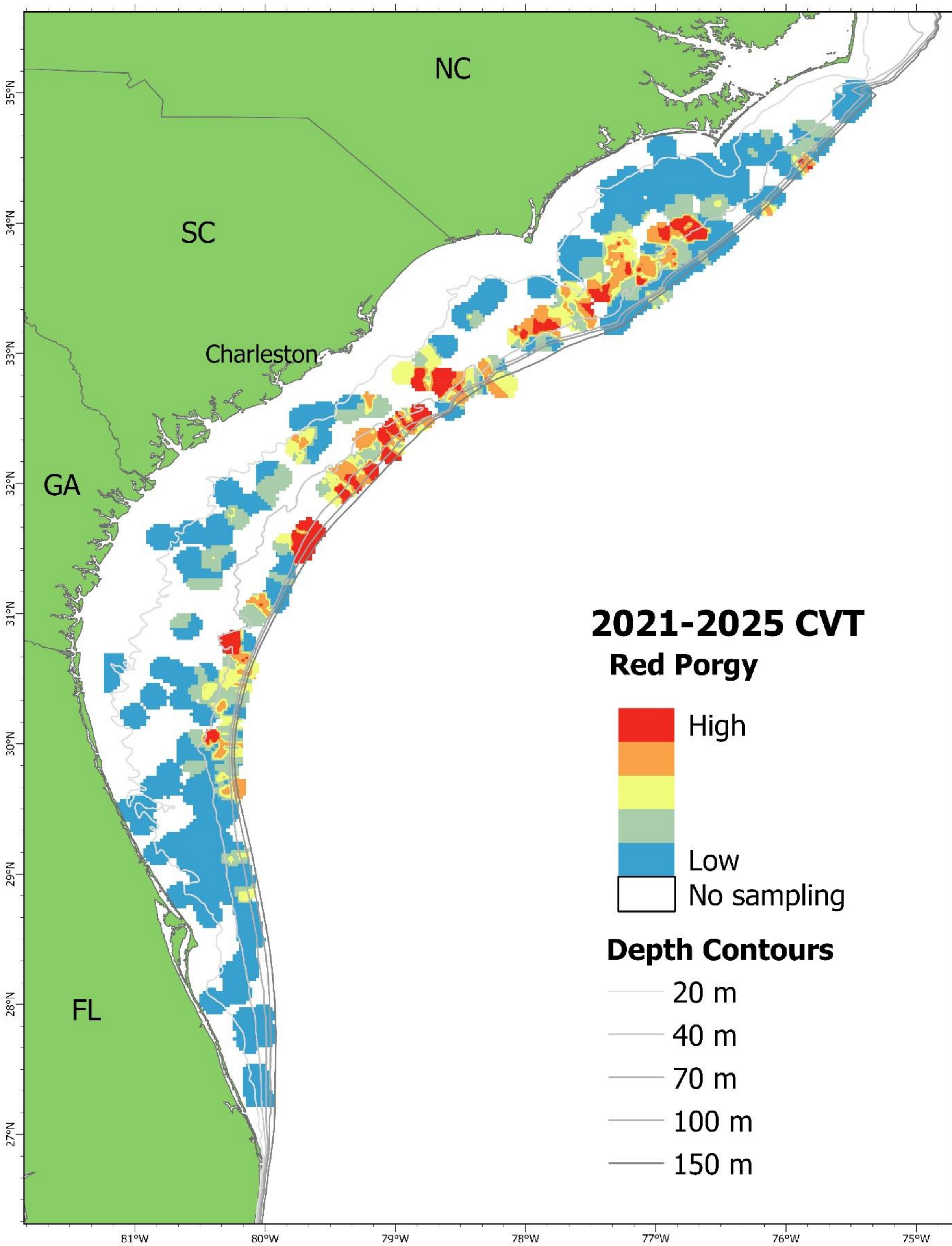


Figure 32. Distribution map of Red Porgy catches from CVTs from 2021-2025.

Vermilion Snapper (*Rhomboplites aurorubens*)

Nominal and standardized abundance of Vermilion Snapper caught with CVTs decreased in 2025 relative to 2024 with both values being below the long-term mean (**Table 20** and **Figure 33A**). Mean lengths of Vermilion Snapper caught in CVTs decreased in 2025 relative to 2024 (**Figure 33B**). The spatial distribution of Vermilion Snapper catches from CVTs is highest in the central study region but prevalent throughout the latitudinal range (**Figure 34**).

Table 20. Chevron trap nominal abundance and zero-inflated negative binomial (ZINB) standardized abundance for Vermilion Snapper and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	86	0.275	595	0.58	0.52	0.18
1991	272	142	0.522	2891	3.24	2.04	0.2
1992	288	105	0.365	1505	1.59	1.16	0.2
1993	392	126	0.321	1312	1.02	0.85	0.13
1994	387	175	0.452	3338	2.63	2.34	0.13
1995	361	135	0.374	1786	1.51	1.2	0.13
1996	361	122	0.338	2475	2.09	1.12	0.21
1997	406	100	0.246	1424	1.07	0.92	0.16
1998	426	110	0.258	1180	0.84	0.88	0.17
1999	230	74	0.322	726	0.96	1.52	0.36
2000	298	104	0.349	1684	1.72	1.32	0.16
2001	245	83	0.339	1184	1.47	0.99	0.25
2002	238	97	0.408	1501	1.92	2.1	0.2
2003	224	31	0.138	162	0.22	0.43	0.3
2004	282	67	0.238	358	0.39	0.54	0.2
2005	303	80	0.264	749	0.75	0.58	0.19
2006	297	54	0.182	347	0.36	0.44	0.33
2007	337	80	0.237	1214	1.1	0.81	0.16
2008	303	74	0.244	1046	1.05	0.95	0.18
2009	404	97	0.240	1489	1.12	1.2	0.19
2010	731	194	0.265	2156	0.9	0.7	0.17
2011	731	147	0.201	1957	0.81	0.63	0.16
2012	1174	172	0.147	1020	0.26	0.4	0.14
2013	1358	178	0.131	1110	0.25	0.28	0.13
2014	1473	223	0.151	1363	0.28	0.45	0.16
2015	1464	291	0.199	2132	0.44	0.93	0.16
2016	1485	378	0.255	4322	0.89	0.91	0.1
2017	1538	338	0.220	3609	0.71	1.25	0.12
2018	1736	339	0.195	3209	0.56	1.11	0.13
2019	1665	393	0.236	4967	0.91	1.46	0.1
2020	-	-	-	-	-	-	-
2021	1882	346	0.184	3226	0.52	0.74	0.11
2022	1648	365	0.222	4457	0.82	1.71	0.13
2023	1516	382	0.252	6115	1.23	1.3	0.11
2024	1507	260	0.173	2558	0.52	0.67	0.12
2025	1534	187	0.122	1403	0.28	0.52	0.17

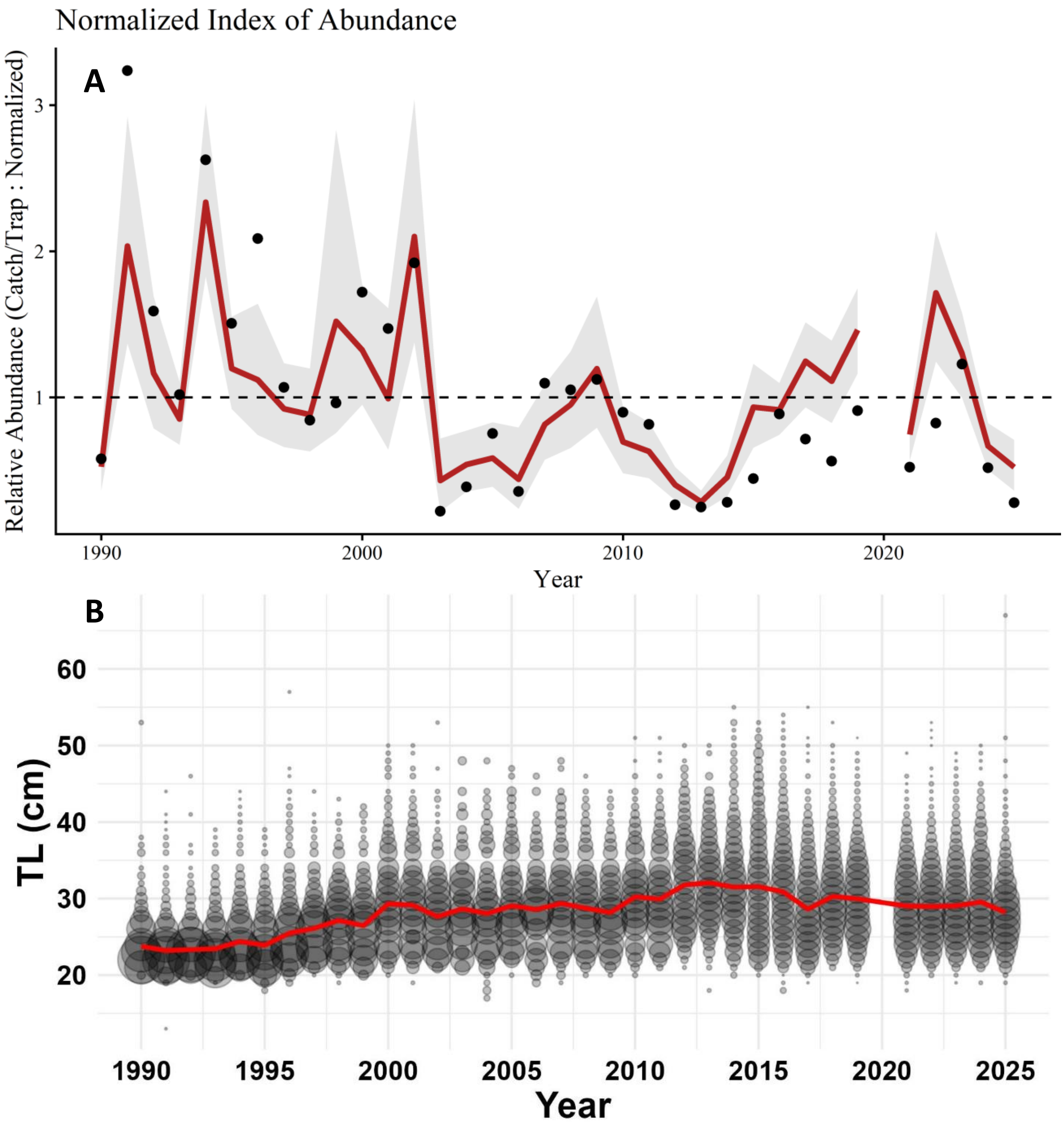


Figure 33. Chevron trap index of abundance and length compositions for Vermilion Snapper. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

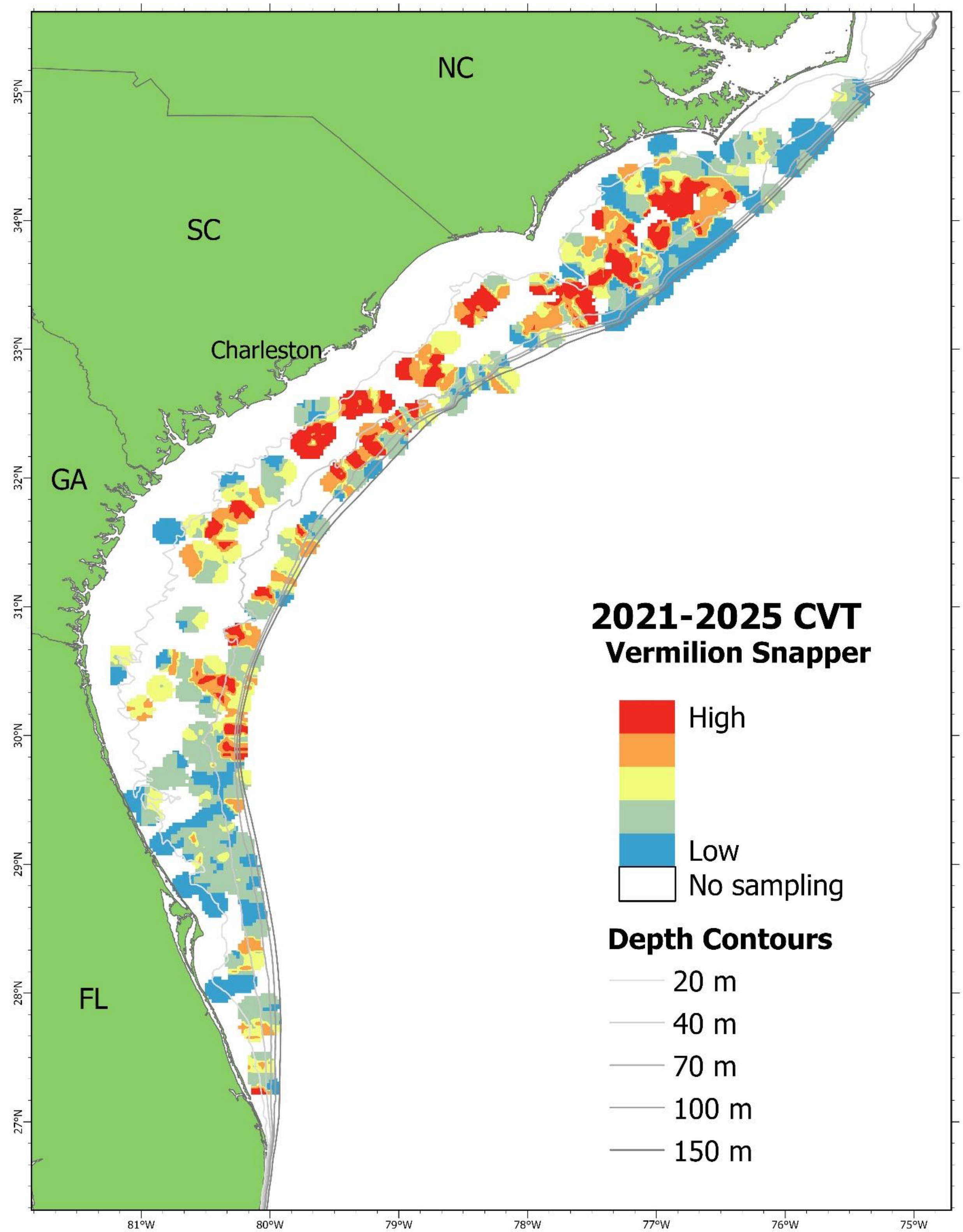


Figure 34. Distribution map of Vermilion Snapper catches from CVTs from 2021-2025.

Greater Amberjack (*Seriola dumerili*)

Greater Amberjack were not caught with CVTs in large enough numbers or consistently enough for development of an index of relative abundance. Here we provide proportion positive and total fish by year (**Table 22**) The mean length of Greater Amberjack caught in CVTs increased in 2025 relative to 2024, but only 6 fish were captured (**Figure 37**).

Table 22. Chevron trap catch of Greater Amberjack and information associated with chevron trap sets.

Year	Collections	Positive	Proportion Positive	Total Fish
1990	313	0	0.000	0
1991	272	0	0.000	0
1992	288	0	0.000	0
1993	392	0	0.000	0
1994	387	0	0.000	0
1995	361	0	0.000	0
1996	361	1	0.003	1
1997	406	6	0.015	7
1998	426	9	0.021	12
1999	230	1	0.004	1
2000	298	3	0.010	4
2001	245	5	0.020	5
2002	238	0	0.000	0
2003	224	2	0.009	2
2004	282	1	0.004	1
2005	303	0	0.000	0
2006	297	1	0.003	1
2007	337	3	0.009	4
2008	303	0	0.000	0
2009	404	0	0.000	0
2010	731	4	0.005	4
2011	731	1	0.001	1
2012	1174	2	0.002	2
2013	1358	8	0.006	9
2014	1473	5	0.003	6
2015	1464	8	0.005	8
2016	1485	13	0.009	16
2017	1538	8	0.005	10
2018	1736	3	0.002	3
2019	1665	10	0.006	10
2020	-	-	-	-
2021	1882	14	0.007	15
2022	1648	13	0.008	22
2023	1516	7	0.005	8
2024	1507	9	0.006	12
2025	1534	3	0.002	6

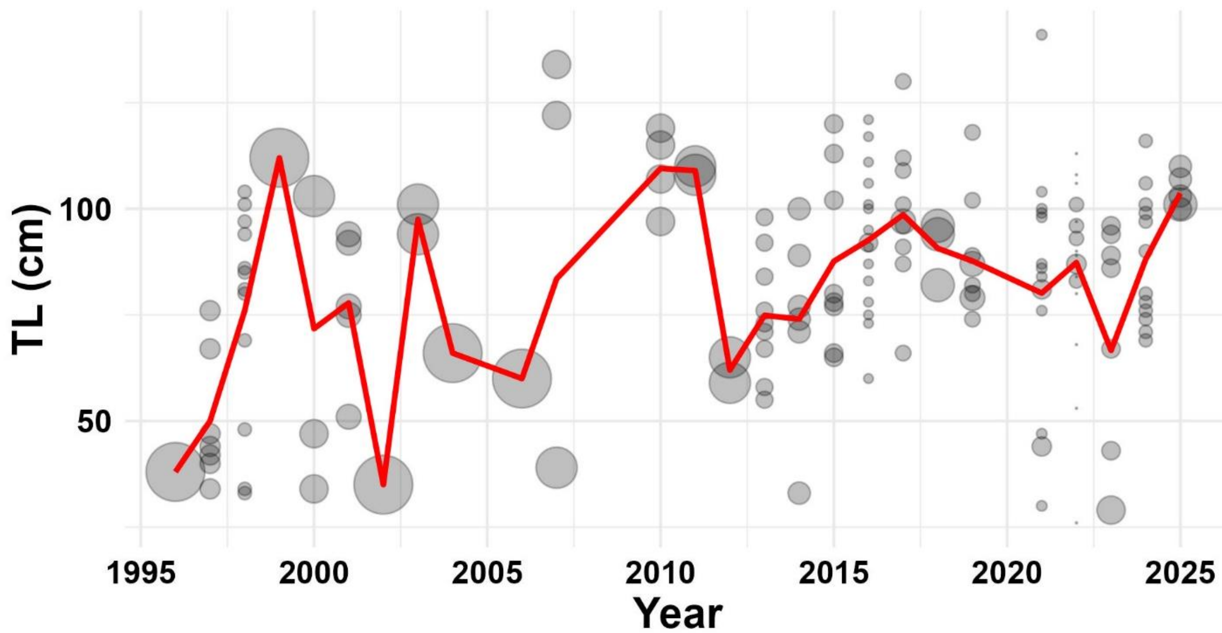


Figure 37. Greater Amberjack total lengths (cm) caught with chevron traps by year.

Almaco Jack (*Seriola rivoliana*)

The nominal and standardized abundance of Almaco Jack caught with CVTs in 2025 decreased relative to 2024, but both remained above the times series mean (**Table 21** and **Figure 35A**). Mean lengths of Almaco Jack caught in CVTs in 2025 increased relative to 2024 (**Figure 35B**). The spatial distribution of Almaco Jack catches from CVTs is widespread throughout the region, but lowest off of Florida (**Figure 36**).

Table 21. Chevron trap nominal abundance and zero-inflated negative binomial (ZINB) standardized abundance for Almaco Jack and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	1	0.003	1	0.2	0.14	0.96
1991	272	0	0.000	0	0	0	30.74
1992	288	1	0.004	1	0.22	0.18	1
1993	392	0	0.000	0	0	0	8.09
1994	387	5	0.013	7	1.14	0.64	0.45
1995	361	3	0.008	5	0.87	0.6	0.56
1996	361	1	0.003	1	0.17	0.11	0.95
1997	406	2	0.005	2	0.31	0.27	0.76
1998	426	2	0.005	2	0.3	0.17	0.69
1999	230	0	0.000	0	0	0	0.3
2000	298	3	0.010	4	0.84	0.61	0.67
2001	245	0	0.000	0	0	0	56.2
2002	238	0	0.000	0	0	0	15.32
2003	224	0	0.000	0	0	0	39.78
2004	282	1	0.004	1	0.22	0.13	1.34
2005	303	1	0.003	2	0.42	0.26	1.13
2006	297	0	0.000	0	0	0	36.29
2007	337	3	0.009	3	0.56	0.41	0.68
2008	303	2	0.007	2	0.42	0.32	0.77
2009	404	5	0.012	11	1.71	1.38	0.55
2010	731	2	0.003	2	0.17	0.17	0.71
2011	731	0	0.000	0	0	0	11.79
2012	1174	14	0.012	17	0.91	0.98	0.34
2013	1358	17	0.013	32	1.48	1.54	0.32
2014	1473	13	0.009	14	0.6	0.66	0.28
2015	1464	33	0.023	41	1.76	2.07	0.22
2016	1485	39	0.026	70	2.97	3.41	0.21
2017	1538	46	0.030	74	3.03	3.71	0.23
2018	1736	42	0.024	60	2.17	2.57	0.18
2019	1665	63	0.038	133	5.02	3.97	0.17
2020	-	-	-	-	-	-	-
2021	1882	18	0.010	21	0.7	0.94	0.26
2022	1648	26	0.016	58	2.21	2.46	0.48
2023	1516	44	0.029	84	3.49	3.69	0.19
2024	1507	24	0.016	40	1.67	1.98	0.26
2025	1534	15	0.010	35	1.44	1.6	0.32

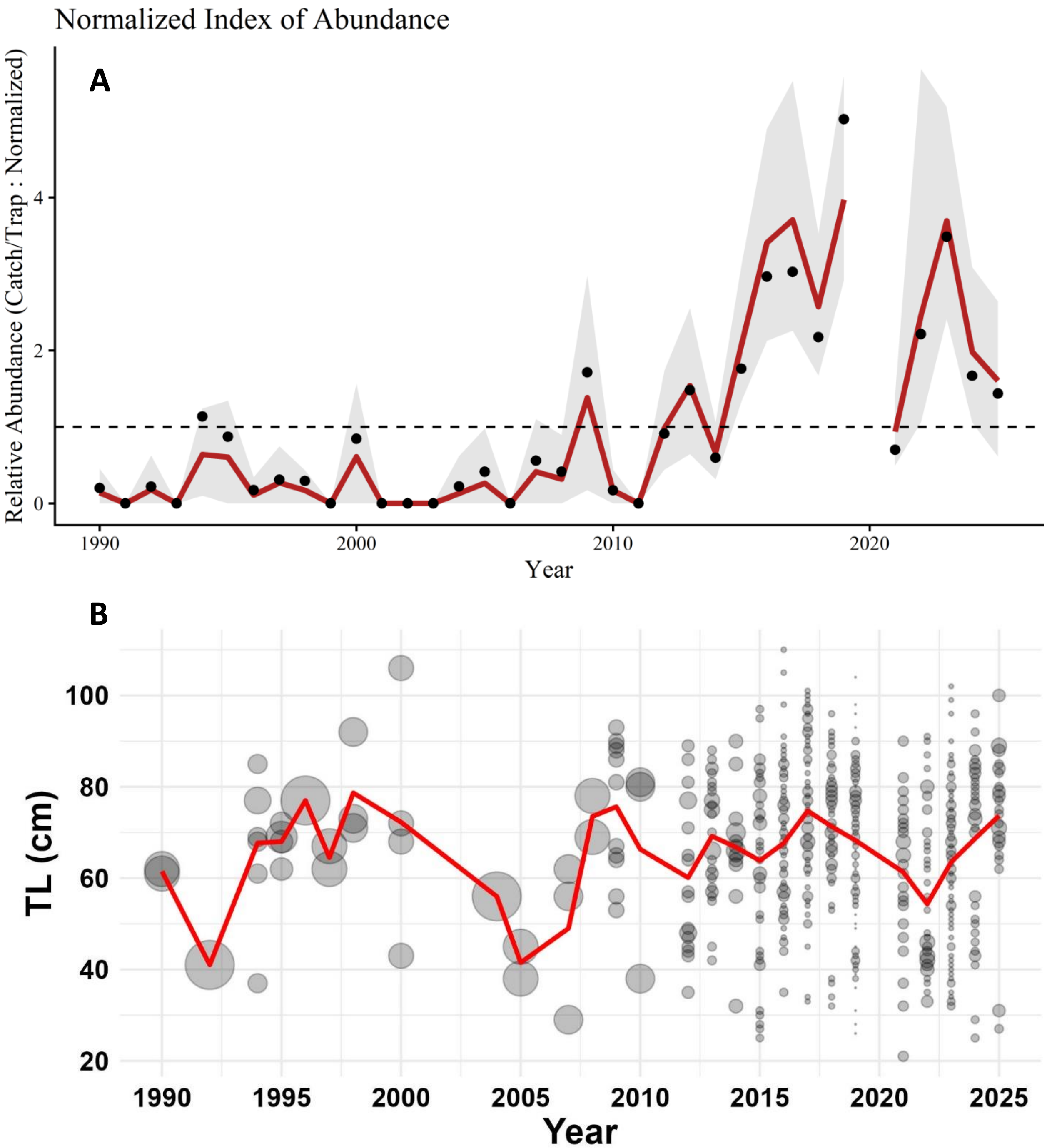


Figure 35. Chevron trap index of abundance and length compositions for Almaco Jack. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

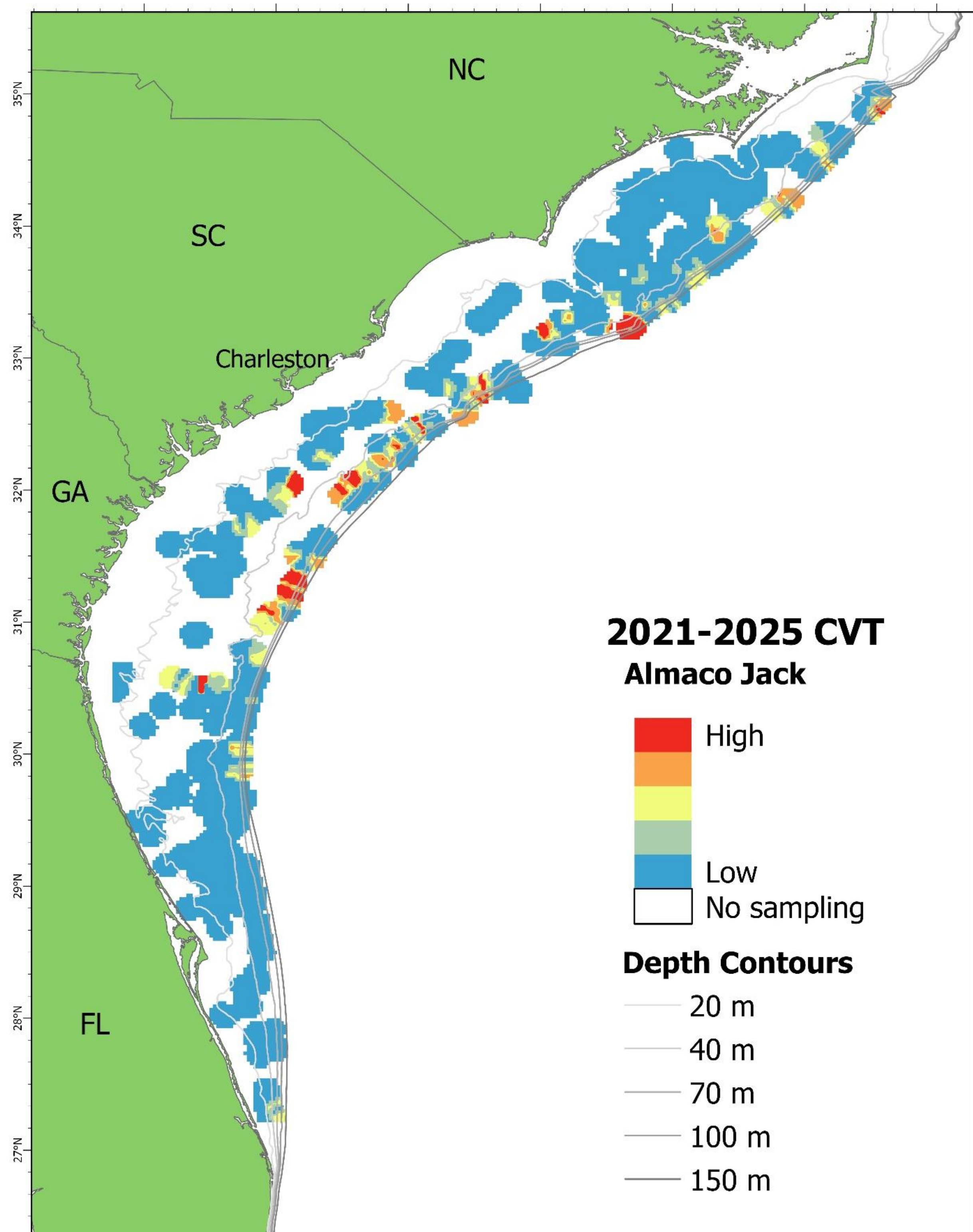


Figure 36. Distribution map of Almaco Jack catches from CVTs from 2021-2024.

<u>*Stenotomus* spp.</u>

Nominal and standardized abundance of *Stenotomus* spp. caught with CVTs in 2025 increased slightly relative to 2024, with both well below the time series mean (**Table 23** and **Figure 38A**). *Stenotomus* spp. mean lengths from CVT catch in 2025 increased slightly relative to 2024 (**Figure 38B**). The spatial distribution of *Stenotomus* spp. catches from CVTs is relatively evenly distributed in shallower waters, with slightly limited catches in the southern portion of the region (**Figure 39**).

Table 23. <u>Chevron trap</u> nominal abundance and ZINB standardized abundance for <u>*Stenotomus* spp.</u> and information associated with deployments included in standardized abundance calculation.

					Nominal Abundance	ZINB Standardized Abundance	
Year	Included Collections	Positive	Proportion Positive	Total Fish	Normalized	Normalized	CV
1990	313	122	0.390	3598	1.57	0.89	0.12
1991	272	101	0.371	3816	1.92	1.38	0.12
1992	288	123	0.427	3810	1.81	1	0.15
1993	392	87	0.222	2109	0.74	0.51	0.16
1994	387	91	0.235	3645	1.29	1.09	0.16
1995	361	153	0.424	5946	2.25	1.28	0.1
1996	361	129	0.357	5710	2.16	1.7	0.14
1997	406	120	0.296	6333	2.13	1.98	0.11
1998	426	139	0.326	5552	1.78	1.67	0.1
1999	230	70	0.304	3238	1.93	1.93	0.14
2000	298	82	0.275	4113	1.89	2.16	0.18
2001	245	67	0.274	2862	1.6	1.77	0.13
2002	238	56	0.235	1315	0.76	1.59	0.51
2003	224	40	0.179	3463	2.11	2.02	0.23
2004	282	81	0.287	4199	2.04	1.97	0.26
2005	303	83	0.274	4173	1.88	1.73	0.15
2006	297	63	0.212	1839	0.85	0.98	0.16
2007	337	66	0.196	2217	0.9	1.1	0.17
2008	303	56	0.185	2794	1.26	1.36	0.17
2009	404	68	0.168	1503	0.51	0.59	0.67
2010	731	125	0.171	3431	0.64	0.8	0.2
2011	731	137	0.187	2959	0.55	1.1	0.18
2012	1174	206	0.176	3847	0.45	0.56	0.12
2013	1358	150	0.111	1760	0.18	0.28	0.17
2014	1473	122	0.083	1392	0.13	0.28	0.15
2015	1464	136	0.093	2128	0.2	0.36	0.16
2016	1485	131	0.088	2737	0.25	0.49	0.16
2017	1538	108	0.070	2526	0.22	0.51	0.17
2018	1736	144	0.083	2718	0.21	0.41	0.16
2019	1665	131	0.079	2653	0.22	0.4	0.17
2020	-	-	-	-	-	-	-
2021	1882	127	0.068	1824	0.13	0.24	0.19
2022	1648	102	0.062	1368	0.11	0.22	0.22
2023	1516	106	0.070	1979	0.18	0.39	0.2
2024	1507	74	0.049	630	0.06	0.12	0.25
2025	1534	70	0.046	865	0.08	0.16	0.33

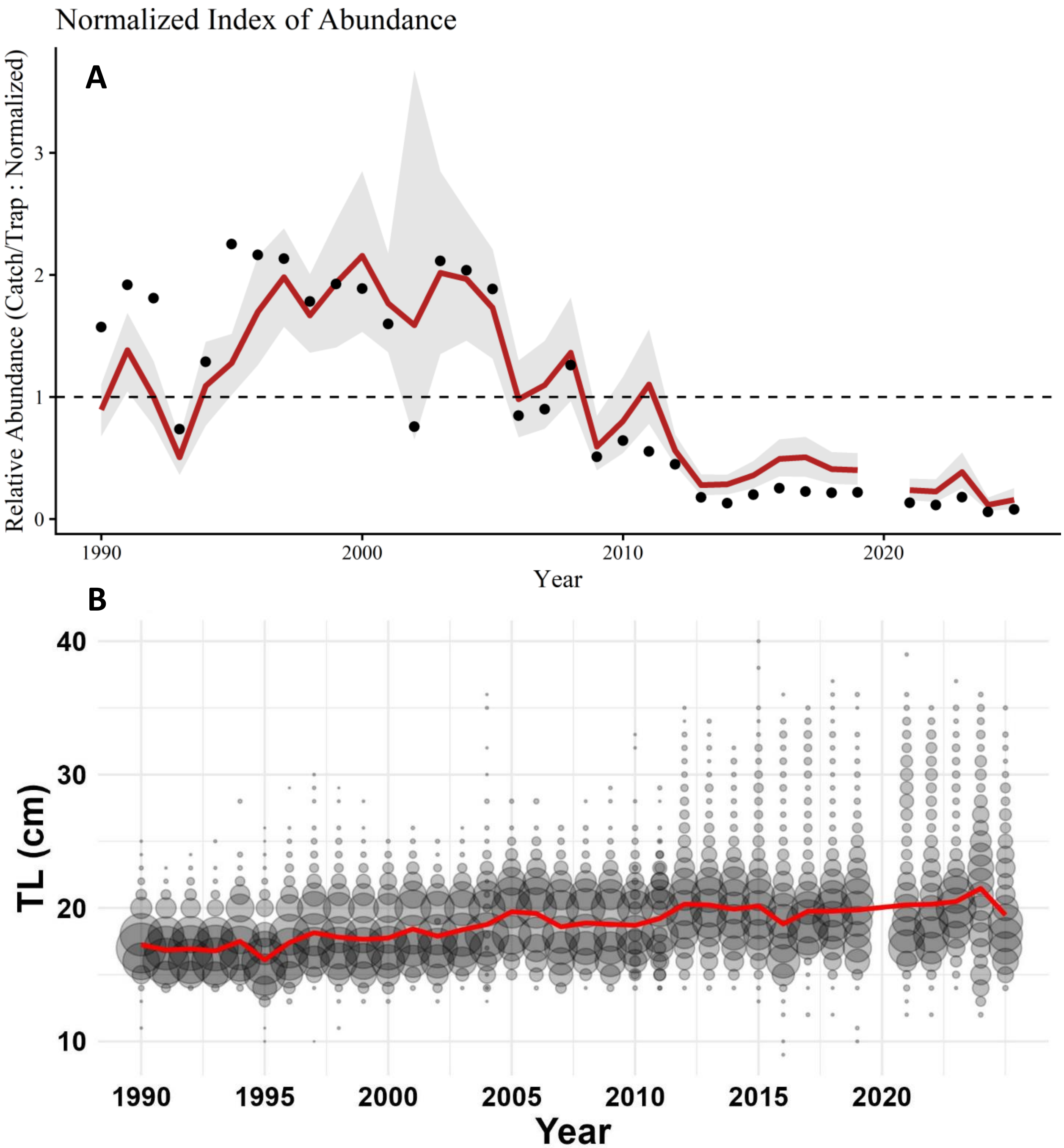


Figure 38. Chevron trap index of abundance and length compositions for *Stenotomus* spp. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

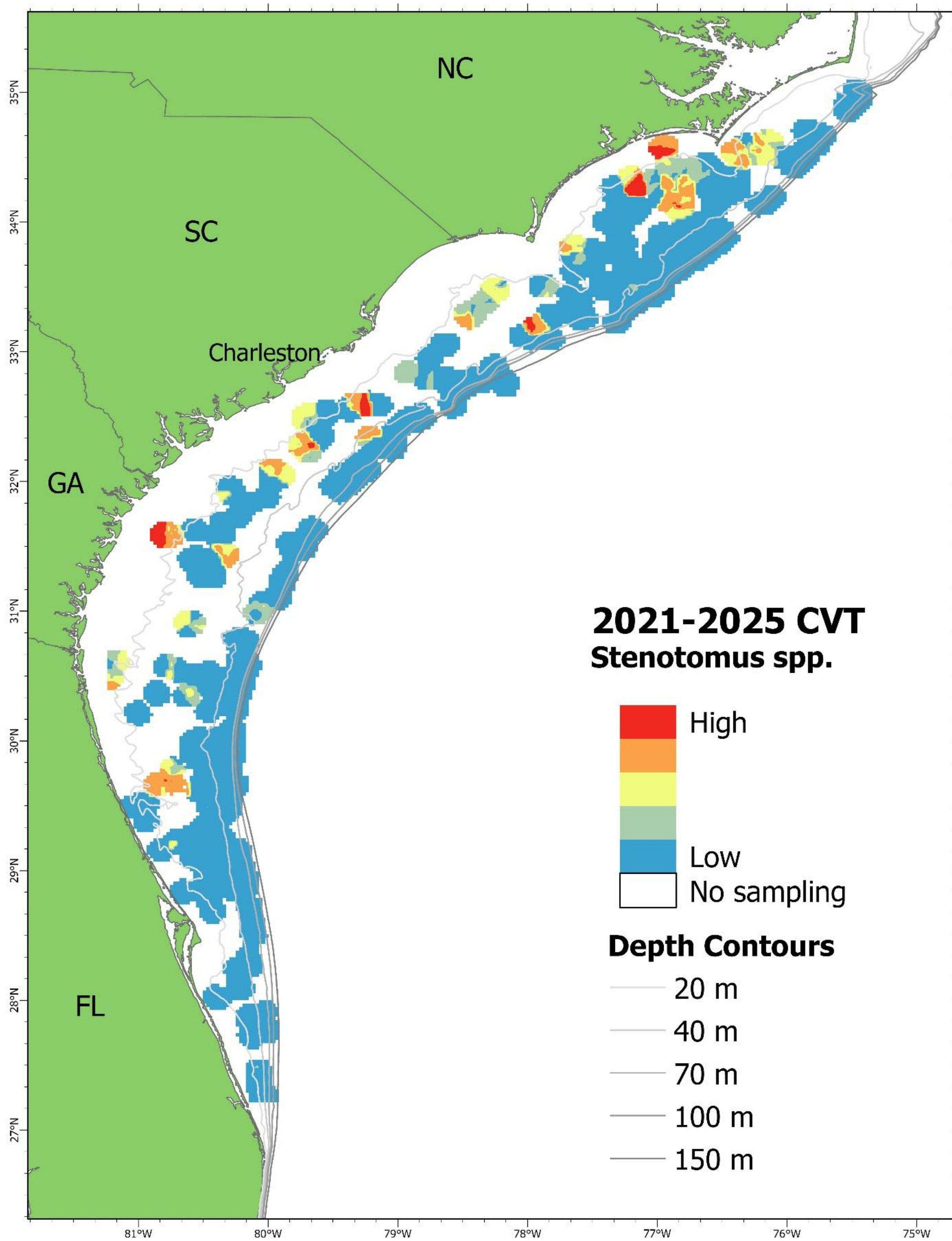


Figure 39. Distribution map of *Stenotomus* spp. catches from CVTs from 2021-2025.

