American Saltwater Guides Association

A Review of the Fishery, Biology, and Life History of the Little Tunny (*Euthynnus alletteratus*) in the Northwest Atlantic

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DRAFT

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EXECUTIVE SUMMARY

In recent years, Little Tunny has become a popular target of recreational fisheries along the Atlantic coast of the United States. There is currently no management plan for this species in United States waters or internationally (ICCAT 2021; NCMF 2023). There is limited research on stock structure or status. However, in the Eastern Atlantic several studies have shown genetic differences amongst Little Tunny from different locations (Gaykov and Bokhanov 2020; Olle et al. 2020). Commercial landings over the past decade have been dominated by Florida and North Carolina. Commercial discards occur almost exclusively in gill net fisheries. Florida has been responsible for 77% of recreational landings in the past decade. Approximately 73% of all recreationally caught Little Tunny since 1981 were released, and survival of these fish varies from 35% to 95% depending on fish condition. Recreational catch lengths and weights varied from 17 to 116 cm (Mean = 59.7 cm) and from 0.1 to 11.4 kg (Mean = 1.67 kg). There were no significant differences in length-frequencies amongst years or regions. Length weight equations were calculated by wave (two-month periods) and no significant differences were found.

The only growth study in United States waters (Adams and Kerstetter 2014) found males grow slower and reach larger sizes than females, and combined they reach a maximum size of 77.9 cm at a maximum age of five years. The only maturity study from the United States waters (de Sylva and Rathjen 1981) did not sample enough small fish to estimate length of first maturity, but all males over 40 cm and all females over 36 cm were mature. Little Tunny exhibit asynchronous oocyte development and multiple spawning events throughout the spring and summer (Schaefer 2001), with eggs being shed in several batches when water is the warmest (Collette and Nauen 1983). Spawning occurs near shore, and fecundity can vary from 70,000 to 2,200,000 eggs in females from 38 to 70 cm (Diouf 1980). Little is known about the natural

mortality of Little Tunny but estimates of larval instantaneous daily mortality ranges from 0.72 to 0.95 and estimates of adult natural mortality range from 0.167 to 0.396 (Allman and Grimes 1998; El-Haweet et al. 2013).

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BACKGROUND

Internationally, small tunas support fisheries that are important both economically and as a food source (Majkowski 2007; Isaac et al. 2012; Lucena-Fredou et al. 2021). In the United States, Little Tunny has become a popular target of recreational fisheries (NCMF 2023). Members of the Mackerel and Cobia Advisory Panel have indicated that the recreational fishery for them has become economically important (MCC 2022). Little Tunny is a popular target of the For-Hire industry, as they can be easily caught and provide a fun fight for clients (MCC 2022). The majority of recreationally caught Little Tunny are released, and little is known about the survival of these fish. There is also a small commercial fishery for Little Tunny, where they are usually utilized as bait for larger pelagic species and food (NCMF 2023). In 2022 the American Saltwater Guides Association (ASGA) wrote the South Atlantic Fishery Management Council to request that Little Tunny be included in a fisheries management plan based on a desire to be proactive and precautionary for a species that is important to recreational fisheries, and anecdotal evidence of increasing unreported landings (Poston, W. Personal Communication; 4/19/2023).

The assessment and management of tunas in the Atlantic and Mediterranean is the responsibility of the International Commission for Conservation of Atlantic Tunas (ICCAT). There is no ICCAT assessment or management plan for Little Tunny, however the species was identified priority for increased data collection (ICCAT 2019). In the United States, Little Tunny were previously grouped under the Coastal Migratory Pelagics Fishery Management Plan (CMP FMP) (Federal Register 1982), but no management regulations were proposed. In 2011 they were removed from this management plan and remain unassessed and unmanaged in United States waters (Federal Register 2011). The species included in the CMP FMP are managed jointly by the South Atlantic and Gulf of Mexico Fishery Management Councils. In federal

waters, highly migratory species are managed by the National Oceanic and Atmospheric Administration Highly Migratory Species (NOAA HMS) Program. This program manages species that overlap multiple management council's jurisdictions. In addition, each state has its own marine fisheries management system for the fisheries occurring in their respective state waters (Appendix 1).

FISHERIES

Stock Structure and Status

There is little information available to determine the stock structure of many small tuna species, including Little Tunny (ICCAT 2019). There is currently no management structure in place for Little Tunny, but independent attempts to define stock structure and complete data-poor assessments are underway internationally (ICCAT 2021). Currently Little Tunny in the Atlantic are divided into five stock regions, based on traditional ICCAT management areas (ICCAT 2021). These areas are as follows: Northwest Atlantic, Northeast Atlantic, Mediterranean, Southeast Atlantic, and Southwest Atlantic (Figure 1).

There are no available genetic or morphological stock structure studies from the Northwest Atlantic, but there is a limited amount of information from other ICCAT management areas. Olle et al. (2020) found major genetic differences in Little Tunny within the Northeast management area. The two groups sampled were from the Ivory Coast and Senegal as well as Portugal and Spain (Olle et al. 2020). These genetic differences were of the same magnitude as the differences between Atlantic and Pacific Little Tunny (Olle et al. 2020). Gaykov and Bokhanov (2007) found morphological similarities between fish from Nigeria and Angola, countries in different ICCAT management units. Gaykov and Bokhanov (2020) also found significant morphological differences between those fish, and fish captured from Liberia and Morocco. Allaya et al. (2017) found significant differences in morphology of fish captured within Tunisian waters. Despite being separate management units, Little Tunny have been shown to migrate between the Mediterranean and Atlantic via the strait of Gibraltar (Rey and Cort 1981). There is clearly a lack of knowledge on the true stock structure of Little Tunny in the Atlantic and based on the results of studies in the Eastern Atlantic, it's possible there are different stocks within United States waters.

There is no official stock assessment for Little Tunny in any of the ICCAT management areas, but they have been identified as priority to be evaluated by ICCAT in 2017 (ICCAT 2017). There have been several examinations of stock status and stock risk recently, but much of it was focused outside of the Northwest Atlantic. Lucena-Fredou et al. (2017) developed a productivity susceptibility analysis for the longline fishery and found Little Tunny in the South Atlantic to be considered highly vulnerable. Pons et al. (2019A) used length-based data-limited assessment methods to determine that Little Tunny in the Southeast Atlantic are being overfished. Pons et al. (2019B) used catch-based assessment methods to come to the same conclusion. When the datasets were combined in an integrated assessment, no Little Tunny stocks were overfished (Pons et al 2019B; Lucena-Fredou et al. 2021). There was a high level of uncertainty in the results of these studies (Pons et al 2019B; Lucena-Fredou et al. 2021).

Data Sources

For this review, only non-confidential fisheries data was used. The commercial landings, recreational landings, and recreational discards data were provided by the Atlantic Coastal Cooperative Statistics Program (ACCSP). Commercial landings data dates back to 1951 and were limited to annual landings by state. Commercial discard data was provided by the Northeast (ME-NC) and Southeast Fisheries Science Centers (NC-TX) (NEFSC and SEFSC) and dates back to 1991. The observed discard data was aggregated by state, stat area, and gear type. Estimating total discards was beyond the scope of this review, but the observed values were used to characterize the gear types and states responsible for discarded Little Tunny. The non-confidential portion of this data represented 72% of all observed Little Tunny discards by weight in the Northeast. Southeast observer data was limited to numbers of fish observed and coverage was minimal.

All recreational data came from the Marine Recreational Information Program (MRIP) and there were few problems with confidentiality. As data was aggregated at more specific levels (i.e., state and fishing mode) estimation error became more significant. When examining the mode of fishing and location of catch, we presented the data as percentages of the total rather than specific values, allowing for the characterization of the fishery. Recreational discards are only reported in numbers of fish.

Commercial Landings

Historic commercial landings of Little Tunny were peaked in 1952 (744,000 lbs.) through but declined and remained low through the early 1980s (Mean = 8,6319 lbs.) (Figure 2). Landings increased through the 1980s, 1990s, and early 2000s (Figure 2). Over the past decade, landings have become stable between 435,197 and 613,112 lbs. (Mean = 509,812 lbs.).

Over the time-series, the South Atlantic averaged the highest landings (126,074.5 lbs.) (Table 1). Almost all (~90%) of the landings prior to the 1980s were from the Mid-Atlantic and North Atlantic (Figure 3). This changed in the 1980s South Atlantic began landing the majority of Little Tunny (Figure 3). Over the past decade, the South Atlantic has been responsible for 90% of the landings (Table A2.1).

Much of the early landings from the Mid-Atlantic and North Atlantic came from a combination of New Jersey, New York, and Massachusetts (Figure 4). From the 1990s through today, the landings have predominantly occurred in Florida and North Carolina (Table 2). Over the past decade these two states have been responsible for 51% and 39% of the all Little Tunny landings, respectively (Table A2.3). Individual state and region data can be seen in Appendix 2.

Commercial Discards

Almost 99% of observed Little Tunny discards in the Northeast Fisheries Observer Program were caught by gill nets. There are three types of gillnets observed by the program: fixed (34%), drift floating (20%), and drift sinking (45%). The annual breakdown of discards by gear can be seen in Figure 5. Only five states in the Northeast Fisheries Observer Program have recorded Little Tunny discards for the time series, and the majority of these discards come from North Carolina (80%) (Figure 6). There is very little data on discarded Little Tunny from the Southeast Fisheries Observer Program.

Recreational Landings

Since 1981 recreational landings have varied from 712,206 lbs. in 1982 to 5,513,399 lbs. in 2015 (Mean = 2,531,574.4 lbs.) (Table 3) (Figure 7). Landings over the past decade have been high relative to the rest of the time-series (Mean 3,456,398 lbs.). Like the commercial fishery, the South Atlantic accounts for the majority of recreational landings (Figure 8), with 84% of the landings since 1981 and 85% within the past decade (Table A2.4). Much of those landings are from Florida (76%) (Figure 9) (Table 4). Individual state and region data can be seen in Appendix 2.

The mode of fishing responsible for the landings varied by region, state, and year. Across all regions there was a decrease in landings from for-hire vessels in recent years (Figure 10). Private boats represent the majority of landings in all regions (Figure 11) (Table 5). Shore fishing is most common in the North-Atlantic (Figure 11) (Table 5). The North Atlantic has the smallest percentage of for-hire landings (3%) (Figure 11) (Table 5). Rhode Island (63%) and Massachusetts (45%) have the highest percentage of shore caught Little Tunny (Figure 12) (Table 6). Individual region and state catch by mode can be seen in Appendix 2.

The percentage of landings in state and federal waters also varied by region, state, and year. There did not seem to be an overall pattern in location of landings across the time-series (Figure 13). The North Atlantic (91%) has the highest percentage of landings in state waters (Figure 14) (Table 7). The Mid-Atlantic catches were predominantly in federal waters (76%), while the South Atlantic was split almost evenly (Figure 14) (Table 7). Of the South Atlantic states, Florida and North Carolina are the only ones with a high percentage of catch in state waters (Figure 15) (Table 8).

Recreational Discards

With the popularity of catch and release recreational fishing, discards represent an important component of the fishery. Over the entire time-series, 73% of little tunny catch was released (Figure 16) (Table 9). Since 1981 recreational discards have ranged from 78,347 fish in 1985 to 2,606,690 fish in 2014 (Mean = 1,210,849 fish) (Table 10) (Figure 18). There has been an overall increase in discards across the time series (Figure 18). Similar to commercial and recreational landings over the same time-period, recreational discards have occurred predominantly in the South Atlantic (Figure 19). This region has accounted for 77% of the discards since 1981 and 64% within the past decade (Table A2.10). Florida has the most discards of any state, accounting for 72% overall and 54% within the past decade (Figure 20) (Table 11). Individual state plots, and data can be seen in Appendix 2.

The mode of fishing responsible for the discards was dominated by private boats almost everywhere. Across all regions there appeared to be a decrease in the percentage of discards from for-hire vessels in the 2000s (Figure 21). Like landings, shore discards are more common in the North Atlantic (Figure 22) (Table 12). Rhode Island and Massachusetts have the highest

percentage of shore released Little Tunny (Figure 23) (Table 13). Individual region and state catch by mode can be seen in Appendix 2.

The percentage of discards in state and federal waters also varied by region, state, and year. There did not seem to be an overall pattern in location of discards across the time-series (Figure 24). The majority of discards in the North Atlantic (95%) came from state waters (Figure 25) (Table 14). The Mid-Atlantic and South Atlantic discards were split almost evenly between state and federal waters (Figure 25) (Table 14).). Of the South Atlantic states, Florida and North Carolina are the only ones with a high percentage of discards in state waters (Figure 25) (Table 15).

Recreational Effort

The number of directed trips, trips where Little Tunny were the primary or secondary target, has varied from 4,071 trips in 1982 to 816,388 trips in 2022 (Mean = 22,571.2 trip). There has been an increasing trend over the time-series (R^2=0.86) specifically starting in 1993 (Figure 27).

Release Mortality

Since more than half of all recreationally caught Little Tunny are released, post-release mortality plays an important role in determining the total removals of the fishery. There is only one study on post-release mortality from the recreational fishery and analysis is ongoing (Kim et al. 2023). Preliminary results indicate survival of fish in good condition is approximately 95%, and declines to 35% for fish in poor condition (Kim et al. 2023). Of the 63 fish tagged in this experiment, 54 were in good condition, 6 were in fair conditions, and 3 were in poor condition (Kim et al. 2023).

LENGTH AND WEIGHT

Data Sources

All length and weight data utilized in this section came from the MRIP survey data, and dates back to 1981. Since this is a recreational fishery survey, all data is affected by the selectivity of hook and line gear, with the possibility that smaller size classes may be underrepresented. The data was downloaded from the online MRIP query system (NMFS FSD 2023), and analysis was completed in R Studio (RStudio Team 2020).

Comparisons of length frequency data were made using a series of Kolmogorov & Smirnov (K-S) tests with a modified version of the clus.lf function in the fishmethods package. The data did not have a sampling unit (i.e., interview or shift) variable to use, so a generic haul variable was assigned to each group, eliminating the among sampling unit variance and simplifying the comparison.

Length-weight observations were transformed using logarithms. Estimated weights were calculated from the relationships and compared to the observed weights to calculate 95% confidence intervals (Wigley et al. 2003). Length-weight relationships were compared across MRIP sample waves (two-month sampling bins starting as January and February). The predicted weights from each wave's length-weight relationship were compared using an analysis of covariance (ANCOVA).

Recreational Size Structure

There were 45,451 length samples collected by MRIP from 1981 to 2022 ranging from 17 to 116 cm (Mean = 59.7 cm; SD = 10.41 cm) (Figure 25). Annual mean length ranged from 53.4 cm in 2013 to 63.8 cm in 1989 (Table 16) with non-insignificant decreasing trend across the

time-series (Figure 26). There were no significant differences in length distributions amongst years (K-S Tests; $p>0.05$), and all annual distributions can be seen in Figure A3.1.

The majority of samples came from the Gulf of Mexico and South Atlantic (95%). Mean length across the regions ranged from 57.1 cm in the Gulf of Mexico to 60.0 cm in the South Atlantic (Table 17). There were no significant differences in length distributions amongst regions (K-S Tests; $p>0.05$) (Figure 30), and all annual distributions for each region can be seen in Appendix 3. There was also no significant difference in length frequency distributions when grouped by month. (K-S Tests; $p>0.05$) (Figure 31).

There were 44,663 weight samples collected by MRIP from 1981 to 2022 ranging from 0.1 to 11.4 kg (Mean = 1.67 kg; SD = 0.908 kg) (Table 16). Annual mean weight ranged from 1.21 kg in 2013 to 3.17 kg in 2018 (Table 16) with non-significant decreasing trend across the time-series (Figure 29). Mean weight across the sub-regions ranged from 1.45 kg in the Gulf of Mexico, to 1.75 kg in the Mid-Atlantic (Table 17).

Length-Weight Relationships

The overall log-transformed length-weight relationship (Equation 1) showed a good fit ($R^2 = 0.88$) (Figure 32). When separated by wave, the R^2 values ranged from 0.83 for wave five to 0.94 for wave six (Table 18), and logarithmic length-weight relationships can be seen in Figure 33. When predicted weights were plotted with their 95% confidence intervals, there was good agreement amongst waves (Figure 34). The ANCOVA showed no significant difference in predicted weights amongst waves ($p>0.05$).

Equation 1.

$$log\,(W) = log\,(9.5E^{-6}) + 2.92\,log\,(L)$$

LIFE HISTORY

Growth and Maturity

Little Tunny can reach sizes over 100 cm (39.4 in), with the largest MRIP recorded fish measuring 116 cm (45.7 in) and 8 kg (17.7 lbs). There is only one published growth study on Little Tunny in United States waters. Adams and Kerstetter (2014) aged the otoliths of 213 Little Tunny collected from recreational fishermen in the Florida straits. Their estimated von Bertalanffy growth equation can be seen in Equation 2. When separated by sex, males grew slower and reached larger sizes, while females grew faster to smaller sizes (Table 19) (Adams and Kerstetter 2014). The estimated maximum size for the combined sexes was 77.9 cm (30.7 in) at a maximum age of five years (Adams and Kerstetter 2014). Due to the small spatial and temporal scale of the study relative to the distribution of Little Tunny across the entire Atlantic coast, this growth equation may not be representative of the population. There were 852 MRIP measurements greater than the estimated maximum size in Adams and Kerstetter (2014).

Equation 2

$$L(a) = 77.93(1 - e^{(-0.69(a+0.69))})$$

It may be beneficial to examine growth studies outside of the United States waters. A summary of the von Bertalanffy growth parameters from growth studies completed across the Atlantic can be seen in Table 19. The study completed closest to United States waters was from Campeche bank in the Gulf of Mexico (Cabrera et al. 2005). The Little Tunny from Campeche Bank were determined to exhibit a slower growth rate than in Adams and Kerstetter (2014) and reach larger sizes (Cabrera et al. 2005) (Table 19). The study with the largest sample size (n = 1454) took place in the Mediterranean and Aegean seas, where the Little Tunny were estimated

to reach a maximum age of nine, grow slower, and reach a larger maximum size (123 cm/48.4 in) (Kahraman and Oray 2001) (Table VB Growth).

There has been one maturity study done on Little Tunny in United States Atlantic waters. De Sylva and Rathjen (1981) examined the maturity of recreationally caught Little Tunny from North Carolina to Florida. They did not have enough juvenile fish to estimate length at first maturity (L_{50}), but they did find that at 40 cm (15.7 in) for males and 36 cm (14.2 in) for females 100% of samples were mature (de Sylva and Rathjen 1981) (Table 20). Cruz-Castan et al. (2019) examined the reproductive biology of Little Tunny in the Southwest Gulf of Mexico and estimated a L_{50} of 34.35 cm (34.52 in) in males and 34.60 cm (13.62 in) in females. Maturity estimates for all areas of the Atlantic can be seen in Table 20.

Distribution, Habitat, and Diet

Little Tunny are distributed throughout coastal waters of the Eastern Atlantic, Mediterranean, and in Western Atlantic from the Gulf of Maine to Brazil (de Sylva and Rathjen 1961). Larvae have been found in large numbers near shore (Calkins and Klawe 1963; Marchal 1963; Gorbunova 1965; de Sylva et al. 1987), including in the Mississippi River delta (Allman and Grimes 1988). These larvae ranged from 2.5 mm at two days to 14 mm at 13 days old (Allman and Grimes 1988). In Florida waters larvae feed almost exclusively on appendicularians (Llopiz et al. 2010). Larvae were limited to the top 50 m of the water column (Llopiz et al. 2010).

Adult Little Tunny remain within the waters of the continental shelf (de Sylva et al. 1987). They school by size with other *Scombrids* but can scatter during certain times of the year (Collette and Nauen 1983). Their diet in United States waters is dominated by herring, and Little Tunny can be seen darting through schools and breaking the surface of the water while feeding

(de Sylva and Rathjen 1961). Manooch et al. (1985) ranked the prevalence of different food sources found in Little Tunny from United States waters. From highest to lowest they were clupeids, engraulids, unidentifiable fish, carangids, squid, stomatopods, penaeids, diogenids, stromateids, and synodontids (Manooch et al. 1985). Season and time of day have been shown to affect the feeding habits of adults (Garcia and Posada 2013). Along the East Coast of the United States, adults move as far North as Massachusetts through the summer and early fall, before migrating back to the South for the winter (de Sylva and Rathjen 1961).

Spawning

Little Tunny exhibit asynchronous oocyte development and multiple spawning events throughout the spring and summer (Schaefer 2001), with eggs being shed in several batches when water is the warmest (Collette and Nauen 1983). Temperatures between 24˚ and 28˚ C were found to be the optimal thermal window for reproduction in the Gulf of Mexico (Cruz-Castan et al. 2019). Spawning has also been shown to be affected by the North Atlantic Oscillation (Baez et al. 2019) and prey availability (Llopiz et al. 2010). Due to the presence of larvae, it is believed that spawning occurs near the coast (Calkins and Klawe 1963; Marchal 1963; Gorbunova 1965; de Sylva et al. 1987). Spawning in the Northwest Atlantic is believed to occur in the waters of the Gulf of Mexico, Florida, the Bahamas, and the Carolinas (Yoshida 1979).

In the Southeast United States, the percentage of ripe males goes from 11.8% in March to 88.9% in May, with a peak in June (de Sylva and Rathjen 1961). The percentage of ripe females increased from 5% in March to 65% in May, with a peak in July (de Sylva and Rathjen 1961). In the Gulf of Mexico, Cruz-Castan et al. (2019) found two defined peaks in spawning activity in July and September. A similar spawning season is seen in the Mediterranean and Eastern

Atlantic (Collette and Nauen 1983; Mohamed et al. 2014; Saber et al. 2019). There is limited information on the fecundity of Little Tunny. Diouf (1980) found that fecundity ranged from 70,000 to 2,200,000 eggs in females ranging from 38 cm (14.9 in) to 70 cm (27.6 in).

Natural Mortality

There is little published information about Little Tunny natural mortality. Various methods of estimation using life history traits have been published, some of which are summarized by Vetter (1988). Allman and Grimes (1998) estimated the instantaneous daily mortality of Little Tunny larvae in the Mississippi River delta region, finding that in the Mississippi River plume it was 0.95 and in Panama City, Florida, it was 0.72. The natural mortality of Little Tunny adults along the Eastern Coast of Alexandria, Egypt was calculated using two methods, with the estimates ranging from 0.167 to 0.396 (El-Haweet et al. 2013).

Potential sources of Little Tunny natural mortality include predation, disease, and environmental stress. The most common predators of Little Tunny are sharks, yellowfin tuna and billfishes, as well as some observed cannibalism (Valerias and Abad 2006; Garcia and Posada 2013). In Egypt, wild-caught Little Tunny were found to be infected with trypanorhyncha metacestodes at an infection rate of 38.7% (Abdelsalam et al. 2016). This infection can lead to inflammation, necrosis, and fibrosis within the affected organs (Abdelsalam et al. 2016).

RESEARCH RECOMMENDATIONS

Fisheries Data

A more exhaustive review of fisheries catch data should be undertaken in order to estimate the total removals of the fishery and examine the uncertainty in these estimates. If possible, length data from commercial landings should be applied to the total landings to estimate catch at length. Fleet wide commercial discards need to be estimated from the appropriate method. With the majority of commercial discards occurring in gill net fisheries, survival of these fish is most likely low. For recreational landings, there is length data that could be applied to get catch at length. However, research will need to examine the effects of location and season on the groupings when applying length frequencies to landings. A more thorough investigation into recreational discards, including an examination of the uncertainty surrounding the estimate will better describe the number of fish discarded every year.

Biosampling

There have been minimal studies on the life history of Little Tunny in United States waters. Life history parameters such as growth, maturity, and fecundity play a large role in stock assessment modeling. Effort should be put forth to take biological samples from harvested Little Tunny along the Atlantic coast. The samples could include otoliths to estimate growth, gonads to estimate length at first maturity and fecundity, and tissue samples for genetic testing to evaluate stock structure.

Tagging

With more than half of the recreationally caught Little Tunny being released, post-release mortality and the factors effecting it will be crucial in determining total removals by the fishery. Tagging projects such as Kim et al. (2023) can help refine the estimate of mortality and provide

advice to minimize mortality. Tagging studies can also estimate natural mortality and population size, both of which are important components of any future assessment.

Fishery CPUE

Fisheries independent surveys are used to track population trends for many species. Since Little Tunny do not show up in any fisheries independent surveys, some measure of recreational catch per unit effort (CPUE) could be used to standardize catch through the years and track fluctuations in the population. This should be done by isolating trips that targeted Little Tunny. For-hire vessels would most likely have the best catch rates and consistent methods, making them best suited for a CPUE study.

Economics

An analysis that examines the economic impact of the recreational Little Tunny fishery will help to justify precautionary approaches to management of the stock. Since the majority of this fishery is recreational catch and release, the economic value is harder to elucidate than just putting a dollar value on landings. In recreational fisheries revenue is generated through charters, tackle shops, marinas, and general tourism to areas where the fishery is occurring. Including these factors in an analysis that can estimate the impact Little Tunny has on local economies may help justify the need for management.

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TABLES

Table 1. A summary of commercial landings (lbs) from 1950-2021 by region.

	Mid-Atlantic	North Atlantic	South Atlantic	Total
Min	9	6	129	3000
Max	722000	247400	370816	744700
Mean	22672.1	35190.9	126074.5	241936.9
SD	64899.02	45735.45	99319.38	208374.87

Table 2. A summary of commercial landings (lbs) from 1950-2021 by state.

State	Min	Max	Mean	SD
MASSACHUSETTS	1200	247400	26128.2	70040.70
RHODE ISLAND	775	130487	46571.3	34166.36
CONNECTICUT	6	2000	327.7	739.54
NEW YORK	9	104500	20441.4	24024.63
NEW JERSEY	100	722000	41112.0	106915.88
DELAWARE	300	3000	1650.0	1909.19
MARYLAND	100	6800	1763.0	2381.95
VIRGINIA	25	13700	4157.8	4497.45
NORTH CAROLINA	129	370816	121616.4	76279.16
SOUTH CAROLINA	259	20262.11	5491.9	5910.45
GEORGIA	685	900	776.3	111.09
FLORIDA-EAST	8935	360139.4	207086.9	87266.08

Table 3. A summary of recreational landings (lbs) from 1981-2021 by region.

	Mid-Atlantic	North Atlantic	South Atlantic	Total
Min	20	33	320	712206
Max	998580	366801	4891017	5513399
Mean	90002.3	47221.6	810912.7	2531174.4
SD	163842.28	64480.39	1047721.78	969630.82

Table 4. A summary of recreational landings (lbs) from 1981-2021 by state.

State	Min	Max	Mean	SD
MASSACHUSETTS	1221	366801	65310.2	90259.29
RHODE ISLAND	163	134727	41733.2	39040.70
CONNECTICUT	33	187464	31509.1	49894.07
NEW YORK	624	249899	66649.1	65952.08
NEW JERSEY	388	998580	196933.9	243264.41
DELAWARE	20	30633	8333.7	10077.72
MARYLAND	234	808764	76229.8	166323.76
VIRGINIA	481	449289	54366.4	92314.04
NORTH CAROLINA	8627	1117723	198845.4	202893.66
SOUTH CAROLINA	320	95251	16587.8	24895.84
GEORGIA	20	87345	14781.3	21079.96
FLORIDA	435901	4891017	1931143.5	899474.75

Table 5. Percentage of recreational landings from each mode of fishing from 1981-2021 by region.

Region	Shore	For Hire	Private
Mid-Atlantic	10%	25%	65%
North Atlantic	48%	3%	49%
South Atlantic	15%	25%	60%
Total	16%	24%	60%

Table 6. Percentage of recreational landings from each mode of fishing from 1981-2021 by state.

State	Shore	For Hire	Private
MASSACHUSETTS	45%	3%	52%
RHODE ISLAND	63%	3%	35%
CONNECTICUT	4%	2%	94%
NEW YORK	15%	23%	62%
NEW JERSEY	13%	25%	62%
DELAWARE	0%	45%	55%
MARYLAND	0%	25%	75%
VIRGINIA	0%	25%	75%
NORTH CAROLINA	29%	31%	40%
SOUTH CAROLINA	0%	42%	58%
GEORGIA	0%	14%	86%
FLORIDA	14%	25%	62%

Table 7. Percentage of recreational landings in Federal and State waters from 1981-2021 by region.

Region	Federal	State
Mid-Atlantic	76%	24%
North Atlantic	9%	91%
South Atlantic	48%	52%
Total	50%	50%

Table 8. Percentage of recreational landings in Federal and State waters from 1981-2021 by state.

State	Federal	State
MASSACHUSETTS	4%	96%
RHODE ISLAND	15%	85%
CONNECTICUT	0%	100%
NEW YORK	50%	50%
NEW JERSEY	73%	27%
DELAWARE	90%	10%
MARYLAND	100%	0%
VIRGINIA	85%	15%
NORTH CAROLINA	49%	51%
SOUTH CAROLINA	95%	5%
GEORGIA	97%	3%
FLORIDA	47%	53%

Table 9. The percentage of catch landed vs discarded from 1981-2021 by region.

Region	Landings	Discards
Mid-Atlantic	24%	76%
North Atlantic	10%	90%
South Atlantic	31%	69%
Total	27%	73%

Table 10. A summary of recreational discards (individuals) from 1981-2021 by region.

	Mid-Atlantic	North Atlantic	South Atlantic	Total
Min	7	123	10	78347
Max	1952676	981784	273165	2606690
Mean	248568.3	72239.8	32233.7	1210849.4
SD	422905.25	142249.88	48146.93	620313.34

Table 11. A summary of recreational discards (individuals) from 1981-2021 by state.

State	Min	Max	Mean	SD
MASSACHUSETTS	188	981784	117905.1	216773.68
RHODE ISLAND	123	315534	45207.1	61422.70
CONNECTICUT	936	334830	49544.6	72920.41
NEW YORK	80	297313	77553.7	91020.45
NEW JERSEY	1522	390112	74303.2	93370.24
DELAWARE	7	7497	2417.0	2509.29
MARYLAND	140	98522	10182.8	22250.11
VIRGINIA	16	164594	11206.9	32426.39
NORTH CAROLINA	2533	273165	65662.9	54471.83
SOUTH CAROLINA	10	32277	6003.3	8922.09
GEORGIA	142	9050	4100.4	3031.26
FLORIDA	75595	1952676	874480.5	431864.95

Table 12. Percentage of recreational discards from each mode of fishing from 1981-2021 by region.

Region	Shore	For Hire	Private
Mid-Atlantic	15%	10%	76%
North Atlantic	52%	1%	47%
South Atlantic	4%	5%	91%
Total	13%	5%	82%

Table 13. Percentage of recreational discards from each mode of fishing from 1981-2021 by state.

State	Shore	For Hire	Private
MASSACHUSETTS	45%	3%	52%
RHODE ISLAND	63%	3%	35%
CONNECTICUT	4%	2%	94%
NEW YORK	15%	23%	62%
NEW JERSEY	13%	25%	62%
DELAWARE	0%	45%	55%
MARYLAND	0%	25%	75%
VIRGINIA	0%	25%	75%
NORTH CAROLINA	29%	31%	40%
SOUTH CAROLINA	0%	42%	58%
GEORGIA	0%	14%	86%
FLORIDA	4%	5%	91%

Table 14. Percentage of recreational discards in Federal and State waters from 1981-2021 by region.

Region	Federal	State
Mid-Atlantic	47%	53%
North Atlantic	5%	95%
South Atlantic	58%	42%
Total	48%	52%

Table 15. Percentage of recreational discards in Federal and State waters from 1981-2021 by state.

