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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March 25, 2026

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

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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

<u>Sample Collection</u>

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).

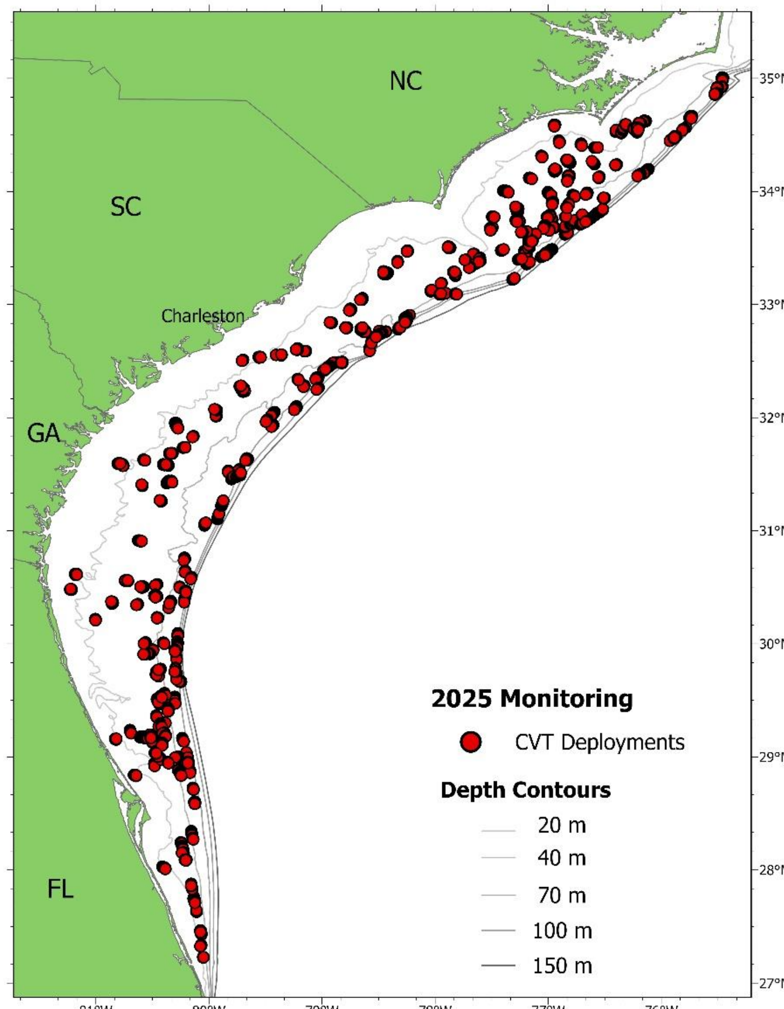

Figure 1. Map of all monitoring stations sampled in 2025, the most recent sampling year. Note that each symbol may represent multiple sampling events due to proximity of locations and scale of the map.

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.

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).

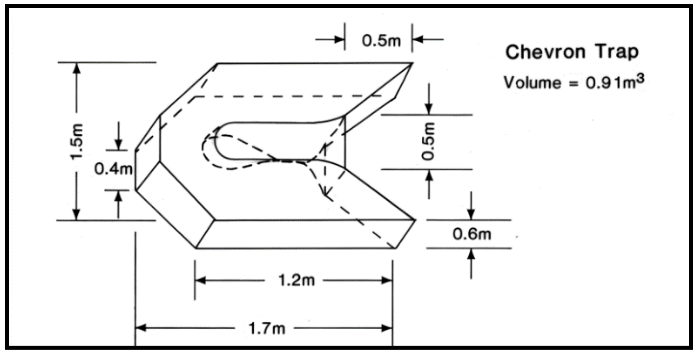

Figure 2. Diagram of the chevron trap (CHV) used for monitoring purposes by MARMAP/SERFS from 1990-present (from Collins 1990).

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

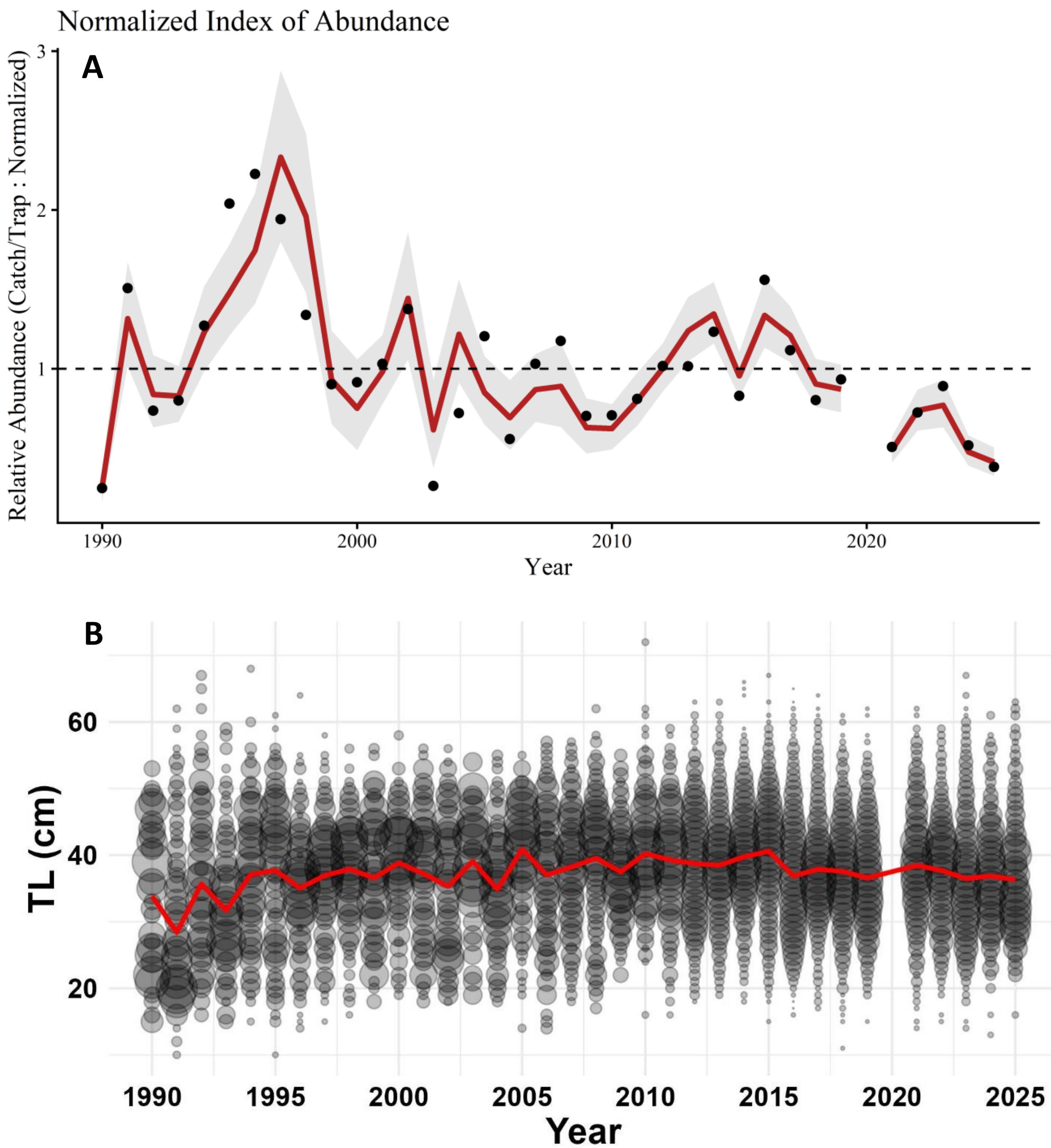

Figure 4. Chevron trap index of abundance and length compositions for Gray Triggerfish. A) Normalized nominal (black dot) and ZINB standardized (red line) abundance with 95 % confidence intervals (CI, gray area). B) Total lengths (cm) by year. Red line represents annual mean length. Vertical axis represents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

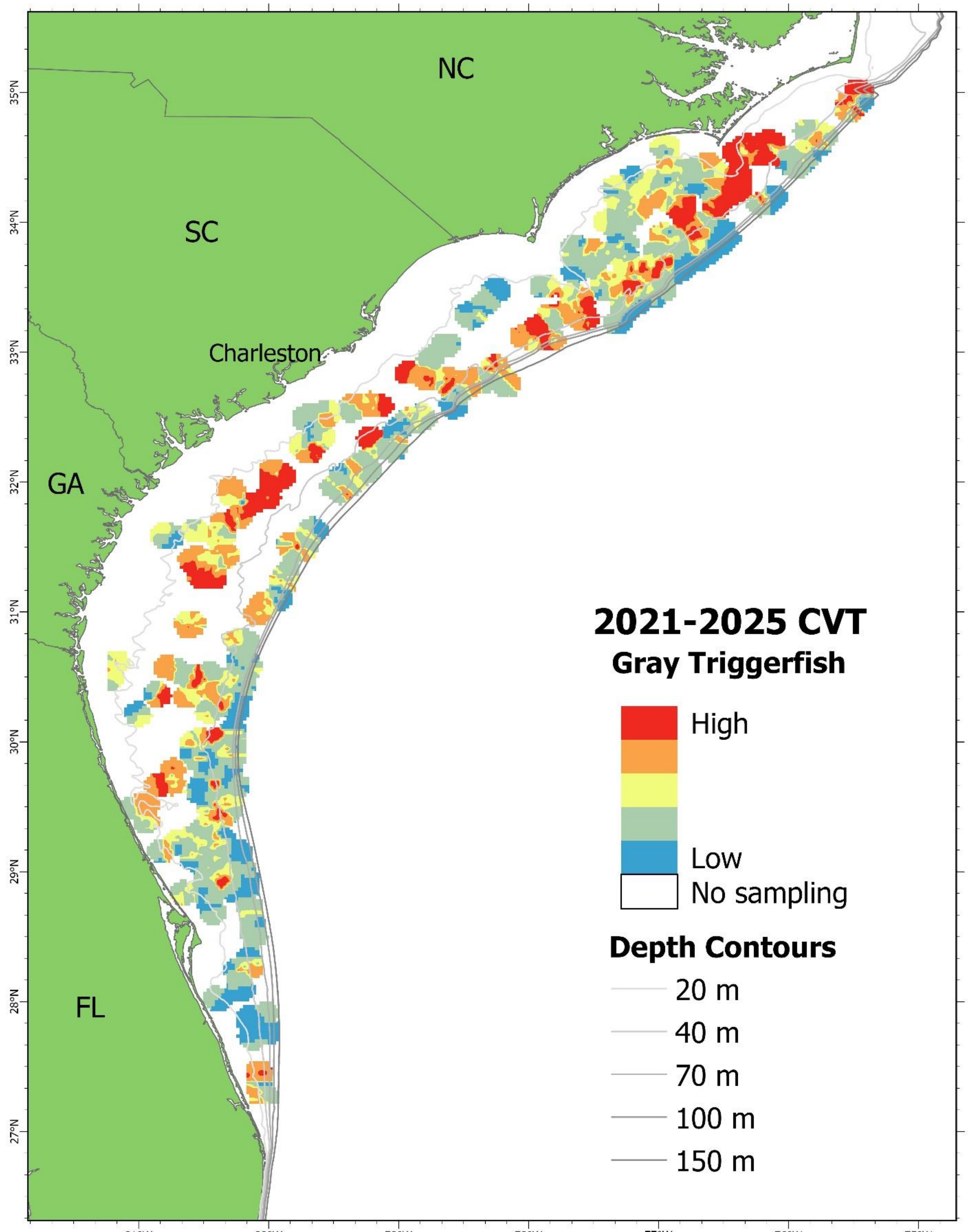

Figure 5. Distribution map of Gray Triggerfish catches from chevron-video traps (CVT) from 2021-2025. Colors indicate quintiles of catch per trap hour and white indicates areas not sampled. The map smoothing was accomplished with inverse distance weighting.

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

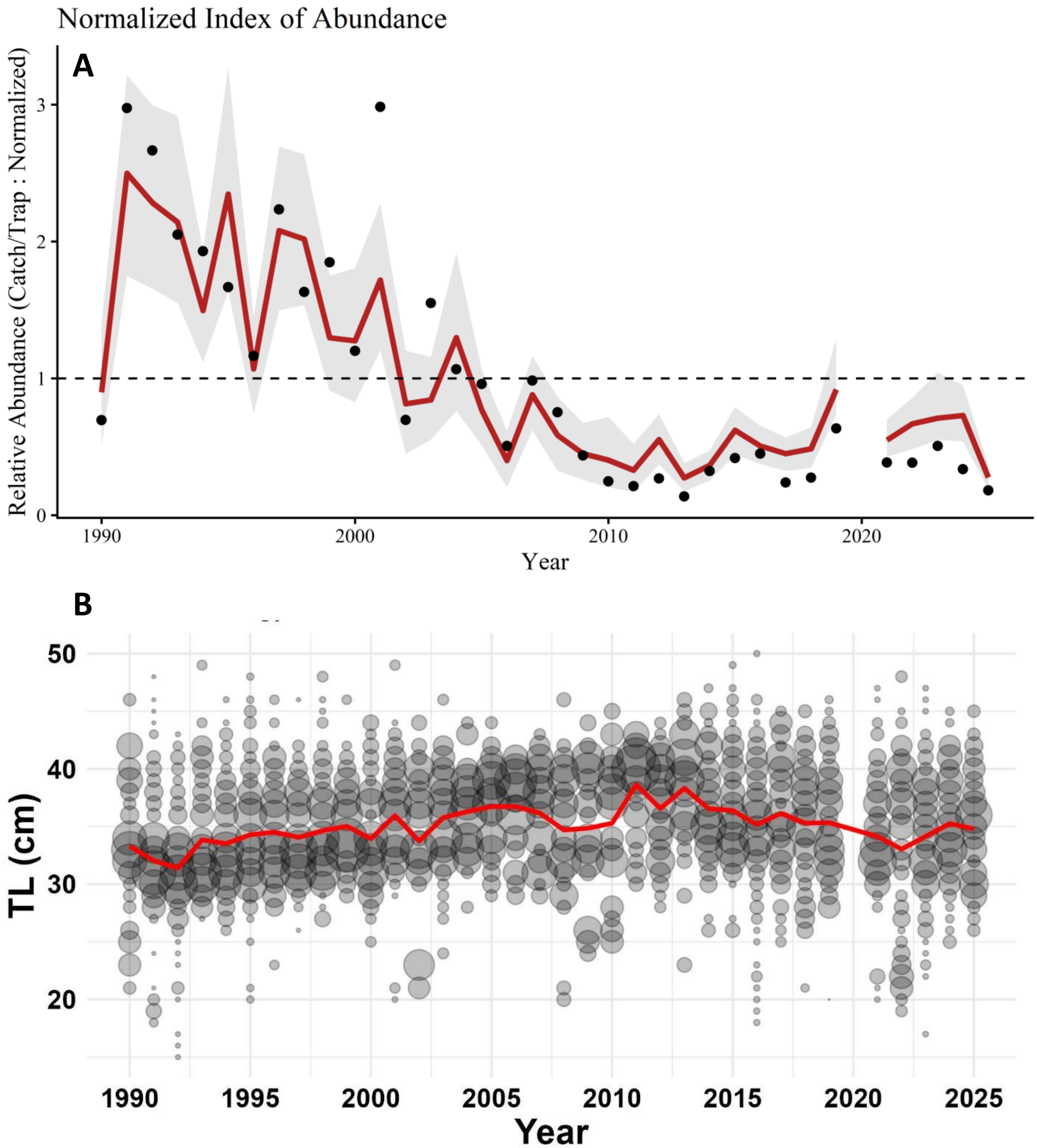

Figure 6. Chevron trap index of abundance and length compositions for Knobbed Porgy. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

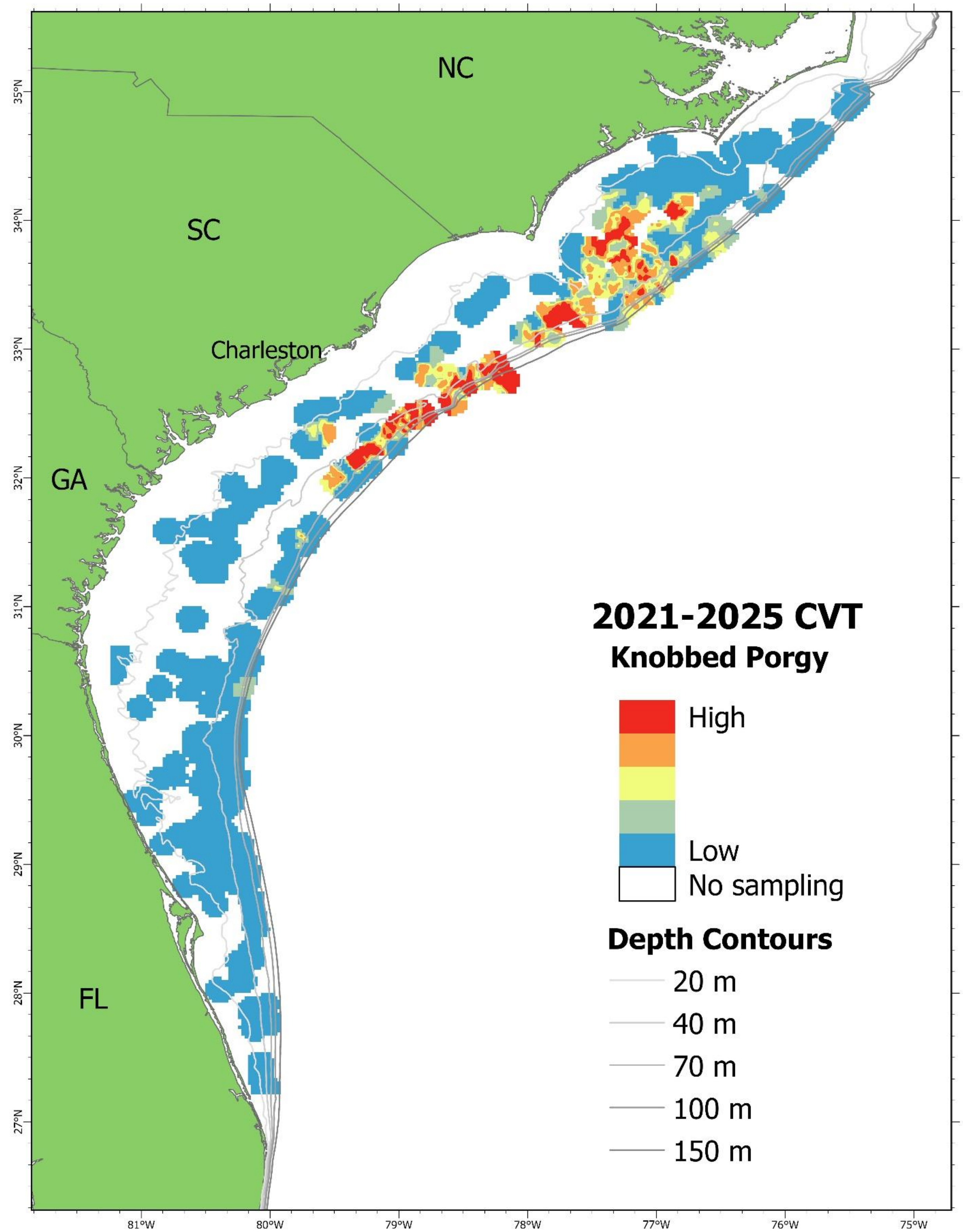

Figure 7. Distribution map of Knobbed Porgy catches from CVTs from 2021-2025.