Acknowledgments

We would like to thank all SCDNR Reef Fish Survey (MARMAP and SEAMAP-SA) and SEFIS staff who collected the data for this report, most notably Christina Schobernd for providing data collected by SEFIS. We appreciate the efforts of the vessel crews of the R/V *Palmetto*, R/V *Lady Lisa*, R/V *Lady Lilian* R/V *Savannah*, and NOAA Ships *Nancy Foster* and *Pisces* for their assistance in collecting samples at sea.

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Relative abundance of select reef fishes from Southeast Reef Fish Survey video data, 2011–2025

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Introduction

Reef fish species along the southeast United States Atlantic coast (hereafter, SEUS) have been monitored by the Marine Resources Monitoring, Assessment, and Prediction program (MARMAP) and the Southeast Reef Fish Survey (SERFS) with chevron traps since 1990. These trap data have been central components of the stock assessments of many various fish species in the SEUS, and trap indices for a number of species have been summarized annually by the South Carolina Department of Natural Resources (e.g., Vecchio et al. 2025). Beginning in 2011, video cameras were attached to all traps deployed region-wide by SERFS to provide additional information about reef fish relative abundance and seafloor habitat. The goal of this report is to provide video-based indices of abundance for many reef fish species in the SEUS, which complements the summary of trap-based indices of abundance of Vecchio et al. (2025).

Caveats

- Video-based indices of abundance are not an indication of stock status, the latter of which requires additional information such landings, length and age compositions, and life history parameters.
- The ways in which video-based indices of abundance are standardized in this report (e.g., model selection, predictor variables included) may be different from those used in SEDAR stock assessments.
- Video reading takes many months to complete, often finishing approximately 1 year after collection. Thus, the last year of video data included in this report is 2025.
- Species were only included here if the SERFS video index was included in a recent SEDAR assessment or the CVs were low enough that the video index might be useful.

Results

A total of 18,239 videos were included in our analyses between 2011 and 2025 (Table 1). These video samples were not missing any data and all 41 video frames could be read. Note that no videos were collected in 2020 due to the covid-19 pandemic and that some videos collected in 2021–2024 could not be read due to more videos being collected in those years than could be read by the available video readers. When all videos were not able to be read in a given year, the videos read by readers in those years were randomly selected. The seasonality, depth, latitude, and bottom water temperature of sampling was highly consistent among years (Table 1). Likewise, the spatial distribution of sampling was similar across years (Figure 1). Species-specific indices of abundance follow in alphabetical order by scientific name.

Table 1. Annual sampling information for samples included in these analyses. Minimum and maximum values are shown for date, depth, latitude, and bottom temperature. No sampling occurred in 2020 due to the covid-19 pandemic.

Year	*n*	Date	Depth (m)	Latitude (ºN)	Bottom temperature (ºC)
2011	590	5/19–10/26	15–93	27.2–34.5	14.8–28.8
2012	1083	4/24–10/10	15–106	27.2–35.0	12.9–27.8
2013	1221	4/24–10/4	15–100	27.3–35.0	12.4–28.1
2014	1382	4/23–10/21	15–110	27.2–35.0	16.1–29.3
2015	1406	4/21–10/22	16–110	27.3–35.0	13.6–28.5
2016	1410	5/4–10/26	17–115	27.2–35.0	15.5–29.3
2017	1422	4/26–9/29	15–111	27.2–35.0	14.8–28.2
2018	1653	4/25–10/4	16–114	27.2–35.0	13.6–28.3
2019	1544	4/30–9/25	16–110	27.2–35.0	15.0–29.5
2020	0	-	-	-	-
2021	1381	4/28–9/30	16–109	27.2–35.0	15.1–28.4
2022	1060	4/26–9/27	17–113	27.2–35.0	14.6–32.5
2023	1376	5/16–10/11	15–121	27.2–35.0	15.8–28.3
2024	1289	4/15–10/3	15–102	27.2–35.0	13.8–29.6
2025	1422	4/30–9/26	15–107	27.2–35.0	11.4–29.8

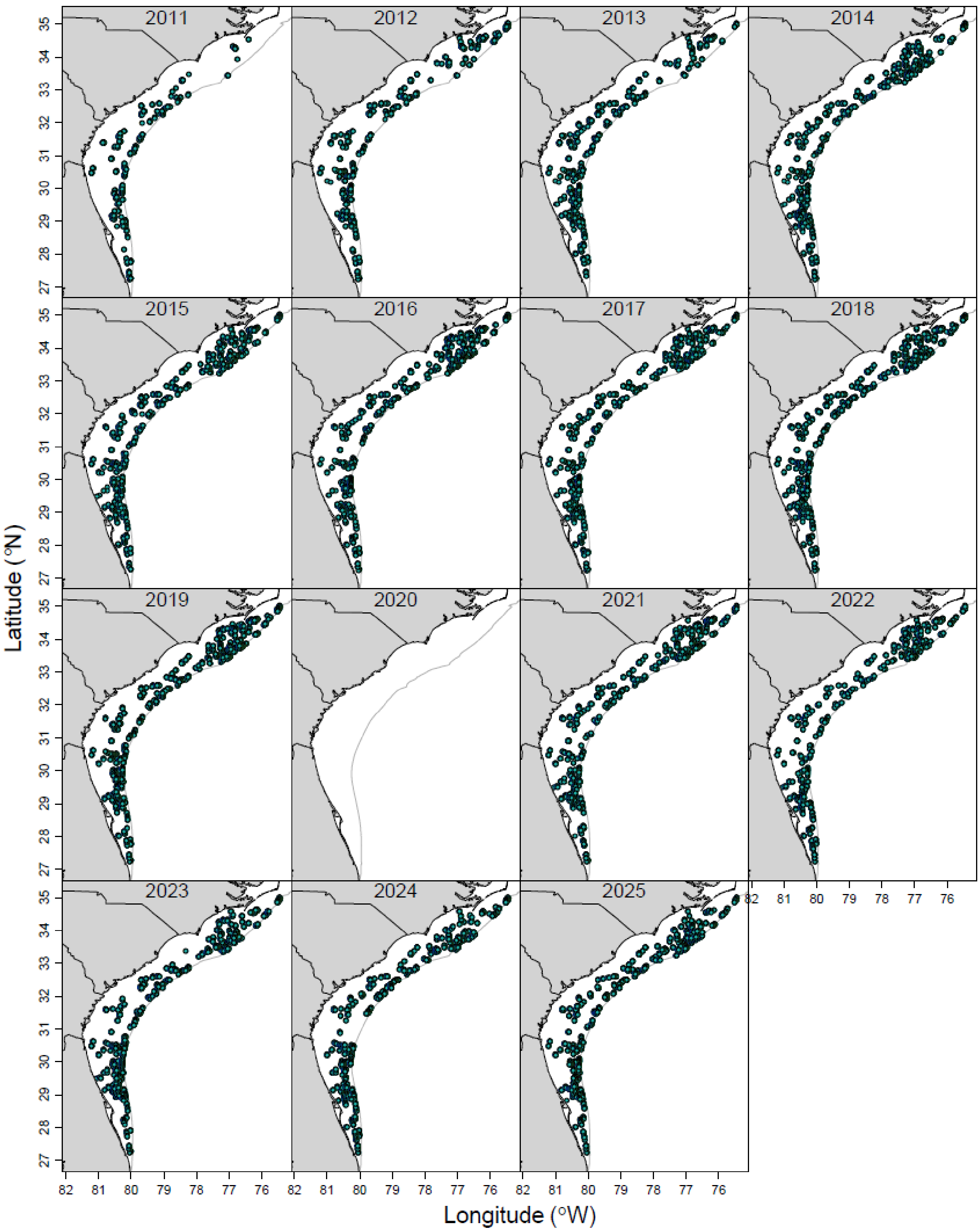
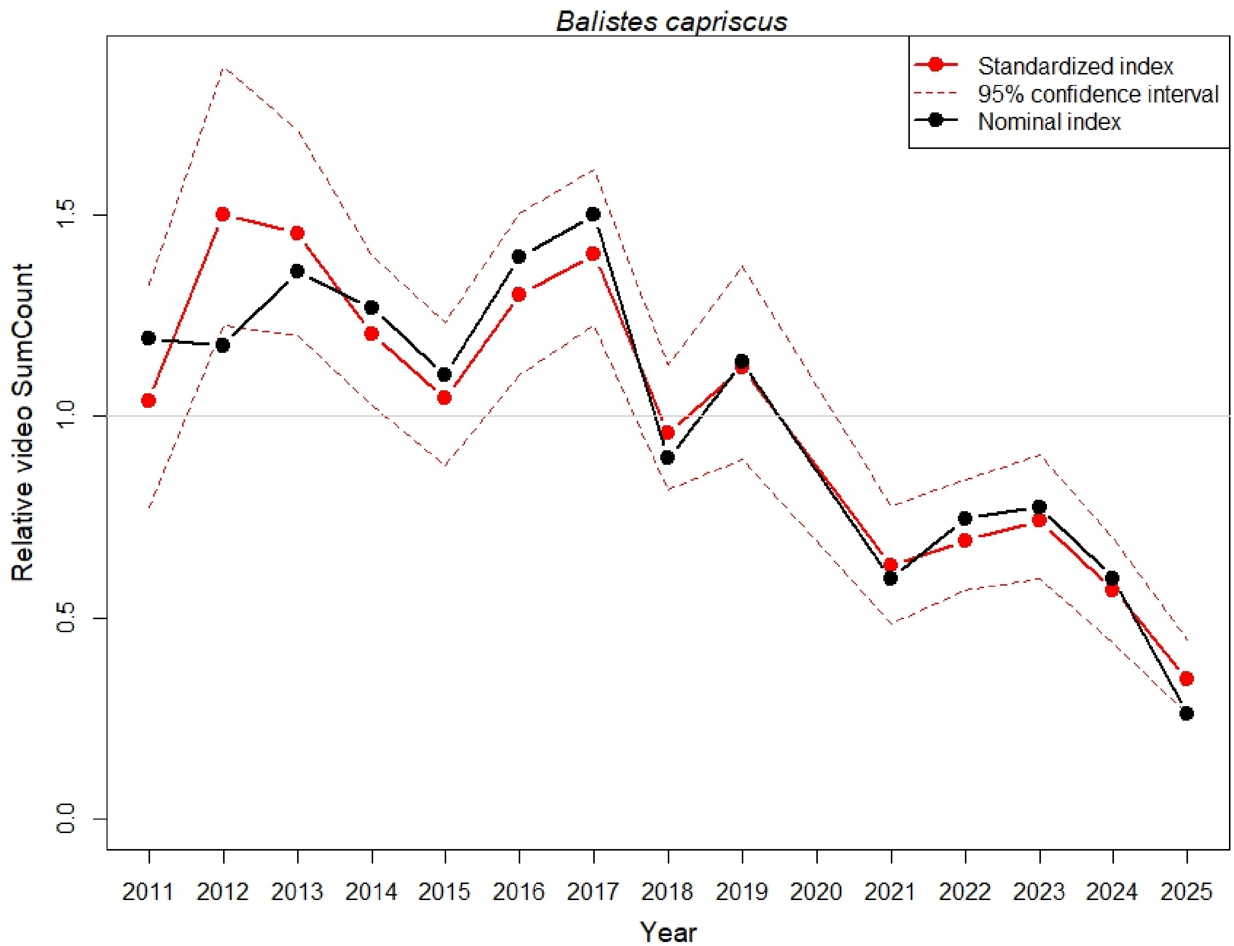


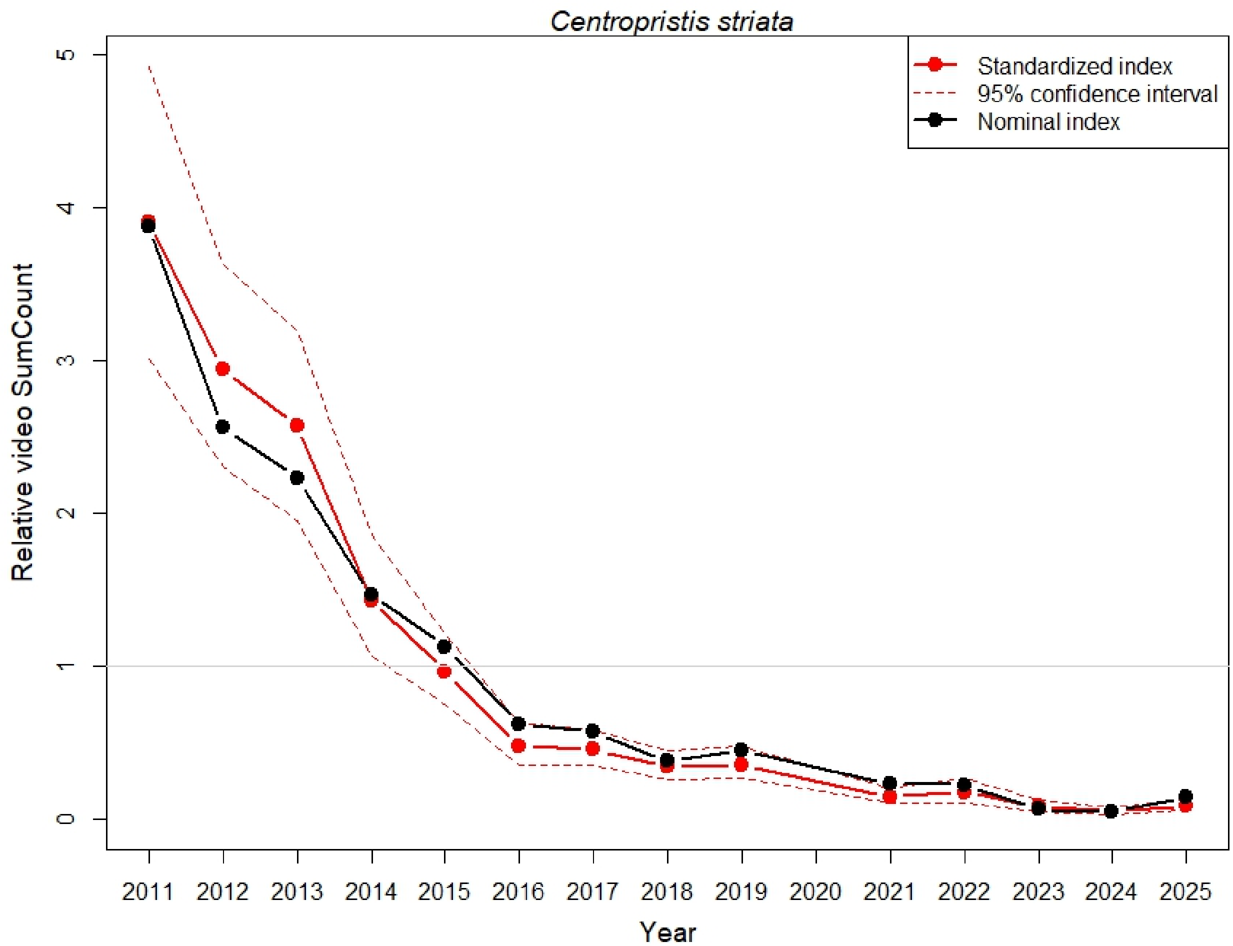
Figure 1. Annual sampling locations by the Southeast Reef Fish Survey that were included in the video analyses. Note that points often overlap and that no sampling was carried out in 2020 due to the covid-19 pandemic. Gray isobath is 100 m deep.

Gray triggerfish (*Balistes capriscus*)



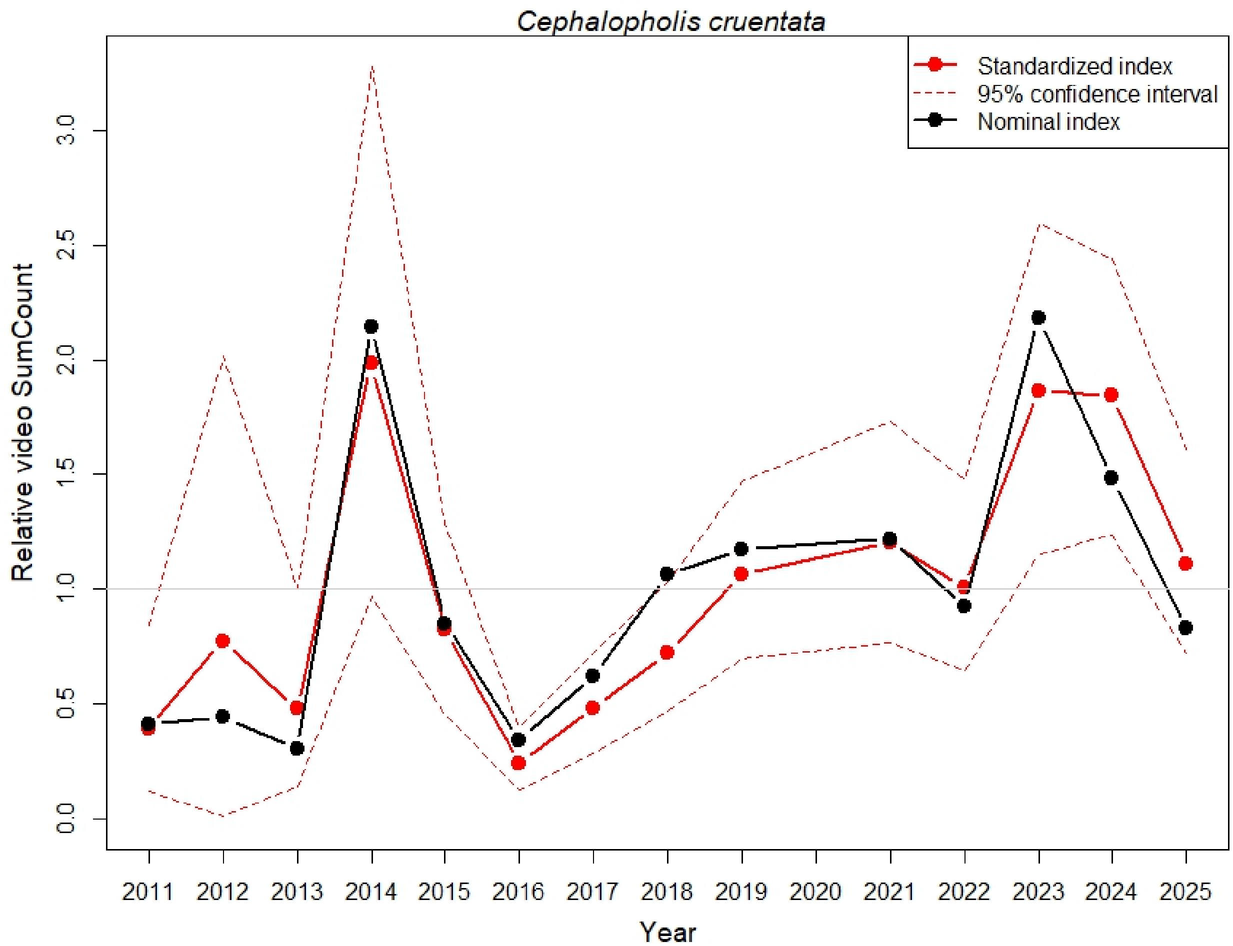
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.314	1.193	1.038	0.14
2012	1083	0.297	1.176	1.501	0.11
2013	1221	0.307	1.360	1.455	0.09
2014	1382	0.344	1.269	1.203	0.08
2015	1406	0.373	1.101	1.045	0.09
2016	1410	0.423	1.397	1.303	0.08
2017	1422	0.431	1.500	1.401	0.07
2018	1653	0.349	0.896	0.958	0.08
2019	1544	0.341	1.134	1.120	0.11
2020	0	-	-	-	-
2021	1381	0.253	0.596	0.629	0.12
2022	1060	0.282	0.745	0.692	0.10
2023	1376	0.304	0.775	0.740	0.11
2024	1289	0.244	0.596	0.568	0.11
2025	1422	0.142	0.261	0.346	0.14

Black sea bass (*Centropristis striata*)



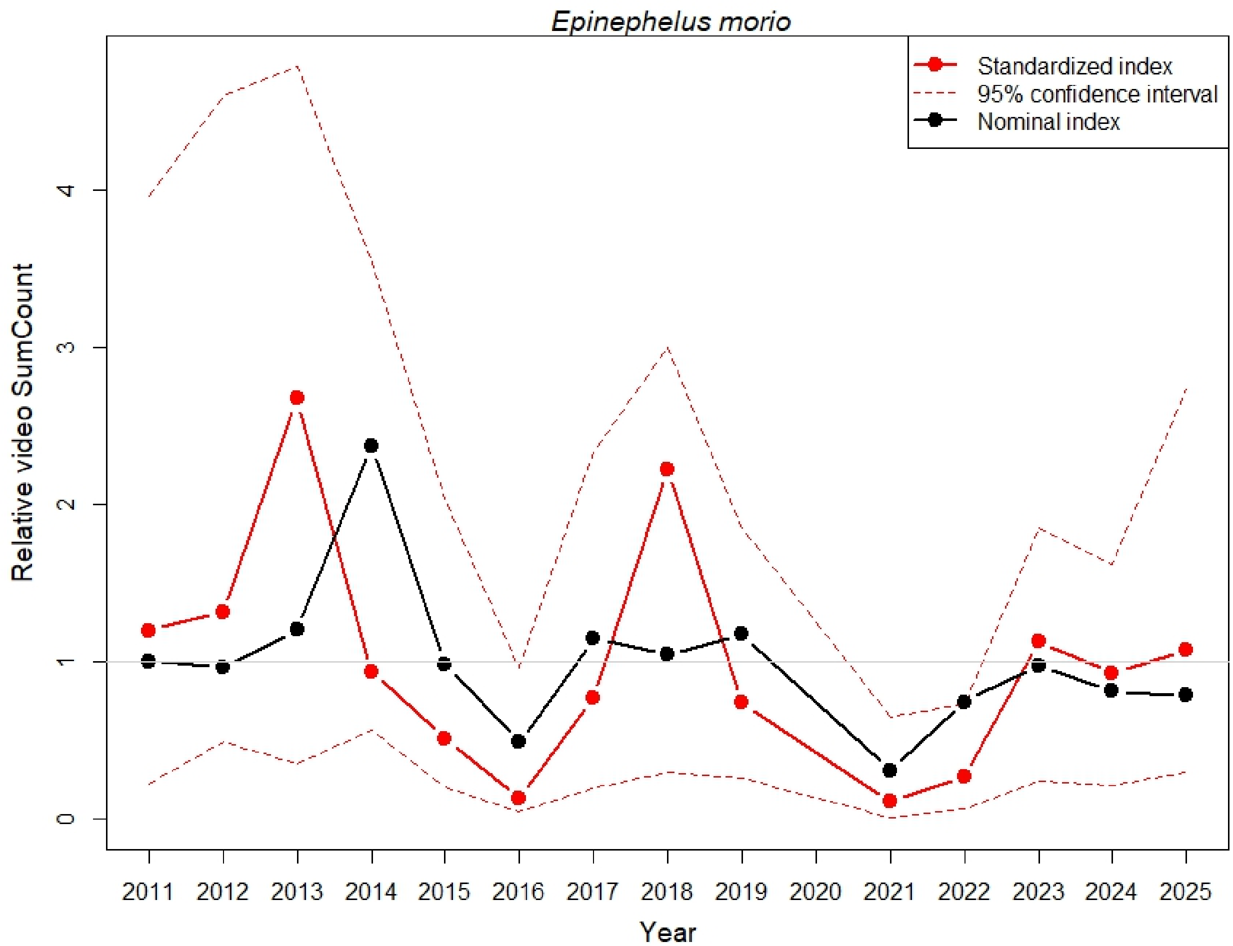
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.312	3.881	3.907	0.13
2012	1083	0.333	2.560	2.947	0.12
2013	1221	0.310	2.234	2.578	0.13
2014	1382	0.250	1.468	1.433	0.14
2015	1406	0.328	1.129	0.962	0.12
2016	1410	0.238	0.622	0.481	0.15
2017	1422	0.233	0.570	0.453	0.13
2018	1653	0.183	0.378	0.345	0.13
2019	1544	0.176	0.452	0.358	0.15
2020	0				
2021	1381	0.105	0.231	0.146	0.18
2022	1060	0.123	0.223	0.176	0.25
2023	1376	0.070	0.065	0.081	0.22
2024	1289	0.051	0.046	0.051	0.24
2025	1422	0.056	0.141	0.084	0.22

Graysby (*Cephalopholis cruentata*)



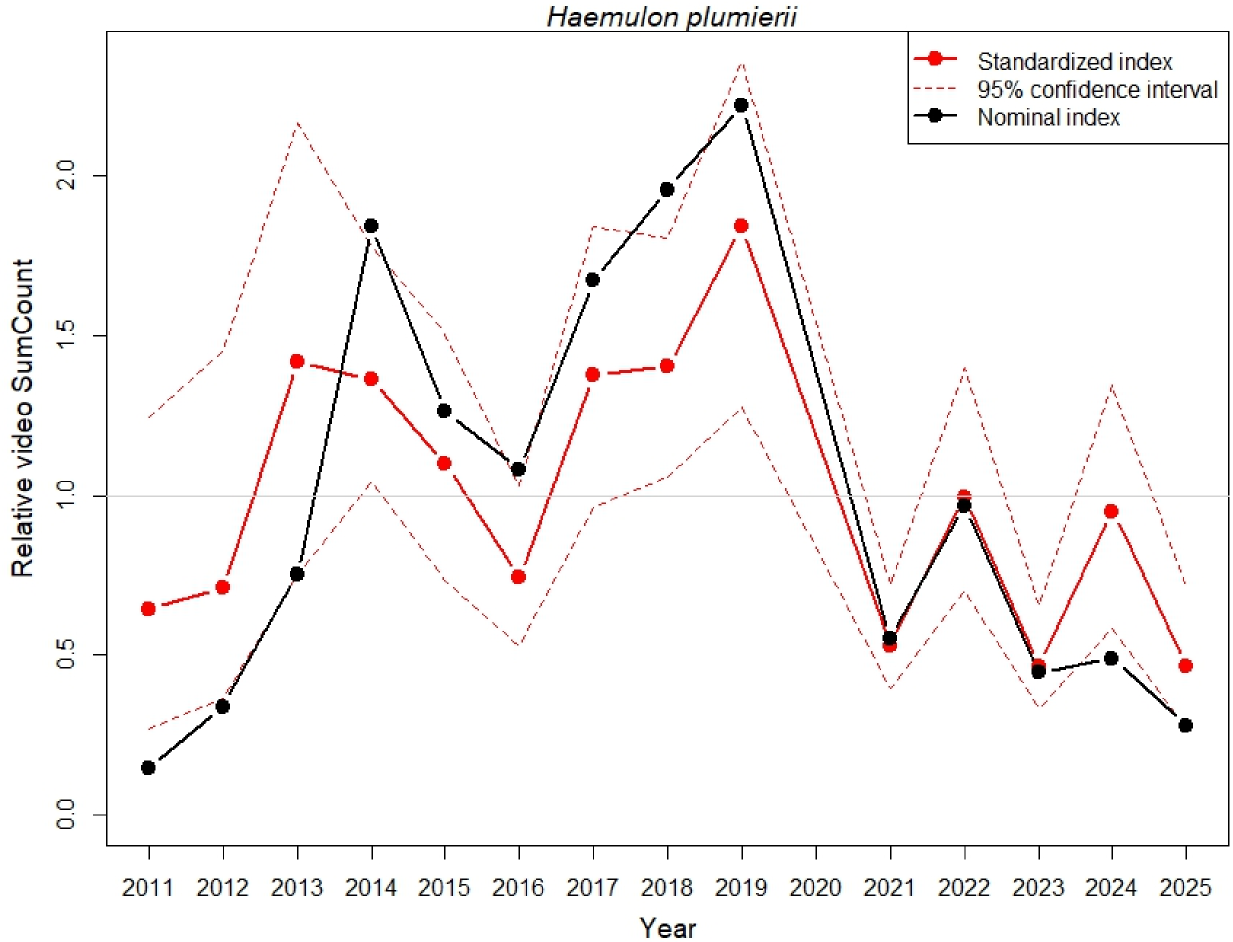
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.014	0.413	0.396	0.45
2012	1083	0.004	0.443	0.775	0.68
2013	1221	0.008	0.303	0.482	0.47
2014	1382	0.020	2.143	1.982	0.30
2015	1406	0.024	0.851	0.821	0.26
2016	1410	0.022	0.345	0.241	0.29
2017	1422	0.035	0.623	0.484	0.23
2018	1653	0.044	1.064	0.720	0.21
2019	1544	0.044	1.176	1.067	0.19
2020	0	-	-	-	-
2021	1381	0.042	1.220	1.203	0.21
2022	1060	0.041	0.925	1.007	0.21
2023	1376	0.054	2.181	1.867	0.20
2024	1289	0.063	1.484	1.845	0.17
2025	1422	0.044	0.828	1.109	0.21

Red grouper (*Epinephelus morio*)



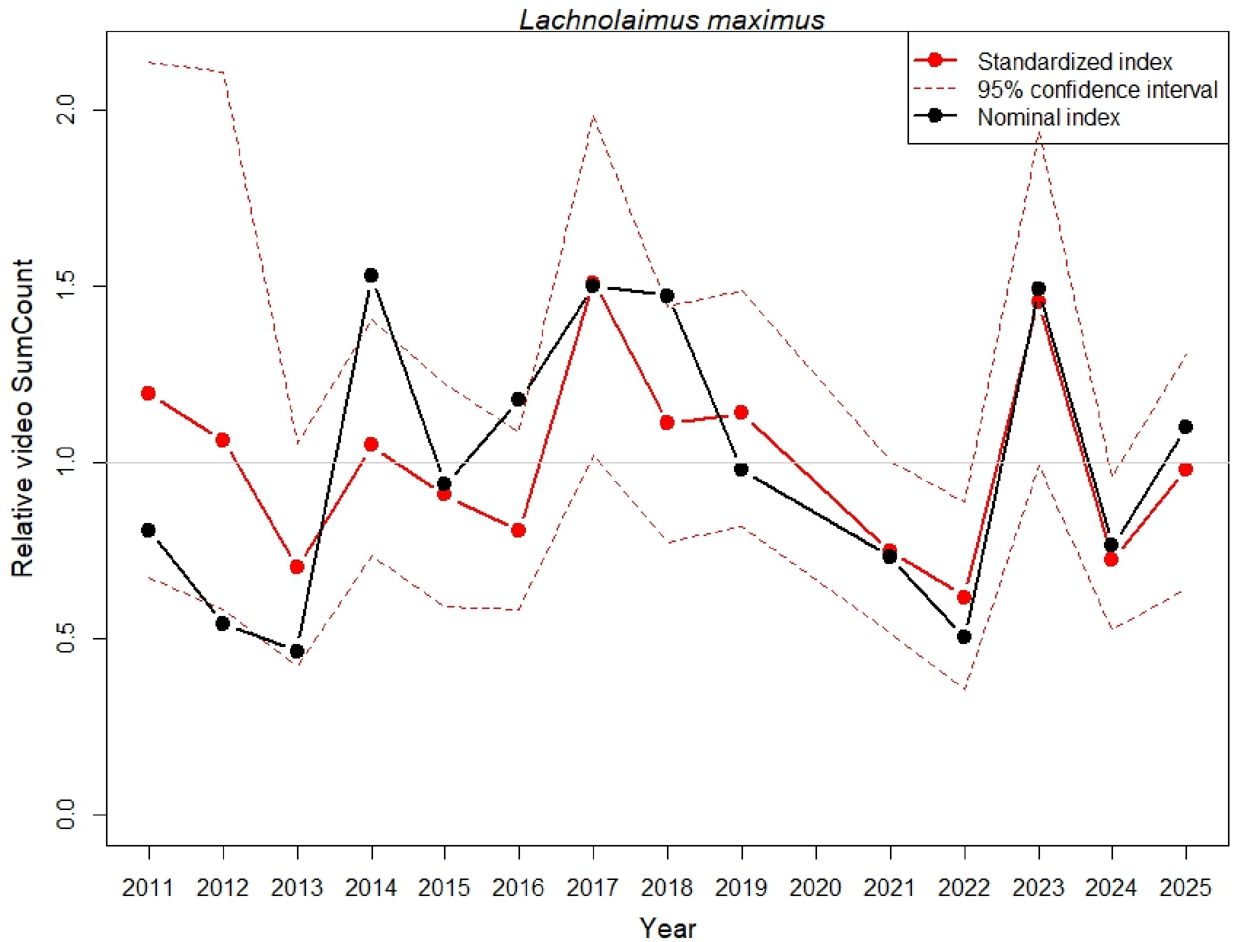
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.014	1.004	1.196	0.64
2012	1083	0.018	0.965	1.317	0.72
2013	1221	0.010	1.201	2.672	0.65
2014	1382	0.021	2.370	0.937	0.47
2015	1406	0.016	0.986	0.512	0.58
2016	1410	0.010	0.487	0.130	0.99
2017	1422	0.012	1.148	0.765	0.63
2018	1653	0.016	1.043	2.219	0.57
2019	1544	0.020	1.175	0.739	0.48
2020	0	-	-	-	-
2021	1381	0.005	0.310	0.112	1.08
2022	1060	0.012	0.745	0.269	0.69
2023	1376	0.025	0.972	1.128	0.56
2024	1289	0.023	0.811	0.926	0.55
2025	1422	0.015	0.784	1.078	0.56

White grunt (*Haemulon plumierii*)