State	Federal	State
MASSACHUSETTS	2%	98%
RHODE ISLAND	7%	93%
CONNECTICUT	11%	89%
NEW YORK	25%	75%
NEW JERSEY	60%	40%
DELAWARE	100%	0%
MARYLAND	97%	3%
VIRGINIA	93%	7%
NORTH CAROLINA	48%	52%
SOUTH CAROLINA	96%	4%
GEORGIA	89%	11%
FLORIDA	59%	41%

Table 16. Annual MRIP survey of length and weight data from 1981-2022.

Year	Count	Length				Weight			
		Min	Max	Mean	SD	Min	Max	Mean	SD
1981	234	33	78	58.6	7.92	0.4	6.0	1.87	1.220
1982	166	27	116	60.8	12.92	0.2	11.4	1.82	1.209
1983	392	25	98	60.2	12.07	0.2	7.3	1.70	0.919
1984	275	29	82	57.5	14.47	0.1	3.9	1.60	0.936
1985	205	21	89	63.0	9.30	0.2	5.9	2.37	1.296
1986	672	28	87	61.2	9.51	0.1	4.6	1.85	0.772
1987	1001	23	102	60.6	10.58	0.1	4.8	1.80	0.829
1988	818	24	90	61.4	10.53	0.2	4.6	1.82	0.866
1989	735	23	87	63.8	10.94	0.1	7.0	2.08	0.944
1990	898	23	87	61.7	10.74	0.1	5.9	1.88	0.923
1991	1028	22	82	59.8	10.49	0.1	9.0	1.75	0.826
1992	1327	24	89	59.0	10.17	0.1	4.4	1.65	0.758
1993	756	17	95	58.7	13.15	0.1	7.6	1.74	1.012
1994	763	24	91	60.3	9.20	0.1	4.9	1.67	0.729
1995	574	21	83	59.4	11.82	0.1	4.0	1.64	0.744
1996	825	21	91	59.9	10.79	0.1	4.7	1.71	0.785
1997	1089	26	91	59.8	13.62	0.1	6.3	2.05	1.229
1998	1531	24	93	57.8	12.90	0.1	5.5	1.72	0.930
1999	2101	24	93	59.0	10.46	0.1	7.5	1.95	1.007
2000	1889	27	88	57.3	10.00	0.1	5.6	1.61	0.779
2001	1460	26	80	59.6	8.85	0.2	4.3	1.72	0.762
2002	1847	20	102	59.7	9.58	0.1	6.7	1.66	0.782
2003	1241	27	91	59.1	9.45	0.1	5.8	1.66	0.746
2004	1371	31	78	61.1	8.42	0.2	3.9	1.70	0.666
2005	807	31	103	60.9	7.62	0.2	8.3	1.67	0.717
2006	1304	29	82	61.3	7.35	0.2	4.2	1.68	0.588
2007	1108	17	110	60.4	9.27	0.2	7.4	1.64	0.703
2008	954	28	83	57.4	10.42	0.1	4.6	1.46	0.737
2009	997	30	86	58.2	10.05	0.2	5.1	1.52	0.819
2010	979	17	90	58.6	10.74	0.2	4.8	1.54	0.798
2011	1289	17	87	57.5	11.36	0.1	4.4	1.51	0.780
2012	1687	17	88	58.5	9.57	0.1	4.9	1.49	0.700
2013	91	29	74	53.4	11.49	0.1	2.9	1.21	0.648
2014	1546	26	92	57.8	10.61	0.1	6.1	1.51	0.835
2015	1571	20	87	58.3	9.69	0.1	4.6	1.51	0.733
2016	1654	30	85	57.6	9.72	0.2	4.5	1.47	0.812
2017	1286	27	91	56.3	10.18	0.1	5.2	1.39	0.763
2018	1206	22	89	57.9	10.79	0.1	9.7	3.17	1.701
2019	1295	23	100	56.0	10.43	0.1	7.1	1.37	0.793
2020	1610	28	100	57.3	9.38	0.2	7.1	1.44	0.791
2021	1440	27	88	55.2	9.37	0.1	4.8	1.27	0.685
2022	1429	22	91	55.0	9.83	0.1	5.2	1.28	0.704
Total	**45451**	**17**	**116**	**58.7**	**10.41**	**0.1**	**11.4**	**1.67**	**0.908**

Table 17. A summary of length and weight data for each region of the MRIP survey.

Values	Carribean	Gulf of Mexico	Mid-Atlantic	North Atlantic	South Atlantic	Total
Count	4	19330	1431	617	24069	45451
Min of Length	34	17	24	33	17	17
Max of Length	54	116	103	110	102	116
Average of Length	40.8	57.1	58.9	59.6	60.0	58.7
StdDev of Length	9.00	9.34	9.71	7.62	11.13	10.41
Min of Weight		0.1	0.1	0.3	0.1	0.1
Max of Weight		9.0	10.5	7.4	11.4	11.4
Average of Weight		1.45	1.75	1.51	1.68	1.58
StdDev of Weight		0.773	1.076	0.802	0.995	0.915

Table 18. A summary of length-weight relationship parameters for waves 1-6.

Wave	a	b	log(a)	SE	R^2
1	9.5E-06	2.92	-11.56	0.004	0.91
2	8.8E-06	2.95	-11.64	0.005	0.85
3	7.7E-06	2.99	-11.78	0.002	0.87
4	1.1E-05	2.88	-11.39	0.003	0.86
5	1.0E-05	2.91	-11.49	0.006	0.83
6	1.1E-05	2.90	-11.45	0.003	0.94
Total	**9.5E-06**	**2.9283**	**-11.56**	**0.002**	**0.88**

Table 19. A summary of von Bertalanffy growth parameters from all available studies on Little Tunny around the world.

Citation	Area/Region	Sex	n	Method	L_{inf} (cm)	L_{inf} (in)	k	t_0	Max Age	Min L_{obs} (cm)	Min L_{obs} (in)	Max L_{obs} (cm)	Max L_{obs} (in)
Adams and Kerstetter (2014)	Florida Straits	Combined	213	Otoliths	77.93	30.7	0.69	-0.69	5	25	9.8	83.2	32.8
		Male	121	Otoliths	87.91	34.6	0.37	-1.65	-	-	-	-	-
		Female	63	Otoliths	77.49	30.5	0.64	-0.76	-	-	-	-	-
Hajjej et al. (2012)	Tunisian coast	Combined	413	Spines	127.2	50.1	0.139	-2.14	7	19.2	7.6	97.8	38.5
		Male	164	Spines	128.9	50.7	0.1375	-2.15	-	37.3	14.7	97.8	38.5
		Female	211	Spines	130.8	51.5	0.1312	-2.22	-	35.7	14.1	95.5	37.6
Cayre and Diouf (1983)	Senegal coasts	Combined	491	Spines	112	44.1	0.126	-	-	29.4	11.6	80.2	31.6
Rodriguez-Roda (1979)	East Atlantic Spain	Combined	-	Vertebrae	115	45.3	0.19	-1.71	5				
		Combined		Spines	117	46.1	0.192	-1.12	7	36	14.2	110	43.3
Hattour (2009)	Tunisian coasts	Combined	107	Vertebrae	106	41.7	0.255	-0.76	7				
		Combined		Otoliths	105	41.3	0.322	-0.51	7				
Kahraman and Oray (2001)	Aegean Sea	Combined	145	Spines	127.5	50.2	0.106	-4.18	5+	55	21.7	85	33.5
Kahraman and Oray (2001)	Mediterranean Sea	Combined	1454	Spines	123.229	48.5	0.127	-3.839	8+	52	20.5	97.5	38.4
Cabrera et al. (2005)	Gulf of Mexico	Combined	-	-	86	33.9	0.26	-0.32	-	-	-	-	-
Valeiras et al. (2008)	Western Mediterranean	Combined	130	Spines	91.5	36.0	0.39	-0.4	5	48	18.9	84	33.1
Vieira et al. (2021)	Southern Brazil	Combined	345	Spines	79.19	31.2	0.42	-0.97	5	33	13.0	78	30.7

Table 20. A summary of maturity estimates from all available studies on Little Tunny around the world.

Original Citation	Area/Region	Sex	n	Length (cm)	Length (in)	Estimate Type
Cruz-Castan et al. (2019)	Southwest Gulf of Mexico	Combined	951	34.4	13.5	L_{50}
		Male	455	34.35	13.5	L_{50}
		Female	480	34.6	13.6	L_{50}
Valeiras and Abad (2006)	Mediterranean Sea	Combined	-	56	22.0	L_{50}
Rodriguez-Roda (1966)	Gulf of Cadiz	Combined	425	57	22.4	L_{50}
Chur (1973)	Gulf of Guinea	Combined	-	43	16.9	L_{50}
Diouf (1981)	Senegal	Combined	-	40	15.7	L_{50}
de Sylva and Rathjen (1961)	North Carolina to Florida	Male	1340	40	15.7	100% Mature
		Female		36	14.2	100% Mature
Hajjej et al. (2010a)	Southern Tunisia	Male	153	42.8	16.9	L_{50}
		Female	244	44.8	17.6	L_{50}
Mahamed et al. (2014)	Egypt	Combined	628	42	16.5	L_{50}
		Male	44	33	13.0	L_{50}
		Female	102	38	15.0	L_{50}
Diouf (1980)	Northeast and Southeast Atlantic	Combined	-	42	16.5	L_{50}
Ramirez-Arredondo et al. (1996)	Venezuela	Combined	-	39.7	15.6	L_{50}
Saber et al. (2018)	Spanish Mediterranean	Combined	1266	51.13	20.1	L_{50}
		Male	414	43.44	17.1	L_{50}
		Female	461	50.07	19.7	L_{50}
Viera et al. (2021)	Brazil	Male	169	49.28	19.4	L_{50}
		Female	174	42.37	16.7	L_{50}

FIGURES

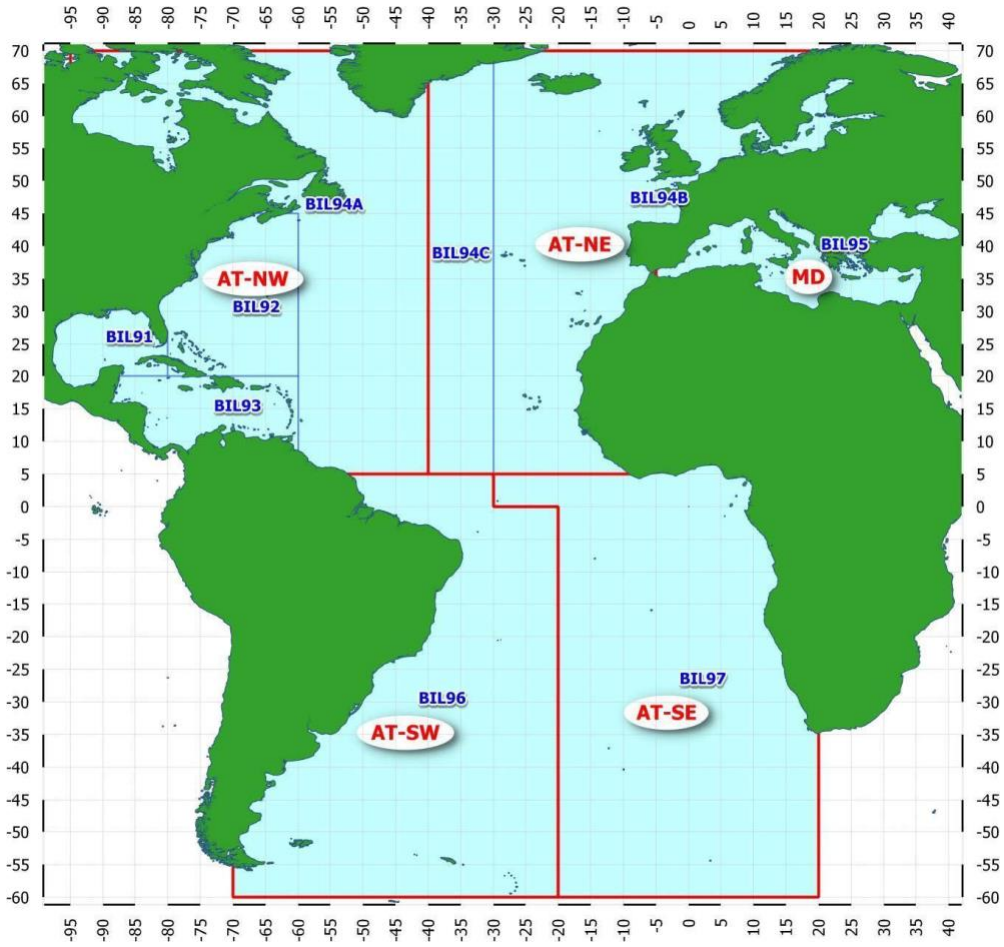

Figure 1. The five management units used by ICCAT for small tunas (ICCAT 2016).

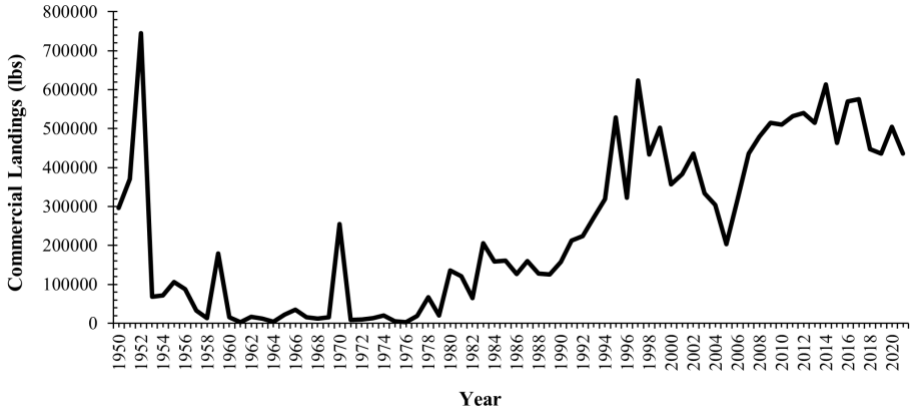

Figure 2. Total commercial landings (lbs) from 1950 to 2021.

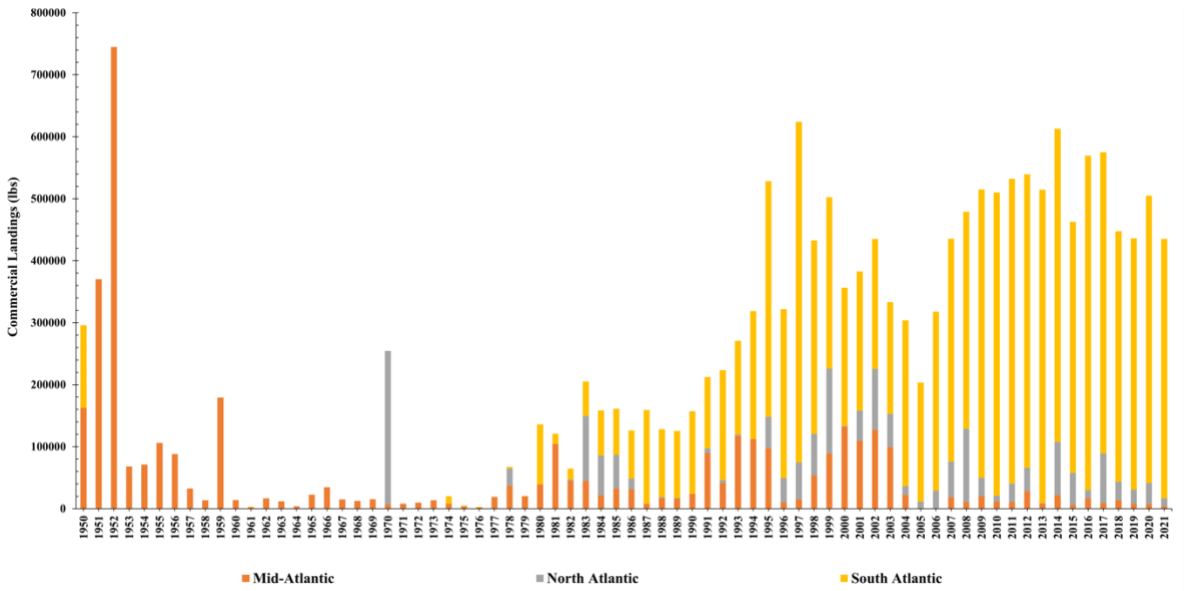

Figure 3. Total commercial landings (lbs) from 1950 to 2021 by region.

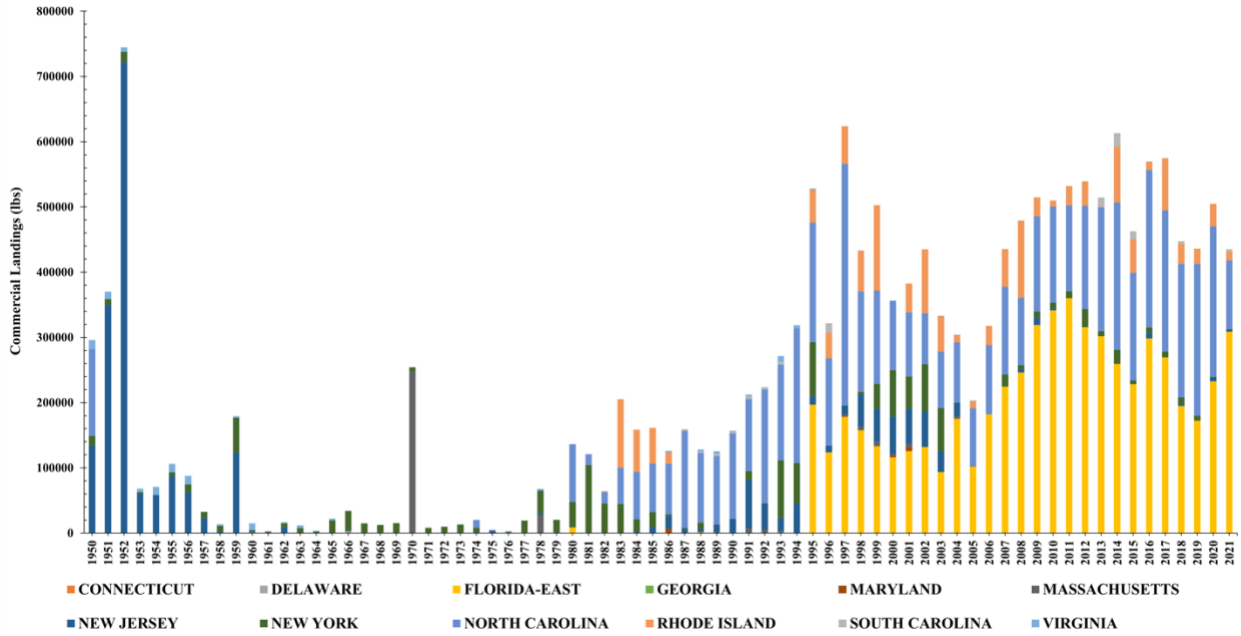

Figure 4. Total commercial landings (lbs) from 1950 to 2021 by state.

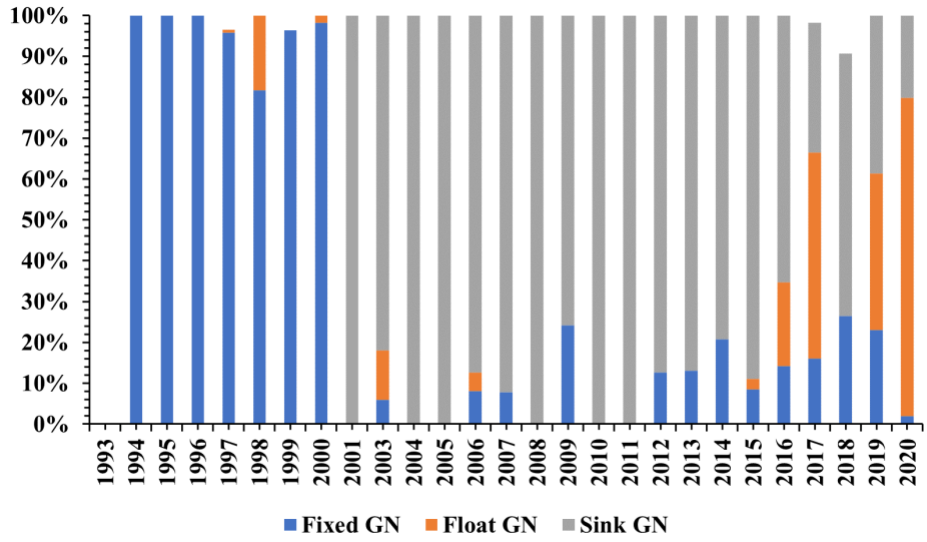

Figure 5. Percentage of commercial discards by type of gill net from 1993-2020

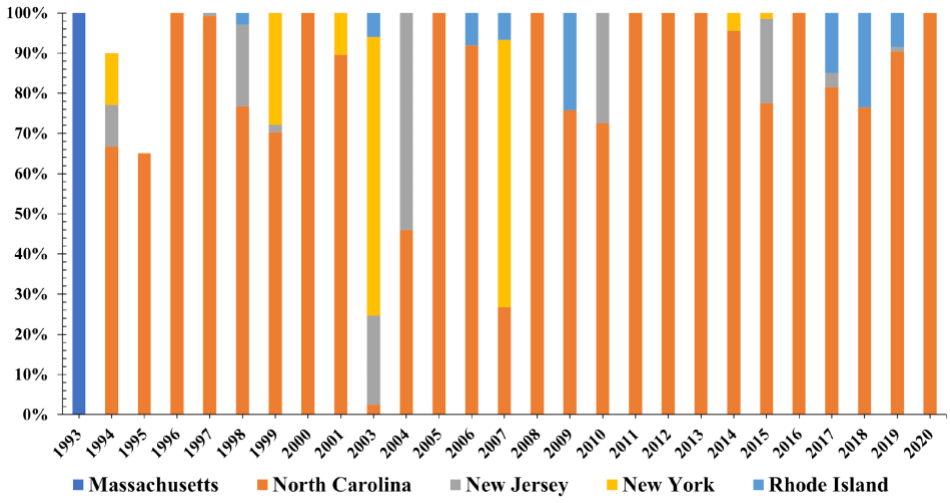

Figure 6. Percentage of commercial discards by state from 1993-2020

Figure 7. Total recreational landings (lbs) from 1981 to 2021.

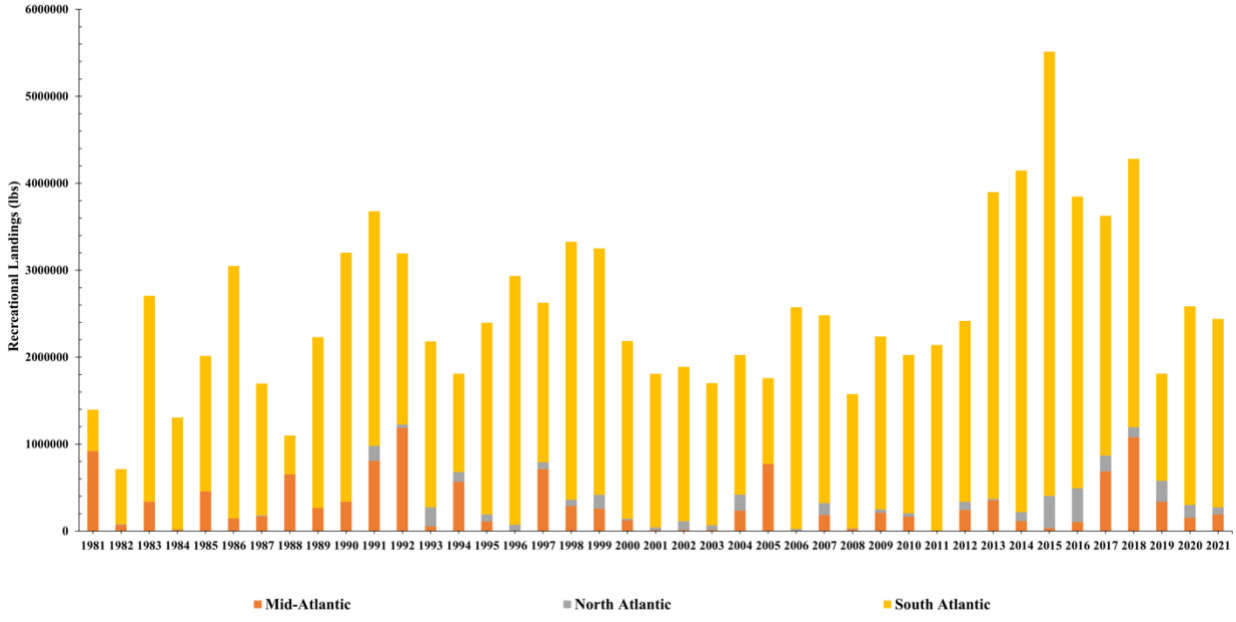

Figure 8. Total recreational landings (lbs) from 1950 to 2021 by region.

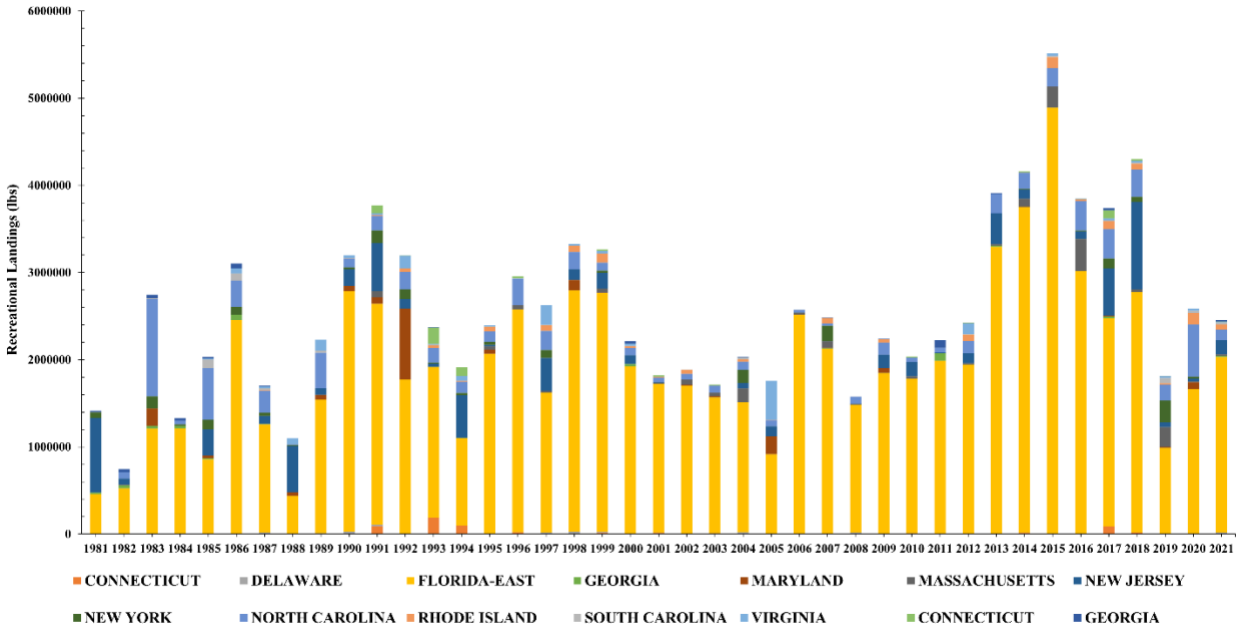

Figure 9. Total recreational landings (lbs) from 1950 to 2021 by state.

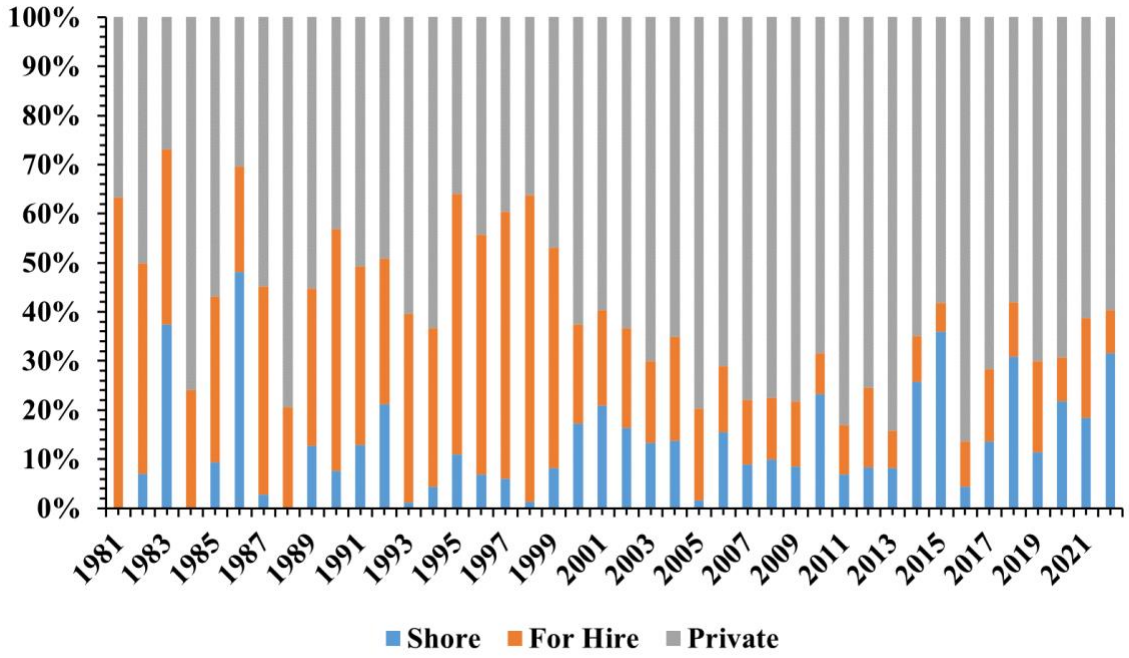

Figure 10. Percentage of recreational landings by mode of fishing from 1981-2022.

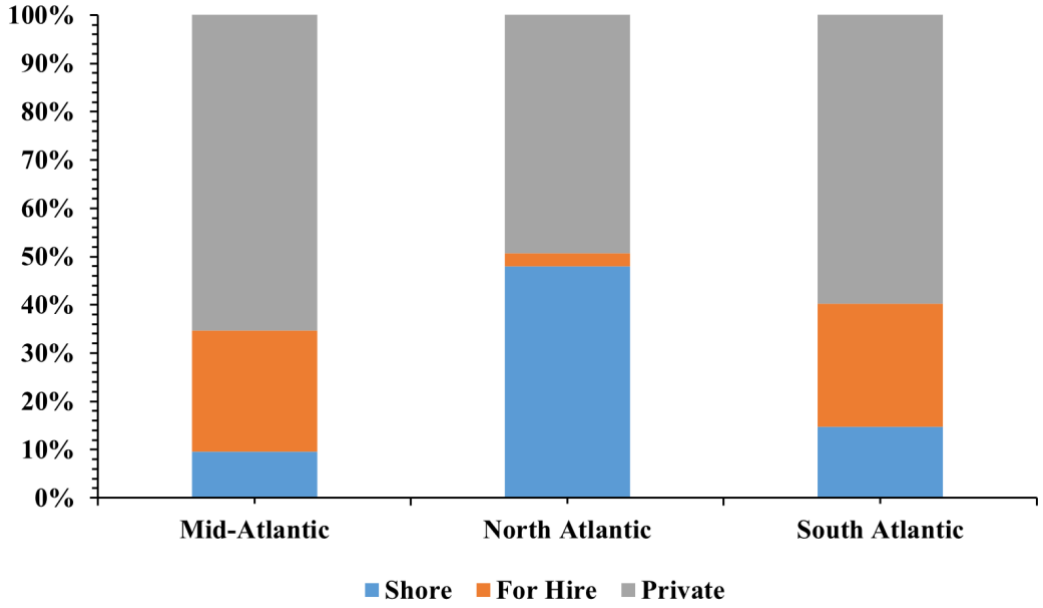

Figure 11. Percentage of recreational landings by mode of fishing for each region.

