



Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: ISFMP Policy Board

FROM: Assessment and Science Committee

DATE: April 24, 2023

SUBJECT: Revisions to the Stock Assessment Schedule

The Assessment Science Committee (ASC) met on April 17th, 2023 to address several agenda items, including assessment data and code sharing needs, the upcoming changes to the MRIP data standards and queries, and revising the ASMFC stock assessment schedule.

ASMFC Staff reviewed the [current stock assessment schedule](#) for 2023 to 2025 and raised concerns to ASC about the workload for Technical Committee (TC) and Stock Assessment Subcommittee (SAS) members and Staff. In addition to the benchmark assessments scheduled for completion over that time period, there are a number of assessment updates and similar tasks on the schedule that will increase the workload for assessment teams, many of which overlap. See the supplemental file “Full Assessment Timeline 2023-2025.xlsx” for a more detailed overview which highlights when work will occur, not just when assessments are scheduled for completion.

Proposed Changes

ASC recommends the following changes to reduce overall workload without postponing the completion of critical benchmark and update assessments.

- **Change the sturgeon assessment in 2024 from a benchmark to an update.** The Sturgeon TC recommended conducting an update due to a lack of significant progress on research recommendations since the last benchmark.
- **Change the menhaden single-species assessment in 2025 from a benchmark to an update.** The single-species assessment has a mature model that has been peer reviewed multiple times. There are no planned changes to model structure or inputs for the 2025 assessment. Conducting an update instead of a benchmark would reduce work on the TC (which overlaps with the Ecological Reference Point WG), Staff, and ERP Review Panel, while still allowing the most up-to-date information to be provided to the ERP models. The ERP assessment would continue as a benchmark in 2025 and both the single-species and ERP assessments would undergo benchmarks as planned in 2031 to develop spatial components for the models.

M23-039

Long-Term Stock Assessment Schedule (Draft April 2023)

Species	2018	2019	2020	2021	2022	2023	2024	2025	2026
American Eel					Benchmark				
American Shad			Benchmark						
American Lobster			Benchmark					Benchmark	
Atlantic Croaker							Benchmark		
Atlantic Menhaden		Benchmark			Update			Update	
Atl. Menhaden ERPs		Benchmark						Benchmark	
Atlantic Sea Herring	Benchmark		Update		Update		Update	Benchmark	Update
Atlantic Striped Bass	Benchmark				Update		Update		<i>*Update</i>
Atlantic Sturgeon							Update		
Black Drum					Benchmark				
Black Sea Bass	Update	Update		Update		Benchmark		Update	
Bluefish	Update	Update		Update	Benchmark	Update		Update	
Coastal Sharks			Benchmark			Benchmark			
Cobia		Benchmark						Update	
Horseshoe Crab		Benchmark					Update		
Horseshoe Crab ARM				Benchmark		Update	Update	Update	Update
Jonah Crab						Benchmark			
Northern Shrimp	Benchmark			Update			Update		
Red Drum					Benchmark		Benchmark		
River Herring							Benchmark		
Scup	Update	Update		Update		Update			
Spanish Mackerel					Update				
Spiny Dogfish	Update				Benchmark				Update
Spot							Benchmark		
Spotted Seatrout									
Summer Flounder	Benchmark			Update		Update		Update	
Tautog				Update			<i>*Update</i>		
Weakfish		Update						Update	
Winter Flounder			Update		Update		Update		Benchmark

Notes:

Coastal Sharks Hammerhead benchmark assessment 2023
 Spotted Seatrout States conduct individual assessments
 Striped Bass 2027 Benchmark Assessment
 Sturgeon 2027 Benchmark Assessment
 River Herring Peer Review in 2023, Board presentation in 2024

	ASMFC Peer Review
	SARC Review (Research Track)
	SEDAR Peer Review (Research Track)
	Completed

**Italics = under consideration, not officially scheduled*

Year	Month	American Eel Benchmark 2022	Intermediate Stock Assessment Training Course 2023	Jonah Crab Benchmark 2023	River Herring Benchmark 2023	Lobster Data Updates (Annually)	Northern Shrimp Data Update 2023	HSC ARM Annual	Horseshoe Crab Update 2024	Northern Shrimp Update 2024	Spot and Croaker Benchmarks 2024 (and TLAs Annually)	Red Drum Benchmark 2024	Atlantic Sturgeon Update 2024	Striped Bass Update 2024	Weakfish Update 2024	Menhaden Single-Species 2025	Menhaden ERP 2025	Lobster Benchmark 2025 (*Tentative dates to be confirmed during planning in later 2023)	
	Science Staff (Policy Staff)->	K. Anstead (C. Starks)	K. Drew, J. Kipp, K. Anstead	J. Kipp (C. Starks)	K. Drew (J. Boyle)	J. Kipp (C. Starks)	K. Drew (C. Tuohy)	K. Anstead (C. Starks)	K. Anstead (C. Starks)	K. Drew (C. Tuohy)	J. Kipp & K. Anstead (T. Bauer)	J. Kipp (T. Bauer)	K. Drew & K. Anstead (J. Boyle)	K. Drew (E. Franke)	K. Drew (T. Bauer)	K. Drew & K. Anstead (J. Boyle)	K. Drew & K. Anstead (J. Boyle)	J. Kipp (C. Starks)	
2023	January	SAS Calls to Address Post-Assessment Board Task									Circulate Data Requests	Circulate Data Requests							
	February																		
	March		Intermediate Training								Mid-March Data Due		TC Planning Call						
	April		Weekly Classes: Mock	Assessment Workshop							Validated Landings		SAS Planning Call						
	May		DW								Data Workshop (Virtual)	May 30: Data deadline	Circulate Data Requests					Methods Workshop I (ERP)	
	June	Write Supplemental Report		Draft Assessment Report and review with TC		Circulate Data Requests						Data Workshop	Data Due through 2022		TC/SAS Planning Call			New Data Submissions Due	
	July	Report to Meeting Materials		Peer Review Workshop					Request Data for ARM	TC & SAS Planning Calls									
	August	Present Supplemental Report to Board			Assessment Workshop	Data Due				Circulate Data Requests									
	September				Report drafted	Process Data; Draft Memo and review with TC	Data available		ARM/DBETC Call to Review ARM Results	Data Due through 2022		Assessment Workshop I; Run TLA and TC Call to Review						Assessment Planning	
	October			Present Assessment and Review Reports to Board	Report approved by TC/SAS	Present Data Update to Board	Traffic light approach completed		Present ARM to Board	Index Sub-group Work & Calls		Present TLA to Board	Assessment Workshop I				Data Workshop		
	November		Mock AW 1: in-person		Peer Review		Memo drafted												
	December													Update Models & Methods					
2024	January				Reports to Meeting Materials										TC/SAS Planning Call			Circulate Data Requests	
	February				Present Assessment to Board				Update Models & Methods		Assessment Workshop II								
	March		Mock AW 2: in-person																
	April															FI Data through 2022 Due		Stock Structure Workshop	
	May					Circulate Data Requests												Data through 2023 due	
	June																	Data/Researcher Workshop	
	July							Request Data for ARM	Report Finalized by SAS			Report Finalized by SAS	Report to Meeting Materials	Data through 2023 submitted	Data through 2023 submitted				
	August					Data Due			Report Finalized by SAS		TC Call to Approve Assessment	July/August: Data Requests for TLA	Early June: TC Review	Model runs	Model runs			Multi-species Data Due	
	September					Process Data; Draft Memo and review with TC		ARM/DBETC Call to Review ARM Results	Report to Meeting Materials										
	October					Present Data Update to Board		Present ARM to Board	Present update to Board at Summer Meeting w/Annual ARM		Data available	Run TLA & TC Call						Methods Workshop II	
	November									UME model runs completed		Present Assessment & TLA to Board	Present Assessment to Board			Report finalized for Meeting Materials	Report finalized for Meeting Materials	Assessment Workshop I	
	December									Report drafted	Present Assessment & TLA to Board					Present Assessment to Board	Present Assessment to Board		
2025	January																		
	February															Assessment Workshop		Assessment Workshop II (if needed)	
	March																		
	April																		
	May					Circulate Data Requests												Draft Assessment Report	
	June																		
	July							Request Data for ARM										Review Assessment with TC	
	August					Data Due					Request TLA Data							Peer Review Workshop	
	September					Process Data; Draft Memo and review with TC		ARM/DBETC Call to Review ARM Results				Run TLA & TC Call							
	October					Present Data Update to Board		Present ARM to Board				Present TLA to Board							
	November																		
	December															Present Assessments to Board		Present Assessment and Review Reports to Board	

American Eel	Jonah Crab	S/River Herring	Lobster	SAS	Northern Shad	HSC ARM	HSC SAS	Spot and Croaker	Red Drum	Atlantic Sturgeon	Striped Bass	S/Weakfish	SA Menhaden	Menhaden	ERF
Kristen Anstead	Joshua Carlson	Jason Boucher	Joshua Carlson	Robert Atwood	Kristen Anstead	Kristen Anstead	Kristen Anstead	Joey Ballen	Kristen Anstead	Michael Celestin	Linda Barry	Sydney Alford	Kristen Anstead		
Jason Boucher	Jeremy Collie	James Boyle	Jeff Kipp	Lulu Bates	Linda Barry	Linda Barry	Linda Barry	Tracey Bauer	Jason Boucher	Margaret Conroy	Tracey Bauer	Kristen Anstead	Jason Boucher		
Matt Cieri	Jeff Kipp	Michael Brody	Conor McMahon	Katie Drew	Henrietta Bell	Margaret Corbett	Tracey Bauer	Jared Flowe	James Boyle	Katie Drew	Margaret Conroy	James Boyle	Michael Celestin		
Margaret Conroy	Derek Perry	Margaret Conroy	Tracy Pugh	Alicia Miller	Jason Boucher	Jeffrey Dobbs	Margaret Finch	Angela Giuliano	Michael Celestin	Brooke Lowmeyer	Katie Drew	Jeff Brust	David Chagaris		
Sheila Eyster	Kathleen Reardon	Katie Drew	Kathleen Reardon	Tracy Pugh	Margaret Conroy	Michael Kenc	Jeff Kipp	Jeff Kipp	Margaret Conroy	Gary Nelson	Angela Giuliano	Matt Cieri	Matt Cieri		
Laura Lee	Burton Shank	William Eakins	Burton Shank		Steve Doctor	Dave Smith	Laura Lee	CJ Schlick	Katie Drew	Alexei Sharov	Yan Jiao	Caitlin Craig	Micah Dean		
Caitlin Starks	Caitlin Starks	Ben Gahagan	Caitlin Starks		Jim Lyons	Caitlin Starks	Brooke Lowmeyer	Ethan Simpson	Jared Flowers	John Sweka	Laura Lee	Katie Drew	Katie Drew		
John Sweka	Corinne True	Kyle Hoffman			Conor McGowan	John Sweka	Harry Rickabaugh	Chris Swans	Dewayne Fox			Eric Levesque	Brooke Lowmeyer	Shanna Madson	
Troy Tuckey		Trey Mace			Bryan Nuse		Somers Smott		Nathaniel Hancock			Shanna Madson	Jason McNamee	Jason McNamee	
Keith Whiteford		John Sweka			Samantha Robinson				Amanda Higgs				Amy Schueler	Amy Schueler	
John Young		Joe Zydlewski			Dave Smith				Dave Kazyak				Alexei Sharov	Alexei Sharov	
					Caitlin Starks				Laura Lee				Chris Swans	Howard Towns	
					John Sweka				Bill Post					Jim Uphoff	
					Wendy Walsh				Eric Schneider						
									David Secor						

Commissioner Stipend Discussion Paper

Atlantic States Marine Fisheries Commission

April 18, 2023

Background

The Commission has discussed the potential to provide stipends to Legislative and Governors' Appointee (LGA) Commissioners for their participation in Commission activities. To date, the Commission has not provided a stipend or other financial compensation to Commissioners for participation. In contrast, the Magnuson-Stevens Act establishes a daily compensation rate (GS 15, Step 7, currently ~\$540/day) for Federal Fishery Management Council members when engaged in Council activities. This paper presents different options that have been discussed.

Potential Tax Benefit for Commissioners

At the Winter Meeting, the idea of a potential tax benefit for Commissioners was suggested. Given that LGA Commissioners volunteer their time, staff was asked explore potential tax benefit options for the Commissioner's donated time.

Staff talked with tax professionals including a CPA. The tax professionals generally did not commit to a potential tax benefit for Commissioners volunteering time to the Commission. They noted a benefit was unlikely but each Commissioner would need to consult with their own tax advisor.

Stipends Paid by Member States to Their Commissioners

It was suggested that each state could voluntarily provide stipends to their LGA Commissioners if they choose to do so. These stipends would be outside of the Commission process and would be handled entirely by the individual states. Staff did not research this approach since it would be addressed by the individual states.

Options for Providing a Stipend to Legislative and Governors' Appointee (LGA) Commissioners

The following options are similar to those presented at the 2023 Winter Meeting.

Option 1 – Status Quo

The LGA Commissioners will continue to serve on a volunteer basis and not receive a stipend from the Commission.

Option 2 – A Stipend will be provided only for extraordinary meetings

The LGA Commissioners will receive a stipend for meetings that are outside of the four quarterly Commission meetings and outside of the joint meetings with one of the three Federal Fishery Management Councils. Examples of these meetings include NEFMC Atlantic Herring Committee meetings, Recreational Fisheries Summit, Scenario Planning Summit, etc.

Approximate Financial Impact: 13 Person days X \$540 Stipend = \$ 7,020

Option 3 – A Stipend will be provided for meetings outside of the Commission Quarterly Meetings

The LGA Commissioners will receive a stipend for meetings that are outside of the four quarterly Commission meetings including joint meetings with one of the three Federal Fishery Management Councils and other extraordinary meetings.

Approximate Financial Impact: 82 Person days X \$540 Stipend = \$44,280

Other Considerations

If a stipend is provided to LGA Commissioners, consideration should be given to the following items:

- Stipend for Proxies
- Virtual Participation
- LGA Eligibility to Receive Stipend
- Travel Days
- Partial Days
- Administrative Burden
- Other



Bob Beal
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Atlantic States Marine Fisheries Commission
1050 N. Highland Street Suite 200
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April 24, 2023

RE: Support for Precautionary False Albacore and Atlantic Bonito Management and Transmittal of Literature Reviews

Dear Mr. Beal and members of the ASMFC Interstate Fisheries Management Program Policy Board (ISFMP):

Thank you for your consideration of false albacore and Atlantic bonito management at the upcoming Spring ASMFC Meeting. The American Saltwater Guides Association is a coalition of conservation minded private anglers, fishing guides, and small fishing related businesses. There are few species that unite the entire Atlantic coast like false albacore. There are cult-like followings of dedicated anglers for both of these inshore speedsters, and entire coastal economies depend upon them. Unfortunately, no formal management plans or conservation measures exist for either of these species, jeopardizing the long-term sustainability and abundance of false albacore and Atlantic bonito throughout the Atlantic coast. The ISFMP has a tremendous opportunity to proactively develop precautionary management for false albacore and Atlantic bonito. To jumpstart this process, ASGA has taken the initiative to provide the Commission with literature reviews of both species--in addition to the other scientific efforts referenced in more detail below. **ASGA strongly supports the ASMFC developing proactive management and precautionary guardrails for false albacore and Atlantic bonito.**

False albacore and Atlantic bonito provide extensive opportunity for inshore and near-shore anglers along the Atlantic coast. The light tackle and fly-fishing communities are especially dependent on these seasonal inshore species. So much so, that anglers and fishing guides in the Northeast will extend their seasons by traveling south to North Carolina to continue targeting false albacore. In 2022, preliminary estimates from the Marine Recreational Information Program identified 816,388 directed trips (primary and secondary target) for false albacore (aka, little tunny) and 203,409 Atlantic bonito trips.¹ These trips generate tremendous economic value for many within our membership up and down the Atlantic coast. Commercially, there are directed fisheries and relatively stable landings; however, ASGA is concerned about directed, large-scale fisheries potentially expanding with no management frameworks in place. These species are extremely valuable throughout the Atlantic coast, and, while there is currently no management, they would only benefit in the long-term by proactively developing management now.

The false albacore and Atlantic bonito fisheries, much like several other ASMFC managed species, are predominantly recreational. As a resource first, science-based organization, we want what is best for the health of the fishery, which is ultimately best for all stakeholders. This is the

¹ Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division April 4, 2023.

time for the ASMFC to be proactive and ensure these fisheries remain healthy and available to all stakeholders for the long-term. ASGA is advocating for proactive guardrails for both the recreational and commercial sectors targeting these species. While we understand that there are no stock assessments for false albacore or Atlantic bonito, and extensive data gaps exist, ASGA firmly believes that in the absence of perfect science, fishery management must be precautionary. ASGA has gone so far as to raise hundreds of thousands of dollars to provide the science needed to better understand these species.

To support our members dependent on these species and to catalyze proactive, precautionary management, ASGA initiated several scientific research efforts in 2022 with plans to continue and expand them in 2023:

- **Acoustic Tagging:** in the Fall of 2022, ASGA, the New England Aquarium, and partners deployed acoustic tags into false albacore in Nantucket Sound (near Cape Cod, MA). Data from other acoustic receiver arrays are still coming in, but we know that 90% of the released fish pinged, indicating a high rate of survivability. Now that we know acoustic tagging works for false albacore, we will deploy more tags in 2023 and utilize new technology to learn more about post-release mortality and movements.
- **Conventional Tagging:** ASGA worked with partners from Florida, North Carolina, New York, and Massachusetts to deploy conventional tags into false albacore. These tags are high volume, low return data collection tools. We are excited to increase these efforts in 2023 and learn more about coastal dynamics.
- **Genetics Work:** Over the course of three days in October 2022, ASGA leveraged some of the best Captains on the East coast to collect false albacore fin clips in Massachusetts, New York, and North Carolina. These fin clips went to our partners at Cornell University's Center for Sustainability; they analyzed the samples and concluded—based on the available sample size/region—this is clearly one stock of false albacore. ASGA is excited to continue this work in 2023 and include more sampling regions.

All of these scientific efforts were privately funded by ASGA and our partners because false albacore are an incredibly important species for our businesses and deserve proper management and conservation. ASGA fully intends to share this research and scientific information with managers and other scientific entities, and we have an exciting new tool to assist in filling recreational fishing data gaps.

Furthermore, we have attached two literary reviews² in draft form, which collate all known information on false albacore and Atlantic Bonito. ASGA commissioned these papers from Nicholas M. Calabrese, a Senior Fisheries Research Technician and PhD Candidate at the University of Massachusetts at Dartmouth's School of Marine Science and Technology in hopes that they would speed up the process at the ASMFC and lessen the potential workload for staff.

In addition, please see ASGA's September 2022 letter to the South Atlantic Fishery Management Council signed by more than 1,000 private anglers, fishing guides, and fishing-related brands and

² [A Review of the Fishery, Biology, and Life History of the Little Tunny \(*Euthynnus alletteratus*\) in the Northwest Atlantic](#) and [A Review of the Fishery, Biology, and Life History of the Atlantic Bonito \(*Sarda sarda*\) in the Northwest Atlantic](#).

companies from all over the Atlantic coast that supported developing precautionary management for False Albacore.³

Thank you for your consideration of these comments and efforts to develop management for false albacore and Atlantic bonito. This is a tremendous opportunity for the ASMFC to show passionate, conservation-minded anglers that it listens to the community and can manage fisheries proactively rather than reactively. **To that end, ASGA strongly supports the ISFMP Policy Board initiating an action at the Spring ASMFC Meeting to develop management plan(s) to ensure the long-term sustainability of false albacore and Atlantic bonito.**

Sincerely,



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CC: Members of the ASMFC's Interstate Fishery Management Program Policy Board

³ American Saltwater Guides Association. ASGA Albie FMP Request. September 2022.
https://saltwaterguidesassociation.com/wp-content/uploads/2022/09/ASGA_Albie_CMP_FMP_Request_Final.LOGOs_.pdf

American Saltwater Guides Association

A Review of the Fishery, Biology, and Life History of the Little Tunny

(*Euthynnus alletteratus*) in the Northwest Atlantic

Nicholas M. Calabrese and Stephanie L. Merhoff

DRAFT

Final to be submitted within 15 days of the ASMFC Meeting

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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).

Stock Structure and Status

FISHERIES

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	Caribbean	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	-	-	-	-	-
Hajje 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
Cayre and Diouf (1983)	Senegal coasts	Female	211	Spines	130.8	51.5	0.1312	-2.22	-	35.7	14.1	95.5	37.6
		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	-	-	-	-
Hattour (2009)	Tunisian coasts	Combined	-	Spines	117	46.1	0.192	-1.12	7	36	14.2	110	43.3
		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
		Combined	951	34.4	13.5	L ₅₀
Cruz-Castan et al. (2019)	Southwest Gulf of Mexico	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
Hajje et al. (2010a)	Southern Tunisia	Male	153	42.8	16.9	L ₅₀
		Female	244	44.8	17.6	L ₅₀
		Combined	628	42	16.5	L ₅₀
Mahamed et al. (2014)	Egypt	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
		Combined	1266	51.13	20.1	L ₅₀
Saber et al. (2018)	Spanish Mediterranean	Male	414	43.44	17.1	L ₅₀
		Female	461	50.07	19.7	L ₅₀
		Male	169	49.28	19.4	L ₅₀
Viera et al. (2021)	Brazil	Female	174	42.37	16.7	L ₅₀

FIGURES

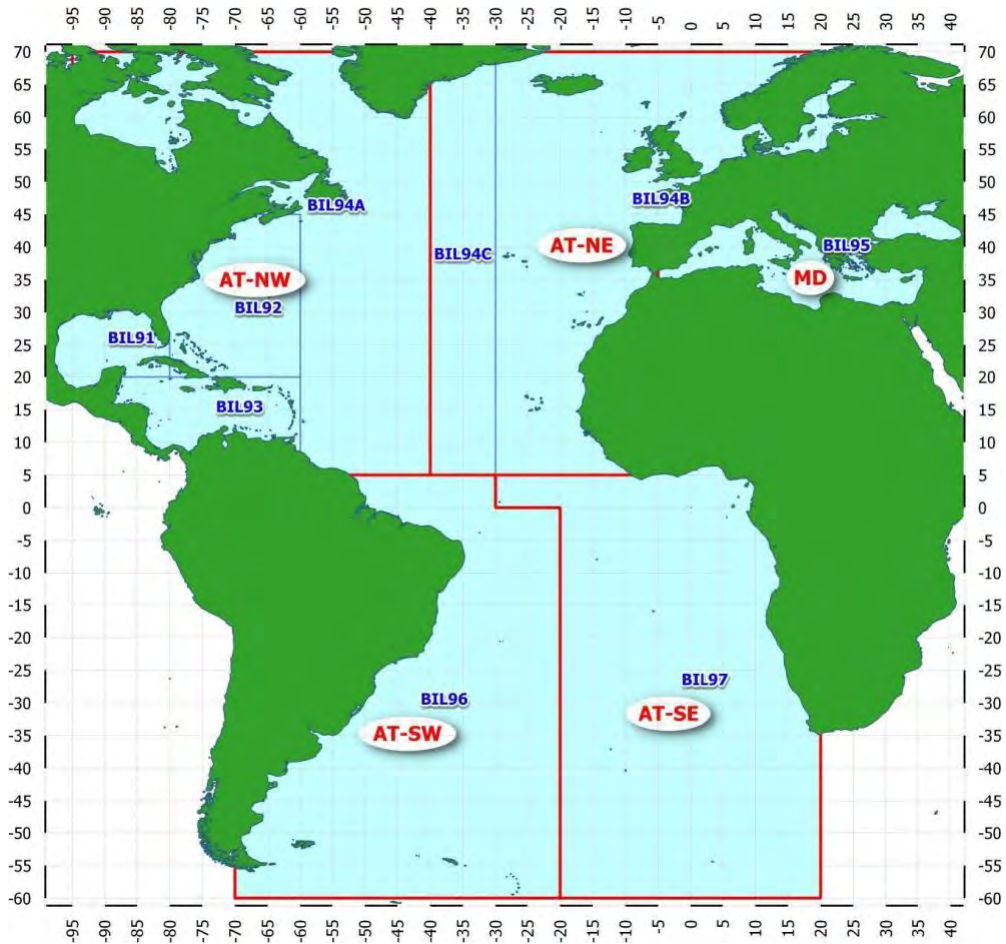


Figure 1. The five management units used by ICCAT for small tunas (ICCAT 2016).

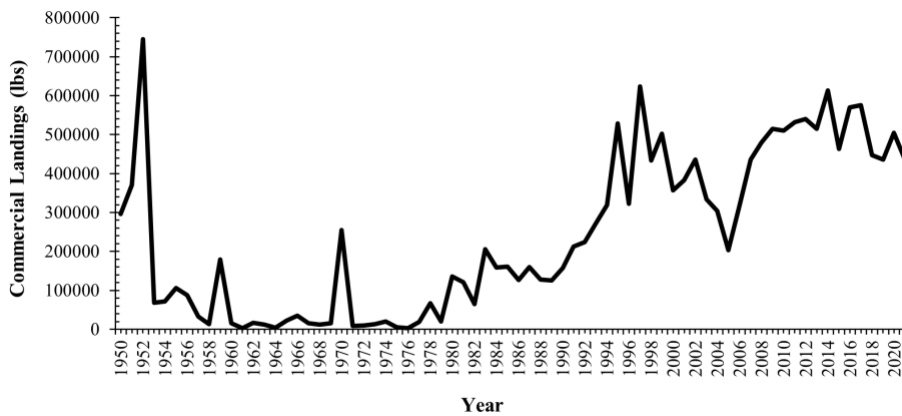


Figure 2. Total commercial landings (lbs) from 1950 to 2021.

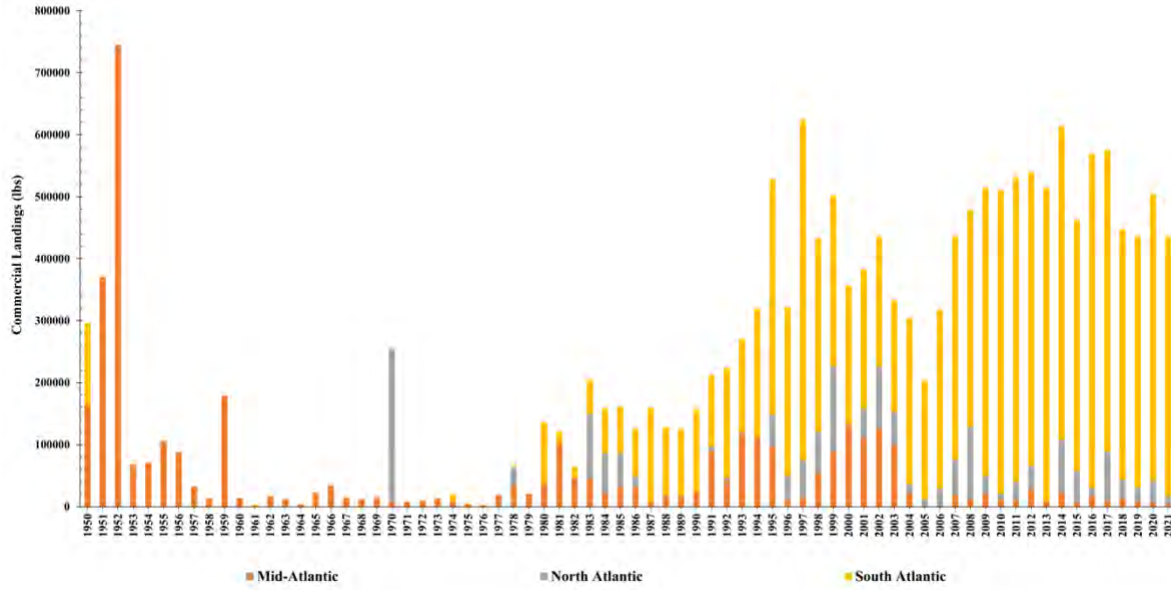


Figure 3. Total commercial landings (lbs) from 1950 to 2021 by region.

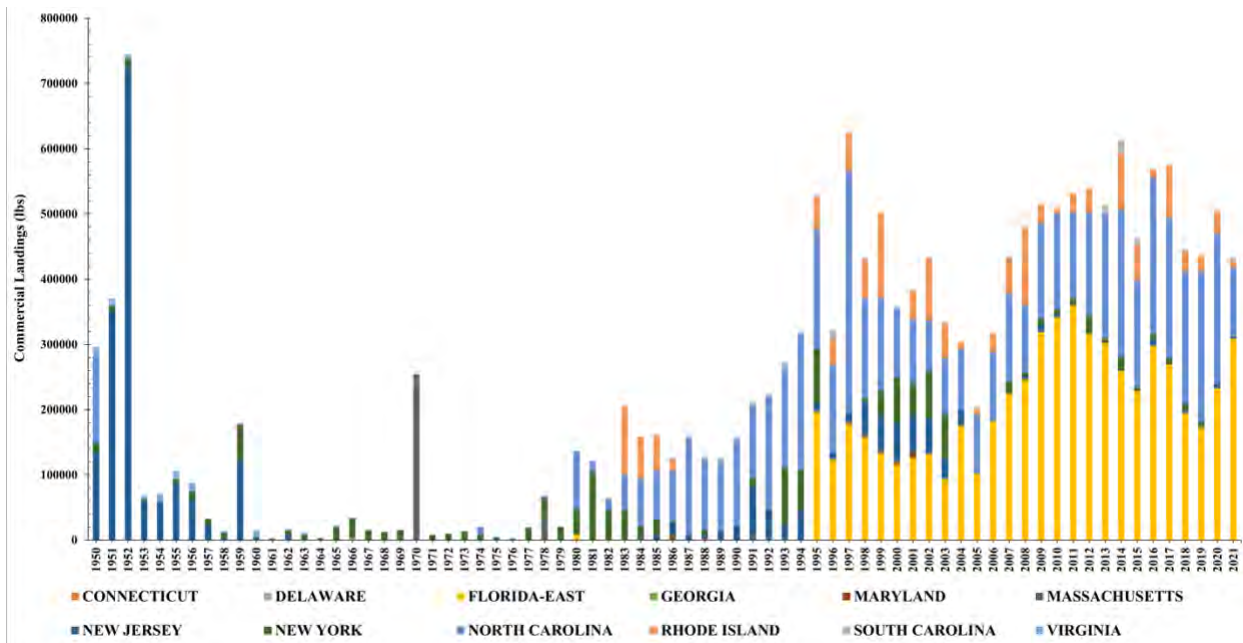


Figure 4. Total commercial landings (lbs) from 1950 to 2021 by state.