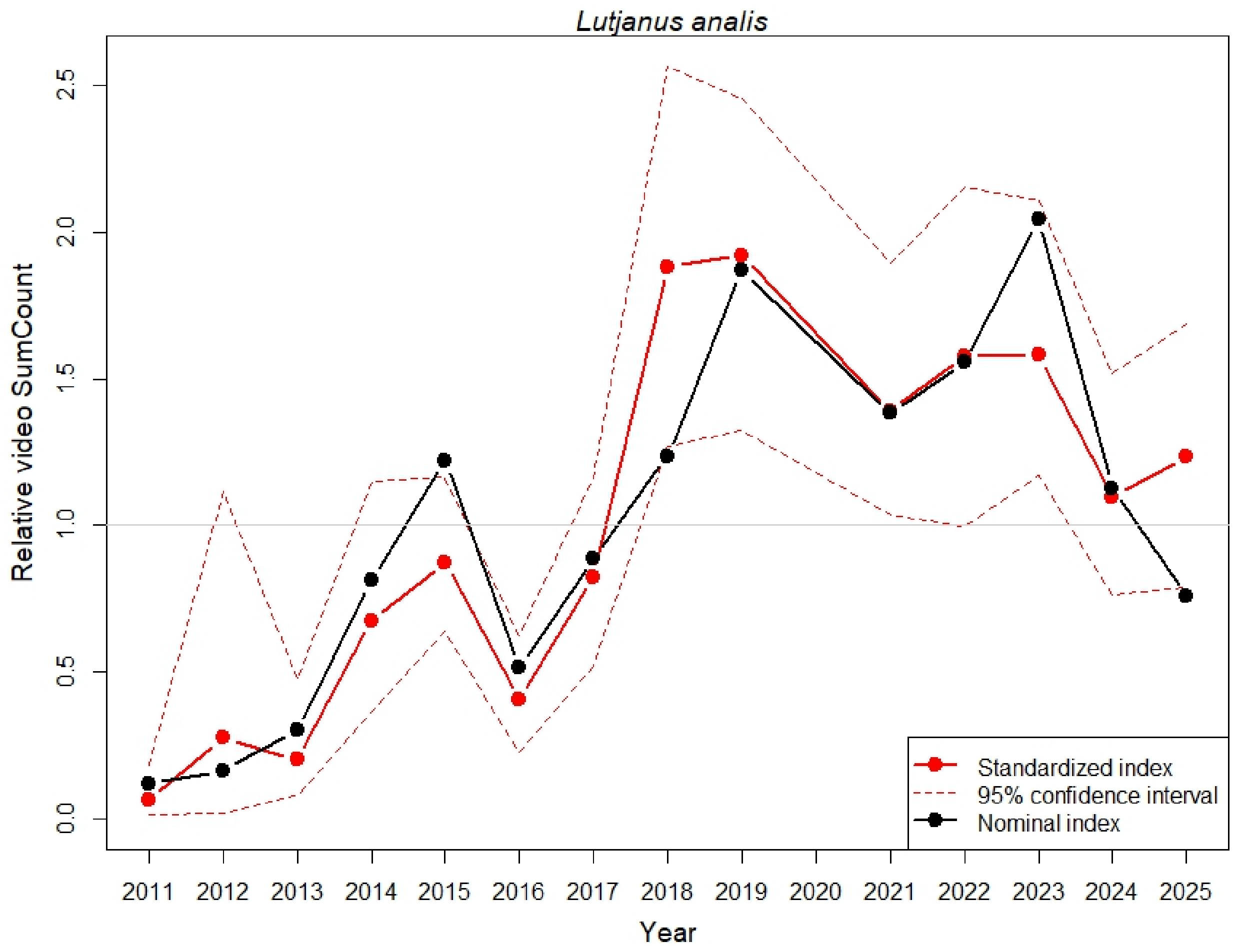
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.042	0.145	0.645	0.38
2012	1083	0.077	0.338	0.711	0.39
2013	1221	0.071	0.752	1.416	0.26
2014	1382	0.177	1.843	1.364	0.14
2015	1406	0.164	1.264	1.099	0.19
2016	1410	0.152	1.082	0.745	0.17
2017	1422	0.169	1.671	1.376	0.17
2018	1653	0.169	1.956	1.404	0.13
2019	1544	0.176	2.220	1.839	0.16
2020	0	-	-	-	-
2021	1381	0.138	0.550	0.529	0.15
2022	1060	0.137	0.966	0.993	0.17
2023	1376	0.113	0.445	0.464	0.18
2024	1289	0.112	0.490	0.950	0.21
2025	1422	0.059	0.279	0.465	0.23

Hogfish (*Lachnolaimus maximus*)



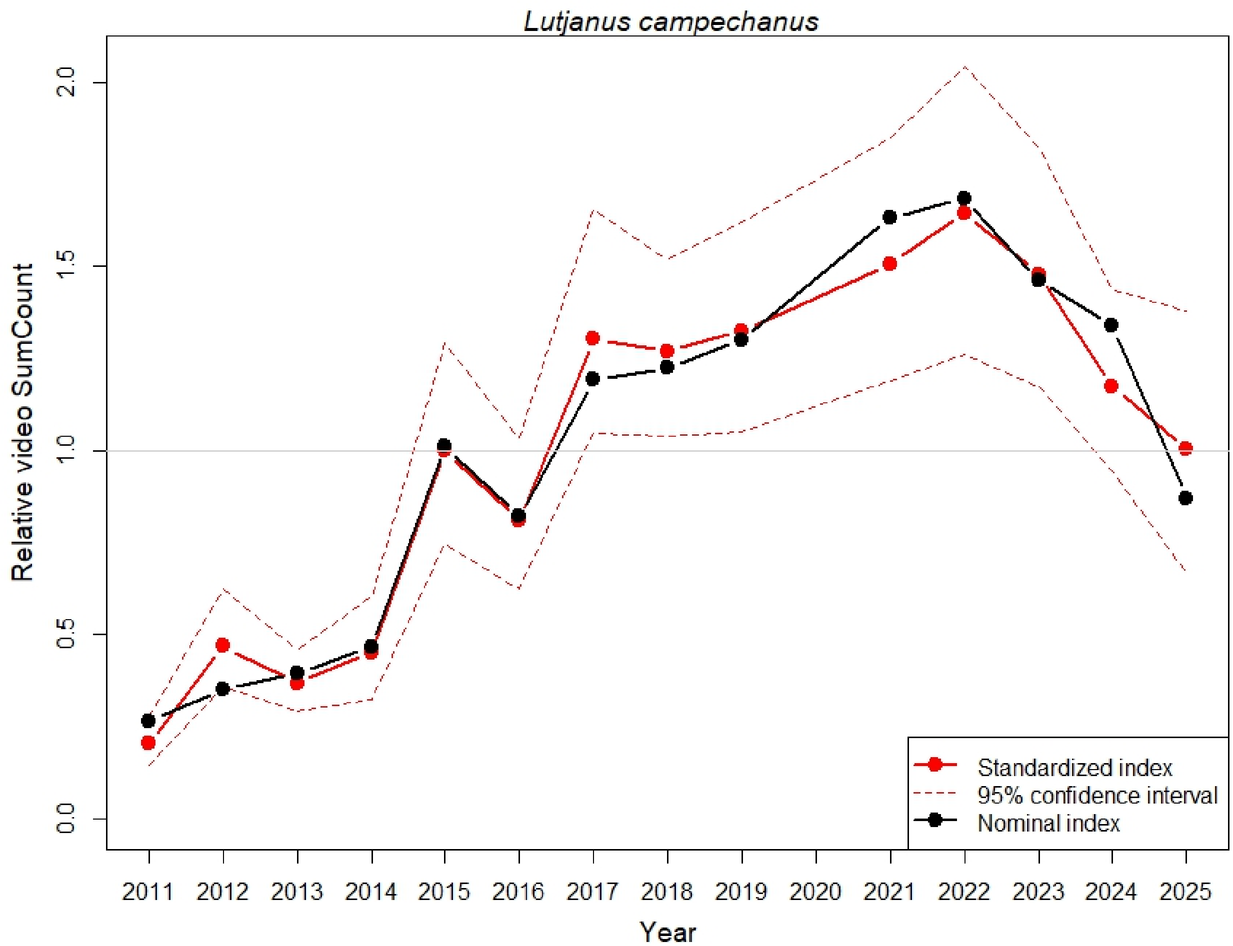
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.056	0.807	1.195	0.30
2012	1083	0.026	0.543	1.063	0.33
2013	1221	0.029	0.463	0.701	0.24
2014	1382	0.076	1.528	1.048	0.16
2015	1406	0.057	0.937	0.907	0.19
2016	1410	0.070	1.177	0.805	0.16
2017	1422	0.066	1.501	1.508	0.17
2018	1653	0.064	1.473	1.110	0.15
2019	1544	0.067	0.979	1.140	0.16
2020	0	-	-	-	-
2021	1381	0.054	0.733	0.747	0.17
2022	1060	0.037	0.502	0.618	0.22
2023	1376	0.070	1.493	1.454	0.18
2024	1289	0.054	0.764	0.724	0.16
2025	1422	0.063	1.100	0.981	0.18

Mutton snapper (*Lutjanus analis*)



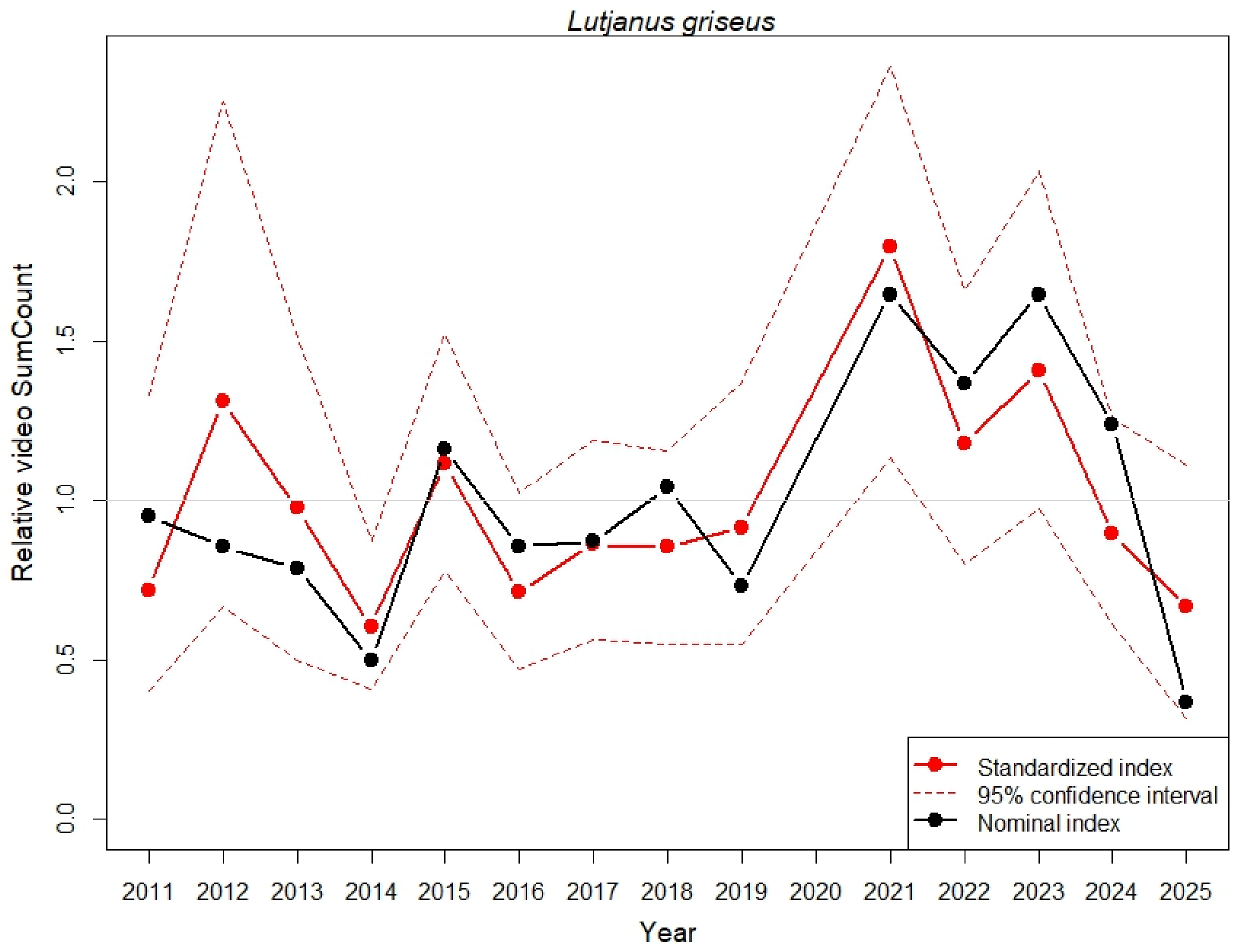
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.008	0.120	0.064	0.60
2012	1083	0.005	0.164	0.276	0.88
2013	1221	0.008	0.300	0.202	0.47
2014	1382	0.026	0.813	0.676	0.29
2015	1406	0.055	1.222	0.874	0.16
2016	1410	0.026	0.515	0.405	0.24
2017	1422	0.044	0.888	0.822	0.20
2018	1653	0.060	1.237	1.881	0.18
2019	1544	0.069	1.870	1.920	0.16
2020	0	-	-	-	-
2021	1381	0.075	1.382	1.388	0.16
2022	1060	0.068	1.557	1.577	0.20
2023	1376	0.087	2.044	1.582	0.15
2024	1289	0.056	1.128	1.097	0.18
2025	1422	0.050	0.759	1.235	0.19

Red snapper (*Lutjanus campechanus*)



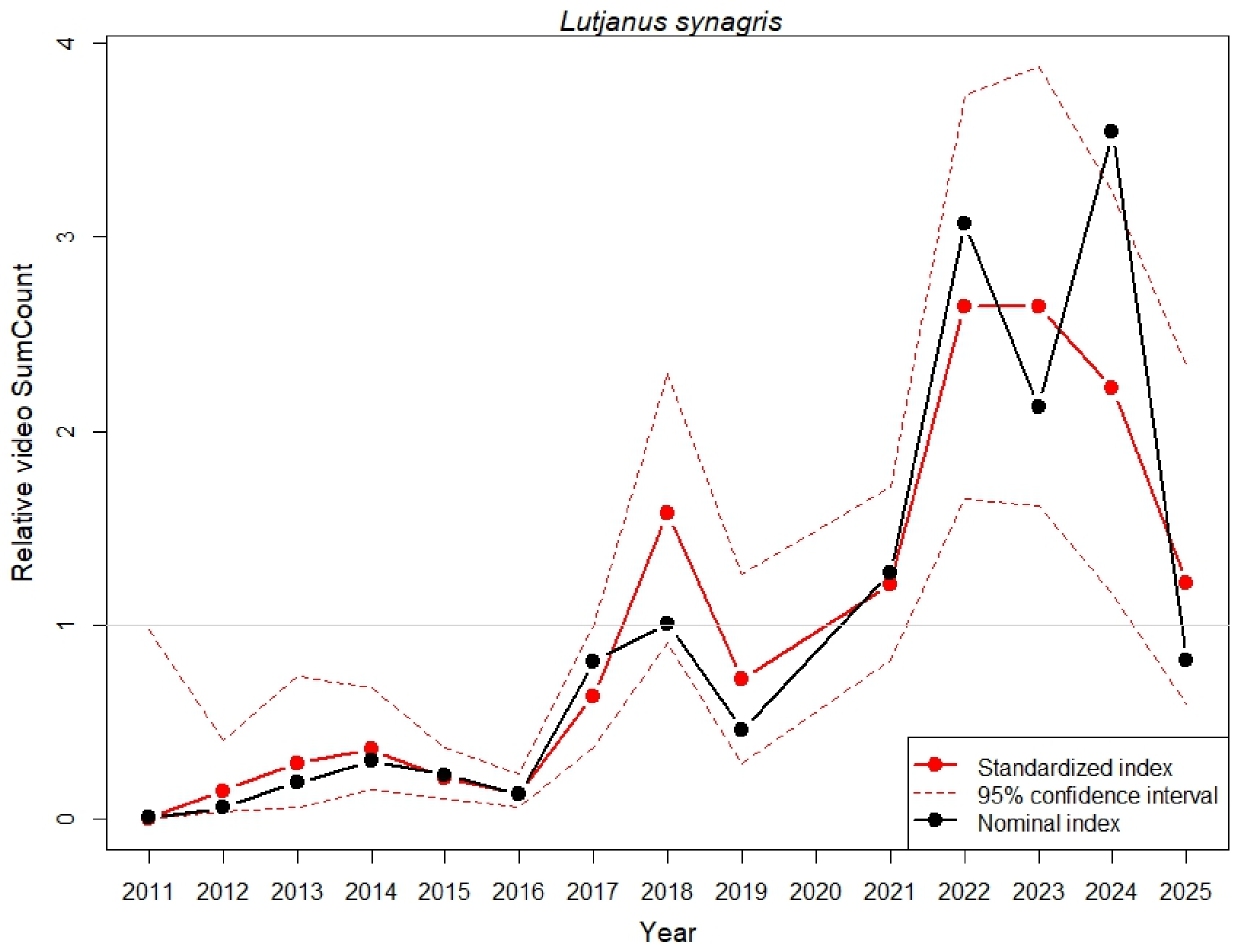
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.229	0.264	0.204	0.16
2012	1083	0.241	0.351	0.469	0.14
2013	1221	0.267	0.394	0.368	0.11
2014	1382	0.217	0.465	0.451	0.16
2015	1406	0.264	1.010	0.999	0.14
2016	1410	0.222	0.821	0.810	0.13
2017	1422	0.305	1.191	1.303	0.12
2018	1653	0.291	1.223	1.269	0.10
2019	1544	0.281	1.300	1.325	0.11
2020	0	-	-	-	-
2021	1381	0.358	1.630	1.505	0.11
2022	1060	0.339	1.682	1.644	0.13
2023	1376	0.331	1.462	1.478	0.11
2024	1289	0.361	1.339	1.172	0.11
2025	1422	0.292	0.868	1.002	0.20

Gray snapper (*Lutjanus griseus*)



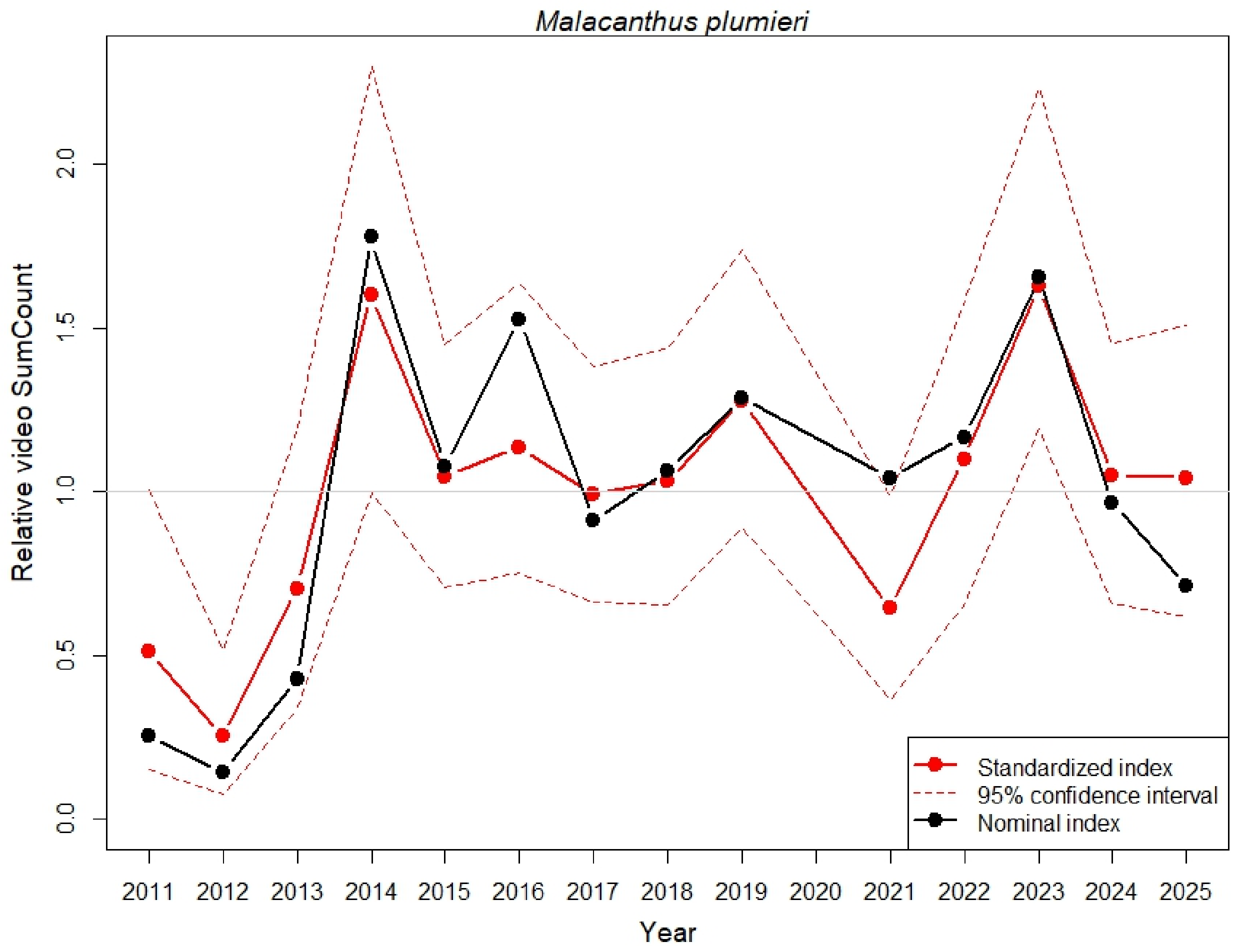
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.073	0.950	0.718	0.32
2012	1083	0.055	0.853	1.312	0.30
2013	1221	0.068	0.785	0.975	0.27
2014	1382	0.058	0.499	0.602	0.19
2015	1406	0.085	1.160	1.113	0.17
2016	1410	0.060	0.856	0.712	0.20
2017	1422	0.077	0.870	0.862	0.18
2018	1653	0.080	1.041	0.852	0.19
2019	1544	0.071	0.730	0.915	0.23
2020	0	-	-	-	-
2021	1381	0.096	1.645	1.794	0.19
2022	1060	0.114	1.365	1.180	0.19
2023	1376	0.113	1.644	1.405	0.19
2024	1289	0.124	1.237	0.894	0.18
2025	1422	0.053	0.365	0.666	0.32

Lane snapper (*Lutjanus synagris*)



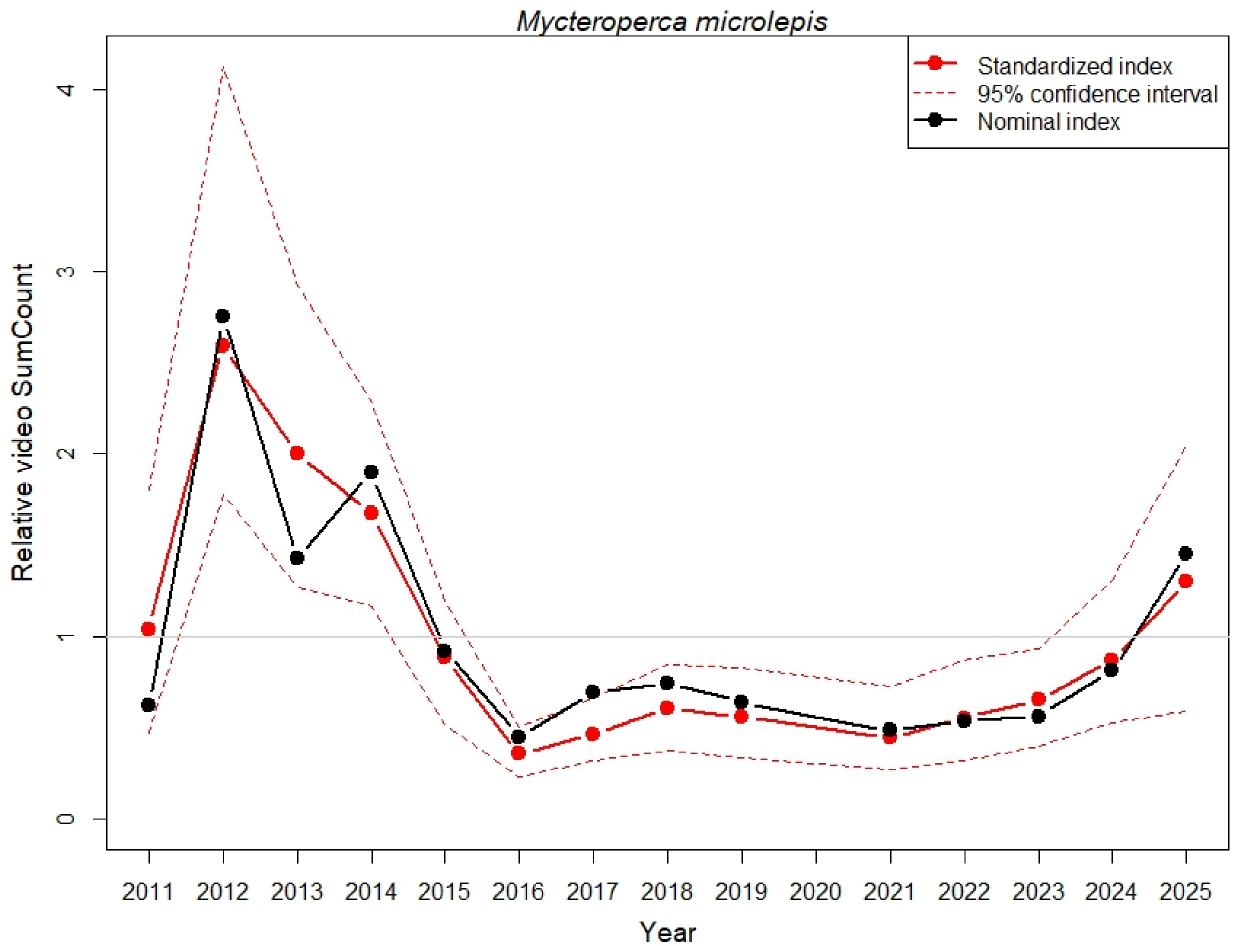
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.000	0.004	0.004	6.14
2012	1083	0.009	0.058	0.146	0.62
2013	1221	0.015	0.186	0.284	0.63
2014	1382	0.024	0.297	0.357	0.36
2015	1406	0.027	0.228	0.212	0.31
2016	1410	0.021	0.125	0.131	0.35
2017	1422	0.042	0.812	0.633	0.26
2018	1653	0.054	1.007	1.577	0.23
2019	1544	0.038	0.460	0.723	0.37
2020	0	-	-	-	-
2021	1381	0.074	1.265	1.208	0.19
2022	1060	0.098	3.073	2.645	0.2
2023	1376	0.073	2.127	2.645	0.22
2024	1289	0.081	3.540	2.222	0.25
2025	1422	0.027	0.817	1.215	0.35

Sand tilefish (*Malacanthus plumieri*)



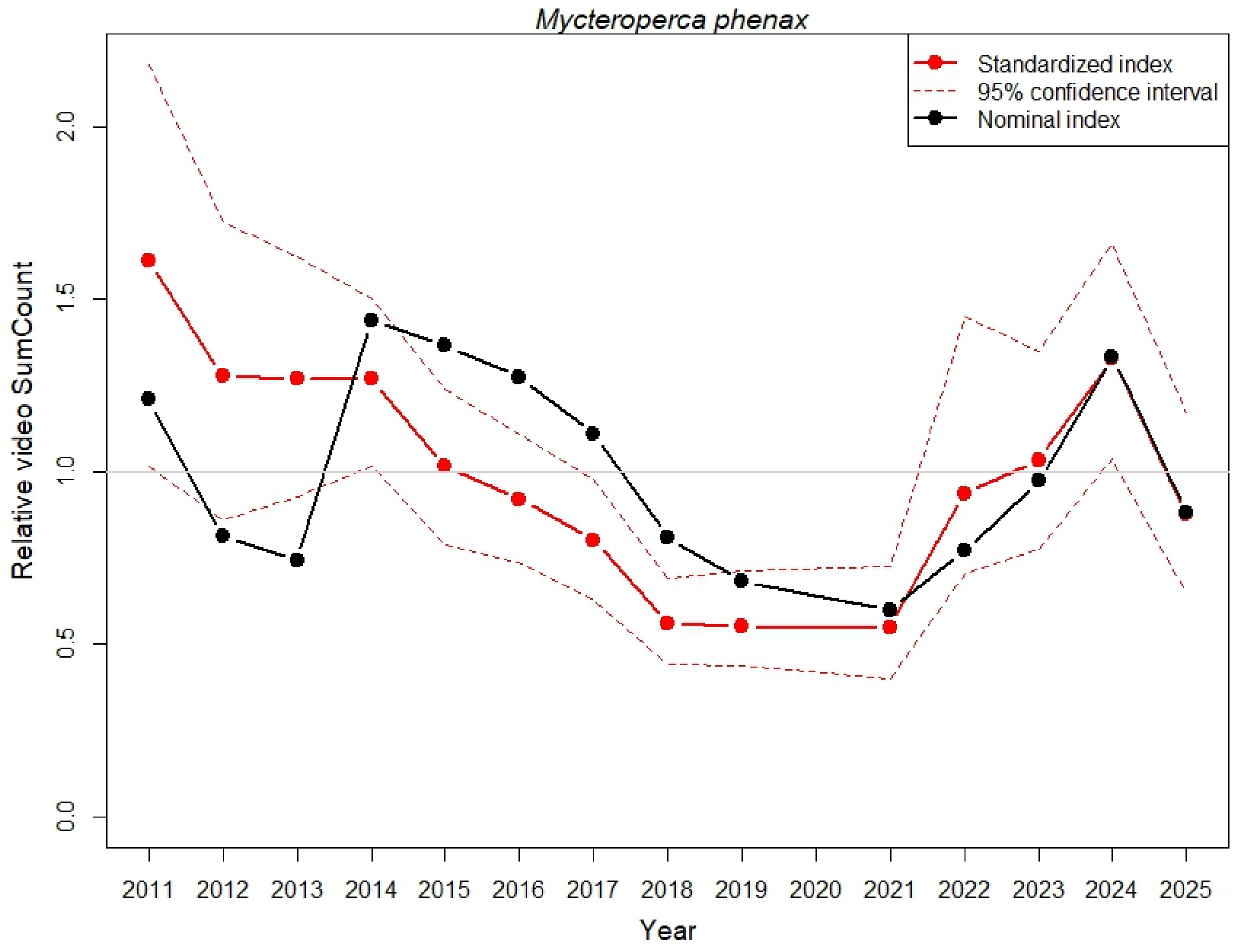
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.014	0.254	0.510	0.41
2012	1083	0.007	0.142	0.251	0.46
2013	1221	0.022	0.429	0.703	0.32
2014	1382	0.054	1.776	1.600	0.21
2015	1406	0.052	1.078	1.045	0.18
2016	1410	0.054	1.525	1.136	0.20
2017	1422	0.050	0.911	0.991	0.18
2018	1653	0.057	1.065	1.033	0.20
2019	1544	0.062	1.285	1.274	0.17
2020	0	-	-	-	-
2021	1381	0.037	1.042	0.643	0.26
2022	1060	0.043	1.166	1.099	0.21
2023	1376	0.060	1.652	1.625	0.16
2024	1289	0.042	0.965	1.050	0.20
2025	1422	0.039	0.711	1.041	0.23

Gag (*Mycteroperca microlepis*)



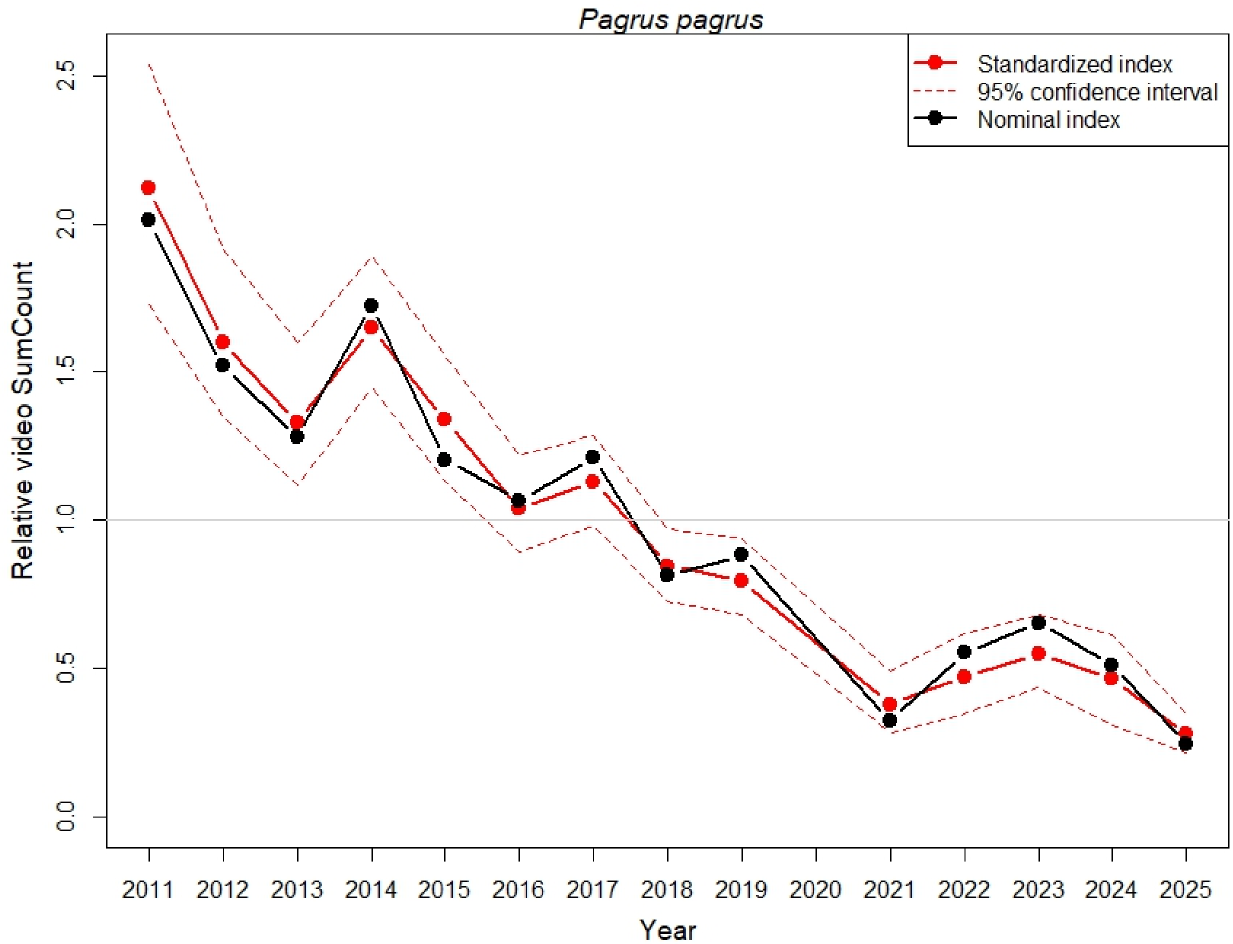
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.061	0.626	1.039	0.33
2012	1083	0.079	2.751	2.595	0.21
2013	1221	0.059	1.430	2.001	0.22
2014	1382	0.082	1.900	1.673	0.17
2015	1406	0.081	0.919	0.882	0.21
2016	1410	0.065	0.450	0.357	0.20
2017	1422	0.077	0.698	0.464	0.19
2018	1653	0.074	0.741	0.605	0.21
2019	1544	0.069	0.641	0.559	0.23
2020	0	-	-	-	-
2021	1381	0.057	0.484	0.445	0.25
2022	1060	0.065	0.535	0.555	0.25
2023	1376	0.062	0.562	0.651	0.21
2024	1289	0.076	0.814	0.872	0.24
2025	1422	0.068	1.450	1.303	0.33

Scamp (*Mycteroperca phenax*)