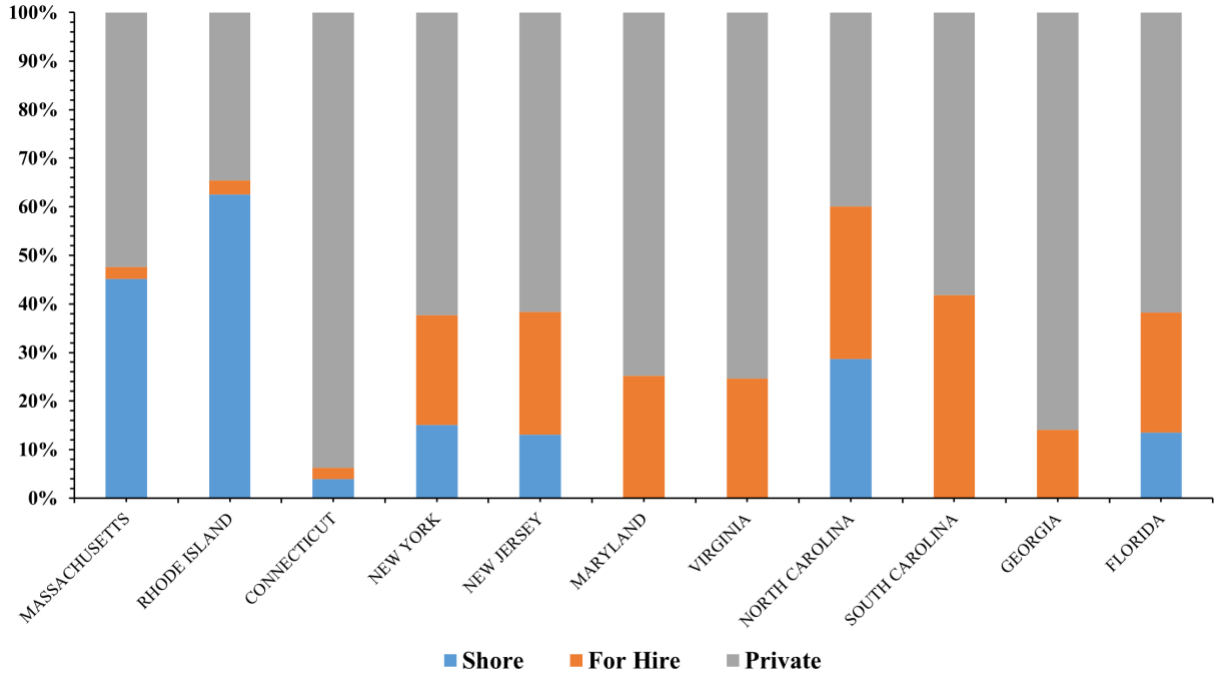

Figure 12. Percentage of recreational landings by mode of fishing for each state.

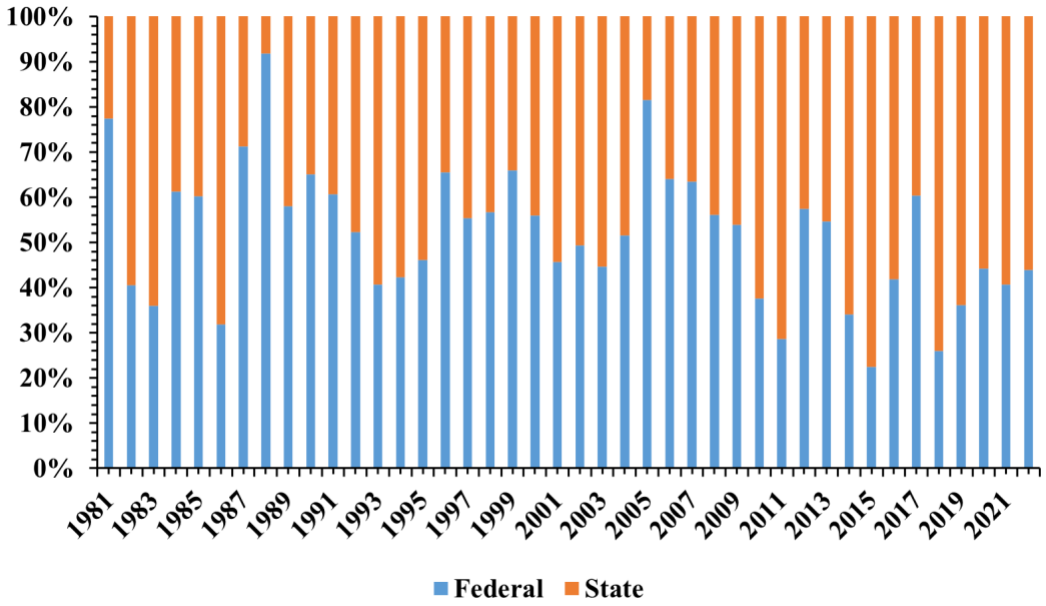

Figure 13. Percentage of recreational landings in federal and state waters from 1981-2022.

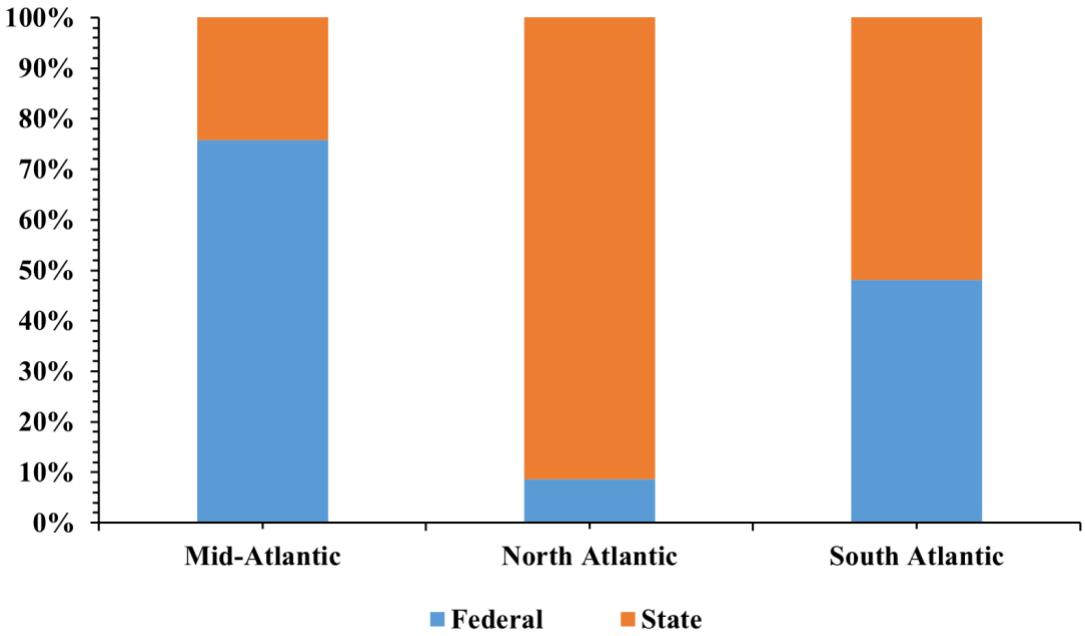

Figure 14. Percentage of recreational landings in federal and state waters for each region.

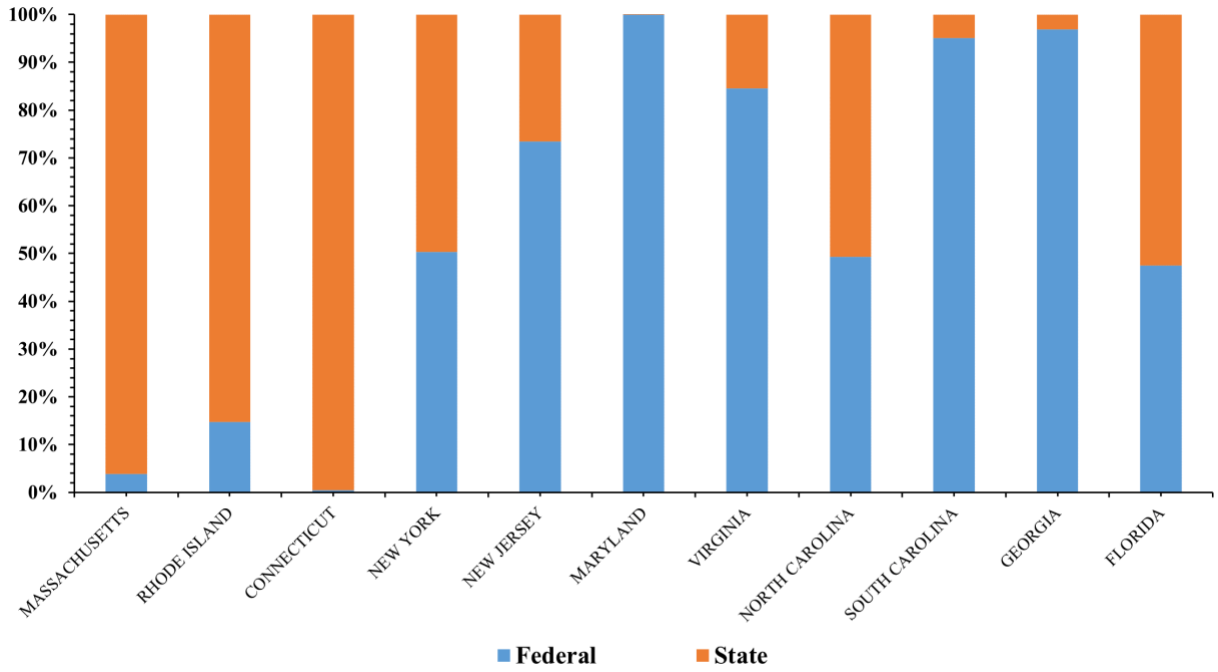

Figure 15. Percentage of recreational landings in federal and state waters for each state.

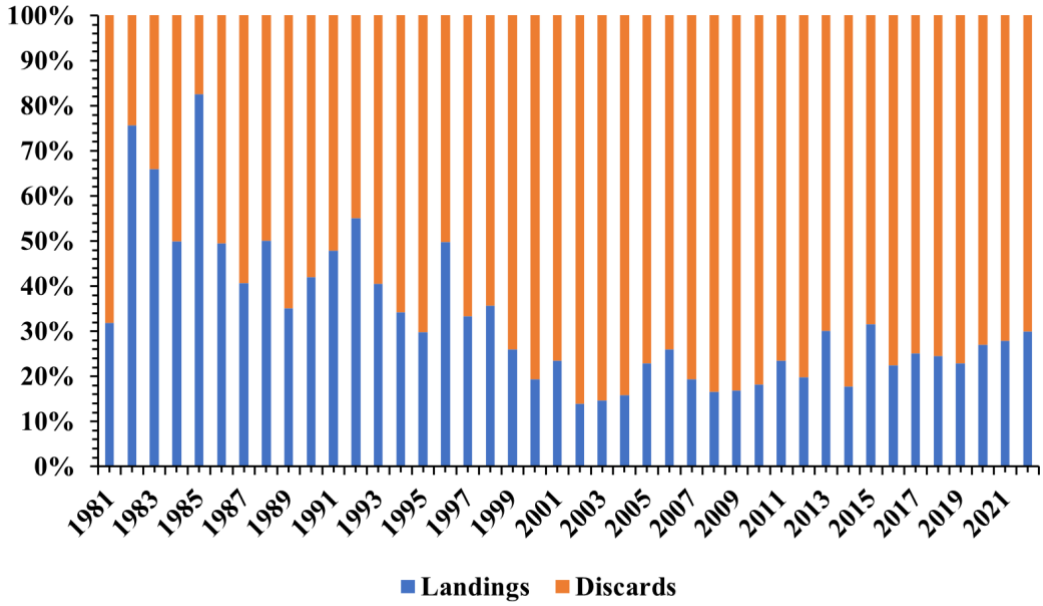

Figure 16. Percentage of fish landed vs discarded from 1981 to 2022.

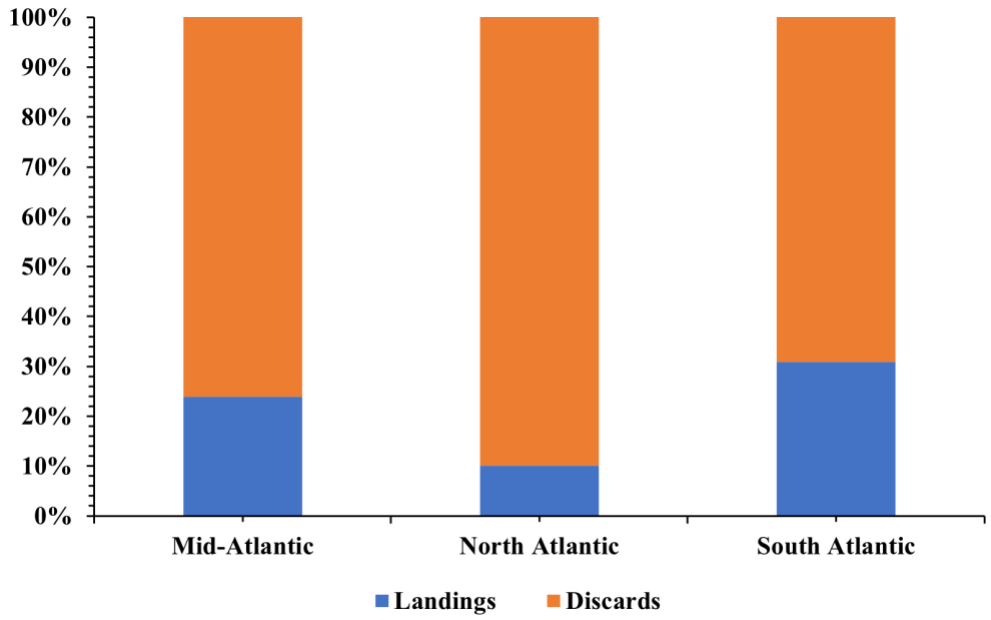

Figure 17. Percentage of fish landed and discarded by region from 1981 to 2022.

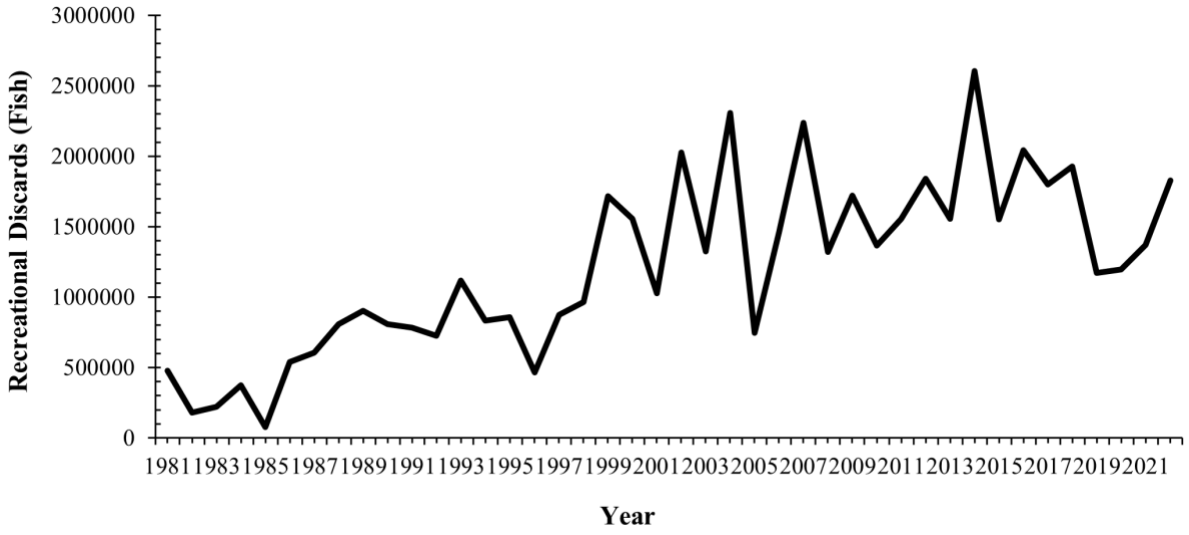

Figure 18. Total recreational discards (individuals) from 1981 to 2021.

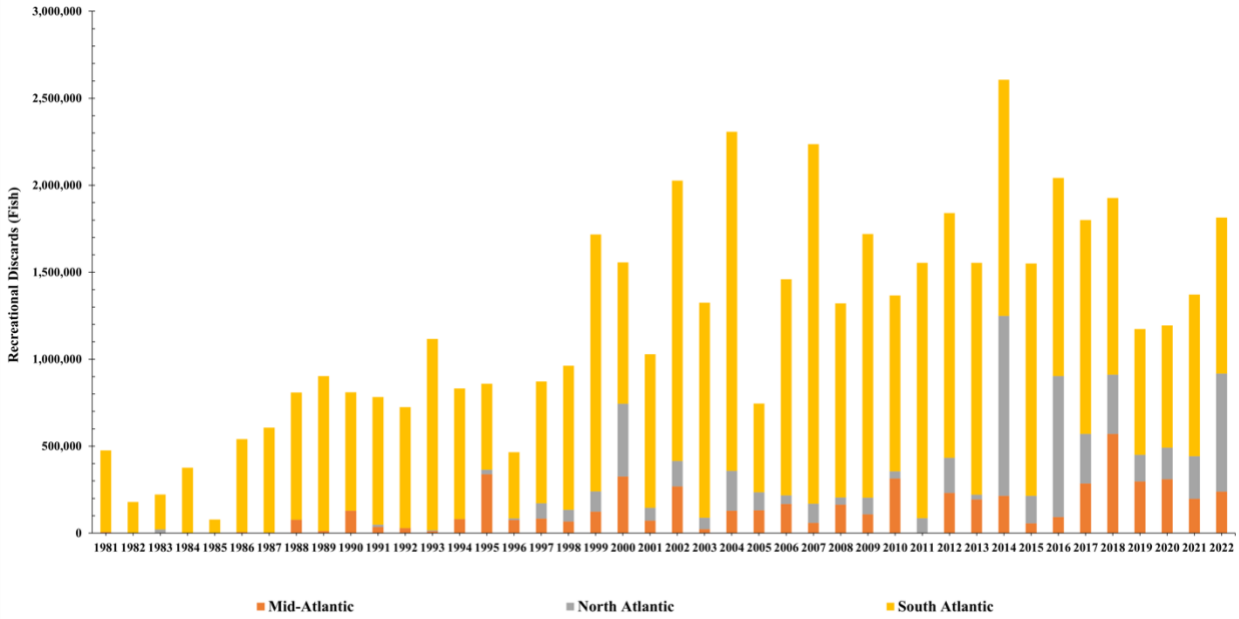

Figure 19. Total recreational discards (individuals) from 1981 to 2021 by region.

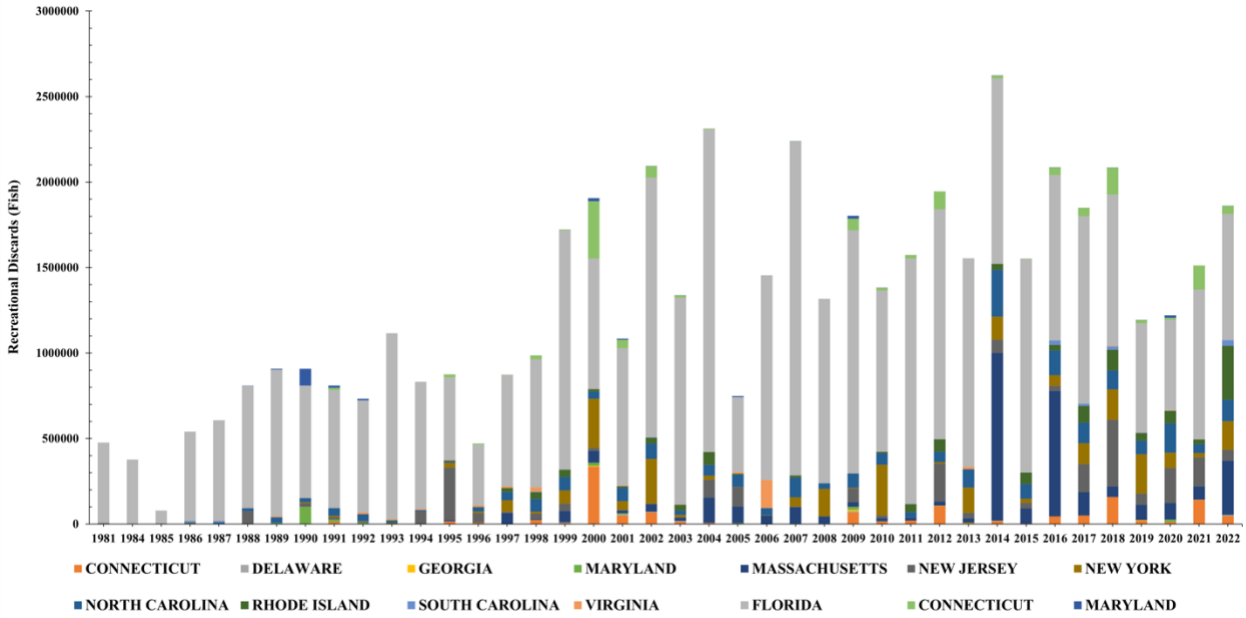

Figure 20. Total recreational discards (individuals) from 1981 to 2021 by state.

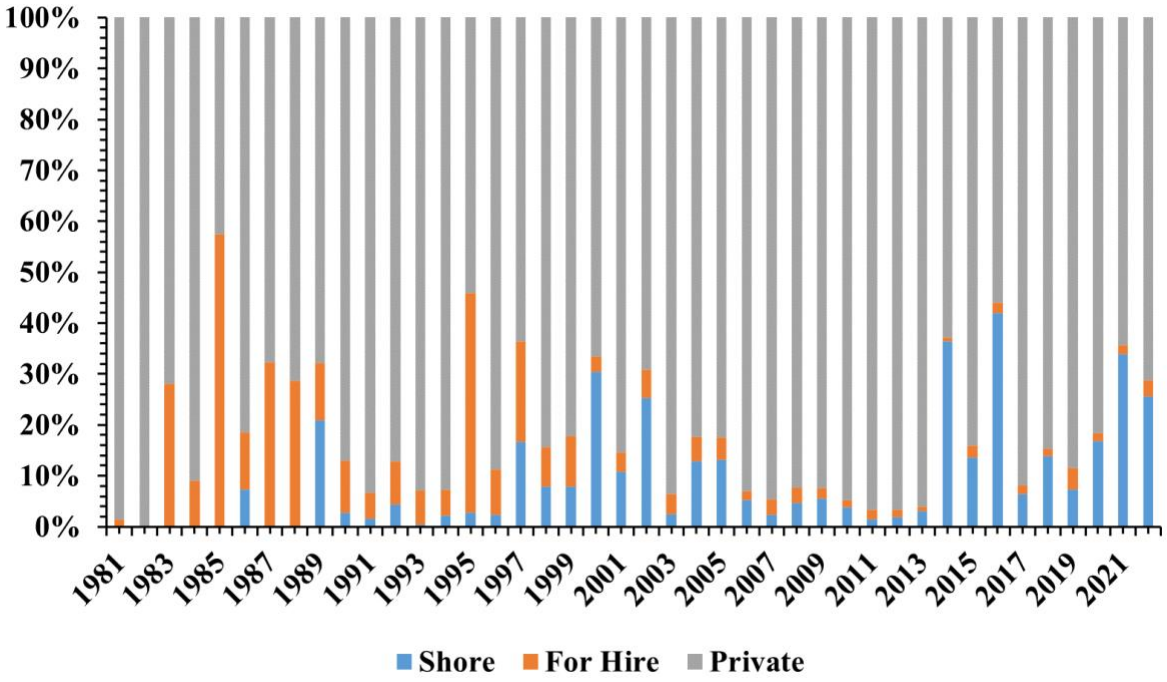

Figure 21. Percentage of recreational discards from each mode of fishing from 1981-2022.

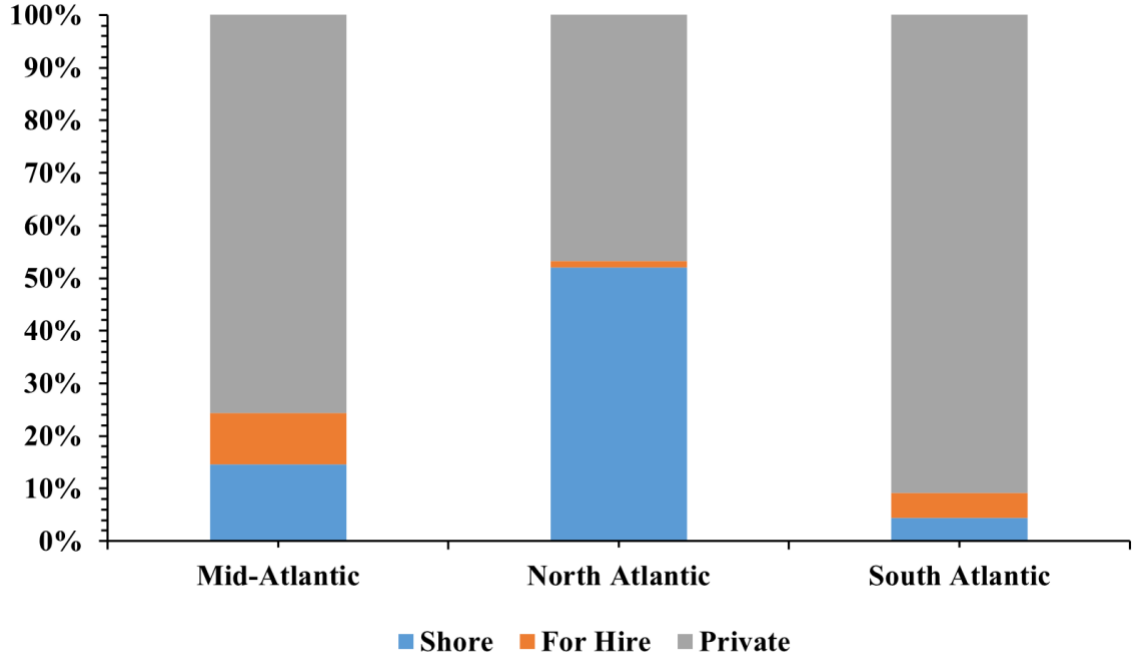

Figure 22. Percentage of recreational discards from each mode of fishing by region.

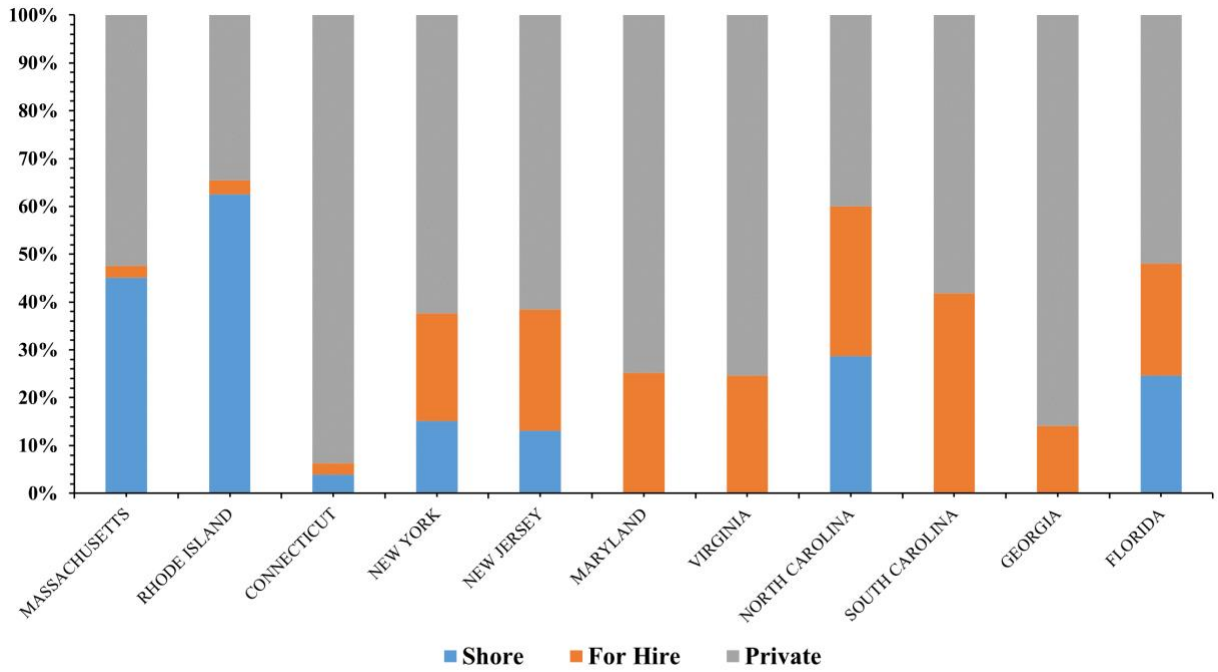

Figure 23. Percentage of recreational discards by mode of fishing for each state.

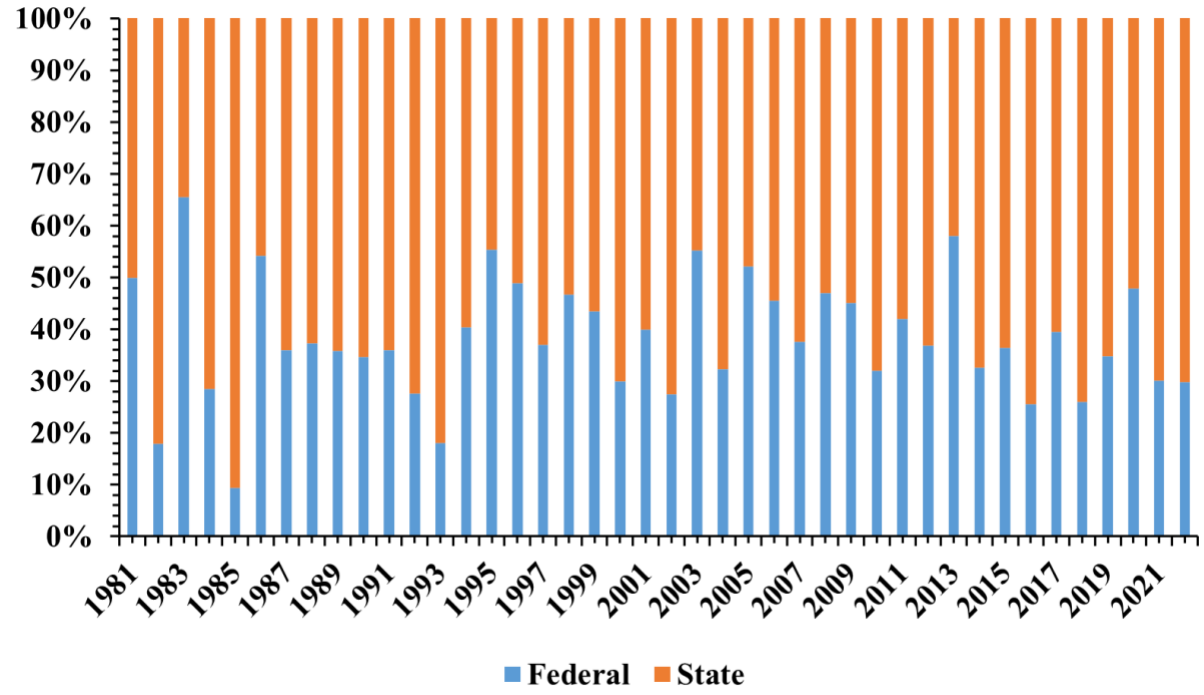

Figure 24. Percentage of recreational discards in federal and state waters from 1981-2022.