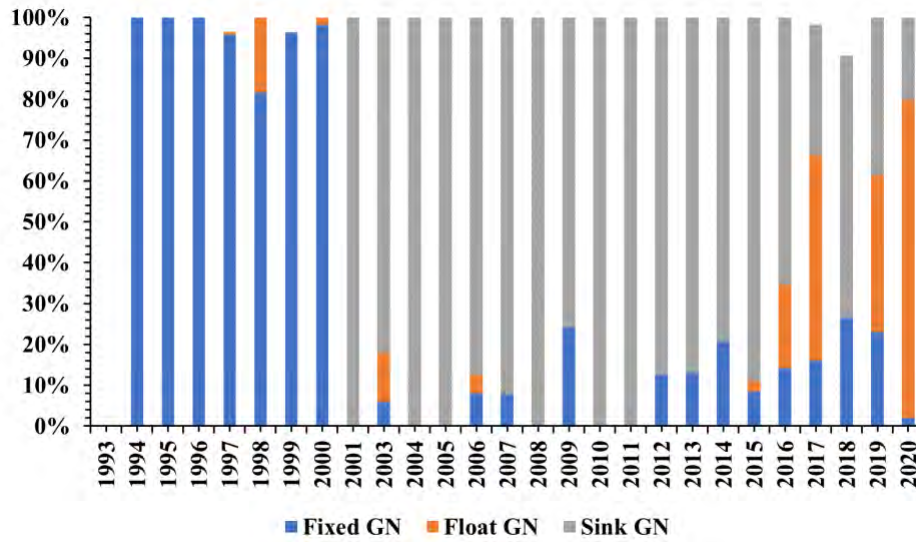


Figure 5. Percentage of commercial discards by type of gill net from 1993-2020

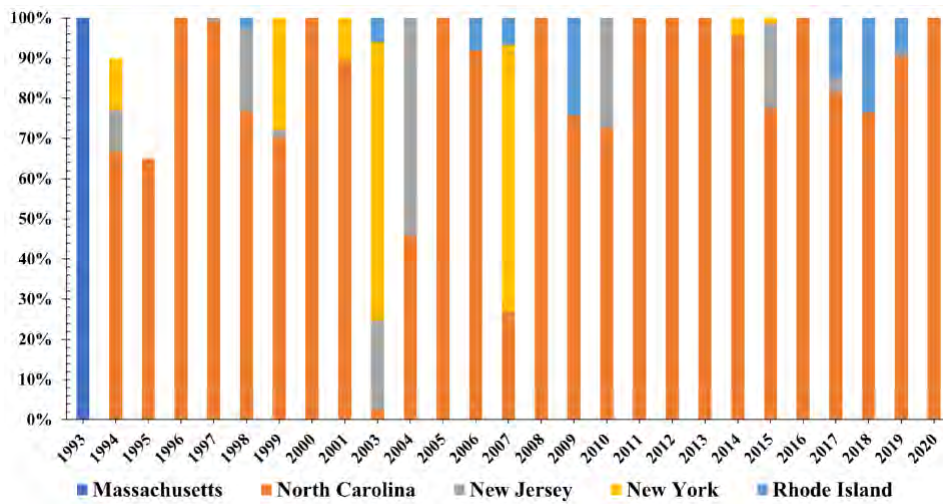


Figure 6. Percentage of commercial discards by state from 1993-2020

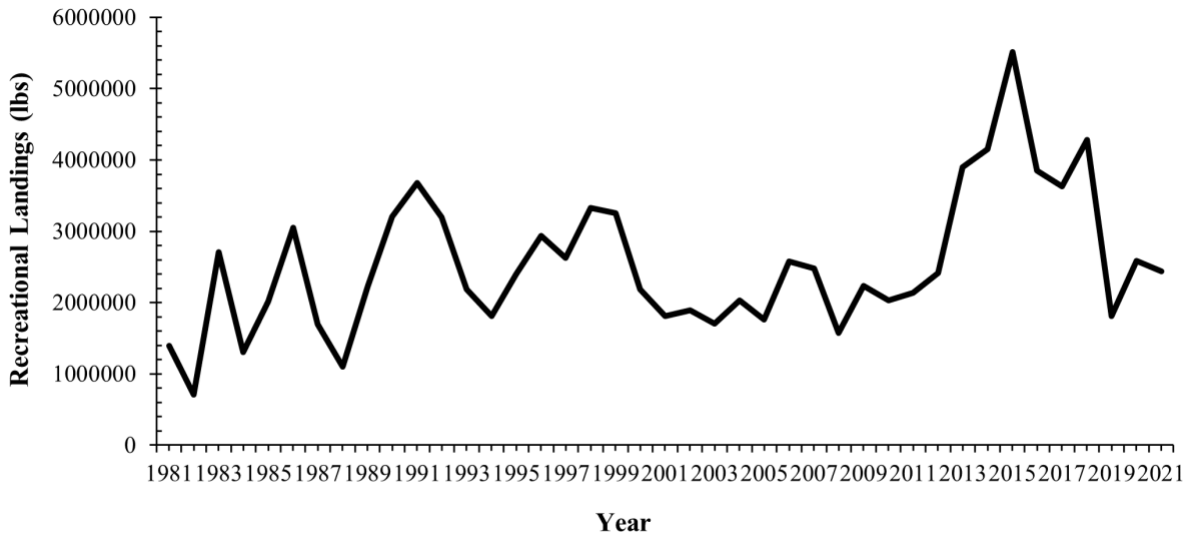


Figure 7. Total recreational landings (lbs) from 1981 to 2021.

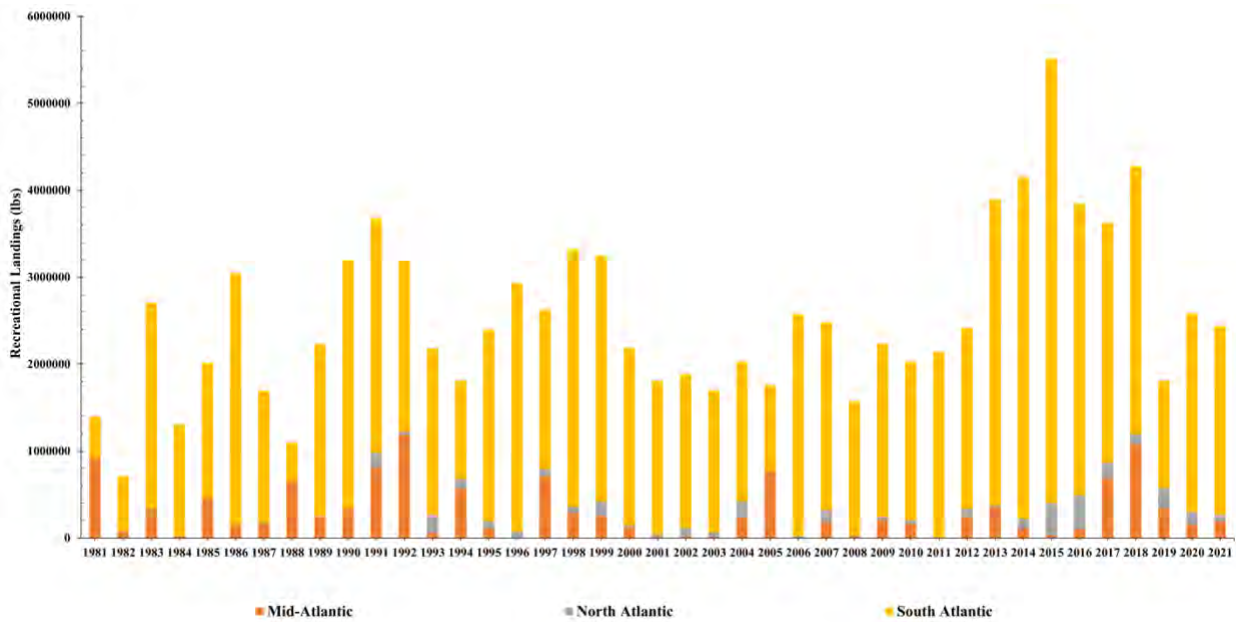


Figure 8. Total recreational landings (lbs) from 1950 to 2021 by region.

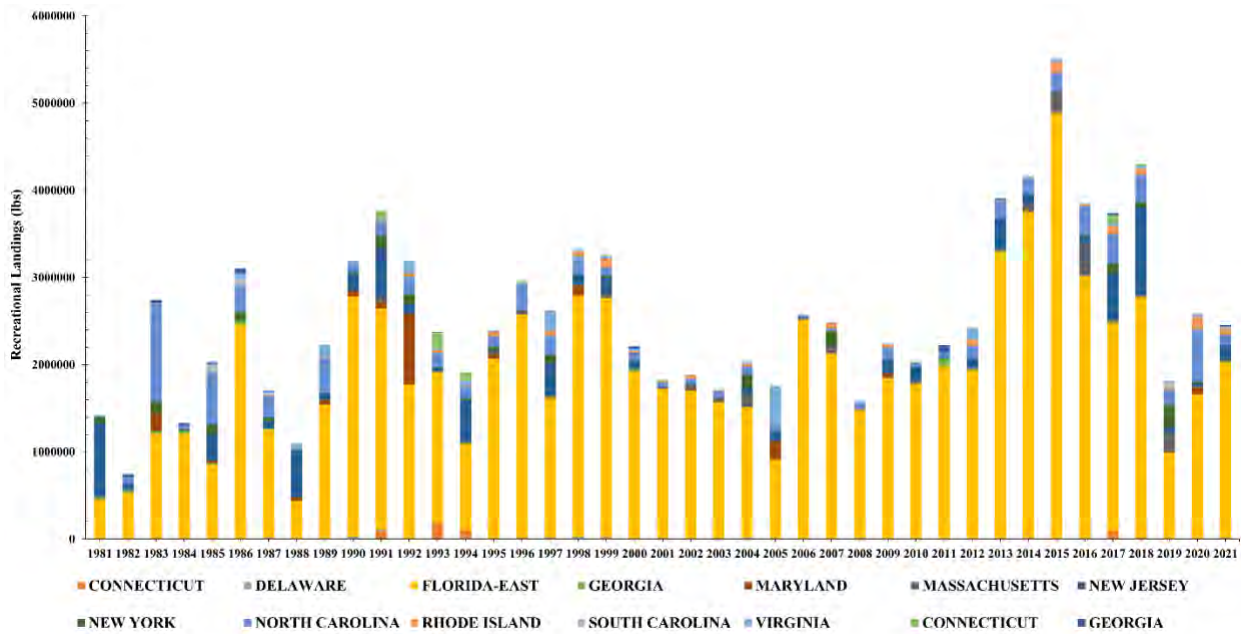


Figure 9. Total recreational landings (lbs) from 1950 to 2021 by state.

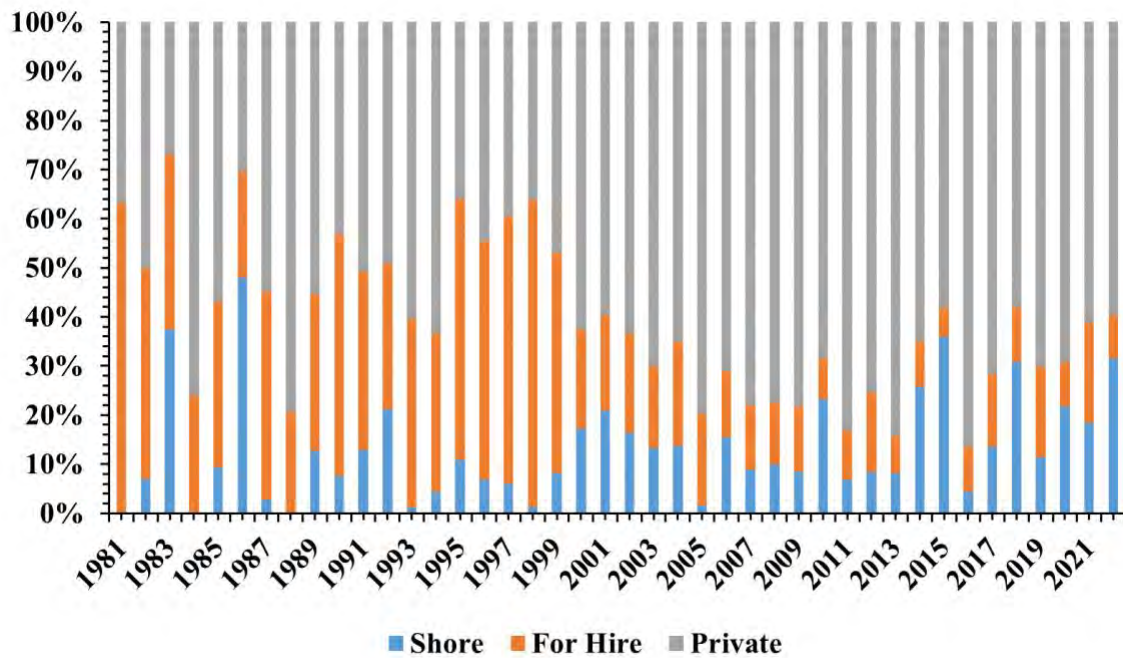


Figure 10. Percentage of recreational landings by mode of fishing from 1981-2022.

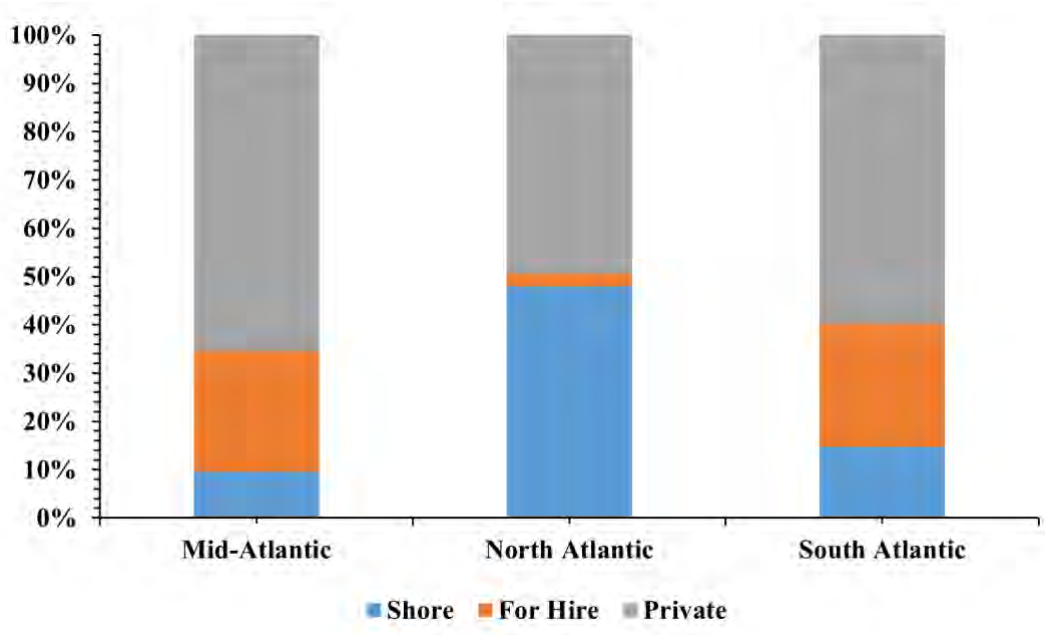


Figure 11. Percentage of recreational landings by mode of fishing for each region.

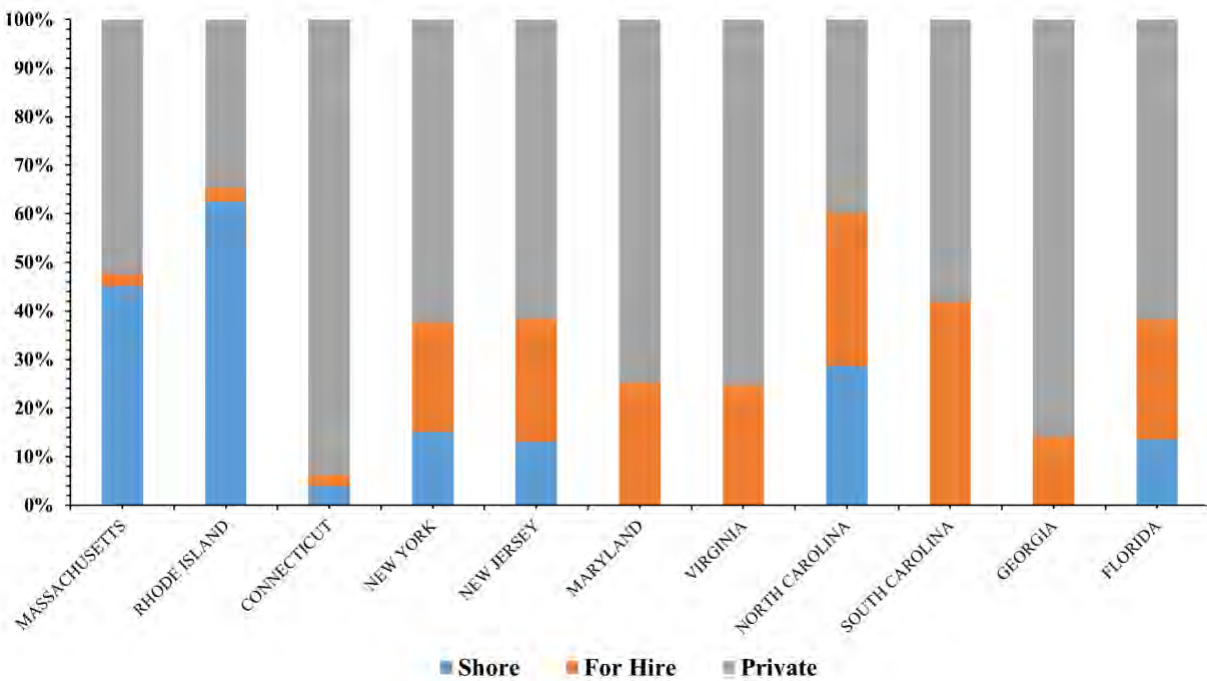


Figure 12. Percentage of recreational landings by mode of fishing for each state.



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

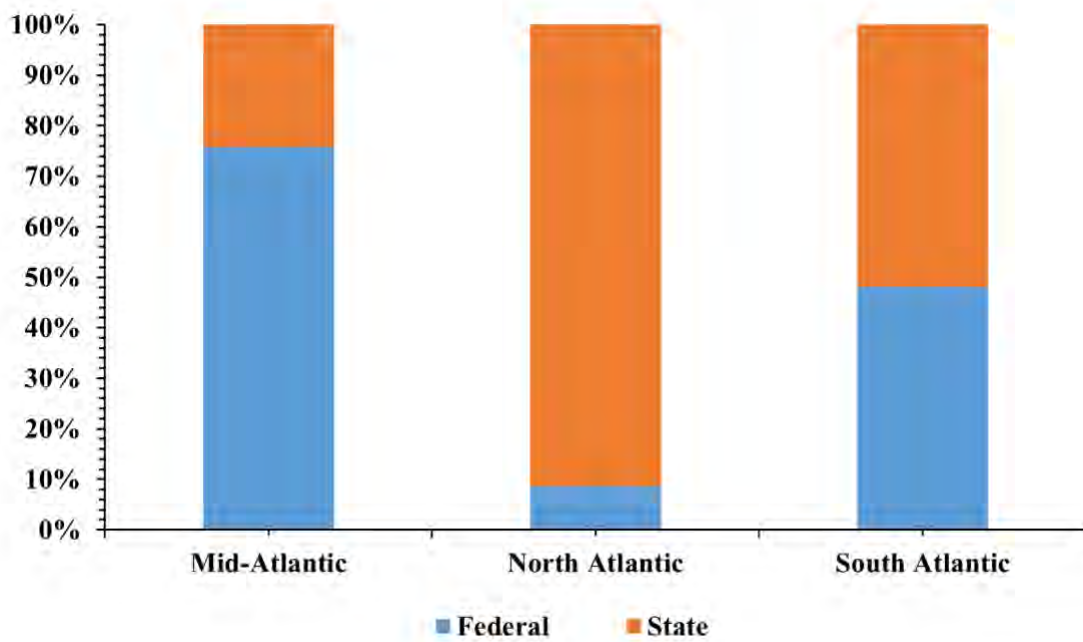


Figure 14. Percentage of recreational landings in federal and state waters for each region.

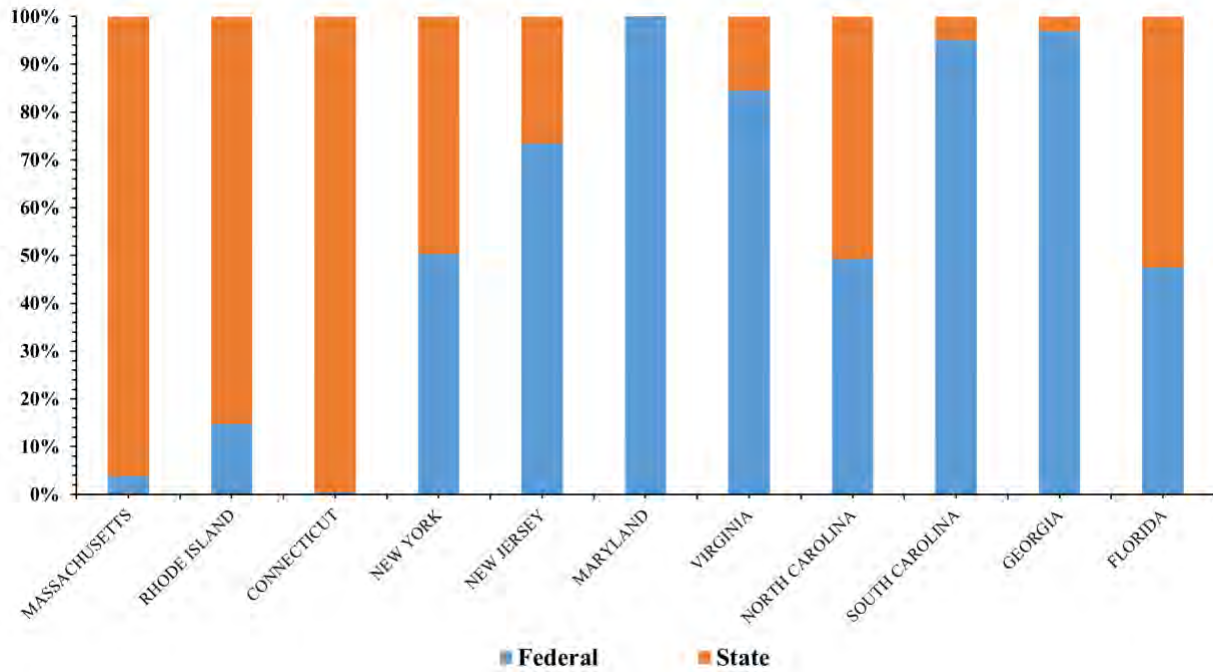


Figure 15. Percentage of recreational landings in federal and state waters for each state.

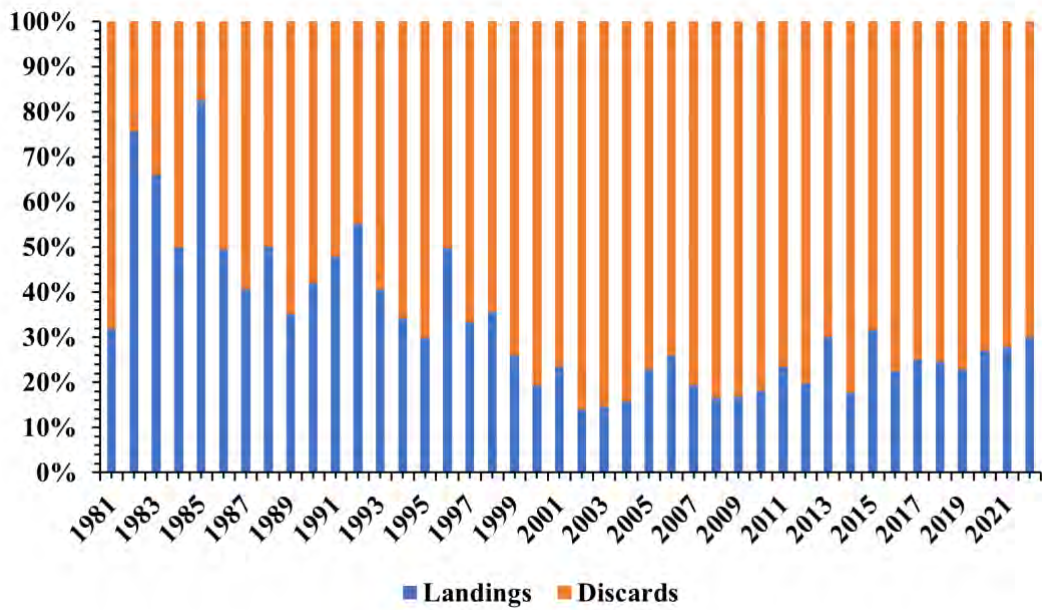


Figure 16. Percentage of fish landed vs discarded from 1981 to 2022.

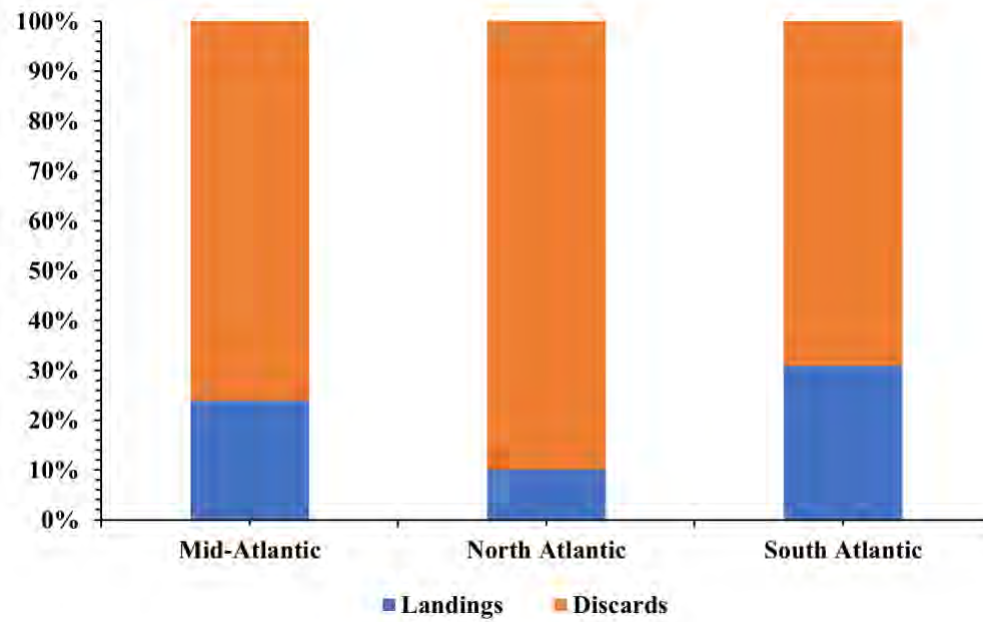


Figure 17. Percentage of fish landed and discarded by region from 1981 to 2022.

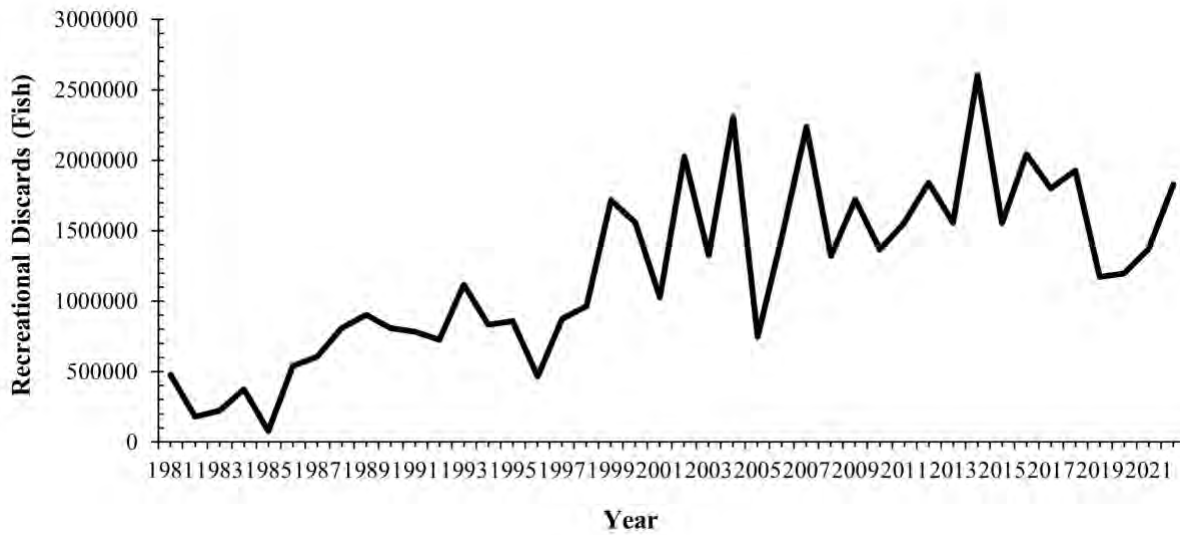


Figure 18. Total recreational discards (individuals) from 1981 to 2021.

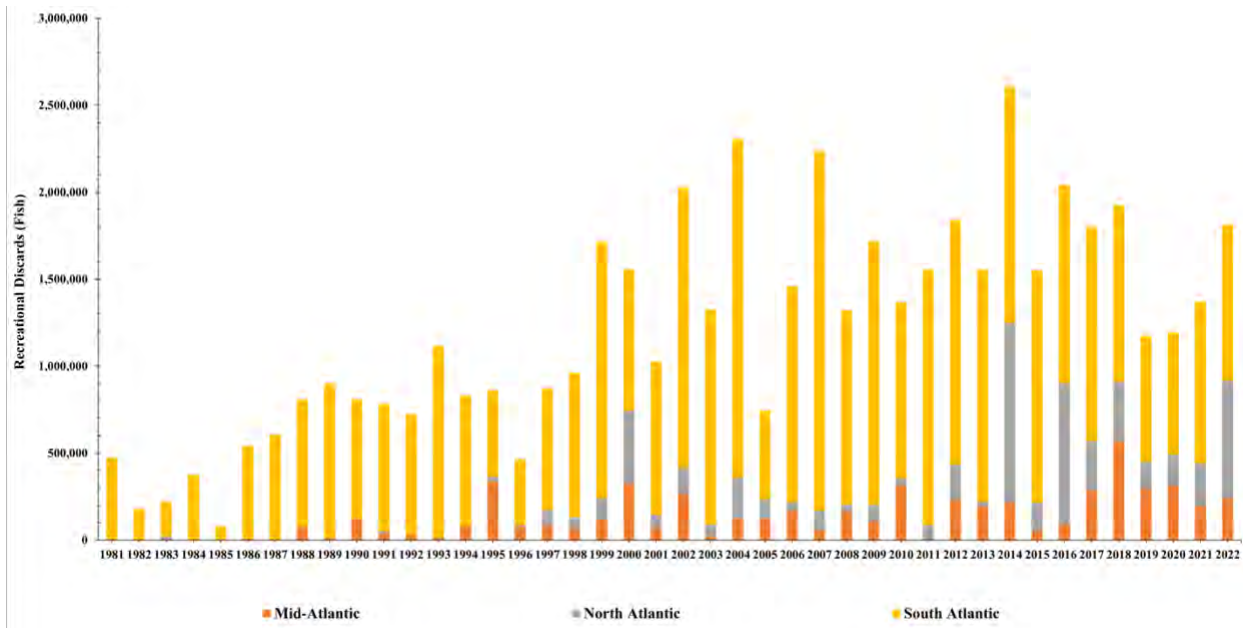


Figure 19. Total recreational discards (individuals) from 1981 to 2021 by region.