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

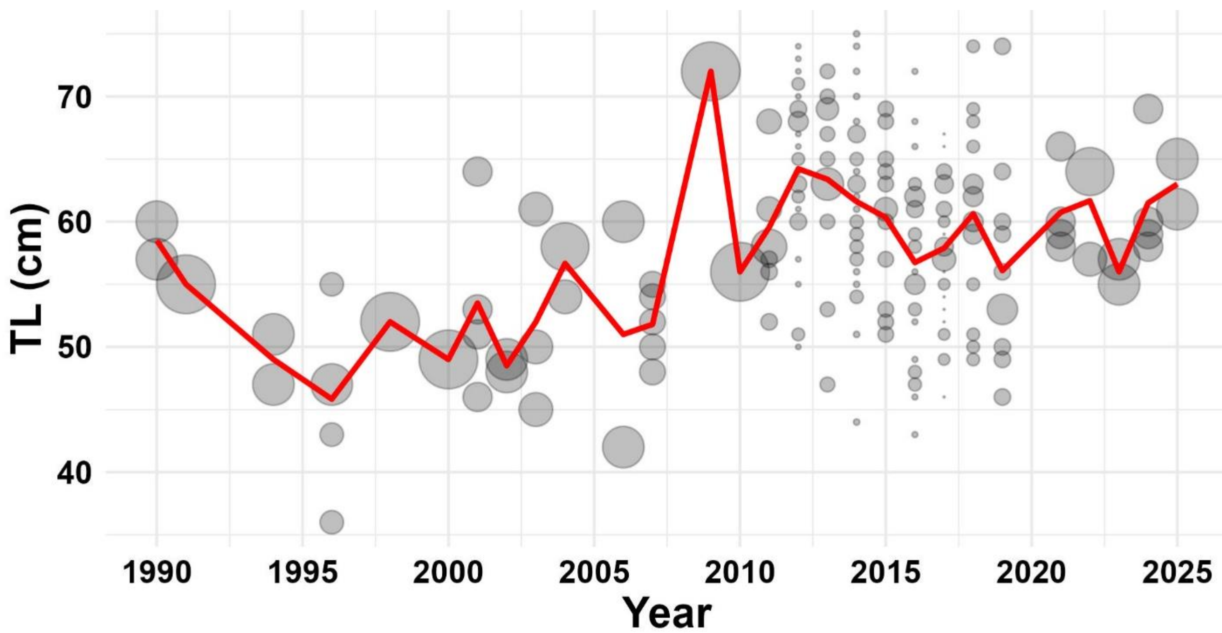

Figure 8. Blueline Tilefish total lengths (cm) caught with chevron trap by year.

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

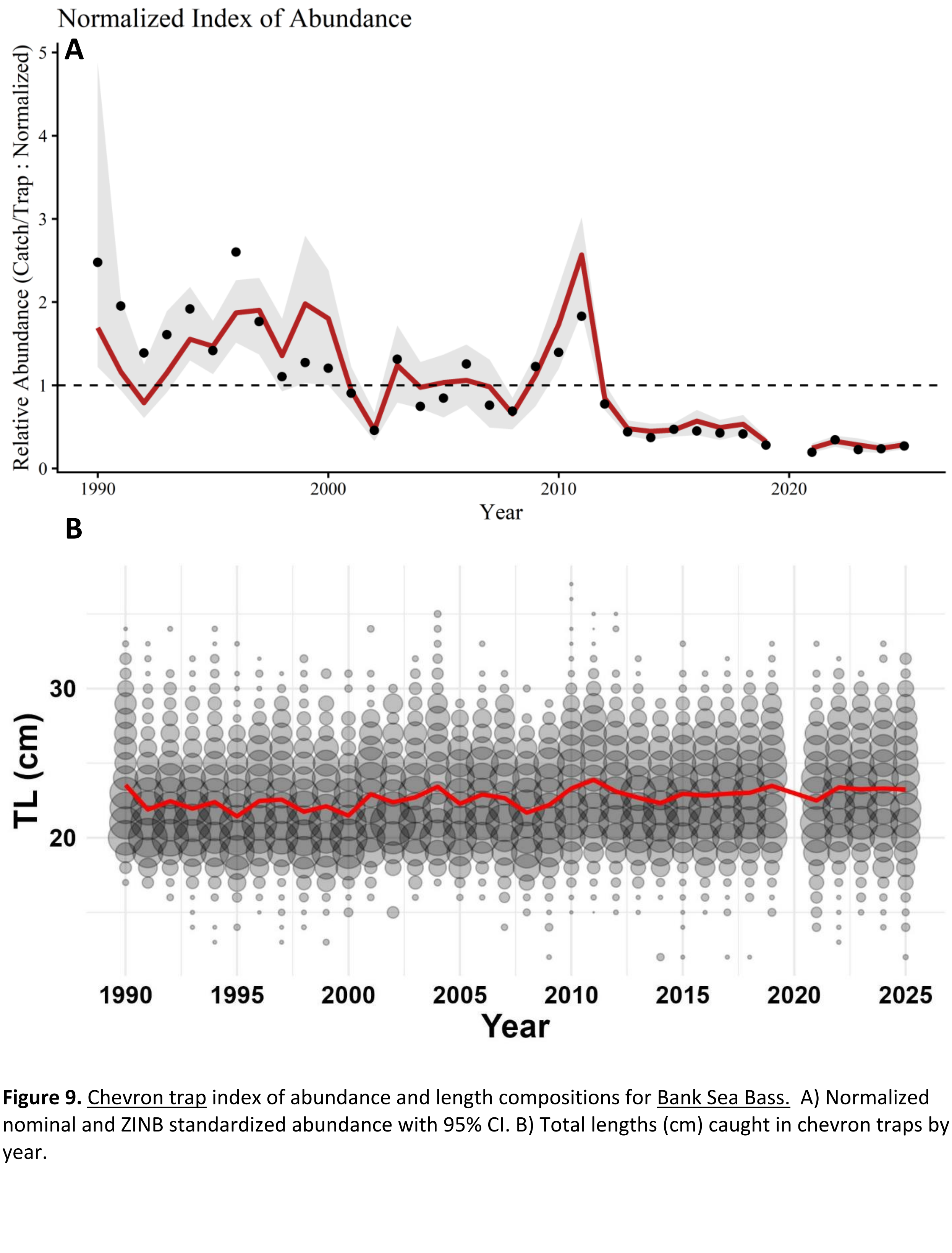

Figure 9. Chevron trap index of abundance and length compositions for Bank Sea Bass. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught in chevron traps by year.

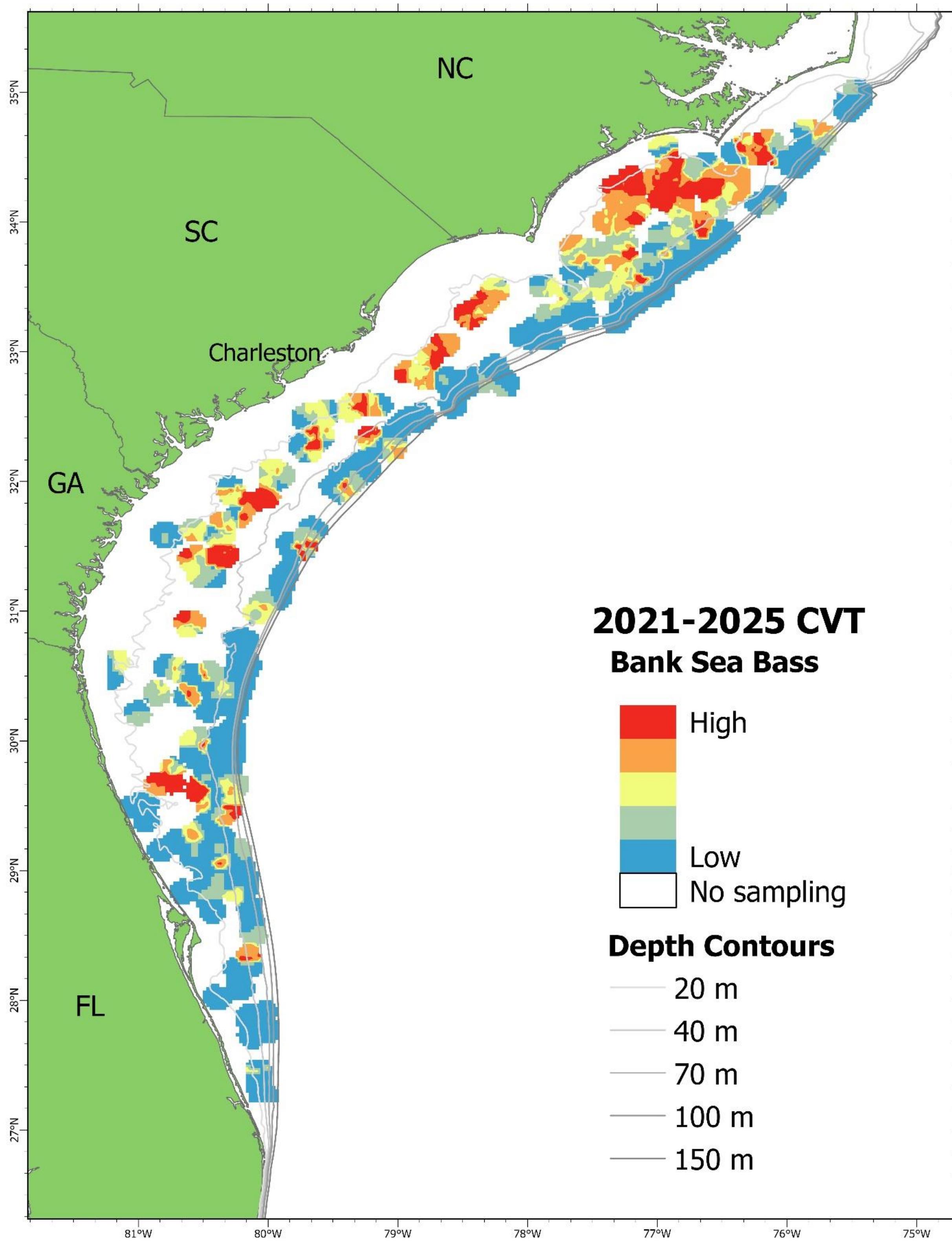

Figure 10. Distribution map of Bank Sea Bass catches from CVTs from 2021-2025.

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

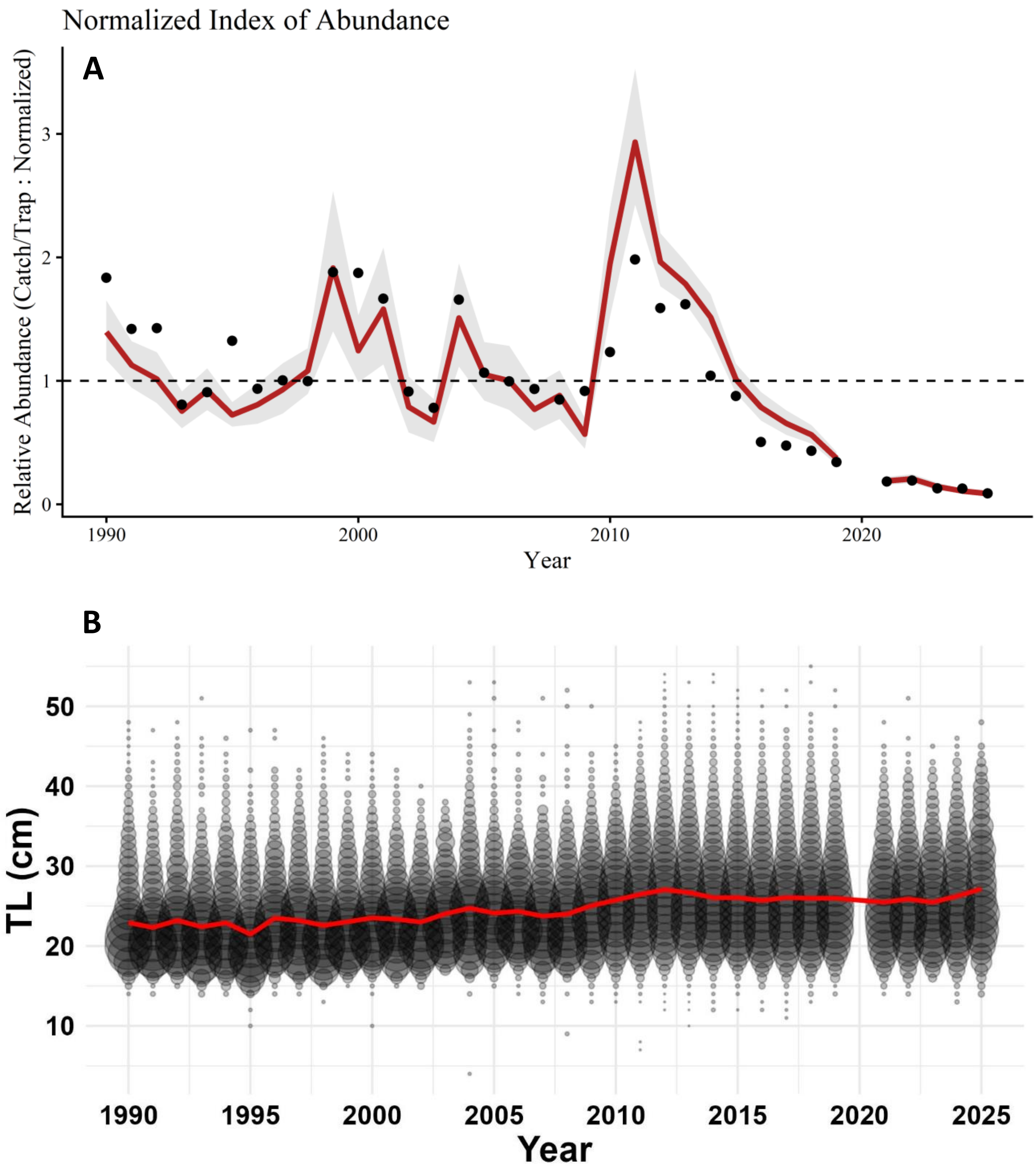

Figure 11. Chevron trap index of abundance and length compositions for Black Sea Bass. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