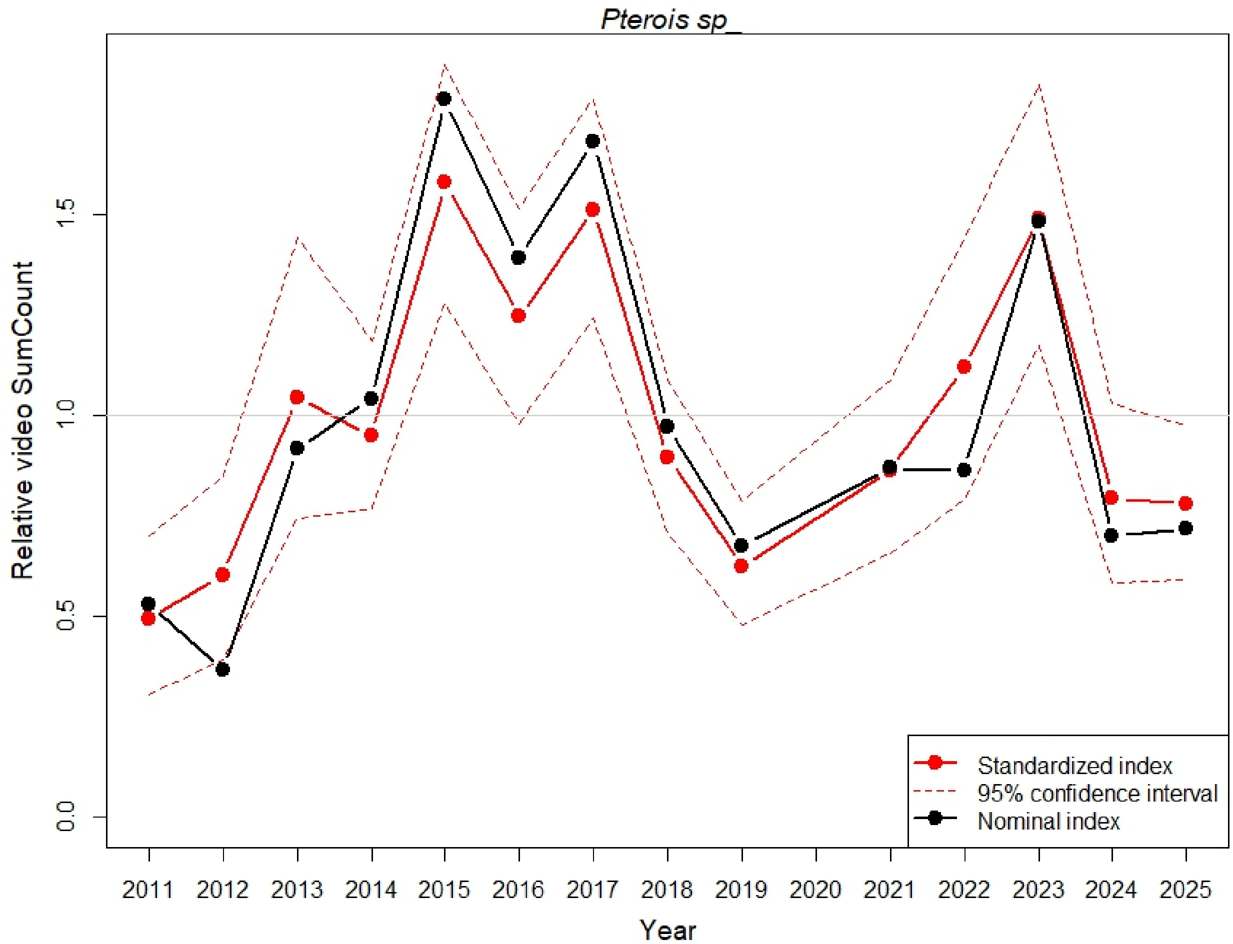
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.156	1.208	1.611	0.19
2012	1083	0.095	0.814	1.278	0.18
2013	1221	0.091	0.742	1.268	0.14
2014	1382	0.152	1.437	1.268	0.10
2015	1406	0.131	1.368	1.017	0.11
2016	1410	0.147	1.274	0.920	0.10
2017	1422	0.123	1.108	0.801	0.11
2018	1653	0.106	0.809	0.562	0.11
2019	1544	0.106	0.682	0.551	0.12
2020	0	-	-	-	-
2021	1381	0.083	0.600	0.550	0.15
2022	1060	0.097	0.770	0.937	0.19
2023	1376	0.107	0.973	1.034	0.14
2024	1289	0.121	1.333	1.328	0.12
2025	1422	0.108	0.882	0.876	0.16

Red porgy (*Pagrus pagrus*)



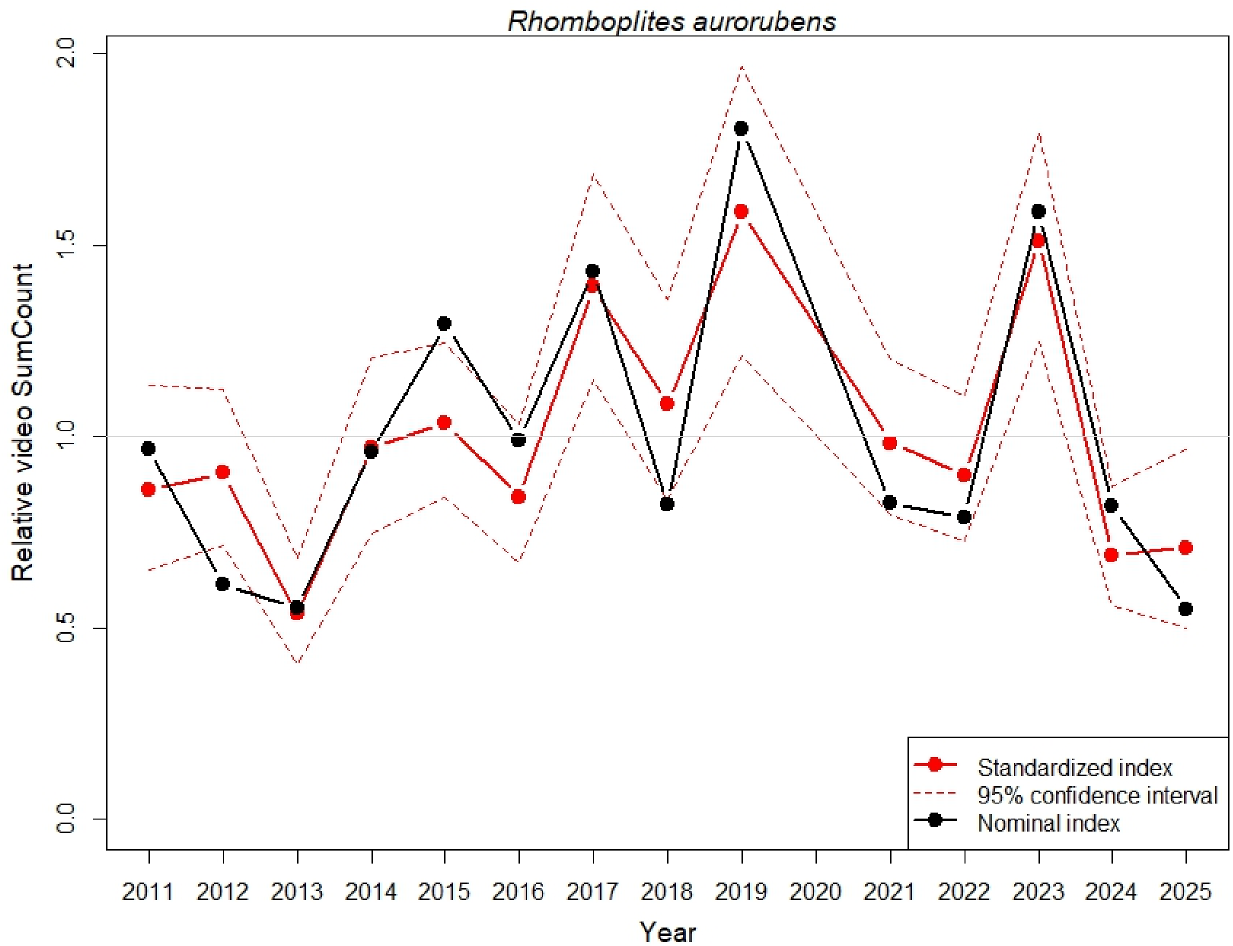
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.476	2.012	2.120	0.10
2012	1083	0.391	1.521	1.601	0.09
2013	1221	0.359	1.279	1.331	0.09
2014	1382	0.439	1.724	1.649	0.07
2015	1406	0.387	1.204	1.338	0.08
2016	1410	0.367	1.065	1.041	0.08
2017	1422	0.353	1.213	1.130	0.07
2018	1653	0.338	0.813	0.846	0.08
2019	1544	0.314	0.883	0.797	0.08
2020	0	-	-	-	-
2021	1381	0.145	0.326	0.380	0.14
2022	1060	0.175	0.552	0.474	0.14
2023	1376	0.242	0.655	0.550	0.11
2024	1289	0.169	0.510	0.464	0.18
2025	1422	0.188	0.244	0.278	0.12

Lionfish (*Pterois* spp.)



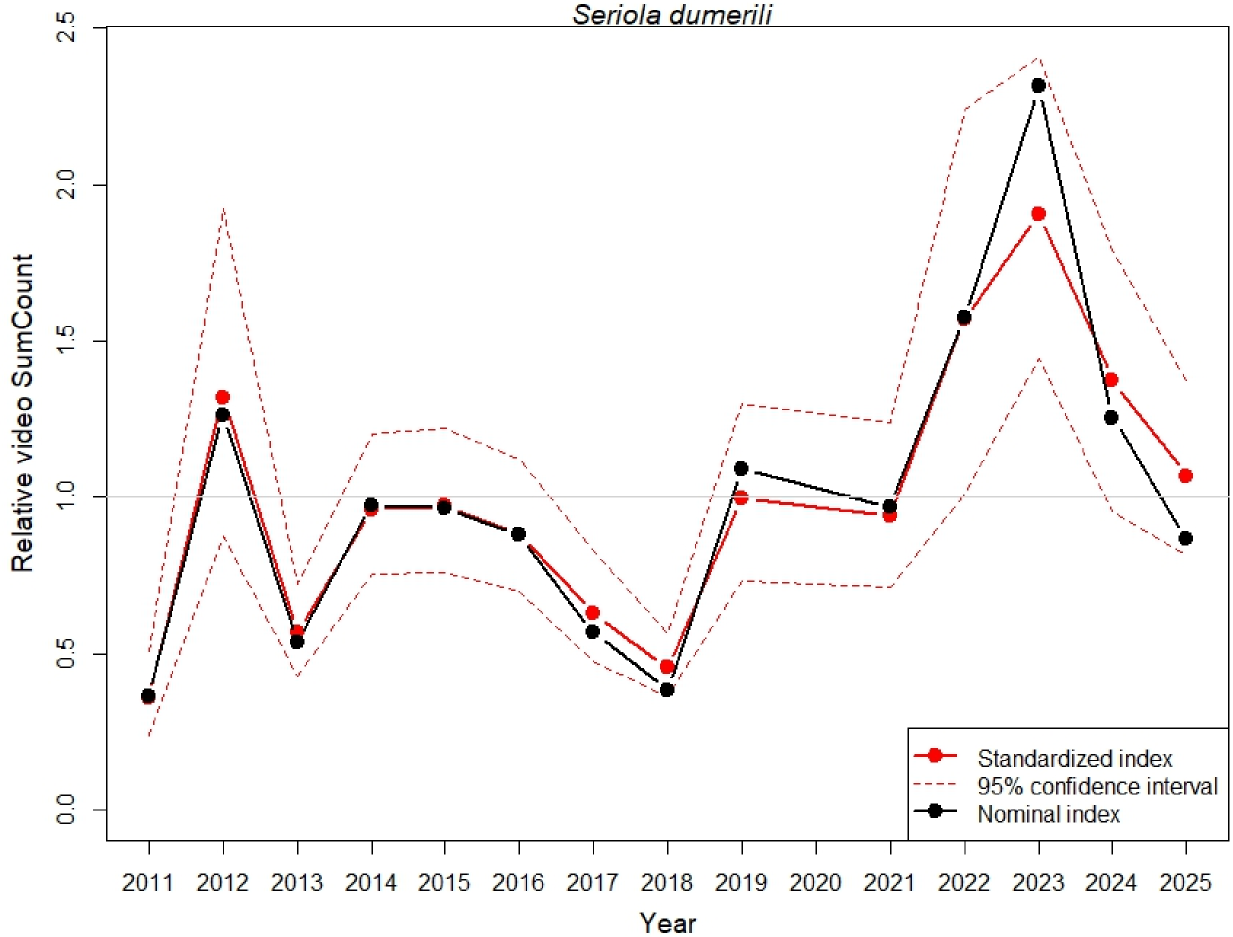
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.081	0.531	0.494	0.21
2012	1083	0.066	0.365	0.602	0.21
2013	1221	0.092	0.918	1.045	0.17
2014	1382	0.147	1.041	0.951	0.11
2015	1406	0.196	1.787	1.580	0.10
2016	1410	0.178	1.393	1.246	0.11
2017	1422	0.187	1.682	1.514	0.09
2018	1653	0.150	0.974	0.894	0.11
2019	1544	0.100	0.676	0.624	0.13
2020	0	-	-	-	-
2021	1381	0.108	0.869	0.865	0.13
2022	1060	0.126	0.862	1.120	0.15
2023	1376	0.159	1.484	1.490	0.11
2024	1289	0.109	0.700	0.795	0.14
2025	1422	0.107	0.719	0.779	0.13

Vermilion snapper (*Rhomboplites aurorubens*)



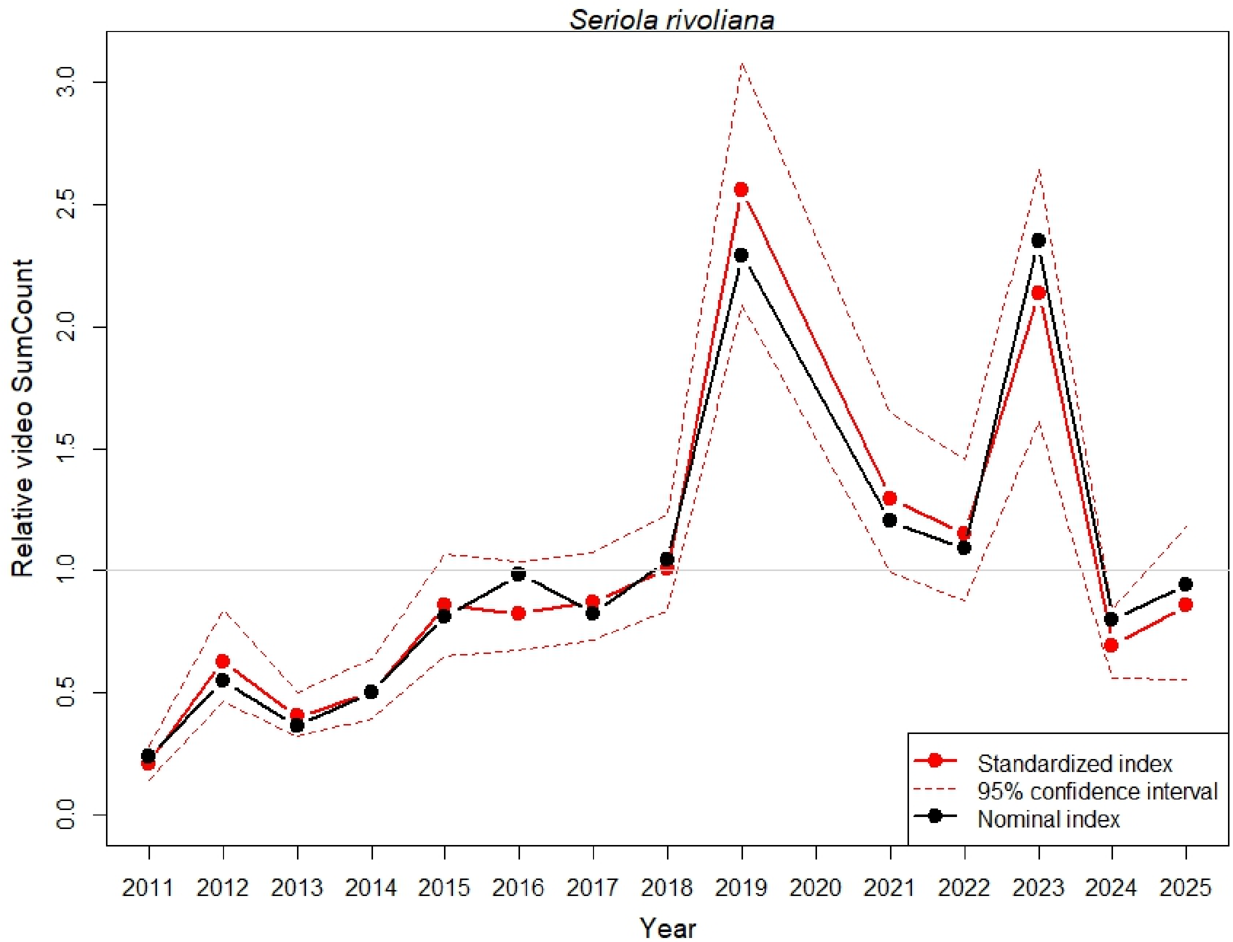
Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.322	0.968	0.858	0.15
2012	1083	0.253	0.614	0.904	0.11
2013	1221	0.241	0.552	0.536	0.13
2014	1382	0.305	0.958	0.969	0.12
2015	1406	0.312	1.292	1.036	0.10
2016	1410	0.332	0.989	0.841	0.11
2017	1422	0.327	1.432	1.391	0.10
2018	1653	0.310	0.822	1.086	0.13
2019	1544	0.316	1.805	1.587	0.12
2020	0	-	-	-	-
2021	1381	0.278	0.825	0.984	0.10
2022	1060	0.307	0.789	0.897	0.11
2023	1376	0.341	1.585	1.511	0.09
2024	1289	0.257	0.819	0.690	0.11
2025	1422	0.191	0.549	0.710	0.17

Greater amberjack (*Seriola dumerili*)



Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.110	0.362	0.358	0.18
2012	1083	0.155	1.264	1.321	0.20
2013	1221	0.143	0.534	0.569	0.13
2014	1382	0.203	0.975	0.960	0.12
2015	1406	0.227	0.966	0.974	0.12
2016	1410	0.225	0.880	0.881	0.12
2017	1422	0.165	0.567	0.627	0.14
2018	1653	0.142	0.381	0.455	0.12
2019	1544	0.198	1.093	0.998	0.14
2020	0	-	-	-	-
2021	1381	0.181	0.968	0.942	0.14
2022	1060	0.203	1.574	1.568	0.20
2023	1376	0.243	2.314	1.904	0.13
2024	1289	0.200	1.255	1.374	0.16
2025	1422	0.169	0.868	1.069	0.14

Almaco jack (*Seriola rivoliana*)



Year	*N*	Proportion positive	Nominal index	Standardized index	CV
2011	590	0.147	0.239	0.207	0.17
2012	1083	0.187	0.547	0.629	0.15
2013	1221	0.168	0.363	0.403	0.12
2014	1382	0.192	0.503	0.501	0.12
2015	1406	0.257	0.814	0.858	0.13
2016	1410	0.294	0.985	0.826	0.11
2017	1422	0.271	0.826	0.873	0.11
2018	1653	0.302	1.042	1.007	0.10
2019	1544	0.397	2.294	2.562	0.10
2020	0	-	-	-	-
2021	1381	0.272	1.204	1.295	0.12
2022	1060	0.290	1.091	1.154	0.13
2023	1376	0.378	2.349	2.136	0.13
2024	1289	0.241	0.802	0.692	0.10
2025	1422	0.228	0.941	0.857	0.20

Methods – video sampling

We used fishery-independent trap video data collected by the Southeast Reef Fish Survey (SERFS) for these analyses. SERFS consists of three fishery-independent programs that sample collaboratively in the SEUS using identical methodologies to sample reef fishes: (1) the Southeast Fishery-Independent Survey, (2) the Marine Resources Monitoring, Assessment, and Prediction program of the South Carolina Department of Natural Resources, and (3) the Southeast Area Monitoring and Assessment Program – South Atlantic. All programs are funded by the National Marine Fisheries Service and work together to sample reef fishes in the region. We used SERFS video data from 2011 to 2025 here, a time when video data were collected by SERFS in a consistent manner.

Stations were selected for sampling using a simple random sampling design. Out of approximately 4,300 stations on or near hardbottom, approximately 1,500 were selected for sampling each year. Most stations sampled in this study were randomly selected stations. Some stations were sampled even though they were not randomly selected for sampling in a given year, primarily to increase efficiency while on research cruises. A small number of new hardbottom stations were sampled each year based on information from fishermen, charts, sonar mapping, or historical data, and included in the analyses if hardbottom was detected. Sampling occurred during daylight hours each year between April or May and September or October on the RV *Savannah*, RV *Palmetto*, RV *Lady Lillian*, SRVx *Sand Tiger*, and NOAA Ship *Pisces*.

SERFS attached video cameras to chevron traps. Chevron traps used in our study were 1.7 m × 1.5 m × 0.6 m in size, with a total volume of 0.91 m^3 (Collins 1990). They were constructed from plastic-coated galvanized 2-mm diameter wire mesh (mesh size = 3.4 × 3.4 cm). Each trap was baited with 24 menhaden (*Brevoortia* spp.). In our study, chevron traps were deployed in groups of 6 or fewer, and each trap was separated from other simultaneously soaking traps by at least 200 m to provide independence among samples (Bacheler et al. 2018).

SERFS attached high-definition video cameras over the mouth and nose of each trap to provide additional data on the abundance and distribution of reef fish since 2011. In 2011–2014, SERFS attached Canon Vixia HF-S200 video cameras in Gates HF-S21 housings over the mouth of each trap deployed, facing away from the trap. In 2015, the survey replaced Canon cameras with GoPro Hero 3+ or 4 cameras (calibration study described below). Fish were only counted on cameras attached over the mouth of each trap. However, an additional camera (GoPro Hero 1, 3+, 4, or Nikon Coolpix S210/S220) was placed over the nose of the trap in order to quantify habitat information in the opposite direction (Bacheler et al., 2014). In 2023, GoPro Hero 3+ or 4 cameras were replaced by GoPro Hero 9 cameras, but settings, resolutions, and fields-of-view were set exactly the same as GoPro Hero 3+/4 cameras so calibration was not required. Videos were excluded from our analyses if they were too dark to identify fish, out of focus, corrupt, or if the corresponding traps were bouncing or moving.

Video-based relative abundance was calculated using a derivation of the MeanCount approach (Schobernd et al., 2014). The most common video reading metric is *MaxN* (Ellis and DeMartini, 1995), which is the maximum number of individuals of a given species observed in a single video frame. Schobernd et al. (2014) showed that *MaxN* was nonlinearly related to true abundance, however, and proposed using the MeanCount approach instead because it was proportionally related to true abundance. MeanCount is calculated as the mean number of individuals of a given species across a series of frames within a video. A potential downside of MeanCount is that the precision of MeanCount may be lower than for *MaxN* (Campbell et al., 2015, but see Schobernd et al., 2014). In our study, MeanCount was calculated as the mean number of individuals of each species across snapshots spaced 30 seconds apart beginning 10 minutes after the trap landed on the bottom (to allow time for the trap to settle) and lasting a total of 20 minutes. Thus, we read 41 frames from each video in our study. For these analyses, we used a derivation of MeanCount called SumCount, which was simply the sum of all individuals of a particular species observed across all video frames in our analysis. When the number of frames read is the same, as was the case in our study, MeanCount and SumCount are exactly linearly related. SumCount was used here instead of MeanCount because our particular modeling approach required count (instead of continuous) data.

A side-by-side camera calibration study took place in 2014 to develop species-specific camera calibration factors between Canon and GoPro cameras. Paired cameras were deployed on 54 traps side-by-side, facing away from the trap mouth, and the subsequent videos were read using the SumCount metric for a variety of species. For each species in which video-based indices of abundance were developed, we calculated species-specific camera calibration coefficients. Fish were more abundant on GoPro compared to Canon videos, so video counts from GoPro cameras in 2015–2025 were decremented using these calibration coefficients to make data from those cameras analogous with data collected by Canon cameras in 2011–2014.

Characteristics of the site and water were obtained for each station sampled in our study. We used the vessel's echosounder to estimate depth (m) and the ship's global positioning unit to estimate latitude. Bottom water temperature (ºC) for each group of simultaneously deployed traps was measured using a "conductivity-temperature-depth" cast. Habitat variables were visually estimated from each of the two cameras attached to traps in our study, one of which (substrate composition) was included in our analyses (see Bacheler et al. [2014] for more details). The percent of the visible substrate that was hard-bottom (hereafter referred to as "substrate composition") was estimated for each camera, and a mean value was calculated for each station sampled. Current direction was estimated as "away", "sideways", or "towards" based on the movement of visible particles in the water relative to the view field of the video camera over the trap mouth. Last, water clarity was classified as "low" if substrate could not be seen, "moderate" if substrate could be seen but not the horizon, and "high" if the horizon was visible in the distance. Video samples were excluded from our analyses if any variables were missing or unknown.

Methods – data analysis

The recommendation of the video index workshop (Bacheler and Carmichael 2014) was to apply a zero-inflated modeling approach to the development of fishery-independent video indices. Zero-inflated models are valuable tools for modeling distributions that do not fit standard error distributions due to excessive number of zeroes. These data distributions are often referred to as "zero-inflated" and are a common condition of count based ecological data. Zero inflation is considered a special case of over-dispersion that is not readily addressed using traditional transformation procedures (Hall 2000, Zeileis et al. 2008). Due to the high proportion of zero counts found in our data set, we used a zero-inflated model approach that accounted for the high occurrence of zero values, as well as the positive counts. The model does so by combining binomial and count processes (Zuur et al. 2009, Zeileis et al. 2008). We assume that there are two biological processes that require different statistical distributions – one for presence-absence and one for SumCount given their presence.

To standardize each species' video SumCounts, we used a zero-inflated negative binomial model formulation as:

$$\text{SumCount} = y + wc + cd + sc + d + t + lat + temp \mid y + wc + cd + sc + d + t + lat + temp$$

where y = year, wc = water clarity, cd = current direction, sc = substrate composition, d = depth, t = day of the year, lat = latitude, and $temp$ = bottom water temperature, and all predictor variables were categorical. In this formulation, variables to the left of the "|" apply to the count sub-model and variables to the right apply to the binomial sub-model. For all ZINB models, we retained full models for simplicity because model selection is time consuming. All data manipulation and analyses were conducted using R version 4.3 (R Core Team 2023). Modeling was executed using the zeroinfl function in the countreg package (Zeileis and Kleiber 2017).

Uncertainty in indices was computed using a bootstrap procedure with N = 1,000 replicates. In each replicate, a data set of the original size was created by drawing observations (rows) at random with replacement. This was done by year to maintain the same annual sample size as in the original data. For each species, the full model was fitted to each bootstrapped data set and uncertainty (CVs and 95% confidence intervals) were computed for the estimated standardized indices. Both the nominal (raw) index and the ZINB standardized index were normalized (scaled) to a mean of 1.

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SEAMAP-SA

RESULTS OF TRAWLING EFFORTS IN COASTAL ATLANTIC WATERS OFF THE SOUTHEASTERN UNITED STATES, 2025

Report #: SEAMAP-SA-CS-2026-001

June 2026

Prepared By

Elizabeth Bullard, Keilin Gamboa-Salazar, and Amy Zimney

SEAMAP - SA Coastal Trawl Survey

South Carolina Department of Natural Resources

Marine Resources Division

Marine Resources Research Institute

Charleston, South Carolina

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INTRODUCTION

The Southeast Area Monitoring and Assessment Program - South Atlantic (SEAMAP-SA) Coastal Trawl Survey (CTS) is funded by the National Marine Fisheries Service (NMFS) and conducted by the South Carolina Department of Natural Resources - Marine Resources Division (SCDNR-MRD). Standardized activities have been in place since 1990. This survey provides long-term, fishery-independent data on seasonal abundance and biomass of all finfish, elasmobranchs, decapod and stomatopod crustaceans, sea turtles, horseshoe crabs, and cephalopods that are accessible by bottom trawls in coastal nearshore waters. Additional data recorded for priority species include measurements of length or width, sex and individual weights for blue crabs, sharks, sea turtles, and horseshoe crabs, and age and reproductive information on selected fish and decapod species.

The COVID-19 pandemic had significant implications for the CTS field sampling operations. Field sampling was suspended from March 2020 until June 2021. When sampling resumed in July 2021, only the catch from one net of two concurrently towed nets, was processed to reduce catch volume, density of personnel on board, and to increase time efficiency. Net comparison analyses were completed in 2020 using historic datasets to ensure this change in protocol did not introduce bias into catch data. A manuscript including these analyses and other considerations has been published under the title “Community composition across a regional bottom trawl survey and interactions with survey design” (Bullard et al., 2026).

Due to level funding and increasing costs of the survey (e.g. vessel rate, staff, etc.), the number of seasons sampled was changed, beginning in 2023, from three sampling seasons: Spring (April-May), Summer (July-August), and Fall (late-September-November), to two seasons: Spring (April-June) and Fall (August-October). This shift in timing optimizes species data used in stock assessments and other analyses, as Summer data are rarely used or used in combination with other seasons, and because an audit of data uses highlighted the need for Spring and Fall data for recruitment indices (i.e. Bluefish and mackerels), while Summer provided no unique data for management. In addition, this change extended the utilized seasons into longer sampling windows with more likely workable weather. In 2024, the R/V *Lady Lillian* replaced the R/V *Lady Lisa*, switching the sampling approach from a double-rigged trawl operation to a stern trawl operation which required a new net configuration, a 60 ft (18.3 m) 4-seam fly trawl.

This report summarizes information on species composition, abundance, and biomass from CTS deployments since the advent of standardized sampling (1990) through the most recent year of finalized data (2025).

METHODS AND MATERIALS

Data Collection

Samples were taken by trawl from the coastal zone in Atlantic waters off the southeastern United States between Cape Hatteras, North Carolina, and Cape Canaveral, Florida within six regions: Raleigh Bay, Onslow Bay, Long Bay, South Carolina, Georgia, and Florida (Figure 1). Multi-legged trips were conducted throughout this range in all sampling seasons, thus providing data for the full spatial range at least twice each year.

Stations were selected randomly from a pool of stations within each of 24 shallow-water strata across regions within the survey range (Figure 1). Strata were delineated by the 4.6 m depth contour inshore and the 9.1 m depth contour offshore. To reduce the variability of the data, the method of allocating the number of stations within each stratum was changed in 2001 from proportional allocation, based on the total surface area of each stratum, to optimal allocation (Thompson, 1992). With the optimal allocation scheme, the number of stations sampled within each stratum is determined annually, with higher effort allocated to strata with historically higher variability of priority species (designated species of management or ecological interest; Table 1). The number of stations allocated to each stratum, during each season in 2025, ranged from three to six with a total of 102 stations selected per season based on the funding available for days at sea.

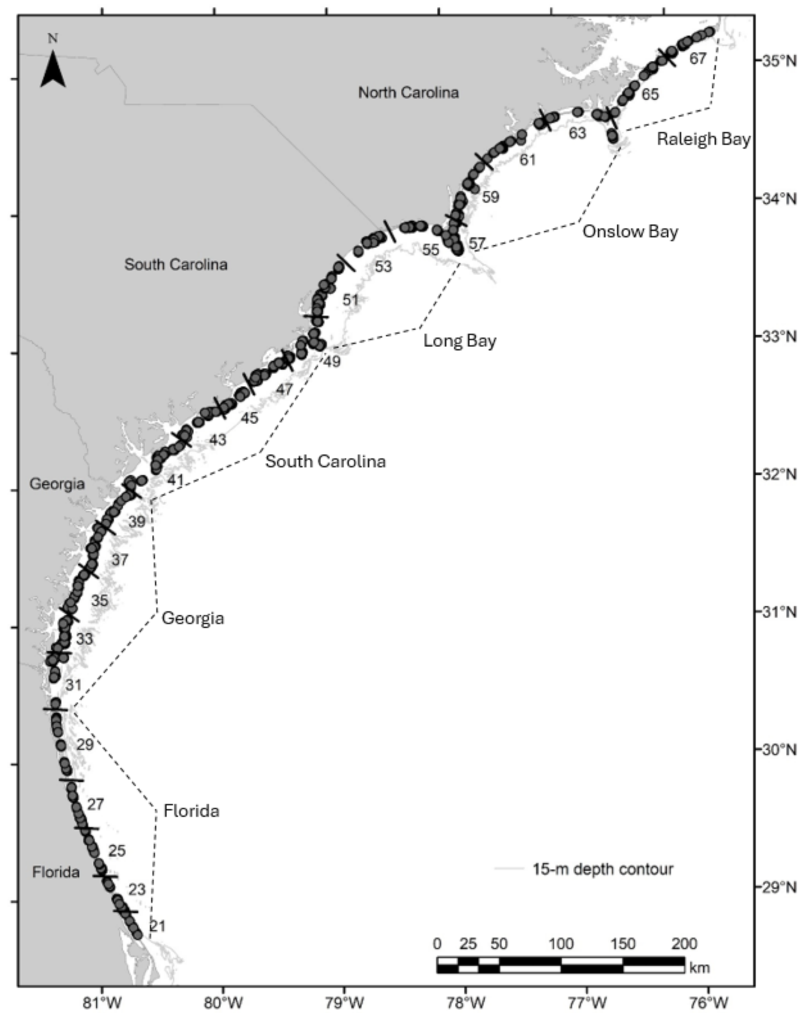


Figure 1. Strata (labelled as numbers) and station locations (gray dots) sampled within each region (names) by the SEAMAP-SA Coastal Trawl Survey.

In 2025, sampling occurred on board the R/V *Lady Lillian*, a 90 ft (27.4 m) stern trawler owned and operated by SCDNR-MRD, using a single 60’ (18.3m) four-seam fly trawl net (manufactured by Beaufort Marine Supply, Beaufort, SC) without a Turtle Excluder Device (TED). The body of the trawl was constructed of #9 Spectra twine with 1.875 in (47.6 mm) stretch mesh. The cod end of the net was constructed of #36 polypropylene twine with 1.625 in (41.3 mm) stretch mesh and was protected by chafing gear of #96 polypropylene net twine with 4 in (10.2 cm) stretch mesh.

Sampling was conducted during daylight hours, from 1 hour after sunrise to 1 hour before sunset. Trawls were towed for 20 min, excluding wire-out and haul-back time, with a target speed of 2.5 kts, relative to ground. Contents of the net were sorted to species (limited exceptions to genus or family only), and total biomass and number of individuals were recorded for all species of finfish, elasmobranchs, decapod and stomatopod crustaceans, cephalopods, sea turtles, xiphosurans, and Cannonball Jellies (*Stomolophus meleagris*). For other miscellaneous invertebrates and algae, which were treated as two separate taxonomic groups, only total biomass was recorded. If researchers were unable to identify a specimen, data were recorded and the specimen preserved and transported to the laboratory at SCDNR-MRD, Marine Resources Research Institute (MRRI), where it was identified to the lowest taxonomic level possible. When trawls contained high volume catches (generally greater than 100 kg), all endangered and rare species and species that pose a risk to staff during handling (e.g. elasmobranchs, catfish, scorpionfish) were removed and given priority for processing. The remaining net contents were subsampled into shrimp baskets. Each shrimp basket was weighed, and a randomly selected basket (two baskets for catches greater than 250 kg) was sorted and processed as described above. Abundance and biomass for each species was then expanded to estimate the total abundance and biomass of each species in the full catch using the ratio of the subsampled basket weight to the total catch weight.

When large numbers of a species occurred in the processed catch (selected basket or full net contents), all individuals of that species were weighed, but only a haphazardly selected subsample was processed for abundance. The species subsample consisted of approximately 32 to 64 individuals when the estimated total number in the processed catch was at least 64 individuals or more than 128, respectively. The total number of individuals in the catch was then estimated based on the ratio of the processed subsample weight to the total weight for that species.

During catch processing (full net contents, selected basket, or haphazardly selected subsample), priority species (Table 1) underwent a Length Frequency work-up (LF) where lengths were measured to the nearest millimeter (mm) for each individual. During LF, some priority species were selected to undergo a Life History work-up (LH; Table 2). LH-selected species are designated at the beginning of each sampling year based on management needs. LH finfish specimens were selected using a proportional sampling design. LH finfish specimens were measured to the nearest mm for total length, fork length, centerline length, and/or standard length, weighed to the nearest gram, and the sex of each individual was determined based on gross gonad morphology. Sagittal otoliths and a representative sample of gonadal tissue were preserved and transported to the laboratory at SCDNR-MRD, MRRI, where samples were processed following accepted standard procedures (Harris *et al*., 2004). LH data were also collected from individual specimens of other LH-selected species including the White Shrimp, *Penaeus setiferus* (total length in mm, sex, female ovarian development, and occurrence of mated females), Blue Crab, *Callinectes sapidus* (carapace width in mm, sex, maturity, and presence and developmental stage of eggs), Horseshoe Crab, *Limulus polyphemus* (prosoma width in mm, individual weight, sex, and maturity), all sharks (total and fork lengths in mm, individual weight, and sex) and marine turtles (curved and straight carapace lengths and widths in cm and individual weight; Table 2). Marine turtles in good condition were released as quickly as possible according to NMFS permitting guidelines, with PIT and flipper tags generally applied if not already present, or numbers logged if prior tags were in place. If a turtle was sick or injured, the turtle rescue coordinator for the state in which the trawl occurred was contacted and consulted regarding whether the turtle would be transferred to rescue staff to receive additional care or released after further observation.