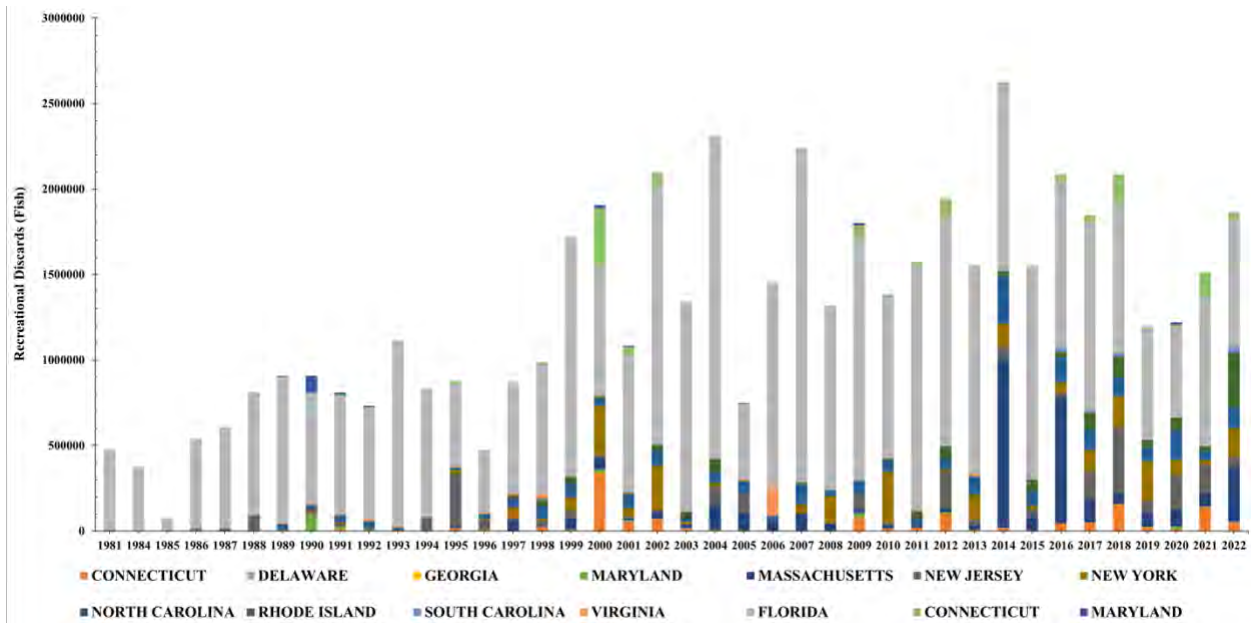


Figure 20. Total recreational discards (individuals) from 1981 to 2021 by state.

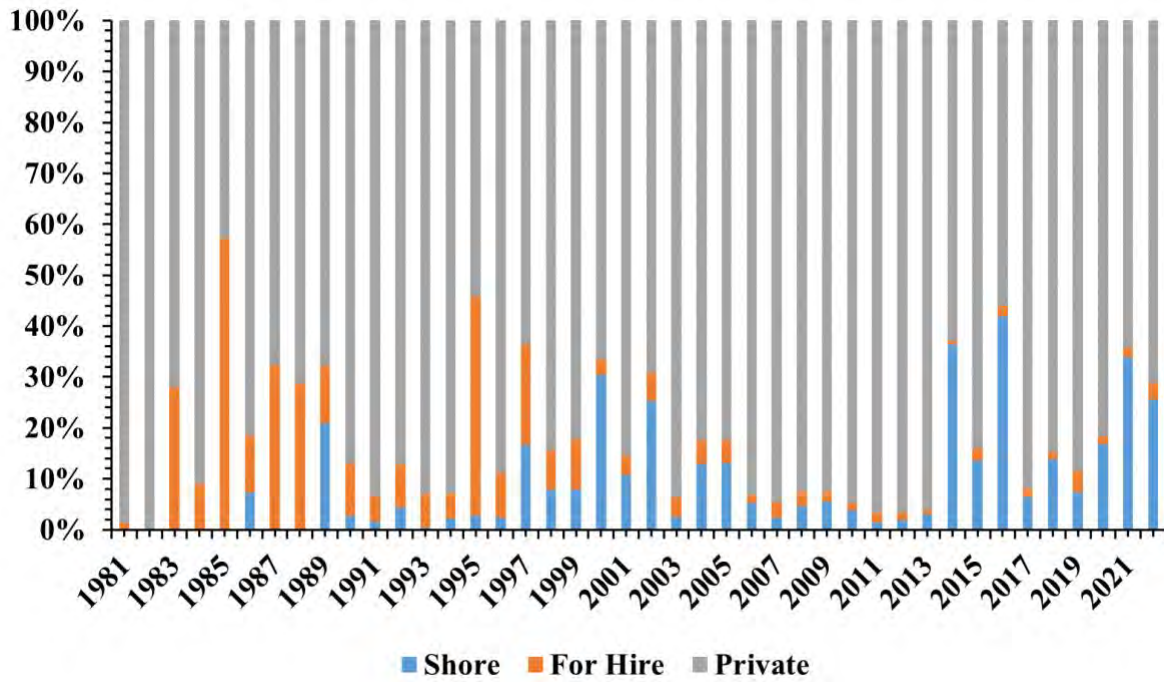


Figure 21. Percentage of recreational discards from each mode of fishing from 1981-2022.

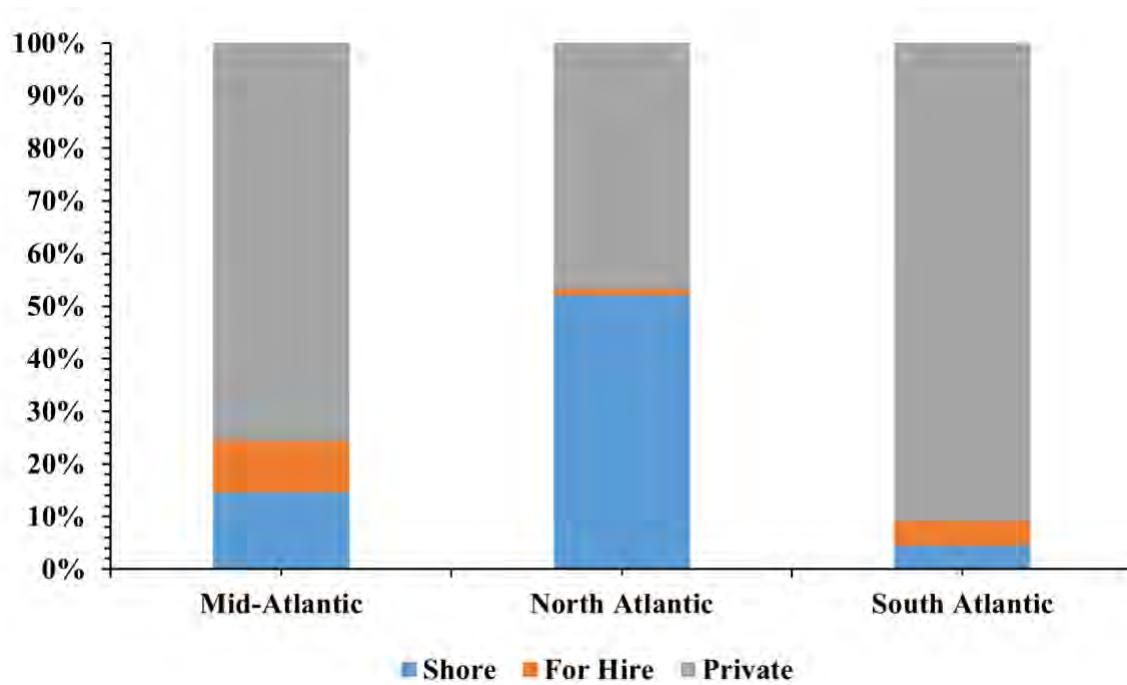


Figure 22. Percentage of recreational discards from each mode of fishing by region.

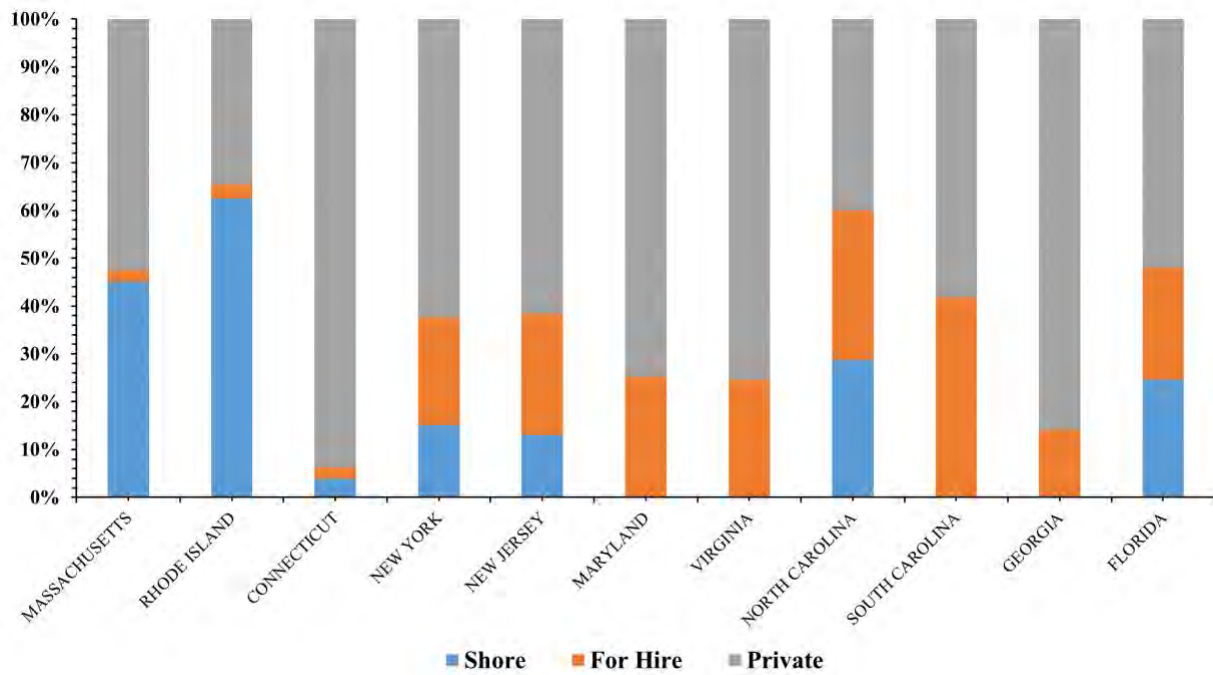


Figure 23. Percentage of recreational discards by mode of fishing for each state.

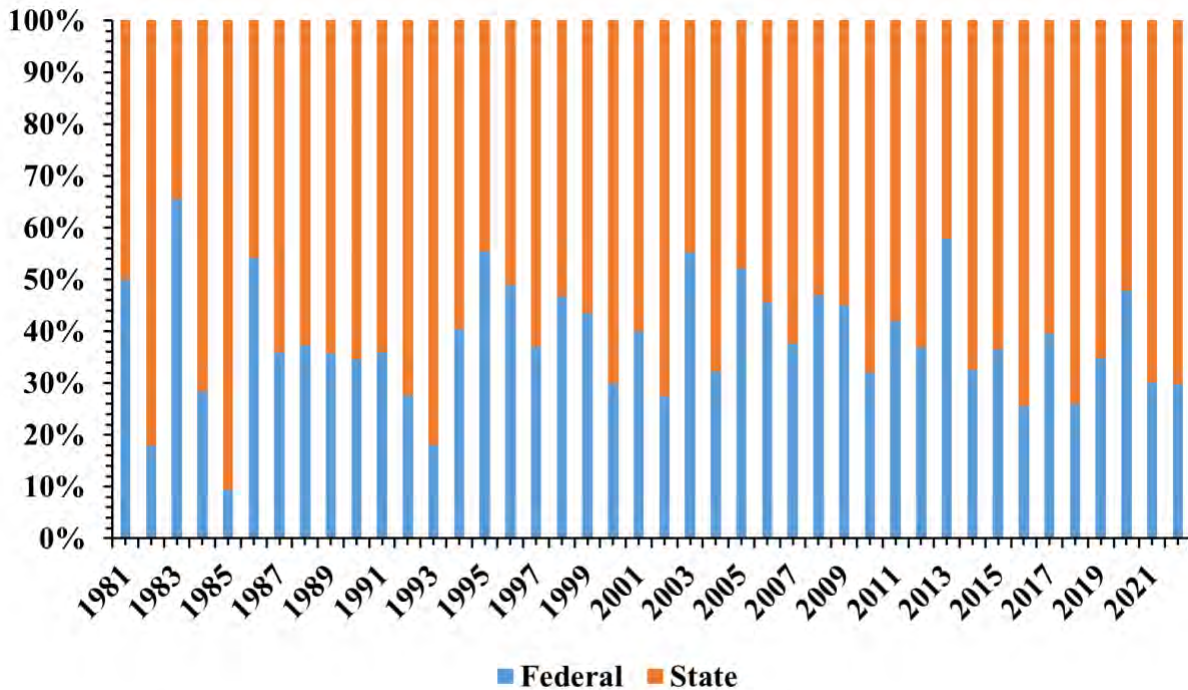


Figure 24. Percentage of recreational discards in federal and state waters from 1981-2022.

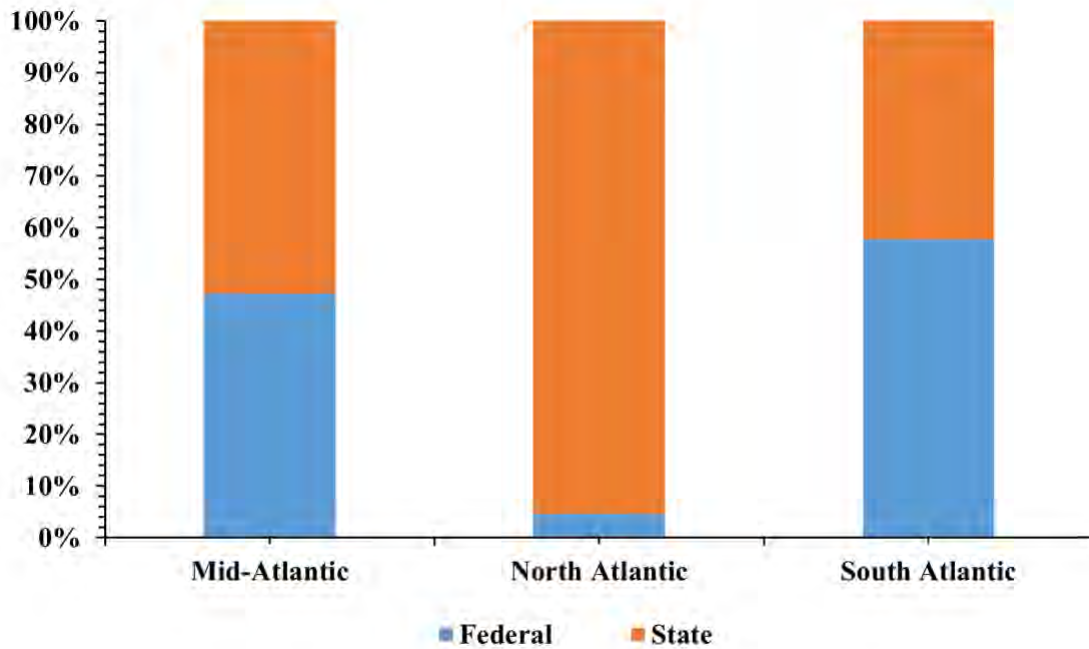


Figure 25. Percentage of recreational discards in federal and state waters for each region.

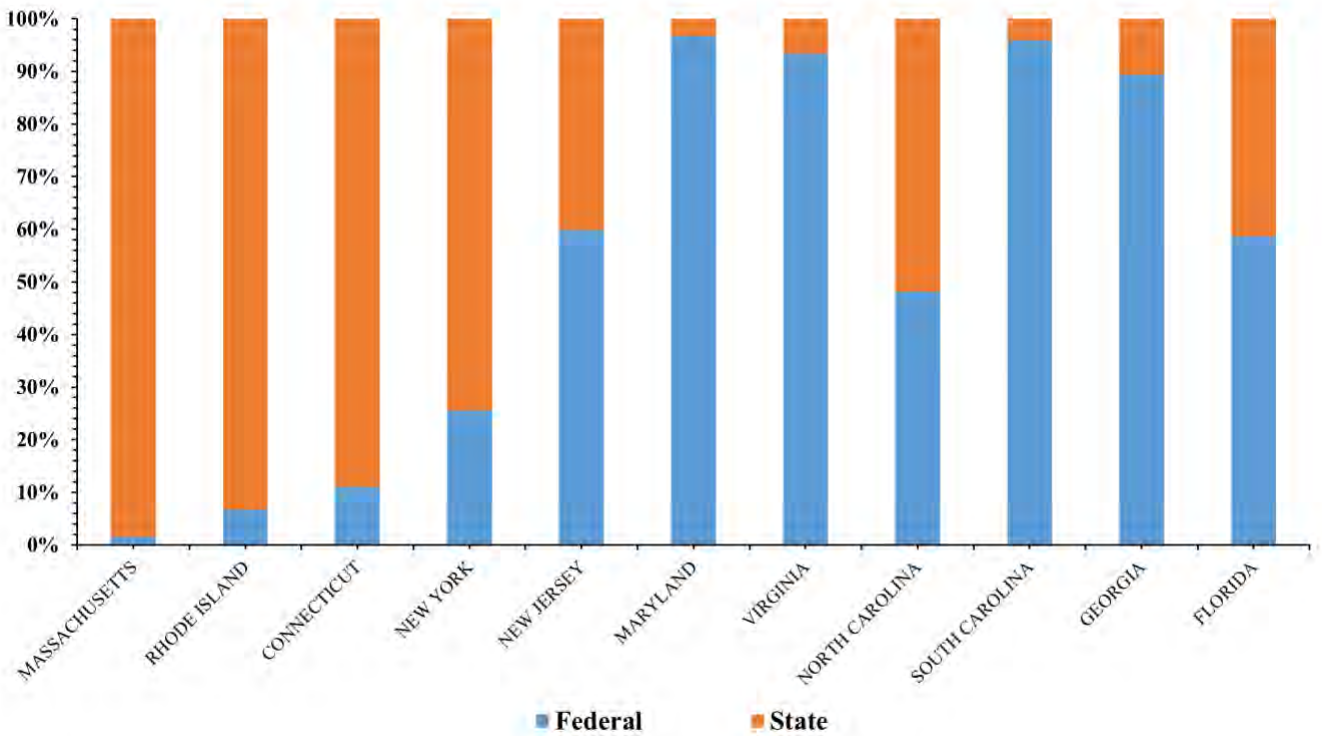


Figure 26. Percentage of recreational discards in federal and state waters for each state.

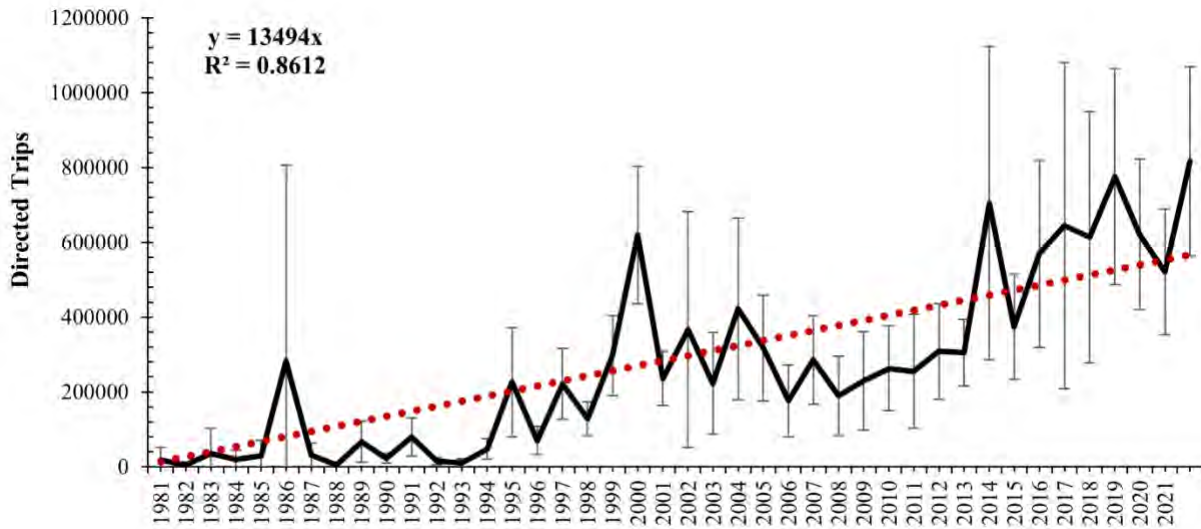


Figure 27. Directed trips for Little Tunny with 95% confidence intervals from 1981-2022.

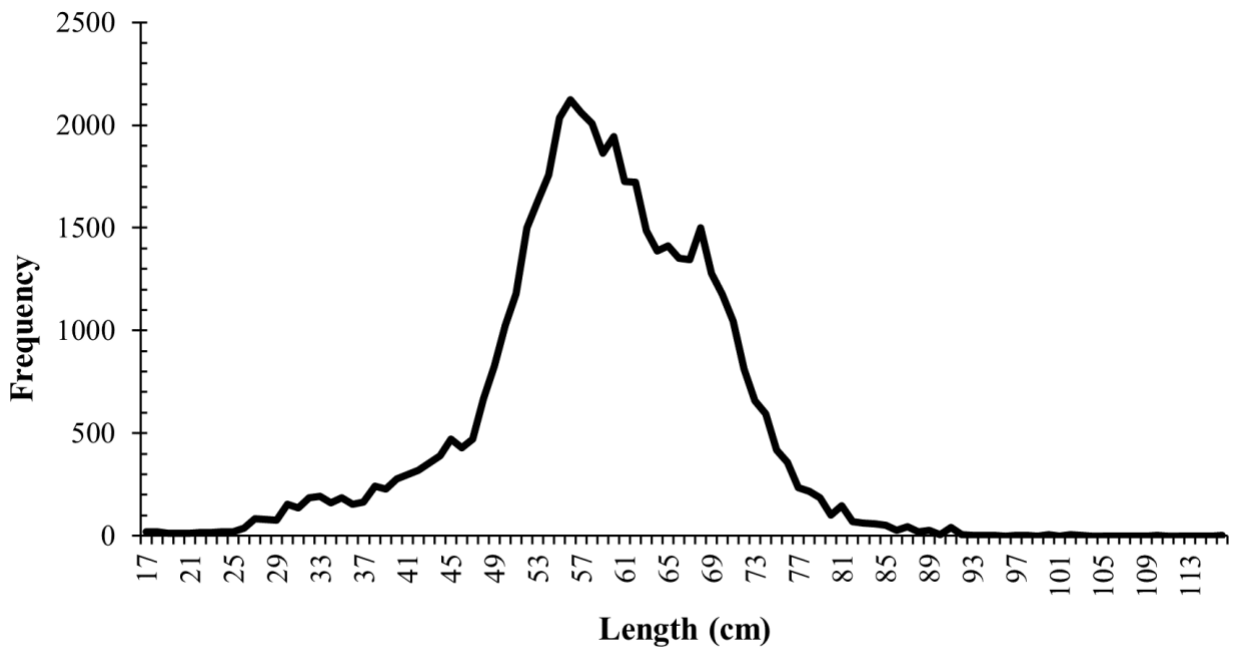


Figure 28. The aggregated length-frequency of the entire MRIP data set.

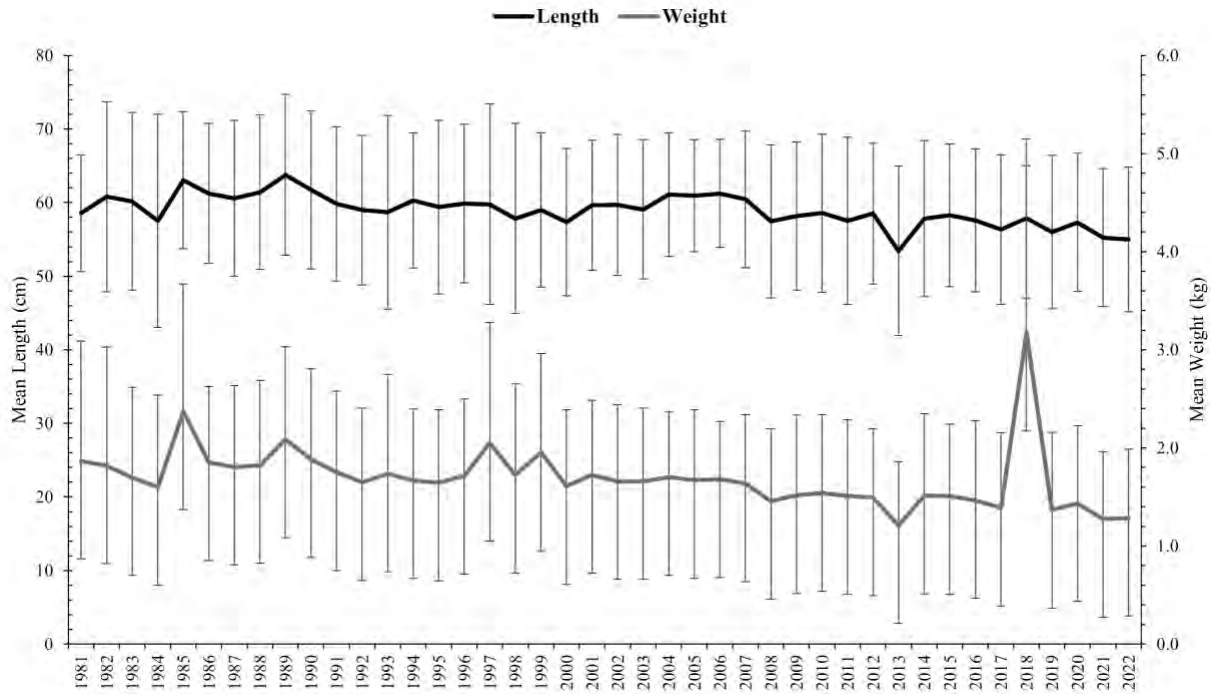


Figure 29. The mean length (Black) and mean weight (Gray) of MRIP sampled fish from 1981 to 2022, error bars based on standard deviation.

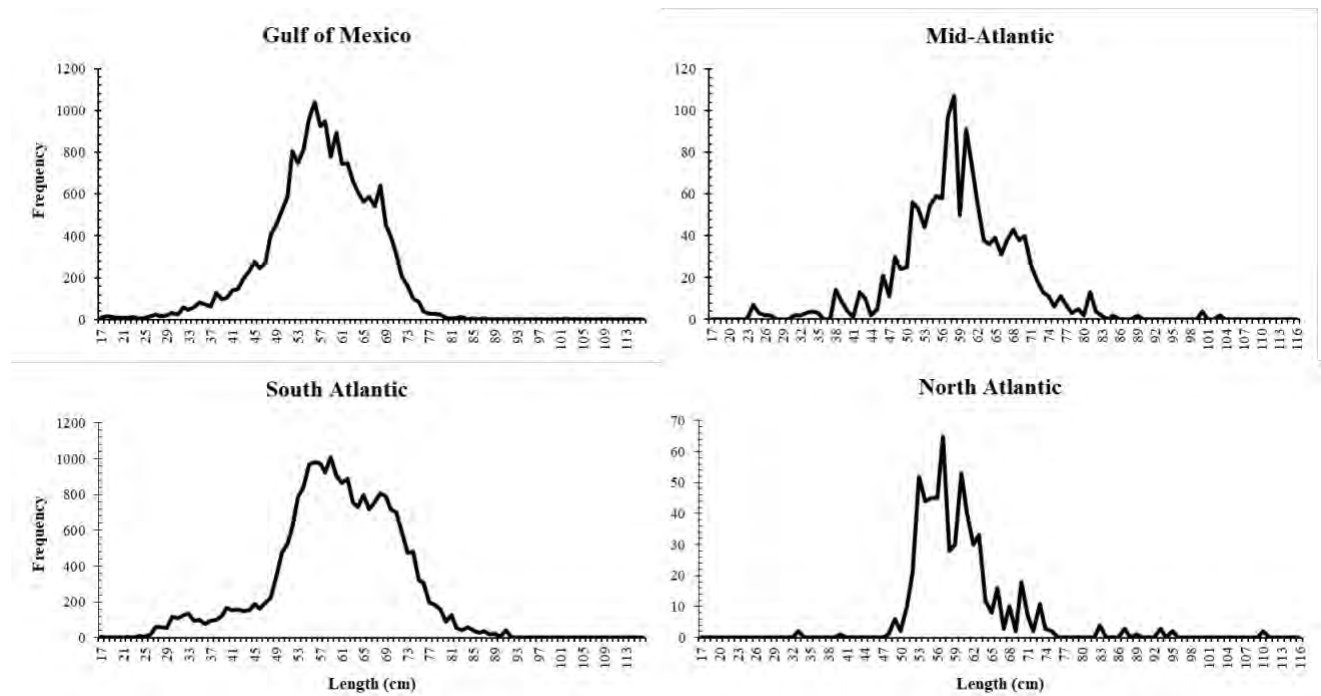


Figure 30. The length frequency distributions for the four sub-regions with data from 1981-2022.

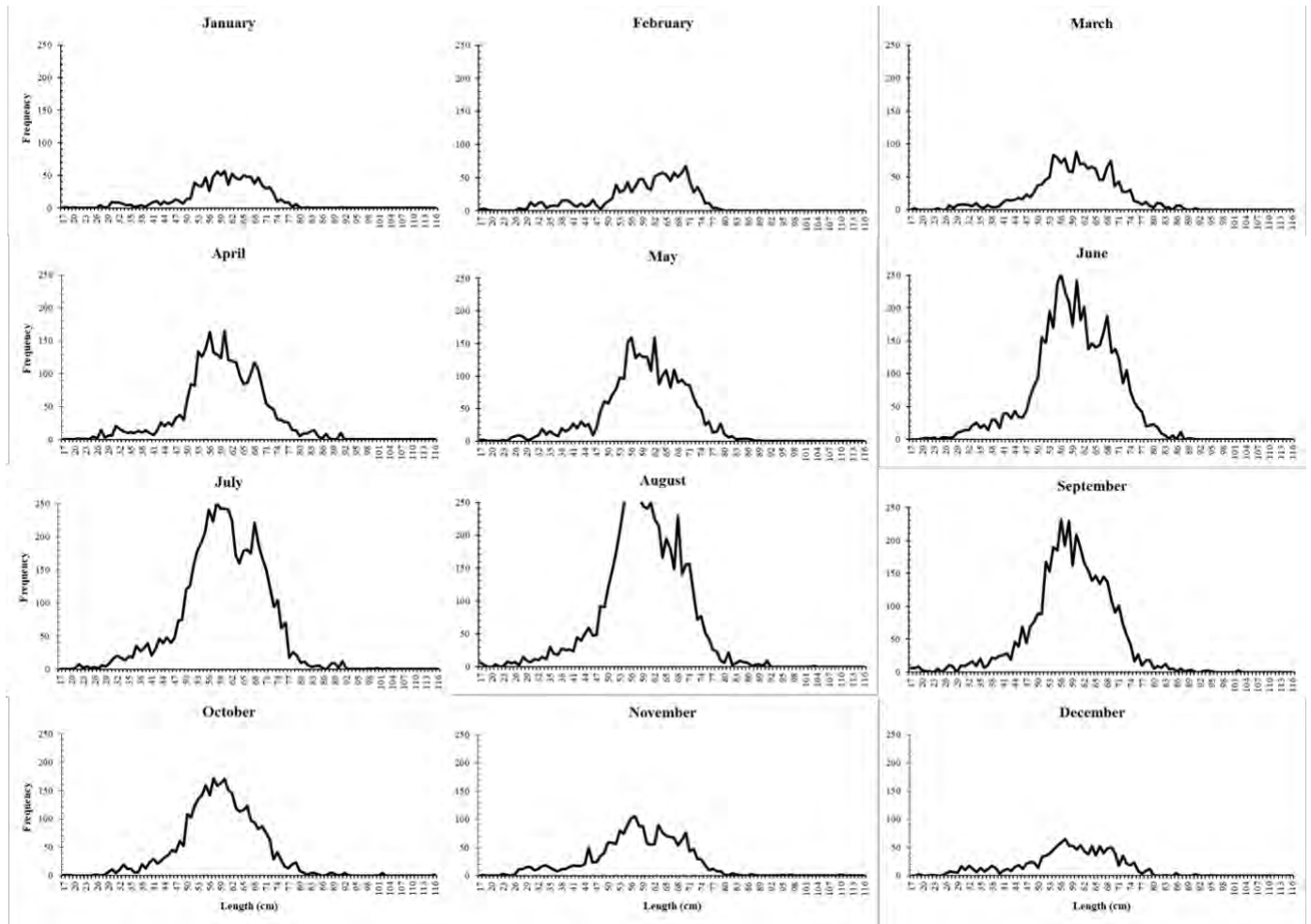


Figure 31. The length frequency distributions for by month with data from 1981-2022.