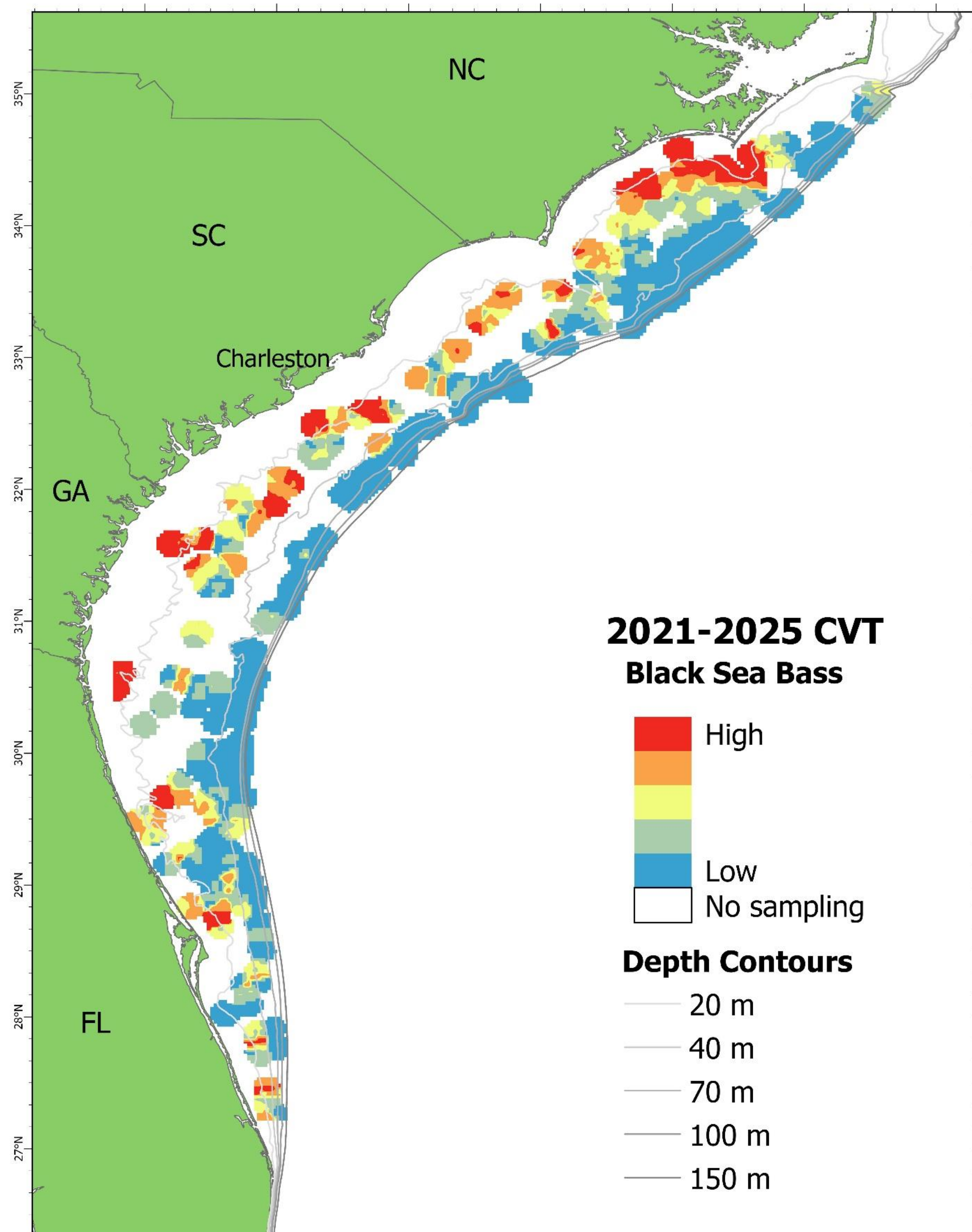

Figure 12. Distribution map of Black Sea Bass catches from CVTs from 2021-2025.

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

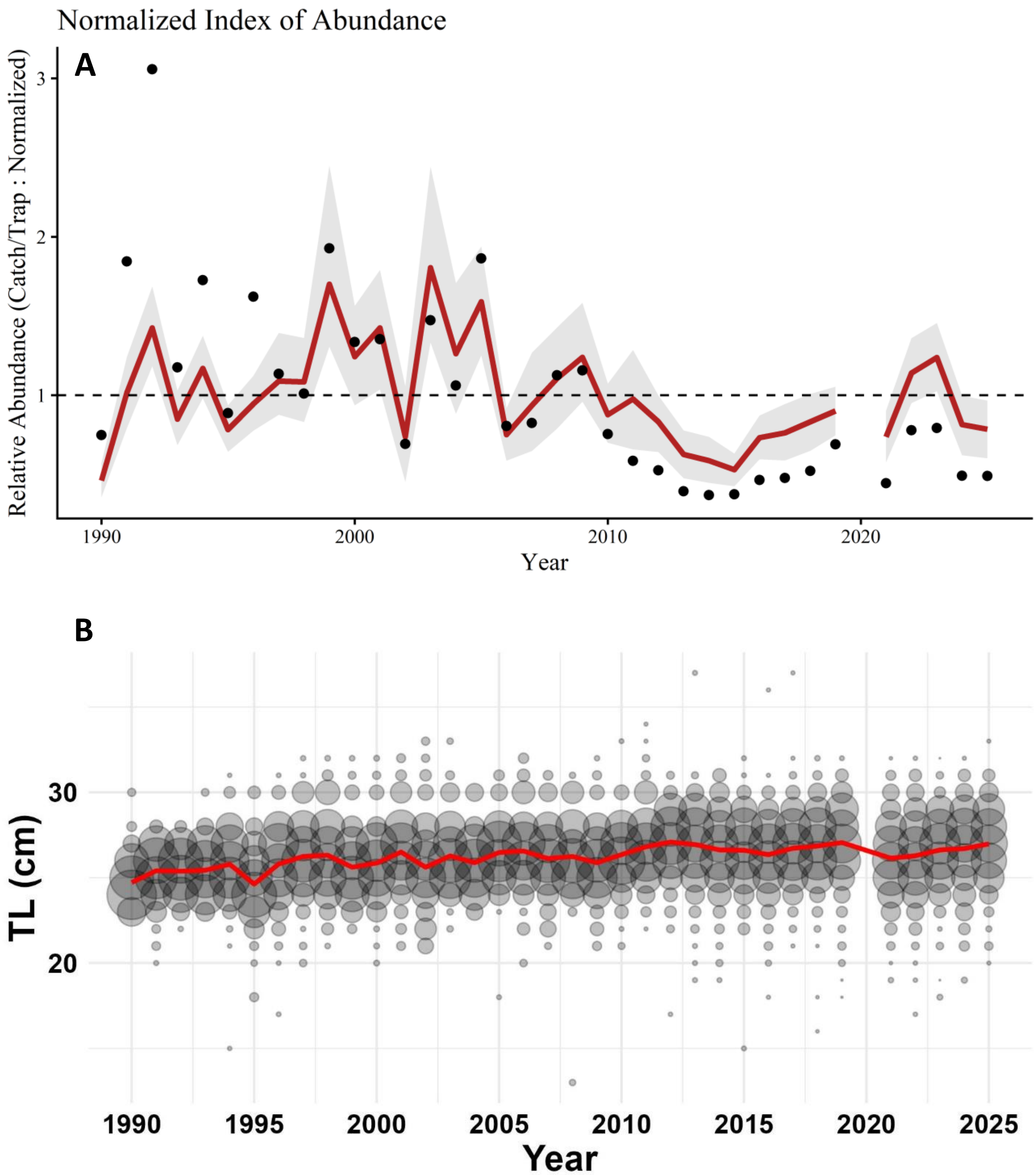

Figure 13. Chevron trap index of abundance and length compositions for Sand Perch. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

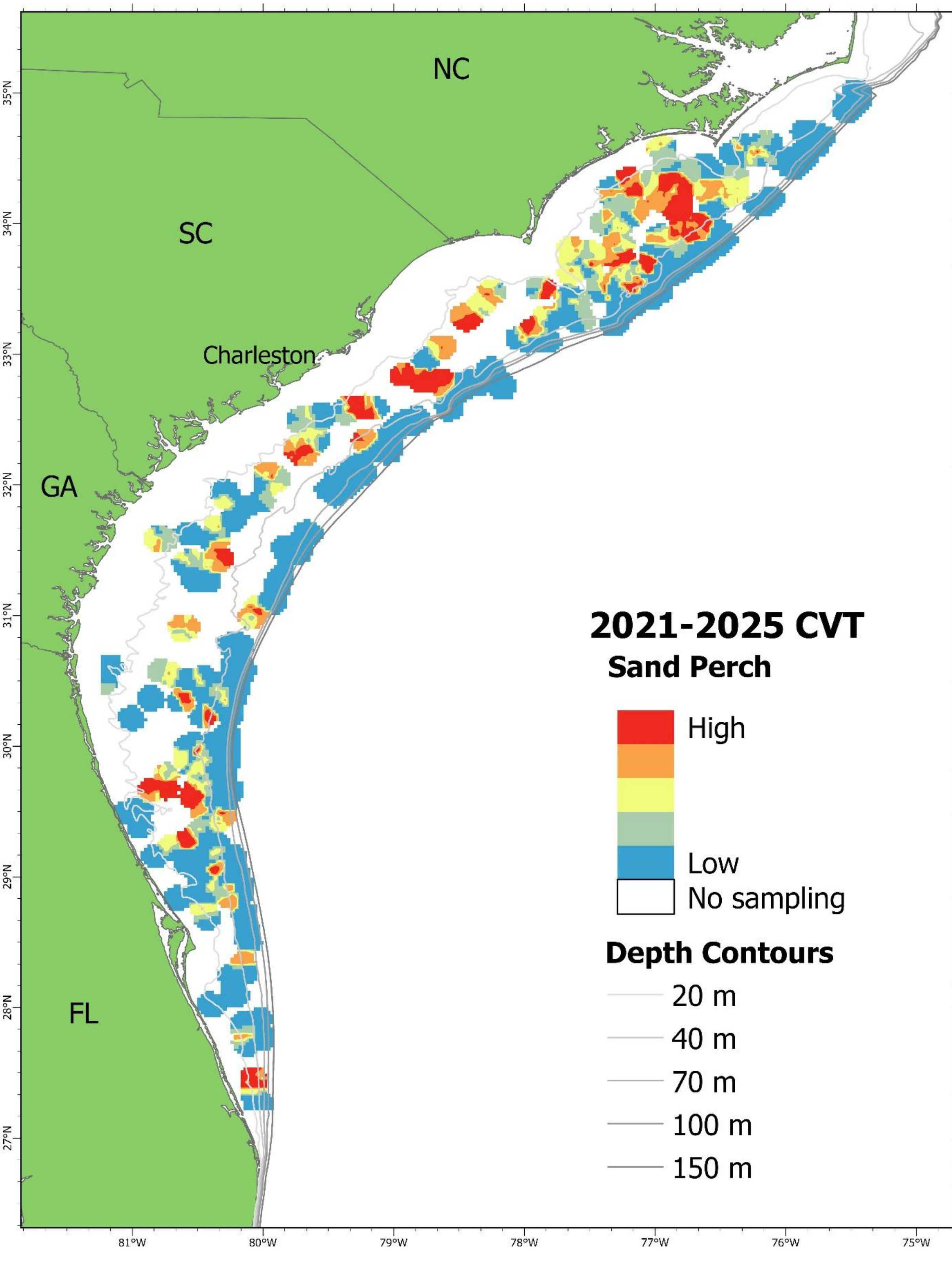

Figure 14. Distribution map of Sand Perch catches from CVTs from 2021-2025.

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

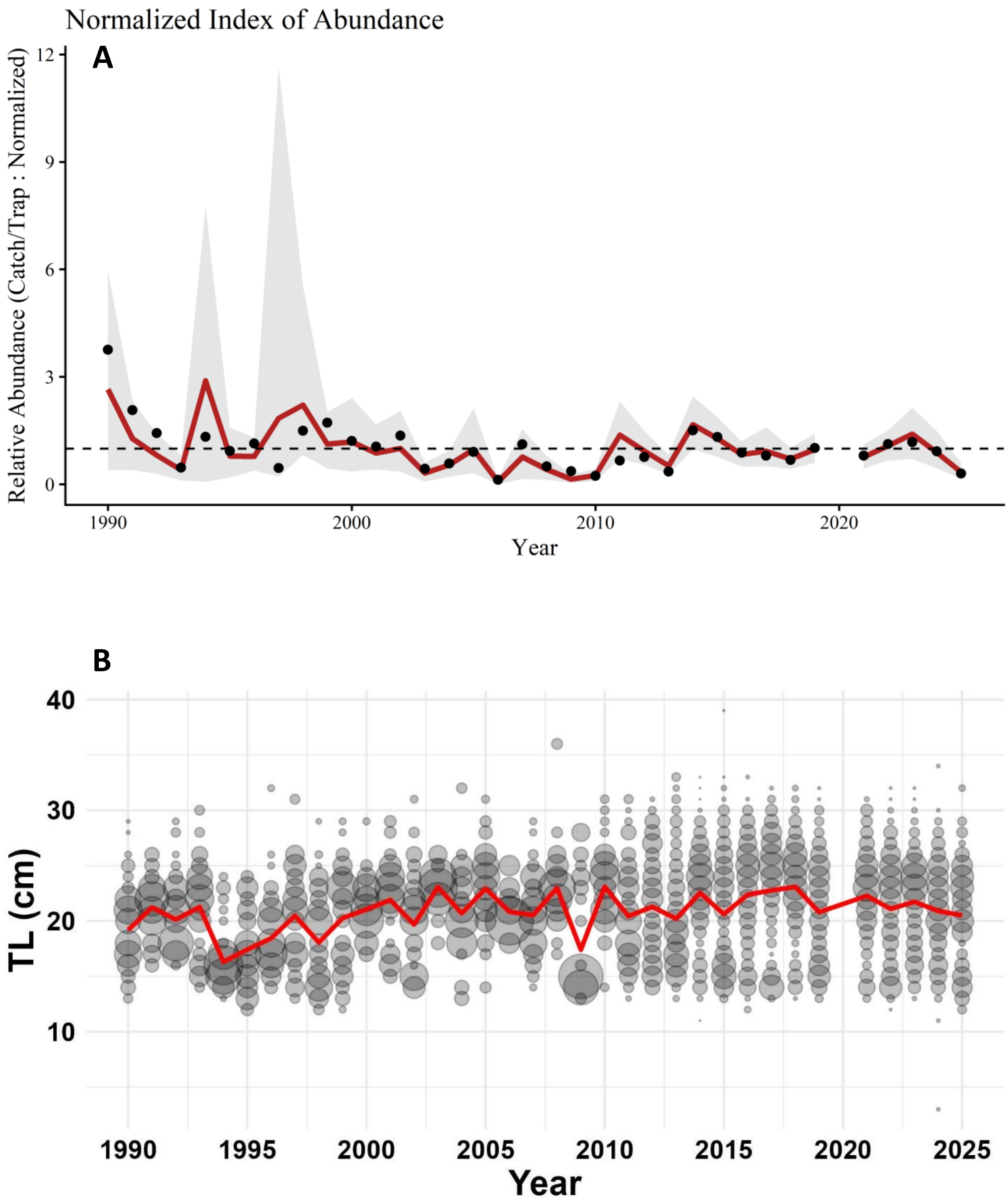

Figure 15. Chevron trap index of abundance and length compositions for Spottail Pinfish. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught in chevron traps by year.

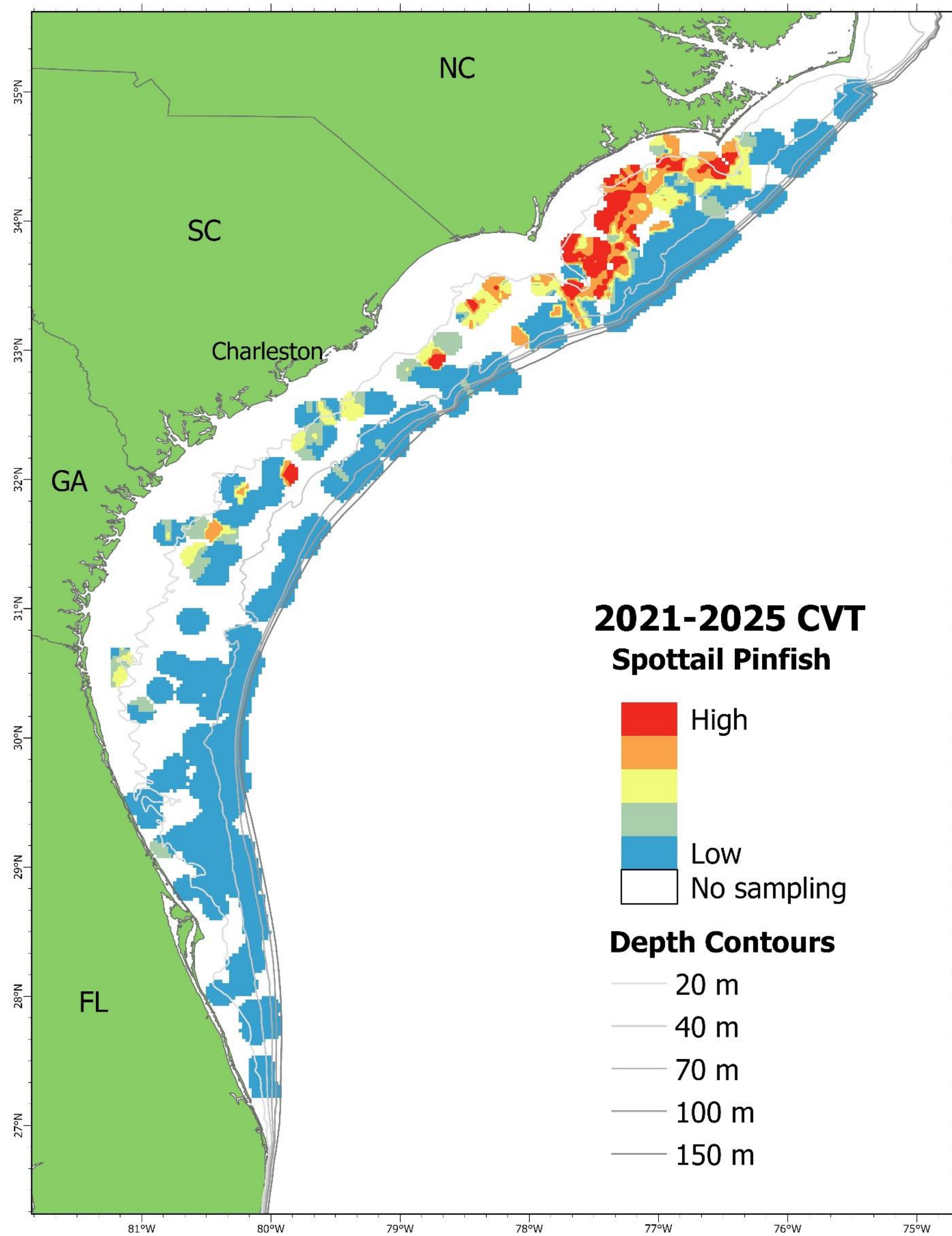

Figure 16. Distribution map of Spottail Pinfish catches from CVTs from 2021-2025.