Table 1. Priority species of the SEAMAP-SA Coastal Trawl Survey in 2025.

Common Name	Scientific Name	Common Name	Scientific Name
Finfish		**Elasmobranchs**	
Sheepshead	*Archosargus probatocephalus*	Thresher Shark	*Alopias vulpinus*
Yellowfin Menhaden	*Brevoortia smithi*	Blacknose Shark	*Carcharhinus acronotus*
Atlantic Menhaden	*Brevoortia tyrannus*	Spinner Shark	*Carcharhinus brevipinna*
Black Sea Bass	*Centropristis striata*	Finetooth Shark	*Carcharhinus isodon*
Atlantic Spadefish	*Chaetodipterus faber*	Bull Shark	*Carcharhinus leucas*
Spotted Seatrout	*Cynoscion nebulosus*	Blacktip Shark	*Carcharhinus limbatus*
Weakfish	*Cynoscion regalis*	Dusky Shark	*Carcharhinus obscurus*
Spot	*Leiostomus xanthurus*	Sandbar Shark	*Carcharhinus plumbeus*
Southern Kingfish	*Menticirrhus americanus*	Sand Tiger Shark	*Carcharias taurus*
Gulf Kingfish	*Menticirrhus littoralis*	Tiger Shark	*Galeocerdo cuvier*
Northern Kingfish	*Menticirrhus saxatilis*	Nurse Shark	*Ginglymostoma cirratum*
Atlantic Croaker	*Micropogonias undulatus*	Smooth Dogfish	*Mustelus canis*
Gag Grouper	*Mycteroperca microlepis*	Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*
Gulf Flounder	*Paralichthys albigutta*	Scalloped Hammerhead	*Sphyrna lewini or gilberti*
Summer Flounder	*Paralichthys dentatus*	Bonnethead	*Sphyrna tiburo*
Southern Flounder	*Paralichthys lethostigma*	Spiny Dogfish	*Squalus acanthias*
Harvestfish	*Peprilus paru*	Atlantic Angel Shark	*Squatina dumeril*
Atlantic Butterfish	*Peprilus triacanthus*	**Marine Turtles**	
Black Drum	*Pogonias cromis*	Loggerhead Sea Turtle	*Caretta caretta*
Bluefish	*Pomatomus saltatrix*	Green Sea Turtle	*Chelonia mydas*
Red Drum	*Sciaenops ocellatus*	Leatherback Sea Turtle	*Dermochelys coriacea*
King Mackerel	*Scomberomorus cavalla*	Kemp’s Ridley Sea Turtle	*Lepidochelys kempi*
Spanish Mackerel	*Scomberomorus maculatus*	**Xiphosurans**	
Decapods		Horseshoe Crab	*Limulus polyphemus*
Blue Crab	*Callinectes sapidus*		
Brown Shrimp	*Penaeus aztecus*		
Pink Shrimp	*Penaeus duorarum*		
White Shrimp	*Penaeus setiferus*		

Table 2. Priority species of the SEAMAP-SA Coastal Trawl Survey designated for life history in 2025.

Common Name	Scientific Name	Length/Width	Weight	Sex	Age	Maturity
Finfish						
Weakfish	*Cynoscion regalis*	X	X	X	X	
Spot	*Leiostomus xanthurus*	X	X	X	X	
Southern Kingfish	*Menticirrhus americanus*	X	X	X	X	
Atlantic Croaker	*Micropogonias undulatus*	X	X	X	X	
Bluefish	*Pomatomus saltatrix*	X	X	X	X	X
King Mackerel	*Scomberomorus cavalla*	X	X	X	X	
Spanish Mackerel	*Scomberomorus maculatus*	X	X	X	X	X
Decapods						
Blue Crab	*Callinectes sapidus*	X	X	X		X
White Shrimp	*Penaeus setiferus*	X		X		X
Xiphosurans						
Horseshoe Crab	*Limulus polyphemus*	X	X	X		X
Sharks (all species)		X	X	X		
Marine Turtles (all species)		X	X			

Hydrographic data, including surface to bottom temperature and salinity profile measurements, were logged with a Seabird SBE-19 plusV2 CTD profiler and Star Oddi DST logger at each station. Additionally, sampling depth (start and end) and location data were also recorded.

Data Analysis

Nominal Abundance Estimation

Data from the paired 75 ft mongoose-type Falcon trawl nets (1990-2019) were pooled for analysis to form a standard unit of effort (tow). Single nets (75 ft mongoose-type Falcon trawl: 2021-2023; 60 ft 4-seam fly trawl: 2024-2025) each represented the tow. To create one response variable across net processing strategies, abundance was expressed as number of individuals or biomass in kilograms (kg) per hectare of bottom swept (ha). Estimated area swept by a net was calculated using data collected from Simrad mensuration sensors by multiplying the average width of the net opening (75 ft mongoose-type Falcon trawl: 14.9 m for one net processed, 29.8 m for two nets processed; 60 ft 4-seam fly trawl: 11.3 m), by the distance in meters (m) trawled and dividing the product by 10,000 m2/ha. If area swept could not be accurately estimated (e.g., U-turn was executed to avoid entanglement with other gear or vessels), the tow was omitted from analyses. Tows with missing covariate information also were excluded from analysis (e.g. bottom temperature or bottom salinity) (Appendix 1). Annual nominal mean abundance was calculated by determining the sum of the number of individuals caught per hectare, divided by the total number of tows for that year (Equation 1).

Equation 1.

$$\text{Annual Abundance} = \left(\Sigma \frac{\#\ individuals\ caught}{tow\ area\ swept(ha)}\right)/\#\ \text{tows}$$

The nominal abundance was then normalized by dividing the annual abundance by the mean abundance for the time series to produce relative abundance. This provided a reference point for individual years in relation to the time series as a whole, with a value of 1 being the long-term mean.

Abundance Standardization

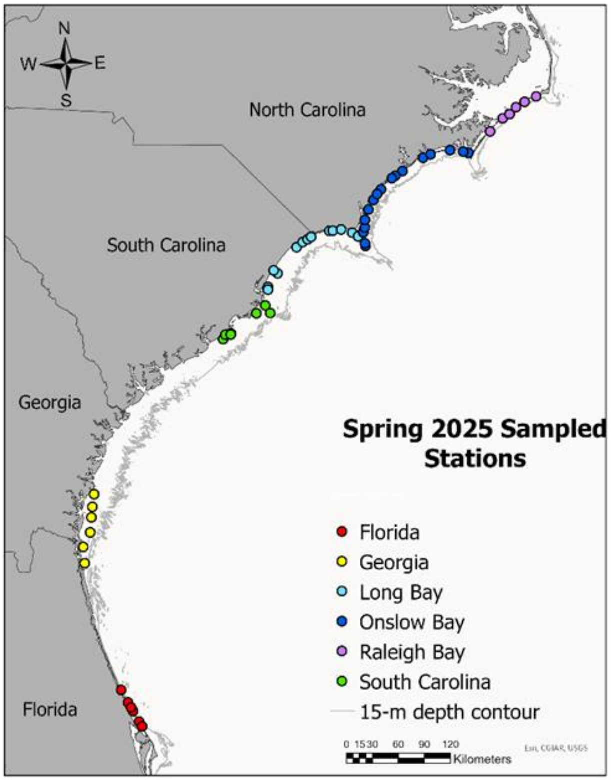
Abundance estimates were standardized to account for variation in sampling resulting from incomplete seasonal and regional sampling coverage using zero-inflated model structures. Zero-inflated model structures may improve fit, reduce bias in standard errors, and reduce overdispersion caused by the excessive zeros that can occur in ecological count data sets (Zuur et al, 2009). Additionally, these model structures allow the use of continuous covariates, to account for the change in seasonal timing by using day of year in the models instead of categorical seasons. Model structures considered included zero inflated Poisson GAM (ZIP) and zero-inflated negative binomial GAM (ZINB). All analyses were performed in R (R Core Team, 2026). Standardized procedures were based on Ballenger et al. (2017) using the FishyR package (Ballenger, 2022) using modified R scripts and methodology.

Priority species selected for abundance standardization were those where the species was present in ≥ 1.5% of tows in the full time series (i.e., percentage required for convergence of standardization models). *Year*, *day of year (DOY)*, *latitude, bottom temperature*, and *bottom salinity* were included as model covariates. Tows missing covariate information were excluded from analysis (Appendix 1). All covariates were continuous variables with polynomial shapes. The maximum allowed order for each polynomial, except *year*, was based on preliminary GAMs but was limited to a maximum fourth order under the assumption that higher order polynomials would not have biological relevance and the potential for higher order polynomials to increase processing time for models. Because of widely differing scales of *DOY, latitude, bottom temperature, and bottom salinity*, each was centered by subtracting the individual covariate mean and scaled, by dividing the centered values by their standard deviation prior to calculating the GAMs to improve model stability. *Year* was not limited for polynomial order or centered as it was a focal value for results. There were two components of the model: presence/absence and abundance when present. Catch per cubic meter per tow was modeled versus all covariates to inform the polynomial order for the count sub-model. The presence/absence data were modeled versus all covariates for the zero-inflation sub-model. Model selection was based on Bayesian information criteria to increase the penalty associated with adding parameters to the model. A two-step optimization process was utilized due to computational demands. All covariates were removed from the zero-inflation sub-model and the count sub-model was optimized for all covariates. The count sub-model optimal values were fixed, and the covariate structure of the zero-inflation sub-model was optimized. We allowed for the possibility that different covariates can be included in the zero-inflated sub-model and catch sub-model for each species. The only exception was *year*, which was required in both sub-models. All analyses were performed in R (R Development Core Team 2026). The zero-inflated models in R were developed using the function zeroinfl available in the package pscl (Jackman, 2011; Zeileis et al, 2008). Annual year effect coefficients of variation (CVs) were computed using bootstrapping procedures of 5,000 iterations. As with the nominal index, the standardized index was normalized by dividing the annual standardized abundance by the mean standardized abundance for the time series, with a value of 1 being the mean for the time series.

RESULTS AND DISCUSSION

Sampling Effort

In 2025, 157 of the 204 allocated stations were sampled (55 stations in Spring and 102 stations in Fall; Figure 2). A total of 12 stations were completed in Raleigh Bay, 34 stations in Onslow Bay, 26 stations in Long Bay, 26 stations in South Carolina, 29 stations in Georgia, and 30 stations in Florida. Missed stations were due to transmission issues with the R/V *Lady Lillian*.



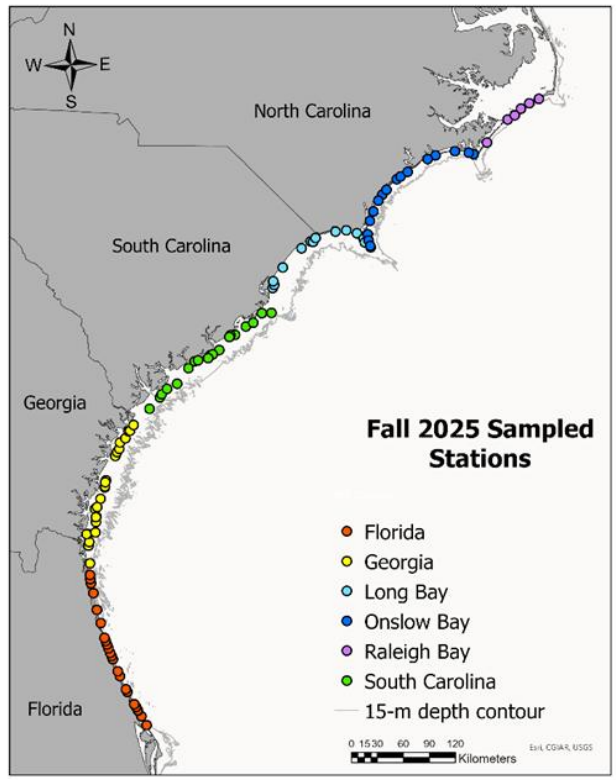


Figure 2. Stations sampled by the SEAMAP-SA Coastal Trawl Survey in 2025 during the Spring (April-June) and Fall (August-October) cruises. Different colored circles indicate sampling locations in various regions.

Hydrographic Measurements

The annual mean bottom temperature (25.9 ℃) was 2.5 degrees higher than the long-term mean bottom temperature (23.4 ℃; 1990-2025). The annual mean bottom salinity (34.8) was 0.2 higher than the long-term mean bottom salinity (34.6). The observed differences may be due to the overall shift in seasonal timing (later start, earlier finish), but the increase in mean bottom temperature is consistent with long-term trends in the region (Craig et al, 2021).

Species Composition

The 2025 sampling effort resulted in the collection of 141 identified taxa (i.e., species, genus, or family; Appendix 2). Trawls produced 87 species of finfish, 27 species of decapod crustaceans, 18 species of elasmobranchs, 3 species of marine turtles, 3 genera of cephalopods, 2 species of stomatopod crustaceans, and 1 species of xiphosuran. Species richness, the number of taxa collected, was greatest during Fall, and in Georgia waters (Table 3). Species richness was lowest in Raleigh Bay.

Table 3. Summary of the number of stations sampled, species richness (number taxa collected), the total number of individuals and weight (kg), and the nominal CPUE in abundance (individuals/ha) and biomass (kg/ha) by season and region in 2025. Excludes miscellaneous invertebrates, Cannonball Jellies, and algae.

		Species	Total	Total	CPUE	
	Stations	Richness	Number	Weight	Abundance	Biomass
Season						
Spring	55	73	93,150	8,040.66	1,043.812	51.1519
Fall	102	121	177,375	8,692.24	1,002.400	86.5267
Region						
Raleigh Bay	12	57	14,430	809.31	716.805	40.2022
Onslow Bay	34	79	55,497	5,241.01	987.966	93.3013
Long Bay	26	72	64,872	3,254.67	1,464.181	73.4590
South Carolina	26	77	29,731	1,540.21	984.085	35.4388
Georgia	29	80	44,790	2,558.01	935.171	53.4088
Florida	30	70	61,205	3,329.69	1,202.668	65.4279

Abundance and Biomass Estimates

In 2025, the CTS caught an estimated 270,525 individuals (1029.172/ha), excluding miscellaneous invertebrates, Cannonball Jellies, and algae, with a biomass of 16,732.91 kg (63.658 kg/ ha) (Appendix 2). Miscellaneous invertebrates, Cannonball Jellies (n = 3,004), and algae contributed an additional 3,237.81 kg (12.318 kg/ ha) to the total biomass in 2025.

Abundance of Priority Finfish Species

Brevoortia smithi

The nominal and ZINB standardized abundance (hereinafter referred to as the nominal abundance and standardized abundance) of Yellowfin Menhaden, *Brevoortia smithi,* increased slightly in 2025 but has remained relatively stable since 2021 (Figure 3A). Both the nominal and standardized abundance remained below the time series mean. Fork lengths ranged from 22 to 28 cm with a mean fork length of 25 cm (Figure 3B).

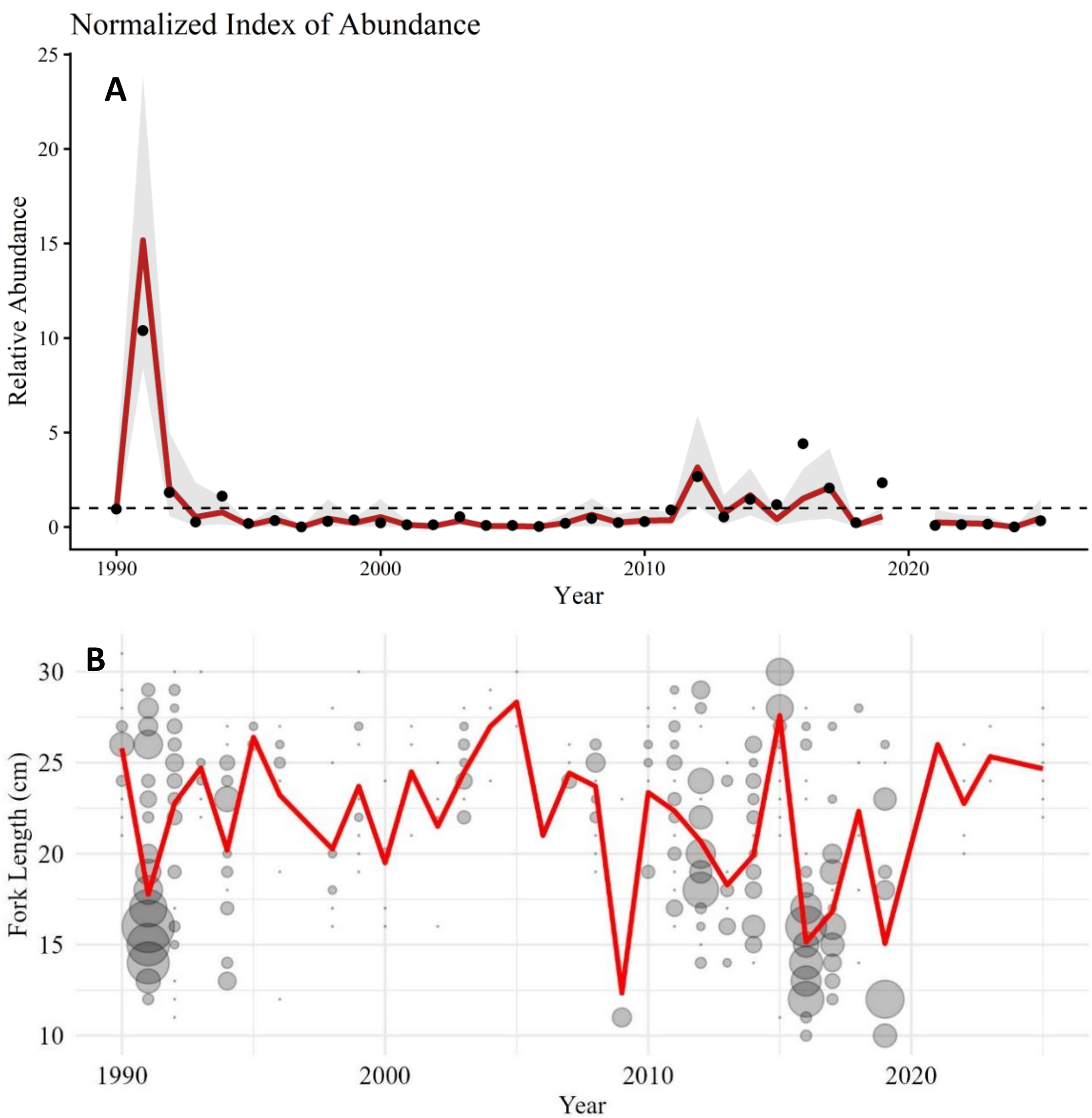


Figure 3. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Brevoortia smithi* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean fork length of *Brevoortia smithi* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Brevoortia tyrannus

The nominal and standardized abundance of Atlantic Menhaden, *Brevoortia tyrannus*, increased slightly in 2025 relative to 2024 (Figure 4A), however they both remained below the time series mean. Fork lengths ranged from 10 to 18 cm with a mean fork length of 11 cm, the lowest mean fork length value in the time series (Figure 4B).

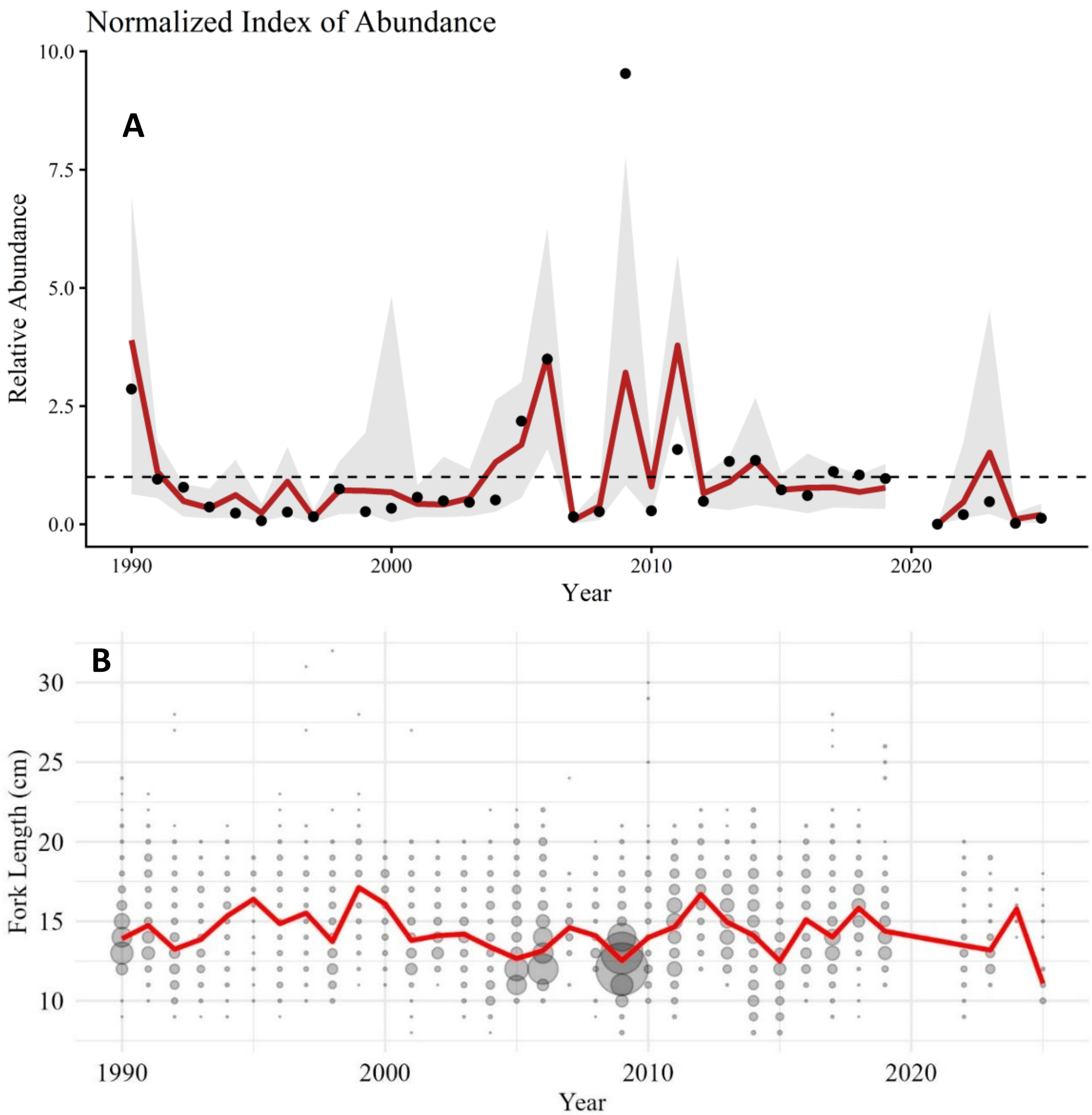


Figure 4. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Brevoortia tyrannus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean fork length of *Brevoortia tyrannus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Centropristis striata

The nominal and standardized abundance of Black Sea Bass, *Centropristis striata,* increased in 2025 relative to 2024 (Figure 5A). The nominal abundance remained below the time series mean, while the standardized abundance had a larger increase and moved just above the time series mean. Total lengths ranged from 11 to 16 cm with a mean total length of 14 cm, the lowest mean total length value in the time series (Figure 5B). Otoliths and gonads were collected from 15 Black Sea Bass (Spring = 7, Fall = 8) for life history research in 2025 for the Reef Fish Survey of the Coastal Research Section.

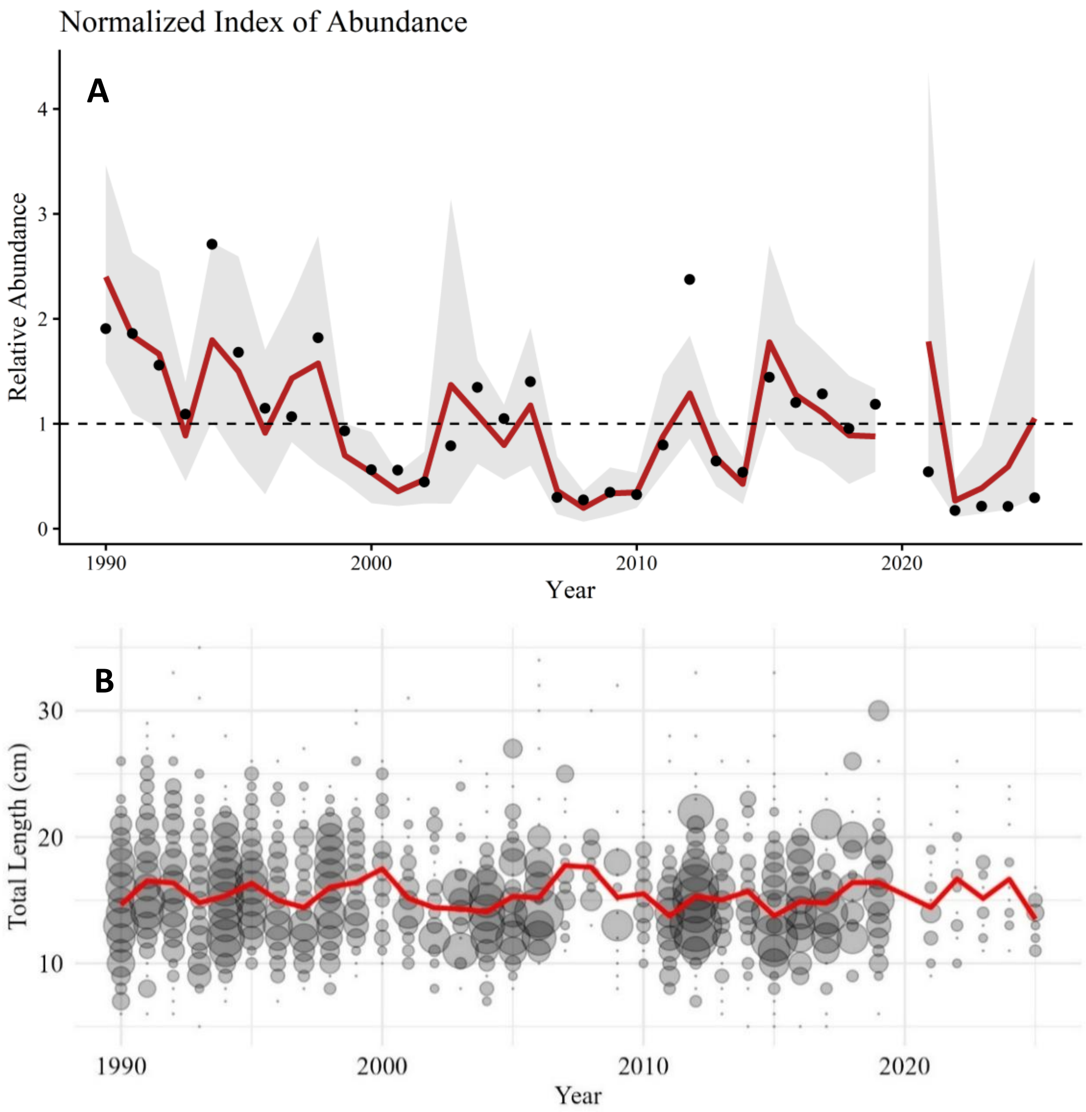


Figure 5. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Centropristis striata* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Centropristis striata* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Chaetodipterus faber

The nominal and standardized abundance of Atlantic Spadefish, *Chaetodipterus faber,* increased in 2025 relative to 2024 (Figure 6A). The nominal abundance remained below the time series mean, while the standardized abundance moved above the time series mean. Total lengths ranged from 5 to 22 cm with a mean total length of 11 cm (Figure 6B).

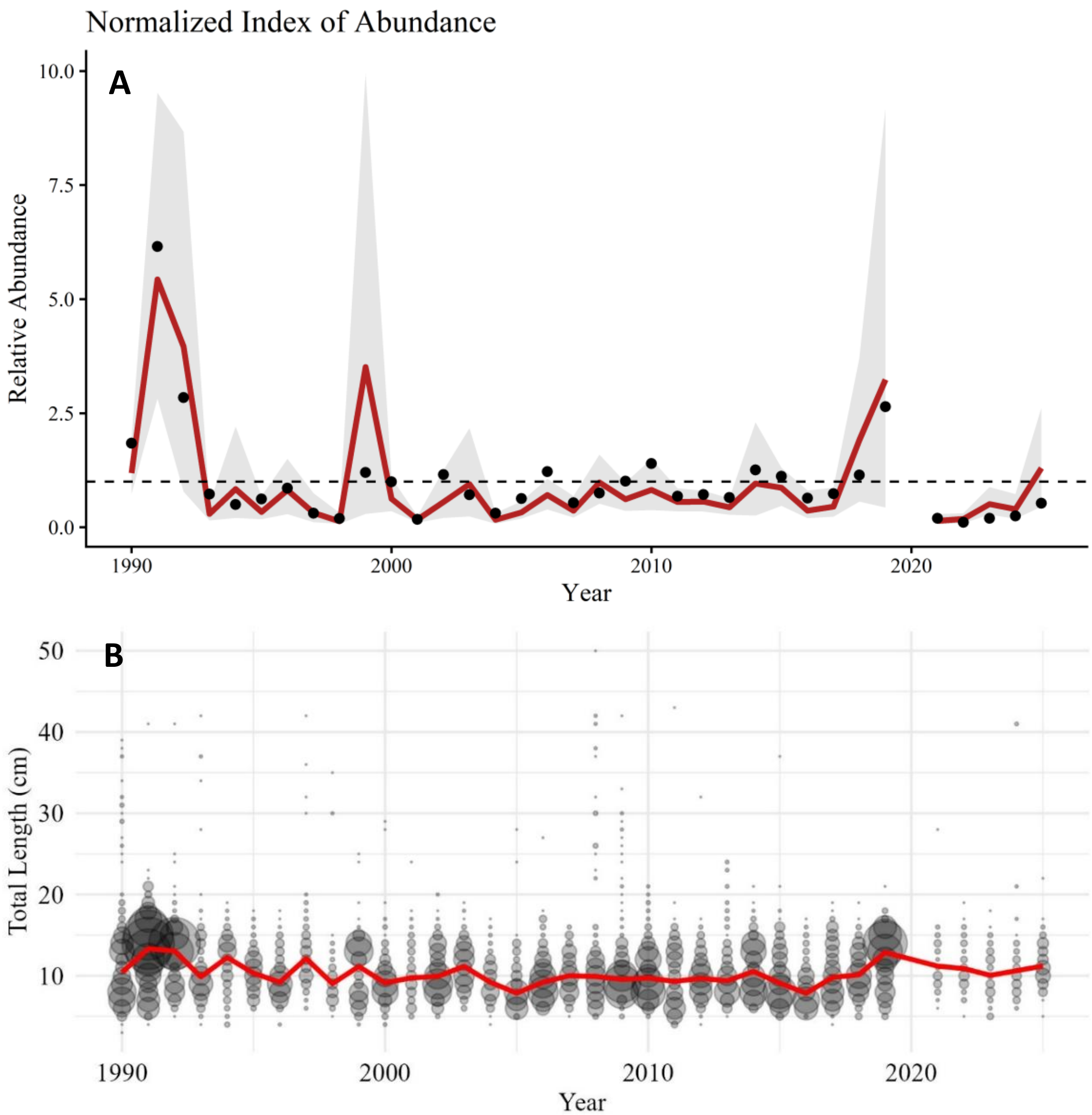


Figure 6. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Chaetodipterus faber* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Chaetodipterus faber* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Cynoscion regalis

The nominal abundance of Weakfish, *Cynoscion regalis,* increased slightly in 2025 relative to 2024, while the standardized abundance decreased between the years. The nominal abundance remained below the time series mean while the standardized abundance remained above the time series mean (Figure 7A). Total lengths ranged from 10 to 37 cm with a mean total length of 19 cm (Figure 7B). Otoliths were collected from 357 Weakfish (Spring = 102, Fall = 255) for life history research in 2025.

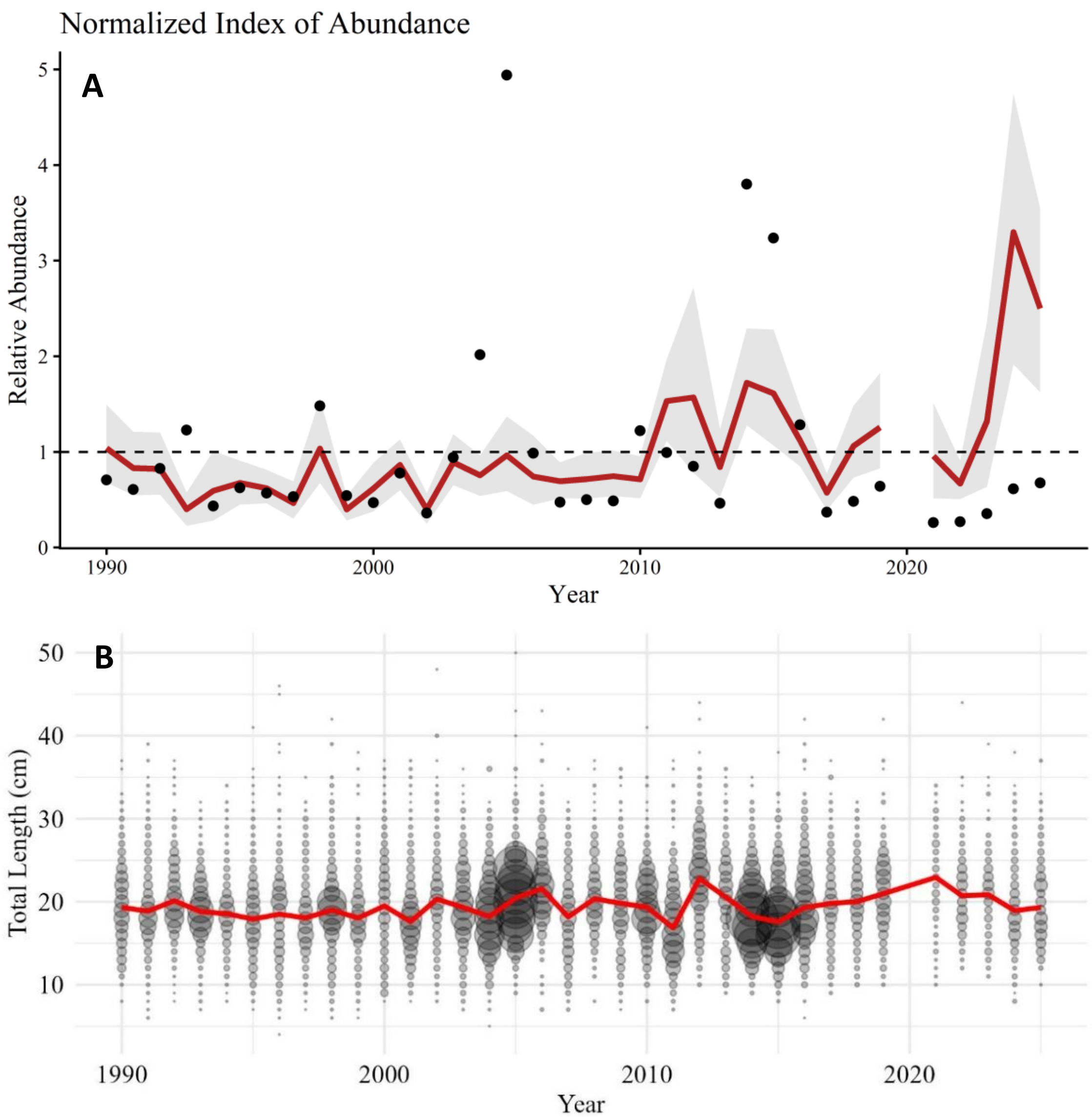


Figure 7. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Cynoscion regalis* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Cynoscion regalis* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Leiostomus xanthurus

The nominal and standardized abundance of Spot, *Leiostomus xanthurus*, increased in 2025 relative to 2024 (Figure 8A). The nominal abundance shifted to just above the time series mean, similar to the nominal abundance in 2023. The standardized abundance remained above the time series mean and was the highest standardized abundance recorded in the time series. Centerline lengths ranged from 8 to 23 cm with a mean centerline length of 15 cm (Figure 8B). Otolith samples were collected from 453 Spot (Spring = 180, Fall = 273) for life history research in 2025.