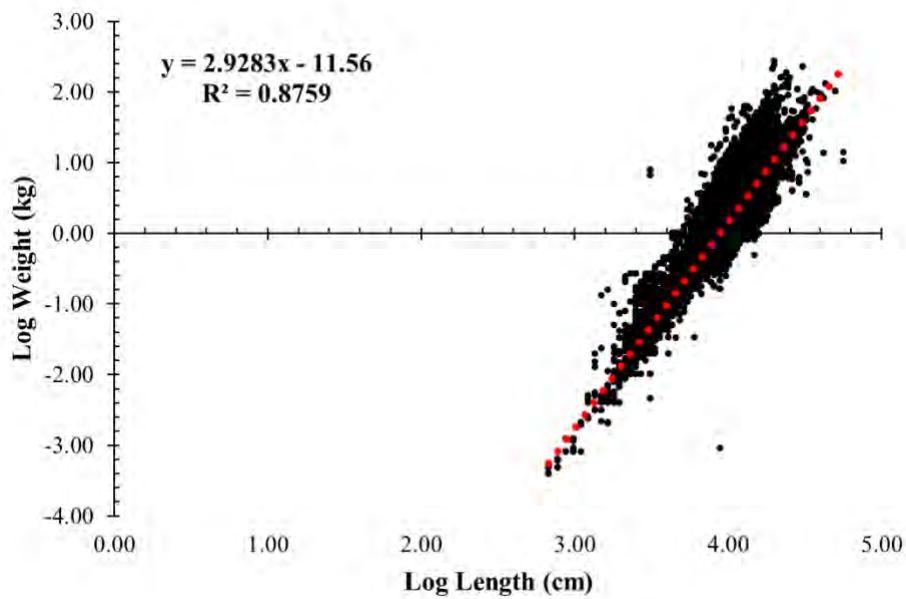


Figure 32. The logarithmic length-weight relationship on all data from 1981-2022.

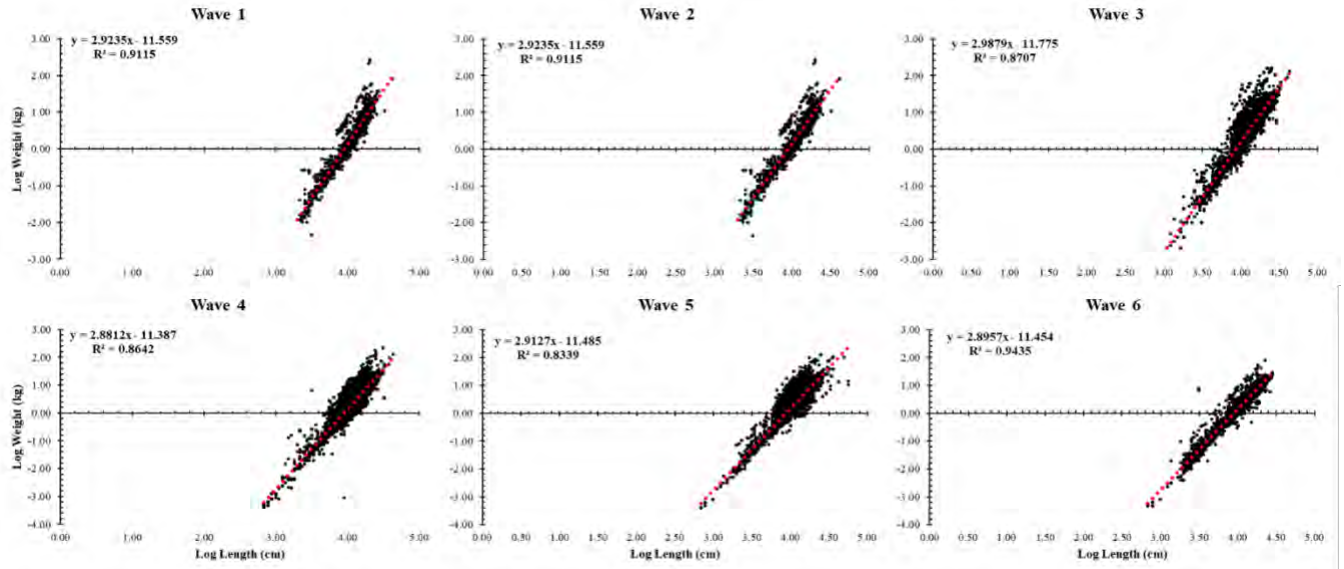


Figure 33. The logarithmic length-weight relationship for waves 1-6 using all data from 1981-2022.

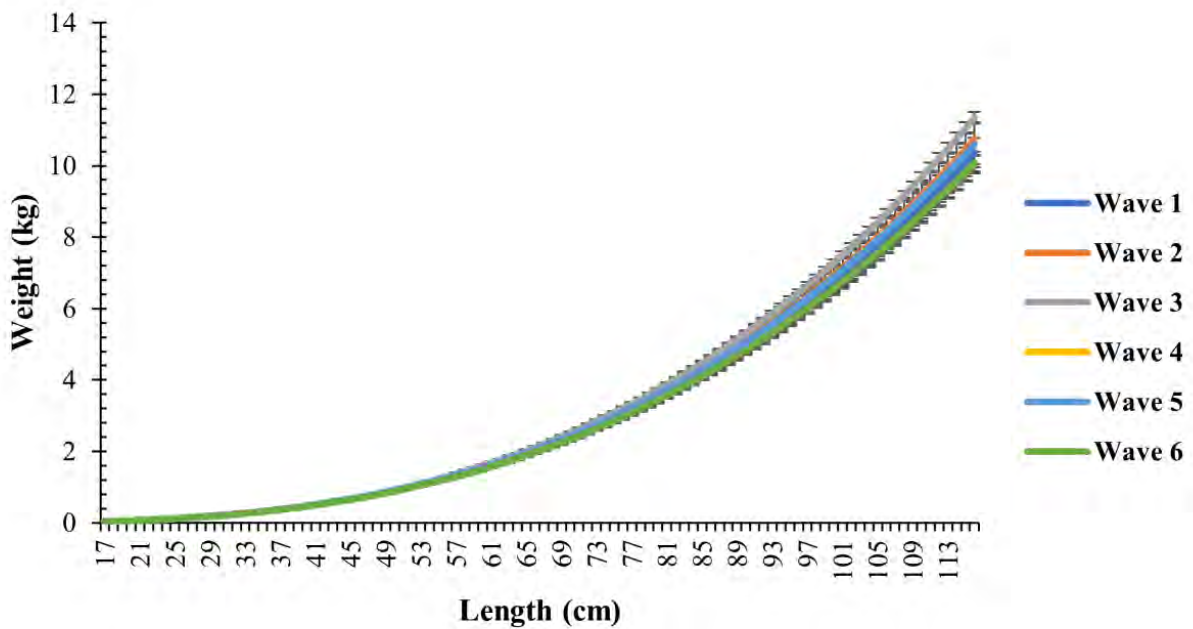


Figure 34. The predicted weights at length for waves 1-6 with 95% confidence intervals.

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 Commission
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%

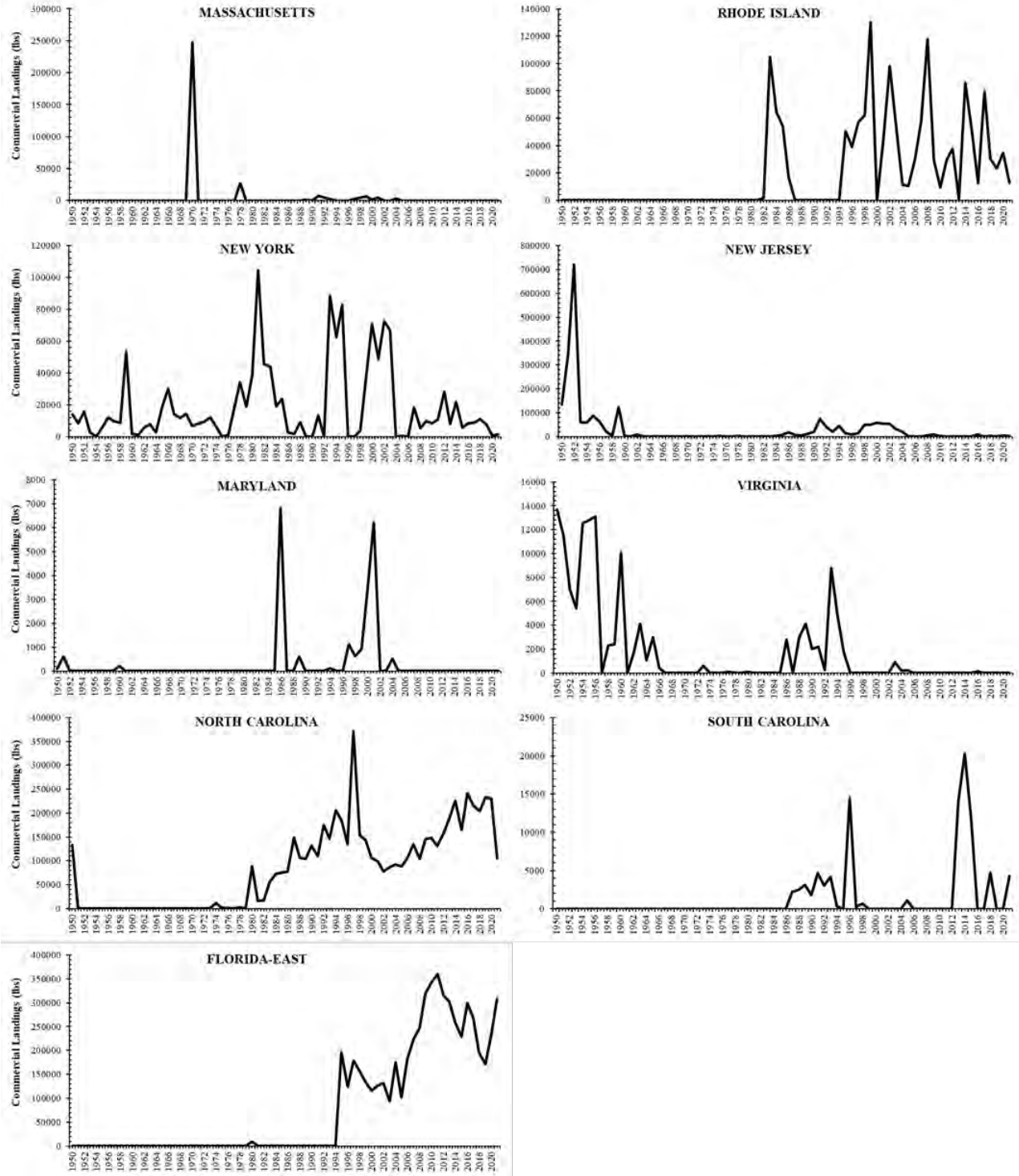


Figure A2.1. Commercial landings (lbs) 1950-2021 by state.

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%	-

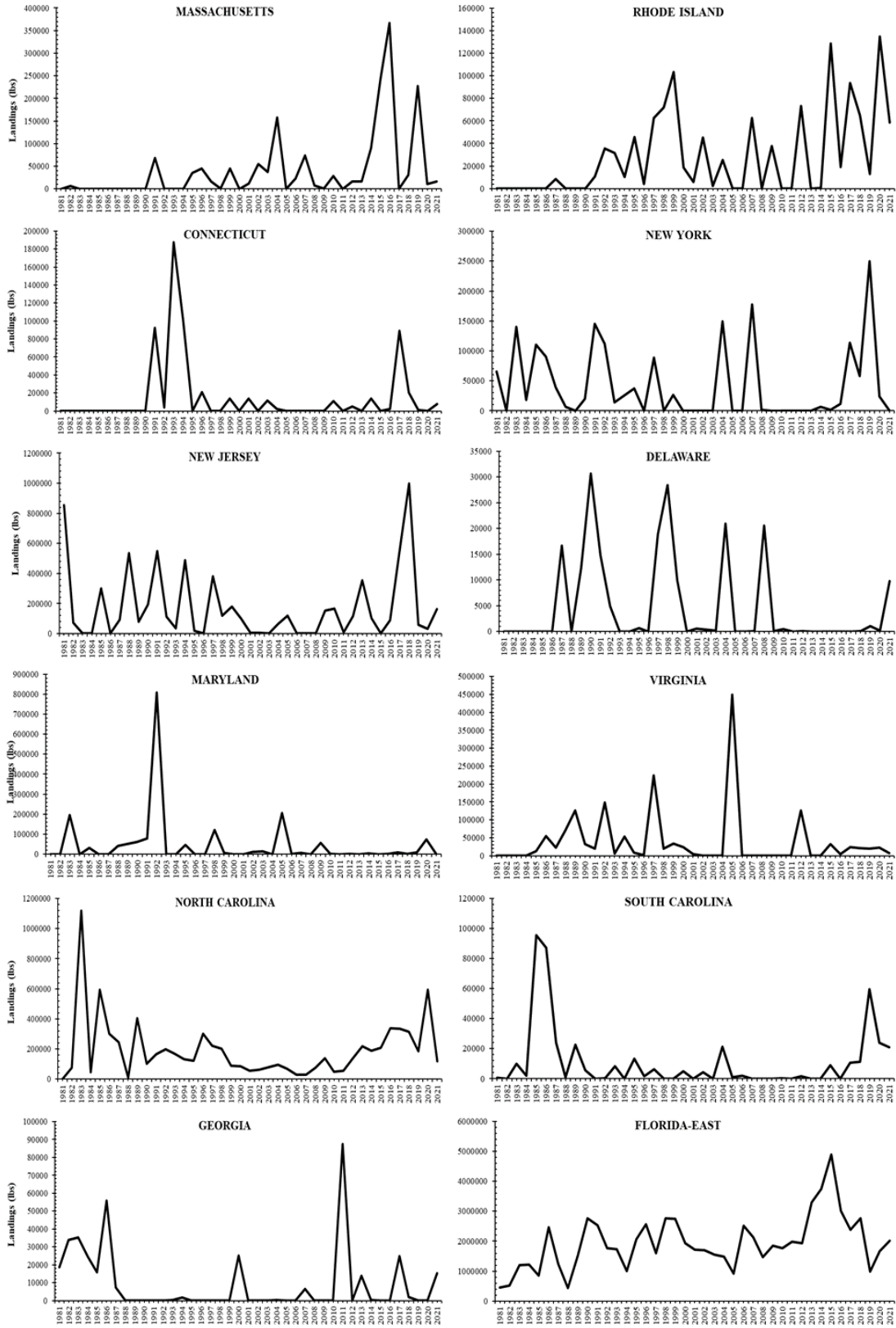


Figure A2.2. Recreational landings (lbs) 1981-2021 by state.

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%

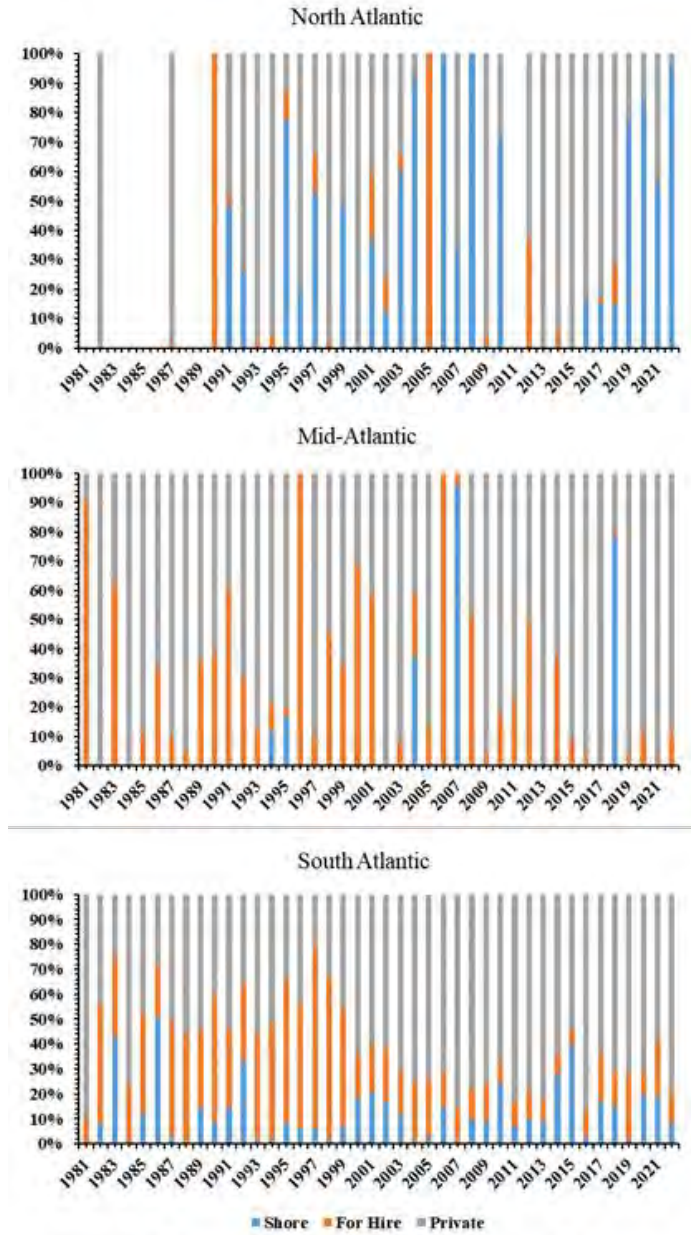


Figure A2.3. Percentage of recreational landing 1981-2021 by fishing mode for each region.

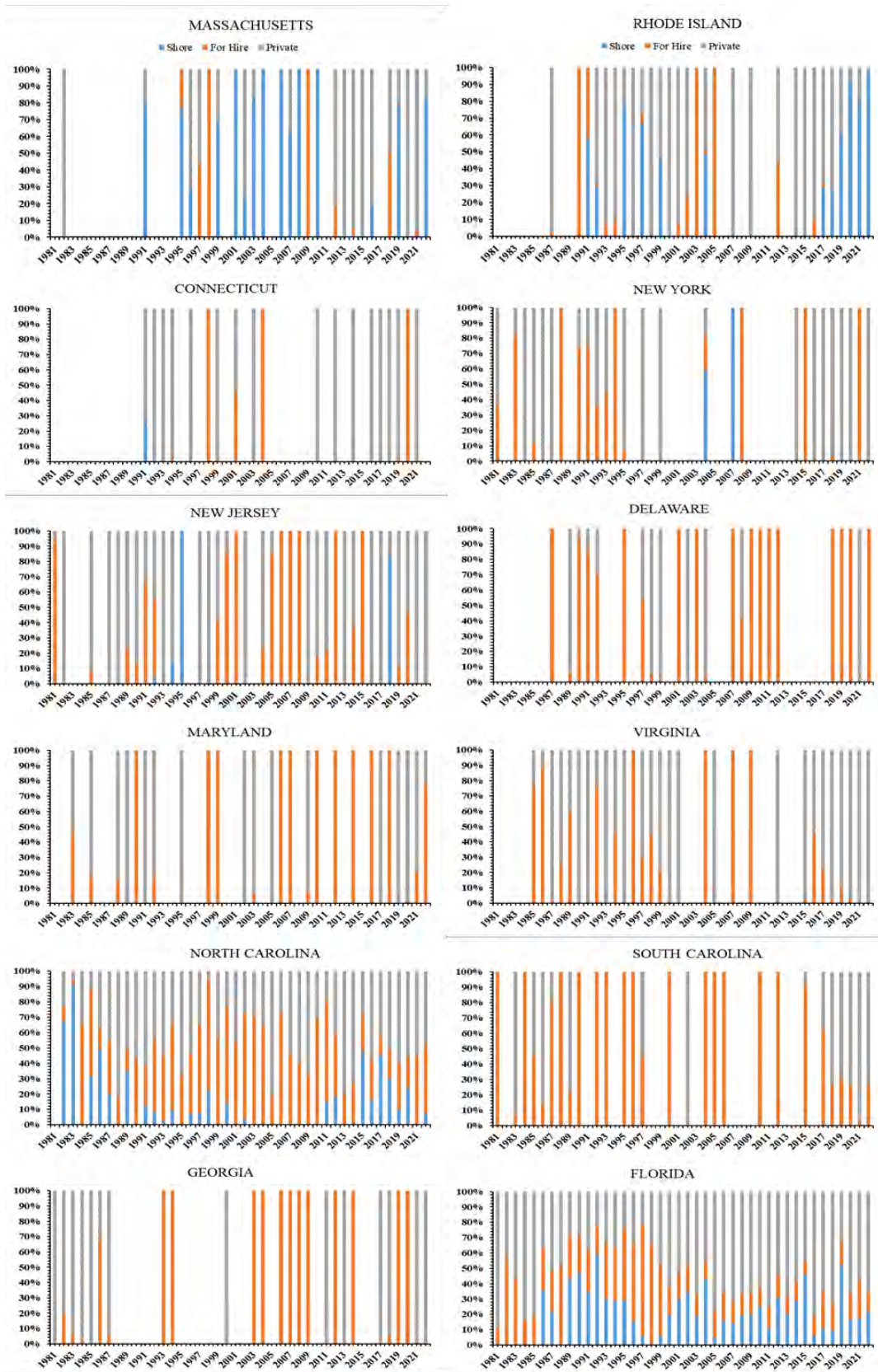


Figure A2.4. Percentage of recreational landing 1981-2021 by fishing mode for each state.

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%

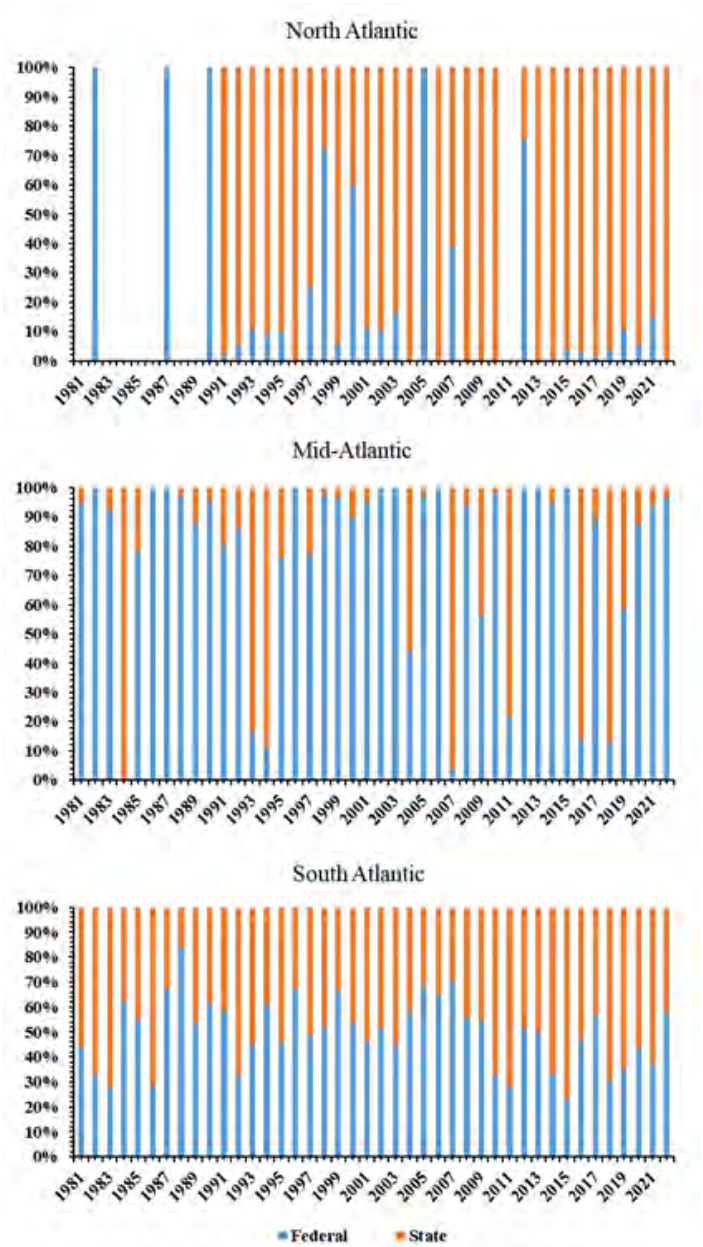


Figure A2.5. Percentage of recreational landing 1981-2021 in state and federal waters for each region.

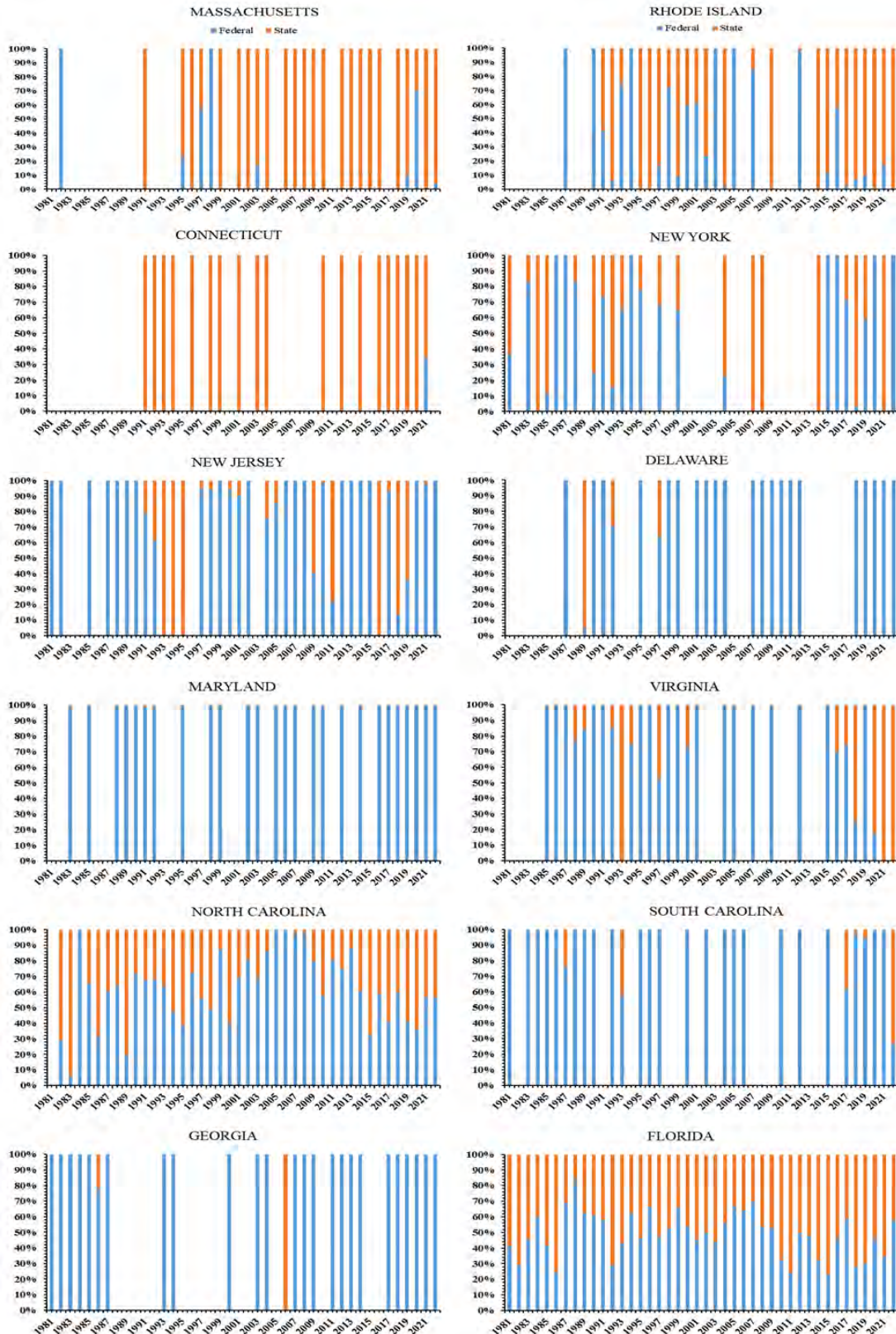


Figure A2.6. Percentage of recreational landing 1981-2021 in state and federal waters for each state.

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%

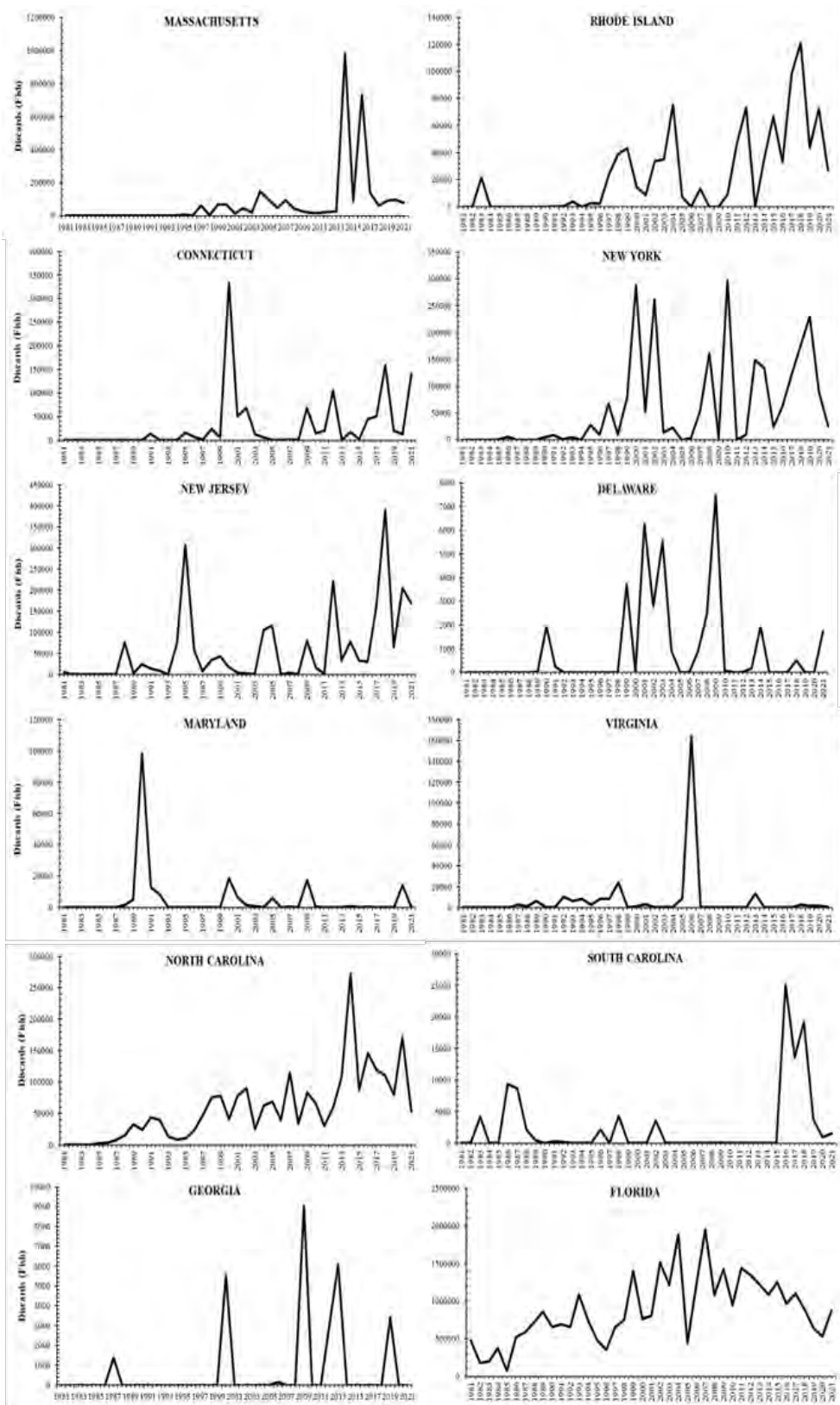


Figure A2.7. Recreational discards (individuals) 1981-2021 by state.