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

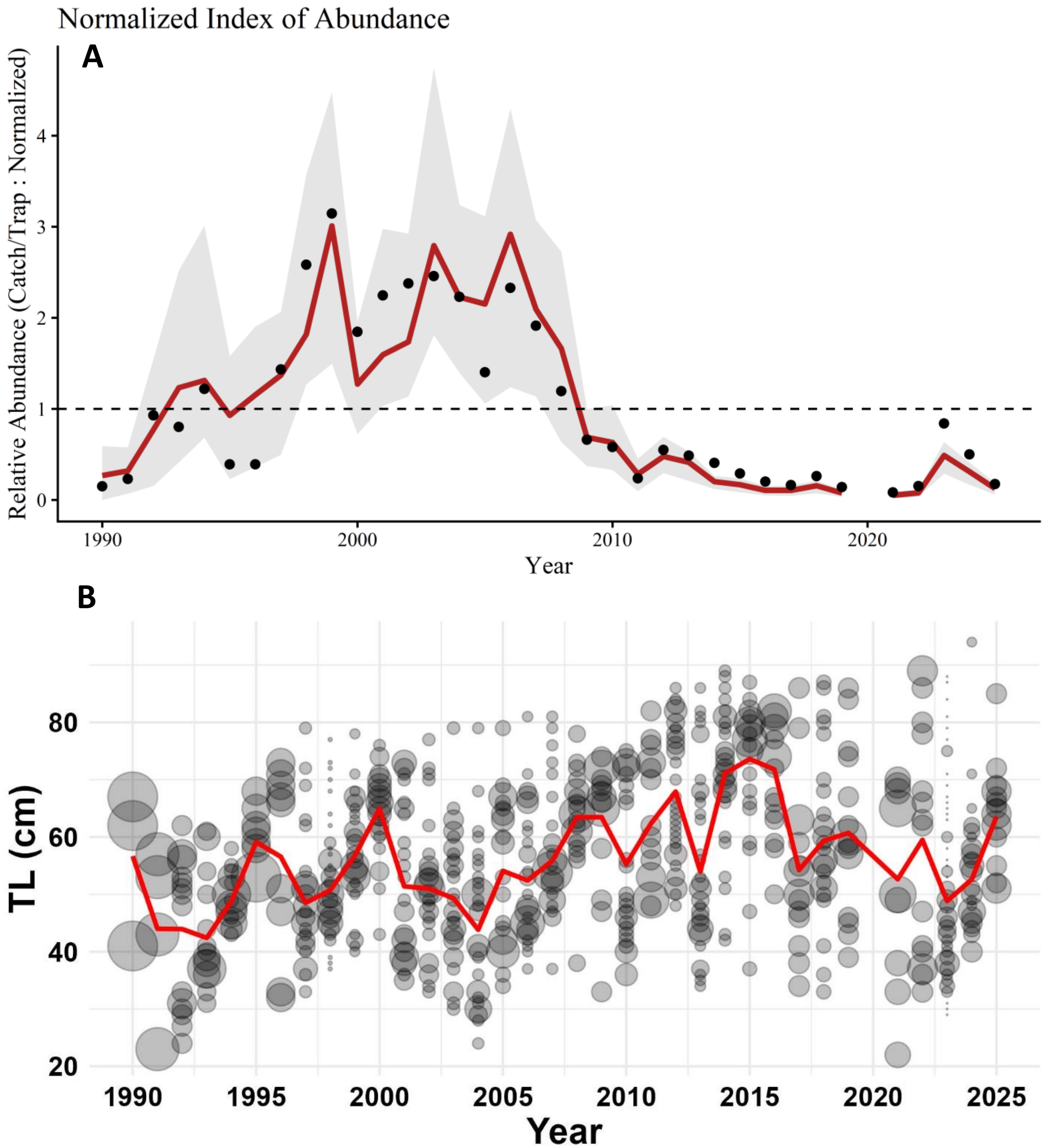

Figure 17. Chevron trap index of abundance and length compositions for Red Grouper. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

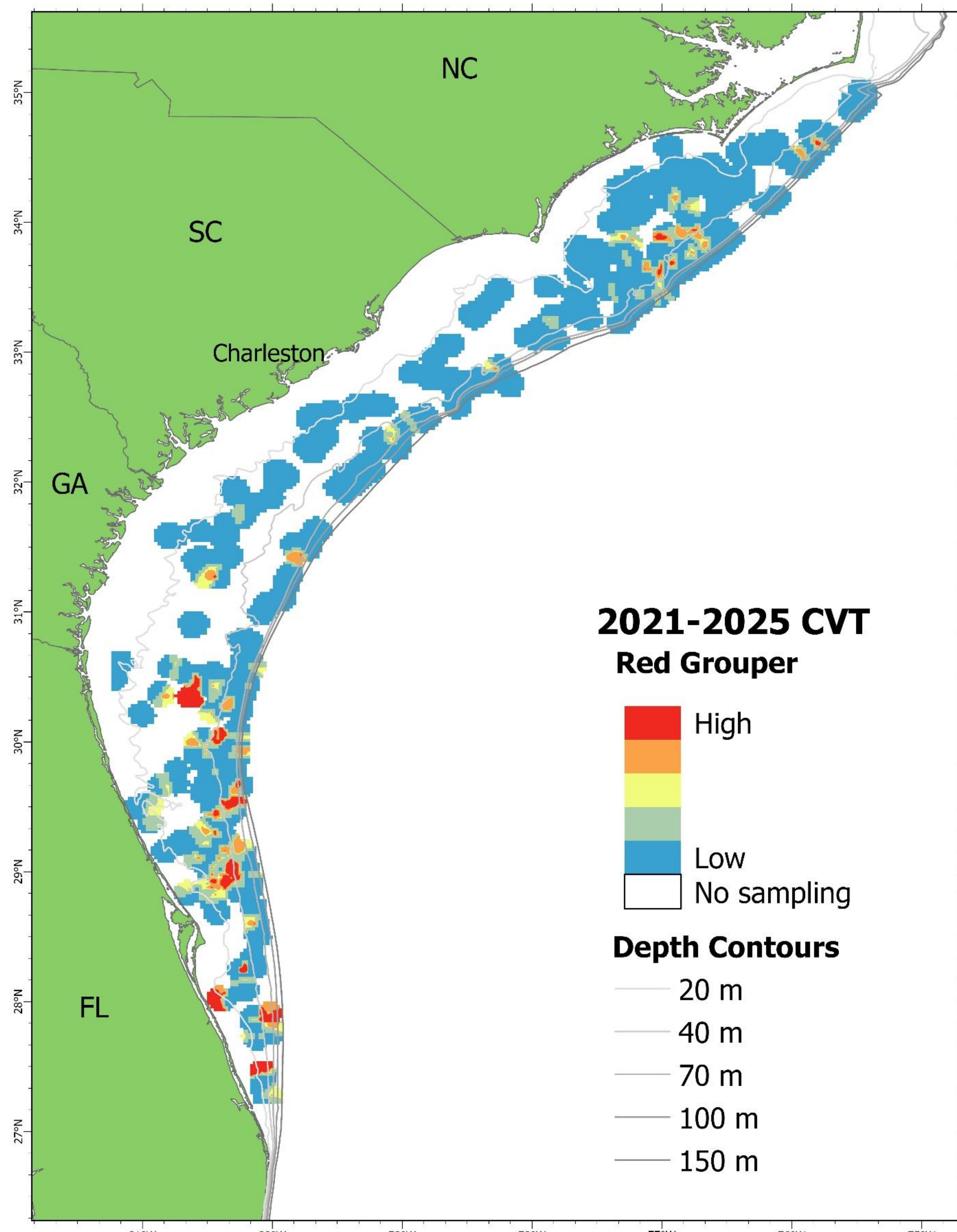

Figure 18. Distribution map of <u>Red Grouper</u> catches from CVTs from 2021-2025.

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

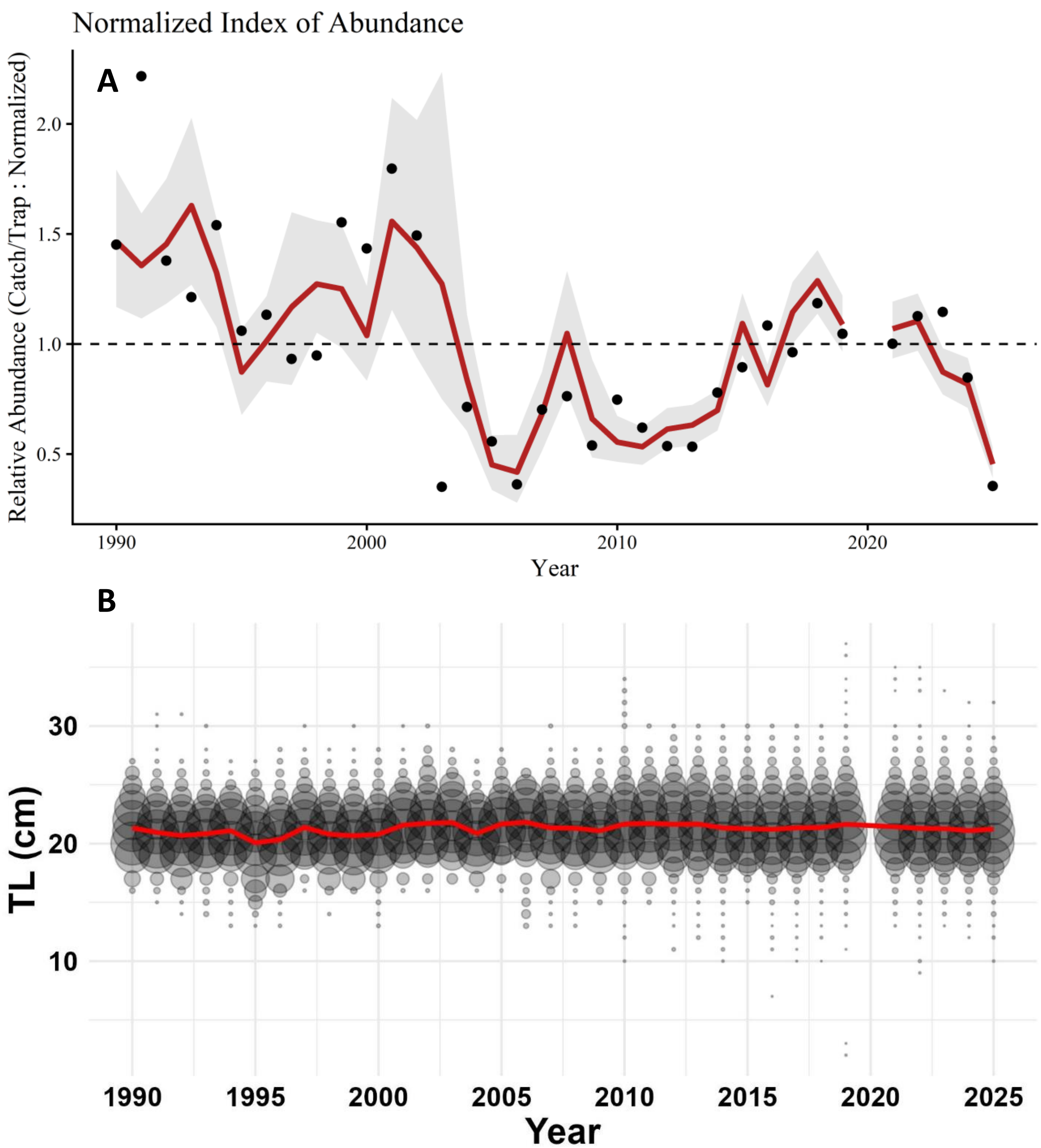

Figure 19. Chevron trap index of abundance and length compositions for Tomtate. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

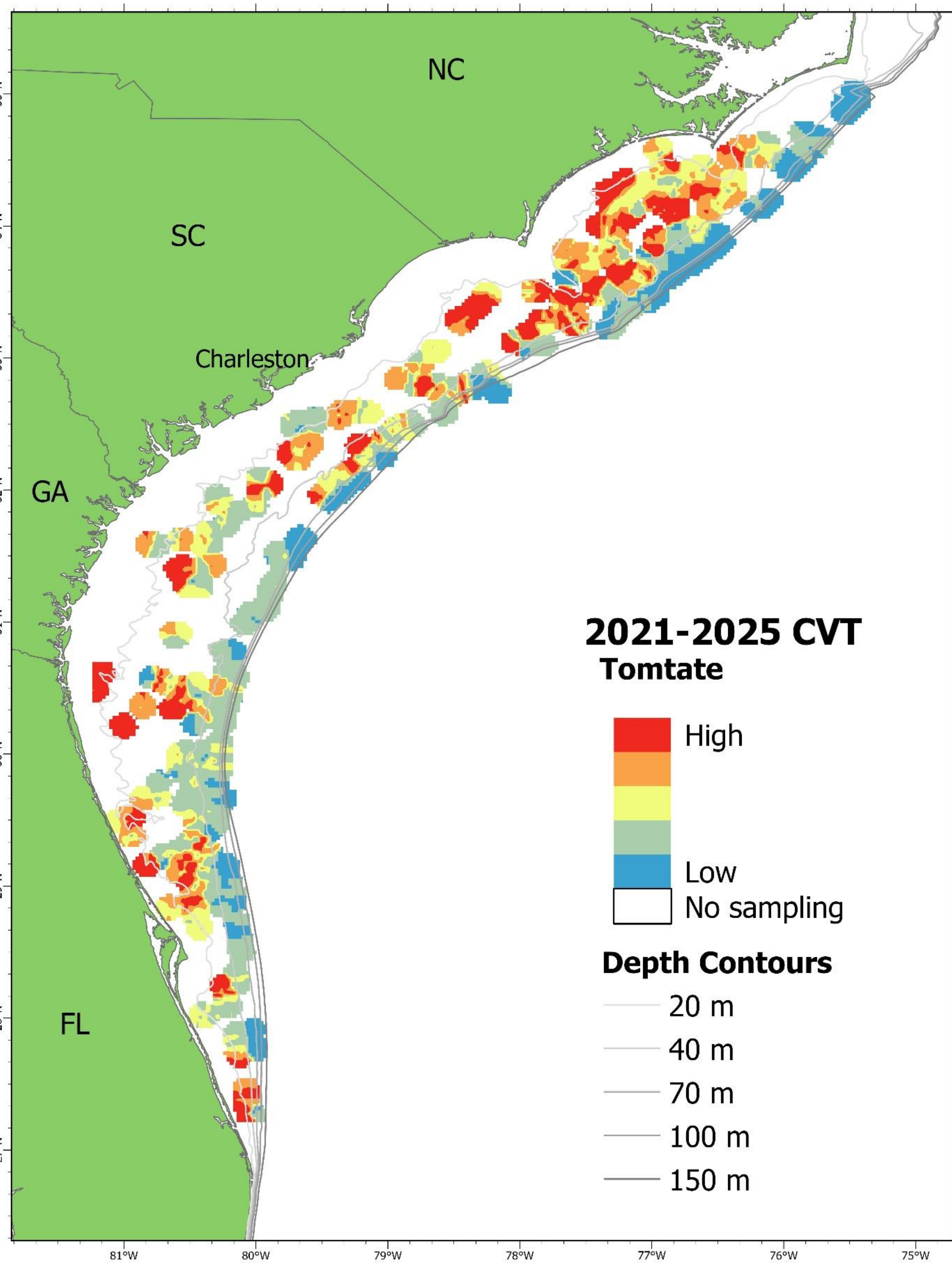

Figure 20. Distribution map of Tomtate catches from CVTs from 2021-2025.