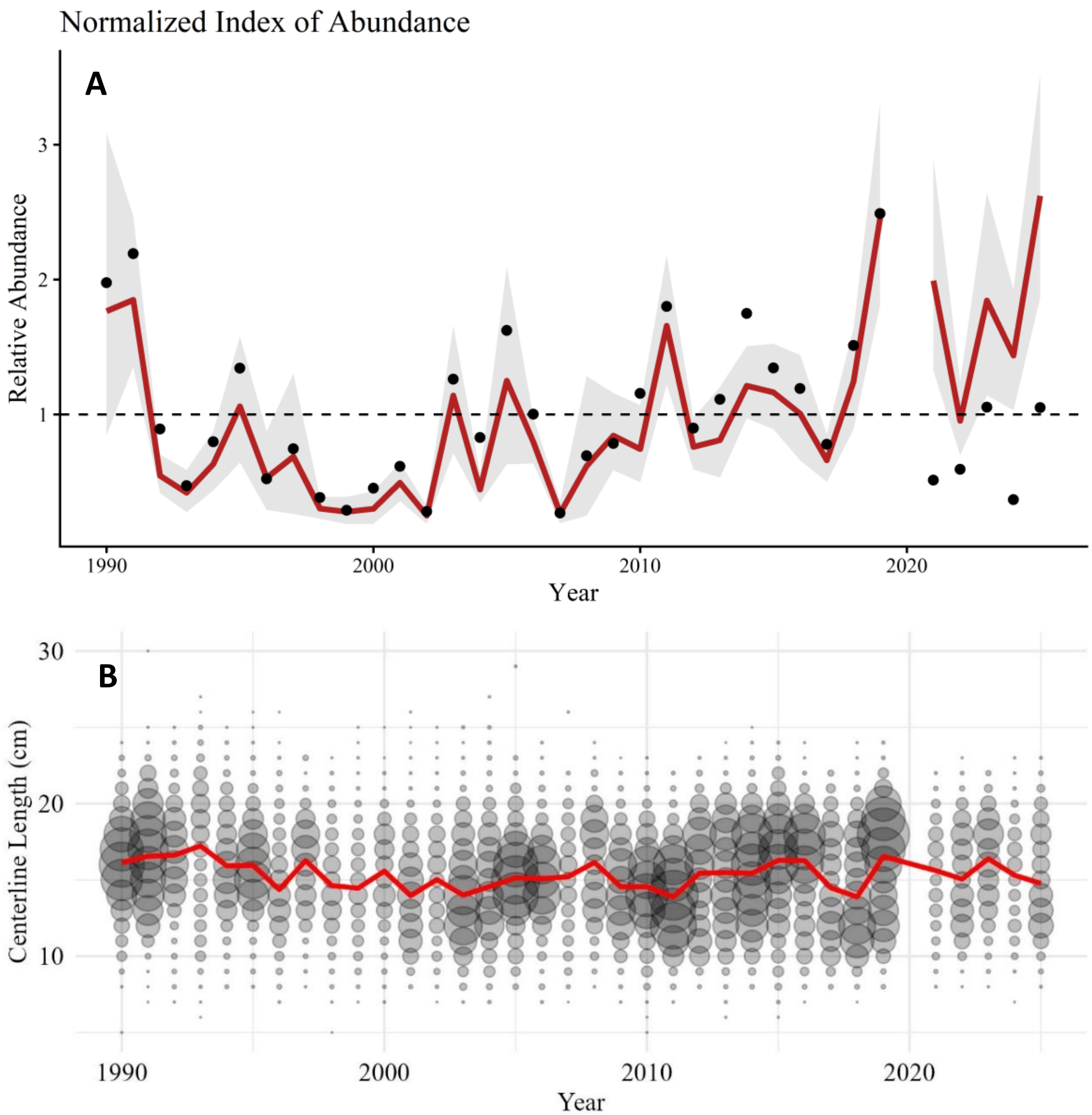


Figure 8. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Leiostomus xanthurus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean centerline length of *Leiostomus xanthurus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Menticirrhus americanus

Both the nominal and standardized abundance of Southern Kingfish, *Menticirrhus americanus*, increased relative to 2024 (Figure 9A). While the nominal abundance remained below the time series mean, the standardized abundance moved above the time series mean. Total lengths ranged from 7 to 35 cm with a mean total length of 18cm (Figure 9B). Otolith samples were collected from 386 Southern Kingfish (Spring = 125, Fall = 261) for life history research in 2025.

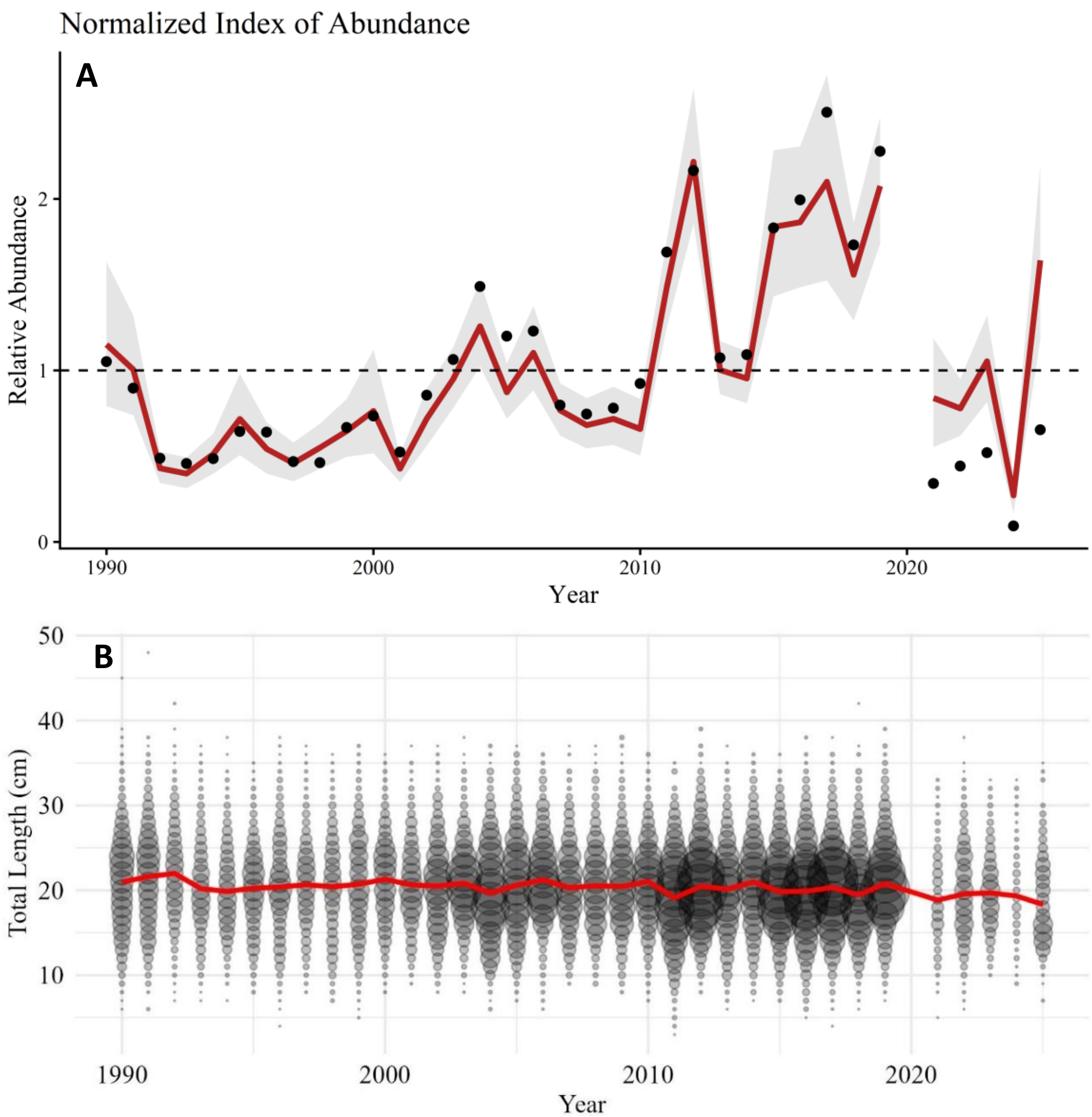


Figure 9. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Menticirrhus americanus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Menticirrhus americanus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Menticirrhus littoralis

The nominal and standardized abundance of Gulf Kingfish, *Menticirrhus littoralis*, increased relative to 2024 (Figure 10A). The nominal abundance increased to just below the time series mean, and the standardized abundance increased above the time series mean. Total lengths ranged from 17 to 32 cm with a mean total length of 24 cm (Figure 10B).

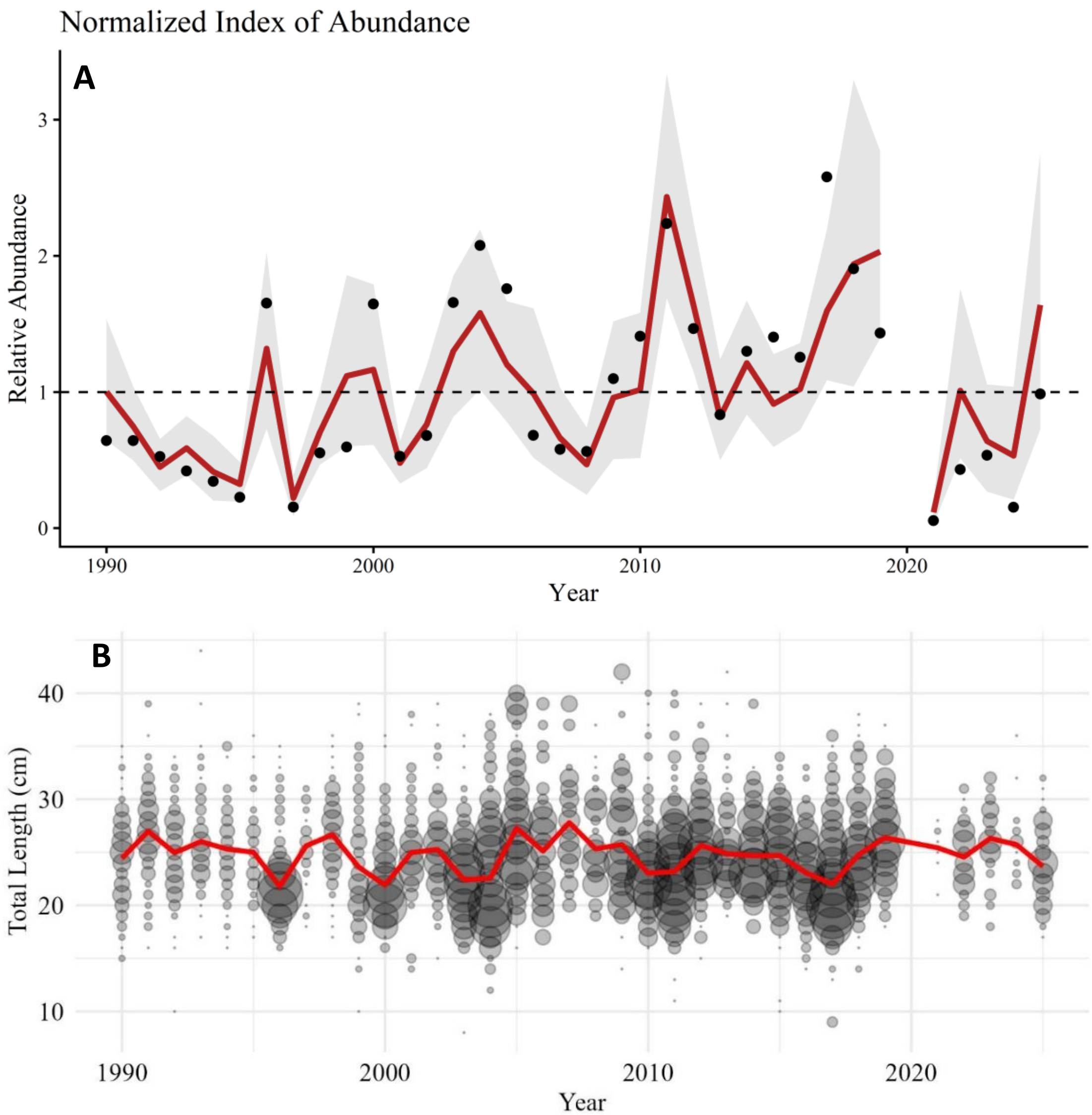


Figure 10. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Menticirrhus littoralis* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Menticirrhus littoralis* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Micropogonias undulatus

The nominal and standardized abundance of Atlantic Croaker, *Micropogonias undulatus*, increased in 2025 compared to the abundances in recent years (Figure 11A). The nominal abundance increased above the times series mean while the standardized abundance remained above the times series mean. Total lengths ranged from 5 to 25 cm with a mean total length of 17 cm (Figure 11B). Otolith samples were taken from 309 Atlantic Croaker specimens (Spring = 96, Fall = 213) for life history research in 2025.

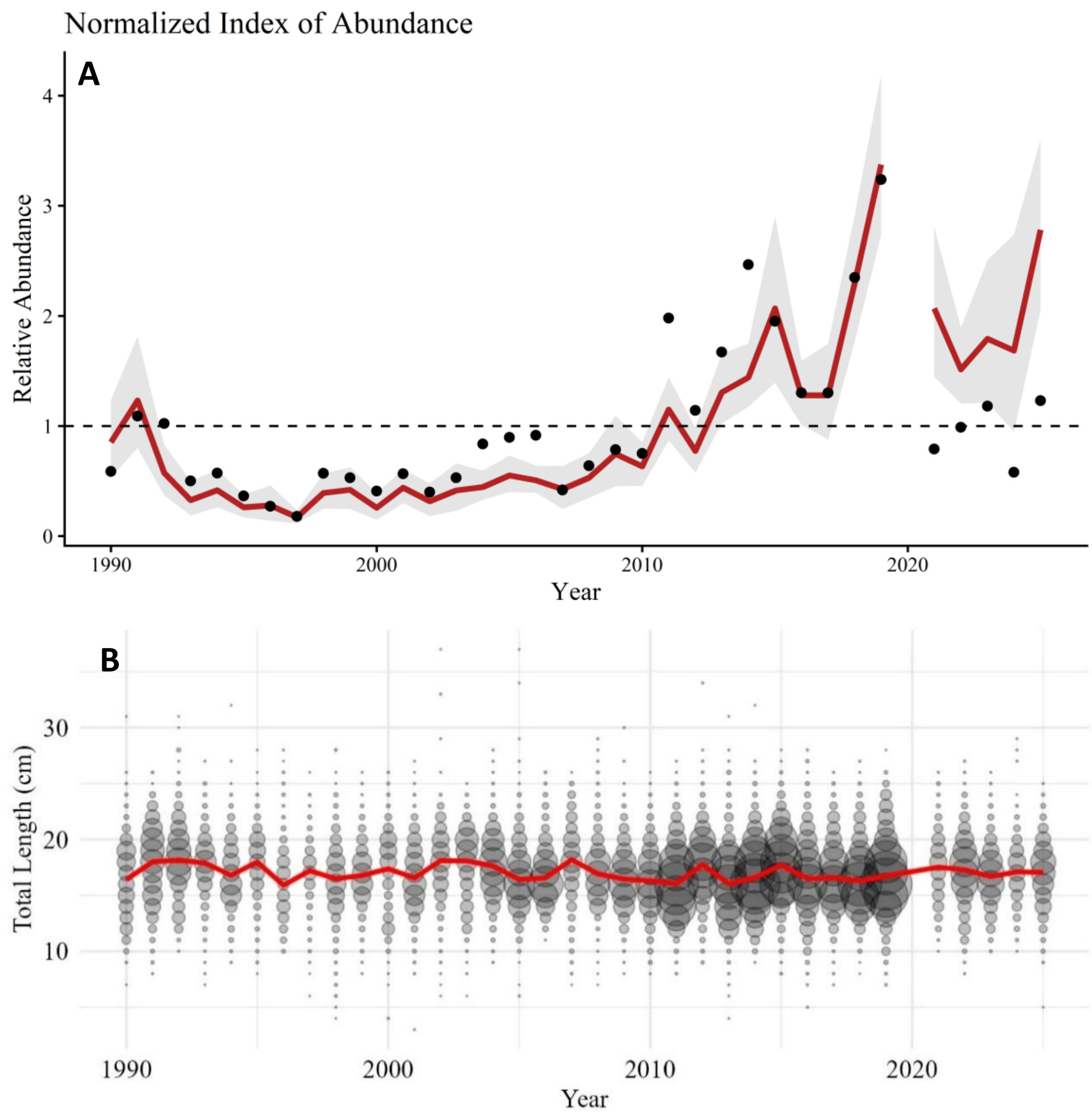


Figure 11. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Micropogonias undulatus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Micropogonias undulatus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Paralichthys albigutta

Both the nominal and standardized abundance of Gulf Flounder, *Paralichthys albigutta*, decreased in 2025 relative to 2024, but each remained above the time series mean (Figure 12A). Total lengths ranged between 16 and 38 cm with a mean total length of 24 cm (Figure 12B).

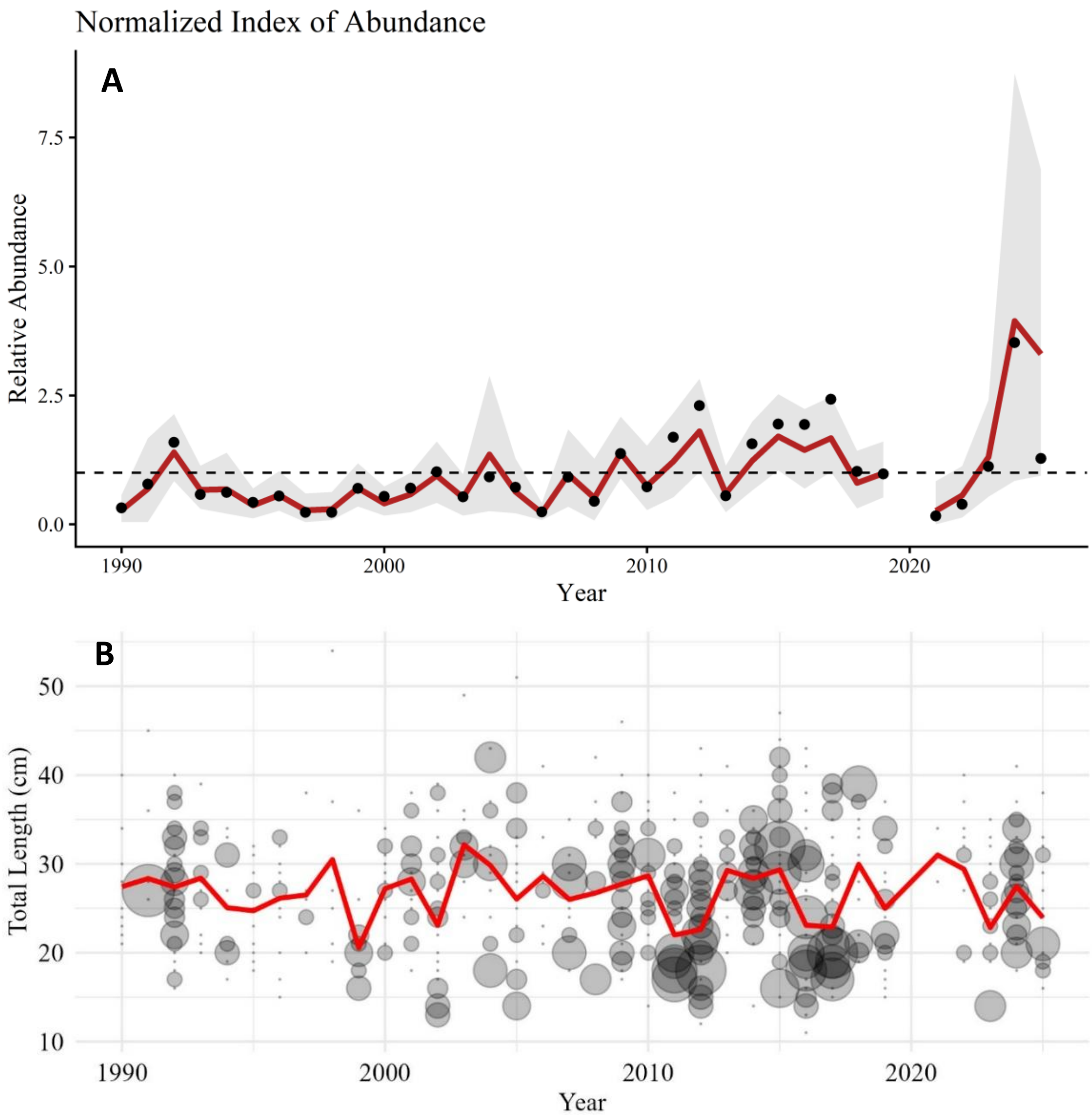


Figure 12. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Paralichthys albigutta* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Paralichthys albigutta* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Paralichthys dentatus

The nominal and standardized abundance of Summer Flounder, *Paralichthys dentatus*, increased in 2025 to a value similar to the nominal and standardized abundances in 2021 (Figure 13A). While the nominal abundance remained below the time series mean, the standardized abundance was relatively similar to the time series mean. Total lengths ranged between 13 and 38 cm with a mean total length of 22 cm (Figure 13B).

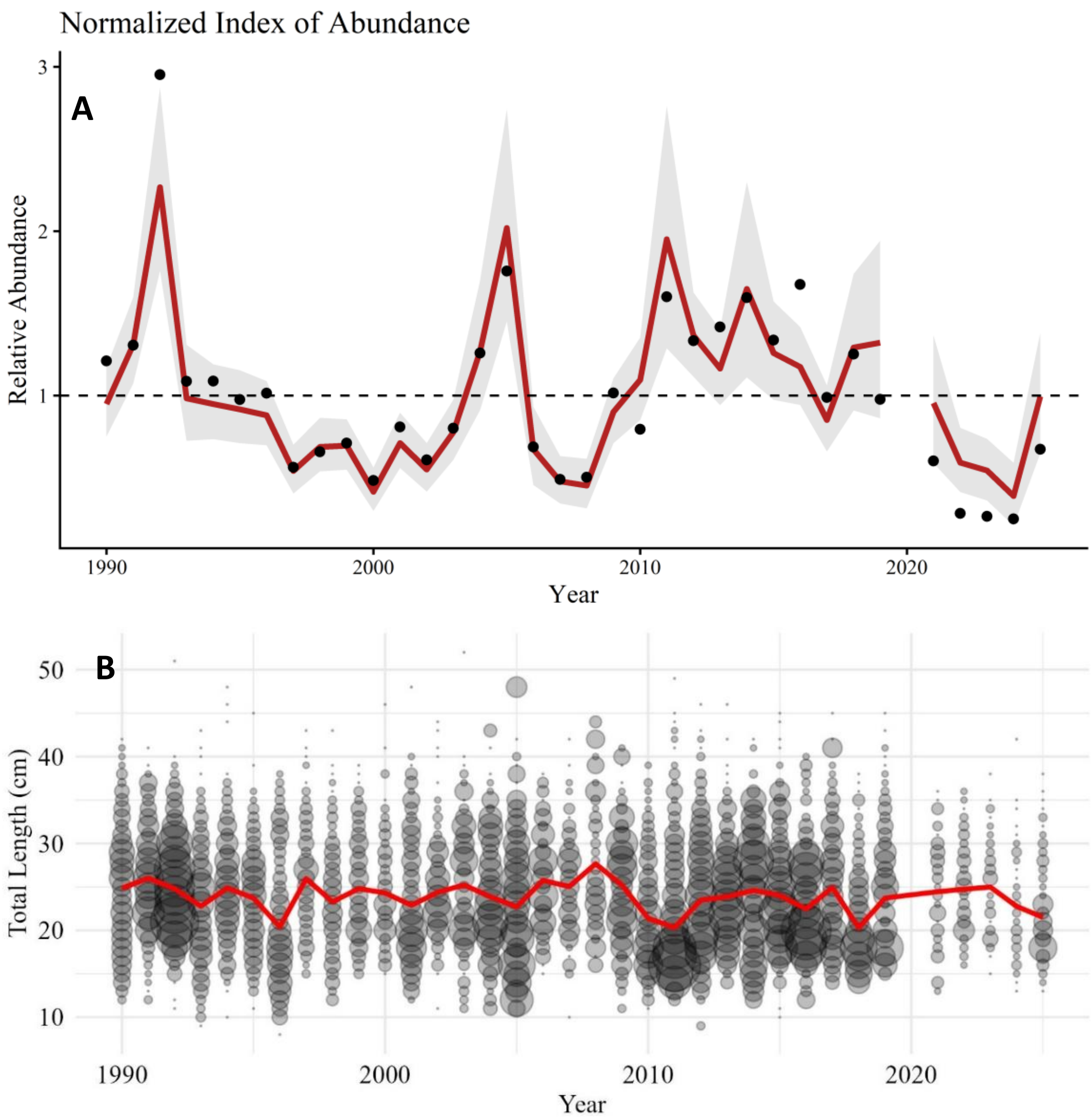


Figure 13. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Paralichthys dentatus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Paralichthys dentatus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Paralichthys lethostigma

The nominal and standardized abundance of Southern Flounder, *Paralichthys lethostigma*, increased in 2025 compared to 2024 (Figure 14A). The nominal and standardized abundance remained above the times series mean and were the highest nominal and standardized abundances recorded during the time series. Total lengths ranged from 21 to 45 cm with a mean total length of 32 cm (Figure 14B).

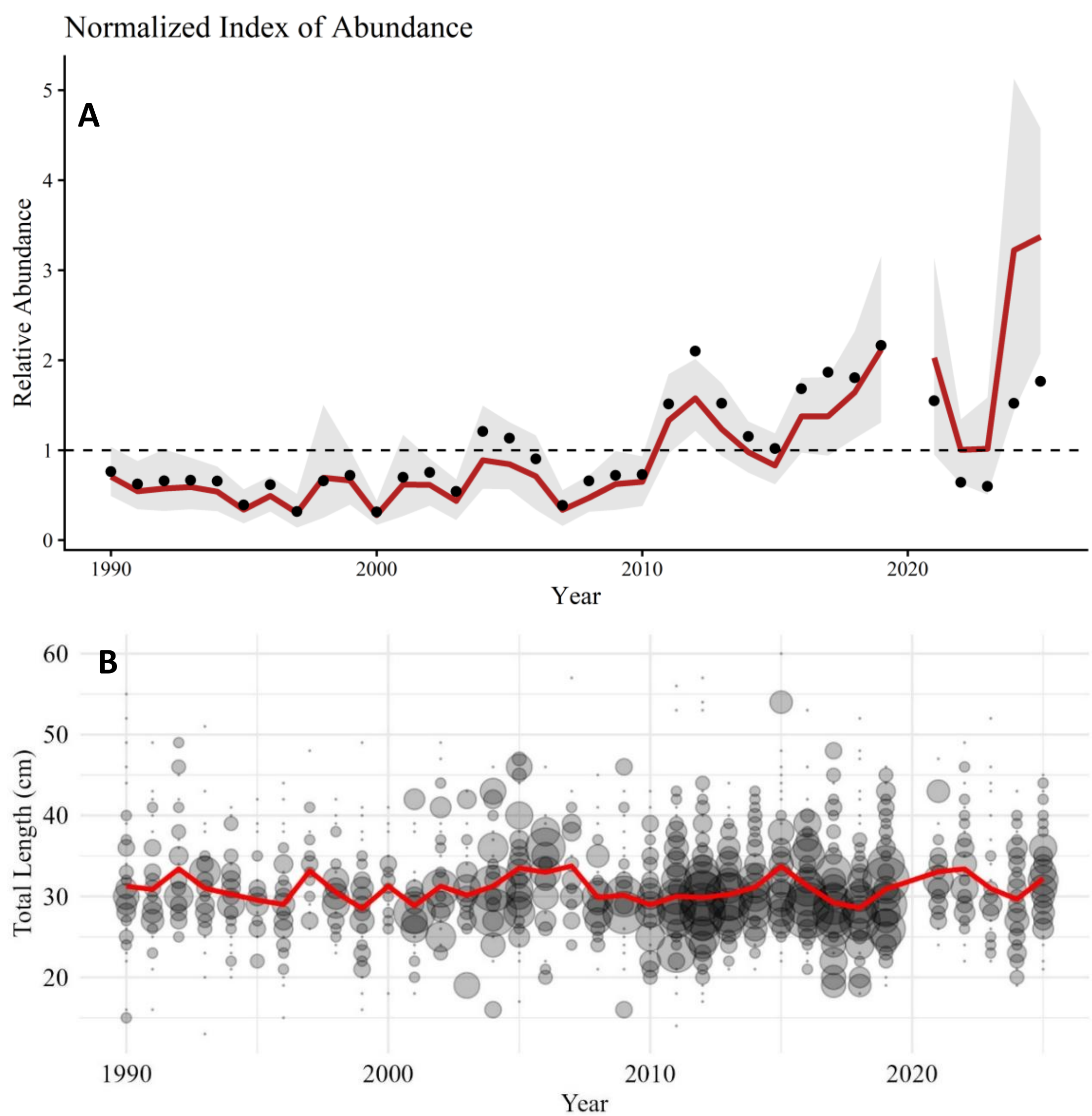


Figure 14. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Paralichthys lethostigma* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Paralichthys lethostigma* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Peprilus paru

Both the nominal and standardized abundance of Harvestfish, *Peprilus paru*, in 2025 were relatively similar to abundances in 2024 (Figure 15A). The nominal abundance decreased slightly and was the lowest recorded abundance since 2004, while the standardized abundance remained relatively similar to 2024. Both remained below the time series mean. Fork lengths ranged from 3 to 19 cm with a mean fork length of 11 cm (Figure 15B).

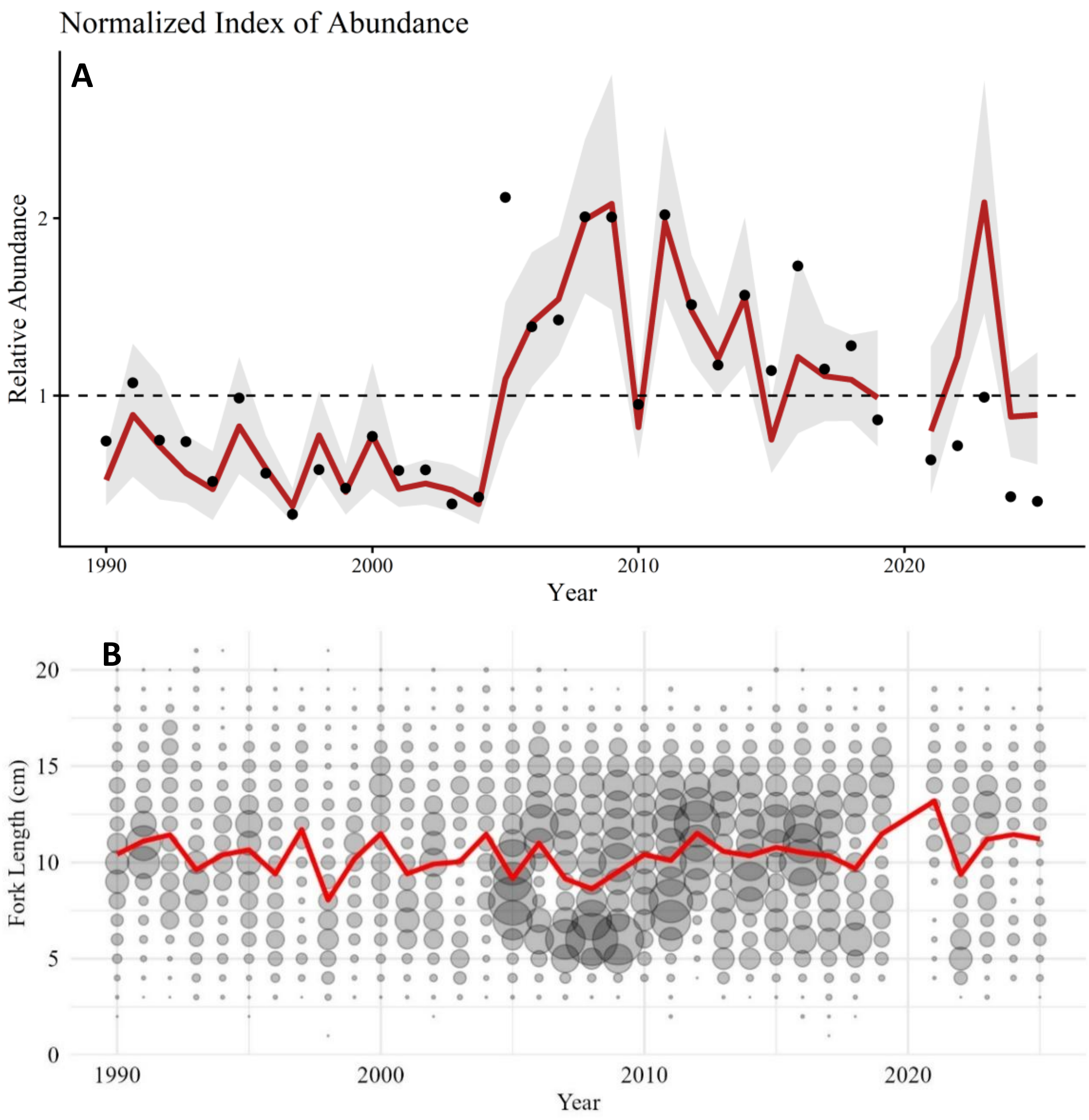


Figure 15. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Peprilus paru* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean fork length of *Peprilus paru* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Peprilus triacanthus

The nominal abundance of Atlantic Butterfish, *Peprilus triacanthus,* increased slightly from 2024 to 2025, while the standardized abundance decreased between the years (Figure 16A). The nominal abundance remained below the time series mean, while the standardized abundance remained above the time series mean. Fork lengths ranged from 3 to 19 cm with a mean fork length of 10 cm (Figure 16B).

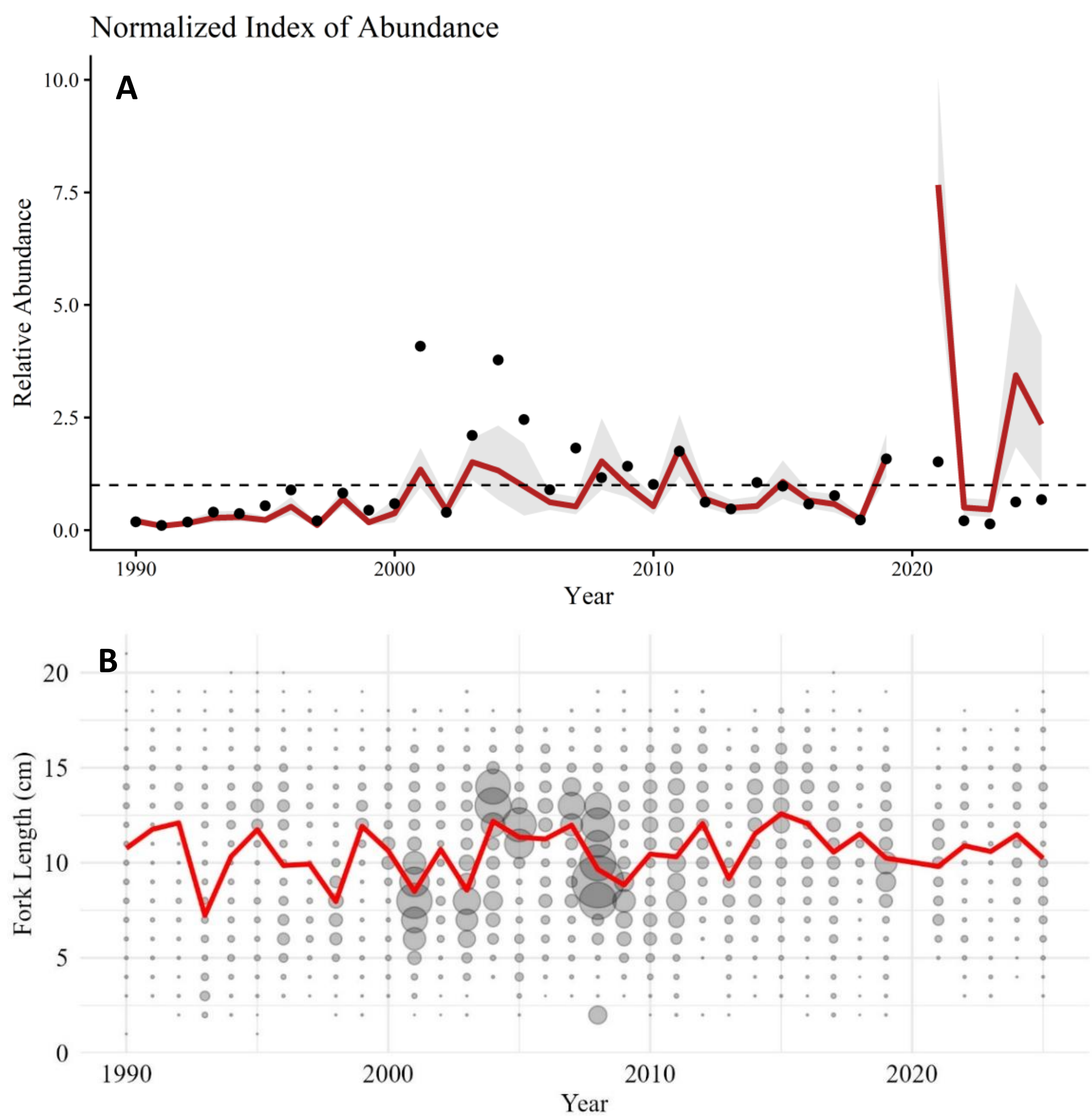


Figure 16. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Peprilus triacanthus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean fork length of *Peprilus triacanthus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Pomatomus saltatrix

The nominal abundance of Bluefish, *Pomatomus saltatrix*, increased in 2025 relative to 2024 and was the highest nominal abundance since 2015, although it remained below the time series mean (Figure 17A). The standardized abundance decreased relative to 2024 but remained above the time series mean. Fork lengths ranged from 8 to 34 cm with a mean fork length of 19 cm (Figure 17B). Otolith samples were collected from 261 Bluefish (Spring = 183, Fall = 78) and gonad tissue samples were collected from 101 specimens (Spring = 69, Fall = 32) for life history research in 2025.