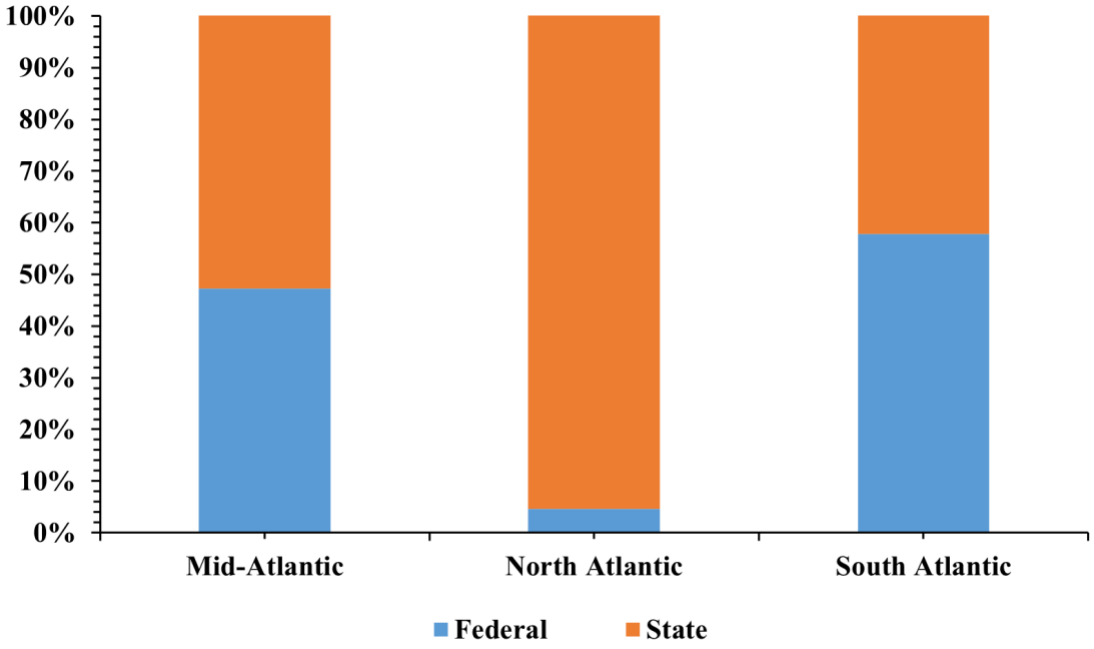

Figure 25. Percentage of recreational discards in federal and state waters for each region.

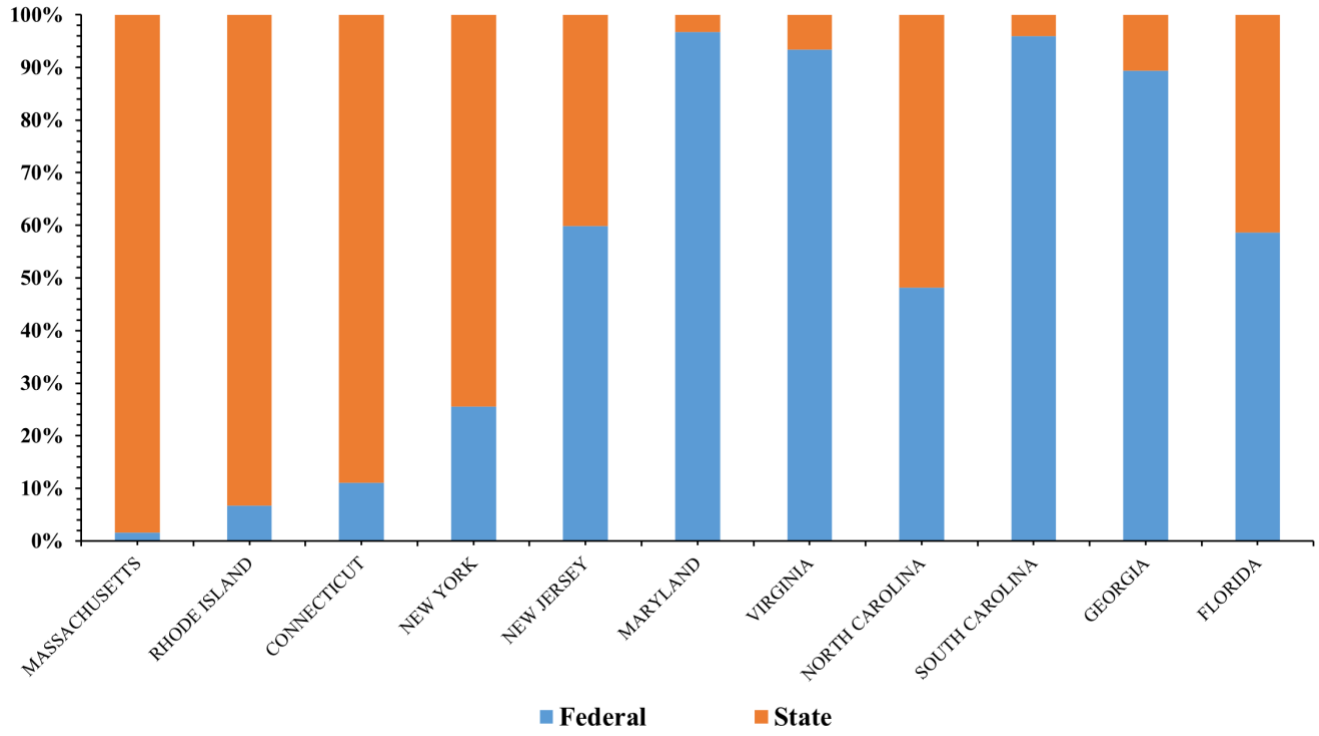

Figure 26. Percentage of recreational discards in federal and state waters for each state.

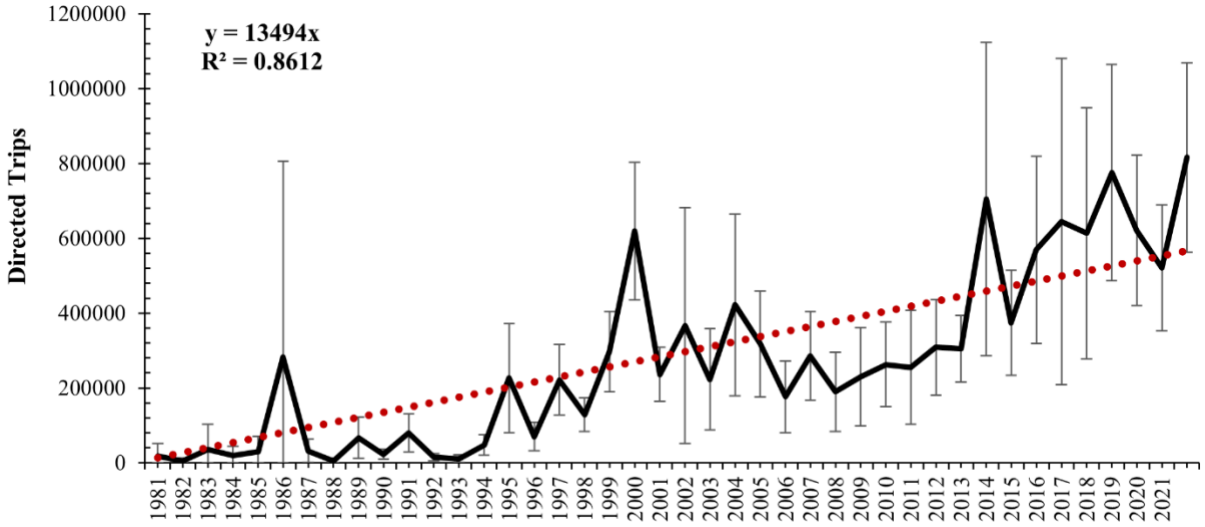

Figure 27. Directed trips for Little Tunny with 95% confidence intervals from 1981-2022.

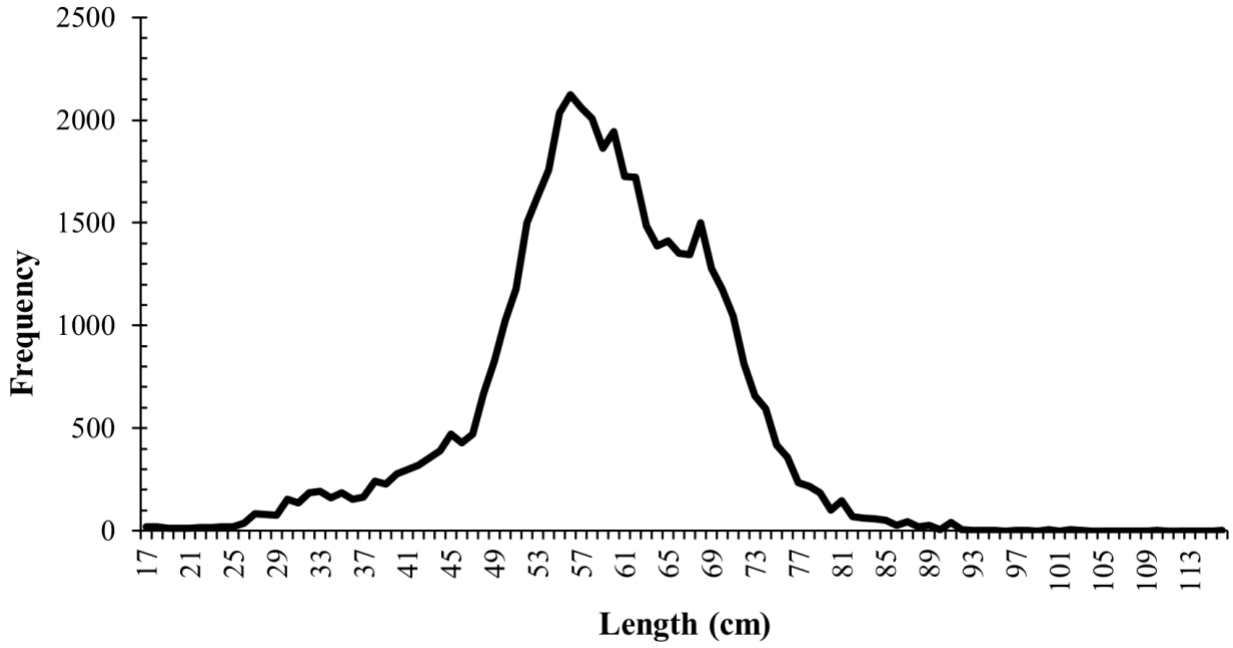

Figure 28. The aggregated length-frequency of the entire MRIP data set.

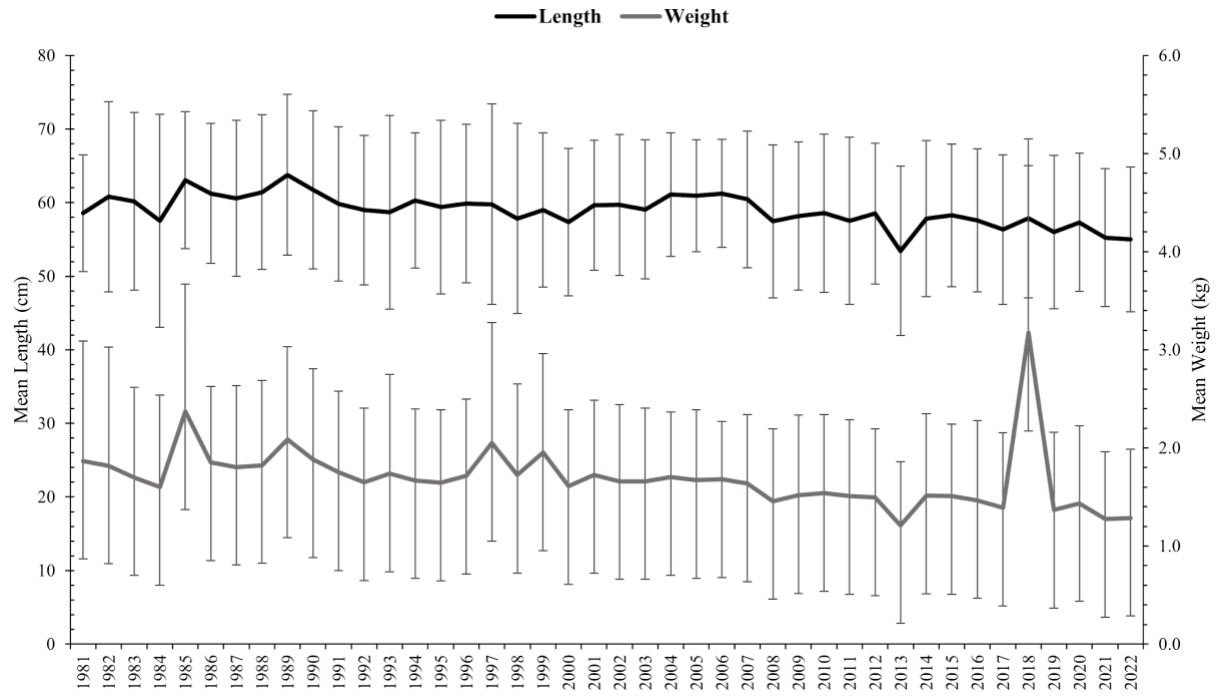

Figure 29. The mean length (Black) and mean weight (Gray) of MRIP sampled fish from 1981 to 2022, error bars based on standard deviation.

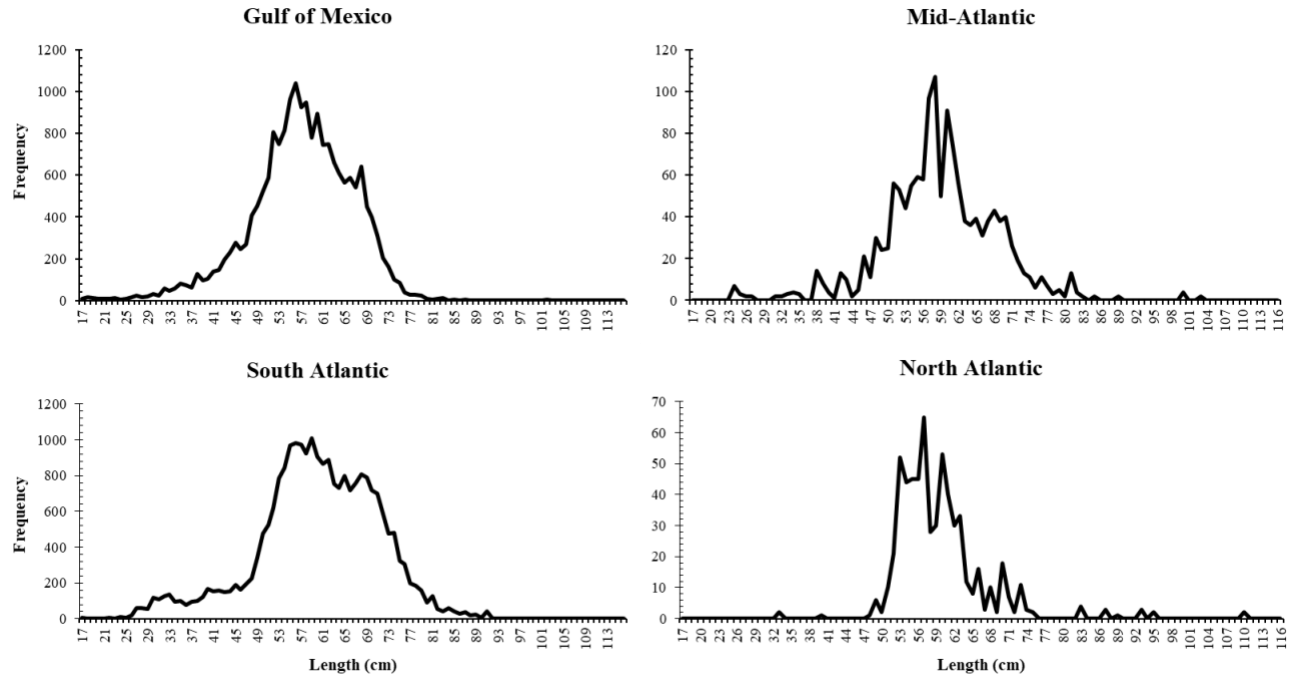

Figure 30. The length frequency distributions for the four sub-regions with data from 1981-2022.

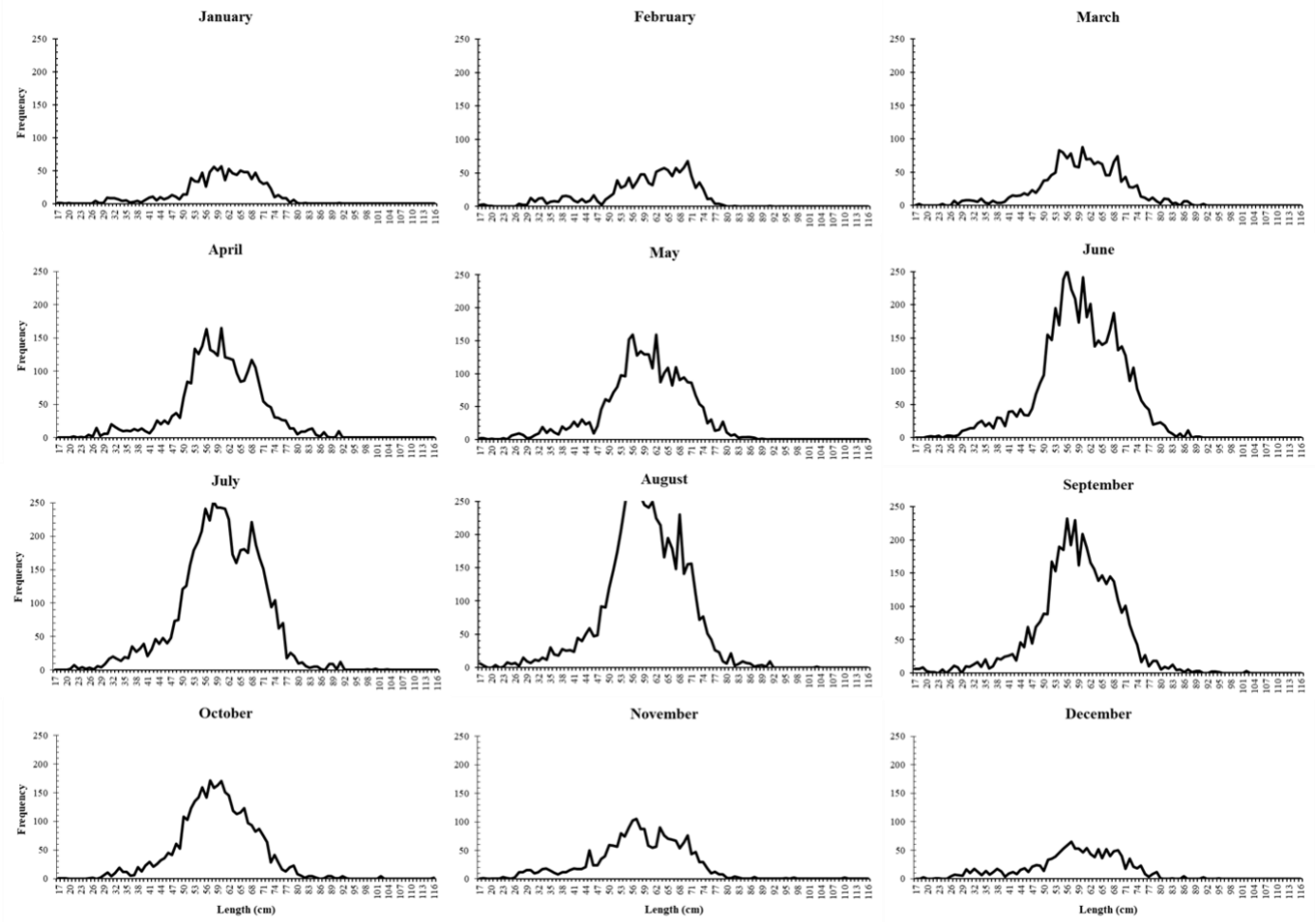

Figure 31. The length frequency distributions for by month with data from 1981-2022.

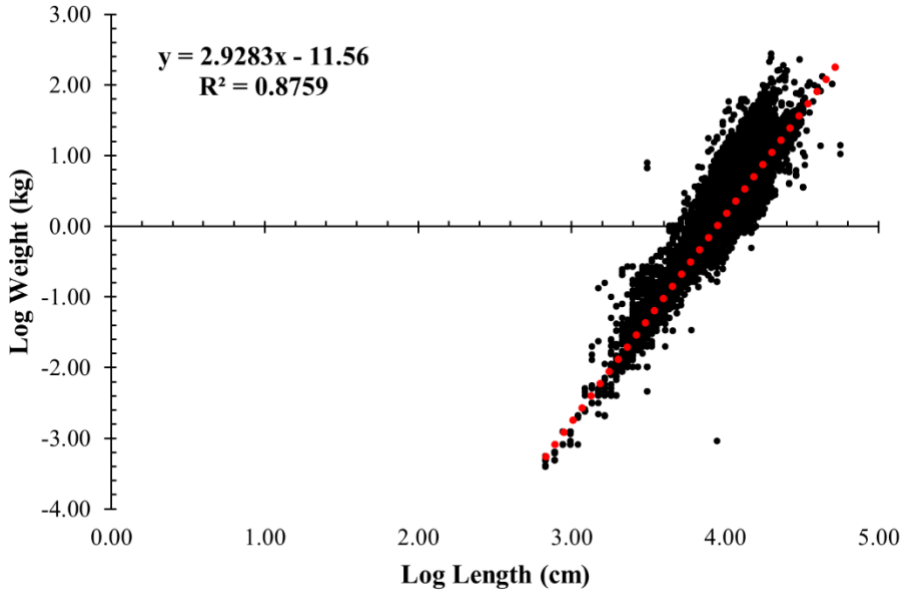

Figure 32. The logarithmic length-weight relationship on all data from 1981-2022.

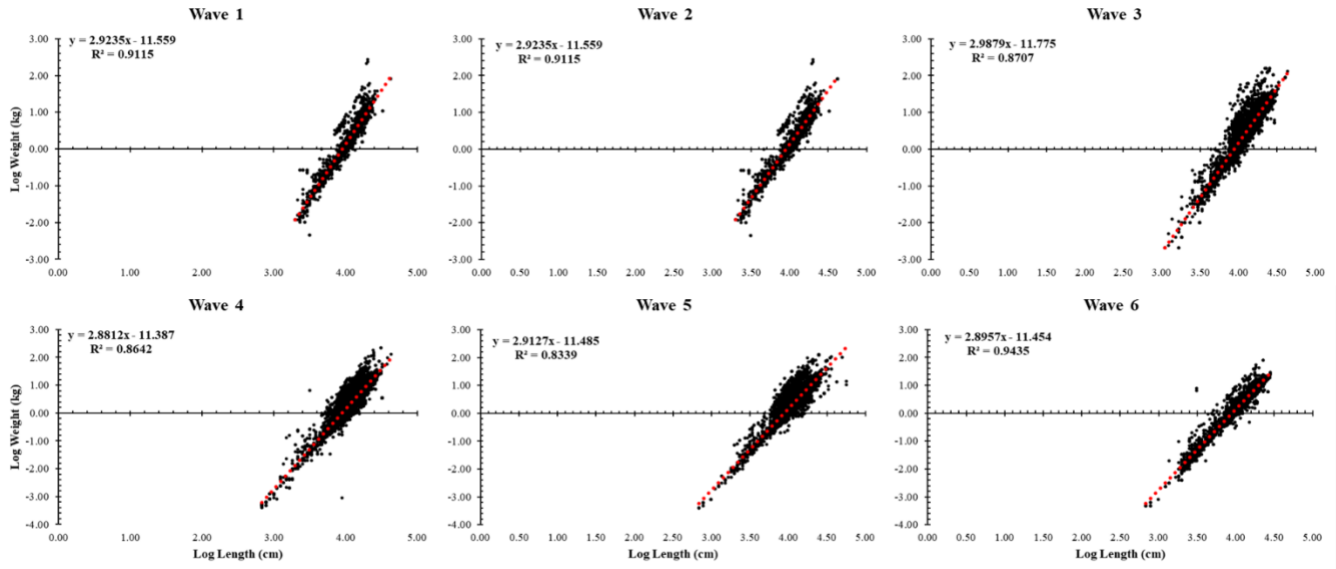

Figure 33. The logarithmic length-weight relationship for waves 1-6 using all data from 1981-2022.

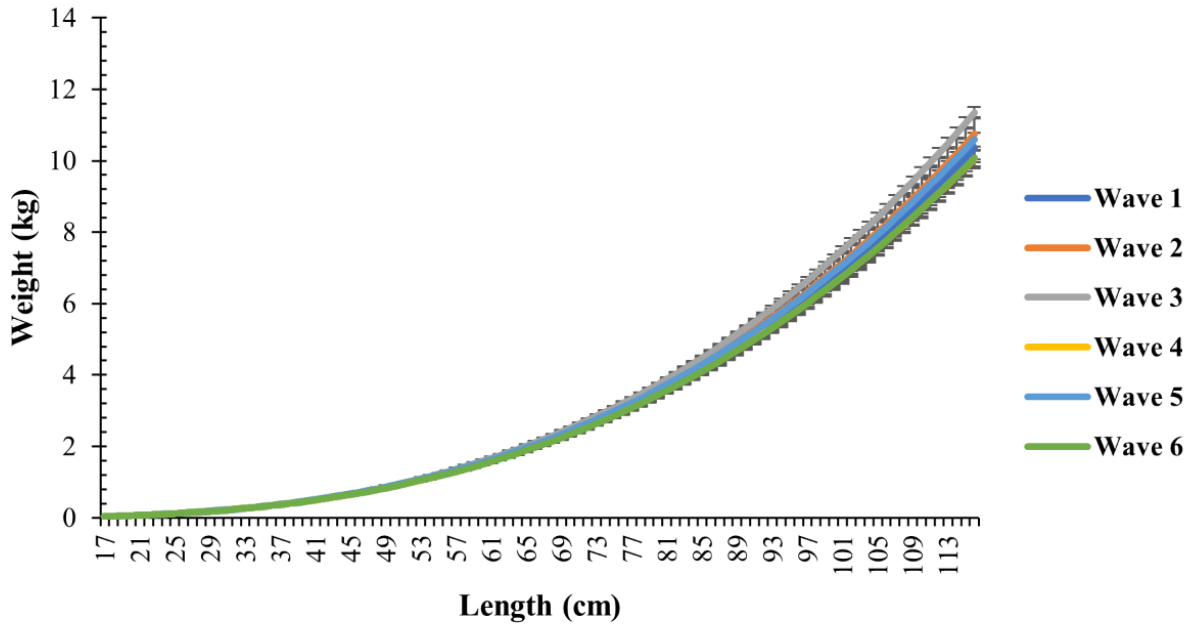

Figure 34. The predicted weights at length for waves 1-6 with 95% confidence intervals.

APPENDIX 1. MANAGEMENT AUTHORITY

Table 1. The marine fisheries management authority for each state along the Atlantic and Gulf coasts.

State	Management Authority
Maine	Department of Marine Resources
New Hampshire	Fish and Game
Massachusetts	Division of Marine Fisheries
Rhode Island	Department of Environmental Management
Connecticut	Department of Energy & Environmental Protection
New York	Department of Environmental Conservation
New Jersey	Department of Environmental Protection
Delaware	Fish and Wildlife
Maryland	Department of Natural Resources
Virginia	Marine Resources Commision
North Carolina	Division of Marine Fisheries
South Carolina	Department of Natural Resources
Georgia	Department of Natural Resources
Florida	Fish and Wildlife Conservation Commission

APPENDIX 2. FISHERIES DATA

Table A2.1. Commercial landings (lbs) 1950-2021 by region.

Year	Mid-Atlantic	North Atlantic	South Atlantic	Total
1950	162700	0	133200	295900
1951	370300	0	0	370300
1952	744700	0	0	744700
1953	68300	0	0	68300
1954	71100	0	0	71100
1955	106200	0	0	106200
1956	88000	0	0	88000
1957	32500	0	0	32500
1958	13500	0	0	13500
1959	179200	0	0	179200
1960	14000	0	0	14000
1961	2200	0	900	3100
1962	16700	0	0	16700
1963	11900	0	0	11900
1964	3800	0	0	3800
1965	22400	0	0	22400
1966	34500	0	0	34500
1967	15000	0	0	15000
1968	12500	0	0	12500
1969	15200	0	0	15200
1970	7000	247400	0	254400
1971	8000	0	0	8000
1972	9900	0	0	9900
1973	13500	0	0	13500
1974	8000	0	12100	20100
1975	3600	0	1400	5000
1976	1700	0	1300	3000
1977	19100	0	0	19100
1978	37100	27500	2880	67480
1979	20300	0	129	20429
1980	39000	0	97185	136185
1981	104500	0	16380	120880
1982	45300	1700	17533	64533
1983	44700	105000	55464	205164
1984	21400	64500	72825	158725
1985	32200	54500	74689	161389
1986	31500	16900	77676	126076
1987	8200	0	150953	159153

Table A2.2. Commercial landings (lbs) 1950-2021 by region (Cont.).

Year	Mid-Atlantic	North Atlantic	South Atlantic	Total
1988	16900	2000	109234	128134
1989	16300	1200	107938	125438
1990	23936	0	133102	157038
1991	89785	7500	115057	212342
1992	41095	5006	177495	223596
1993	117271	2419	150978	270668
1994	112397	0	206446	318843
1995	97609	50517	380262	528388
1996	10226	39380	272336	321942
1997	15129	59578	549193	623900
1998	53737	67006	311824	432567
1999	89252	137023	276315	502590
2000	132068	1274	223012	356354
2001	109533	48880	224202	382615
2002	127259	98275	209698	435232
2003	99180	54054	180119	333353
2004	22077	14284	267664	304025
2005	819	10746	191869	203434
2006	0	29071	288544	317615
2007	18577	57641	359224	435442
2008	10936	117973	350051	478959
2009	20633	29044	465202	514879
2010	11656	9297	488998	509952
2011	10832	29685	491689	532206
2012	28176	37876	473460	539512
2013	8161	775	505620	514556
2014	21896	85900	505316	613112
2015	5816	51806	405092	462714
2016	17168	12624	539667	569460
2017	8951	80119	485835	574905
2018	13414	30373	403897	447684
2019	7643	23344	405124	436111
2020	6920	34515	463443	504878
2021	3860	12859	418479	435198
Overall	22%	10%	68%	
10-Year	2%	7%	90%	

Table A2.3. Commercial landings (lbs) 1950-2021 by state.