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

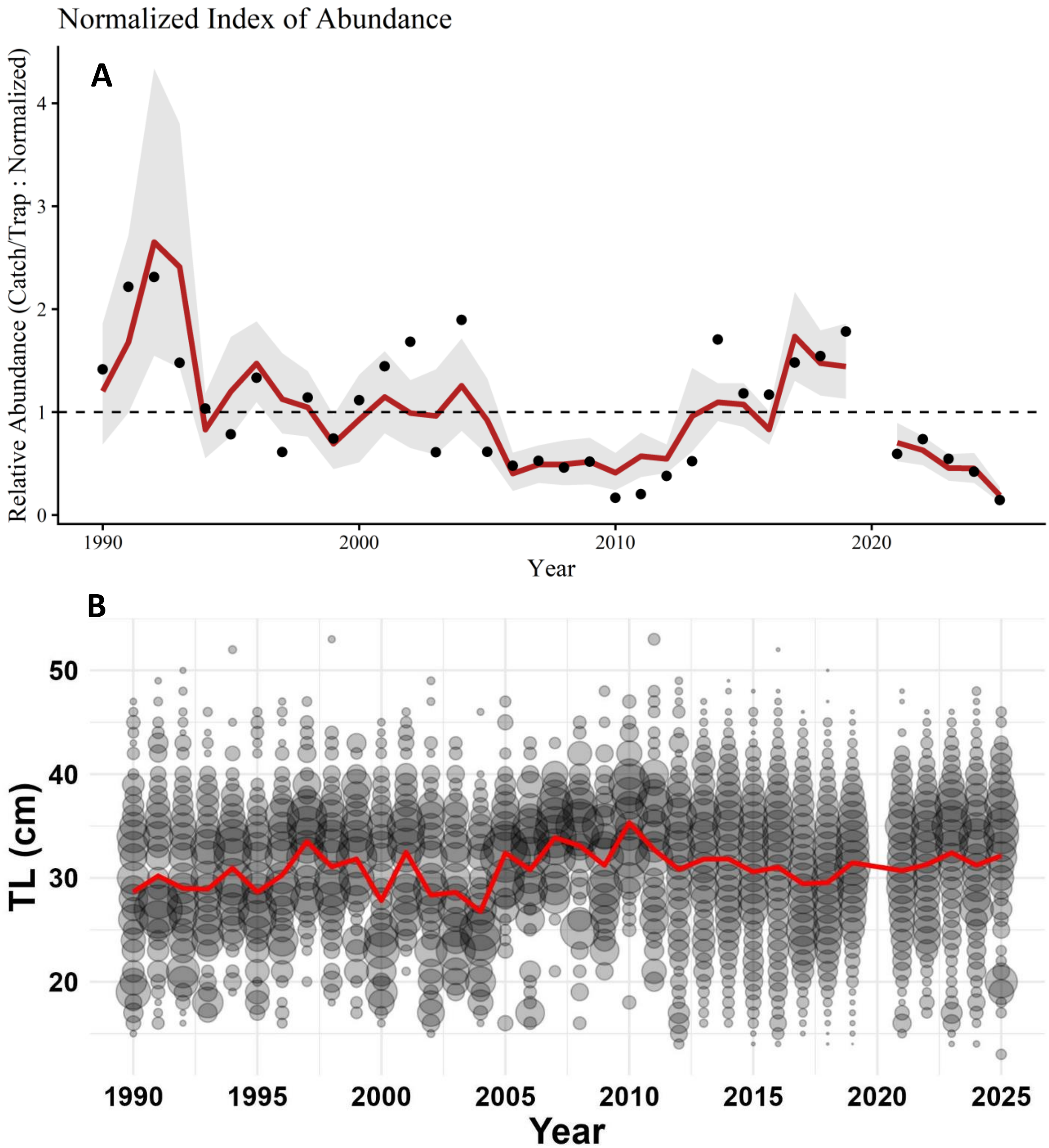

Figure 21. Chevron trap index of abundance and length compositions for White Grunt. A) Chevron trap normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught in chevron traps by year.

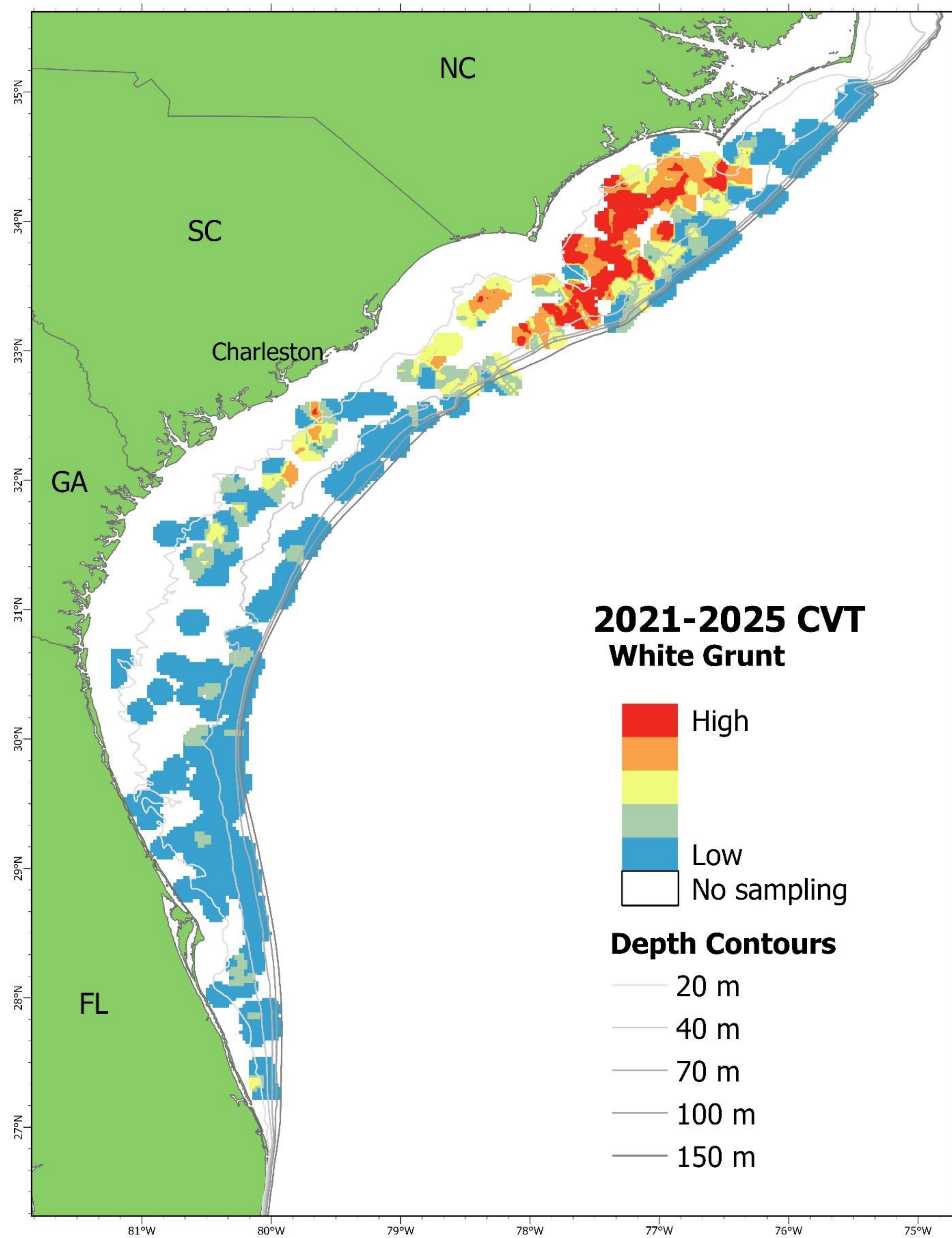

Figure 22. Distribution map of White Grunt catches from CVTs from 2021-2025.

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

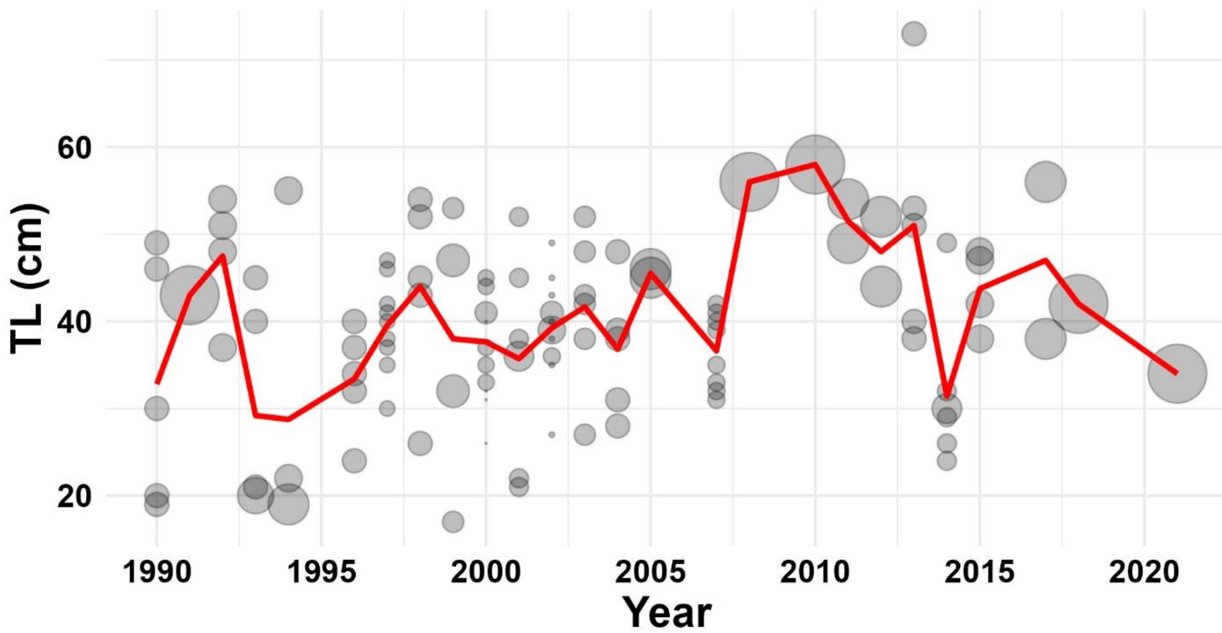

Figure 23. Speckled Hind total lengths (cm) caught in chevron traps by year.

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

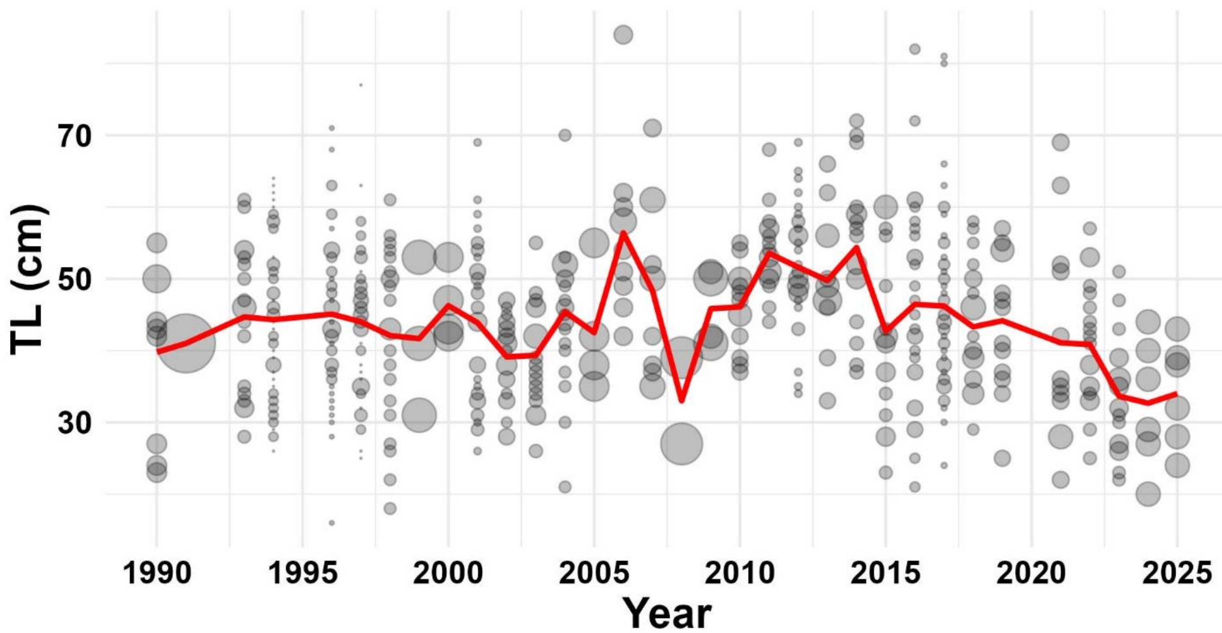

Figure 24. <u>Snowy Grouper</u> total lengths (cm) caught in <u>chevron traps</u> by year.

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

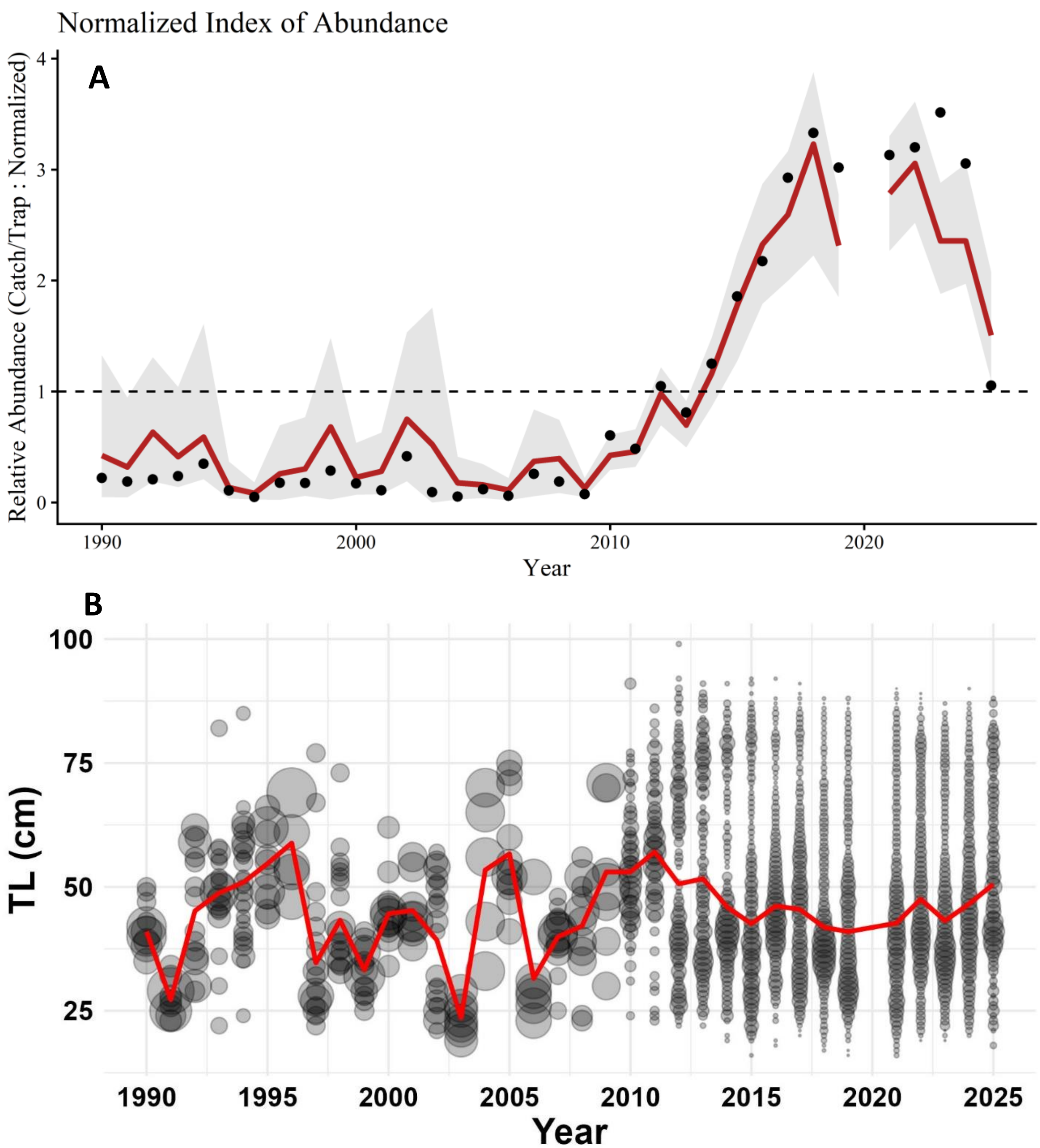

Figure 25. Chevron trap index of abundance and length compositions for Red Snapper A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) caught by year.