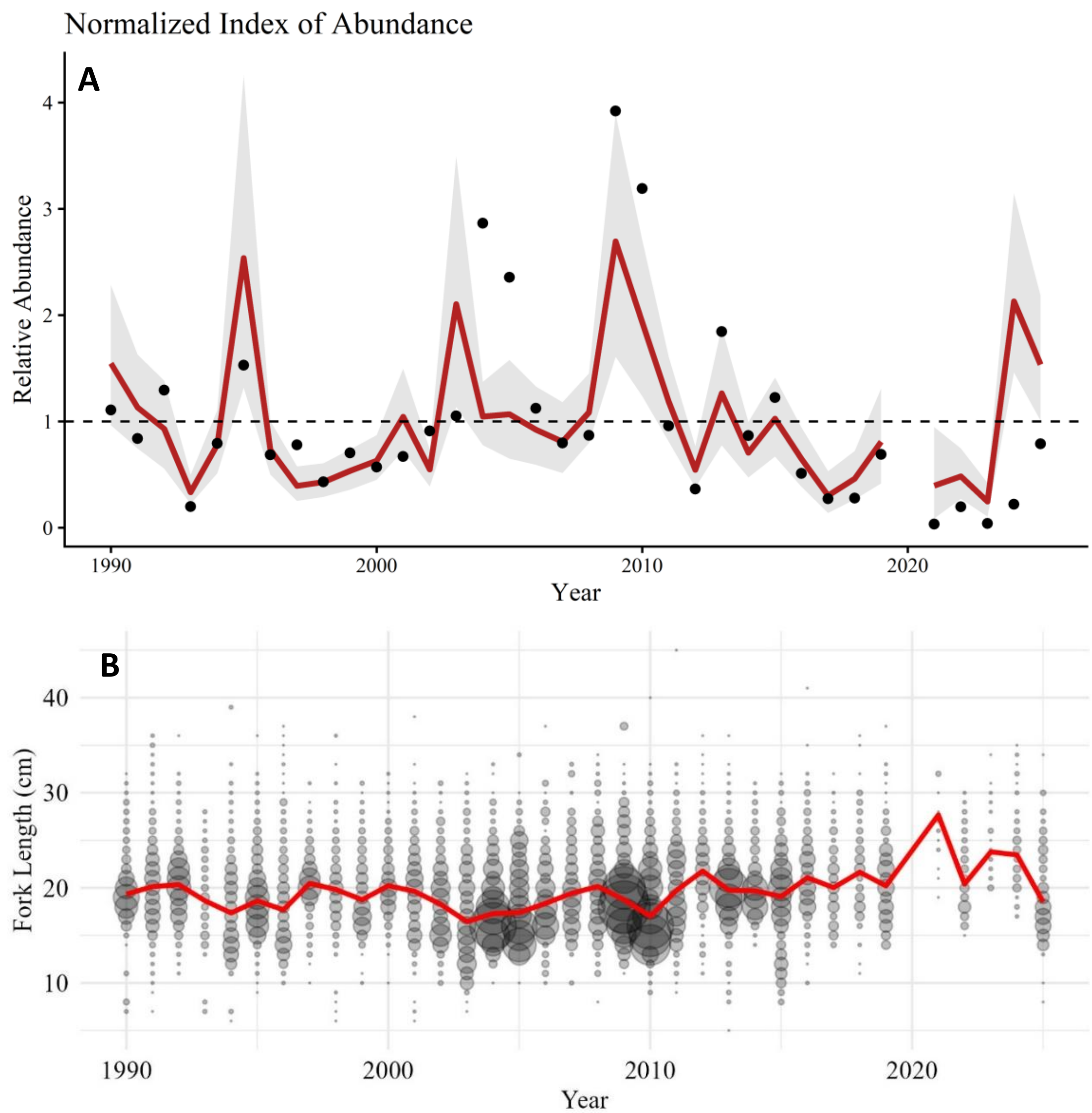


Figure 17. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Pomatomus saltatrix* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean fork length of *Pomatomus saltatrix* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Scomberomorus cavalla

Both the nominal and standardized abundance of King Mackerel, *Scomberomorus cavalla*, decreased in 2025 relative to 2024 (Figure 18A). The nominal abundance remained below the time series mean and is the lowest recorded nominal abundance in the time series. The standardized abundance shifted below the time series mean and was the lowest standardized abundance since 2013. Fork lengths ranged from 8 to 39 cm with a mean fork length of 25 cm, the largest mean fork length in the time series (Figure 18B). Otolith samples were collected from 15 King Mackerel specimens (Spring = 6, Fall = 9) for life history research in 2025.

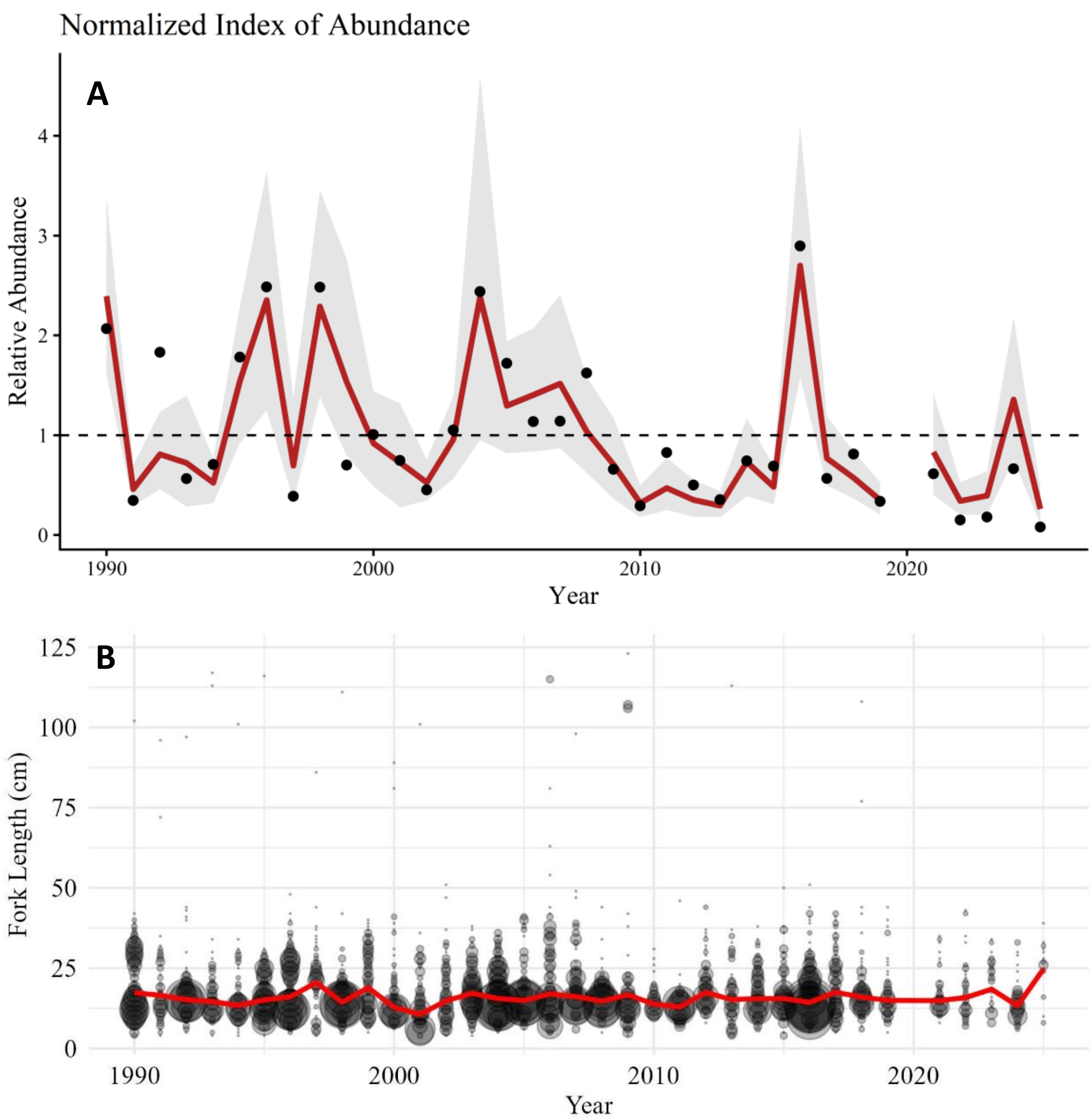


Figure 18. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Scomberomorus cavalla* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean fork length of *Scomberomorus cavalla* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Scomberomorus maculatus

Both the nominal and standardized abundance of Spanish Mackerel, *Scomberomorus maculatus*, decreased in 2025 relative to 2024 (Figure 19A). The nominal abundance remained below the time series mean, and the standardized abundance shifted below the time series mean. Fork lengths ranged from 4 to 42 cm with a mean fork length of 28 cm as the largest mean fork length in the time series (Figure 19B). Otolith samples were collected from 144 Spanish Mackerel (Spring = 68, Fall = 76) and gonad tissue samples were collected from 48 specimens (Spring = 28, Fall = 20) for life history research in 2025.

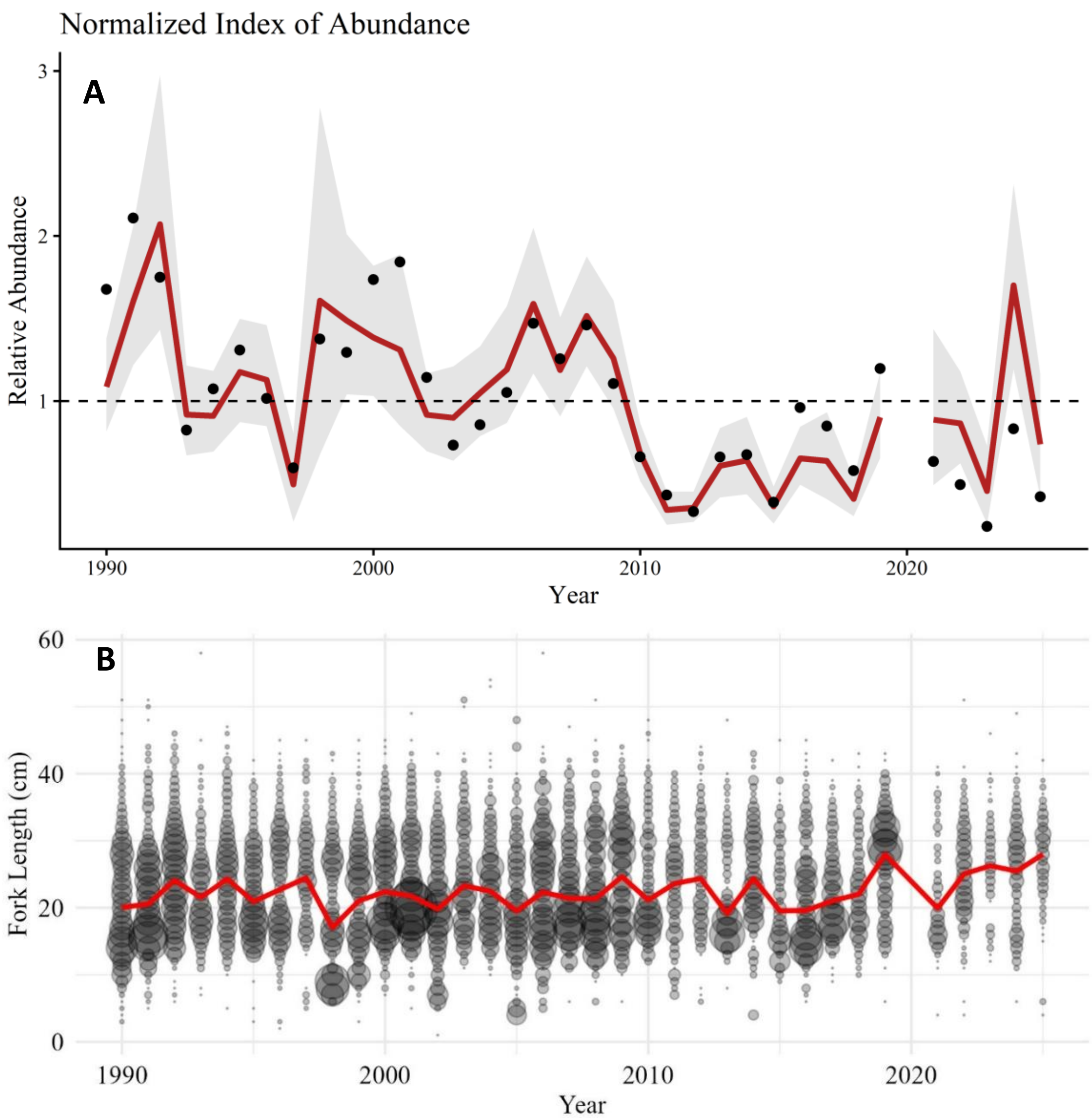


Figure 19. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Scomberomorus maculatus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean fork length of *Scomberomorus maculatus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Distribution and Abundance of Priority Decapod Crustacean Species

Callinectes sapidus

In 2025, both the nominal and standardized abundance of Blue Crab, *Callinectes sapidus*, remained similar to abundances in 2021, 2022, and 2024 (Figure 20A). Carapace widths ranged from 7 to 18 cm with a mean carapace width of 13 cm (Figure 20B).

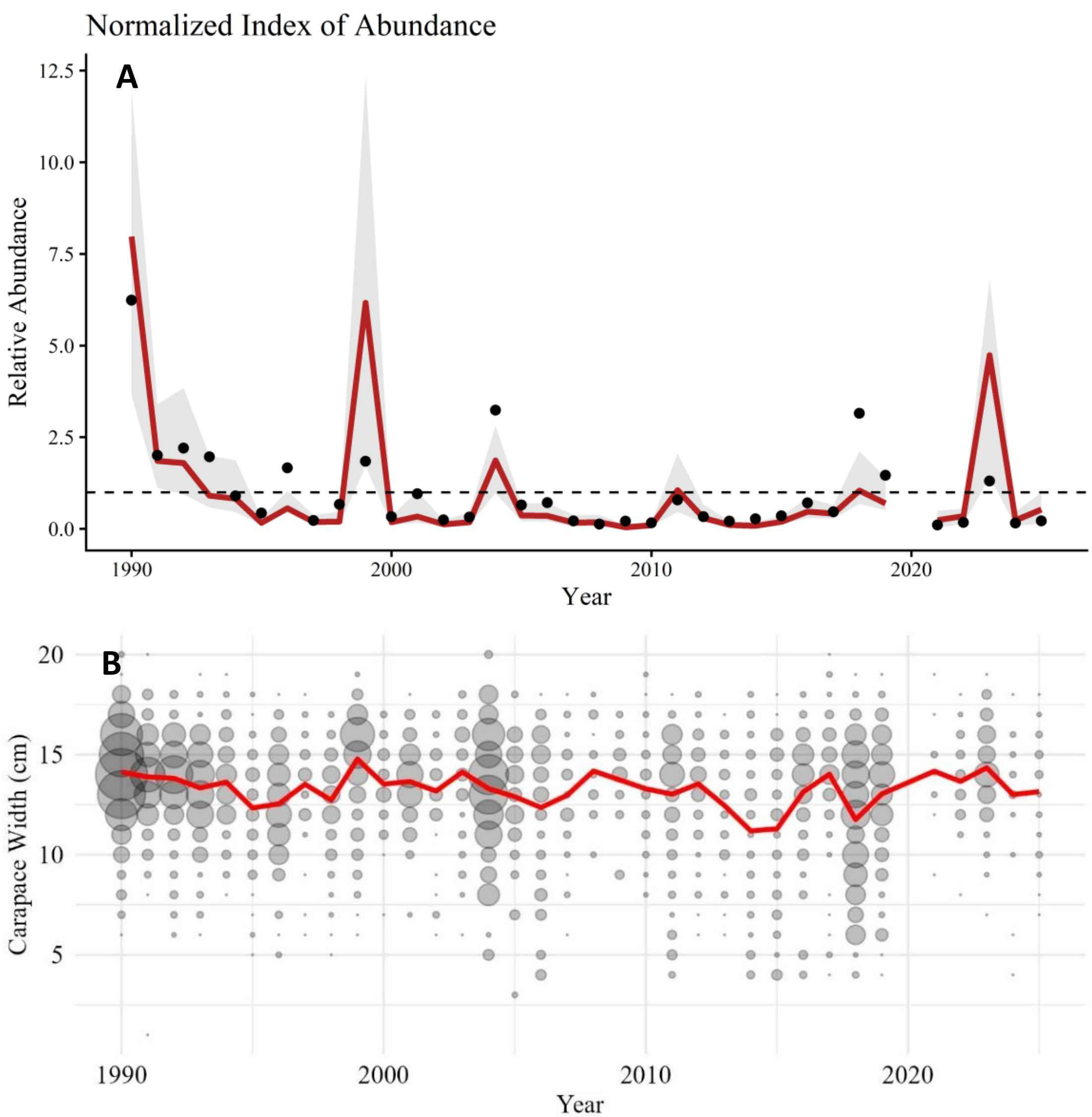


Figure 20. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Callinectes sapidus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean carapace width of *Callinectes sapidus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Penaeus aztecus

The nominal and standardized abundance of Brown Shrimp, *Penaeus aztecus*, in 2025 increased relative to 2024 (Figure 21A). The nominal abundance remained below the time series mean while the standardized abundance shifted above the time series mean. Total lengths ranged from 7 to 17 cm with a mean total length of 11 cm (Figure 21B).

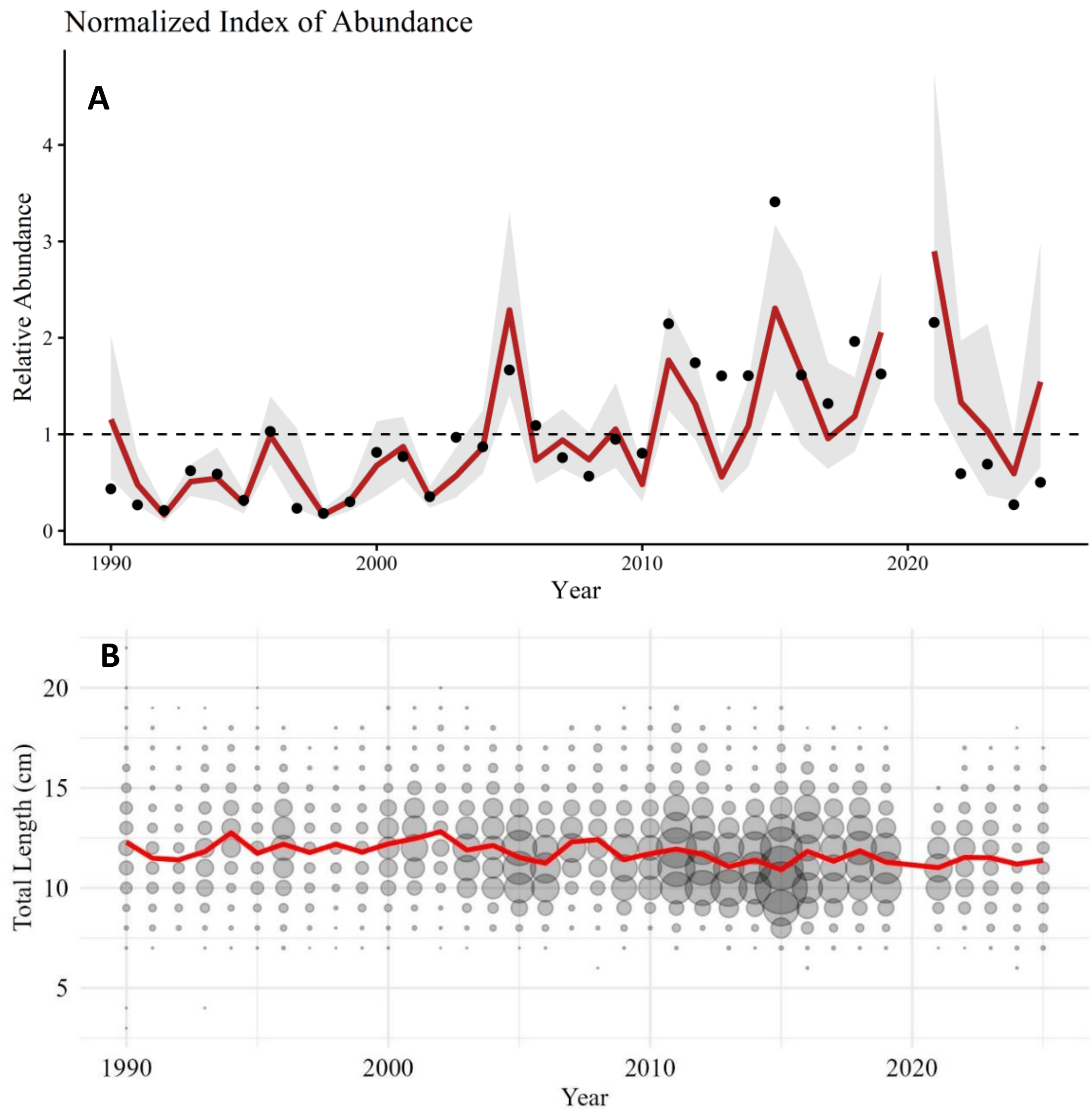


Figure 21. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Penaeus aztecus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Penaeus aztecus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Penaeus duorarum

In 2025, the nominal abundance of Pink Shrimp, *Penaeus duorarum*, remained similar to abundance values since 2013, and remained below the time series mean (Figure 22A). The standardized abundance decreased relative to 2024 and shifted below the time series mean, similar to values since 2013. Total lengths ranged from 9 to 12 cm with a mean total length of 11 cm (Figure 22B).

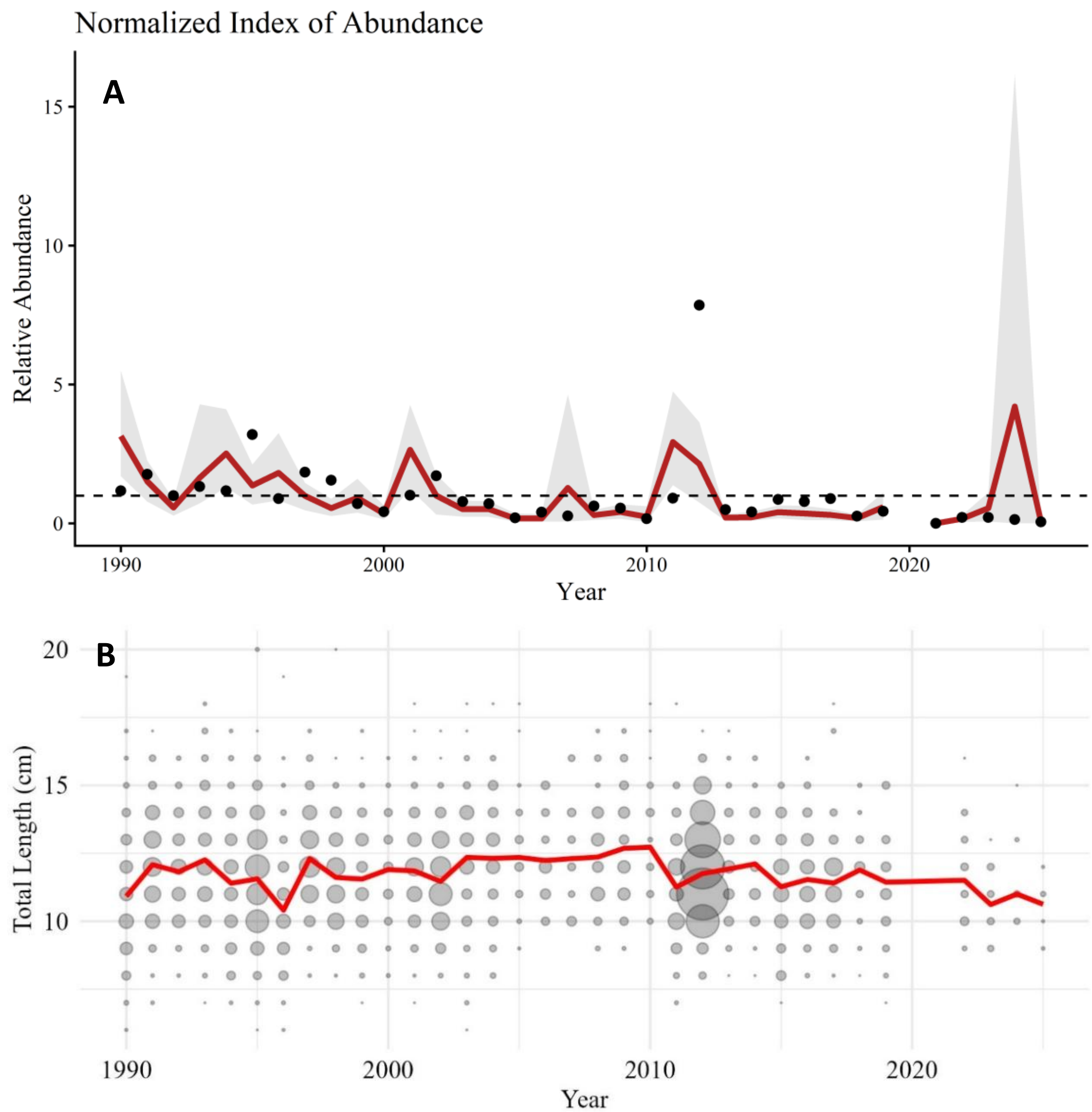


Figure 22. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Penaeus duorarum* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Penaeus duorarum* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Penaeus setiferus

Both the nominal and standardized abundance of White Shrimp, *Penaeus setiferus*, decreased in 2025 relative to 2024 (Figure 23A). While the nominal abundance shifted below the time series mean for the first time since 2014, the standardized abundance remained above the time series mean. Total lengths ranged from 8 to 20 cm with a mean total length of 13 cm (Figure 23B). Gonad tissue samples were collected from 220 specimens (Spring = 72, Fall = 148) for life history research in 2025.

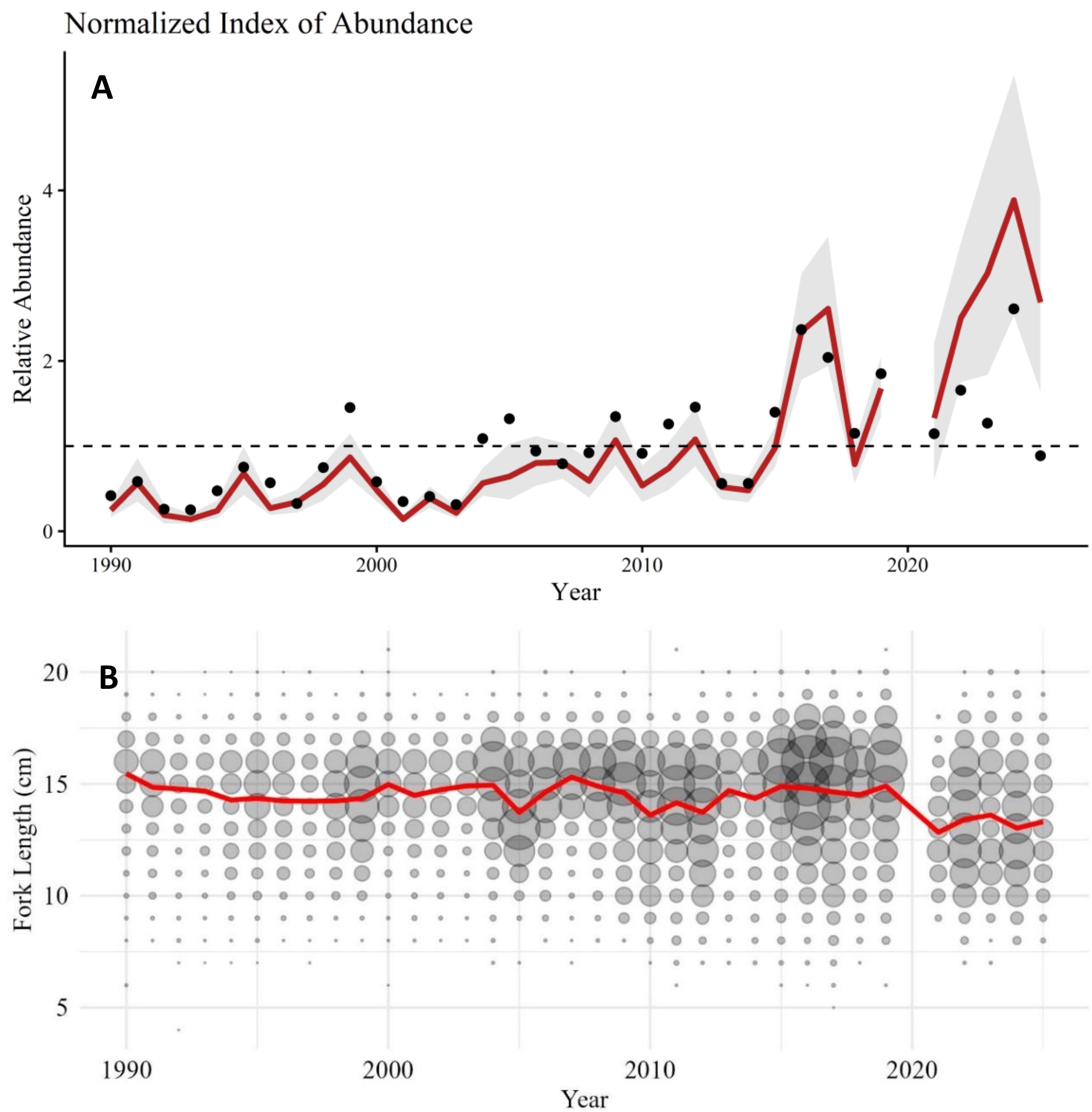


Figure 23. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Penaeus setiferus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Penaeus setiferus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Abundance of Sharks

In 2025, the CTS collected seven shark species (Table 4). The Atlantic Sharpnose Shark, *Rhizoprionodon terraenovae,* was the most abundant shark collected, occurring in 38.2% of tows.

Table 4. Shark species collected by the SEAMAP-SA Coastal Trawl Survey in 2025.

Rank	Common Name	Species Name	Number	% Positive
1	Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*	176	38.2
2	Bonnethead	*Sphyrna tiburo*	115	26.1
3	Scalloped Hammerhead	*Sphyrna lewini or gilberti*	15	8.3
4	Blacknose Shark	*Carcharhinus acronotus*	8	3.2
5	Sand Tiger Shark	*Carcharias taurus*	2	1.3
6	Spinner Shark	*Carcharhinus brevipinna*	1	0.6
7	Blacktip Shark	*Carcharhinus limbatus*	1	0.6

Rhizoprionodon terraenovae

The nominal and standardized abundance of Atlantic Sharpnose Shark, *Rhizoprionodon terraenovae*, decreased in 2025 relative to 2024 (Figure 24A). While the nominal abundance remained below the time series mean, the standardized abundance decreased below the time series mean. Total lengths ranged from 33 to 103 cm with a mean total length of 62 cm (Figure 24B).

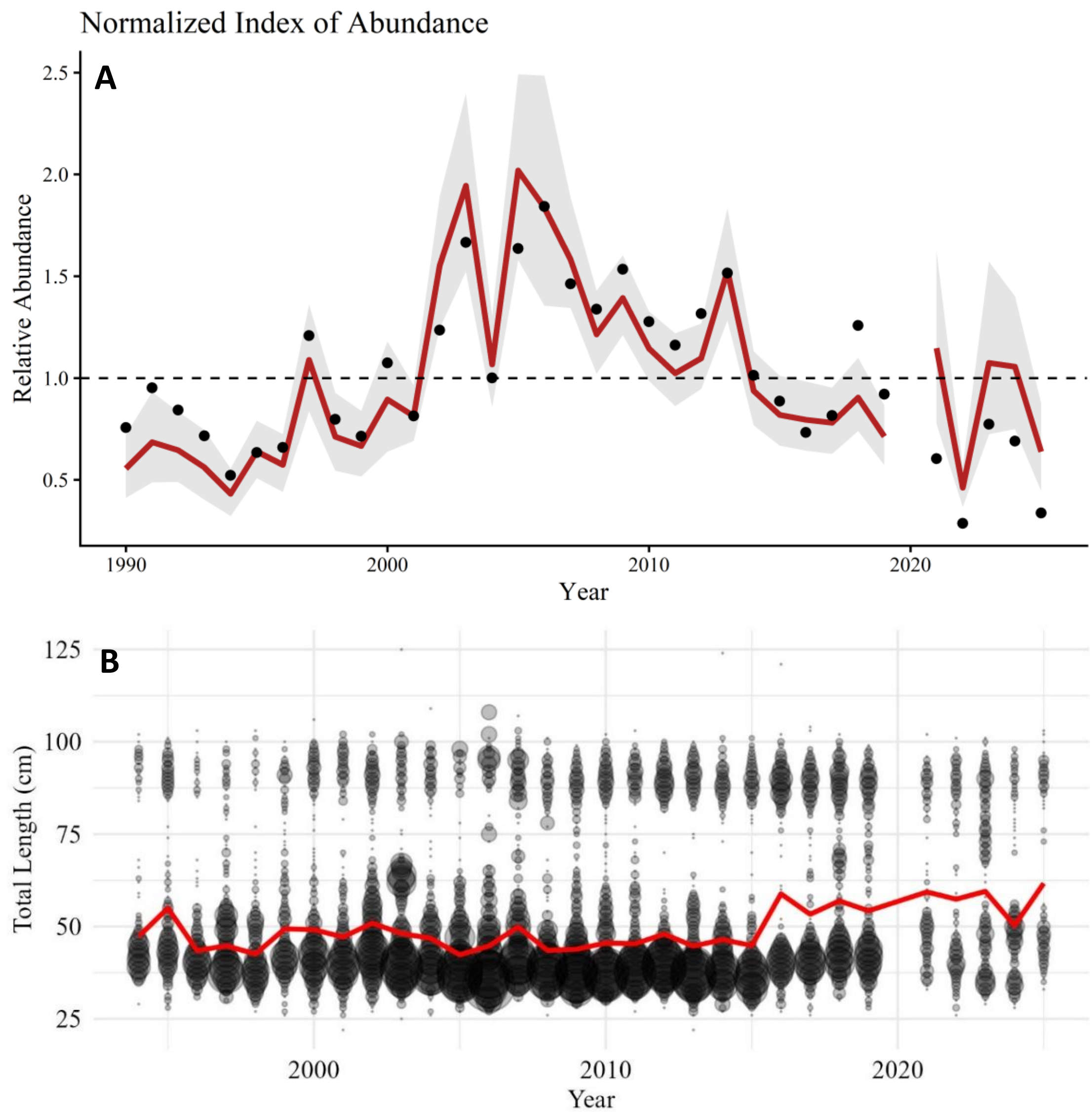


Figure 24. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Rhizoprionodon terraenovae* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Rhizoprionodon terraenovae* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Sphyrna tiburo

Both the nominal and standardized abundance of Bonnethead Shark, *Sphyrna tiburo*, decreased in 2025 compared to 2024 (Figure 25A). The nominal abundance remained below the time series mean, while the standardized abundance remained above the time series mean. Total lengths ranged from 36 to 112 cm with a mean total length of 64 cm (Figure 25B).