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%

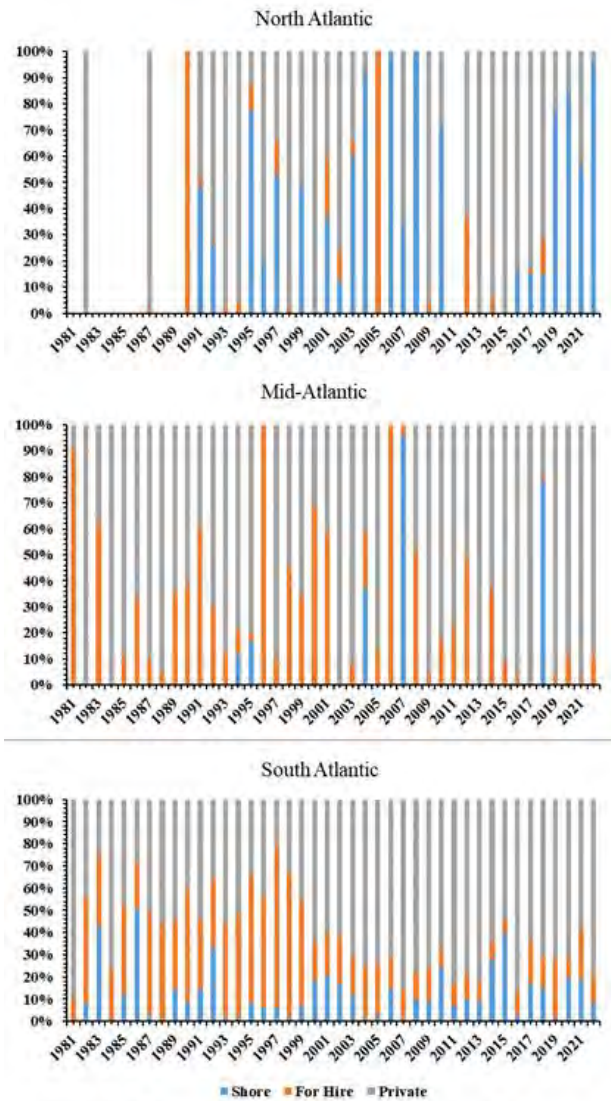


Figure A2.8. Percentage of recreational landing 1981-2021 by fishing mode for each region.

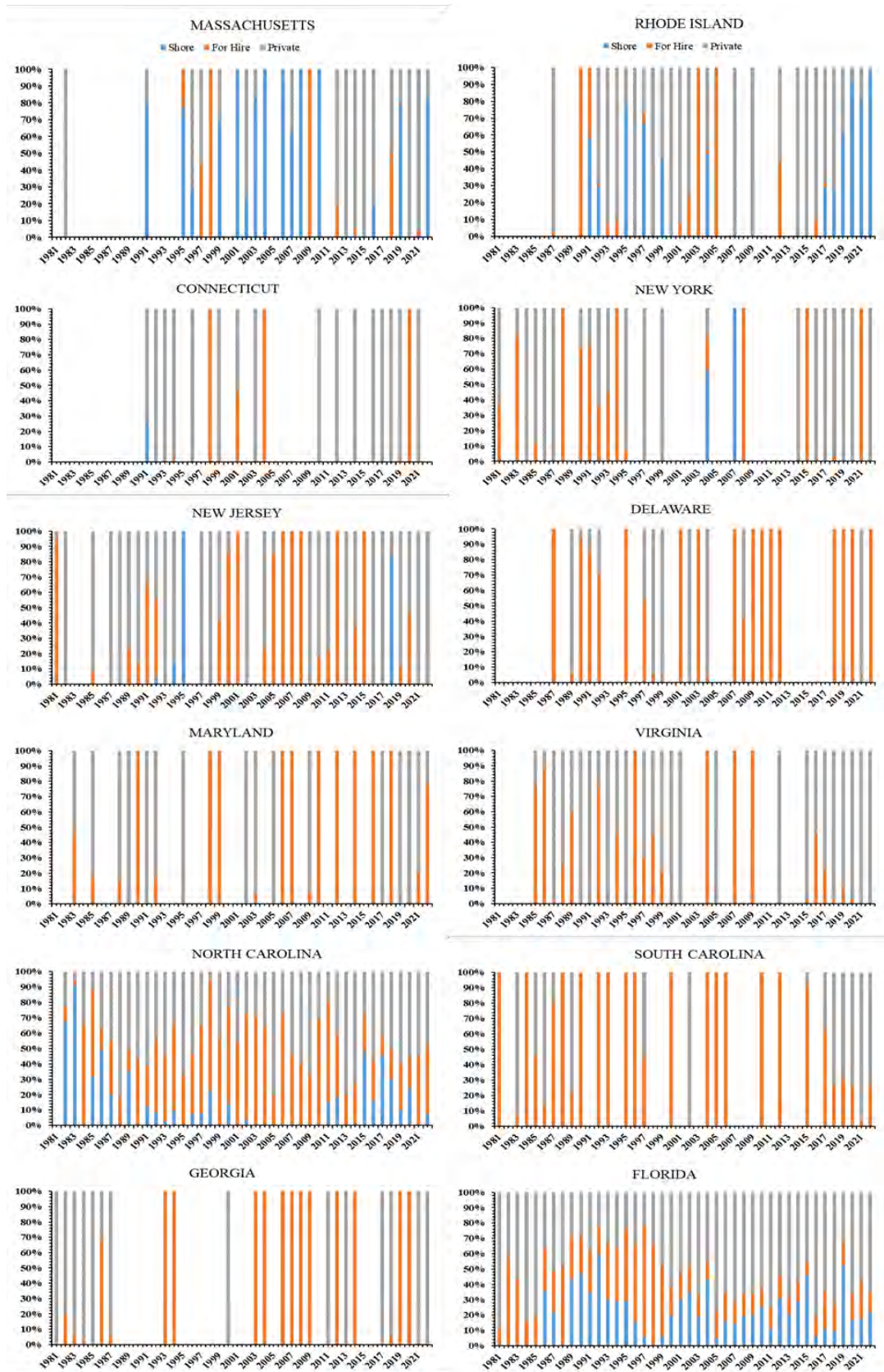


Figure A2.9. Percentage of recreational landing 1981-2021 by fishing mode for each state.

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%

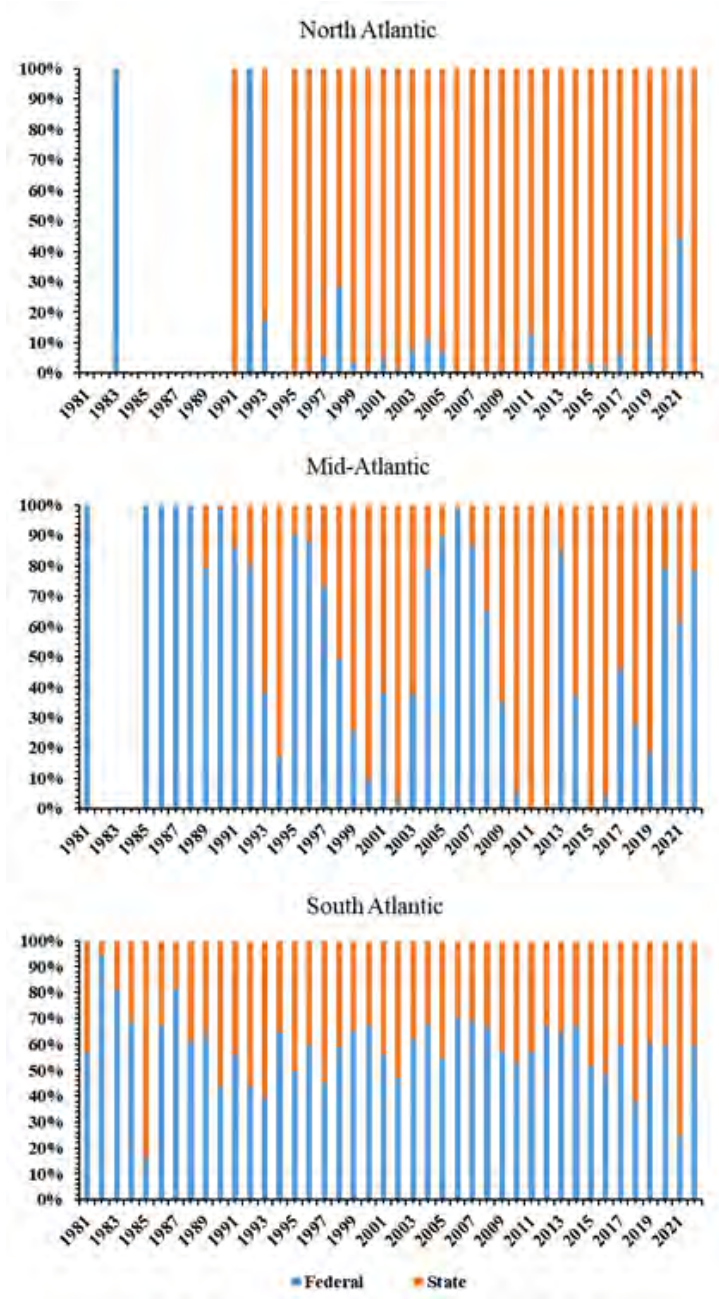


Figure A2.10. Percentage of recreational Discards 1981-2021 in state and federal waters for each region.

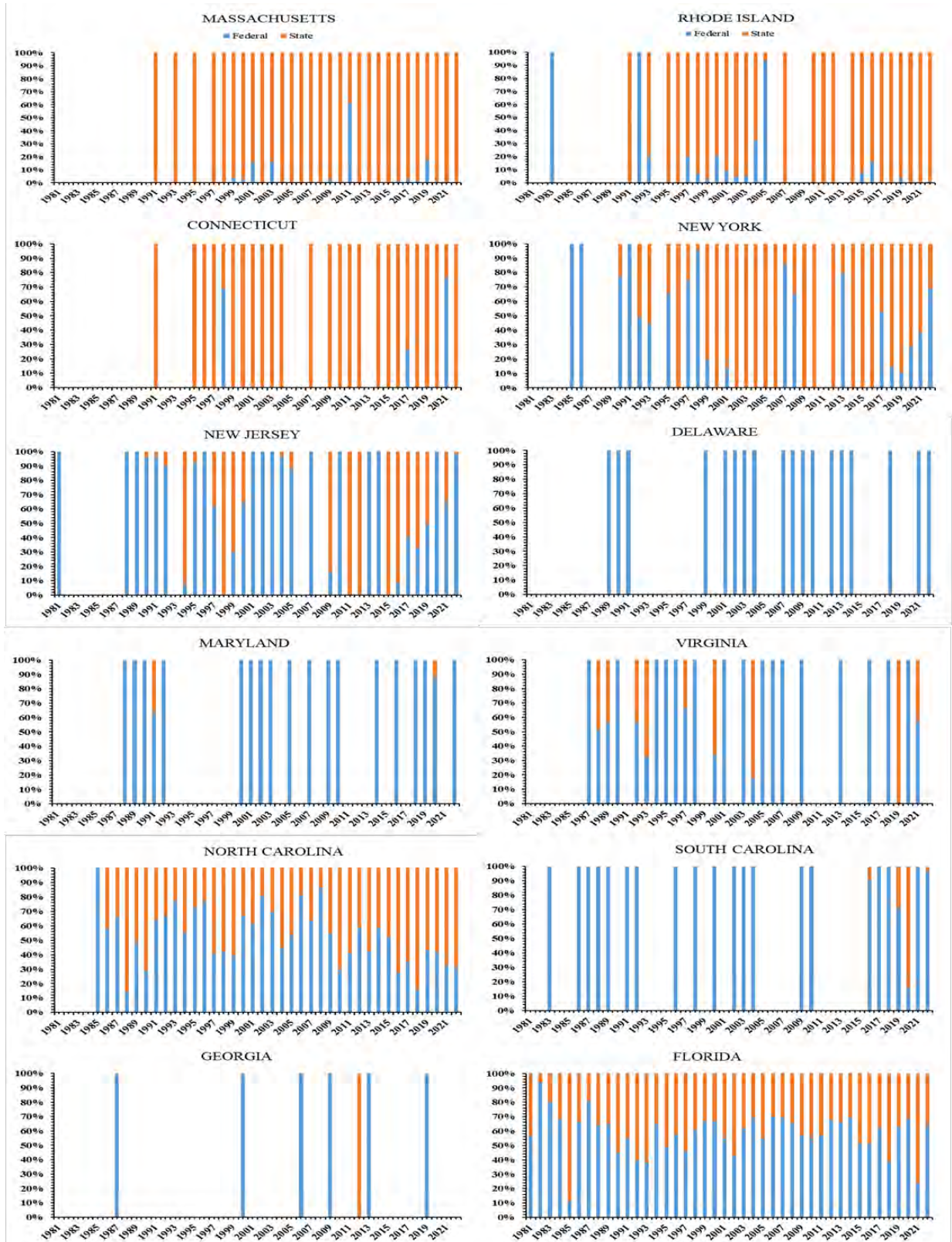


Figure A2.11 Percentage of recreational Discards 1981-2021 in state and federal waters for each state.

APPENDIX 3. LENGTH AND WEIGHT

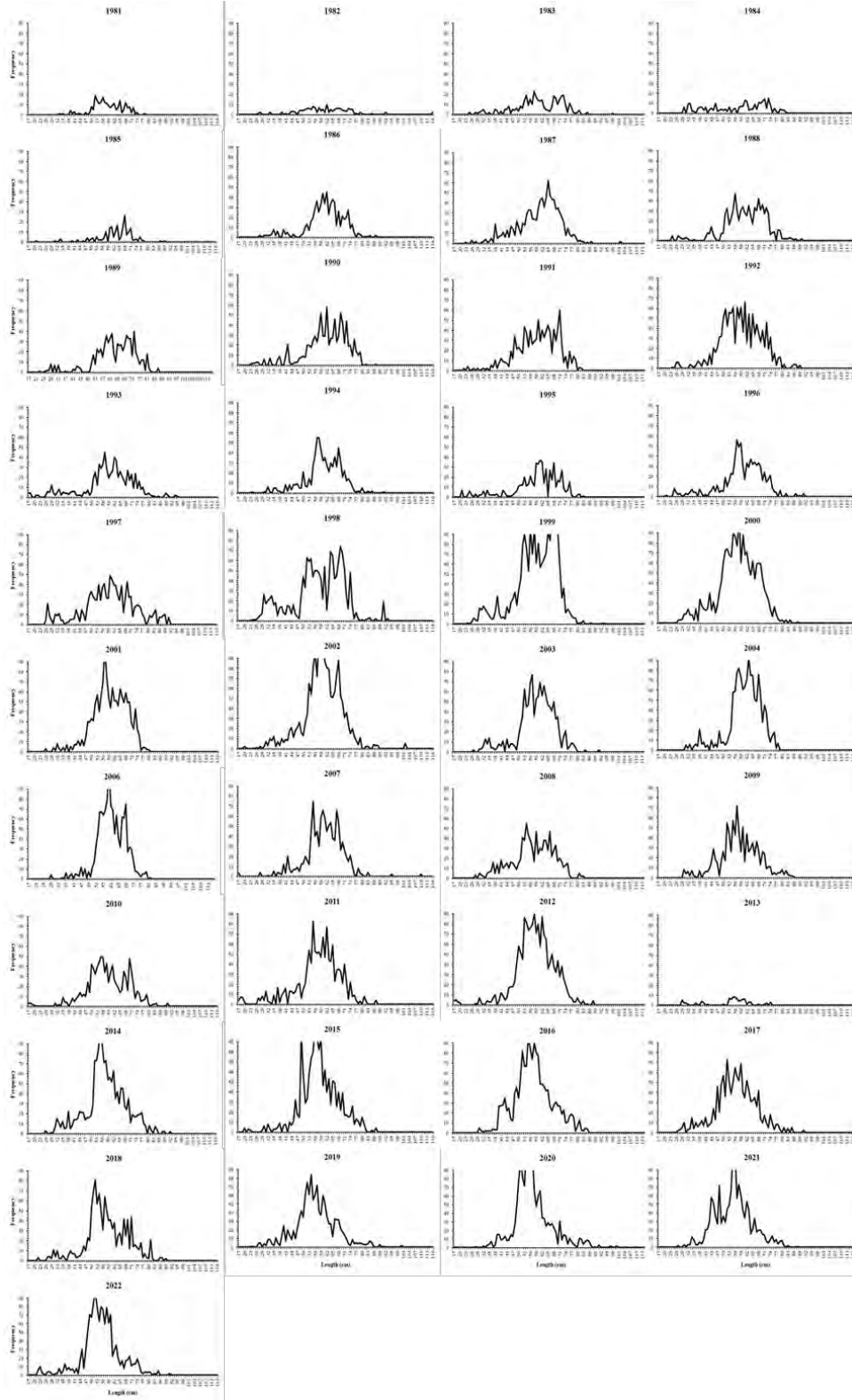


Table A3.1 The length frequencies from all regions by year.

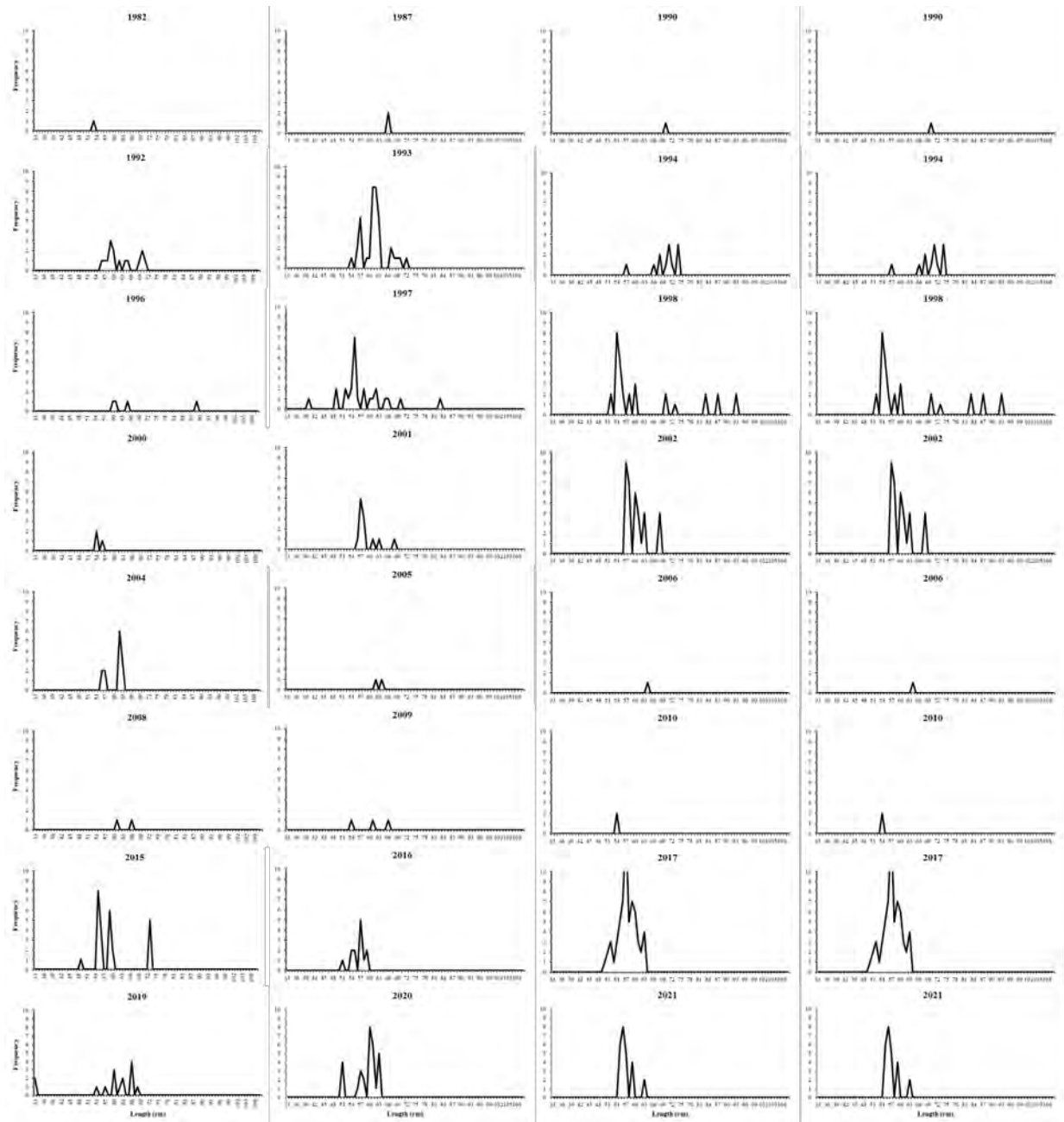


Figure A3.2. The length frequencies from the North Atlantic region by year.

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

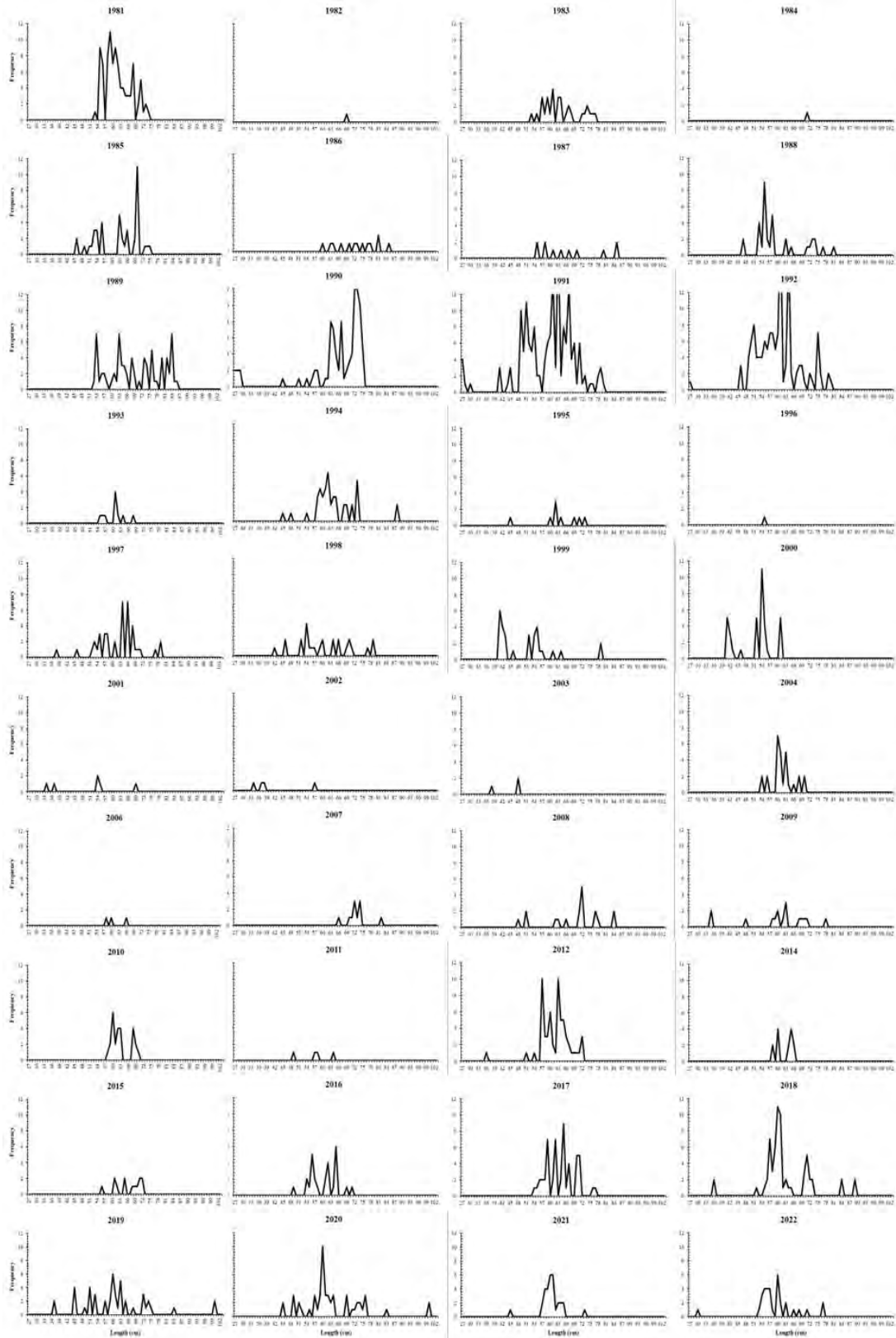


Figure A3.3. The length frequencies from the Mid-Atlantic region by year.

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

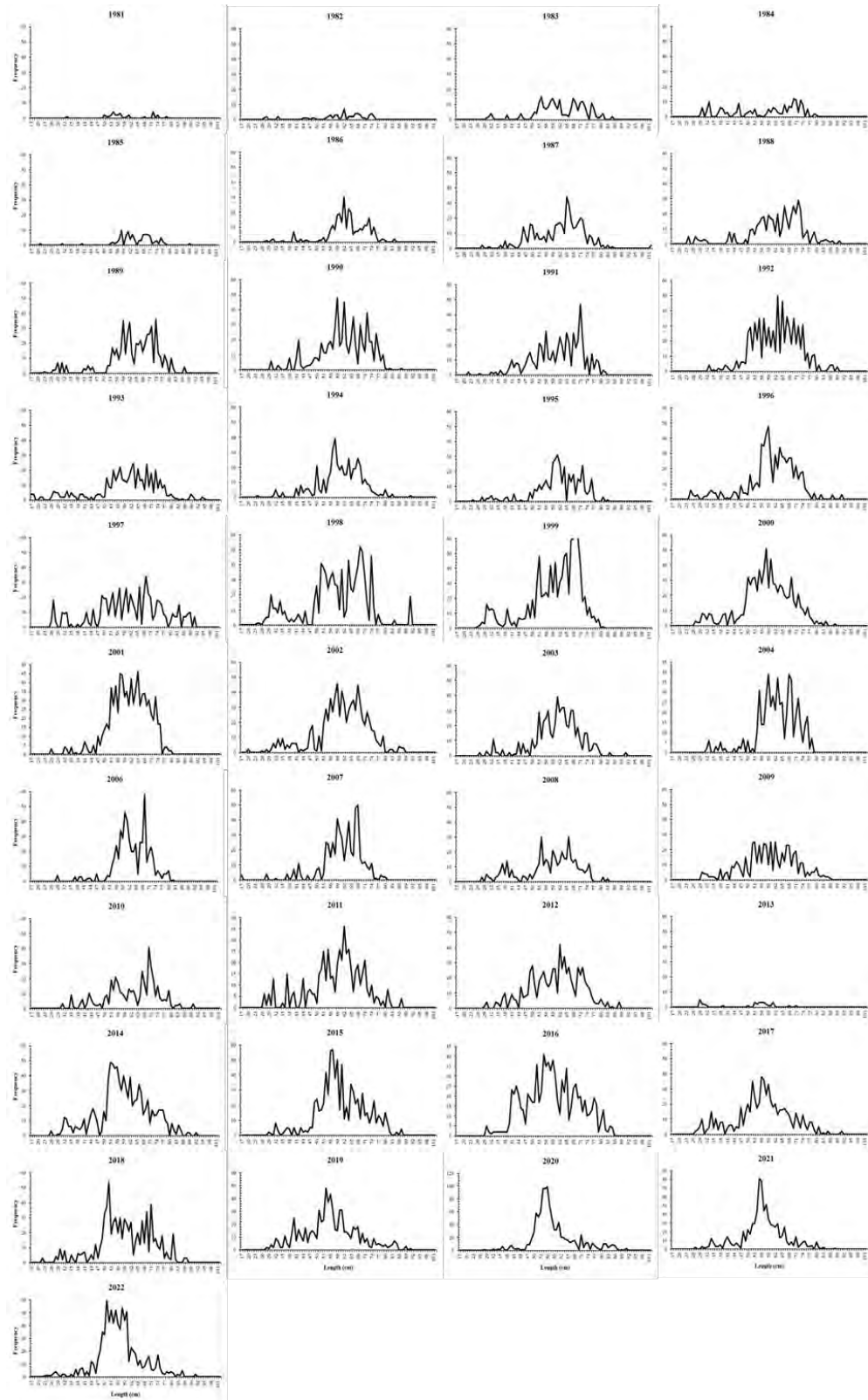


Figure A3.4. The length frequencies from the South Atlantic region by year.

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

American Saltwater Guides Association

A Review of the Fishery, Biology, and Life History of the Atlantic Bonito (*Sarda sarda*) in the Northwest Atlantic

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DRAFT

Final to be submitted within 15 days of the ASMFC Meeting

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EXECUTIVE SUMMARY

In recent years, Atlantic bonito 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). There is limited research on stock structure or status. However, in the Eastern Atlantic several studies have shown genetic differences amongst bonito from different locations (Vines et al. 2004; Turan 2015). Commercial landings over the past decade have been dominated by Rhode Island (43%). Commercial discards occur almost exclusively in gill net fisheries. Much of the recreational landings in the past decade are from Massachusetts, Rhode Island, New Jersey, and North Carolina. Approximately 30% of all recreationally caught bonito since 1981 were discarded, and survival of these fish is unknown. Recreational catch lengths and weights varied from 15 to 113 cm (Mean = 50.6 cm) and from <0.1 to 10.2 kg (Mean = 0.99 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.

There were no growth or maturity studies in United States waters, but growth and maturity parameters from the Mediterranean and East Atlantic are summarized in Tables 19 and 20. Atlantic bonito exhibit asynchronous oocyte development and multiple spawning events throughout the spring and summer with eggs being shed in several batches when water is the warmest (Majorova and Tkacheva 1959; Rey et al., 1984; Kahraman 2014). Spawning occurs near shore, and fecundity can vary from 304,000 and 1,150,000 oocytes (Macias et al 2005; Valerias and Abad 2006). Little is known about the natural mortality of Atlantic bonito but estimates in other areas of the Atlantic range from 0.46 to 0.869 (Baibbat et al. 2019; Petukhova 2020).

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BACKGROUND

Internationally, small tunas, including Atlantic bonito, support fisheries that are important both economically and as a source of food (Majkowski 2007; Isaac et al. 2012; Lucena-Fredou et al. 2021). The Atlantic bonito has become a popular target and welcomed bycatch in the United States recreational fisheries. Many are kept for food or utilized as bait for larger pelagic species and sharks. In recent years, there has been an abundance of juvenile bonito available to recreational anglers. This has resulted in many immature bonito being harvested, and there is concern as to what impact this will have on their population (McManus, C. Personal Communication).