Year	CT	DE	FL	GA	MD	MA	NJ	NY	NC	RI	SC	VA
1950	0	0	0	0	100	0	134800	14100	133200	0	0	13700
1951	0	0	0	0	600	0	349600	8600	0	0	0	11500
1952	0	0	0	0	0	0	722000	15700	0	0	0	7000
1953	0	0	0	0	0	0	60200	2700	0	0	0	5400
1954	0	0	0	0	0	0	58600	0	0	0	0	12500
1955	0	0	0	0	0	0	87500	5900	0	0	0	12800
1956	0	0	0	0	0	0	62800	12100	0	0	0	13100
1957	0	0	0	0	0	0	22800	9700	0	0	0	0
1958	0	0	0	0	0	0	2300	8900	0	0	0	2300
1959	0	0	0	0	0	0	123300	53500	0	0	0	2400
1960	0	0	0	900	200	0	1900	1800	0	0	0	10100
1961	0	0	0	0	0	0	1000	1200	900	0	0	0
1962	0	0	0	0	0	0	9300	5700	0	0	0	1700
1963	0	0	0	0	0	0	0	7800	0	0	0	4100
1964	0	0	0	0	0	0	0	2700	0	0	0	1100
1965	0	0	0	0	0	0	300	19100	0	0	0	3000
1966	0	3000	0	0	0	0	900	30200	0	0	0	400
1967	0	0	0	0	0	0	800	14200	0	0	0	0
1968	0	0	0	0	0	0	700	11800	0	0	0	0
1969	0	0	0	0	0	0	600	14600	0	0	0	0
1970	0	0	0	0	0	247400	100	6900	0	0	0	0
1971	0	0	0	0	0	0	0	8000	0	0	0	0
1972	0	0	0	0	0	0	400	9500	0	0	0	0
1973	0	0	0	0	0	0	600	12300	0	0	0	600
1974	0	0	0	0	0	0	1400	6600	12100	0	0	0
1975	0	0	0	0	0	0	3600	0	1400	0	0	0
1976	0	0	0	0	0	0	400	1300	1300	0	0	0
1977	0	0	0	0	0	0	1300	17700	0	0	0	100
1978	0	0	0	0	0	27500	2900	34200	2880	0	0	0
1979	0	0	0	0	0	0	1400	18900	129	0	0	0
1980	0	0	8935	0	0	0	0	38900	88250	0	0	100
1981	0	0	0	0	0	0	0	104500	16380	0	0	0
1982	0	0	0	0	0	0	0	45300	17533	1700	0	0
1983	0	0	0	0	0	0	500	44200	55464	105000	0	0
1984	0	0	0	0	0	0	2300	19100	72825	64500	0	0
1985	0	300	0	0	0	0	8200	23700	74689	54500	0	0
1986	0	0	0	0	6800	0	19200	2700	77676	16900	0	2800
1987	0	0	0	0	0	0	6400	1800	148730	0	2223	0

Table A2.3. Commercial landings (lbs) 1950-2021 by state (Cont.)

Year	CT	DE	FL	GA	MD	MA	NJ	NY	NC	RI	SC	VA
1988	2000	0	0	0	0	0	4900	9000	106732	0	2502	3000
1989	0	0	0	0	600	1200	11600	0	104839	0	3099	4100
1990	0	0	0	0	0	0	21900	0	131278	0	1824	2036
1991	0	0	0	0	0	7500	74103	13465	110419	0	4638	2217
1992	0	0	0	0	0	5006	40725	125	174481	0	3014	245
1993	0	0	0	744	0	2419	20017	88437	146836	0	4142	8817
1994	0	0	0	0	113	0	44993	62525	206150	0	296	4766
1995	0	0	196817	0	0	0	13100	82852	183445	50517	0	1657
1996	0	0	123878	0	0	0	10186	40	133980	39380	14478	0
1997	0	0	178118	0	1111	2353	14018	0	370816	57225	259	0
1998	0	0	157363	685	620	4869	49184	3933	153798	62137	663	0
1999	0	0	132955	0	924	6536	50759	37569	143360	130487	0	0
2000	0	0	116234	0	3360	1274	57940	70768	106778	0	0	0
2001	0	0	125849	0	6218	4659	54207	49108	98353	44221	0	0
2002	0	0	131900	0	0	0	54661	72598	77798	98275	0	0
2003	0	0	93551	0	0	0	31496	66767	86568	54054	0	917
2004	6	0	175344	0	510	2822	21368	9	92320	11456	0	190
2005	0	0	102059	0	0	0	0	576	88741	10746	1069	243
2006	0	0	181927	0	0	0	0	0	106617	29071	0	0
2007	12	0	224558	0	0	0	0	18577	134666	57629	0	0
2008	0	0	246308	0	0	0	5368	5543	103743	117973	0	25
2009	0	0	319114	0	0	0	10681	9952	146088	29044	0	0
2010	0	0	341661	0	0	0	3220	8436	147337	9297	0	0
2011	0	0	360139	0	0	0	0	10832	131549	29685	0	0
2012	0	0	315610	0	0	0	0	28176	157849	37876	0	0
2013	0	0	301773	0	0	0	0	8161	189746	775	14102	0
2014	0	0	259257	0	0	0	0	21896	225797	85900	20262	0
2015	0	0	228489	0	0	0	0	5816	164853	51806	11750	0
2016	0	0	298460	0	0	0	8689	8342	241208	12624	0	137
2017	168	0	269278	0	0	0	0	8951	216557	79951	0	0
2018	16	0	194990	0	0	0	2441	10973	204177	30357	4730	0
2019	32	0	172246	0	0	0	0	7643	232879	23312	0	0
2020	0	0	232758	0	0	0	6227	693	230685	34515	0	0
2021	60	0	308862	0	0	0	2390	1470	105306	12799	4311	0
Overall	0%	0%	33%	0%	0%	2%	13%	8%	34%	8%	1%	1%
10-Year	0%	0%	51%	0%	0%	0%	0%	2%	39%	7%	1%	0%

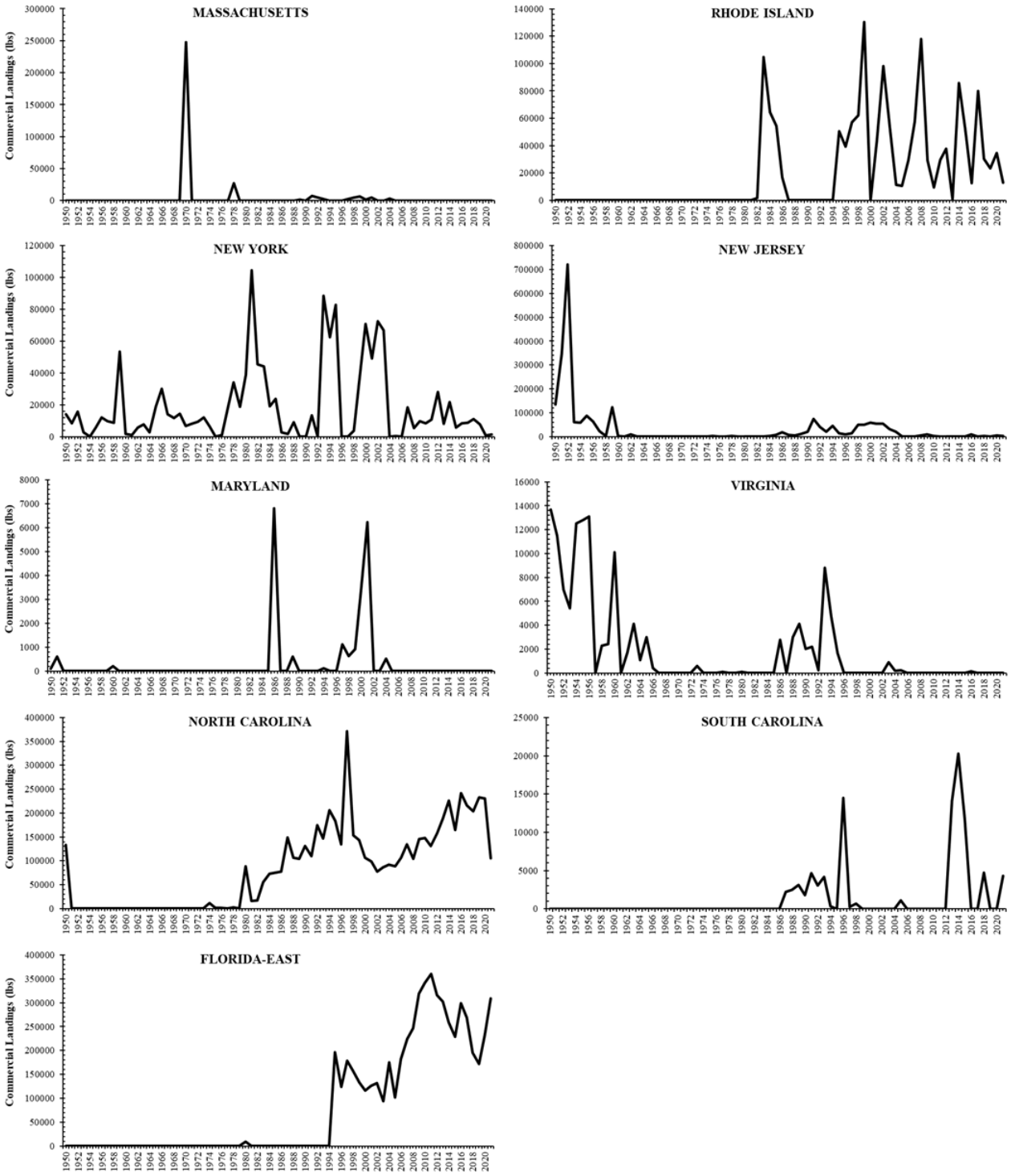

Figure A2.1. Commercial landings (lbs) 1950-2021 by state.

Table A2.4. Recreational landings (lbs) 1981-2021 by region.

Year	Mid-Atlantic	North Atlantic	South Atlantic	Total Landings
1981	920993	0	457781	1397518
1982	71630	6215	600394	712206
1983	336438	0	2335621	2707381
1984	17990	0	1262139	1304684
1985	455637	0	1542895	2014304
1986	145653	0	2846040	3047545
1987	170312	8342	1511246	1697345
1988	653148	0	445410	1098558
1989	268504	0	1960705	2229209
1990	337799	198	2863545	3201542
1991	809101	171579	2697944	3678624
1992	1187473	39171	1967694	3194338
1993	54133	218900	1907937	2181334
1994	566903	111378	1131436	1811538
1995	111012	81137	2204575	2396724
1996	2297	70439	2861819	2934555
1997	712337	79113	1833886	2625336
1998	288578	73486	2966177	3328241
1999	255994	162555	2832336	3250885
2000	124975	18545	2016914	2185496
2001	11683	31182	1764449	1807314
2002	14420	100877	1772812	1888109
2003	14249	51253	1637416	1702973
2004	235601	185982	1604370	2026149
2005	771802	163	986982	1758947
2006	977	22675	2550607	2574312
2007	184506	136239	2155128	2482374
2008	24767	7022	1542132	1573994
2009	210140	38801	1987864	2236893
2010	166811	39692	1819802	2026305
2011	7326	0	2044772	2139443
2012	242793	94541	2079518	2416975
2013	354243	16821	3513499	3898408
2014	113522	105143	3928173	4147012
2015	34510	371067	5107822	5513399
2016	105315	388171	3353006	3846492
2017	685938	182955	2731168	3624896
2018	1078026	116497	3084753	4281179
2019	336800	241650	1231389	1810011
2020	154532	145519	2284562	2584633
2021	181443	82649	2151850	2440971
Overall	12%	4%	84%	-
10-Year	10%	5%	85%	-

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Table A2.5. Recreational landings (lbs) 1981-2021 by state.

Year	CT	DE	FL	GA	MD	MA	NJ	NY	NC	RI	SC	VA	Total
1981	0	0	457274	18744	0	0	855103	65890	0	0	507	0	1397518
1982	0	0	525340	33967	0	6215	71630	0	75054	0	0	0	712206
1983	0	0	1208083	35322	196361	0	0	140077	1117723	0	9815	0	2707381
1984	0	0	1214830	24555	0	0	0	17990	45356	0	1953	0	1304684
1985	0	0	855414	15772	31165	0	300940	110000	592230	0	95251	13532	2014304
1986	0	0	2459237	55852	0	0	0	90692	299670	0	87133	54961	3047545
1987	0	16711	1241671	7445	0	0	91591	38588	245567	8342	24008	23422	1697345
1988	0	0	435901	0	41581	0	534147	6982	8627	0	882	70438	1098558
1989	0	12258	1534553	0	50208	0	79594	0	403625	0	22527	126444	2229209
1990	0	30633	2756561	0	61139	0	193892	19820	101446	198	5538	32315	3201542
1991	92455	14833	2534524	0	78449	68599	549813	145510	163420	10525	0	20496	3678624
1992	3785	4967	1768164	0	808764	0	113618	111832	199210	35386	320	148292	3194338
1993	187464	0	1731845	364	0	0	34569	13781	167719	31436	8373	5783	2181334
1994	101197	0	1001257	1821	0	0	488115	25463	130179	10181	0	53325	1811538
1995	0	666	2068787	0	46524	35329	18656	37033	122540	45808	13248	8133	2396724
1996	20999	0	2559170	0	0	45395	0	0	301132	4045	1517	2297	2934555
1997	0	18918	1605156	0	0	16621	380124	89107	222312	62492	6418	224188	2625336
1998	161	28371	2765331	0	121091	1276	119151	0	200846	72049	0	19965	3328241
1999	13666	9932	2742328	0	6208	45488	179472	26270	90008	103401	0	34112	3250885
2000	0	0	1926266	25062	0	0	100310	0	85780	18545	4868	24665	2185496
2001	13865	556	1710493	0	0	11519	6281	0	53956	5798	0	4846	1807314
2002	0	370	1707138	0	10249	55473	3801	0	61386	45404	4288	0	1888109
2003	11766	201	1558345	55	14048	37071	0	0	79071	2416	0	0	1702973
2004	2299	20946	1487994	196	0	158279	64730	148995	95090	25404	21286	930	2026149
2005	0	0	916158	0	204887	0	117626	0	69869	163	955	449289	1758947
2006	0	0	2518832	53	589	22675	388	0	29943	0	1832	0	2574312
2007	0	86	2125635	6501	6094	73619	606	177239	29493	62620	0	481	2482374
2008	0	20505	1465903	73	0	7022	2756	1506	76229	0	0	0	1573994
2009	0	95	1848430	88	55896	1221	153360	0	139434	37580	0	789	2236893
2010	11296	500	1770130	0	234	28396	166077	0	49291	0	381	0	2026305
2011	0	20	1989482	87345	0	0	7306	0	55290	0	0	0	2139443
2012	5223	57	1937946	123	661	15959	116173	0	140027	73359	1545	125902	2416975
2013	0	0	3295027	13845	0	16821	354243	0	218472	0	0	0	3898408
2014	13695	0	3738902	174	3415	90875	103769	6338	189271	573	0	0	4147012
2015	0	0	4891017	0	0	242544	717	1409	207892	128523	8913	32384	5513399
2016	2271	0	3015161	0	278	366801	88633	11920	337845	19099	0	4484	3846492
2017	89111	0	2386230	24835	8005	0	540210	113981	334367	93844	10571	23742	3624896
2018	20276	68	2757650	1903	386	31229	998580	57953	315762	64992	11341	21039	4281179
2019	1190	1010	986790	172	9218	227636	57036	249899	185096	12824	59503	19637	1810011
2020	33	163	1665907	20	74064	10759	33155	23977	594801	134727	23854	23173	2584633
2021	7921	9808	2012022	15245	0	15933	163449	624	118785	58795	21043	7562	2440971
Overall	1%	0%	76%	0%	2%	2%	7%	2%	8%	1%	0%	2%	-
10-Year	0%	0%	77%	0%	0%	3%	7%	1%	8%	2%	0%	1%	-

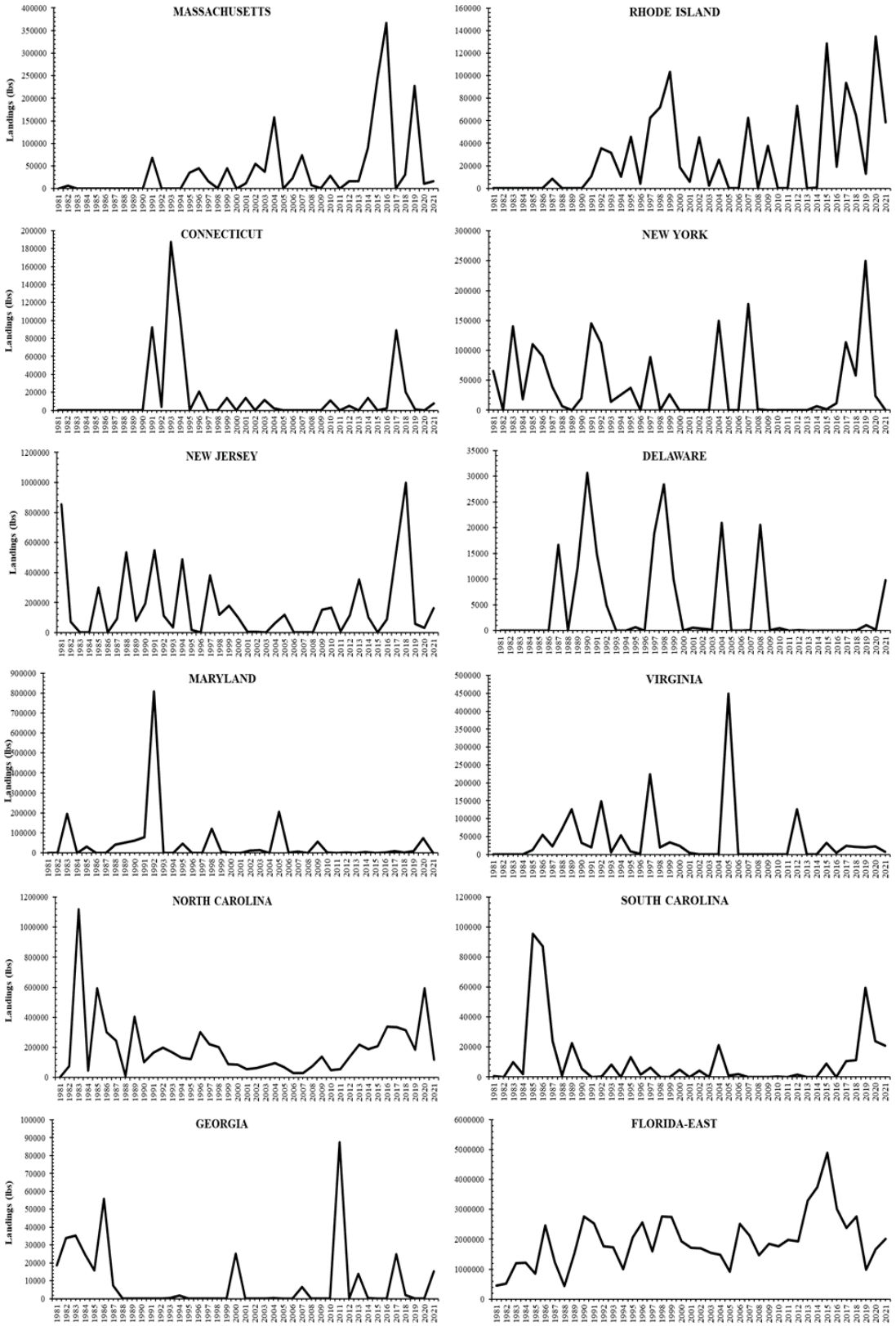

Figure A2.2. Recreational landings (lbs) 1981-2021 by state.

Table A2.6. Percentage of recreational landing 1981-2021 by fishing mode for each region.

Year	Mid-Atlantic			North Atlantic			South Atlantic		
	Shore	**For Hire**	**Private**	**Shore**	**For Hire**	**Private**	**Shore**	**For Hire**	**Private**
1981	0%	91%	9%	0%	0%	0%	0%	10%	90%
1982	0%	0%	100%	0%	0%	100%	8%	48%	44%
1983	0%	62%	38%	0%	0%	0%	43%	32%	25%
1984	0%	0%	100%	0%	0%	0%	0%	24%	76%
1985	0%	12%	88%	0%	0%	0%	12%	40%	48%
1986	0%	34%	66%	0%	0%	0%	51%	21%	29%
1987	0%	10%	90%	0%	3%	97%	3%	46%	51%
1988	0%	5%	95%	0%	0%	0%	0%	44%	56%
1989	0%	35%	65%	0%	0%	0%	14%	32%	54%
1990	0%	38%	62%	0%	100%	0%	9%	51%	41%
1991	0%	61%	39%	49%	3%	49%	14%	31%	54%
1992	0%	30%	70%	27%	1%	72%	34%	30%	36%
1993	0%	12%	88%	0%	2%	98%	1%	43%	55%
1994	12%	9%	79%	0%	4%	96%	1%	47%	52%
1995	17%	3%	80%	77%	10%	13%	8%	57%	35%
1996	0%	100%	0%	19%	0%	81%	7%	50%	43%
1997	0%	11%	89%	53%	13%	34%	6%	73%	21%
1998	0%	46%	54%	0%	2%	98%	2%	66%	33%
1999	0%	34%	66%	48%	0%	52%	7%	49%	45%
2000	0%	69%	31%	0%	0%	100%	18%	17%	64%
2001	0%	59%	41%	37%	22%	41%	21%	19%	60%
2002	0%	0%	100%	13%	10%	77%	17%	21%	62%
2003	0%	7%	93%	60%	5%	35%	12%	17%	71%
2004	38%	21%	41%	92%	2%	7%	1%	24%	75%
2005	0%	13%	87%	0%	100%	0%	3%	23%	74%
2006	0%	100%	0%	100%	0%	0%	15%	14%	72%
2007	96%	4%	0%	33%	1%	66%	0%	15%	85%
2008	0%	52%	48%	100%	0%	0%	10%	12%	78%
2009	0%	3%	97%	0%	4%	96%	10%	15%	76%
2010	0%	18%	82%	72%	0%	28%	24%	8%	68%
2011	0%	22%	78%	0%	0%	0%	7%	10%	83%
2012	0%	48%	52%	0%	37%	63%	10%	12%	79%
2013	0%	0%	100%	0%	0%	100%	9%	8%	83%
2014	0%	38%	62%	0%	5%	95%	27%	9%	64%
2015	0%	9%	91%	0%	0%	100%	39%	6%	55%
2016	0%	2%	98%	17%	0%	82%	3%	10%	87%
2017	0%	1%	99%	15%	1%	83%	17%	19%	64%
2018	78%	2%	20%	15%	13%	72%	15%	14%	71%
2019	0%	3%	97%	77%	1%	22%	2%	27%	72%
2020	0%	11%	89%	84%	0%	15%	19%	9%	71%
2021	0%	2%	98%	57%	1%	42%	19%	23%	59%
2022	0%	11%	89%	96%	0%	4%	8%	12%	80%

Table A2.7. Percentage of recreational landing 1981-2021 by fishing mode (SH = Shore; FH = For Hire; PR = Private) for each state.

Year	CT			DE			FL			GA			MD			MA		
	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR
1981	0%	0%	0%	0%	0%	0%	0%	11%	89%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	0%	0%	0%	57%	43%	0%	20%	80%	0%	0%	0%	0%	0%	100%
1983	0%	0%	0%	0%	0%	0%	0%	44%	56%	0%	7%	93%	0%	47%	53%	0%	0%	0%
1984	0%	0%	0%	0%	0%	0%	0%	16%	84%	0%	2%	98%	0%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	0%	0%	0%	18%	82%	0%	0%	100%	0%	18%	82%	0%	0%	0%
1986	0%	0%	0%	0%	0%	0%	36%	27%	37%	0%	68%	32%	0%	0%	0%	0%	0%	0%
1987	0%	0%	0%	0%	100%	0%	22%	26%	52%	0%	6%	94%	0%	0%	0%	0%	0%	0%
1988	0%	0%	0%	0%	0%	0%	0%	52%	48%	0%	0%	0%	0%	14%	86%	0%	0%	0%
1989	0%	0%	0%	0%	5%	95%	43%	28%	29%	0%	0%	0%	0%	0%	100%	0%	0%	0%
1990	0%	0%	0%	0%	94%	6%	47%	24%	29%	0%	0%	0%	0%	100%	0%	0%	0%	0%
1991	25%	0%	75%	0%	86%	14%	35%	27%	38%	0%	0%	0%	0%	0%	100%	79%	0%	21%
1992	0%	0%	100%	0%	70%	30%	59%	18%	23%	0%	0%	0%	0%	17%	83%	0%	0%	0%
1993	0%	1%	99%	0%	0%	0%	30%	36%	33%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1994	0%	3%	97%	0%	0%	0%	29%	35%	36%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1995	0%	0%	0%	0%	100%	0%	29%	47%	24%	0%	0%	0%	0%	0%	100%	77%	23%	0%
1996	0%	0%	100%	0%	0%	0%	15%	50%	34%	0%	0%	0%	0%	0%	0%	29%	0%	71%
1997	0%	0%	0%	0%	54%	46%	6%	73%	21%	0%	0%	0%	0%	0%	0%	0%	43%	57%
1998	0%	100%	0%	0%	5%	95%	0%	66%	34%	0%	0%	0%	0%	100%	0%	0%	100%	0%
1999	0%	0%	100%	0%	0%	100%	6%	47%	47%	0%	0%	0%	0%	100%	0%	69%	0%	31%
2000	0%	0%	0%	0%	0%	0%	20%	18%	62%	0%	0%	100%	0%	0%	0%	0%	0%	0%
2001	0%	46%	54%	0%	100%	0%	30%	17%	53%	0%	0%	0%	0%	0%	0%	100%	0%	0%
2002	0%	0%	0%	0%	0%	100%	35%	16%	49%	0%	0%	0%	0%	0%	100%	24%	0%	76%
2003	0%	0%	100%	0%	100%	0%	19%	14%	67%	0%	100%	0%	0%	6%	94%	83%	0%	17%
2004	0%	100%	0%	0%	3%	97%	44%	11%	46%	0%	100%	0%	0%	0%	0%	100%	0%	0%
2005	0%	0%	0%	0%	0%	0%	5%	18%	77%	0%	0%	0%	0%	0%	100%	0%	0%	0%
2006	0%	0%	0%	0%	0%	0%	16%	18%	66%	0%	100%	0%	0%	100%	0%	100%	0%	0%
2007	0%	0%	0%	0%	100%	0%	14%	14%	72%	0%	100%	0%	0%	100%	0%	62%	0%	38%
2008	0%	0%	0%	0%	41%	59%	19%	15%	66%	0%	100%	0%	0%	0%	0%	100%	0%	0%
2009	0%	0%	0%	0%	100%	0%	20%	14%	66%	0%	100%	0%	0%	7%	93%	0%	100%	0%
2010	0%	0%	100%	0%	100%	0%	25%	12%	63%	0%	0%	0%	0%	100%	0%	100%	0%	0%
2011	0%	0%	0%	0%	100%	0%	11%	14%	75%	0%	0%	100%	0%	0%	0%	0%	0%	0%
2012	0%	0%	100%	0%	100%	0%	31%	14%	54%	0%	100%	0%	0%	100%	0%	0%	18%	82%
2013	0%	0%	0%	0%	0%	0%	20%	12%	68%	0%	0%	100%	0%	0%	0%	0%	0%	100%
2014	0%	0%	100%	0%	0%	0%	28%	13%	59%	0%	100%	0%	0%	100%	0%	0%	6%	94%
2015	0%	0%	0%	0%	0%	0%	46%	9%	45%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2016	0%	0%	100%	0%	0%	0%	6%	12%	82%	0%	0%	0%	0%	100%	0%	18%	0%	82%
2017	0%	0%	100%	0%	0%	0%	11%	25%	64%	0%	0%	100%	0%	0%	100%	0%	0%	0%
2018	0%	0%	100%	0%	100%	0%	10%	17%	73%	0%	6%	94%	0%	100%	0%	0%	50%	50%
2019	0%	0%	100%	0%	100%	0%	53%	15%	33%	0%	100%	0%	0%	0%	100%	79%	1%	21%
2020	0%	100%	0%	0%	100%	0%	17%	16%	67%	0%	100%	0%	0%	1%	99%	0%	0%	100%
2021	0%	0%	100%	0%	0%	100%	17%	25%	58%	0%	2%	98%	0%	20%	80%	0%	4%	96%
2022	0%	0%	0%	0%	100%	0%	22%	13%	65%	0%	0%	100%	0%	77%	23%	84%	0%	16%

Table A2.7. Percentage of recreational landing 1981-2021 by fishing mode (SH = Shore; FH = For Hire; PR = Private) for each state (Cont.).