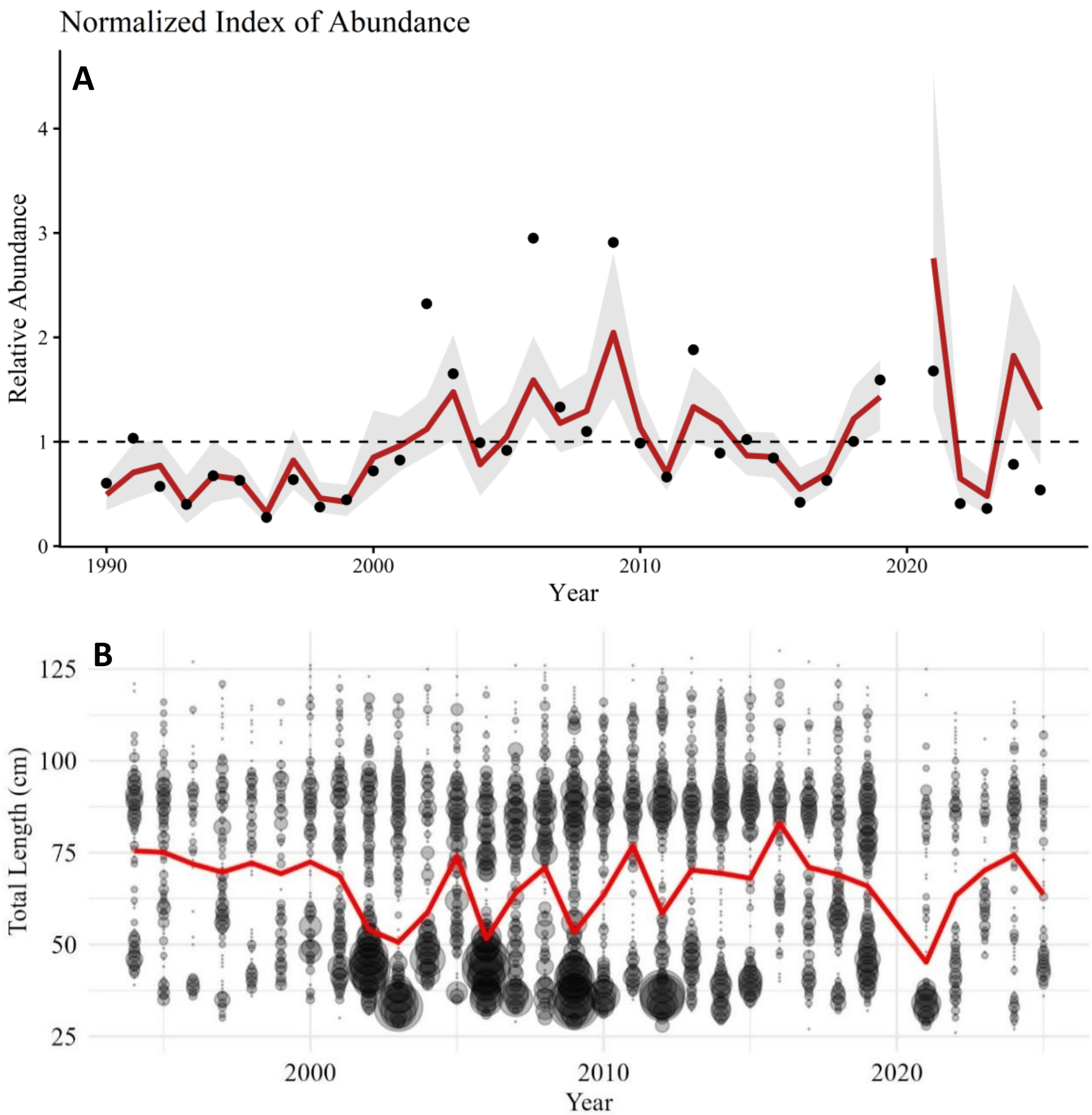


Figure 25. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Sphyrna tiburo* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean total length of *Sphyrna tiburo* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Abundance of Sea Turtles

Caretta caretta

Both the nominal and standardized abundance of Loggerhead Sea Turtles, *Caretta caretta*, increased in 2025 compared to 2024 (Figure 26A). While the nominal abundance remained below the time series mean, the standardized abundance increased above the time series mean. The mean curved carapace length in 2025 was 75 cm (n=6, Figure 26B)

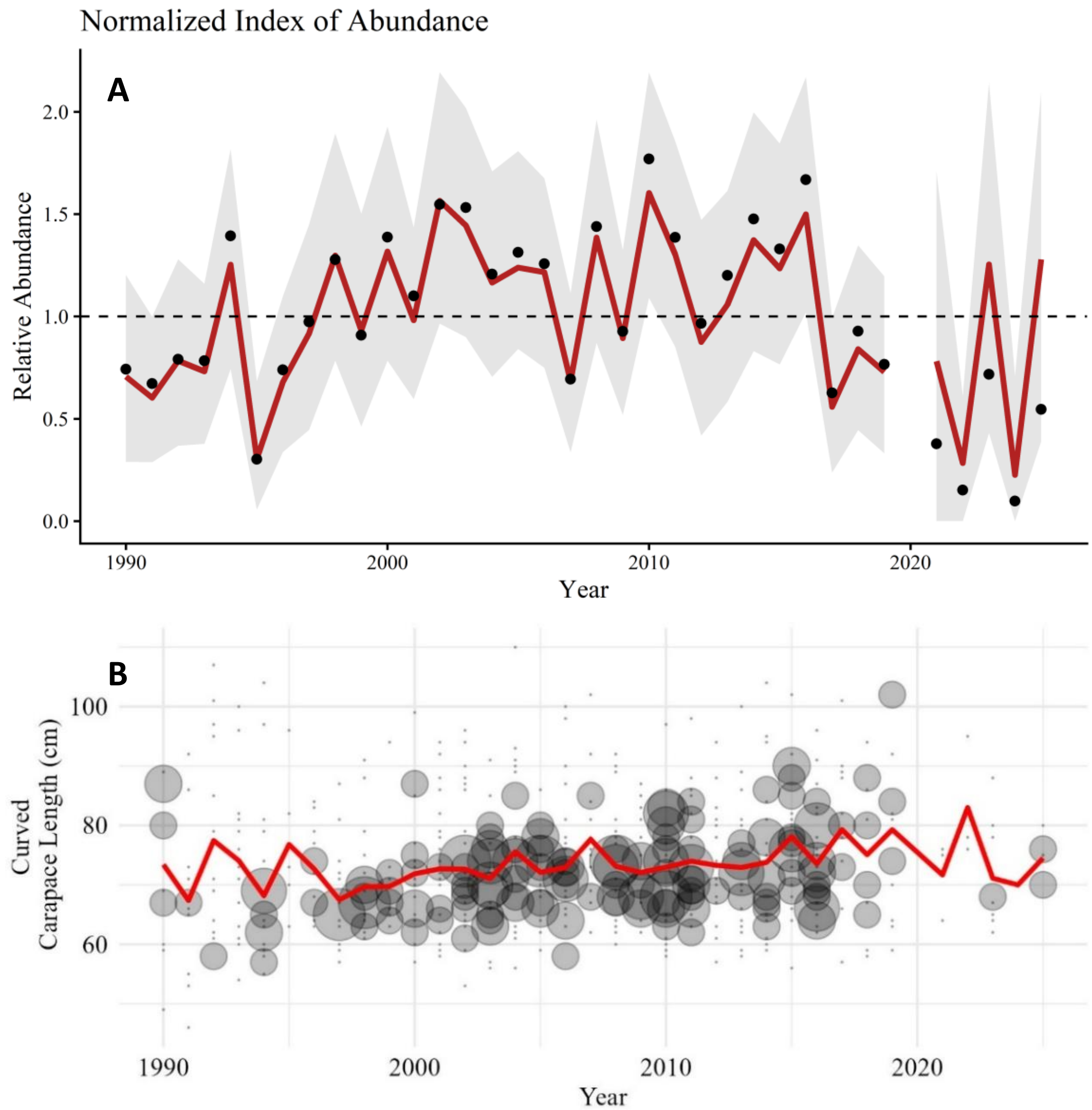


Figure 26. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Caretta caretta* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean curved carapace length of *Caretta caretta* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Lepidochelys kempi

Both the nominal and standardized abundance of Kemp's Ridley Sea Turtles, *Lepidochelys kempi*, increased in 2025 compared to 2024 (Figure 27A). While the nominal abundance remained just below the time series mean, the standardized abundance increased above the time series mean for the first time since 2022. The mean curved carapace length in 2025 was 42 cm (n=3; Figure 27B).

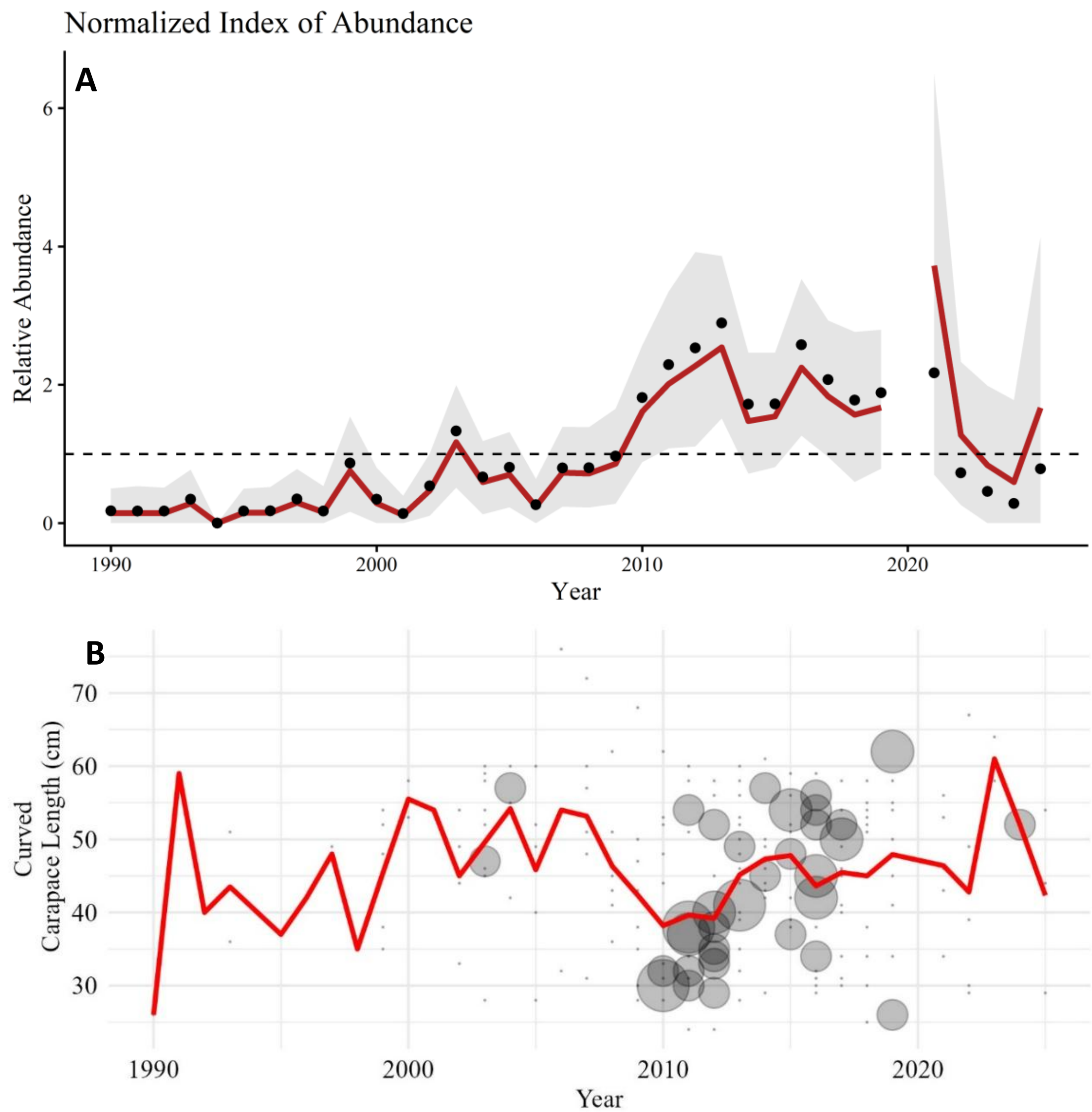


Figure 27. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Lepidochelys kempi* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean curved carapace length of *Lepidochelys kempi* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Abundance of Horseshoe Crabs

Limulus polyphemus

Since 2001, the Horseshoe Crab, *Limulus polyphemus*, has been considered a priority species and abundance, biomass, and individual specimen data have been recorded. Both the nominal and standardized abundance of Horseshoe Crab in 2025 remained below the time series mean and were similar to abundance values in recent years (Figure 28A). Prosoma widths ranged from 20 to 32 cm with a mean prosoma width of 29 cm (Figure 28B).

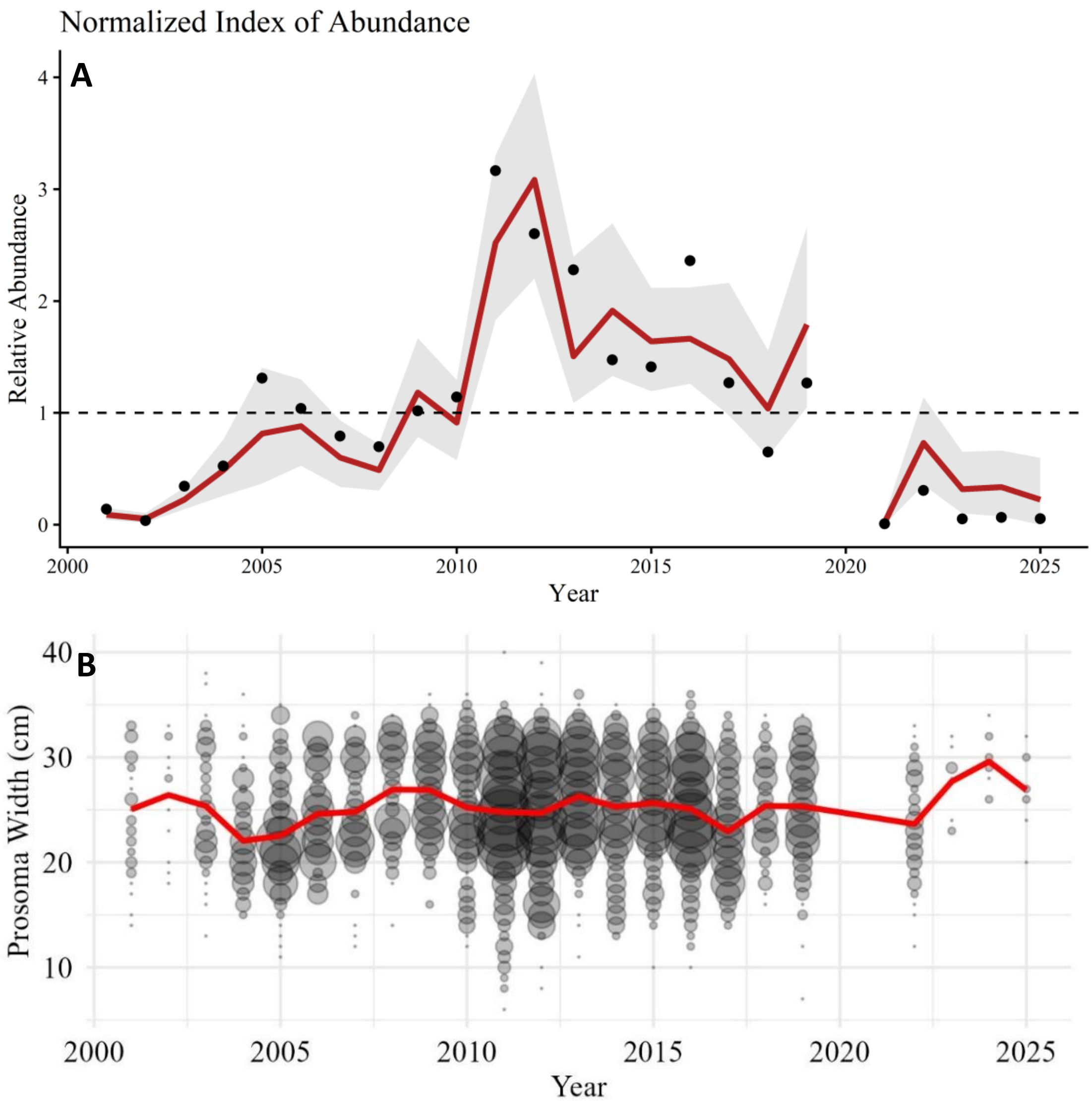


Figure 28. A) Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Limulus polyphemus* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey. B) Mean prosoma width of *Limulus polyphemus* (red line). Vertical axis represents the length from a given year, while the bubble diameter represents the proportion caught of that length by year.

Abundance of Cannonball Jellies

Stomolophus meleagris

Since 2001, the Cannonball Jelly, *Stomolophus meleagris*, has been separated from other miscellaneous invertebrates and the abundance and biomass recorded. Although not a priority species, this decision was the result of the Cannonball Jelly being identified as a major component of overall biomass and a species of increasing commercial interest. The nominal abundance of Cannonball Jelly in 2025 was similar to the abundance values in recent years and remained below the time series mean (Figure 29). The standardized abundance decreased in 2025 compared to 2024 and remained below the time series mean.

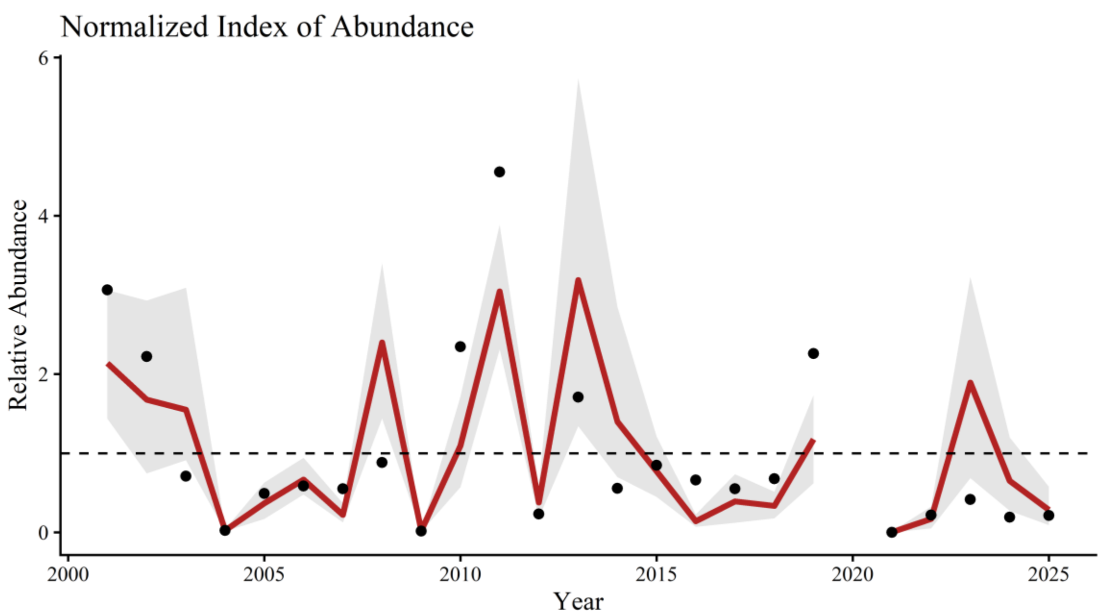


Figure 29. Nominal (black dot) and ZINB standardized (red line) abundance with 95% confidence intervals (gray area) of *Stomolophus meleagris* normalized to the time series mean (dashed line) of the SEAMAP-SA Coastal Trawl Survey.

ACKNOWLEDGMENTS

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Appendix 1. Sampling summary for all collections included in abundance analyses.

	Included	Depth		Latitude (°N)		Temperature (°C)		Salinity		Day of Year	
Year	Collections	Avg	Range	Avg	Range	Avg	Range	Avg	Range	Avg	Range
1990	227	7.5	3-12	32.5	28.9-35.1	24.1	17.7-30.3	34.7	30.9-36.8	213.5	113-319
1991	231	8.3	5-13	32.4	28.9-35.1	23.1	15.0-29.1	34.5	29.3-36.4	211.2	113-320
1992	232	8.2	5-12	32.5	28.9-35.1	22.5	16.5-29.7	34.7	30.6-36.6	210.1	113-309
1993	233	8.2	4-12	32.5	28.9-35.1	22.5	10.6-29.9	34.2	27.7-36.3	208.4	109-308
1994	233	8.3	4-12	32.5	28.9-35.2	23.0	18.4-28.2	34.2	29.7-36.3	210.2	109-308
1995	232	8.2	5-11	32.5	28.9-35.1	24.0	16.9-30.1	34.0	30.7-36.3	207.1	107-311
1996	229	8.2	4-12	32.4	28.9-35.1	22.1	14.2-28.8	33.8	29.3-36.3	204.1	108-304
1997	232	6.1	3-10	32.5	28.9-35.2	23.4	16.3-29.4	34.1	31.0-36.2	200.6	104-298
1998	232	8.2	4-10	32.5	28.9-35.2	23.2	14.8-30.0	33.4	27.6-36.2	204.9	103-314
1999	233	8.1	5-10	32.5	28.8-35.2	22.9	16.2-29.9	34.1	28.6-36.7	204.1	103-312
2000	234	8.3	5-11	32.5	28.8-35.2	23.1	17.9-30.1	34.8	31.4-36.6	205.2	108-305
2001	295	8.3	6-12	32.3	28.8-35.2	22.3	15.1-28.7	35.2	31.9-36.6	209.0	108-313
2002	301	8.6	6-11	32.3	28.8-35.2	24.2	16.2-29.8	35.1	31.1-37.8	204.1	100-312
2003	304	8.6	6-14	32.3	28.8-35.2	21.8	12.3-27.1	33.8	26.8-36.5	199.0	98-295
2004	304	8.3	6-11	32.4	28.8-35.2	22.9	13.7-28.9	34.5	28.7-36.5	203.2	107-303
2005	301	8.4	6-12	32.4	28.8-35.2	22.1	8.7-29.0	33.7	29.4-36.2	200.9	94-313
2006	303	8.0	6-11	32.3	28.8-35.2	23.9	15.9-30.1	35.0	31.1-36.6	200.5	101-299
2007	305	8.2	6-11	32.3	28.8-35.2	23.7	16.7-29.9	35.2	32.2-36.6	207.4	107-312
2008	304	8.3	6-11	32.3	28.8-35.2	23.1	16.2-29.3	34.9	31.0-36.3	204.4	105-304
2009	335	8.2	5-11	32.4	28.8-35.2	23.3	15.8-29.0	35.0	31.6-36.5	203.2	105-302
2010	335	8.2	3-11	32.3	28.8-35.2	23.0	14.2-30.1	35.0	31.9-36.4	204.2	102-316
2011	336	8.7	5-12	32.2	28.8-35.2	23.2	16.8-30.7	35.3	32.0-36.4	208.1	102-318
2012	336	8.9	5-12	32.2	28.8-35.2	23.7	14.5-30.0	35.3	33.1-36.7	205.2	107-315
2013	294	8.4	5-11	32.1	28.8-35.2	22.8	15.1-29.1	34.2	28.3-36.3	206.9	106-311
2014	306	8.5	5-11	32.3	28.8-35.2	23.4	14.0-29.2	34.4	32.1-36.4	201.0	100-303
2015	329	8.6	5-12	32.2	28.8-35.2	22.9	16.6-29.2	34.4	30.4-36.4	205.7	103-317
2016	330	7.9	4-11	32.2	28.8-35.2	23.7	16.7-31.0	34.2	28.7-36.6	209.3	102-323
2017	293	7.6	4-10	32.2	28.8-35.2	23.3	15.7-29.5	35.2	31.7-37.0	202.8	100-313
2018	228	7.7	4-11	32.0	28.8-35.2	24.8	15.8-30.3	34.6	29.9-36.4	211.5	103-320
2019	258	7.8	5-11	32.1	28.8-35.2	23.9	14.4-30.0	34.9	31.1-36.4	201.3	106-326
2020	-	-	-	-	-	-	-	-	-	-	-
2021	112	7.4	5-11	32.2	28.9-34.5	25.9	20.3-28.6	34.3	31.2-35.8	259.0	193-306
2022	279	8.5	5-11	32.2	28.8-35.2	24.1	17.2-30.0	35.2	31.1-36.4	196.8	101-320
2023	177	8.3	6-11	31.8	28.8-34.7	25.9	19.9-30.4	34.9	31.9-36.3	196.6	117-291
2024	143	7.4	5-10	32.2	28.8-35.2	27.1	23.1-30.5	34.1	29.3-36.7	228.8	162-279
2025	155	7.0	4-10	32.4	28.8-35.2	25.4	18.9-30.4	34.9	31.6-36.4	197.0	111-268

Appendix 2. Number of individuals and biomass (kg) for all taxa collected in 2025 (excluding miscellaneous invertebrates, Cannonball Jellies, and algae).

Rank	Species Name	Individuals	Biomass
1	*Micropogonias undulatus*	80,559	4,238.815
2	*Leiostomus xanthurus*	45,052	2,383.429
3	*Chloroscombrus chrysurus*	38,931	1,093.942
4	*Lagodon rhomboides*	17,646	653.154
5	*Penaeus setiferus*	12,461	254.467
6	*Anchoa sp.*	10,725	86.353
7	*Larimus fasciatus*	8,364	517.663
8	*Opisthonema oglinum*	6,874	162.519
9	*Menticirrhus americanus*	4,553	311.842
10	*Stellifer lanceolatus*	4,198	76.538
11	*Peprilus triacanthus*	3,568	120.024
12	*Cynoscion regalis*	3,229	252.736
13	*Synodus foetens*	3,122	197.365
14	*Penaeus aztecus*	2,951	44.017
15	*Selene setapinnis*	2,877	68.816
16	*Cynoscion nothus*	2,147	169.853
17	*Lolliguncula brevis*	1,930	27.427
18	*Loligo sp.*	1,840	31.186
19	*Orthopristis chrysoptera*	1,671	109.838
20	*Peprilus paru*	1,581	101.048
21	*Trinectes maculatus*	975	29.364
22	*Prionotus scitulus*	953	18.636
23	*Citharichthys macrops*	934	14.485
24	*Trichiurus lepturus*	924	111.105
25	*Etropus crossotus*	828	14.675
26	*Pomatomus saltatrix*	793	74.606
27	*Sphyraena guachancho*	740	162.381
28	*Callinectes similis*	676	9.815
29	*Ariopsis felis*	549	80.365
30	*Etrumeus sadina*	474	1.052
31	*Bairdiella chrysoura*	453	19.832
32	*Pagurus pollicaris*	452	14.531
33	*Eucinostomus sp.*	395	6.731
34	*Chaetodipterus faber*	393	24.159
35	*Libinia sp.*	380	4.597
36	*Hepatus epheliticus*	375	7.922
37	*Anchoa hepsetus*	296	2.715
38	*Prionotus carolinus*	293	4.712
39	*Decapterus punctatus*	288	8.608
40	*Scomberomorus maculatus*	283	57.157
41	*Trachinotus carolinus*	222	29.098
42	*Caranx crysos*	220	7.249
43	*Selene vomer*	214	10.590
44	*Prionotus evolans*	202	9.039
45	*Gymnura lessae*	201	120.044
46	*Prionotus salmonicolor*	197	4.383
47	*Myliobatis freminvillii*	184	2,010.071
48	*Ovalipes stephensoni*	182	3.159
49	*Rhizoprionodon terraenovae*	176	248.767
50	*Menticirrhus littoralis*	174	22.177
51	*Paralichthys dentatus*	149	16.334
52	*Citharichthys spilopterus*	143	1.766
53	*Cynoscion sp.*	142	14.020
54	*Ancylopsetta ommata*	132	5.208
55	*Sardinella aurita*	128	1.073
56	*Scophthalmus aquosus*	121	3.008
57	*Persephona mediterranea*	120	1.525
58	*Brevoortia tyrannus*	118	2.587
59	*Sphyrna tiburo*	115	167.789
60	*Achelous gibbesii*	102	0.678
61	*Paralichthys lethostigma*	97	37.635
62	*Squilla empusa*	94	1.180
63	*Arenaeus cribrarius*	89	4.307
64	*Bagre marinus*	83	16.372
65	*Gibbesia neglecta*	79	1.020
66	*Hypanus say*	77	47.658
67	*Hypanus sabinus*	70	10.773
68	*Achelous spinimanus*	65	1.120
69	*Xiphopenaeus kroyeri*	62	0.269
70	*Etropus cyclosquamus*	58	0.544
71	*Callinectes ornatus*	56	0.863
72	*Stenotomus sp.*	54	2.724
73	*Harengula jaguana*	54	1.585
74	*Centropristis philadelphica*	53	2.314
75	*Ovalipes ocellatus*	49	0.900
76	*Diplectrum formosum*	41	0.725
77	*Callinectes sapidus*	34	4.349
78	*Symphurus plagiusa*	33	0.958
79	*Hypanus americanus*	30	51.174
80	*Pagurus longicarpus*	29	0.076
81	*Scomberomorus cavalla*	26	4.326
82	*Paralichthys albigutta*	22	3.705
83	*Gymnura altavela*	20	1,069.280
84	*Centropristis striata*	18	0.652
85	*Chilomycterus schoepfii*	17	4.761
86	*Penaeus duorarum*	16	0.214
87	*Sphyrna lewini*	15	39.785
88	*Rhinobatos lentiginosus*	14	3.324
89	*Umbrina coroides*	14	0.219
90	*Raja eglanteria*	13	5.780

Appendix 2 (cont.). Number of individuals and biomass (kg) for all taxa collected in 2025 (excluding miscellaneous invertebrates, Cannonball Jellies, and algae).

Rank	Species Name	Individuals	Biomass
91	*Echeneis naucrates*	10	2.343
92	*Sphoeroides maculatus*	10	0.864
93	*Limulus polyphemus*	9	21.574
94	*Oligoplites saurus*	9	0.818
95	*Carcharhinus acronotus*	8	91.980
96	*Petrochirus diogenes*	8	3.052
97	*Menippe mercenaria*	7	0.457
98	*Caretta caretta*	6	303.400
99	*Brevoortia smithi*	6	1.633
100	*Lagocephalus laevigatus*	6	1.483
101	*Lutjanus campechanus*	6	0.047
102	*Hypoconcha arcuata*	6	0.040
103	*Acanthostracion quadricornis*	5	1.303
104	*Prionotus tribulus*	5	0.276
105	*Calamus leucosteus*	5	0.110
106	*Rhinoptera bonasus*	4	57.380
107	*Trachurus lathami*	4	0.054
108	*Chelonia mydas*	3	256.800
109	*Bathytoshia centroura*	3	156.400
110	*Lepidochelys kempii*	3	32.920
111	*Rachycentron canadum*	3	3.342
112	*Upeneus parvus*	3	0.047
113	*Stephanolepis hispidus*	3	0.045
114	*Xanthidae*	3	0.005
115	*Carcharias taurus*	2	223.500
116	*Caranx hippos*	2	0.483
117	*Narcine brasiliensis*	2	0.326
118	*Scorpaena calcarata*	2	0.112
119	*Prionotus ophryas*	2	0.051
120	*Scomber scombrus*	2	0.034
121	*Carcharhinus brevipinna*	1	2.830
122	*Carcharhinus limbatus*	1	1.800
123	*Calappa sulcata*	1	0.389
124	*Calappa flammea*	1	0.329
125	*Octopus vulgaris*	1	0.260
126	*Lobotes surinamensis*	1	0.212
127	*Alectis ciliaris*	1	0.144
128	*Diplodus holbrookii*	1	0.124
129	*Syacium papillosum*	1	0.095
130	*Ophidion grayi*	1	0.065
131	*Trachinocephalus myops*	1	0.033
132	*Astroscopus y-graecum*	1	0.025
133	*Aluterus schoepfii*	1	0.016
134	*Hippocampus erectus*	1	0.014
135	Dorosoma petenense	1	0.014
136	*Syngnathus louisianae*	1	0.010
137	*Caranx bartholomaei*	1	0.010
138	*Sicyonia brevirostris*	1	0.008
139	*Pilumnus sayi*	1	0.005
140	*Alpheus heterochaelis*	1	0.003
141	*Scyllarus chacei*	1	0.003
	Total	270,525	16,732.905

Appendix 3. Applications of data and specimens from the SEAMAP-SA CTS in 2025.

Life History	Parasitology	Genetics & Other
Ariopsis felis	*Caranx crysos*	*Busycon carica*
Calamus leucosteus	*Caranx hippos*	*Pomatomus saltatrix*
Centropristis striata	*Chloroscombrus chrysurus*	*Pseudobatos lentiginosus*
Lutjanus campechanus	*Rachycentron canadum*	Miscellaneous whelks
Pseudobatos lentiginosus	*Selene vomer*	
Rachycentron canadum	*Trachinotus carolinus*	
	Trichiurus lepturus	

Stock assessments and compliance reports:

- Atlantic Croaker abundance and biomass data (1990-2024) – ASMFC Compliance Report
- Atlantic Croaker abundance and life history data (1990-2024) for ongoing stock assessment
- Atlantic Menhaden data and indices of abundance (1989-2024) for stock assessment update
- Bluefish data (1989-2024) – ASMFC Compliance Report
- Bluefish indices of abundance (1989-2024) for stock assessment update
- Horseshoe Crab indices of abundance data (2001-2024) – ASMFC Compliance Report
- Weakfish data (1989-2024) – ASMFC Compliance Report

Data provided to state agencies:

- 2025 CTS data collected in North Carolina waters – NC Division of Marine Fisheries
- 2025 CTS shark data collected in North Carolina waters – NC Division of Marine Fisheries
- 2025 CTS data collected in Georgia waters – GADNR
- Sea turtle data collected in Florida waters (2025) – FFWCC - Endangered Species Division

Data provided to federal agencies:

- Sea turtle data (2025) – NOAA Southeast Regional Office (SERO)
- Sea turtle data (2025) – Cooperative Marine Turtle Tagging Program
- Shark data (2025) – NMFS, Highly Migratory Species, Silver Spring, MD
- Data collected off Canaveral National Seashore (2025) – National Park Service
- *Doryteuthis* data (1989-2023) – NOAA Fisheries

Appendix 4. SEAMAP-SA Coastal Trawl Survey Permits. The Coastal Trawl Survey applies for required permits each year. In 2025, the survey operated in compliance with the following:

Federal Permits

- Letter of Acknowledgement from USDOC/NOAA/NMFS Southeast Regional Office (recognizing study activities as scientific research; not subject to fishing regulations or TED requirements, as long as certain conditions are met).
- Letter of Acknowledgment (SHK-LOA-25-26) from USDOC/NOAA/NMFS Highly Migratory Species Management Division (recognizes shark take as resulting from valid sampling effort).
- Endangered Species Act Section 7 Biological Opinion Consultation # SER-2009-07541 from USDOC/NOAA/NMFS Southeast Regional Office (authorizes specified research on marine turtle species collected as a result of otherwise permitted trawling activities).
- CANA-2025-SCI-0014 issued by USDOI/NPS Canaveral National Seashore (authorizes trawling activities in the coastal waters adjacent to the park).

State permits

- North Carolina Division of Marine Fisheries Scientific Collection Permit (Permit Number 706572).
- South Carolina Department of Natural Resources Scientific Collection Permit.
- Georgia Department of Natural Resources Scientific Collecting Permit (CN: 1000540636).
- Florida Fish and Wildlife Conservation Commission Special Activities License (SAL-25-1920-SRP).
- Florida Fish and Wildlife Conservation Commission / Imperiled Species Management Marine Turtle Permit (MTP-25-064).