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 Atlantic bonito, however the species was identified as a species for which more data should be collected in order to assess the stock (ICCAT 2019). In the United States, Atlantic bonito are not managed and, unlike other small tunas and mackerels, were not included under the Coastal Migratory Pelagics Fishery Management Plan (CMP FMP) (Federal Register 1982). 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 Atlantic bonito (ICCAT 2019). There is currently no management structure in place for bonito but attempts to define stock structure and complete data-poor assessments are underway (ICCAT 2021). Currently, bonito 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, and there are only a handful from the other stock areas. Vines et al. (2004) found genetic isolation between bonito in the Western and Eastern Mediterranean. Turan (2015) found genetic differences between fish from the Black, Mediterranean, and Aegean seas. There were also significant genetic differences found in Mediterranean and West African caught bonito (Vines et al. 2020). Despite being separate management units, bonito 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 bonito 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 Atlantic bonito in any of the ICCAT management areas, but in 2017 they were identified by ICCAT as a priority to be evaluated (ICCAT, 2017). There have been several examinations of stock status and stock risk done recently, but much of it was focused outside of the Northwest Atlantic. Pons et al. (2019A) used

length based spawning potential ratio (LBSPR) and length based integrated mixed effects (LIME) models to assess the stock status of Northeast Atlantic and Mediterranean bonito. The other stock areas were excluded due to a lack of data (Pons et al. 2019A). There were conflicting results between the two models for both stock areas (Pons et al. 2019A). Catch based assessment models however, showed that biomass of bonito in the Northeast Atlantic was above B_{MSY} . Petukhova (2020) use LBSPR to assess bonito in the Northeast Atlantic and concluded that overfishing is occurring. 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 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 was 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, statistical 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 used and states responsible for discarded bonito. The non-confidential portion of this data represented 81% of all observed Atlantic bonito 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 by 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

Up until 1977, commercial bonito landings were highly variable, ranging from 35,000 and 288,200 lbs. (Mean = 123,640.7 lbs.). From 1976 until 2000, commercial landings were higher and more variable (Mean = 272,314.3 lbs.) (Figure 2). Landings in the early 2000s dropped dramatically and have remained relatively stable over the past decade, between 25,378 and 81,565 lbs. (Mean = 49,905.7 lbs.).

Prior to the 1970s the Mid-Atlantic was responsible for most of the landings (Figure 3). Over the entirety of the time-series the North Atlantic averaged the highest landings (26,738.3 lbs.), with the majority occurring from the 1970s to the 1990s (Table 2). Over the past decade the North Atlantic has been responsible for 46% of the landings (Figure 3).

Much of the early landings in the Mid-Atlantic came from a combination of New Jersey and New York (Figure 4). Over the past decade Rhode Island has been responsible for 43% of all commercial landings of bonito (Table 2). The rest of the landings occurred in predominantly in New York, New Jersey, and North Carolina (Figure 4). Individual state and region data can be seen in Appendix 2.

Commercial Discards

Over 99% of observed Atlantic bonito discards from the Northeast Fisheries Observer Program were caught by gill nets. There are three types of gillnets that make-up this 99%: fixed (38%), drift floating (44%), and drift sinking (17%). The annual breakdown of discards by gear can be seen in Figure 5. Only five states in the Northeast Fisheries Observer Program have

recorded bonito discards for the time series, and the majority of these discards come from New Jersey (53%) and Rhode Island (25%) (Figure 6). There is very little data on discarded Atlantic bonito from the Southeast Fisheries Observer Program.

Recreational Landings

Since 1981 recreational landings have ranged from 69,609 lbs. in 2016 to 11,527,512 lbs. in 1982 (Mean = 1,192,108.0 lbs.) (Table 3) (Figure 7). Landings have declined from the highs of the early 1980s and remained relatively stable since the 1990s. The Mid-Atlantic has been responsible for the majority of the landings (61%) over the entirety of the time series (Figure 8). Over the past decade, landings have been more evenly distributed between the North, South, and Mid-Atlantic (Table A2.3). Much of the landings in the past decade are from Massachusetts, Rhode Island, New Jersey, and North Carolina (Figure 9) (Table 4). Individual state plots and 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, with the exception of a spike in 2017 (Figure 10). Shore landings appear to vary by year, perhaps as a result of fish movement and availability to shore fishermen. Private boats represent the majority of landings in all regions, except the Mid-Atlantic where for-hire vessels are the most common mode (Figure 11) (Table 5). Shore fishing is most common in the North Atlantic (Figure 11) (Table 5). Individual region and state catch by mode can be seen in Figure 12, Table 6, 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, but more landings occurred in federal (78%) than state (22%) waters (Figure 13) (Table 7). The majority of the landings in the North Atlantic (55%) came from state waters (Figure 14) (Table

7). The Mid-Atlantic (93%) and South Atlantic (65%) catches were predominantly in federal waters (Figure 14) (Table 7). Individual state catch in state and federal waters can be seen in Figure 15, Table 8 Appendix 2.

Recreational Discards

With the popularity of catch and release recreational fishing, discards represent an important component of the fishery. Over the entire time-series 30% of bonito caught were discarded (Table 9) (Figure 16). Almost half the bonito caught in the North Atlantic (46%) and South Atlantic (46%) were discarded (Figure 17) (Table 9). Since 1981 recreational discards have ranged from 5,691 fish in 2009 to 826,667 fish in 1988 (Mean = 148,082 fish) (Table 10) (Figure 18). There is no obvious trend across the time-series, but there does appear to be periodic spikes in discards. The discards follow a similar pattern to landings across regions (Figure 19). The Mid-Atlantic was responsible for 68% of discards overall, but the North Atlantic was responsible for 47% over the past decade (Table A2.9). Florida has the most discards of any state, with much of that occurring early in the time series and very little in the past decade (Figure 20) (Table 11). Massachusetts and New Jersey have the most discards in 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 everywhere. Across all regions there appears to be a decrease in discards from for-hire vessels in recent years (Figure 21). Shore discards appear to vary by year and are more common in the North Atlantic (Figure 22) (Table 12). Rhode Island and Massachusetts have the highest percentage of shore released Bonito (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 the discards in the North Atlantic (84%) came from state waters (Figure 25) (Table 14). The majority of Mid-Atlantic (68%) and South Atlantic (63%) discards occurred in federal waters (Figure 25) (Table 14). In the South Atlantic, Florida and North Carolina are the only states with a high percentage of discards in state waters (Figure 26) (Table 15).

Recreational Effort

The number of directed trips, trips where bonito were the primary or secondary target, has varied from 27,454 trips in 1983 to 335,900 trips in 2014 (Mean = 174,653.4 trip). There has been an increasing trend over the time-series ($R^2=0.7$), specifically starting in 1993 (Figure 27).

Release Mortality

Since 30% of all recreationally caught Atlantic bonito are released, post-release mortality plays an important role in determining the total removals of the fishery. There are currently no estimates of post-release mortality of Atlantic bonito, but a physiological response to the catch process has been recorded (Skomal 2006).

LENGTH AND WEIGHT

Data Sources

All length and weight data utilized in this section comes from MRIP survey dating back to 1981. Because 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 across all observed lengths from each wave's length-weight relationship were compared using an analysis of covariance (ANCOVA).

Recreational Size Structure

There were 6,874 length samples collected by MRIP from 1981 to 2022 ranging from 15 to 113 cm (Mean = 50.6 cm; SD = 12.11 cm) (Figure 28). Annual mean length ranged from 35.5 cm in 2006 to 69.4 cm in 2010 (Table 16) with no significant trend across the time-series (Figure

29). 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 Caribbean sub-region was excluded from the spatial comparisons due to a lack of samples ($n=43$ across all years). Of the remaining sub-regions, the samples were relatively evenly distributed. Mean length across the sub-regions ranged from 47.1 cm in the Mid-Atlantic, to 53.0 cm in the North Atlantic (Table 17). There were no significant differences in length distributions amongst sub-regions (K-S Tests; $p > 0.05$) (Figure 30), and all annual distributions for each sub-regions can be seen in Figures A3.2-9. There was also no significant difference in length frequency distributions when grouped by month. (K-S Tests; $p > 0.05$) (Figure 31),

There were 6,864 weight samples collected by MRIP from 1981 to 2022 ranging from < 0.1 to 10.2 kg (Mean = 0.99 kg; SD = 0.844 kg) (Table 16). Annual mean weight ranged from 0.34 kg in 2006 to 3.30 kg in 2007 (Table 16), with no significant trend across the time-series (Figure 29). Mean weight across the sub-regions ranged from 0.87 kg in the Mid-Atlantic, to 1.07 in the North Atlantic (Table 17).

Length-Weight Relationships

The overall log-transformed length-weight relationship (Equation 1) showed a good fit ($R^2 = 0.94$) (Figure 32). When separated by wave, the R^2 values ranged from 0.86 for wave six to 0.96 for waves two and five (Table 18). Individual 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 except for some deviation in the larger sizes of wave one (Figure 34). The ANCOVA showed no significant difference in predicted weights amongst waves ($p > 0.05$).

Equation 1.

$$\log (W) = \log (3.7E^{-6}) + 3.15\log (L)$$

LIFE HISTORY

Growth and Maturity

We were unable to find any growth studies on Atlantic Bonito from the United States Atlantic coast or Gulf of Mexico. There has been a significant amount of work done on this species in the Eastern Atlantic, Mediterranean, and Black Sea Franicevic et al. 2015; Pons et al. 2019). Combined sex maximum size (L_{∞}) ranged from 62.5 cm (24.6 in) in Western Mediterranean (Valeiras et al. 2008) to 103 cm (40.6 in) in the Black Sea (Zusser 1954) (Mean = 77.51 cm or 30.35 in) (Table 19). Growth rates estimates (k) varied from 0.13 (Zusser 1954) to 0.86 (Demire 1963; Turgan 1958) (Table 19). Age at length zero (t_0) varied from -2.74 (Hansen 1989) to -0.44 (Cengiz 2013) (Mean = -1.55) (Table 19). The two studies that separated sex both found that males grow slower and to larger sizes than females (Cengiz 2013; Kahraman et al. 2018).

Similar to growth, there were no available papers from the United States Atlantic coast or Gulf of Mexico that examined maturity of bonito. There were maturity studies located in the Eastern Atlantic, Mediterranean, and Black Sea (Table 20). Male length at first maturity (L_{50}) ranged from 35.8 cm (14.1 in) in the Mediterranean (Cengiz 2013) to 41 cm (16.1 in) off the coast of Morocco (Baibbat et al. 2016) (Table 20). Female L_{50} ranged from 37 cm (14.6 in) (Postel 1954) to 45 cm (17.7 in) off the coast of Morocco (Dardignac 1962) (Table 20).

Distribution and Movements

Atlantic bonito are distributed throughout coastal waters of the Eastern Atlantic, Mediterranean, and in Western Atlantic, from the Nova Scotia to Uruguay (Valerias and Abad 2006). Larvae are pelagic and limited to the warmest part of the water column, above the thermocline (Reglero et al. 2018). These larvae range from 4 mm at hatching to 2 cm when they

are considered juveniles (Valerias and Abad 2006). Other small tuna larvae off Florida have been shown to feed almost exclusively on appendicularians (Llopiz et al. 2010), but there has been no work specific to Atlantic bonito larvae.

Adult Atlantic bonito remain within the waters of the continental shelf and may move into estuaries (Valerias and Abad 2006). They school by size with other Scombrids but can scatter during certain times of the year (Collette and Nauen 1983). In the Western Atlantic, bonito feed mainly on *clupeids*, *Peprilus paru*, *Leiosomus xanthurus*, *Anchoa sp.*, *Scomberomorus sp.*, *Prionotus sp.*, *Loligo sp.*, *Penaeus sp.*, and squid (Bigelow and Schroeder 1953; Boschung 1966). Along the East Coast of the United States, adults most likely move as far North as Canada during the summer and early fall, before migrating back to the South for the winter, but there is a lack of official documentation of these migrations. Bonito can tolerate temperatures from 12° to 27°C and salinities 14 to 39 (Bianchi et al. 1999).

Spawning

Atlantic bonito exhibit asynchronous oocyte development and multiple spawning events throughout the spring and summer, with eggs being shed in several batches (Majorova and Tkacheva 1959; Rey et al., 1984; Kahraman 2014). Spawning has also been shown to be affected by the North Atlantic Oscillation (Baez et al. 2019). Spawning typically occurs near the coast (Valerias and Abad 2006). In the Northwest Atlantic, spawning occurs in three to four batches during the summer, with a peak in June and July. A similar spawning season is seen in the Mediterranean and Eastern Atlantic (Valerias and Abad 2006; Kahraman et al. 2014). There is limited information on the fecundity of bonito. Bonito exhibit indeterminate fecundity with estimates ranging from 304,000 and 1,150,000 oocytes (Macias et al 2005; Valerias and Abad 2006).

Natural Mortality

There is little published information about Atlantic bonito natural mortality. Various methods of estimation using life history traits have been published, some of which have been summarized by Vetter (1988). Along the southern Atlantic coast of Morocco, natural mortality was estimated to be 0.46, using a method based on fish longevity (Baibbat et al. 2019). In the northeastern region of the Atlantic Ocean, four methods were used to calculate Atlantic bonito natural mortality, with estimates ranging from 0.509 to 0.869 and a mean value of 0.695 (Petukhova 2020). Potential sources of Atlantic Bonito natural mortality include predation, disease, and environmental stress. Primary predators of Atlantic Bonito are wahoo, mahi mahi, and both adult and juvenile Atlantic bonito (Collette and Nauen 1983; Valerias and Abad 2006).

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 using the appropriate methodology. 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 annually. Due to the harvest of immature bonito occurring recently, efforts should be made to estimate these removals specifically.

Biosampling

There have been minimal studies on the life history of Atlantic bonito 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 bonito along the Atlantic coast. These 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 34% of recreationally caught Atlantic bonito being released, post-release mortality and the factors effecting it will be crucial in determining total removals by the fishery. Tagging projects can help refine the estimate of mortality and provide advice as to minimizing mortality. Tagging studies can also estimate natural mortality and population size, important components of any future assessment.

Fishery CPUE

Fisheries independent surveys are used to track population trends for many species. Since Atlantic bonito 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 bonito. 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 bonito fishery will help to justify precautionary approaches to management of the stock. Since the majority of this fishery is recreational and 30% is released, 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 bonito 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	3	5	100	25378
Max	205472	275500	148442	562005
Mean	21749.9	26739.3	16476.4	155040.6
SD	32527.27	41182.33	23235.10	119493.61

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

State	Min	Max	Mean	SD
MAINE	-	-	-	-
NEW HAMPSHIRE	25	25	25.0	0.00
MASSACHUSETTS	100	138900	20459.4	30500.70
RHODE ISLAND	100	275500	44965.2	50513.08
CONNECTICUT	5	5000	480.0	944.34
NEW YORK	500	93274	21426.8	22618.07
NEW JERSEY	200	205472	39226.7	44758.86
DELAWARE	500	500	500.0	#DIV/0!
MARYLAND	13	105020	5907.1	19798.48
VIRGINIA	3	43700	6656.0	9831.85
NORTH CAROLINA	224	42372	13695.1	9554.28
SOUTH CAROLINA	473	5673	2656.5	1617.40
GEORGIA	-	-	-	-
FLORIDA	100	148442	23802.4	32342.04

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

	Mid-Atlantic	North Atlantic	South Atlantic	Total
Min	4	4	86	69609
Max	10119563	1707819	1911323	11527512
Mean	210507.4	80673.9	88941.8	960365.7
SD	1007861.60	190887.91	258164.69	1880829.84

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

State	Min	Max	Mean	SD
MAINE	0	27	27.0	0.00
NEW HAMPSHIRE	0	4	1.2	1.64
MASSACHUSETTS	1	219	42.3	46.84
RHODE ISLAND	0	775	50.0	131.27
CONNECTICUT	0	93	12.5	20.45
NEW YORK	0	352	42.4	71.64
NEW JERSEY	3	4590	240.1	784.94
DELAWARE	0	10	2.5	3.30
MARYLAND	0	368	28.5	79.77
VIRGINIA	0	95	12.7	24.41
NORTH CAROLINA	2	130	27.8	27.62
SOUTH CAROLINA	0	14	3.3	3.61
GEORGIA	0	6	1.8	1.93
FLORIDA	0	867	123.1	235.50

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

Region	Shore	For Hire	Private
Mid-Atlantic	1%	71%	28%
North Atlantic	22%	35%	42%
South Atlantic	7%	12%	81%
Total	5%	42%	33%

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

State	Shore	For Hire	Private
MAINE	0%	0%	100%
NEW HAMPSHIRE	70%	4%	26%
MASSACHUSETTS	40%	4%	56%
RHODE ISLAND	11%	65%	24%
CONNECTICUT	2%	9%	89%
NEW YORK	5%	23%	72%
NEW JERSEY	1%	77%	22%
DELAWARE	7%	76%	17%
MARYLAND	0%	76%	24%
VIRGINIA	0%	57%	43%
NORTH CAROLINA	6%	16%	78%
SOUTH CAROLINA	0%	63%	37%
GEORGIA	0%	44%	56%
FLORIDA	8%	7%	85%

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

Region	Federal	State
Mid-Atlantic	93%	7%
North Atlantic	45%	55%
South Atlantic	65%	35%
Total	78%	22%

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

State	Federal	State
MAINE	100%	0%
NEW HAMPSHIRE	13%	87%
MASSACHUSETTS	12%	88%
RHODE ISLAND	76%	24%
CONNECTICUT	7%	93%
NEW YORK	57%	43%
NEW JERSEY	97%	3%
DELAWARE	93%	7%
MARYLAND	100%	0%
VIRGINIA	94%	6%
NORTH CAROLINA	49%	51%
SOUTH CAROLINA	95%	5%
GEORGIA	92%	8%
FLORIDA	72%	28%

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

Region	Landings	Discards
Mid-Atlantic	80%	20%
North Atlantic	54%	46%
South Atlantic	54%	46%
Total	70%	30%

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

	Mid-Atlantic	North Atlantic	South Atlantic	Total
Min	2	12	0.9	5691
Max	499606	378413	59925	826667
Mean	38691.5	15599.7	8646.3	148082.2
SD	82182.82	43601.01	12091.12	164562.46

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

State	Min	Max	Mean	SD
MAINE	97	97	97.0	0.00
NEW HAMPSHIRE	408	8933	3686.75	3902.149
MASSACHUSETTS	223	378413	27835.3	67226.93
RHODE ISLAND	12	43964	8397.1	10505.91
CONNECTICUT	25	36055	7681.8	10453.02
NEW YORK	109	68779	9084.5	14581.08
NEW JERSEY	66	289811	60140.0	90331.35
DELAWARE	2	3375	900.4	1183.18
MARYLAND	139	10700	3821.4	3444.39
VIRGINIA	59	9361	2736.9	2824.90
NORTH CAROLINA	368	59925	14277.4	13964.09
SOUTH CAROLINA	34	45664	5006.2	9132.64
GEORGIA	0.9	15362	2247.6	3983.87
FLORIDA	22	499606	94555.5	122963.48

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

Region	Shore	For Hire	Private
Mid-Atlantic	23%	16%	61%
North Atlantic	25%	1%	74%
South Atlantic	6%	7%	87%
Total	19%	9%	72%

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

State	Shore	For Hire	Private
MAINE	0%	100%	0%
NEW HAMPSHIRE	0%	0%	100%
MASSACHUSETTS	28%	1%	70%
RHODE ISLAND	25%	2%	73%
CONNECTICUT	0%	0%	100%
NEW YORK	11%	2%	87%
NEW JERSEY	26%	18%	56%
DELAWARE	20%	6%	74%
MARYLAND	0%	20%	80%
VIRGINIA	0%	27%	73%
NORTH CAROLINA	11%	5%	84%
SOUTH CAROLINA	0%	24%	76%
GEORGIA	0%	2%	98%
FLORIDA	3%	6%	92%

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

Region	Federal	State
Mid-Atlantic	68%	32%
North Atlantic	16%	84%
South Atlantic	63%	37%
Total	51%	49%

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

State	Federal	State
MAINE	0%	100%
NEW HAMPSHIRE	3%	97%
MASSACHUSETTS	10%	90%
RHODE ISLAND	40%	60%
CONNECTICUT	9%	91%
NEW YORK	49%	51%
NEW JERSEY	70%	30%
DELAWARE	38%	62%
MARYLAND	99%	1%
VIRGINIA	61%	39%
NORTH CAROLINA	50%	50%
SOUTH CAROLINA	63%	37%
GEORGIA	95%	5%
FLORIDA	73%	27%

Table 16. A summary of length and weight data for each year of the MRIP survey from 1981-2022.

Year	Count	Length				Weight			
		Min	Max	Mean	SD	Min	Max	Mean	SD
1981	154	21	85	50.6	10.93	0.1	3.1	0.87	0.597
1982	155	15	77	53.3	12.11	0.0	4.0	1.18	0.766
1983	53	26	78	57.1	12.04	0.3	2.6	1.41	0.575
1984	81	23	78	55.7	11.10	0.2	2.6	1.34	0.640
1985	98	33	88	52.9	8.68	0.3	5.6	1.14	0.665
1986	285	26	88	54.7	7.23	0.1	3.4	1.21	0.475
1987	259	27	75	53.4	10.07	0.1	3.2	1.15	0.625
1988	596	23	79	47.4	14.25	0.0	2.2	1.01	0.553
1989	515	25	80	51.6	8.46	0.0	3.7	1.10	0.534
1990	244	20	74	52.4	9.25	0.0	2.5	1.04	0.434
1991	345	24	88	54.2	7.88	0.1	5.0	1.16	0.642
1992	234	30	74	54.6	7.29	0.2	3.1	1.24	0.411
1993	192	17	71	51.0	10.61	0.0	2.8	1.08	0.535
1994	214	23	81	41.1	13.71	0.1	3.6	0.64	0.664
1995	104	28	77	47.6	10.65	0.2	2.3	0.83	0.545
1996	72	22	77	46.3	12.64	0.1	3.0	0.88	0.660
1997	221	19	75	54.0	7.44	0.0	3.6	1.22	0.549
1998	165	17	77	53.3	8.63	0.0	3.3	1.16	0.745
1999	103	17	75	48.8	14.40	0.0	2.6	0.99	0.623
2000	162	17	73	48.2	13.60	0.0	3.2	1.03	0.760
2001	197	29	74	54.6	10.49	0.1	3.1	1.21	0.599
2002	265	33	77	54.9	7.85	0.2	3.5	1.21	0.448
2003	85	31	86	51.8	12.10	0.2	3.5	1.15	0.743
2004	103	36	72	55.1	7.08	0.2	3.0	1.20	0.454
2005	32	30	72	53.8	9.94	0.2	3.0	1.19	0.615
2006	72	30	58	35.5	8.45	0.2	1.5	0.34	0.327
2007	69	32	113	67.1	27.84	0.2	10.2	3.30	4.005
2008	30	51	72	61.0	6.55	0.9	3.0	1.87	0.693
2009	22	38	84	53.2	10.58	0.4	4.8	1.22	1.047
2010	29	31	84	69.4	12.84	0.3	4.8	2.84	1.326
2011	65	30	83	65.1	13.56	0.2	4.6	2.28	1.184
2012	89	19	83	62.2	12.25	0.0	4.6	1.91	1.085
2013	43	40	61	53.1	5.53	0.4	1.2	0.88	0.222
2014	140	28	79	43.5	8.50	0.2	4.0	0.61	0.450
2015	59	20	73	51.9	9.87	0.0	3.2	1.11	0.746
2016	52	29	76	50.6	10.18	0.2	3.6	1.01	0.699
2017	91	25	79	46.0	12.41	0.1	3.6	0.81	0.790
2018	204	19	72	43.7	12.31	0.0	3.0	0.70	0.554
2019	362	20	73	43.4	10.08	0.0	3.2	0.63	0.535
2020	352	22	80	46.1	10.41	0.0	3.4	0.76	0.580
2021	111	24	64	50.6	7.74	0.1	1.8	0.95	0.405
2022	140	15	87	41.7	15.91	0.0	4.5	0.75	0.897
Total	6864	15	113	50.6	12.11	0.0	10.2	1.06	0.828

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

Values	Caribbean	Gulf of Mexico	Mid-Atlantic	North Atlantic	South Atlantic	Grand Total
Count of Length	43	1025	1598	2054	2144	6864
Min of Length	40	21	20	15	15	15
Max of Length	61	88	85	113	88	113
Average of Length	53.1	50.9	47.1	53.0	50.7	50.6
StdDev of Length	5.53	12.61	10.05	11.14	13.58	12.11
Min of Weight	0.4	0.1	0.0	0.0	0.0	0.0
Max of Weight	1.2	3.5	5.6	10.2	5.0	10.2
Average of Weight	0.88	0.89	0.87	1.07	1.05	0.99
StdDev of Weight	0.222	0.708	0.572	0.975	0.927	0.844

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

Wave	a	b	log(a)	SE	R²
1	1.6E-05	2.79	-11.07	0.021	0.93
2	1.8E-06	3.34	-13.25	0.005	0.96
3	4.9E-06	3.08	-12.24	0.006	0.93
4	5.7E-06	3.05	-12.08	0.003	0.91
5	2.7E-06	3.24	-12.84	0.003	0.96
6	2.6E-06	3.23	-12.84	0.007	0.86
Total	3.7E-06	3.1543	-12.508	0.003	0.94

Table 19. A summary of von Bertalanffy growth parameters from various studies on Atlantic bonito around the world.

Original Citation	Area/Region	Sex	n	Method	L _{inf} (cm)	L _{inf} (in)	k	t ₀	Max Age	Min	Min	Max	Max
										L _{obs} (cm)	L _{obs} (in)	L _{obs} (cm)	L _{obs} (in)
Baibbat et al. (2016)	Morocco	Combined	2688		73.0	28.7	0.31	-2.45	5	31	12.2	74	29.1
		Combined	238	Otoliths	69.8	27.5	0.76	-0.44	-	23.8	9.4	72	28.3
Cengiz (2013)	Mediterranean	Male	82	Otoliths	72.2	28.4	0.69	-0.52	-	26.6	10.5	69.5	27.4
		Female	100	Otoliths	68.5	27.0	0.78	-0.34	-	28	11.0	72	28.3
Dardignac (1962)	Morocco	Combined	878	Spiues	64.0	25.2	0.69	-1.42	-	19	7.5	72	28.3
Rey et al. (1984)	Gibraltar, Spain	Combined	878	-	80.8	31.8	0.35	-1.7	-	19	7.5	71.5	28.1
Zusser (1954)	Black Sea, Russia	Combined	-	-	103.0	40.6	0.13	-1.8	-	-	-	-	-
Numann (1955)	Black Sea, Turkey	Combined	-	-	67.8	26.7	0.79	-	-	-	-	-	-
Nikolsky (1957)	Black Sea, Turkey	Combined	-	-	81.5	32.1	0.52	-	-	-	-	-	-
Turgan (1958)	Black Sea, Turkey	Combined	-	-	64.0	25.2	0.86	-	-	-	-	-	-
Niklov (1960)	Black Sea, Bulgaria	Combined	-	-	95.6	37.6	0.24	-1.24	-	-	-	-	-
Hansen (1989)	Argentina	Combined	-	-	74.6	29.4	0.22	-2.74	-	-	-	-	-
Cayre et al. (1993)	NE Atlantic	Combined	-	-	80.8	31.8	0.35	-1.7	5	-	-	-	-
Santamaria et al. (1998)	Ionian Sea, Italy	Combined	-	-	80.6	31.7	0.36	-1.37	-	-	-	-	-
		Combined	212		67.9	26.7	0.463	-1.22	-	17.7	7.0	63	24.8
Kahraman et al. (2014)	Black Sea and Sea of Marmara	Male	89	Spine and Otolith	74.6	29.4	0.364	-1.518	-	23	9.1	56.5	22.2
		Female	100		69.6	27.4	0.439	-1.327	-	25.5	10.0	63	24.8
Kotsiri et al. (2018)	Eastern Mediterranean Sea	Combined	502	Otolith	79.9	31.5	0.261	-1.23	7	7.2	2.8	70.4	27.7
Petukhova (2020)	Russia, Northeastern Atlantic Ocean	Combined	5634	-	75.6	29.8	0.41	-	-	22.3	8.8	72.5	28.5
Valeiras et al. (2008)	Western Mediterranean	Combined	136	Spines	62.5	24.6	0.719	-1.21	3	40	15.7	61	24.0
Tkacheva (1958)	Black Sea and Eastern Mediterranean	Combined	-	-	67.8	26.7	0.795	-	-	-	-	-	-
Mayorova and Tkacheva (1959)	Black Sea and Eastern Mediterranean	Combined	-	-	81.5	32.1	0.525	-	-	-	-	-	-
Demir (1963)	Black Sea and Eastern Mediterranean	Combined	-	-	64.0	25.2	0.86	-	-	-	-	-	-
Kutaygil (1967)	Black Sea and Eastern Mediterranean	Combined	-	-	95.6	37.6	0.237	-1.24	-	-	-	-	-
Zaboukas and Megalofonou (2007)	Eastern Mediterranean	Combined	397	Spines	83.0	32.7	0.24	-0.77	7	2.2	0.9	72.5	28.5

Table 20. A summary of maturity estimates from various studies on Atlantic bonito around the world.

Original Citation	Area/Region	Sex	n	L ₅₀ (cm)	L ₅₀ (in)
Baibbat et al. (2016)	Morocco	Combined	2688	42.6	16.8
		Male	83	41	16.1
		Female	75	40	15.7
Cengiz (2013)	Mediterranean	Male	82	35.8	14.1
		Female	100	41.9	16.5
Dardignac (1962)	Morocco	Male	-	40	15.7
		Female	-	45	17.7
Rey et al. (1984)	Gibraltar Spain	Male	242	38	15.0
		Female	229	39	15.4
Ates et al. (2008)	Black Sea and Marmara Sea, Turkey	Combined	694	36.9	14.5
Postel (1954)	East Atlantic	Male	-	39.2	15.4
		Female	-	37	14.6
Kahraman et al. (2014)	Black Sea and Marmara Sea, Turkey	Male	89	36.8	14.5
		Female	100	42.5	16.7
Petukhova (2020)	Russia, Northeastern Atlantic Ocean	Combined	5634	44.7	17.6
Saber et al. (2017)	Mediterranean	Combined		39.9	15.7

FIGURES

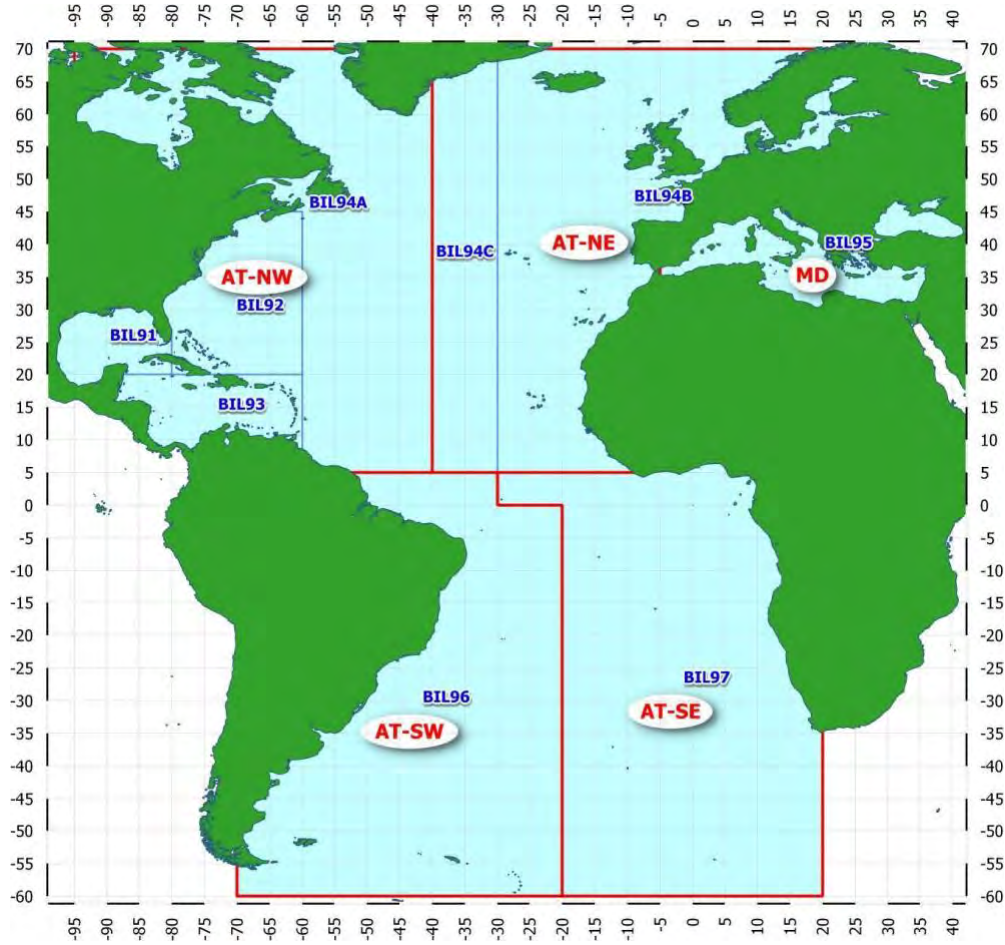


Figure 1. The five management units used by ICCAT for small tunas (ICCAT 2016).