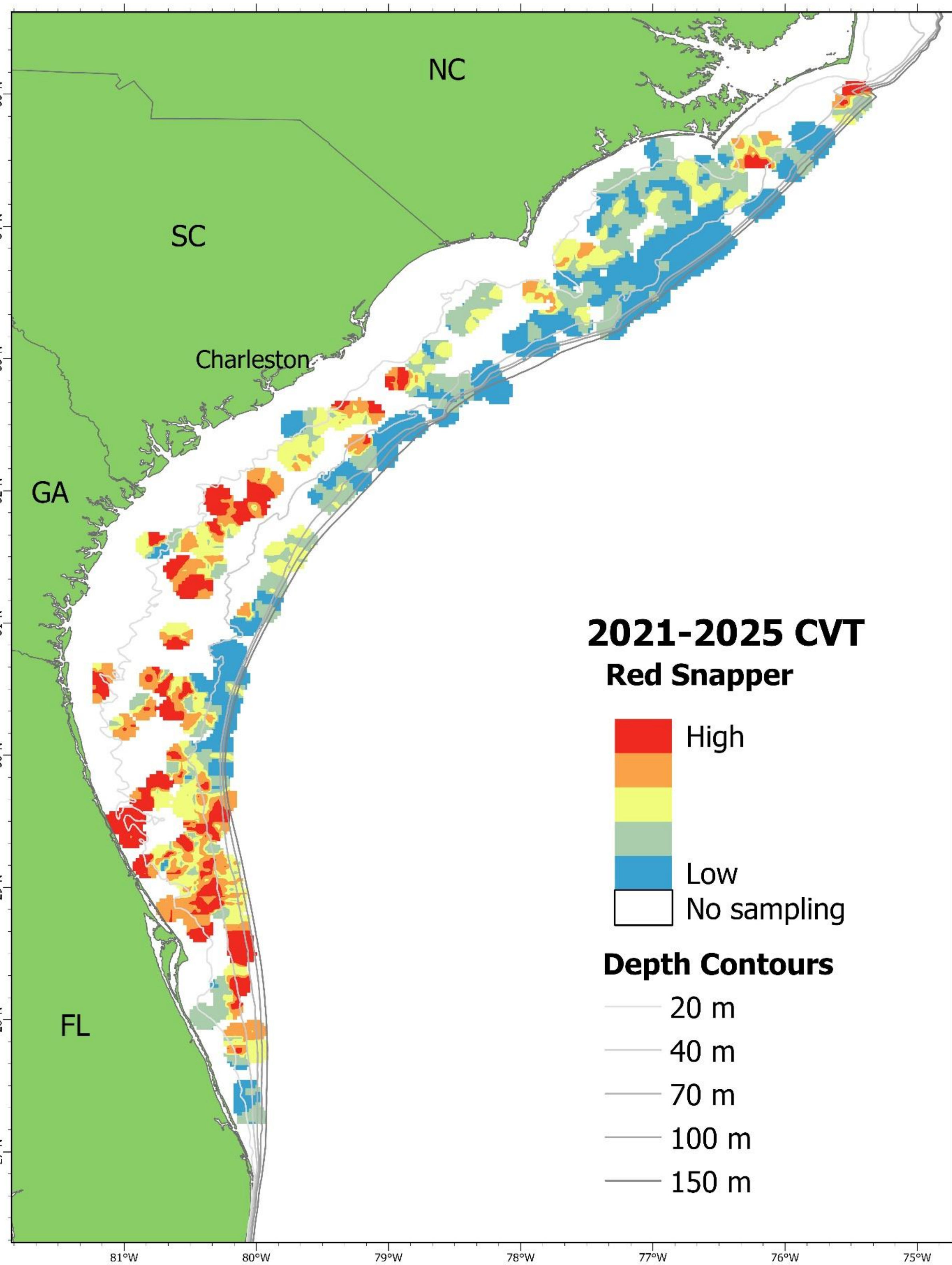

Figure 26. Distribution map of Red Snapper catches from CVTs from 2021-2025.

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

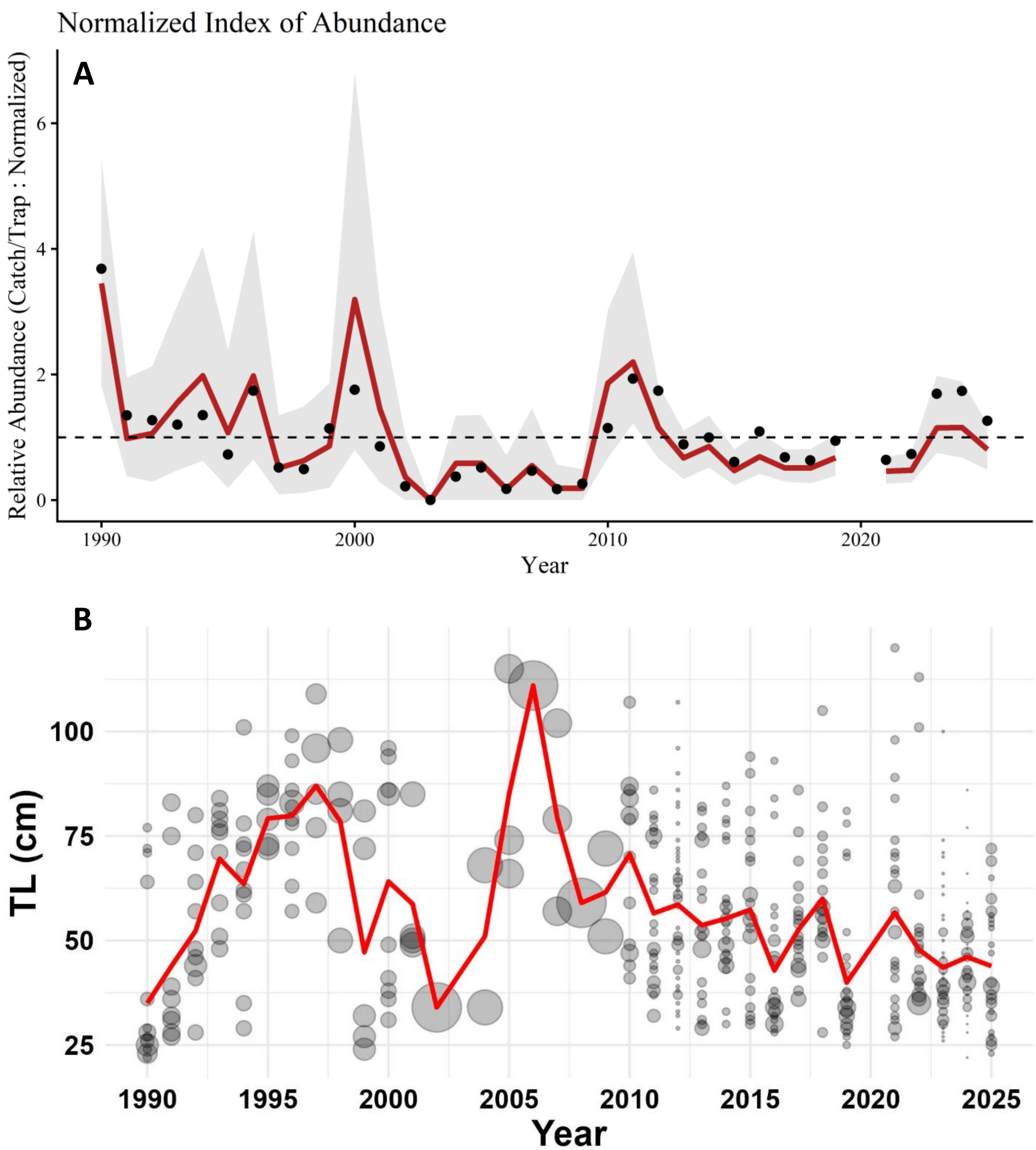

Figure 27. Chevron trap index of abundance and length compositions for Gag. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

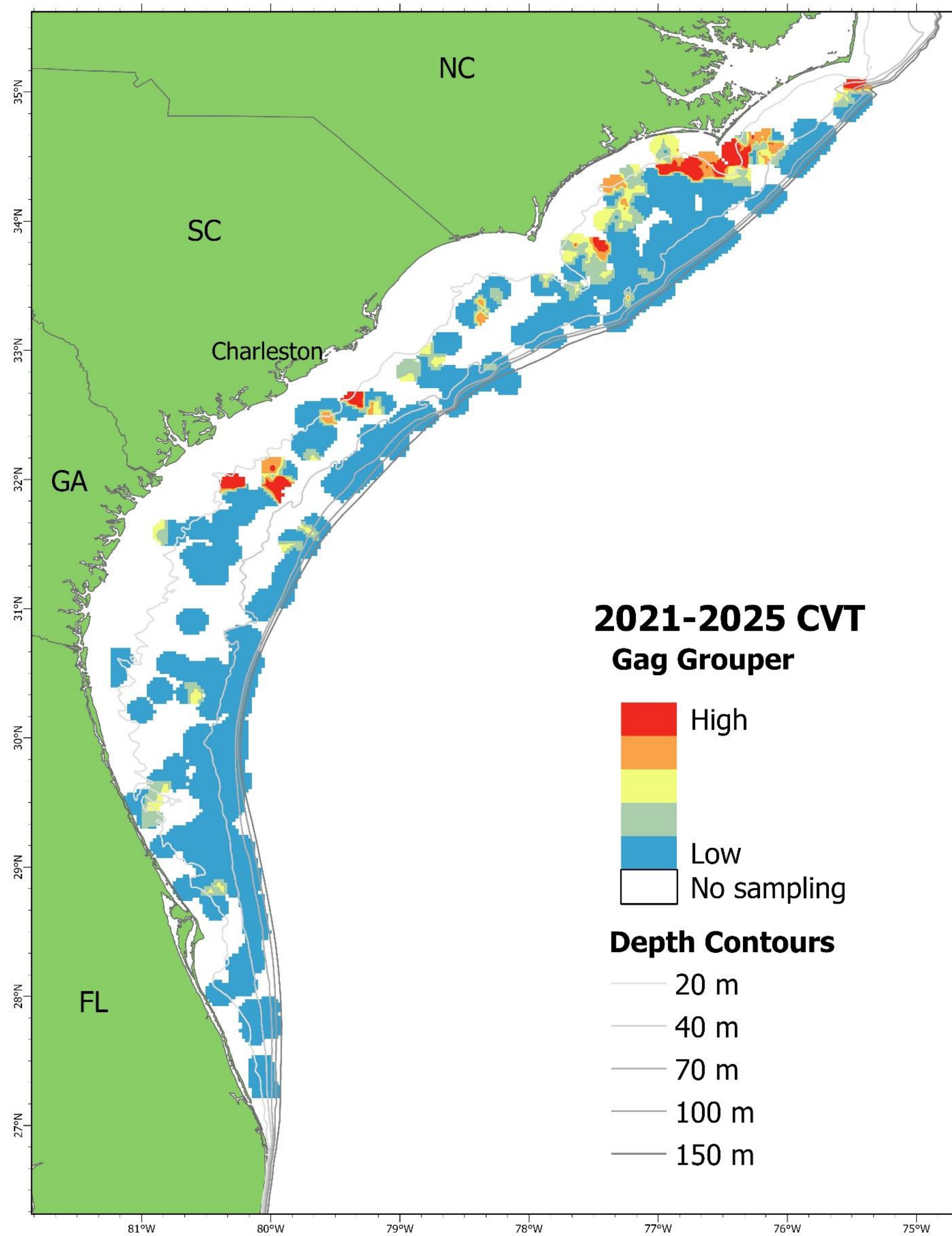

Figure 28. Distribution map of Gag catches from CVTs from 2021-2025.

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

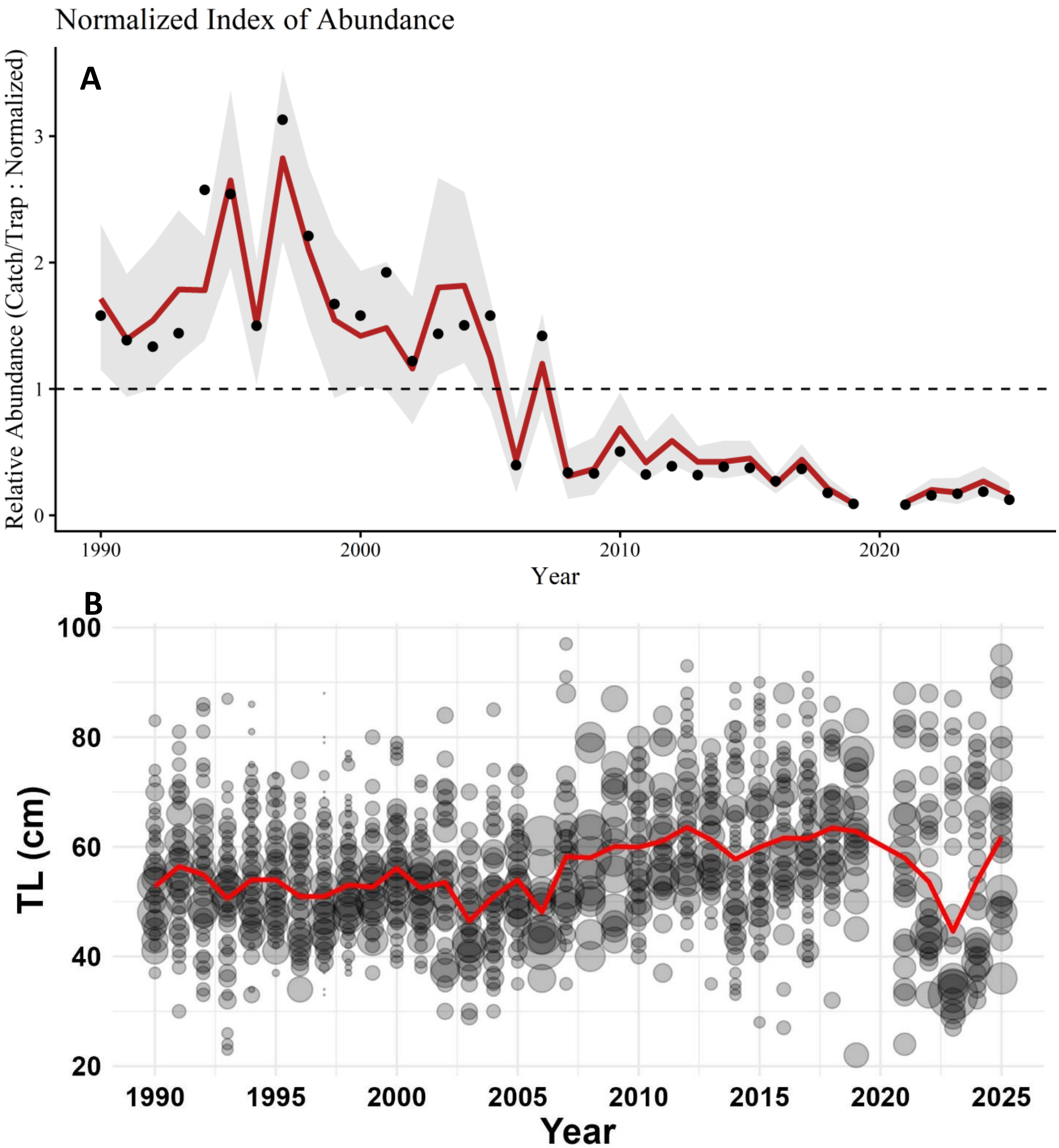

Figure 29. Chevron trap index of abundance and length compositions for Scamp. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

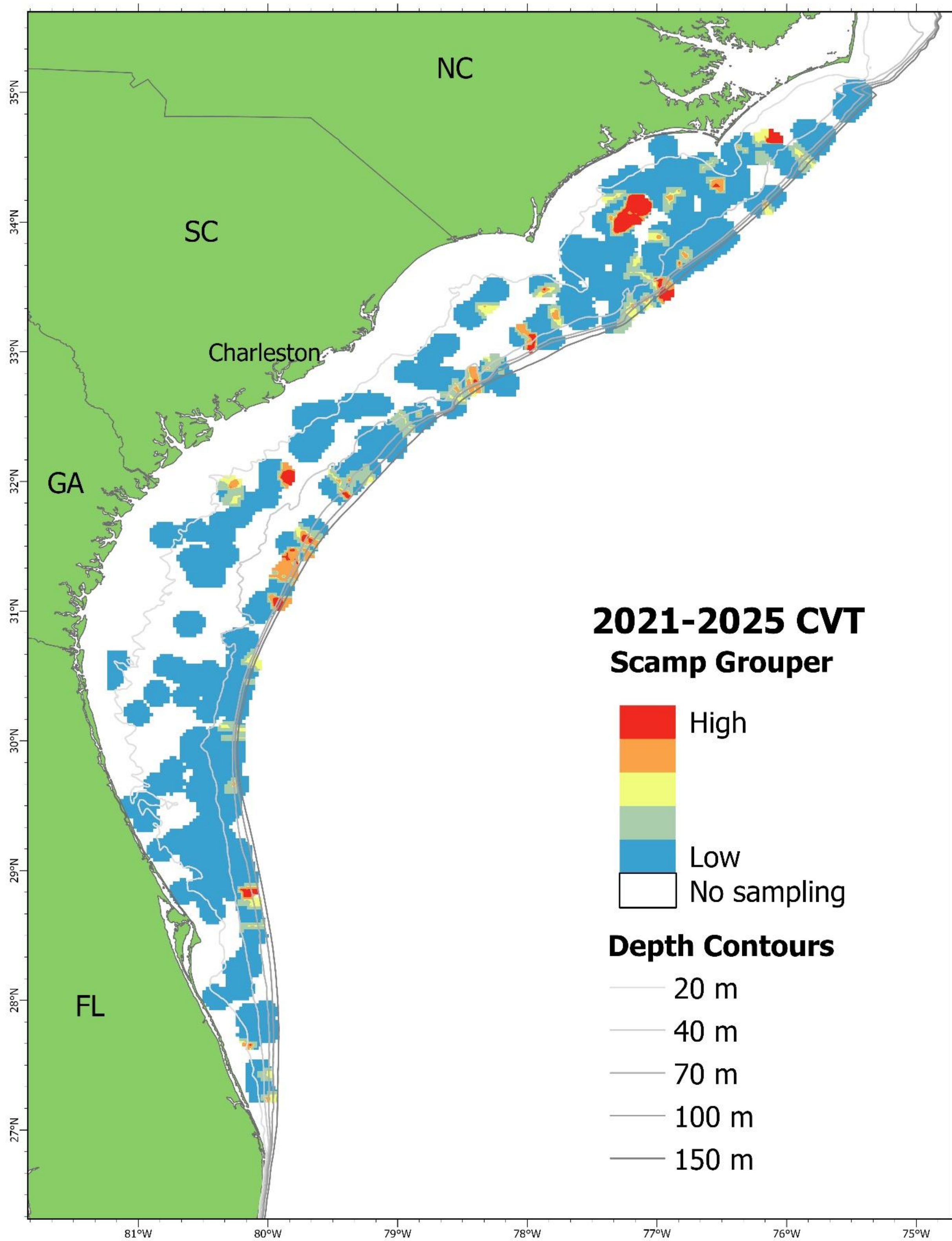

Figure 30. Distribution map of Scamp catches from CVTs from 2021-2025.