Year	NJ			NY			NC			RI			SC			VA		
	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR
1981	0%	95%	5%	0%	37%	63%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%
1982	0%	0%	100%	0%	0%	0%	67%	10%	23%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	82%	18%	91%	3%	6%	0%	0%	0%	0%	7%	93%	0%	0%	0%
1984	0%	0%	0%	0%	0%	100%	0%	67%	33%	0%	0%	0%	0%	100%	0%	0%	0%	0%
1985	0%	8%	92%	0%	12%	88%	32%	56%	12%	0%	0%	0%	0%	46%	54%	0%	77%	23%
1986	0%	0%	0%	0%	1%	99%	49%	13%	38%	0%	0%	0%	0%	14%	86%	0%	88%	12%
1987	0%	0%	100%	0%	0%	100%	20%	36%	45%	0%	3%	97%	0%	80%	20%	0%	2%	98%
1988	0%	0%	100%	0%	100%	0%	0%	18%	82%	0%	0%	0%	0%	100%	0%	0%	26%	74%
1989	0%	23%	77%	0%	0%	0%	35%	13%	52%	0%	0%	0%	0%	22%	78%	0%	60%	40%
1990	0%	13%	87%	0%	73%	27%	0%	43%	57%	0%	100%	0%	0%	100%	0%	0%	0%	100%
1991	0%	67%	33%	0%	75%	25%	12%	27%	61%	58%	42%	0%	0%	0%	0%	0%	0%	100%
1992	5%	51%	44%	0%	35%	65%	9%	48%	43%	30%	1%	69%	0%	100%	0%	0%	76%	24%
1993	0%	0%	100%	0%	45%	55%	3%	43%	54%	0%	7%	93%	0%	100%	0%	0%	0%	100%
1994	14%	0%	86%	0%	100%	0%	9%	57%	33%	0%	10%	90%	0%	0%	0%	0%	47%	53%
1995	100%	0%	0%	0%	7%	93%	0%	33%	67%	77%	0%	23%	0%	100%	0%	0%	0%	100%
1996	0%	0%	0%	0%	0%	0%	8%	38%	54%	0%	0%	100%	0%	100%	0%	0%	100%	0%
1997	0%	0%	100%	0%	0%	100%	8%	57%	35%	67%	5%	28%	0%	44%	56%	0%	30%	70%
1998	0%	0%	100%	0%	0%	0%	22%	72%	5%	0%	0%	100%	0%	0%	0%	0%	45%	55%
1999	0%	41%	59%	0%	0%	100%	0%	57%	43%	45%	1%	54%	0%	0%	0%	0%	20%	80%
2000	0%	86%	14%	0%	0%	0%	14%	63%	23%	0%	0%	100%	0%	100%	0%	0%	0%	100%
2001	0%	100%	0%	0%	0%	0%	0%	55%	45%	0%	7%	93%	0%	0%	0%	0%	0%	100%
2002	0%	0%	100%	0%	0%	0%	4%	69%	27%	0%	23%	77%	0%	0%	100%	0%	0%	0%
2003	0%	0%	0%	0%	0%	0%	0%	71%	29%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2004	0%	23%	77%	60%	23%	18%	0%	64%	36%	48%	2%	49%	0%	100%	0%	0%	100%	0%
2005	0%	85%	15%	0%	0%	0%	0%	19%	81%	0%	100%	0%	0%	100%	0%	0%	0%	100%
2006	0%	100%	0%	0%	0%	0%	0%	72%	28%	0%	0%	0%	0%	100%	0%	0%	0%	0%
2007	0%	100%	0%	100%	0%	0%	0%	47%	53%	0%	1%	99%	0%	0%	0%	0%	100%	0%
2008	0%	100%	0%	0%	100%	0%	0%	40%	60%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2009	0%	1%	99%	0%	0%	0%	0%	33%	67%	0%	1%	99%	0%	0%	0%	0%	100%	0%
2010	0%	17%	83%	0%	0%	0%	0%	69%	31%	0%	0%	0%	0%	100%	0%	0%	0%	0%
2011	0%	22%	78%	0%	0%	0%	15%	65%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2012	0%	100%	0%	0%	0%	0%	18%	40%	42%	0%	44%	56%	0%	100%	0%	0%	0%	100%
2013	0%	0%	100%	0%	0%	0%	0%	20%	80%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2014	0%	38%	62%	0%	0%	100%	0%	28%	72%	0%	0%	100%	0%	0%	0%	0%	0%	0%
2015	0%	100%	0%	0%	100%	0%	48%	25%	27%	0%	0%	100%	0%	92%	8%	0%	3%	97%
2016	0%	0%	100%	0%	2%	98%	16%	26%	58%	0%	10%	90%	0%	0%	0%	0%	45%	55%
2017	0%	0%	100%	0%	0%	100%	45%	12%	43%	29%	3%	68%	0%	62%	38%	0%	21%	79%
2018	85%	2%	14%	0%	4%	96%	30%	19%	51%	26%	0%	74%	0%	26%	74%	0%	3%	97%
2019	0%	11%	89%	0%	0%	100%	10%	30%	59%	61%	0%	39%	0%	30%	70%	0%	9%	91%
2020	0%	47%	53%	0%	0%	100%	24%	21%	55%	91%	0%	9%	0%	26%	74%	0%	3%	97%
2021	0%	1%	99%	0%	100%	0%	0%	45%	55%	81%	0%	19%	0%	3%	97%	0%	0%	100%
2022	0%	0%	100%	0%	0%	100%	8%	45%	47%	98%	0%	2%	0%	27%	73%	0%	0%	100%

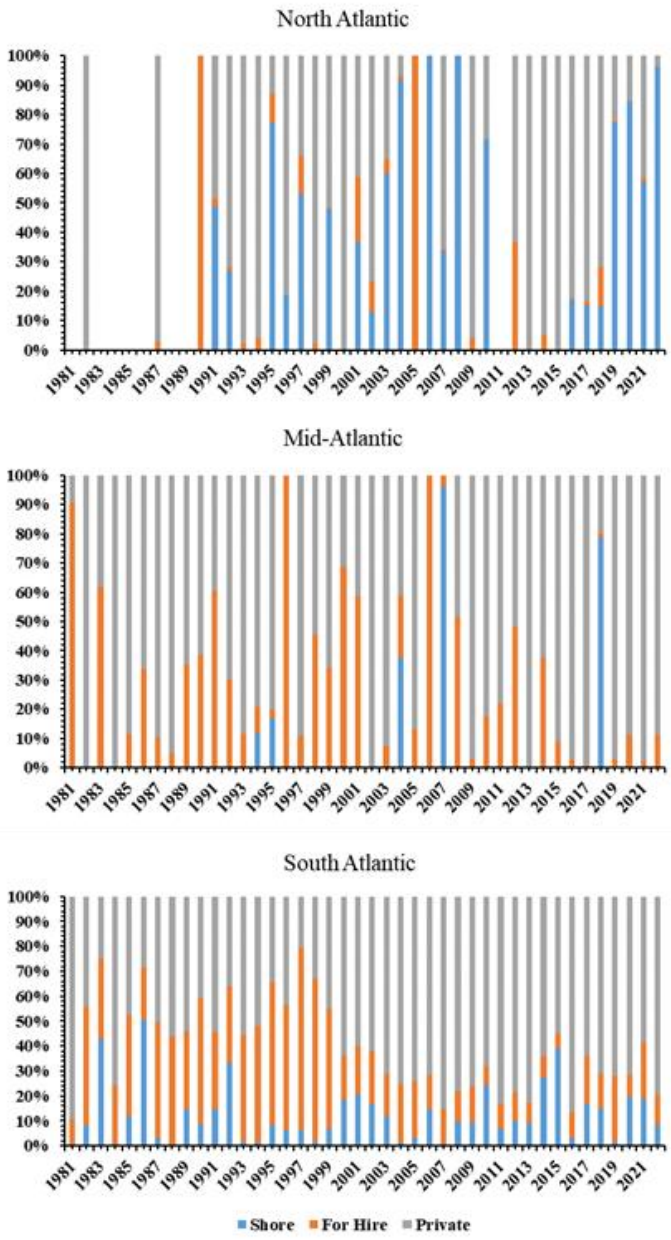

Figure A2.3. Percentage of recreational landing 1981-2021 by fishing mode for each region.

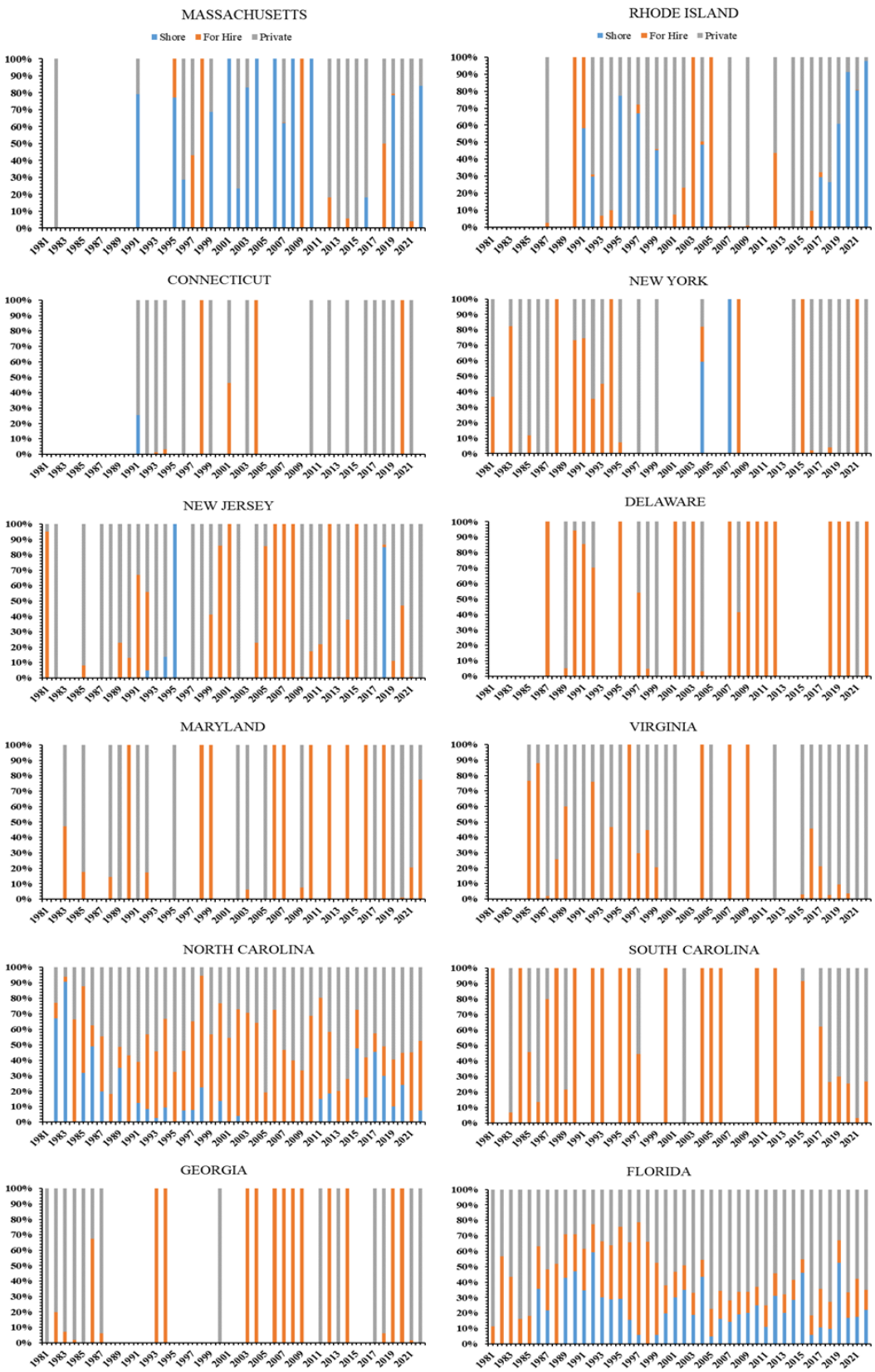

Figure A2.4. Percentage of recreational landing 1981-2021 by fishing mode for each state.

Table A2.8. Percentage of recreational landing 1981-2021 in state and federal waters for each region.

Year	Mid-Atlantic		North Atlantic		South Atlantic	
	Federal	State	Federal	State	Federal	State
1981	95%	5%	0%	0%	44%	56%
1982	100%	0%	100%	0%	33%	67%
1983	93%	7%	0%	0%	28%	72%
1984	0%	100%	0%	0%	62%	38%
1985	79%	21%	0%	0%	55%	45%
1986	100%	0%	0%	0%	28%	72%
1987	100%	0%	100%	0%	68%	32%
1988	97%	3%	0%	0%	84%	16%
1989	88%	12%	0%	0%	54%	46%
1990	96%	4%	100%	0%	62%	38%
1991	81%	19%	3%	97%	58%	42%
1992	86%	14%	5%	95%	33%	67%
1993	17%	83%	11%	89%	45%	55%
1994	11%	89%	9%	91%	61%	39%
1995	76%	24%	10%	90%	46%	54%
1996	100%	0%	0%	100%	67%	33%
1997	77%	23%	25%	75%	48%	52%
1998	98%	2%	73%	27%	52%	48%
1999	96%	4%	6%	94%	67%	33%
2000	90%	10%	60%	40%	54%	46%
2001	95%	5%	11%	89%	46%	54%
2002	100%	0%	10%	90%	51%	49%
2003	100%	0%	17%	83%	45%	55%
2004	44%	56%	0%	100%	58%	42%
2005	98%	2%	100%	0%	69%	31%
2006	100%	0%	0%	100%	65%	35%
2007	4%	96%	39%	61%	70%	30%
2008	94%	6%	0%	100%	56%	44%
2009	56%	44%	0%	100%	55%	45%
2010	98%	2%	0%	100%	33%	67%
2011	22%	78%	0%	0%	29%	71%
2012	100%	0%	76%	24%	52%	48%
2013	100%	0%	0%	100%	50%	50%
2014	94%	6%	0%	100%	33%	67%
2015	100%	0%	4%	96%	23%	77%
2016	14%	86%	3%	97%	47%	53%
2017	89%	11%	1%	99%	57%	43%
2018	13%	87%	4%	96%	31%	69%
2019	58%	42%	10%	90%	35%	65%
2020	88%	12%	5%	95%	44%	56%
2021	94%	6%	15%	85%	37%	63%
2022	97%	3%	1%	99%	58%	42%

Table A2.9. Percentage of recreational landing 1981-2021 in state and federal waters for each state.

Year	CT		DE		FL		GA		MD		MA	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
1981	0%	0%	0%	0%	41%	59%	100%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	29%	71%	100%	0%	0%	0%	100%	0%
1983	0%	0%	0%	0%	46%	54%	100%	0%	100%	0%	0%	0%
1984	0%	0%	0%	0%	60%	40%	100%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	41%	59%	100%	0%	100%	0%	0%	0%
1986	0%	0%	0%	0%	24%	76%	78%	22%	0%	0%	0%	0%
1987	0%	0%	100%	0%	69%	31%	100%	0%	0%	0%	0%	0%
1988	0%	0%	0%	0%	84%	16%	0%	0%	100%	0%	0%	0%
1989	0%	0%	5%	95%	62%	38%	0%	0%	100%	0%	0%	0%
1990	0%	0%	100%	0%	61%	39%	0%	0%	100%	0%	0%	0%
1991	0%	100%	100%	0%	58%	42%	0%	0%	99%	1%	0%	100%
1992	0%	100%	70%	30%	29%	71%	0%	0%	100%	0%	0%	0%
1993	0%	100%	0%	0%	43%	57%	100%	0%	0%	0%	0%	0%
1994	0%	100%	0%	0%	63%	37%	100%	0%	0%	0%	0%	0%
1995	0%	0%	100%	0%	46%	54%	0%	0%	100%	0%	23%	77%
1996	0%	100%	0%	0%	67%	33%	0%	0%	0%	0%	0%	100%
1997	0%	0%	64%	36%	47%	53%	0%	0%	0%	0%	57%	43%
1998	0%	100%	100%	0%	52%	48%	0%	0%	100%	0%	100%	0%
1999	0%	100%	100%	0%	66%	34%	0%	0%	100%	0%	0%	100%
2000	0%	0%	0%	0%	54%	46%	100%	0%	0%	0%	0%	0%
2001	0%	100%	100%	0%	45%	55%	0%	0%	0%	0%	0%	100%
2002	0%	0%	100%	0%	50%	50%	0%	0%	100%	0%	0%	100%
2003	0%	100%	100%	0%	44%	56%	100%	0%	100%	0%	17%	83%
2004	0%	100%	100%	0%	56%	44%	100%	0%	0%	0%	0%	100%
2005	0%	0%	0%	0%	67%	33%	0%	0%	100%	0%	0%	0%
2006	0%	0%	0%	0%	64%	36%	0%	100%	100%	0%	0%	100%
2007	0%	0%	100%	0%	70%	30%	100%	0%	100%	0%	0%	100%
2008	0%	0%	100%	0%	54%	46%	100%	0%	0%	0%	0%	100%
2009	0%	0%	100%	0%	53%	47%	100%	0%	100%	0%	0%	100%
2010	0%	100%	100%	0%	32%	68%	0%	0%	100%	0%	0%	100%
2011	0%	0%	100%	0%	24%	76%	100%	0%	0%	0%	0%	0%
2012	0%	100%	100%	0%	50%	50%	100%	0%	100%	0%	0%	100%
2013	0%	0%	0%	0%	48%	52%	100%	0%	0%	0%	0%	100%
2014	0%	100%	0%	0%	32%	68%	100%	0%	100%	0%	0%	100%
2015	0%	0%	0%	0%	23%	77%	0%	0%	0%	0%	0%	100%
2016	0%	100%	0%	0%	46%	54%	0%	0%	100%	0%	0%	100%
2017	0%	100%	0%	0%	59%	41%	100%	0%	100%	0%	0%	0%
2018	0%	100%	100%	0%	28%	72%	100%	0%	100%	0%	0%	100%
2019	0%	100%	100%	0%	30%	70%	100%	0%	100%	0%	10%	90%
2020	0%	100%	100%	0%	46%	54%	100%	0%	100%	0%	70%	30%
2021	34%	66%	100%	0%	35%	65%	100%	0%	100%	0%	0%	100%
2022	0%	0%	100%	0%	58%	42%	100%	0%	100%	0%	4%	96%

Table A2.9. Percentage of recreational landing 1981-2021 in state and federal waters for each state (Cont.).

Year	NJ		NY		NC		RI		SC		VA	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
1981	99%	1%	37%	63%	0%	0%	0%	0%	100%	0%	0%	0%
1982	100%	0%	0%	0%	29%	71%	0%	0%	0%	0%	0%	0%
1983	0%	0%	82%	18%	6%	94%	0%	0%	100%	0%	0%	0%
1984	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	0%	0%
1985	100%	0%	12%	88%	66%	34%	0%	0%	100%	0%	100%	0%
1986	0%	0%	100%	0%	31%	69%	0%	0%	100%	0%	100%	0%
1987	100%	0%	100%	0%	60%	40%	100%	0%	76%	24%	100%	0%
1988	100%	0%	83%	17%	64%	36%	0%	0%	100%	0%	77%	23%
1989	100%	0%	0%	0%	20%	80%	0%	0%	100%	0%	84%	16%
1990	100%	0%	24%	76%	72%	28%	100%	0%	100%	0%	100%	0%
1991	79%	21%	73%	27%	68%	32%	42%	58%	0%	0%	100%	0%
1992	61%	39%	15%	85%	68%	32%	6%	94%	100%	0%	85%	15%
1993	0%	100%	65%	35%	63%	37%	74%	26%	58%	42%	0%	100%
1994	0%	100%	100%	0%	47%	53%	100%	0%	0%	0%	74%	26%
1995	0%	100%	78%	22%	39%	61%	0%	100%	100%	0%	100%	0%
1996	0%	0%	0%	0%	72%	28%	0%	100%	100%	0%	100%	0%
1997	95%	5%	67%	33%	56%	44%	17%	83%	100%	0%	53%	47%
1998	94%	6%	0%	0%	49%	51%	72%	28%	0%	0%	100%	0%
1999	100%	0%	65%	35%	87%	13%	9%	91%	0%	0%	100%	0%
2000	94%	6%	0%	0%	40%	60%	60%	40%	100%	0%	73%	27%
2001	91%	9%	0%	0%	69%	31%	61%	39%	0%	0%	100%	0%
2002	100%	0%	0%	0%	81%	19%	23%	77%	100%	0%	0%	0%
2003	0%	0%	0%	0%	69%	31%	100%	0%	0%	0%	0%	0%
2004	76%	24%	23%	77%	86%	14%	2%	98%	100%	0%	100%	0%
2005	85%	15%	0%	0%	100%	0%	100%	0%	100%	0%	100%	0%
2006	100%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%
2007	100%	0%	0%	100%	97%	3%	85%	15%	0%	0%	100%	0%
2008	100%	0%	0%	100%	98%	2%	0%	0%	0%	0%	0%	0%
2009	40%	60%	0%	0%	80%	20%	0%	100%	0%	0%	100%	0%
2010	98%	2%	0%	0%	58%	42%	0%	0%	100%	0%	0%	0%
2011	22%	78%	0%	0%	81%	19%	0%	0%	0%	0%	0%	0%
2012	100%	0%	0%	0%	75%	25%	98%	2%	100%	0%	100%	0%
2013	100%	0%	0%	0%	88%	12%	0%	0%	0%	0%	0%	0%
2014	100%	0%	0%	100%	61%	39%	0%	100%	0%	0%	0%	0%
2015	100%	0%	100%	0%	32%	68%	11%	89%	100%	0%	100%	0%
2016	0%	100%	99%	1%	59%	41%	58%	42%	0%	0%	70%	30%
2017	93%	7%	72%	28%	41%	59%	3%	97%	62%	38%	74%	26%
2018	13%	87%	3%	97%	60%	40%	7%	93%	97%	3%	25%	75%
2019	36%	64%	59%	41%	41%	59%	10%	90%	95%	5%	100%	0%
2020	100%	0%	100%	0%	36%	64%	0%	100%	100%	0%	17%	83%
2021	98%	2%	0%	100%	57%	43%	17%	83%	100%	0%	0%	100%
2022	100%	0%	100%	0%	56%	44%	0%	100%	27%	73%	0%	100%

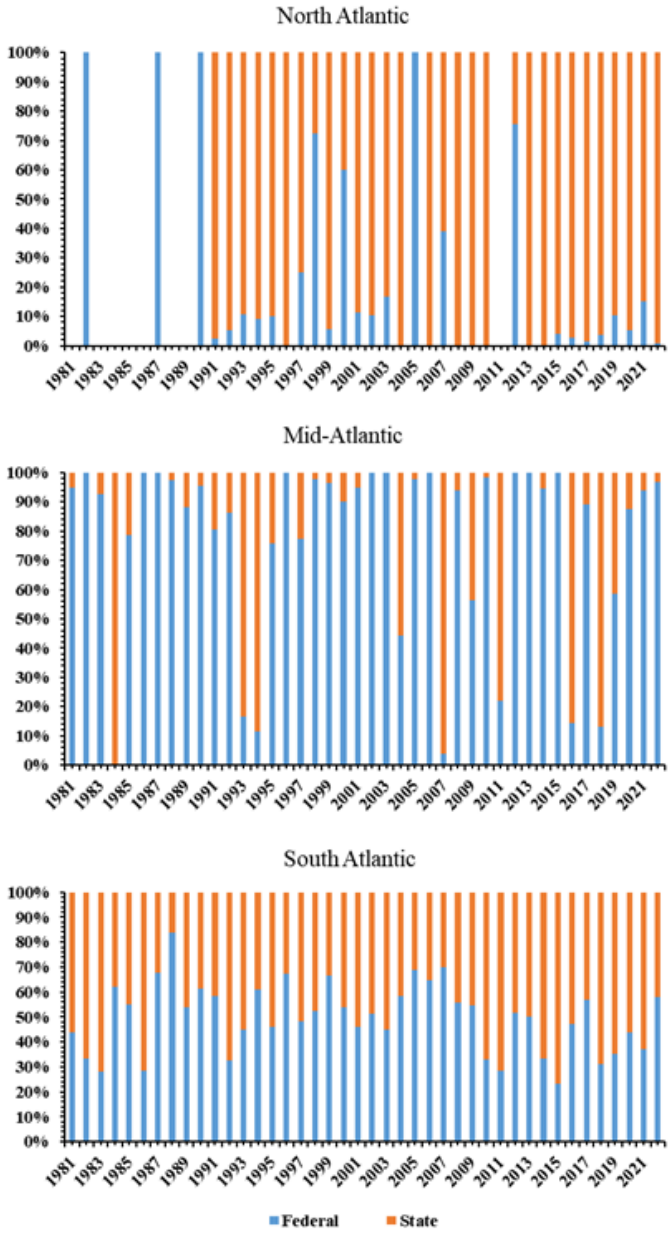

Figure A2.5. Percentage of recreational landing 1981-2021 in state and federal waters for each region.

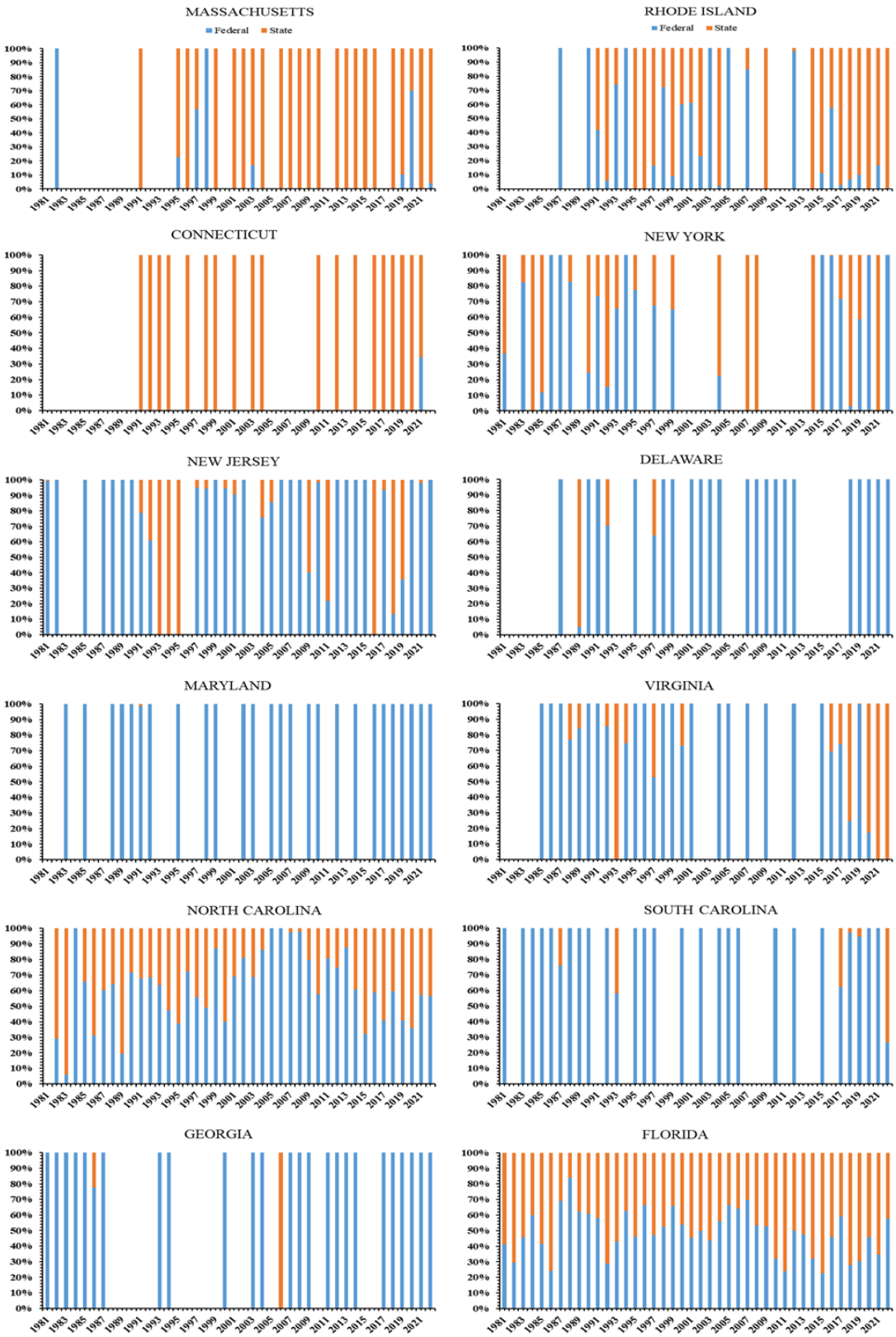

Figure A2.6. Percentage of recreational landing 1981-2021 in state and federal waters for each state.

Table A2.10. Recreational discards (individuals) 1981-2022 by region.

Year	Mid-Atlantic	North Atlantic	South Atlantic	Total Discards
1981	5634	0	470343	475977
1982	0	0	179237	179237
1983	0	21426	201042	222468
1984	0	0	376302	376302
1985	219	0	78128	78347
1986	5547	0	534910	540457
1987	2980	0	603786	606766
1988	77823	0	731042	808865
1989	12858	0	890632	903490
1990	128607	0	681414	810021
1991	35360	13902	733931	783193
1992	28652	123	695081	723856
1993	11155	4762	1100091	1116008
1994	80854	0	751402	832256
1995	338723	26018	494035	858776
1996	75525	8915	380599	465039
1997	83683	87721	700747	872151
1998	66702	67674	828759	963135
1999	124293	115730	1477454	1717477
2000	325082	418189	813483	1556754
2001	72212	73905	882374	1028491
2002	268463	146637	1611236	2026336
2003	22203	66549	1236227	1324979
2004	129395	229080	1949311	2307786
2005	131807	103384	509493	744684
2006	167364	50155	1242543	1460062
2007	58668	110039	2068067	2236774
2008	163333	41844	1115807	1320984
2009	108817	94685	1515860	1719362
2010	313655	42203	1011187	1367045
2011	1522	84637	1468291	1554450
2012	231080	202197	1407275	1840552
2013	194144	26143	1333910	1554197
2014	214350	1034190	1358150	2606690
2015	55838	158564	1336191	1550593
2016	92145	810829	1138813	2041787
2017	285938	284995	1229748	1800681
2018	570765	340511	1015580	1926856
2019	297065	152844	723334	1173243
2020	310111	181568	702774	1194453
2021	196941	245869	928238	1371048
2022	238916	678375	896755	1814046
Overall	**11%**	**12%**	**77%**	-
10-Year	**14%**	**22%**	**64%**	-

Table A2.11. Recreational discards (individuals) 1981-2022 by state.