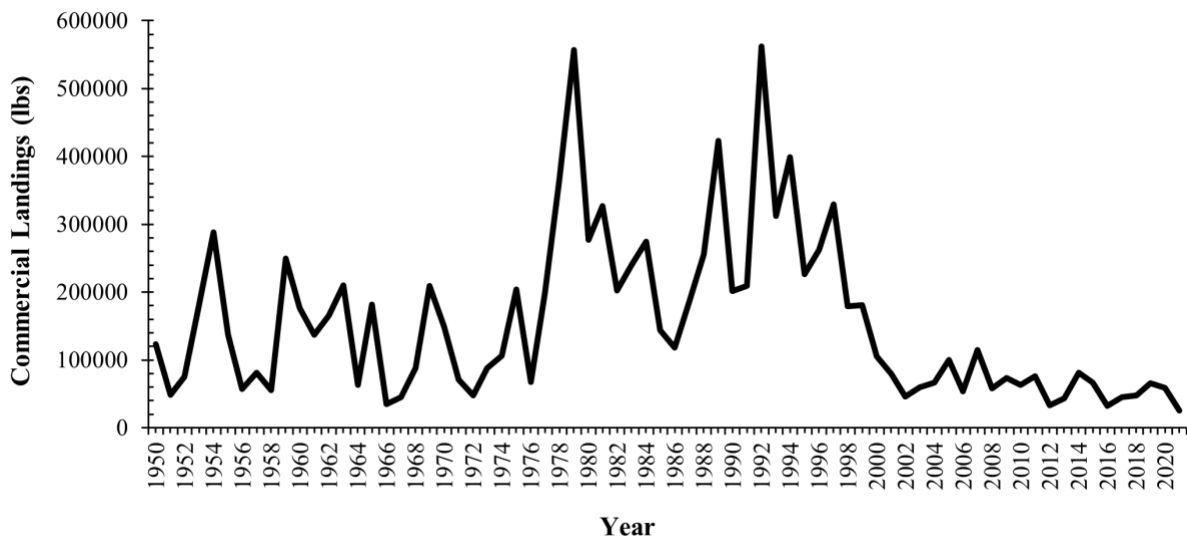


Figure 2. Total commercial landings (lbs.) from 1950 to 2021.

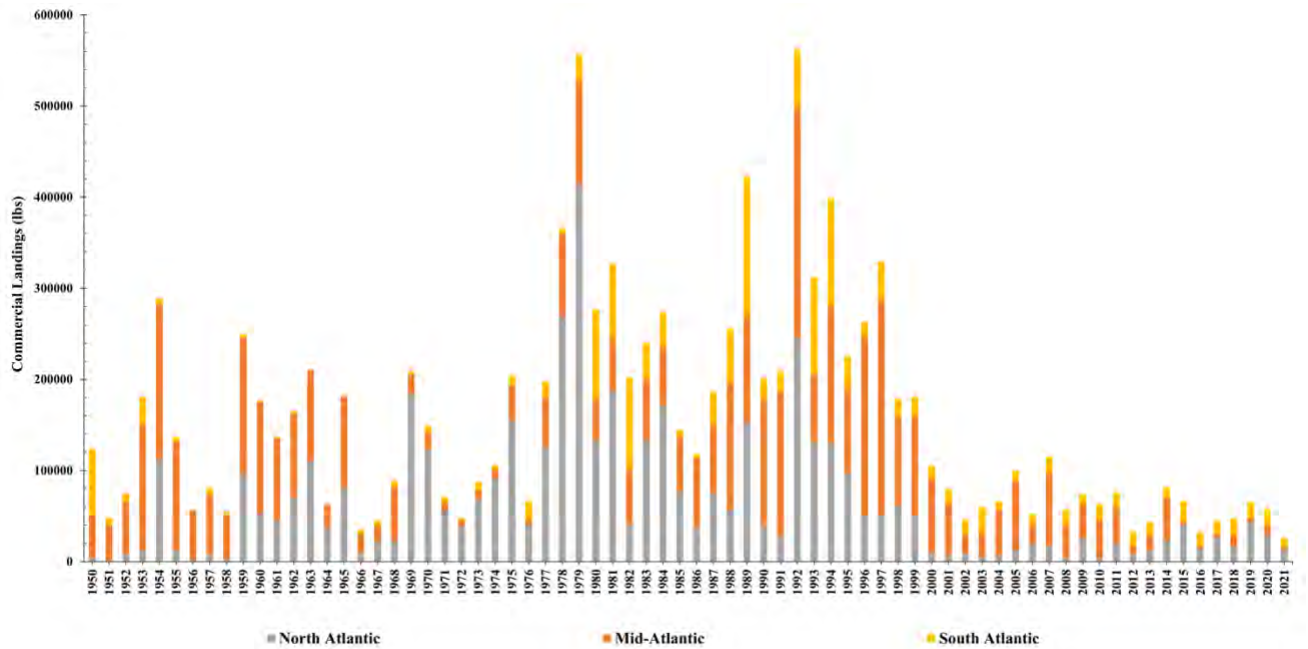


Figure 3. Total commercial landings (lbs.) from 1950 to 2021 by region.

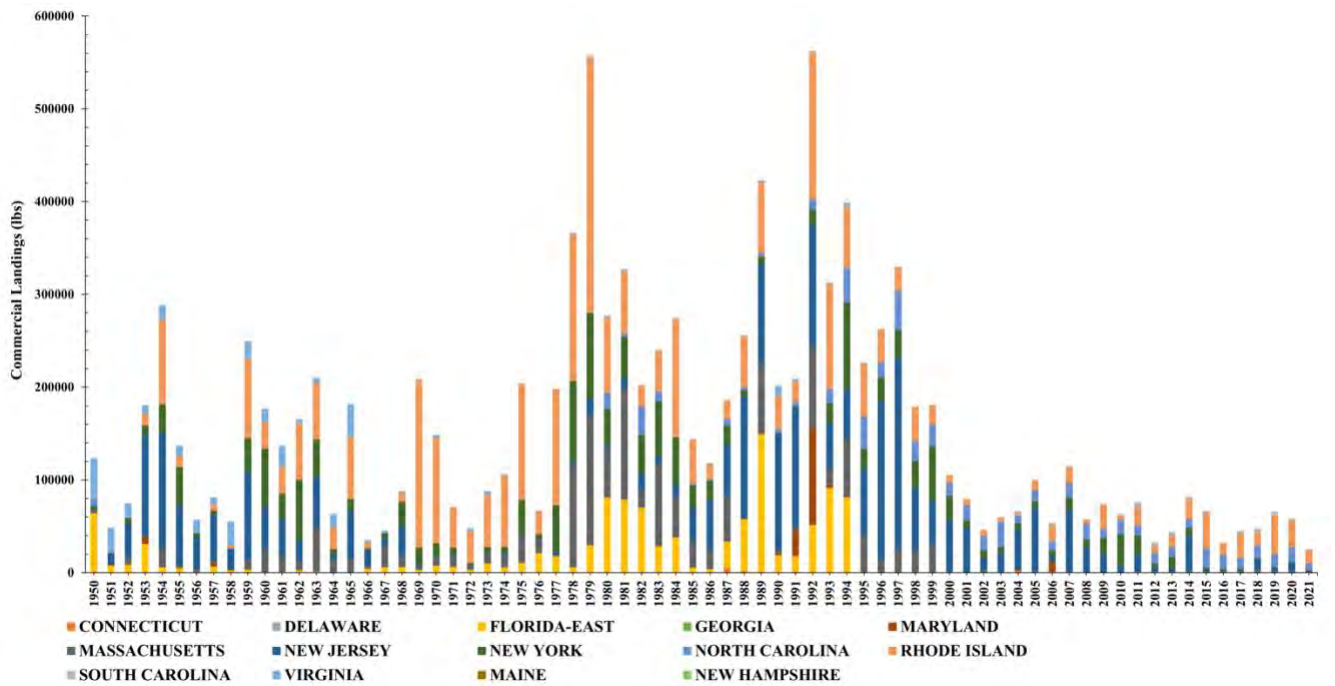


Figure 4. Total commercial landings (lbs.) from 1950 to 2021 by state.

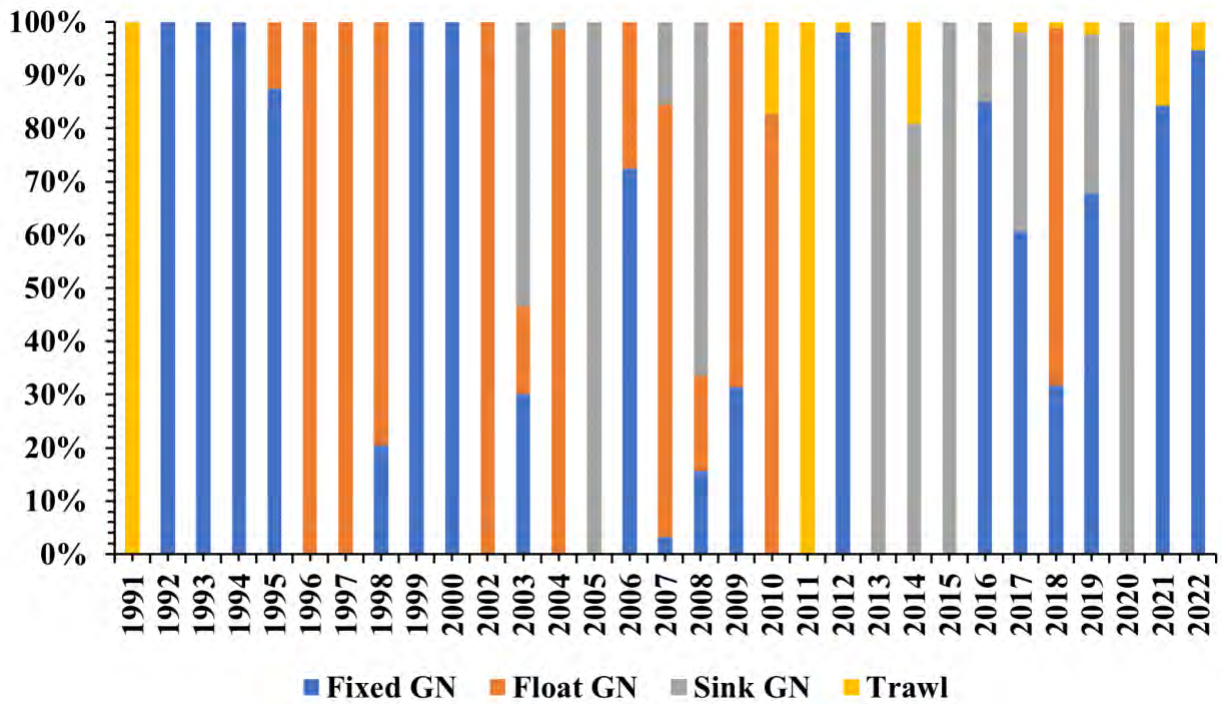


Figure 5. Percentage of commercial discards by type of gill net from 1993-2020

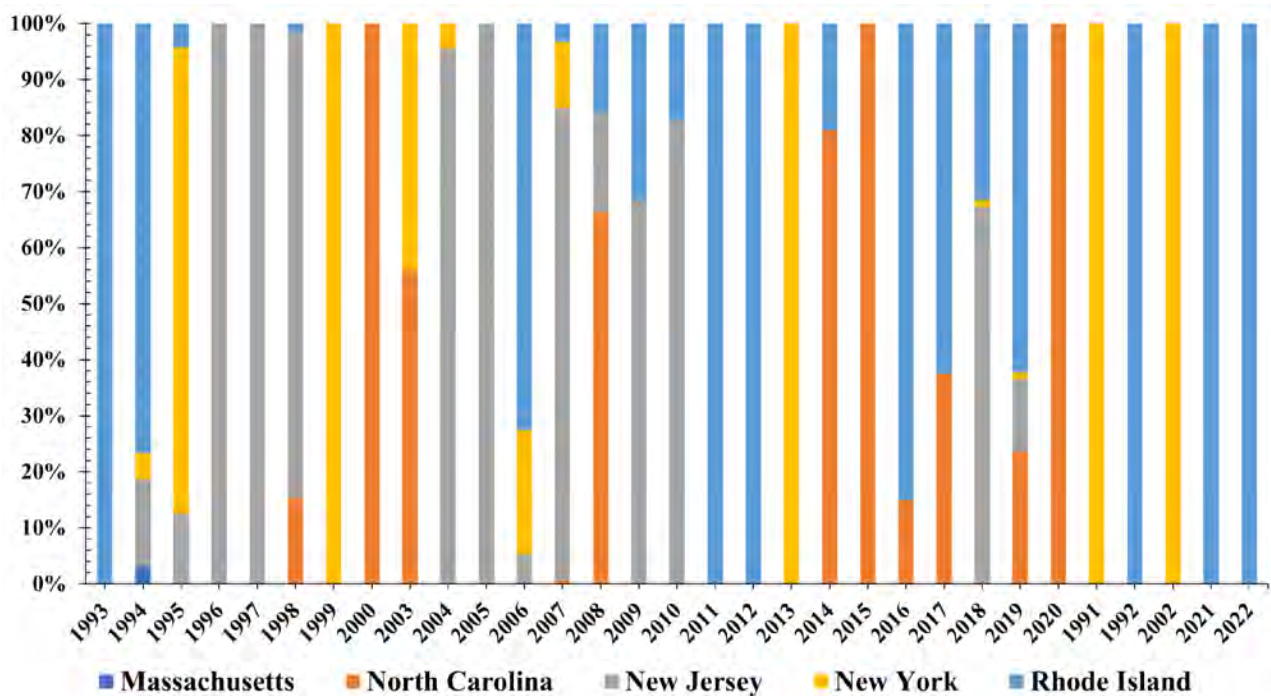


Figure 6. Percentage of commercial discards by state from 1993-2020

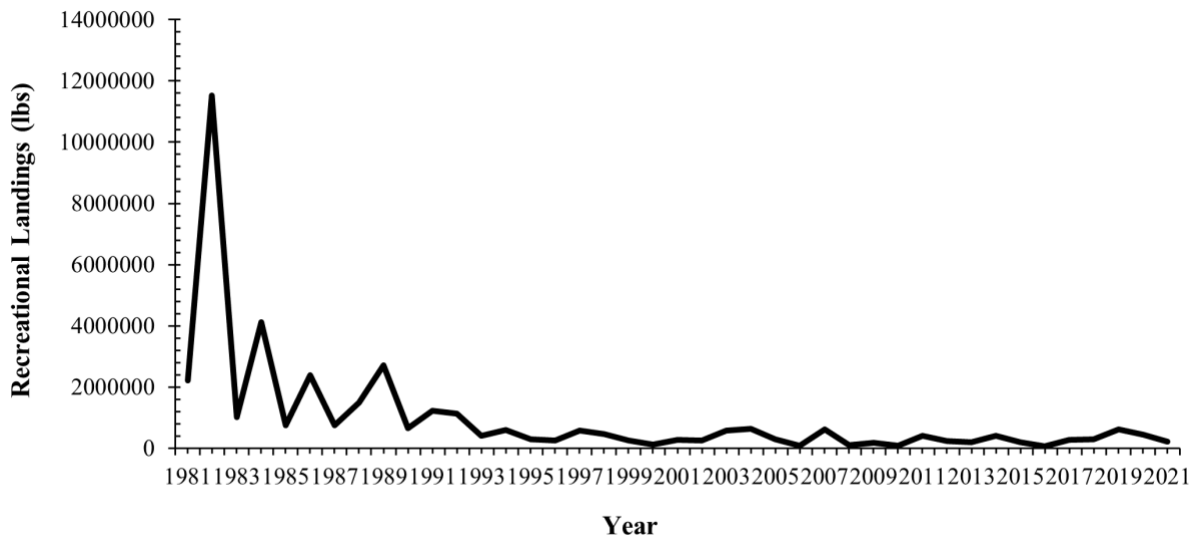


Figure 7. Total recreational landings (lbs.) from 1981 to 2021.

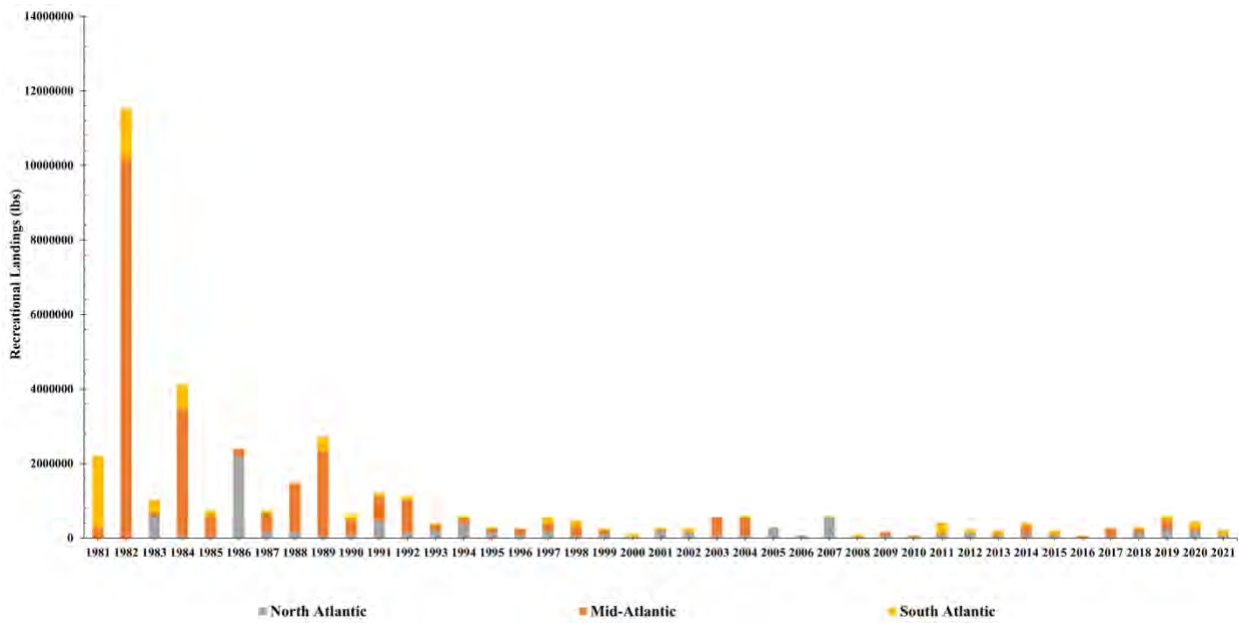


Figure 8. Total recreational landings (lbs.) from 1981 to 2021 by region.

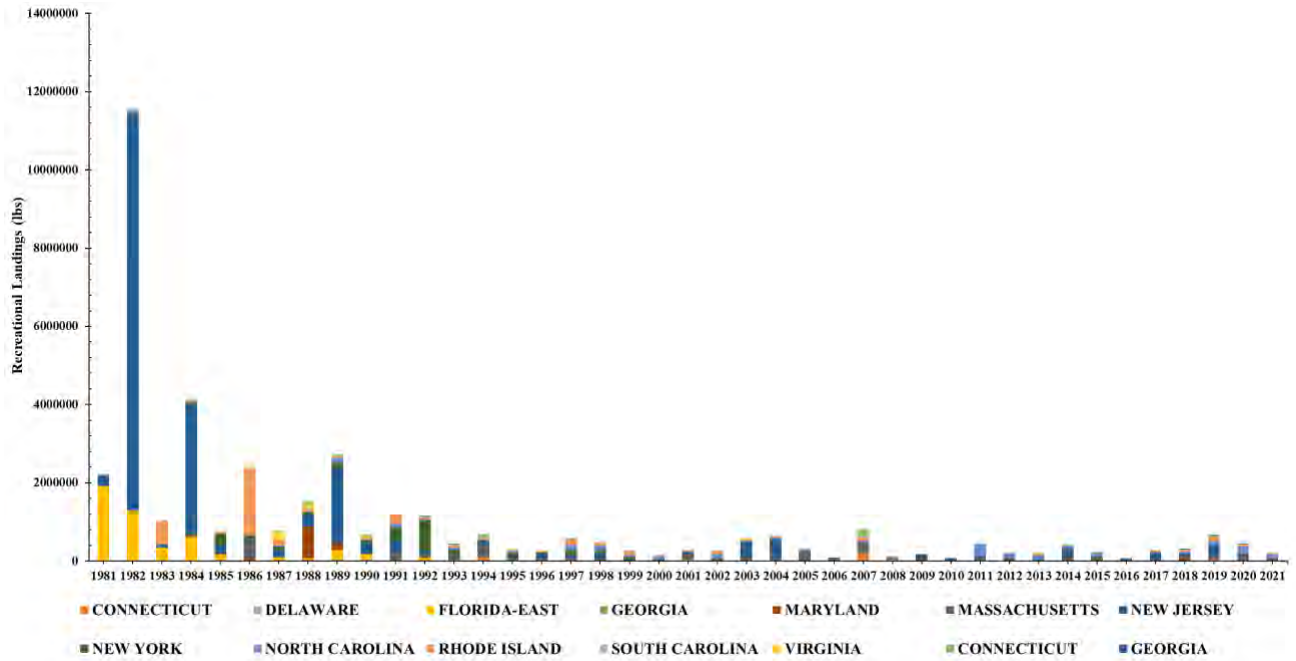


Figure 9. Total recreational landings (lbs.) from 1981 to 2021 by state.

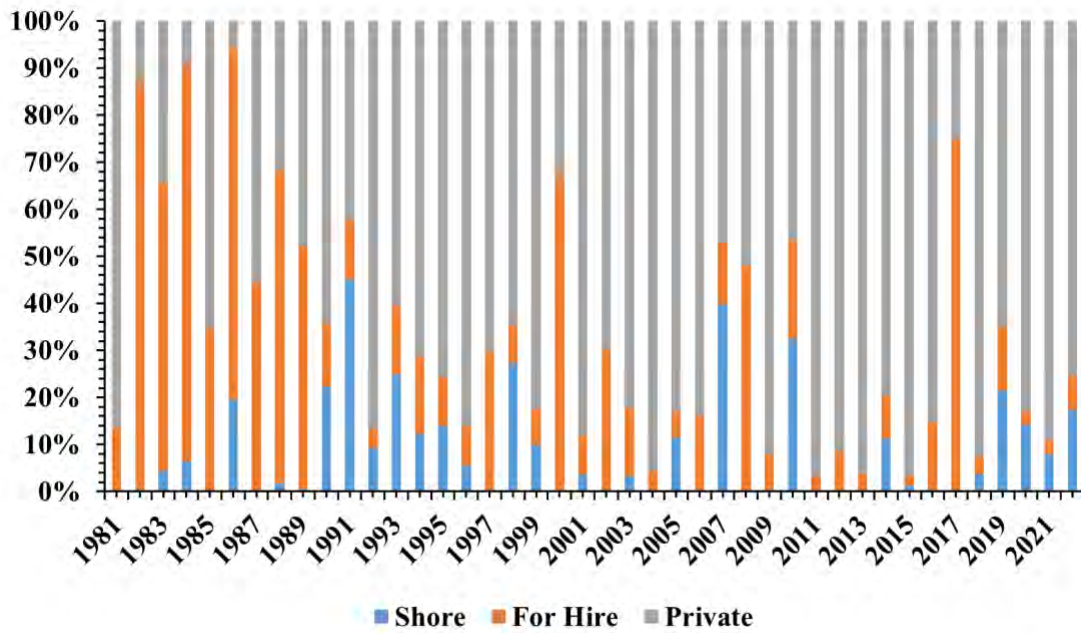


Figure 10. Percentage of recreational landings by mode of fishing from 1981-2022.

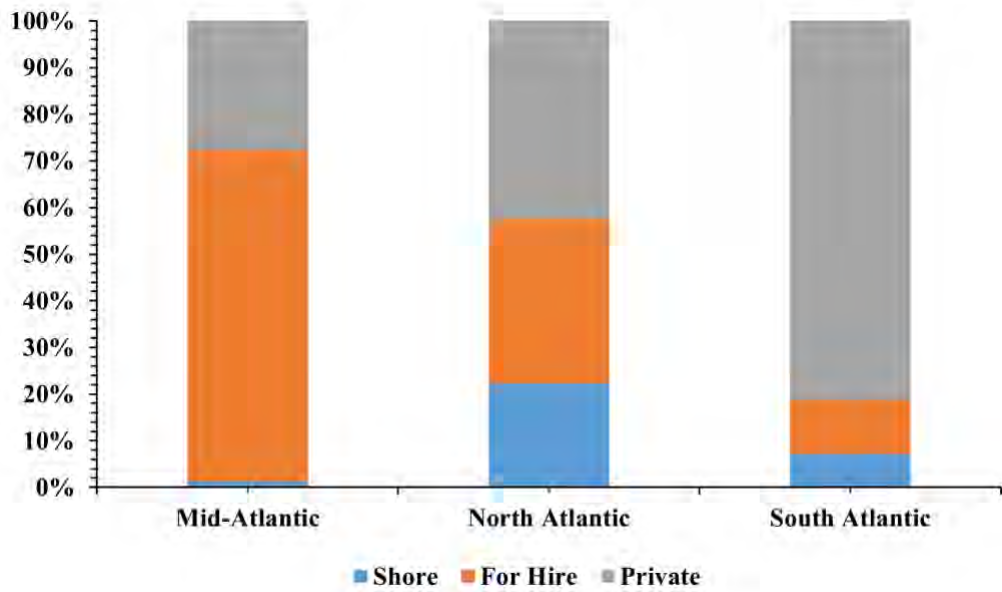


Figure 11. Percentage of recreational landings by mode of fishing for each region.

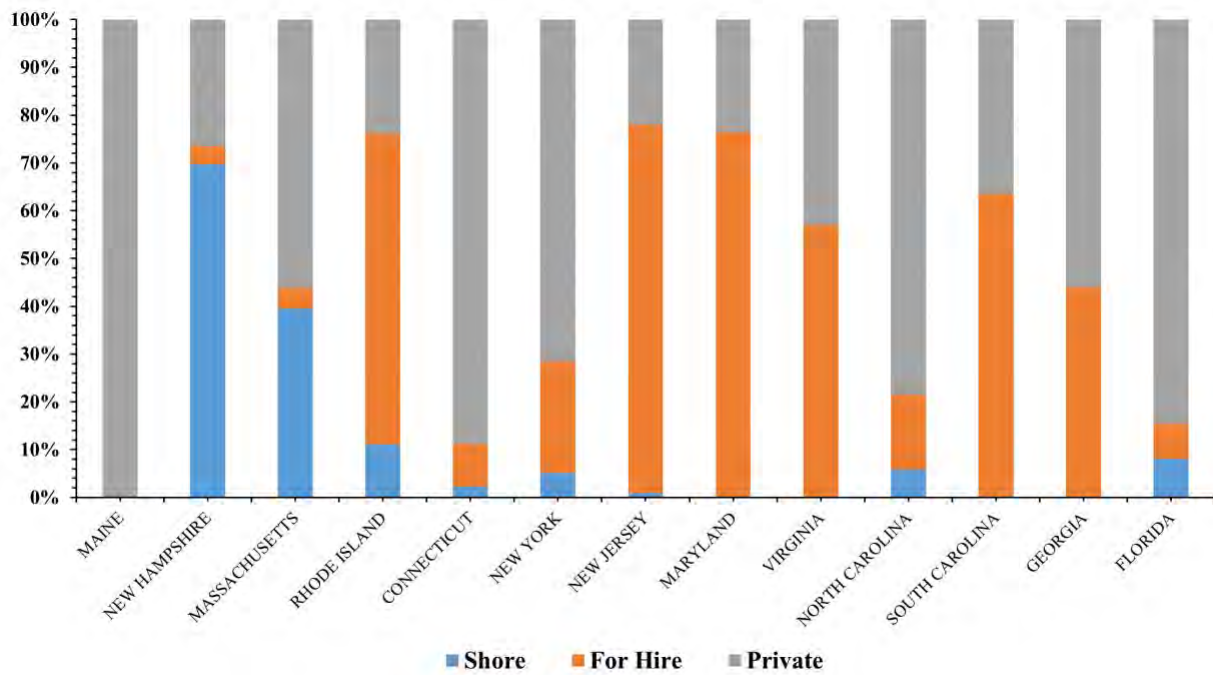


Figure 12. Percentage of recreational landings by mode of fishing for each state.

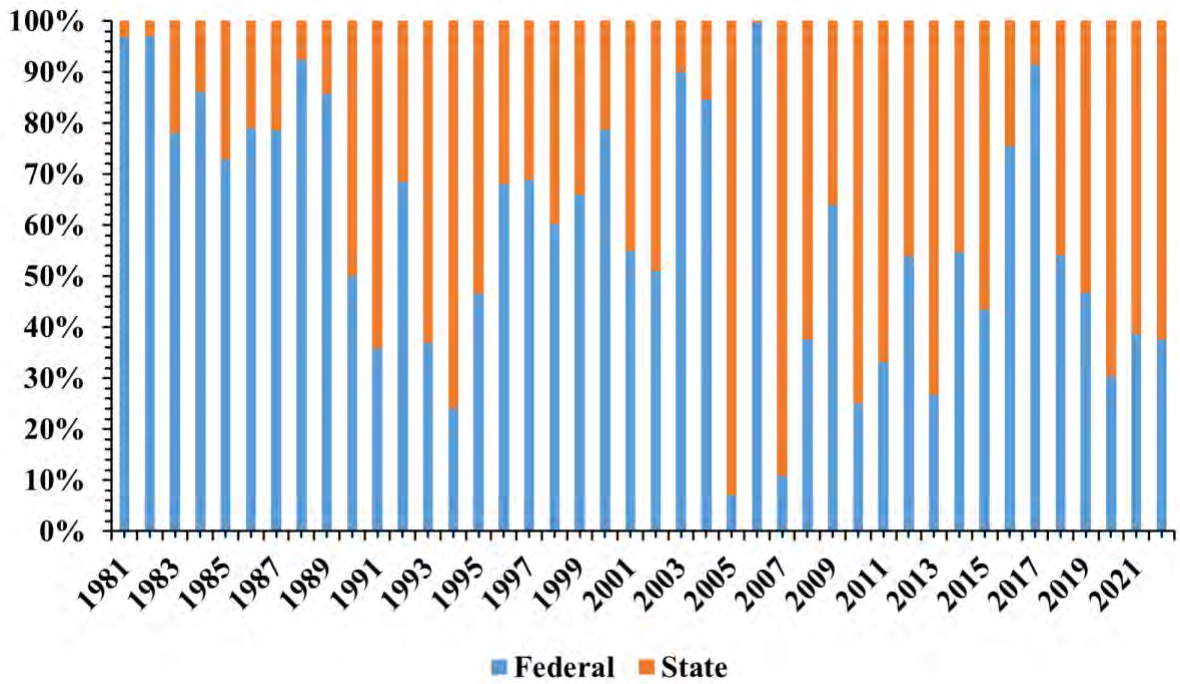


Figure 13. Percentage of recreational landings in federal and state waters from 1981-2022.