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

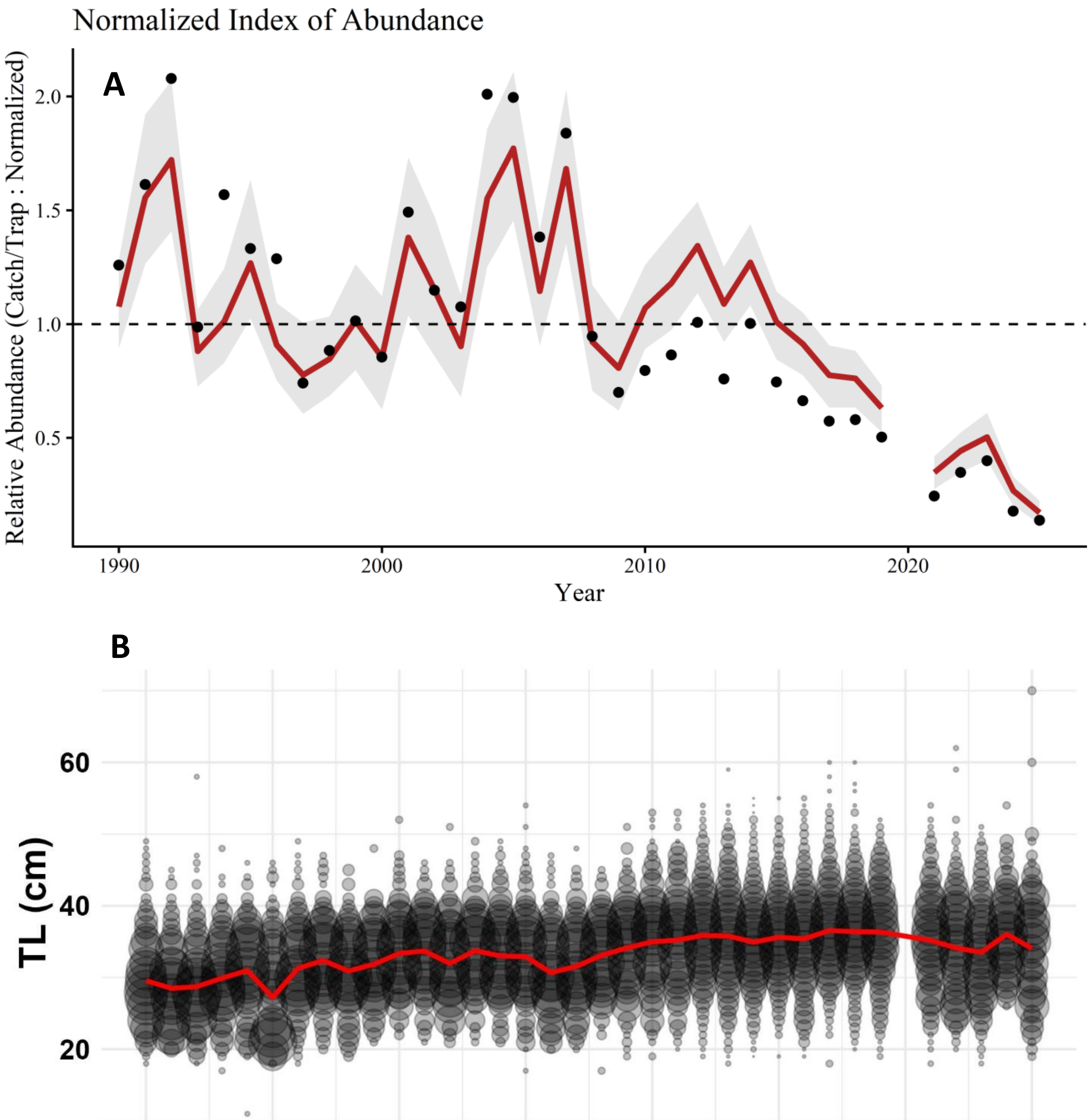

Figure 31. Chevron trap index of abundance and length compositions for Red Porgy. A) Normalized nominal and ZINB standardized abundance with 95% CI. B).

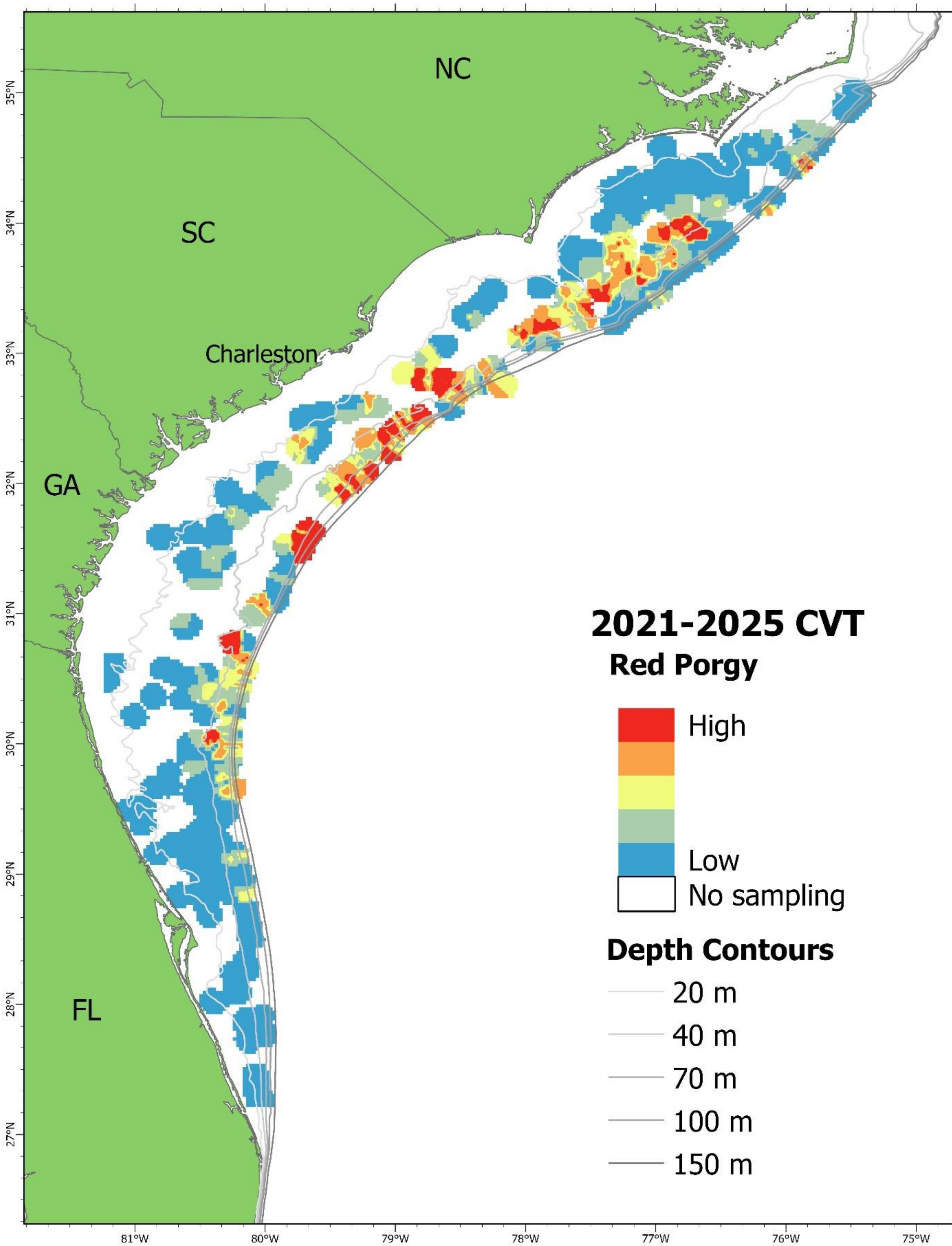

Figure 32. Distribution map of Red Porgy catches from CVTs from 2021-2025.

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

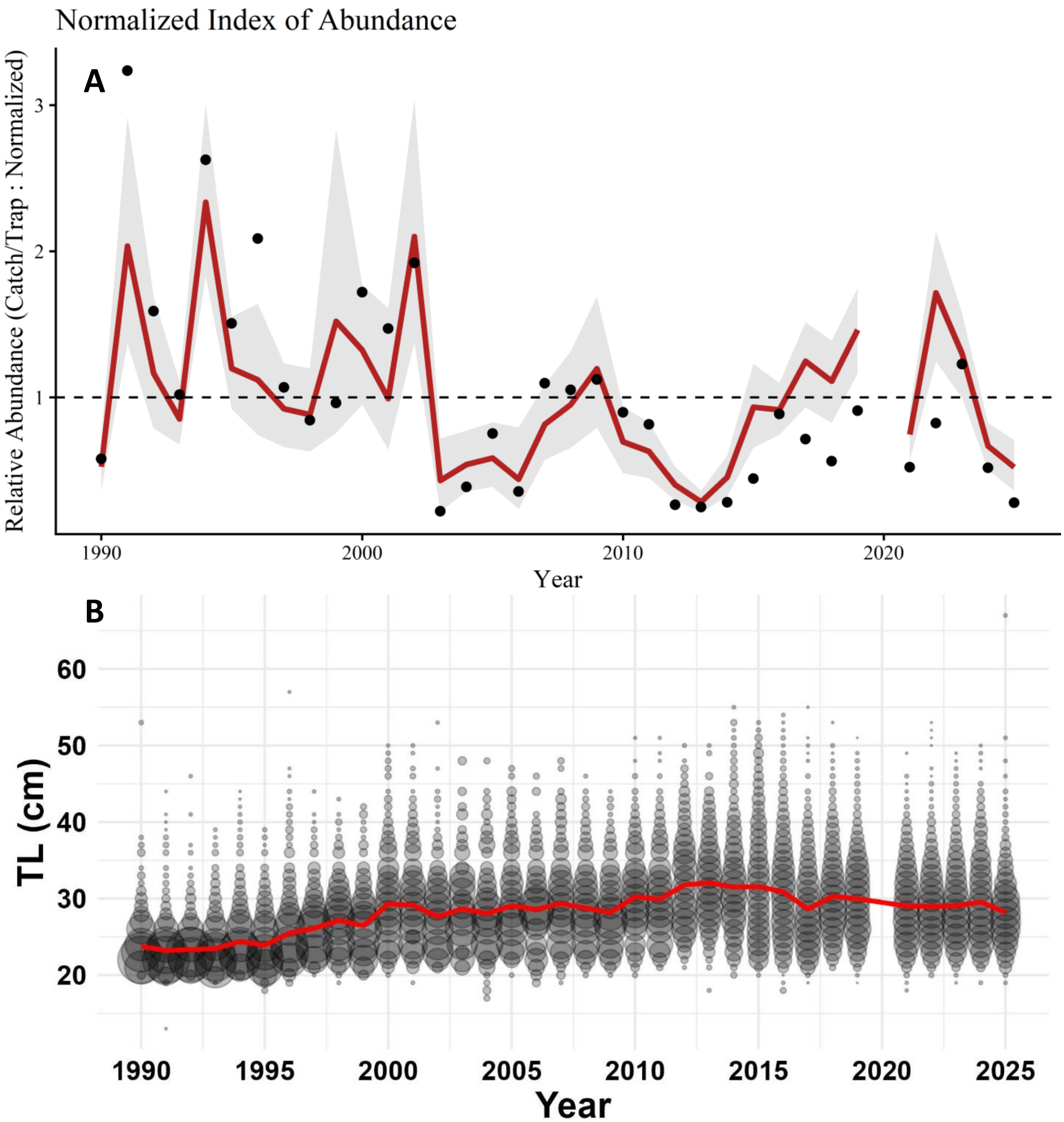

Figure 33. Chevron trap index of abundance and length compositions for Vermilion Snapper. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

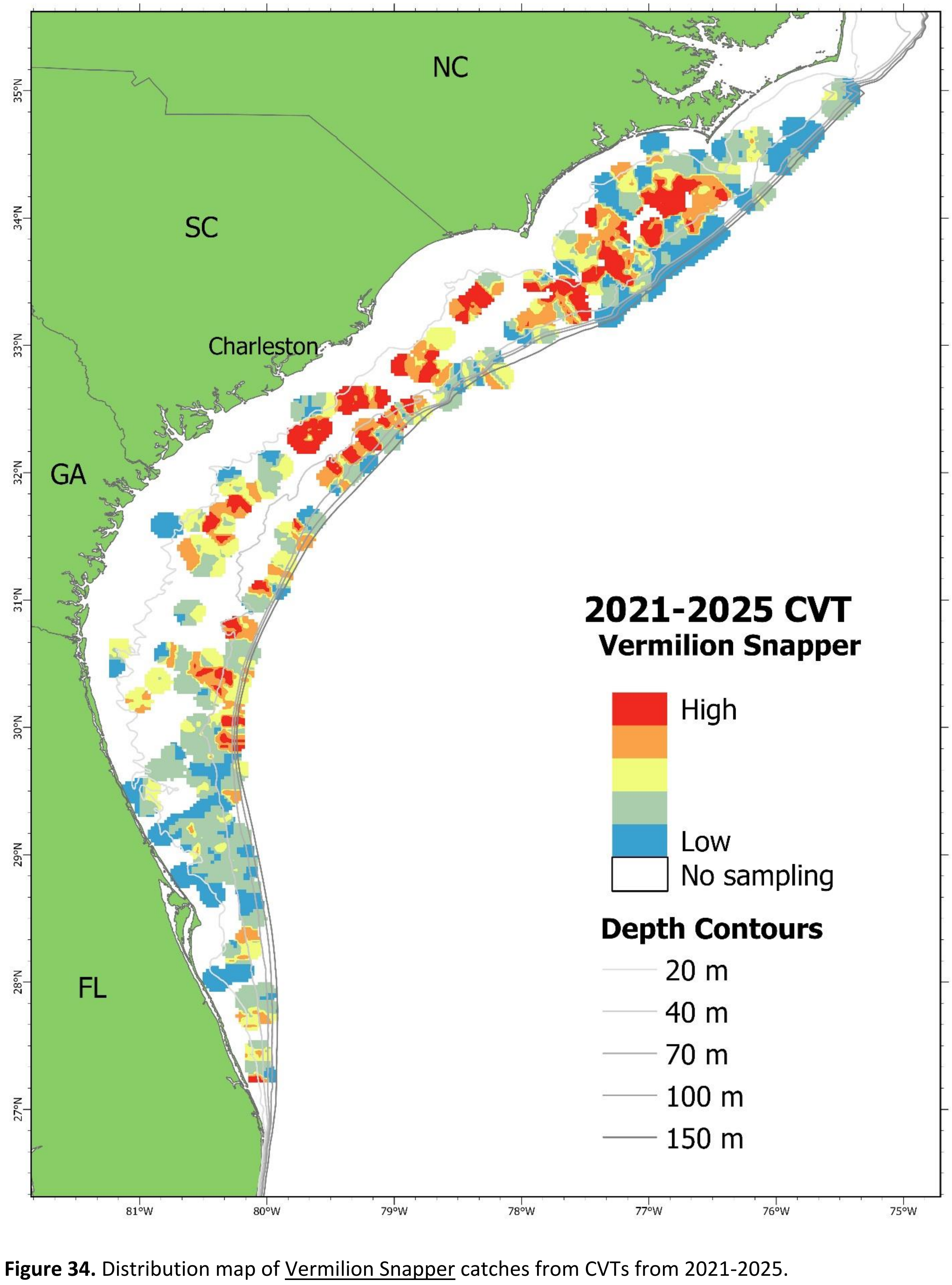

Figure 34. Distribution map of Vermilion Snapper catches from CVTs from 2021-2025.