Year	CT	DE	GA	MD	MA	NJ	NY	NC	RI	SC	VA	FL
1981	0	0	0	0	0	5634	0	0	0	0	0	470343
1982	0	0	0	0	0	0	0	0	0	0	0	179237
1983	0	0	0	0	0	0	0	0	21426	4177	0	196865
1984	0	0	0	0	0	0	0	0	0	0	0	376302
1985	0	0	0	0	0	0	219	2533	0	0	0	75595
1986	0	0	0	0	0	0	5547	3857	0	9364	0	521689
1987	0	0	1387	0	0	0	0	8162	0	8702	2980	585535
1988	0	0	0	1423	0	75093	0	15332	0	2123	1307	713587
1989	0	25	0	4830	0	1895	0	32514	0	466	6108	857652
1990	0	1951	0	98522	0	23250	4286	24132	0	0	598	657282
1991	13435	247	0	12790	188	13906	8417	43851	279	257	0	689823
1992	0	0	0	8651	0	8734	724	39215	123	186	10543	655680
1993	0	0	0	0	824	0	4839	12841	3938	0	6316	1087250
1994	0	0	0	0	0	72639	0	8751	0	0	8215	742651
1995	15960	0	0	0	7289	307944	27777	10469	2769	0	3002	483566
1996	6723	0	0	0	0	57883	9180	23050	2192	2144	8462	355405
1997	936	0	0	0	62980	7491	67673	48107	23805	0	8519	652640
1998	23896	0	0	0	4810	33332	9513	75618	38968	4310	23857	748831
1999	5611	3712	0	0	67135	42293	78288	77884	42984	0	0	1399570
2000	334830	0	5558	18307	68786	17594	287854	41590	14573	10	1327	762105
2001	50072	6260	0	6591	15316	4070	51909	78517	8517	0	3382	803838
2002	67821	2768	0	1422	45085	2752	261521	89706	33731	3562	0	1517628
2003	12674	5558	0	631	19173	1720	13763	24662	34702	119	531	1210783
2004	5428	912	0	0	148347	104881	22965	62965	75305	58	637	1886190
2005	0	0	0	5719	96068	116892	80	68636	7316	0	9116	438314
2006	0	0	142	0	50155	0	2770	39901	0	0	164594	1197722
2007	1650	897	0	472	95010	3898	53377	115324	13379	0	24	1952676
2008	0	2465	0	0	41844	0	160868	33205	0	0	0	1079626
2009	67679	7497	9050	17269	27006	79626	4155	83453	0	130	270	1422384
2010	15130	93	0	462	18227	15787	297313	66459	8846	25	0	944189
2011	20083	0	0	0	17591	1522	0	30347	46963	0	0	1437168
2012	104921	7	3061	0	24074	221554	9519	59160	73202	0	0	1345034
2013	0	164	6084	0	26143	32630	147757	108149	0	0	13593	1219614
2014	16845	1933	0	821	981784	77169	134427	273165	35561	0	0	1084777
2015	2709	0	0	0	88853	32487	23351	87239	67002	0	0	1248952
2016	44515	0	0	524	733492	30453	61152	145700	32822	25161	16	966648
2017	49874	0	0	0	137285	164268	121670	119648	97836	13557	0	1096543
2018	157862	499	0	140	61491	390112	177470	110716	121158	19157	2544	885707
2019	20331	0	3421	185	89111	64988	230128	80205	43402	3720	1764	635988
2020	12018	0	0	14040	97230	205650	88742	171564	72320	986	1679	530224
2021	140874	1750	0	0	77848	169576	24826	52788	27147	1582	789	873868
2022	46737	6768	0	674	316104	64281	167193	125777	315534	32277	0	738701
Overall	**2%**	**0%**	**0%**	**0%**	**7%**	**5%**	**5%**	**5%**	**2%**	**0%**	**1%**	**72%**
10-Year	**3%**	**0%**	**0%**	**0%**	**15%**	**7%**	**7%**	**7%**	**5%**	**1%**	**0%**	**54%**

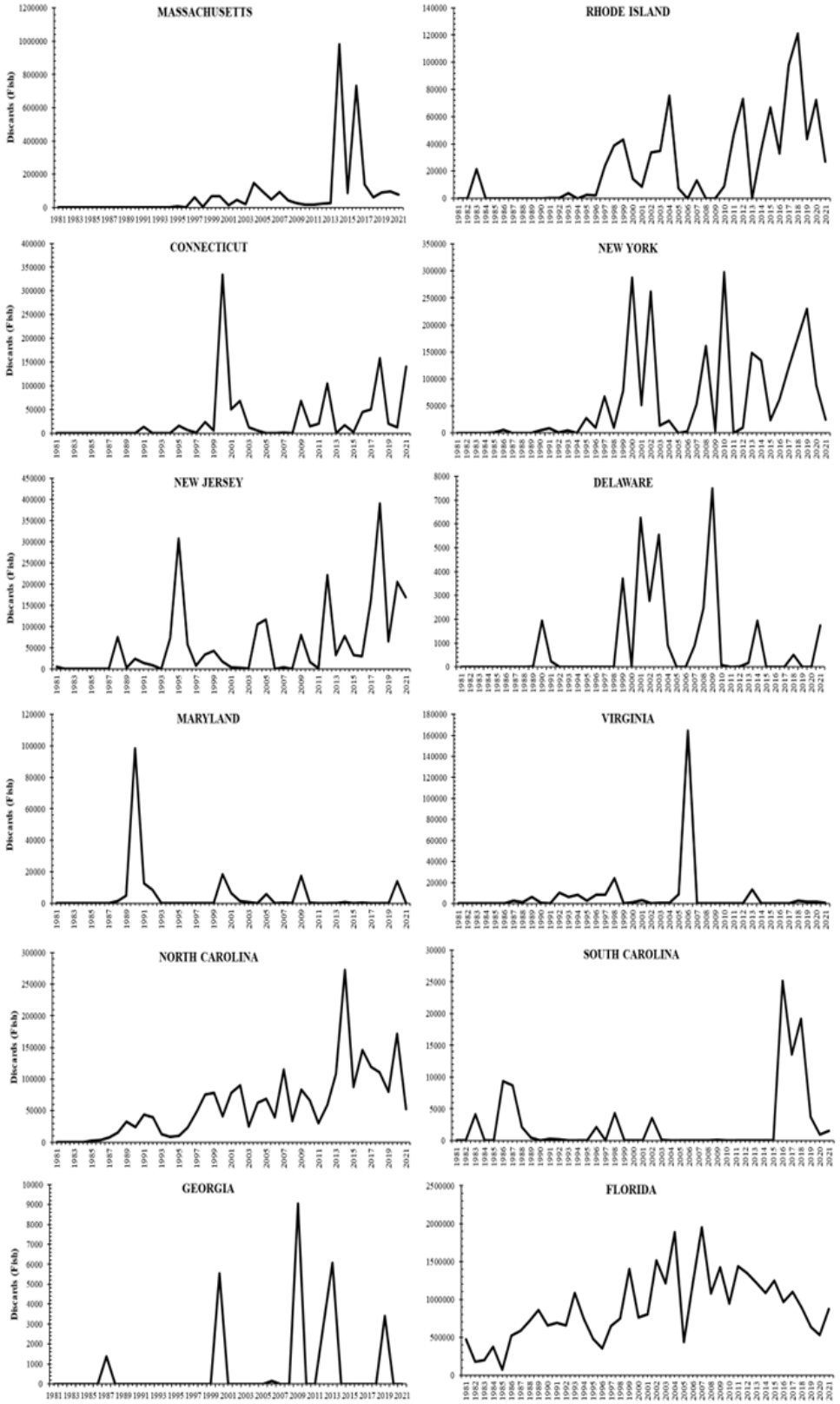

Figure A2.7. Recreational discards (individuals) 1981-2021 by state.

Table A2.12. Percentage of recreational discards 1981-2021 by fishing mode (SH = Shore; FH = For Hire; PR = Private) for each region.

Year	CT			DE			FL			GA			MD		
	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR
1981	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	0%	0%	0%	17%	83%	0%	0%	0%	0%	0%	0%
1984	0%	0%	0%	0%	0%	0%	0%	9%	91%	0%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	0%	0%	0%	60%	40%	0%	0%	0%	0%	0%	0%
1986	0%	0%	0%	0%	0%	0%	8%	11%	82%	0%	0%	0%	0%	0%	0%
1987	0%	0%	0%	0%	0%	0%	0%	34%	66%	0%	1%	99%	0%	0%	0%
1988	0%	0%	0%	0%	0%	0%	0%	29%	71%	0%	0%	0%	0%	0%	100%
1989	0%	0%	0%	0%	0%	100%	21%	12%	67%	0%	0%	0%	0%	0%	100%
1990	0%	0%	0%	0%	78%	22%	0%	11%	89%	0%	0%	0%	0%	10%	90%
1991	34%	0%	66%	0%	41%	59%	0%	2%	98%	0%	0%	0%	0%	0%	100%
1992	0%	0%	0%	0%	0%	0%	4%	5%	91%	0%	0%	0%	0%	73%	27%
1993	0%	0%	0%	0%	0%	0%	0%	6%	94%	0%	0%	0%	0%	0%	0%
1994	0%	0%	0%	0%	0%	0%	0%	5%	95%	0%	0%	0%	0%	0%	0%
1995	0%	10%	90%	0%	0%	0%	2%	6%	91%	0%	0%	0%	0%	0%	0%
1996	0%	0%	100%	0%	0%	0%	2%	5%	93%	0%	0%	0%	0%	0%	0%
1997	0%	0%	100%	0%	0%	0%	6%	14%	81%	0%	0%	0%	0%	0%	0%
1998	0%	0%	100%	0%	0%	0%	1%	6%	93%	0%	0%	0%	0%	0%	0%
1999	44%	6%	50%	0%	0%	100%	2%	10%	88%	0%	0%	0%	0%	0%	0%
2000	74%	1%	25%	0%	0%	0%	4%	2%	94%	0%	0%	100%	0%	26%	74%
2001	28%	0%	72%	0%	26%	74%	10%	2%	88%	0%	0%	0%	0%	100%	0%
2002	2%	0%	98%	0%	0%	100%	6%	8%	85%	0%	0%	0%	0%	0%	100%
2003	0%	8%	92%	0%	1%	99%	1%	3%	95%	0%	0%	0%	0%	100%	0%
2004	50%	0%	50%	0%	18%	82%	0%	6%	94%	0%	0%	0%	0%	0%	0%
2005	0%	0%	0%	0%	0%	0%	6%	6%	89%	0%	0%	0%	0%	1%	99%
2006	0%	0%	0%	0%	0%	0%	2%	2%	96%	0%	100%	0%	0%	0%	0%
2007	0%	0%	100%	0%	0%	100%	0%	3%	97%	0%	0%	0%	0%	100%	0%
2008	0%	0%	0%	0%	31%	69%	1%	3%	95%	0%	0%	0%	0%	0%	0%
2009	0%	0%	100%	0%	0%	100%	0%	2%	98%	0%	0%	100%	0%	23%	77%
2010	0%	0%	100%	0%	100%	0%	6%	2%	93%	0%	0%	0%	0%	100%	0%
2011	0%	29%	71%	0%	0%	0%	0%	1%	99%	0%	0%	0%	0%	0%	0%
2012	0%	0%	100%	0%	100%	0%	0%	2%	98%	0%	0%	100%	0%	0%	0%
2013	0%	0%	0%	0%	100%	0%	1%	1%	98%	0%	0%	100%	0%	0%	0%
2014	3%	0%	97%	0%	0%	100%	0%	2%	98%	0%	0%	0%	0%	100%	0%
2015	0%	0%	100%	0%	0%	0%	14%	2%	84%	0%	0%	0%	0%	0%	0%
2016	10%	11%	80%	0%	0%	0%	7%	3%	91%	0%	0%	0%	0%	100%	0%
2017	0%	1%	99%	0%	0%	0%	1%	1%	98%	0%	0%	0%	0%	0%	0%
2018	0%	1%	99%	0%	1%	99%	1%	1%	98%	0%	0%	0%	0%	0%	100%
2019	0%	0%	100%	0%	0%	0%	0%	2%	98%	0%	0%	100%	0%	0%	100%
2020	20%	0%	80%	0%	0%	0%	0%	3%	97%	0%	0%	0%	0%	1%	99%
2021	0%	0%	100%	0%	0%	100%	48%	2%	50%	0%	0%	0%	0%	0%	0%
2022	0%	0%	100%	0%	0%	100%	0%	2%	97%	0%	0%	0%	0%	0%	100%

Table A2.12. Percentage of recreational landing 1981-2021 by fishing mode (SH = Shore; FH = For Hire; PR = Private) for each state (Cont.).

Year	MA			NJ			NY			NC			RI			SC			VA		
	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR
1981	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	1%	99%	0%	0%	0%
1984	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1986	0%	0%	0%	0%	0%	0%	0%	55%	45%	0%	7%	93%	0%	0%	0%	0%	6%	94%	0%	0%	0%
1987	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	35%	65%	0%	0%	0%	0%	6%	94%	0%	0%	100%
1988	0%	0%	0%	0%	32%	68%	0%	0%	0%	0%	5%	95%	0%	0%	0%	0%	37%	63%	0%	0%	100%
1989	0%	0%	0%	0%	0%	100%	0%	0%	0%	31%	2%	68%	0%	0%	0%	0%	7%	93%	0%	0%	100%
1990	0%	0%	0%	0%	0%	100%	0%	0%	100%	55%	2%	42%	0%	0%	0%	0%	0%	0%	0%	0%	100%
1991	0%	0%	100%	3%	27%	70%	0%	100%	0%	5%	6%	89%	0%	0%	100%	0%	100%	0%	0%	0%	0%
1992	0%	0%	0%	0%	15%	85%	0%	51%	49%	11%	2%	87%	0%	0%	100%	0%	100%	0%	0%	43%	57%
1993	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	25%	75%	48%	0%	52%	0%	0%	0%	0%	0%	100%
1994	0%	0%	0%	12%	0%	88%	0%	0%	0%	0%	38%	62%	0%	0%	0%	0%	0%	0%	0%	17%	83%
1995	100%	0%	0%	0%	90%	10%	17%	6%	77%	0%	4%	96%	0%	12%	88%	0%	0%	0%	0%	0%	100%
1996	0%	0%	0%	0%	0%	100%	0%	0%	100%	11%	54%	35%	0%	0%	100%	0%	53%	47%	0%	73%	27%
1997	80%	0%	20%	0%	0%	100%	19%	74%	7%	15%	32%	53%	37%	5%	58%	0%	0%	0%	0%	0%	100%
1998	100%	0%	0%	99%	1%	0%	0%	67%	33%	11%	24%	66%	26%	0%	74%	0%	100%	0%	0%	0%	100%
1999	70%	0%	29%	0%	0%	100%	23%	1%	76%	9%	31%	60%	15%	0%	85%	0%	0%	0%	0%	0%	0%
2000	69%	2%	28%	0%	64%	36%	21%	2%	78%	4%	13%	83%	47%	0%	53%	0%	100%	0%	0%	0%	100%
2001	60%	0%	40%	0%	0%	100%	0%	0%	100%	8%	7%	85%	0%	9%	91%	0%	0%	0%	0%	0%	100%
2002	66%	1%	33%	0%	0%	100%	82%	0%	18%	12%	4%	84%	91%	4%	5%	0%	0%	100%	0%	0%	0%
2003	71%	0%	29%	0%	100%	0%	0%	0%	100%	15%	23%	62%	0%	1%	99%	0%	100%	0%	0%	0%	100%
2004	75%	1%	24%	0%	2%	98%	0%	23%	77%	1%	9%	89%	58%	0%	42%	0%	100%	0%	0%	17%	83%
2005	67%	0%	32%	0%	1%	99%	0%	100%	0%	0%	11%	89%	0%	0%	100%	0%	0%	0%	0%	4%	96%
2006	66%	0%	34%	0%	0%	0%	0%	0%	100%	0%	7%	93%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2007	24%	0%	76%	0%	9%	91%	0%	1%	99%	2%	6%	92%	34%	0%	66%	0%	0%	0%	0%	100%	0%
2008	86%	0%	14%	0%	0%	0%	0%	0%	100%	0%	17%	83%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2009	86%	2%	11%	75%	2%	23%	0%	0%	100%	0%	2%	98%	0%	0%	0%	0%	100%	0%	0%	100%	0%
2010	0%	0%	100%	0%	0%	100%	0%	0%	100%	1%	8%	90%	0%	0%	100%	0%	100%	0%	0%	0%	0%
2011	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	14%	86%	36%	0%	64%	0%	0%	0%	0%	0%	0%
2012	0%	8%	92%	0%	0%	100%	100%	0%	0%	7%	4%	89%	14%	0%	86%	0%	0%	0%	0%	0%	0%
2013	0%	0%	100%	0%	0%	100%	19%	0%	81%	2%	3%	95%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2014	87%	0%	13%	0%	0%	100%	0%	0%	100%	0%	1%	99%	6%	1%	94%	0%	0%	0%	0%	0%	0%
2015	19%	1%	80%	0%	0%	100%	0%	51%	49%	0%	1%	99%	30%	1%	69%	0%	0%	0%	0%	0%	0%
2016	89%	0%	11%	0%	0%	100%	41%	2%	57%	15%	7%	78%	0%	1%	99%	0%	0%	100%	0%	100%	0%
2017	25%	3%	72%	0%	2%	98%	0%	1%	99%	14%	5%	80%	37%	0%	63%	0%	1%	99%	0%	0%	0%
2018	0%	8%	92%	53%	1%	46%	0%	1%	99%	18%	3%	79%	16%	0%	84%	0%	5%	95%	0%	0%	100%
2019	0%	4%	96%	0%	36%	64%	15%	0%	85%	9%	4%	87%	65%	0%	35%	0%	57%	43%	100%	0%	0%
2020	38%	1%	61%	0%	0%	100%	59%	0%	41%	19%	3%	78%	60%	0%	39%	0%	0%	100%	0%	0%	100%
2021	28%	2%	70%	19%	0%	81%	0%	1%	99%	0%	6%	94%	64%	1%	35%	0%	0%	100%	0%	0%	100%
2022	27%	1%	72%	2%	27%	71%	2%	7%	91%	0%	4%	96%	93%	0%	6%	0%	0%	100%	0%	0%	0%

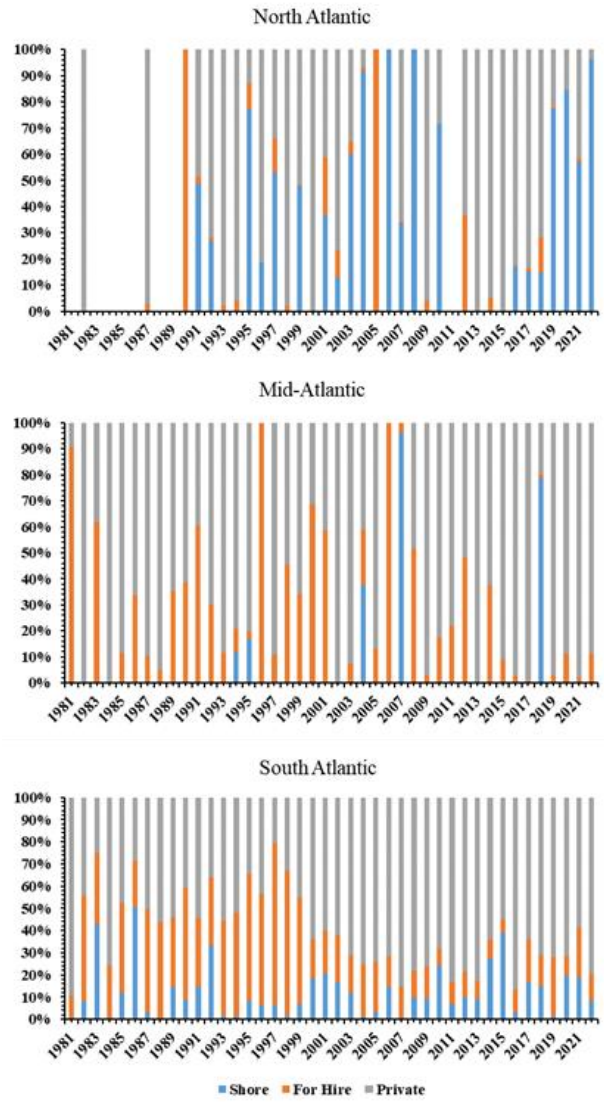

Figure A2.8. Percentage of recreational landing 1981-2021 by fishing mode for each region.

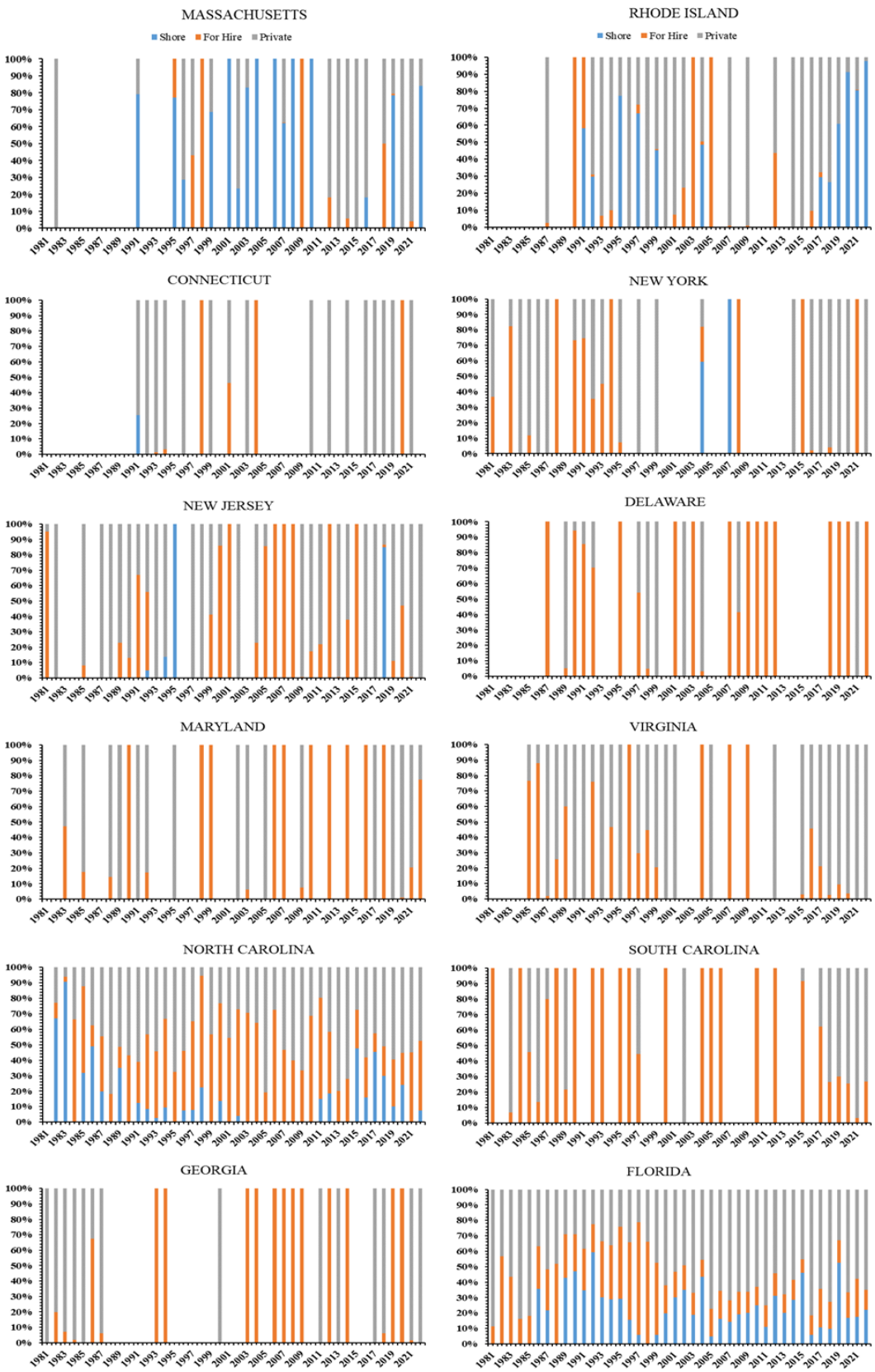

Figure A2.9. Percentage of recreational landing 1981-2021 by fishing mode for each state.

Table A2.13. Percentage of recreational discards 1981-2021 in state and federal waters for each region.

Year	Mid-Atlantic		North Atlantic		South Atlantic	
	Federal	State	Federal	State	Federal	State
1981	100%	0%	0%	0%	57%	43%
1982	0%	0%	0%	0%	94%	6%
1983	0%	0%	100%	0%	81%	19%
1984	0%	0%	0%	0%	68%	32%
1985	100%	0%	0%	0%	16%	84%
1986	100%	0%	0%	0%	67%	33%
1987	100%	0%	0%	0%	81%	19%
1988	99%	1%	0%	0%	61%	39%
1989	79%	21%	0%	0%	64%	36%
1990	99%	1%	0%	0%	44%	56%
1991	86%	14%	0%	100%	56%	44%
1992	80%	20%	100%	0%	43%	57%
1993	38%	62%	17%	83%	39%	61%
1994	17%	83%	0%	0%	64%	36%
1995	90%	10%	0%	100%	50%	50%
1996	88%	12%	0%	100%	60%	40%
1997	73%	27%	5%	95%	45%	55%
1998	49%	51%	29%	71%	59%	41%
1999	26%	74%	3%	97%	65%	35%
2000	9%	91%	1%	99%	67%	33%
2001	38%	62%	4%	96%	56%	44%
2002	3%	97%	1%	99%	47%	53%
2003	38%	62%	7%	93%	62%	38%
2004	79%	21%	11%	89%	68%	32%
2005	90%	10%	7%	93%	55%	45%
2006	98%	2%	0%	100%	70%	30%
2007	87%	13%	0%	100%	69%	31%
2008	65%	35%	0%	100%	66%	34%
2009	35%	65%	1%	99%	57%	43%
2010	5%	95%	0%	100%	53%	47%
2011	0%	100%	13%	87%	57%	43%
2012	0%	100%	0%	100%	67%	33%
2013	84%	16%	0%	100%	64%	36%
2014	37%	63%	0%	100%	67%	33%
2015	0%	100%	3%	97%	52%	48%
2016	4%	96%	2%	98%	48%	52%
2017	46%	54%	6%	94%	59%	41%
2018	28%	72%	0%	100%	37%	63%
2019	19%	81%	11%	89%	60%	40%
2020	79%	21%	1%	99%	60%	40%
2021	61%	39%	44%	56%	24%	76%
2022	78%	22%	0%	100%	59%	41%

Table A2.14. Percentage of recreational discards 1981-2021 in state and federal waters for each state.

Year	CT		DE		FL		GA		MD	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
1981	0%	0%	0%	0%	57%	43%	0%	0%	0%	0%
1982	0%	0%	0%	0%	94%	6%	0%	0%	0%	0%
1983	0%	0%	0%	0%	80%	20%	0%	0%	0%	0%
1984	0%	0%	0%	0%	68%	32%	0%	0%	0%	0%
1985	0%	0%	0%	0%	11%	89%	0%	0%	0%	0%
1986	0%	0%	0%	0%	66%	34%	0%	0%	0%	0%
1987	0%	0%	0%	0%	81%	19%	100%	0%	0%	0%
1988	0%	0%	0%	0%	64%	36%	0%	0%	100%	0%
1989	0%	0%	100%	0%	65%	35%	0%	0%	100%	0%
1990	0%	0%	100%	0%	45%	55%	0%	0%	100%	0%
1991	0%	100%	100%	0%	55%	45%	0%	0%	64%	36%
1992	0%	0%	0%	0%	40%	60%	0%	0%	100%	0%
1993	0%	0%	0%	0%	38%	62%	0%	0%	0%	0%
1994	0%	0%	0%	0%	65%	35%	0%	0%	0%	0%
1995	0%	100%	0%	0%	49%	51%	0%	0%	0%	0%
1996	0%	100%	0%	0%	57%	43%	0%	0%	0%	0%
1997	0%	100%	0%	0%	46%	54%	0%	0%	0%	0%
1998	69%	31%	0%	0%	61%	39%	0%	0%	0%	0%
1999	0%	100%	100%	0%	67%	33%	0%	0%	0%	0%
2000	0%	100%	0%	0%	67%	33%	100%	0%	100%	0%
2001	0%	100%	100%	0%	55%	45%	0%	0%	100%	0%
2002	0%	100%	100%	0%	43%	57%	0%	0%	100%	0%
2003	0%	100%	100%	0%	62%	38%	0%	0%	100%	0%
2004	0%	100%	100%	0%	69%	31%	0%	0%	0%	0%
2005	0%	0%	0%	0%	55%	45%	0%	0%	100%	0%
2006	0%	0%	0%	0%	70%	30%	100%	0%	0%	0%
2007	0%	100%	100%	0%	70%	30%	0%	0%	100%	0%
2008	0%	0%	100%	0%	65%	35%	0%	0%	0%	0%
2009	0%	100%	100%	0%	57%	43%	100%	0%	100%	0%
2010	0%	100%	100%	0%	55%	45%	0%	0%	100%	0%
2011	0%	100%	0%	0%	57%	43%	0%	0%	0%	0%
2012	0%	100%	100%	0%	68%	32%	0%	100%	0%	0%
2013	0%	0%	100%	0%	66%	34%	100%	0%	0%	0%
2014	0%	100%	100%	0%	70%	30%	0%	0%	100%	0%
2015	0%	100%	0%	0%	52%	48%	0%	0%	0%	0%
2016	0%	100%	0%	0%	51%	49%	0%	0%	100%	0%
2017	26%	74%	0%	0%	62%	38%	0%	0%	0%	0%
2018	0%	100%	100%	0%	39%	61%	0%	0%	100%	0%
2019	0%	100%	0%	0%	63%	37%	100%	0%	100%	0%
2020	0%	100%	0%	0%	69%	31%	0%	0%	87%	13%
2021	76%	24%	100%	0%	23%	77%	0%	0%	0%	0%
2022	0%	100%	100%	0%	64%	36%	0%	0%	100%	0%

Table A2.14. Percentage of recreational discards 1981-2021 in state and federal waters for each state (Cont.).

Year	MA		NJ		NY		NC		RI		SC		VA	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
1981	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%
1984	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1986	0%	0%	0%	0%	100%	0%	58%	42%	0%	0%	100%	0%	0%	0%
1987	0%	0%	0%	0%	0%	0%	66%	34%	0%	0%	100%	0%	100%	0%
1988	0%	0%	100%	0%	0%	0%	14%	86%	0%	0%	100%	0%	51%	49%
1989	0%	0%	100%	0%	0%	0%	49%	51%	0%	0%	100%	0%	56%	44%
1990	0%	0%	96%	4%	78%	22%	29%	71%	0%	0%	0%	0%	100%	0%
1991	0%	100%	97%	3%	100%	0%	64%	36%	0%	100%	100%	0%	0%	0%
1992	0%	0%	90%	10%	49%	51%	67%	33%	100%	0%	100%	0%	57%	43%
1993	0%	100%	0%	0%	45%	55%	77%	23%	20%	80%	0%	0%	33%	67%
1994	0%	0%	8%	92%	0%	0%	55%	45%	0%	0%	0%	0%	100%	0%
1995	0%	100%	92%	8%	65%	35%	73%	27%	0%	100%	0%	0%	100%	0%
1996	0%	0%	100%	0%	0%	100%	77%	23%	0%	100%	100%	0%	100%	0%
1997	0%	100%	62%	38%	75%	25%	41%	59%	20%	80%	0%	0%	67%	33%
1998	0%	100%	0%	100%	95%	5%	42%	58%	7%	93%	100%	0%	100%	0%
1999	4%	96%	30%	70%	20%	80%	40%	60%	3%	97%	0%	0%	0%	0%
2000	2%	98%	64%	36%	0%	100%	67%	33%	21%	79%	100%	0%	34%	66%
2001	16%	84%	100%	0%	14%	86%	62%	38%	9%	91%	0%	0%	100%	0%
2002	0%	100%	100%	0%	0%	100%	81%	19%	4%	96%	100%	0%	0%	0%
2003	16%	84%	100%	0%	0%	100%	69%	31%	5%	95%	100%	0%	100%	0%
2004	0%	100%	97%	3%	0%	100%	45%	55%	33%	67%	100%	0%	17%	83%
2005	0%	100%	88%	12%	0%	100%	53%	47%	94%	6%	0%	0%	100%	0%
2006	0%	100%	0%	0%	0%	100%	81%	19%	0%	0%	0%	0%	100%	0%
2007	0%	100%	99%	1%	85%	15%	64%	36%	0%	100%	0%	0%	100%	0%
2008	0%	100%	0%	0%	65%	35%	87%	13%	0%	0%	0%	0%	0%	0%
2009	3%	97%	16%	84%	0%	100%	54%	46%	0%	0%	100%	0%	100%	0%
2010	0%	100%	100%	0%	0%	100%	30%	70%	0%	100%	100%	0%	0%	0%
2011	61%	39%	0%	100%	0%	0%	41%	59%	0%	100%	0%	0%	0%	0%
2012	0%	100%	0%	100%	0%	100%	59%	41%	0%	100%	0%	0%	0%	0%
2013	0%	100%	100%	0%	80%	20%	42%	58%	0%	0%	0%	0%	100%	0%
2014	0%	100%	100%	0%	0%	100%	59%	41%	1%	99%	0%	0%	0%	0%
2015	0%	100%	0%	100%	0%	100%	52%	48%	7%	93%	0%	0%	0%	0%
2016	1%	99%	9%	91%	0%	100%	27%	73%	16%	84%	90%	10%	100%	0%
2017	3%	97%	40%	60%	53%	47%	35%	65%	1%	99%	100%	0%	0%	0%
2018	2%	98%	33%	67%	15%	85%	16%	84%	0%	100%	100%	0%	100%	0%
2019	18%	82%	49%	51%	10%	90%	43%	57%	3%	97%	71%	29%	0%	100%
2020	2%	98%	100%	0%	29%	71%	42%	58%	0%	100%	16%	84%	100%	0%
2021	1%	99%	65%	35%	38%	62%	33%	67%	1%	99%	100%	0%	58%	42%
2022	0%	100%	98%	2%	69%	31%	31%	69%	1%	99%	97%	3%	0%	0%

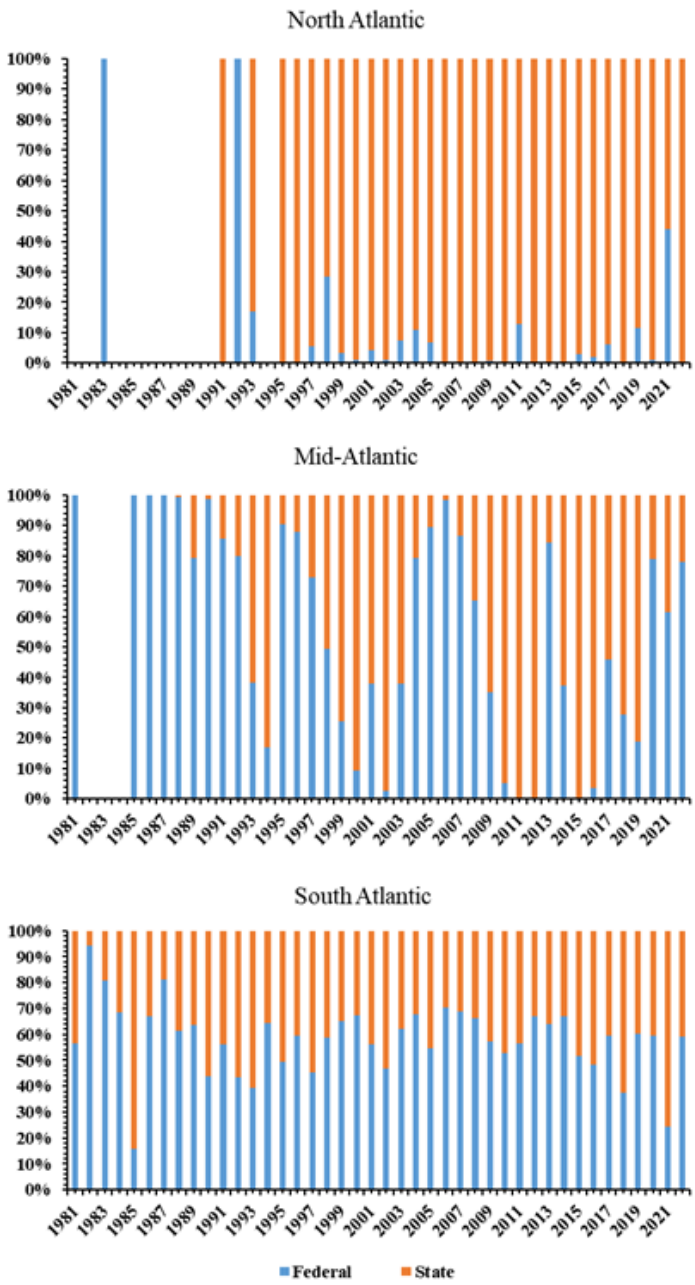

Figure A2.10. Percentage of recreational Discards 1981-2021 in state and federal waters for each region.

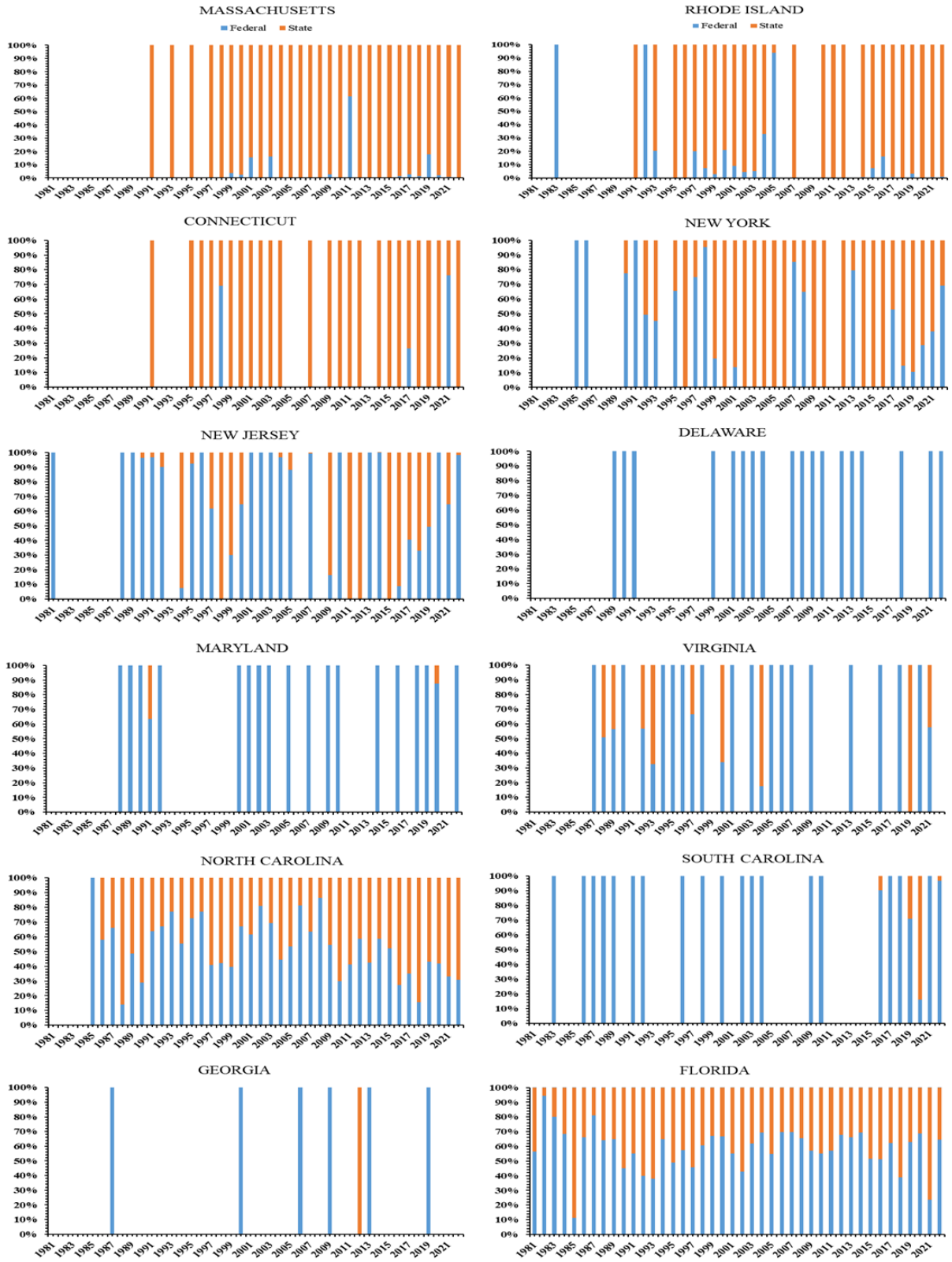

Figure A2.11 Percentage of recreational Discards 1981-2021 in state and federal waters for each state.

APPENDIX 3. LENGTH AND WEIGHT

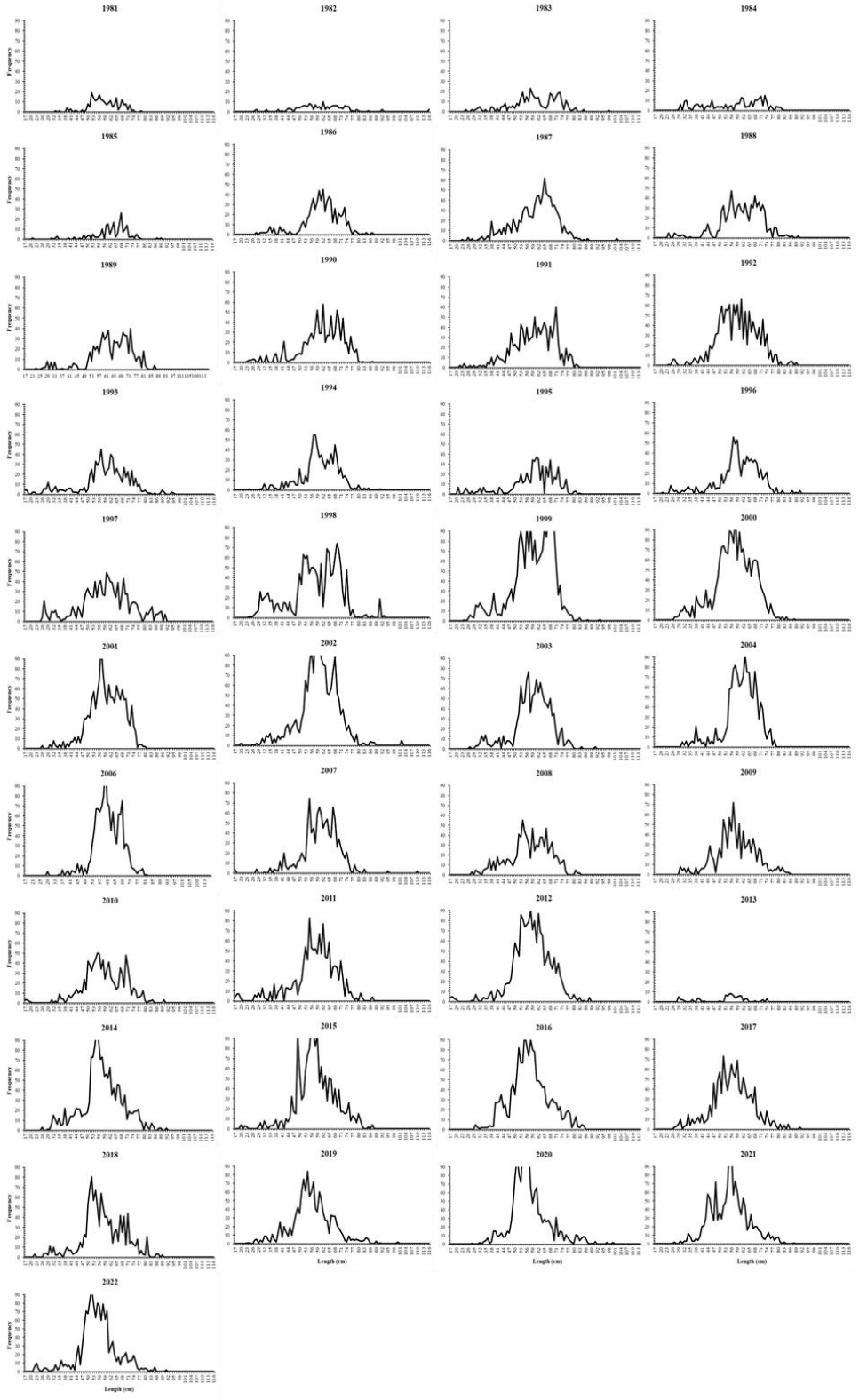

Table A3.1 The length frequencies from all regions by year.

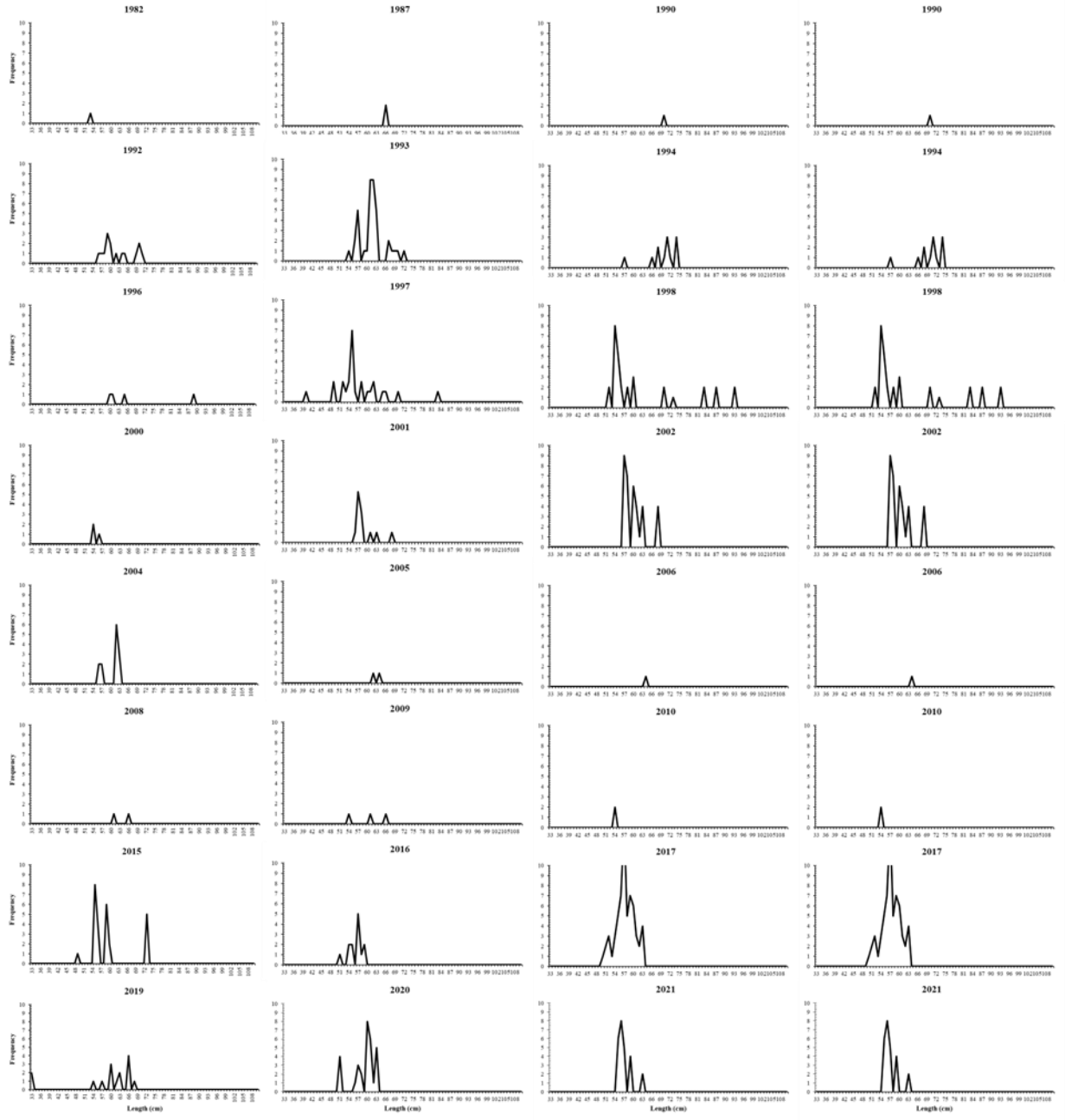

Figure A3.2. The length frequencies from the North Atlantic region by year.

Table A3.1. The summary of length and weight data from the North Atlantic region by year.

Year	North Atlantic								
	Count	Length				Weight			
		Min	Max	Mean	SD	Min	Max	Mean	SD
1981	-	-	-	-	-	-	-	-	-
1982	1	53	53	53.0	-	1.2	1.2	1.25	-
1983	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-
1987	2	66	66	66.0	0.00	2.2	2.3	2.25	0.043
1988	-	-	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-
1990	1	70	70	70.0	-	3.8	3.8	3.84	-
1991	40	50	73	65.2	5.57	1.3	2.9	2.01	0.538
1992	15	56	71	62.6	5.19	1.2	2.7	1.69	0.497
1993	37	54	72	61.7	4.02	1.2	3.1	1.83	0.405
1994	12	57	74	69.7	4.74	1.6	3.2	2.34	0.388
1995	8	60	66	62.8	2.31	1.3	2.2	1.79	0.322
1996	4	60	89	68.8	13.67	1.3	4.7	2.54	1.520
1997	26	40	83	57.3	7.99	0.4	2.2	1.38	0.403
1998	31	52	93	63.2	13.33	1.0	3.8	1.84	0.850
1999	32	48	93	58.3	10.60	0.7	3.8	1.58	0.563
2000	3	54	56	54.7	1.15	1.1	1.7	1.53	0.339
2001	12	56	68	58.9	3.48	1.2	1.7	1.42	0.153
2002	35	57	68	60.3	3.46	1.2	1.9	1.56	0.194
2003	5	57	62	60.0	2.74	1.2	1.8	1.34	0.263
2004	13	56	63	60.5	2.85	1.2	1.8	1.70	0.159
2005	2	62	64	63.0	1.41	1.7	2.0	1.84	0.163
2006	1	64	64	64.0	-	2.0	2.0	1.95	-
2007	10	64	110	82.2	18.55	1.3	7.4	3.73	2.304
2008	2	61	66	63.5	3.54	1.3	2.0	1.62	0.483
2009	3	54	66	60.3	6.03	1.3	2.0	1.50	0.394
2010	2	54	54	54.0	0.00	1.3	1.3	1.28	0.000
2011	-	-	-	-	-	-	-	-	-
2012	46	53	53	53.0	0.00	1.4	1.9	1.58	0.215
2013	-	-	-	-	-	-	-	-	-
2014	13	49	73	57.4	7.83	0.8	1.6	1.22	0.284
2015	26	49	73	59.7	7.02	0.8	1.6	1.34	0.202
2016	13	51	59	56.2	2.27	1.0	2.4	1.57	0.536
2017	63	50	63	57.3	3.08	0.9	2.4	1.48	0.323
2018	31	52	68	56.7	3.38	2.5	4.7	3.22	0.662
2019	15	33	68	58.5	11.01	0.3	2.9	1.80	0.855
2020	30	51	63	59.0	3.71	0.8	2.0	1.42	0.283
2021	25	55	63	57.0	2.24	1.2	1.8	1.40	0.206
2022	58	52	63	57.5	3.37	1.0	1.8	1.28	0.231

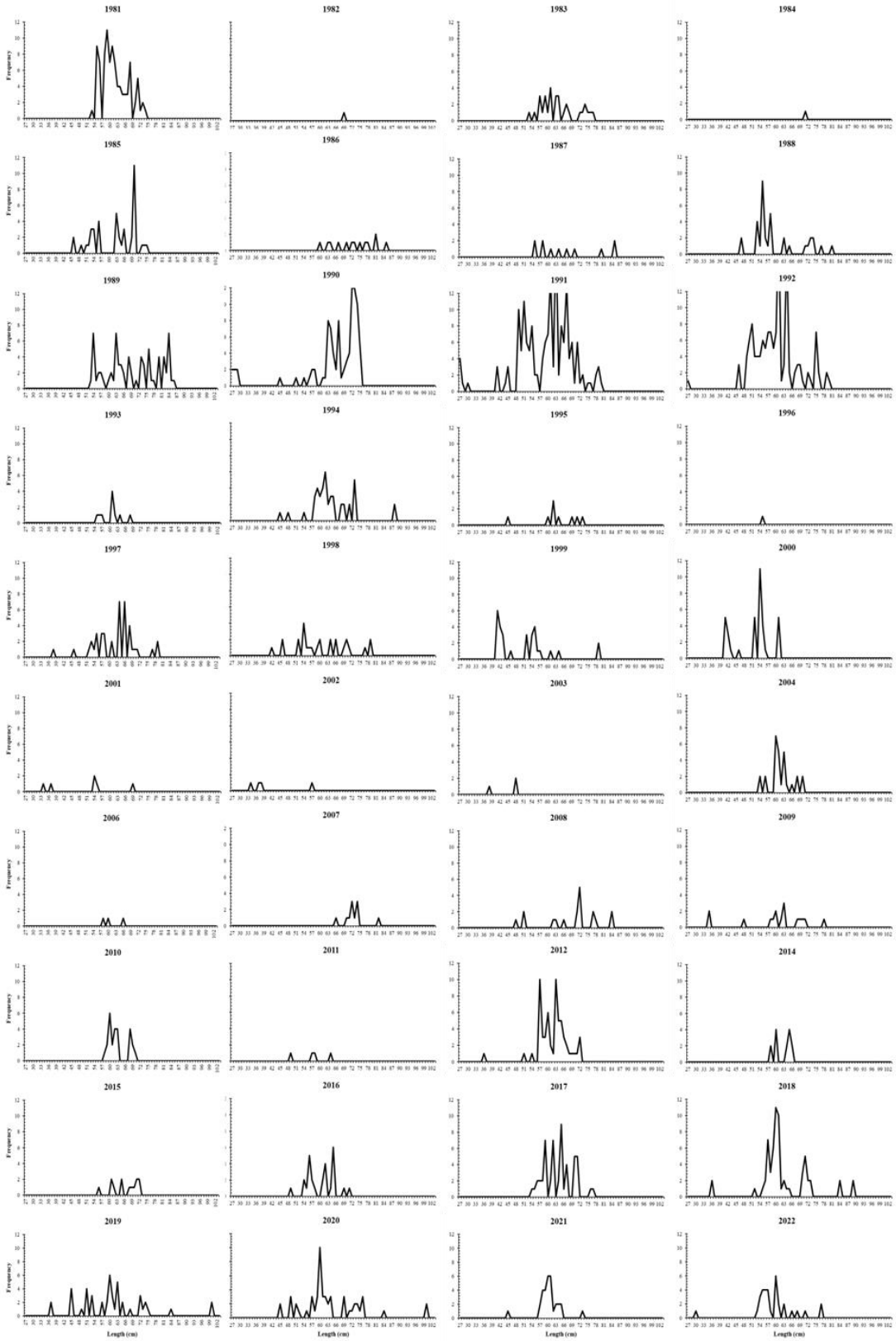

Figure A3.3. The length frequencies from the Mid-Atlantic region by year.

Table A3.2. The summary of length and weight data from the Mid-Atlantic region by year.

Year	Mid-Atlantic								
	Count	Length				Weight			
		Min	Max	Mean	SD	Min	Max	Mean	SD
1981	94	50	71	58.9	5.16	0.7	2.9	1.45	0.457
1982	1	66	66	66.0	-	1.7	1.7	1.72	-
1983	31	50	74	61.1	6.66	1.2	3.8	2.03	0.816
1984	1	68	68	68.0	-	2.9	2.9	2.87	-
1985	42	43	72	59.5	8.23	0.5	3.6	1.60	0.762
1986	13	57	82	69.8	7.70	1.2	4.6	2.72	1.008
1987	11	52	82	64.1	11.49	1.2	4.8	2.24	1.150
1988	35	44	78	57.0	8.79	0.6	4.6	1.79	0.788
1989	73	50	83	66.5	10.28	1.1	4.7	2.47	1.133
1990	94	24	72	62.6	11.47	0.6	4.9	2.58	1.073
1991	172	24	77	56.2	10.19	0.1	4.2	1.77	0.789
1992	138	24	77	56.9	8.11	0.6	4.4	1.56	0.663
1993	10	52	65	57.6	3.86	1.2	1.7	1.40	0.166
1994	44	42	85	61.2	8.03	0.6	4.1	1.74	0.709
1995	9	42	70	60.1	8.19	0.6	2.3	1.61	0.512
1996	1	52	52	52.0	-	0.7	0.7	0.73	-
1997	41	35	76	59.3	8.23	0.3	3.9	1.68	0.868
1998	26	39	76	57.6	10.09	0.5	5.2	1.77	1.201
1999	30	38	76	47.8	10.39	0.4	4.0	1.01	0.876
2000	36	38	58	48.5	6.58	0.4	2.0	0.91	0.396
2001	6	31	66	47.5	12.97	0.3	2.4	1.02	0.787
2002	4	31	54	38.5	10.47	0.3	1.0	0.46	0.359
2003	3	35	45	41.7	5.77	0.3	0.9	0.62	0.268
2004	28	51	67	58.7	4.11	1.0	2.0	1.48	0.235
2005	17	51	103	66.2	15.93	1.0	8.3	2.71	2.517
2006	3	55	63	58.3	4.16	1.4	2.5	1.82	0.622
2007	11	63	79	69.7	3.85	2.2	2.9	2.47	0.231
2008	18	45	81	66.1	10.56	0.9	3.9	2.21	0.863
2009	16	32	75	57.1	11.89	0.2	2.4	1.41	0.622
2010	26	55	67	60.0	3.71	1.1	2.4	1.56	0.393
2011	4	46	61	54.0	6.16	0.8	1.9	1.52	0.526
2012	60	33	69	58.8	5.69	0.2	2.8	1.47	0.386
2013	-	-	-	-	-	-	-	-	-
2014	14	55	63	59.6	3.03	1.3	2.2	1.69	0.328
2015	13	53	69	63.4	5.14	1.0	3.0	1.96	0.550
2016	27	46	68	57.3	5.20	0.7	2.4	1.50	0.478
2017	52	51	74	60.9	5.40	1.0	3.2	1.78	0.572
2018	64	33	89	59.7	9.51	0.6	8.3	3.46	1.550
2019	46	34	100	58.3	13.46	0.3	7.1	1.74	1.417
2020	53	42	100	60.7	11.57	0.5	7.1	1.83	1.288
2021	31	42	70	57.4	4.23	0.5	2.5	1.35	0.312
2022	33	27	74	55.8	7.98	0.1	2.6	1.36	0.512

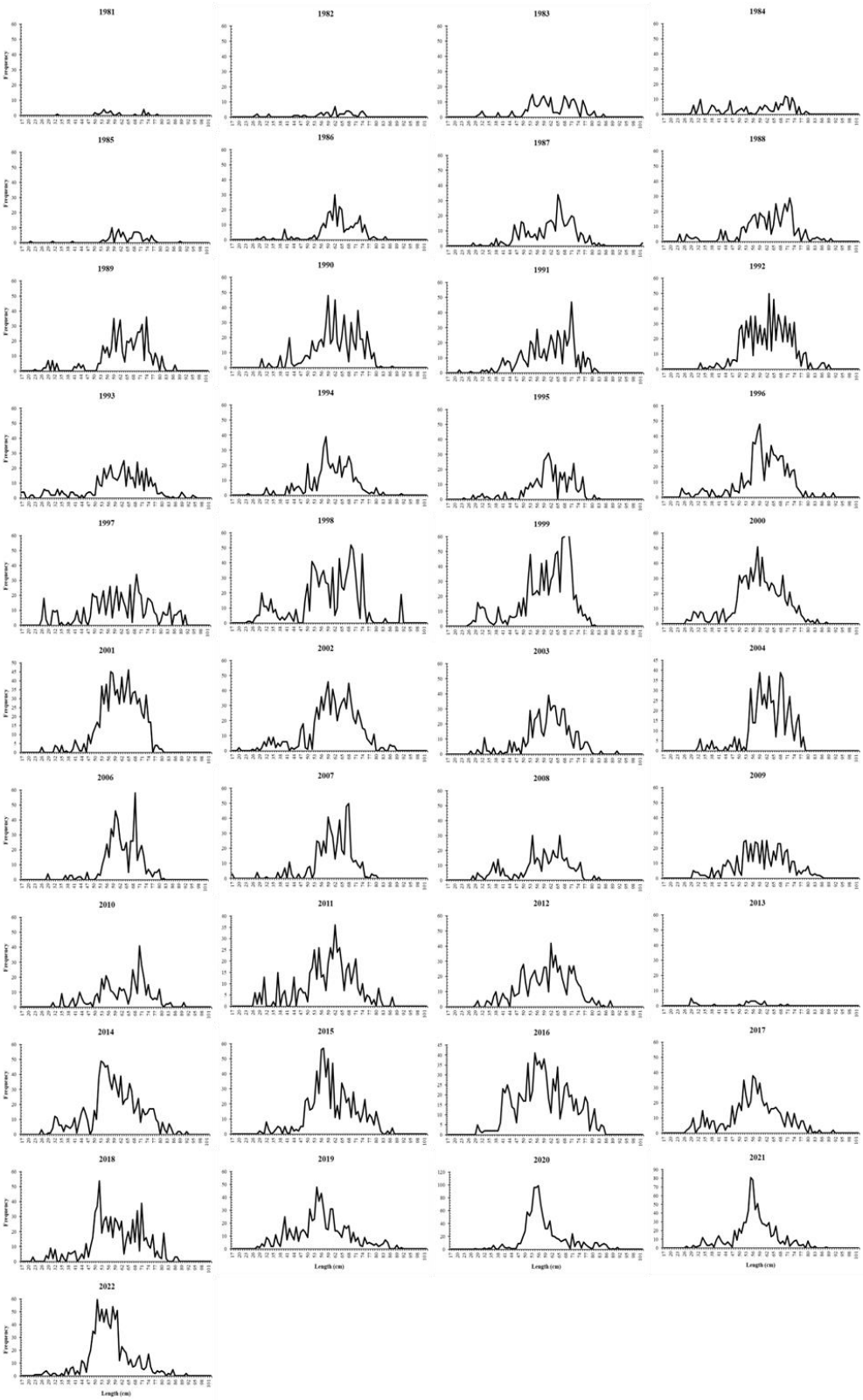

Figure A3.4. The length frequencies from the South Atlantic region by year.

Table A3.3. The summary of length and weight data from the South Atlantic region by year.

Year	South Atlantic								
	Count	Length				Weight			
		Min	Max	Mean	SD	Min	Max	Mean	SD
1981	30	33	78	59.1	9.76	0.9	3.8	1.69	0.681
1982	60	27	75	60.3	12.02	0.2	11.4	1.94	1.577
1983	247	30	85	62.4	10.70	0.2	4.0	1.76	0.855
1984	176	29	80	57.4	14.87	0.1	3.6	1.56	0.922
1985	102	21	89	64.4	9.00	0.2	3.9	2.00	0.670
1986	283	28	84	63.4	8.86	0.1	3.9	1.82	0.750
1987	428	28	102	62.0	10.48	0.1	4.3	1.84	0.795
1988	450	24	90	62.5	12.00	0.2	3.4	1.46	0.976
1989	532	23	87	64.0	11.13	0.2	7.0	2.03	0.917
1990	636	30	87	62.0	10.36	0.2	4.5	1.76	0.806
1991	556	22	82	61.3	10.80	0.1	3.9	1.74	0.786
1992	746	33	89	62.4	9.59	0.2	4.4	1.81	0.767
1993	491	17	95	59.5	14.57	0.1	7.6	1.75	1.119
1994	465	24	91	60.4	9.35	0.1	4.9	1.62	0.735
1995	403	24	83	61.5	10.03	0.1	4.0	1.73	0.721
1996	653	25	91	60.6	10.80	0.1	4.6	1.74	0.776
1997	654	26	91	61.5	15.30	0.1	5.7	2.00	1.264
1998	901	24	91	59.0	13.27	0.1	5.5	1.65	0.803
1999	1034	26	81	59.9	11.46	0.2	7.5	2.17	1.165
2000	815	27	88	58.2	10.77	0.1	5.6	1.72	0.877
2001	835	26	80	61.1	8.71	0.2	4.3	1.89	0.814
2002	815	20	88	60.9	11.08	0.1	4.9	1.82	0.867
2003	583	27	91	60.9	9.91	0.1	5.8	1.86	0.823
2004	550	32	78	62.9	8.65	0.2	3.9	1.90	0.760
2005	398	31	85	61.0	8.69	0.2	4.2	1.73	0.758
2006	559	29	82	63.3	8.00	0.2	4.2	1.84	0.665
2007	549	17	80	61.0	8.89	0.2	4.2	1.70	0.646
2008	436	28	83	57.8	11.82	0.1	4.6	1.53	0.841
2009	521	30	86	59.4	11.51	0.2	5.1	1.69	0.967
2010	436	31	90	62.6	11.42	0.2	4.8	1.87	0.943
2011	541	27	87	58.5	11.89	0.1	4.4	1.60	0.936
2012	691	29	88	60.2	10.92	0.2	4.9	1.64	0.889
2013	35	29	71	49.0	13.25	0.1	2.3	0.97	0.626
2014	935	26	92	59.0	11.68	0.1	6.1	1.63	0.949
2015	817	29	87	60.7	10.18	0.1	4.6	1.70	0.831
2016	874	30	85	58.9	11.53	0.2	4.5	1.61	0.987
2017	648	27	91	56.4	11.80	0.1	5.2	1.44	0.886
2018	760	22	87	59.1	11.79	0.1	9.7	3.37	1.891
2019	719	28	91	55.9	11.85	0.1	5.0	1.40	0.885
2020	1045	28	91	58.5	9.37	0.2	4.9	1.53	0.803
2021	802	27	88	56.5	9.35	0.1	4.8	1.37	0.720
2022	858	23	91	56.5	9.55	0.1	5.2	1.38	0.767