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

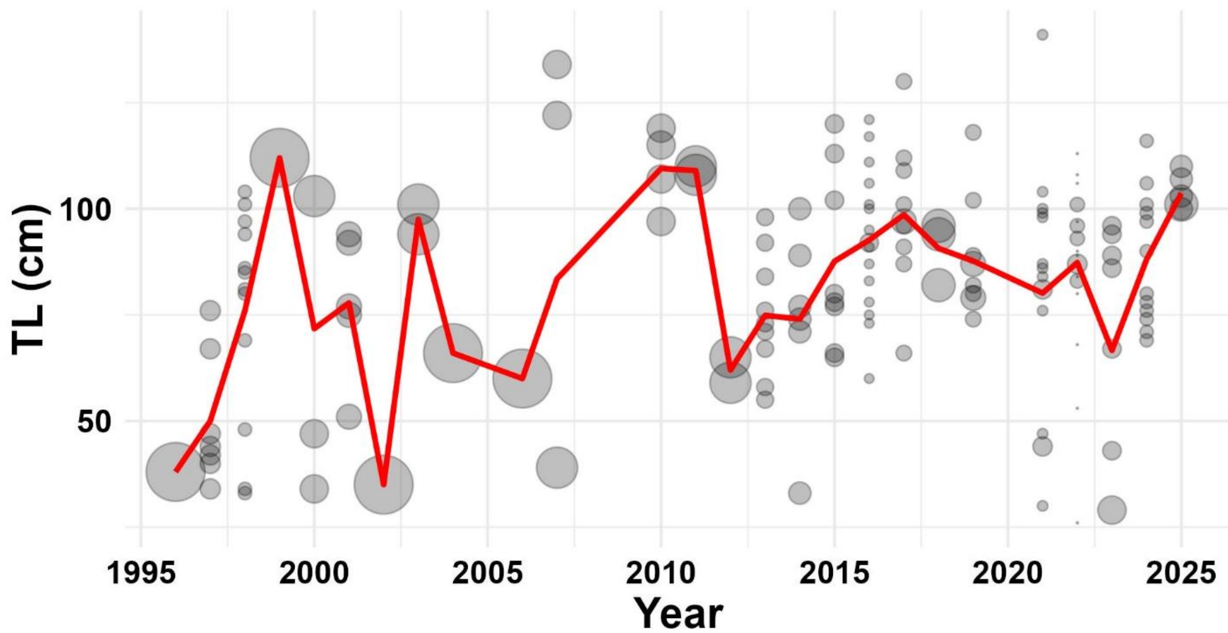

Figure 37. Greater Amberjack total lengths (cm) caught with chevron traps by year.

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

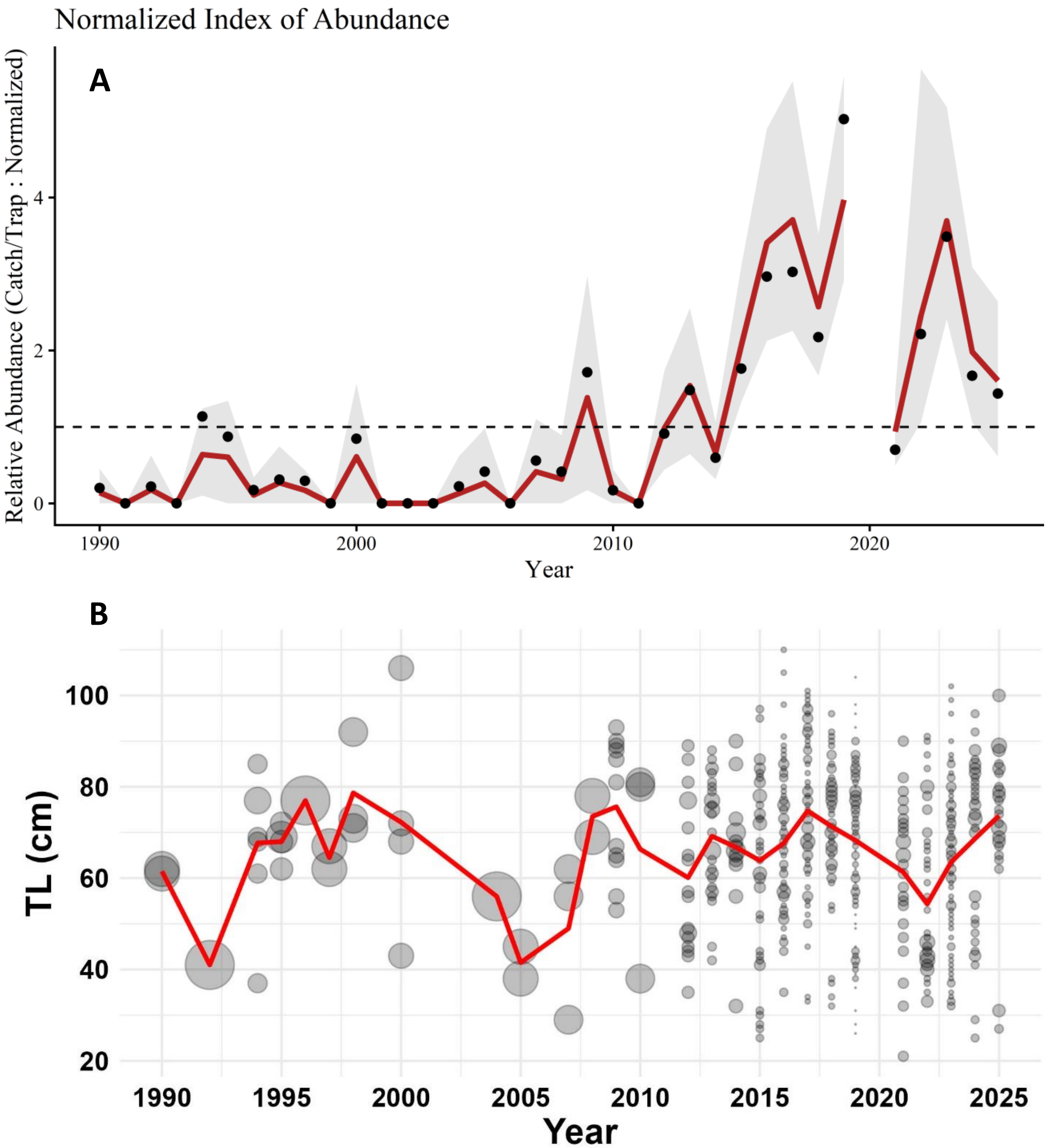

Figure 35. Chevron trap index of abundance and length compositions for Almaco Jack. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

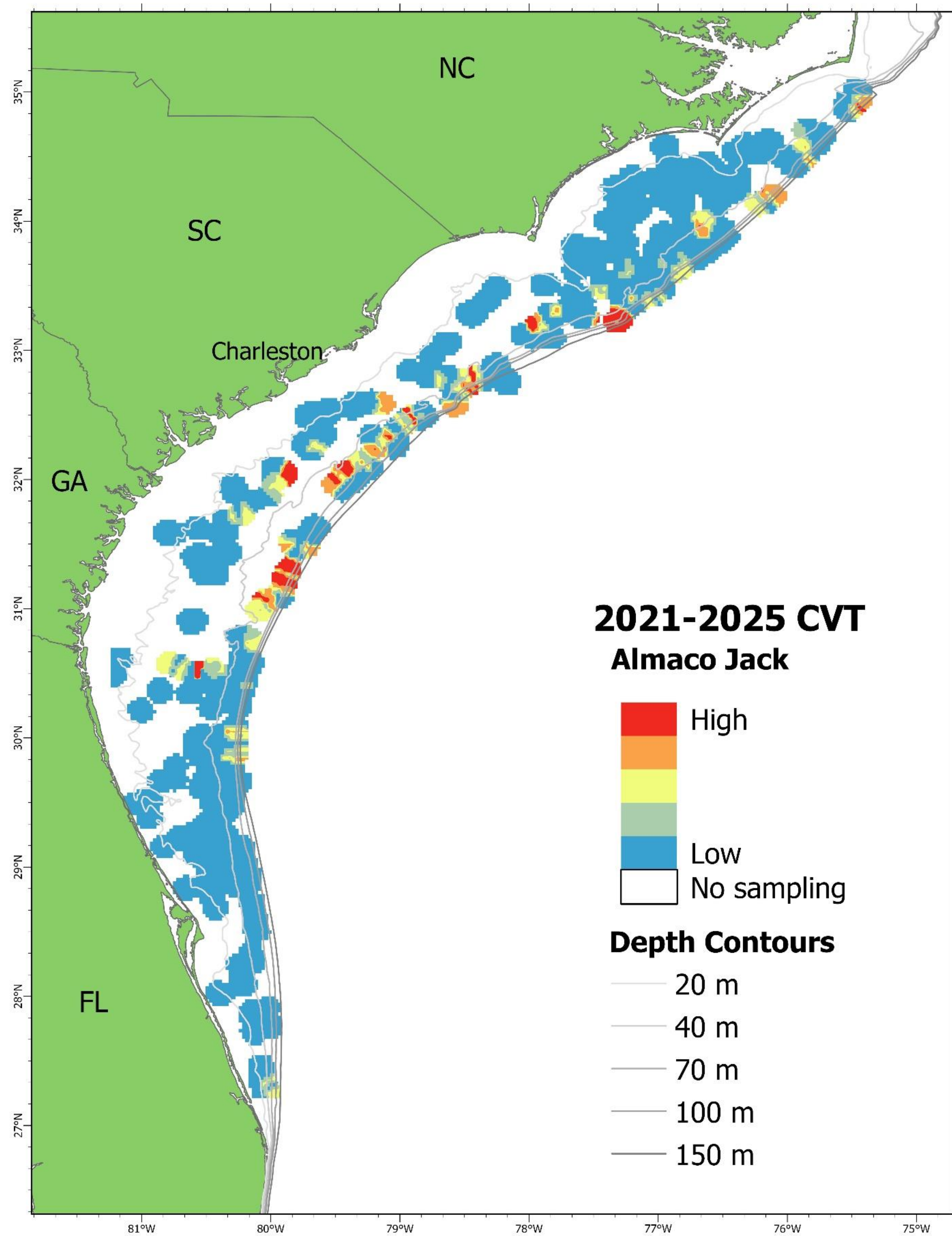

Figure 36. Distribution map of Almaco Jack catches from CVTs from 2021-2024.

Stenotomus spp.

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. Chevron trap nominal abundance and ZINB standardized abundance for *Stenotomus* spp. 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

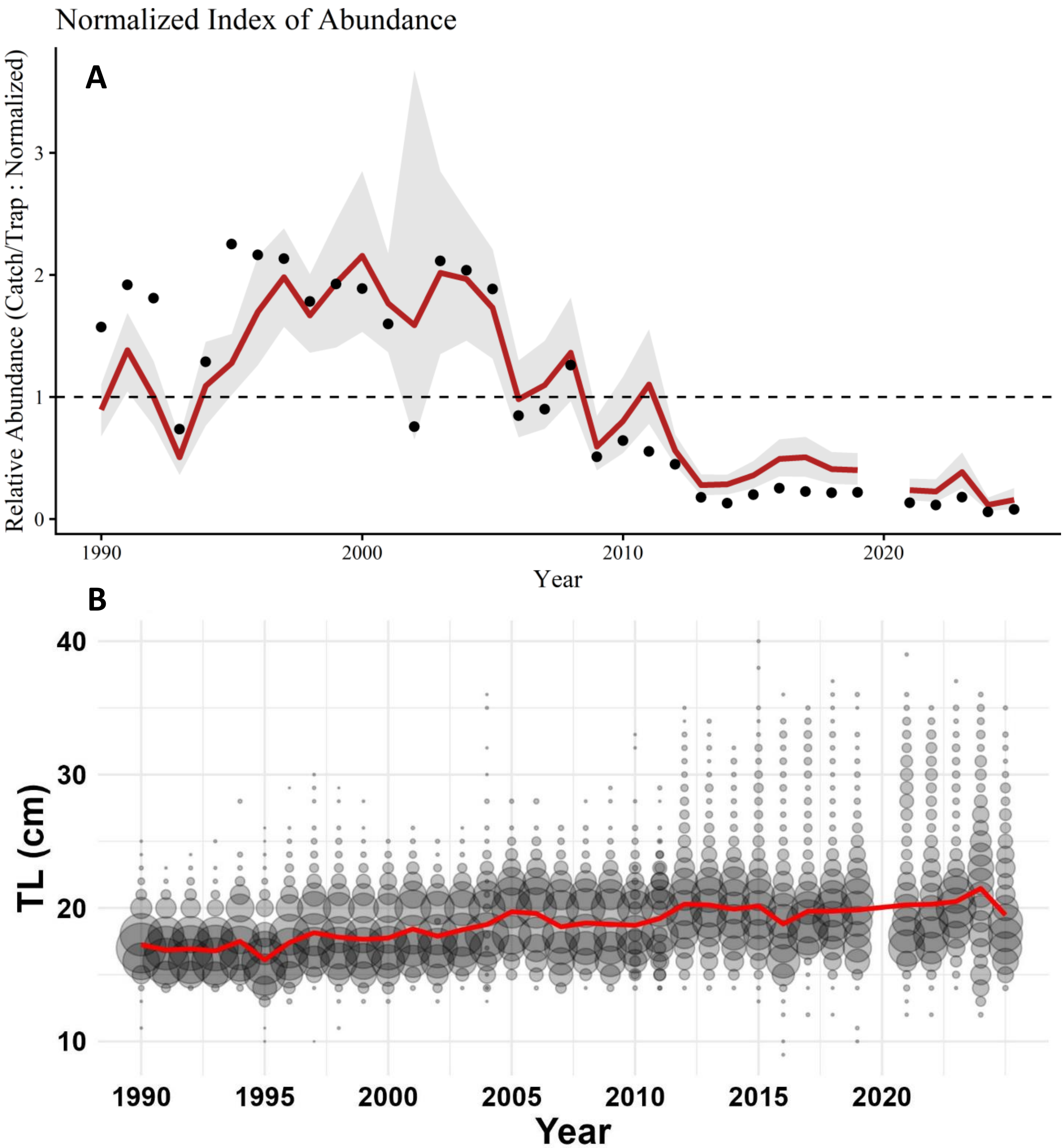

Figure 38. Chevron trap index of abundance and length compositions for *Stenotomus* spp. A) Normalized nominal and ZINB standardized abundance with 95% CI. B) Total lengths (cm) by year.

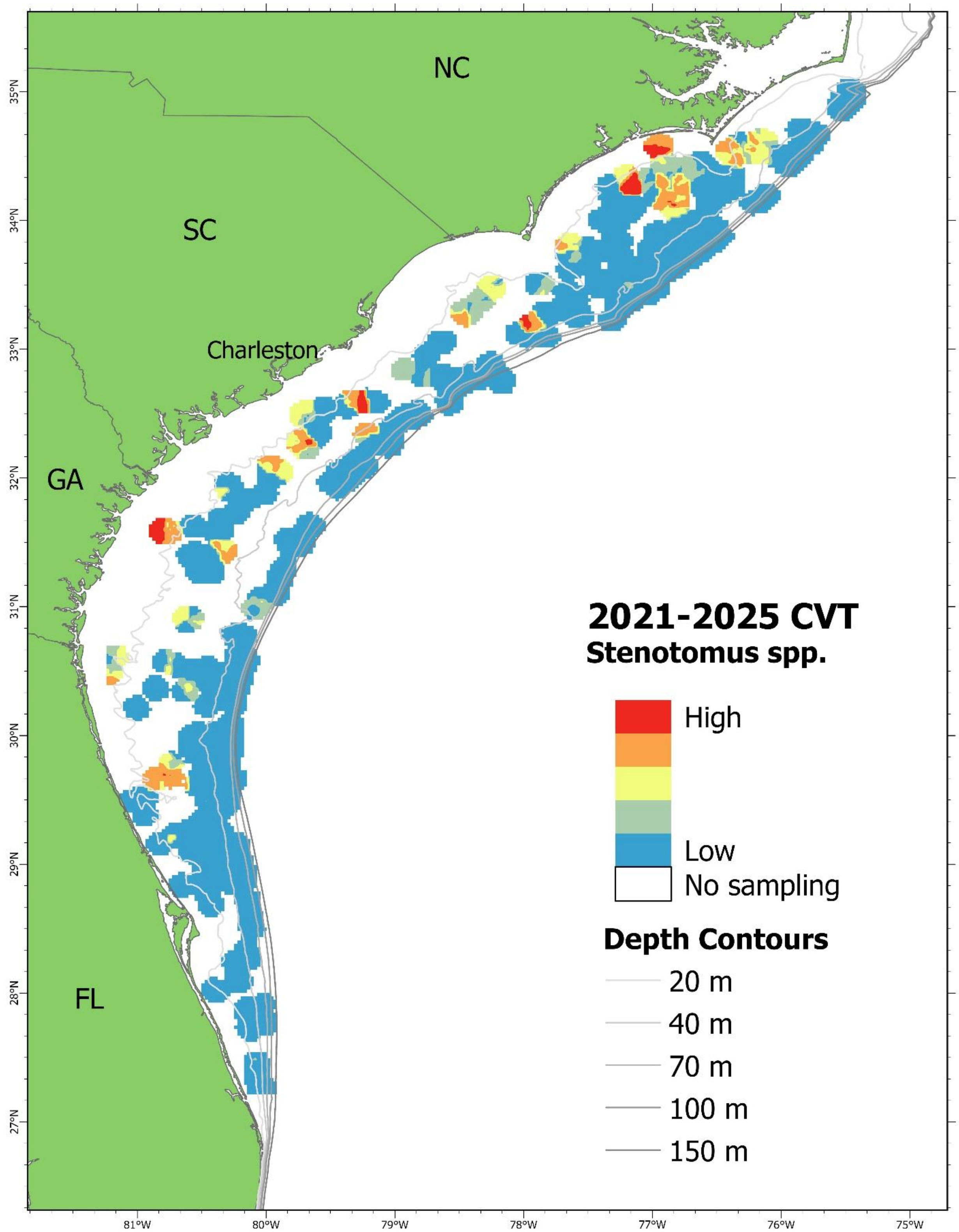

Figure 39. Distribution map of *Stenotomus* spp. catches from CVTs from 2021-2025.

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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