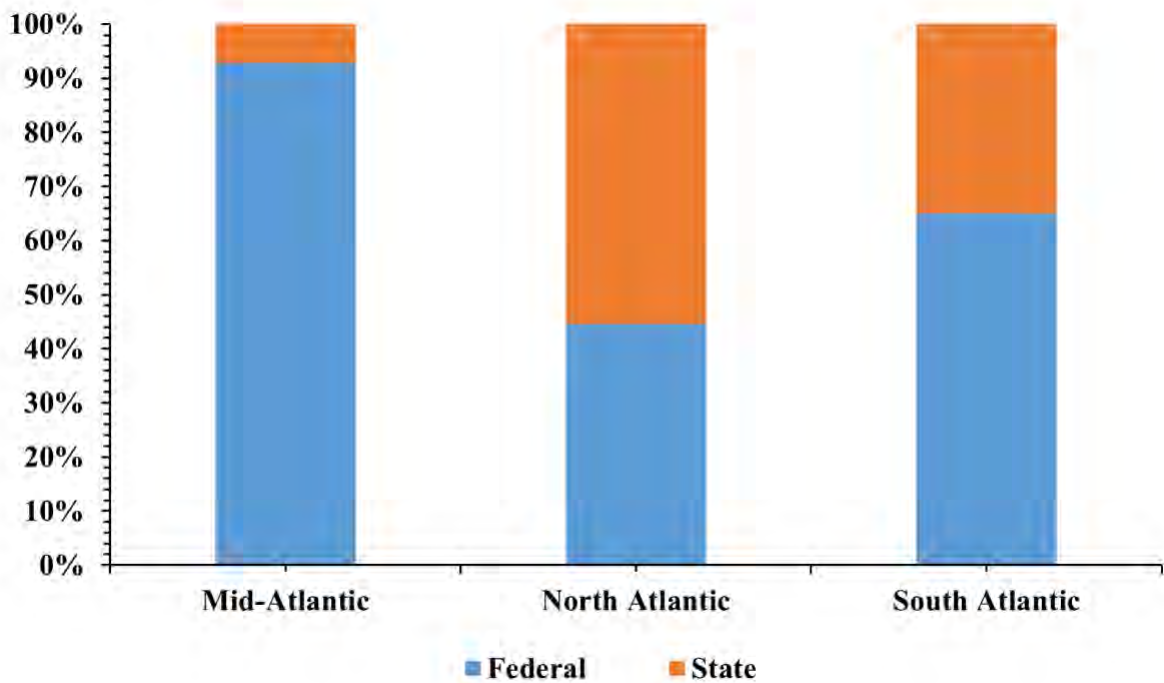


Figure 14. Percentage of recreational landings in federal and state waters for each region.

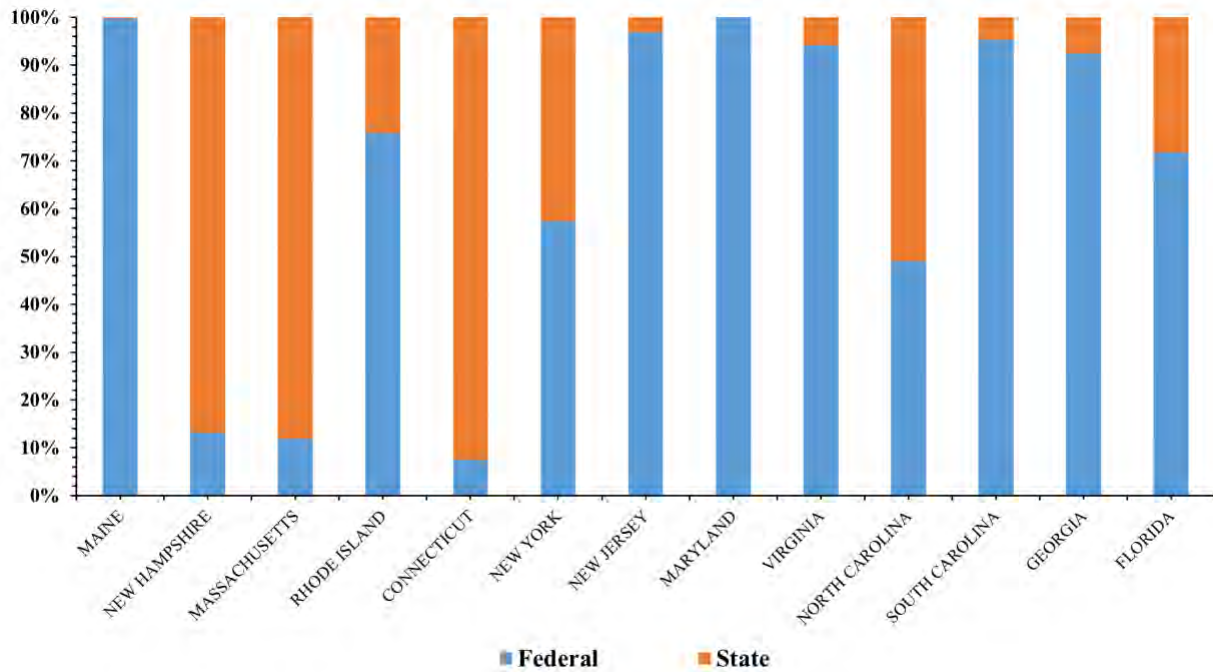


Figure 15. Percentage of recreational landings in federal and state waters for each state.

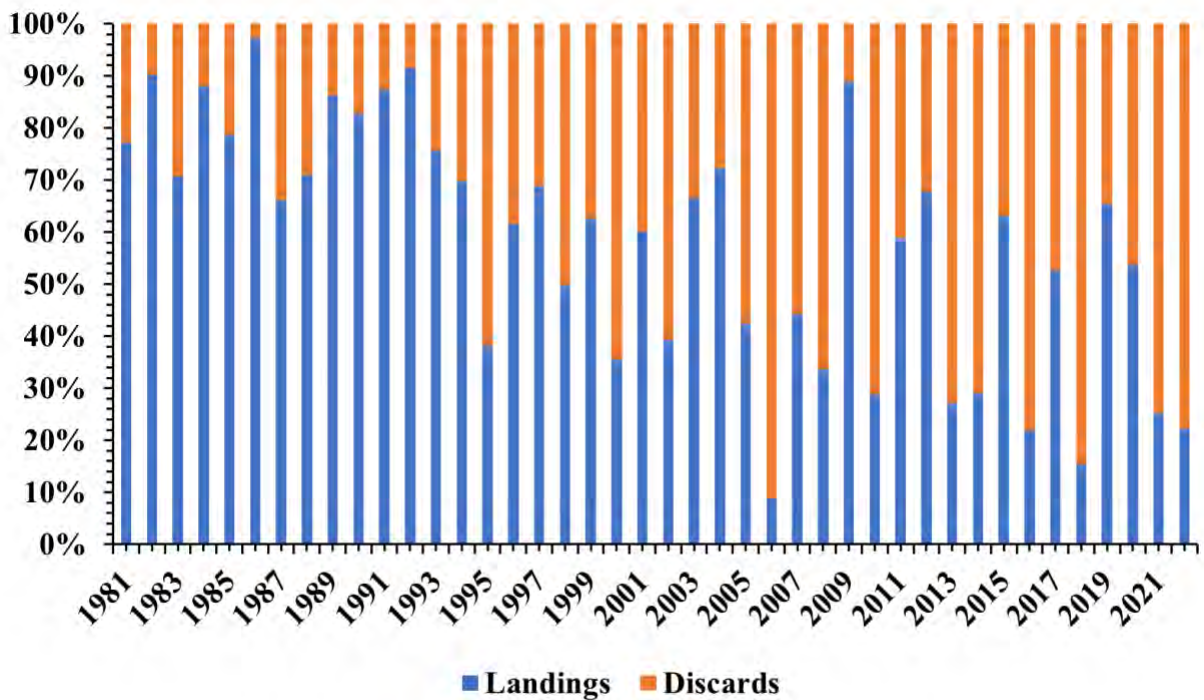


Figure 16. Percentage of fish landed vs discarded from 1981 to 2022.

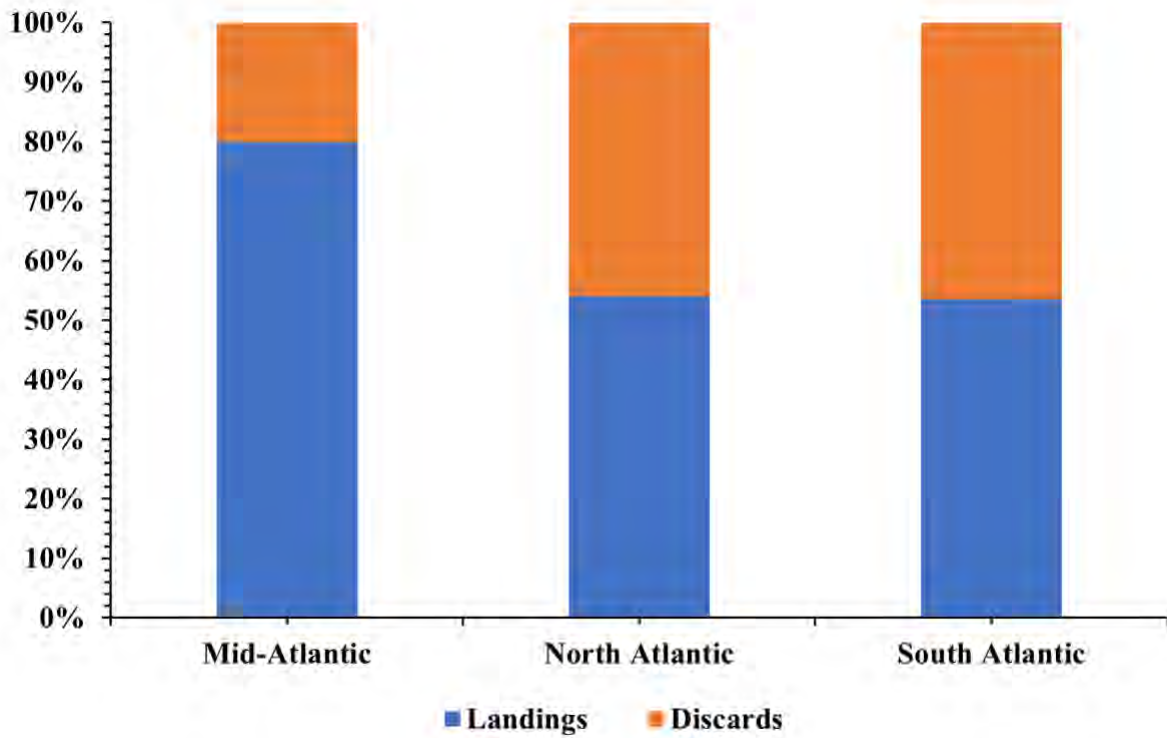


Figure 17. Percentage of fish landed vs discarded by region from 1981 to 2022.

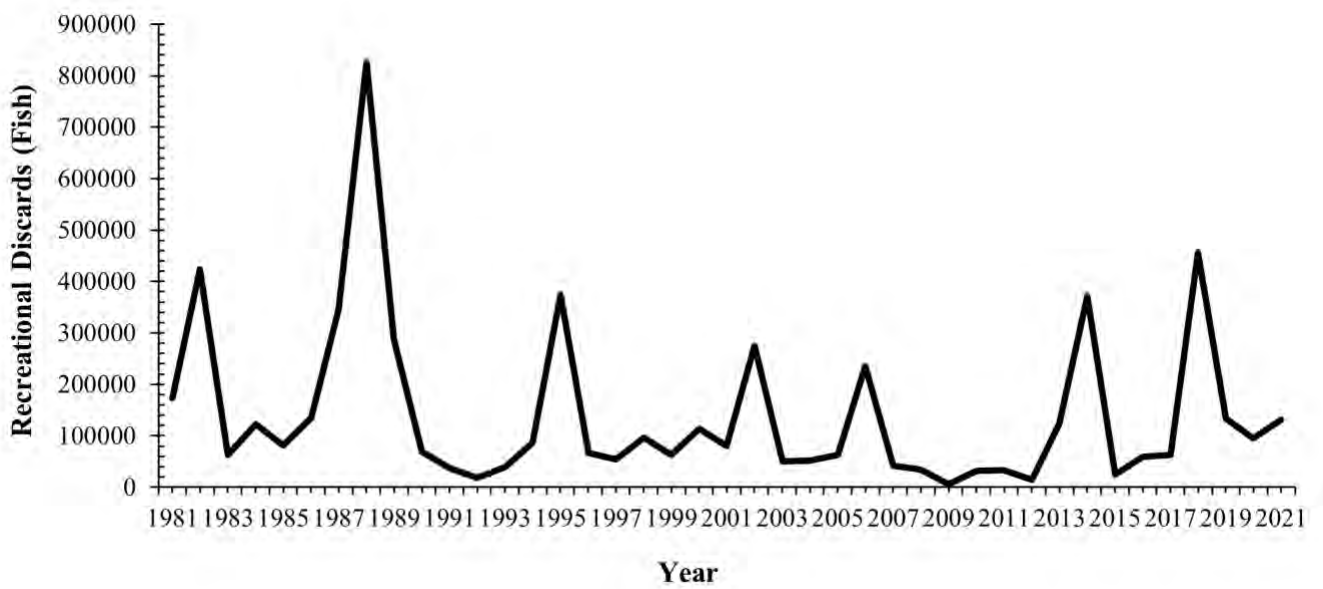


Figure 18. Total recreational discards (individuals) from 1981 to 2021.

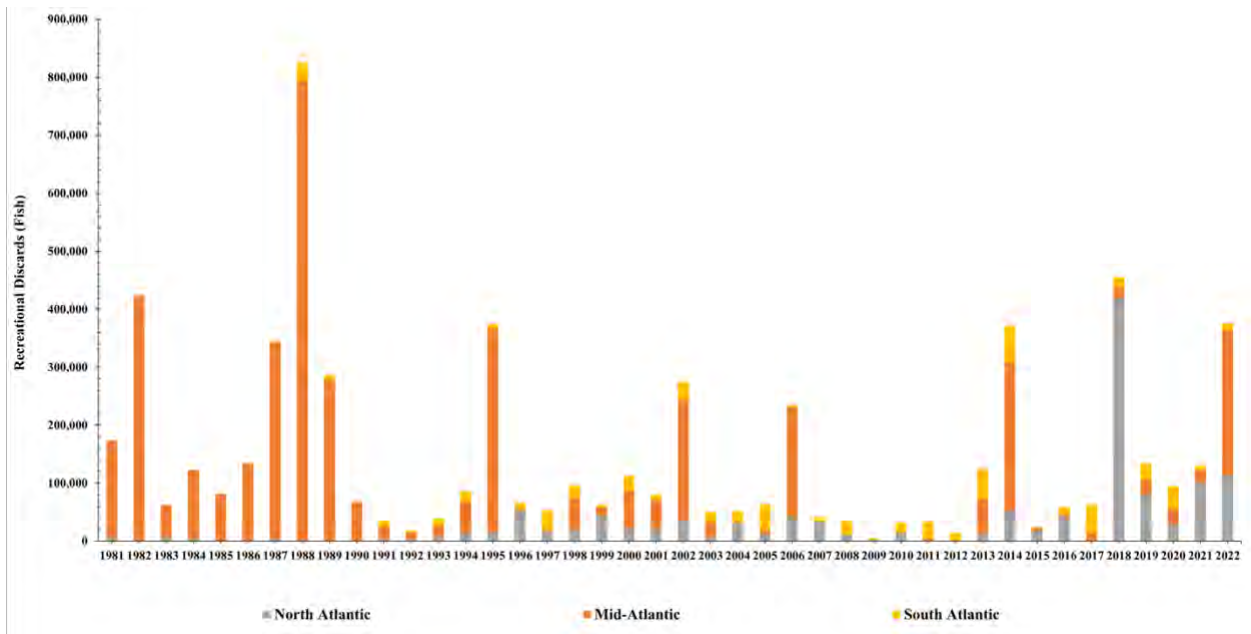


Figure 19. Total recreational discards (individuals) from 1981 to 2021 by region.

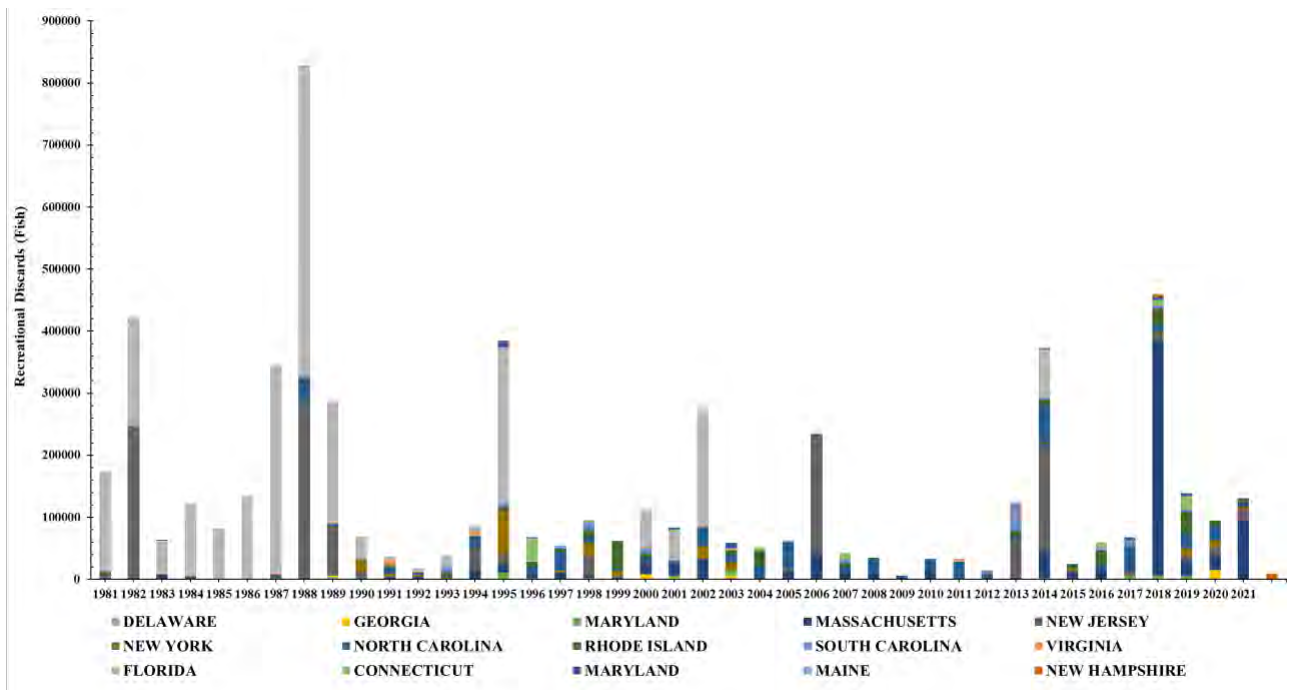


Figure 20. Total recreational discards (individuals) from 1981 to 2021 by state.

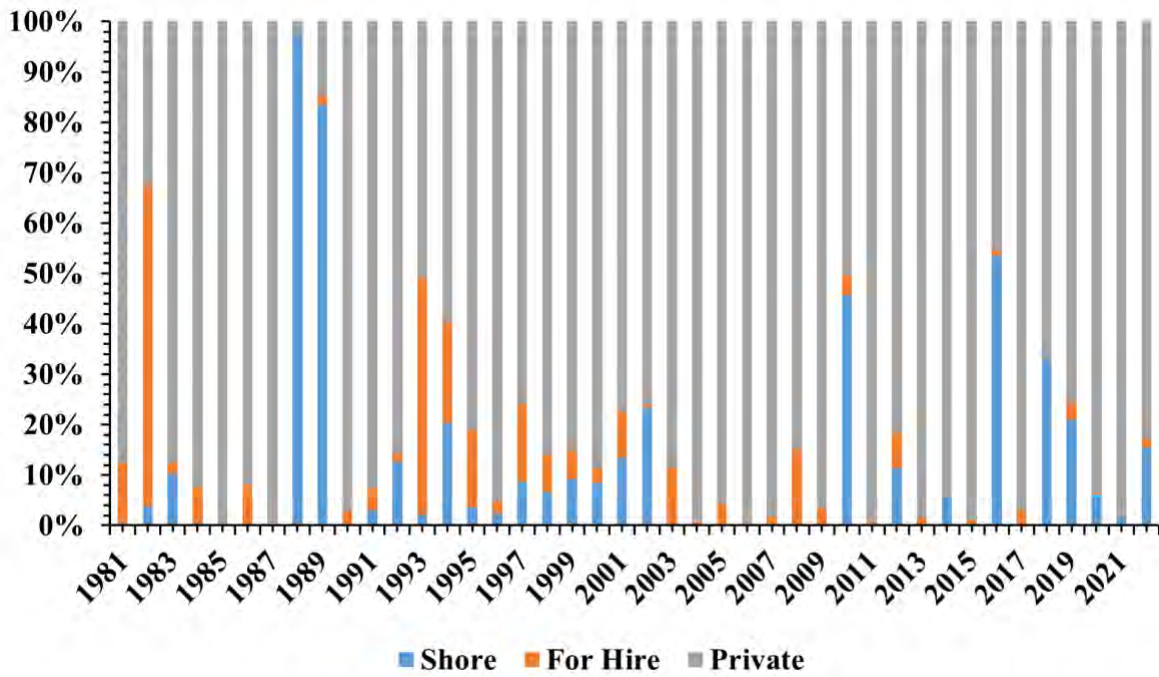


Figure 21. Percentage of recreational discards by mode of fishing from 1981-2022.

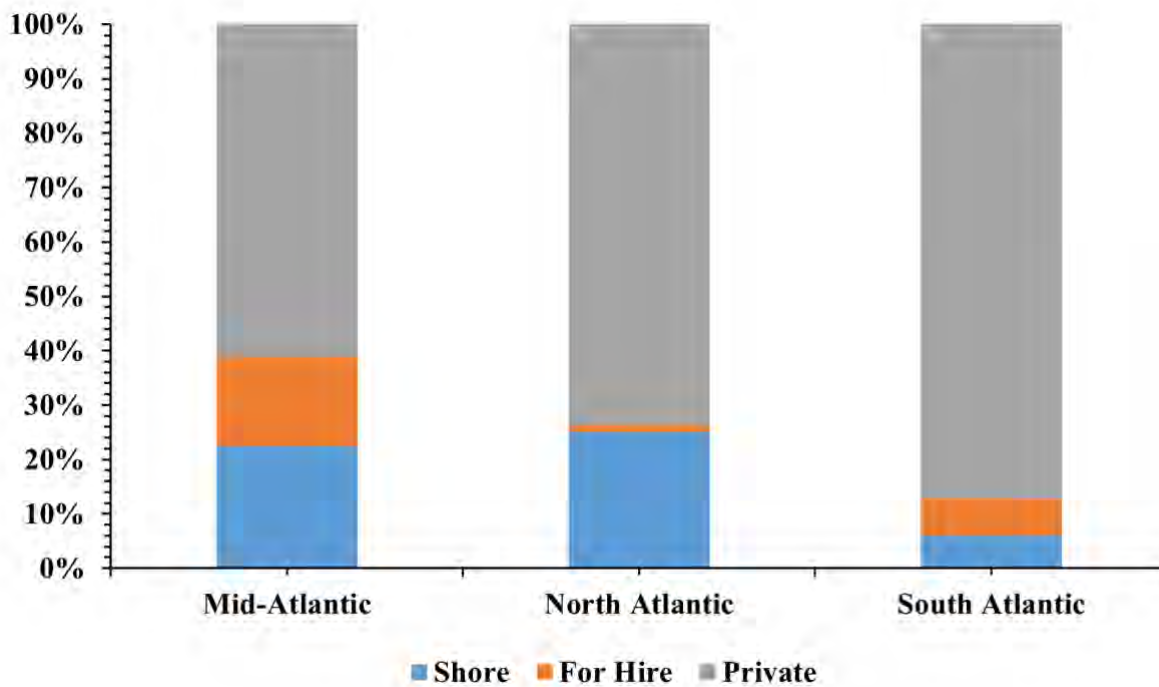


Figure 22. Percentage of recreational discards by mode of fishing for each region.

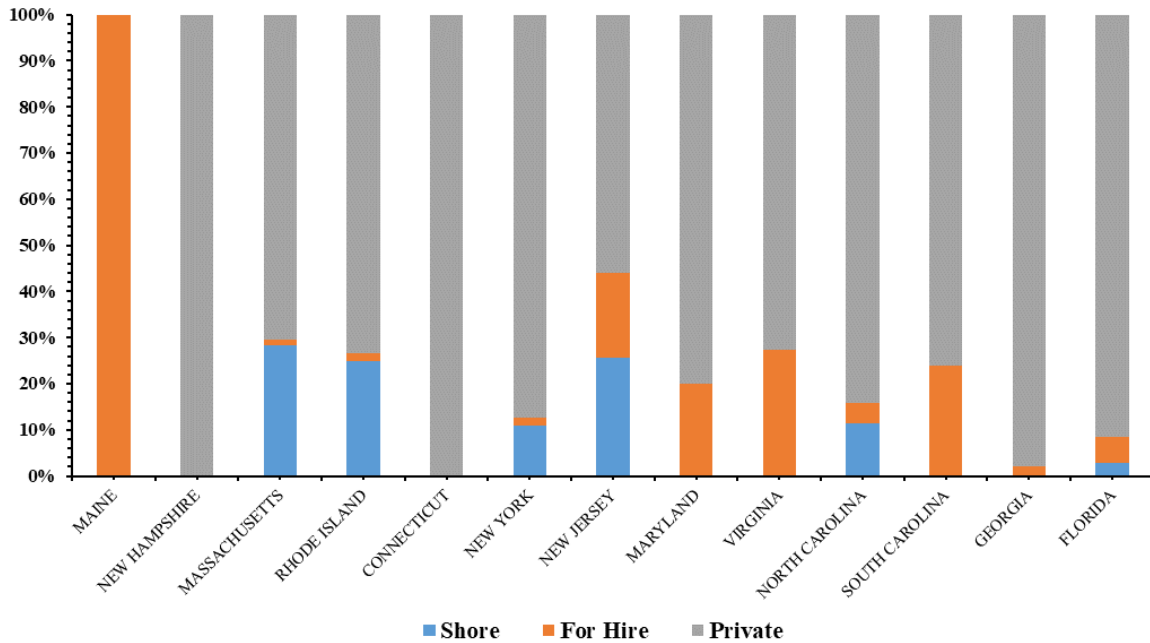


Figure 23. Percentage of recreational discards by mode of fishing for each state.

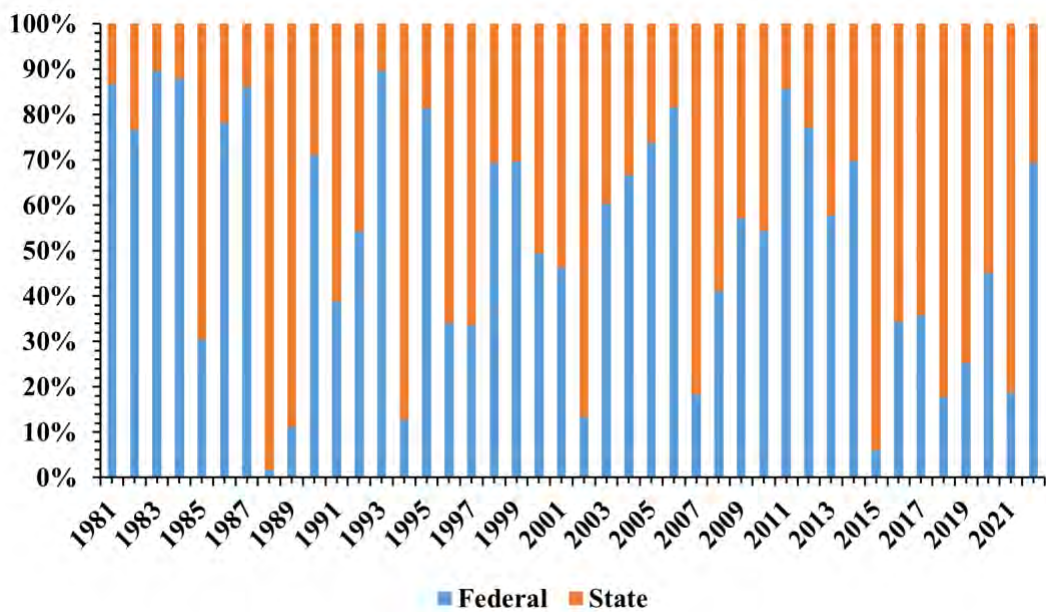


Figure 24. Percentage of recreational discards in federal and state waters from 1981-2022.

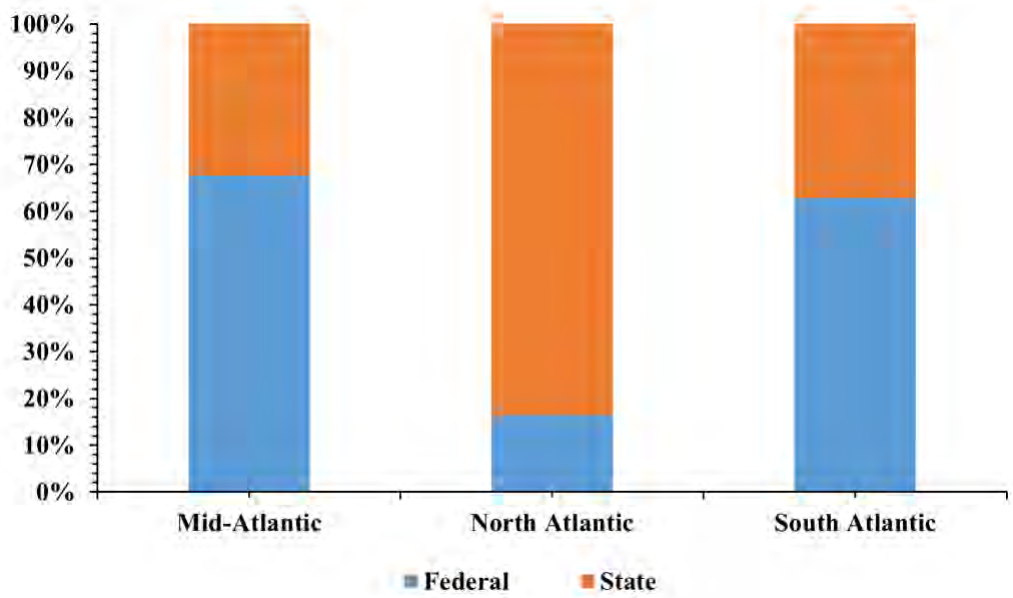


Figure 25. Percentage of recreational discards in federal and state waters for each region.

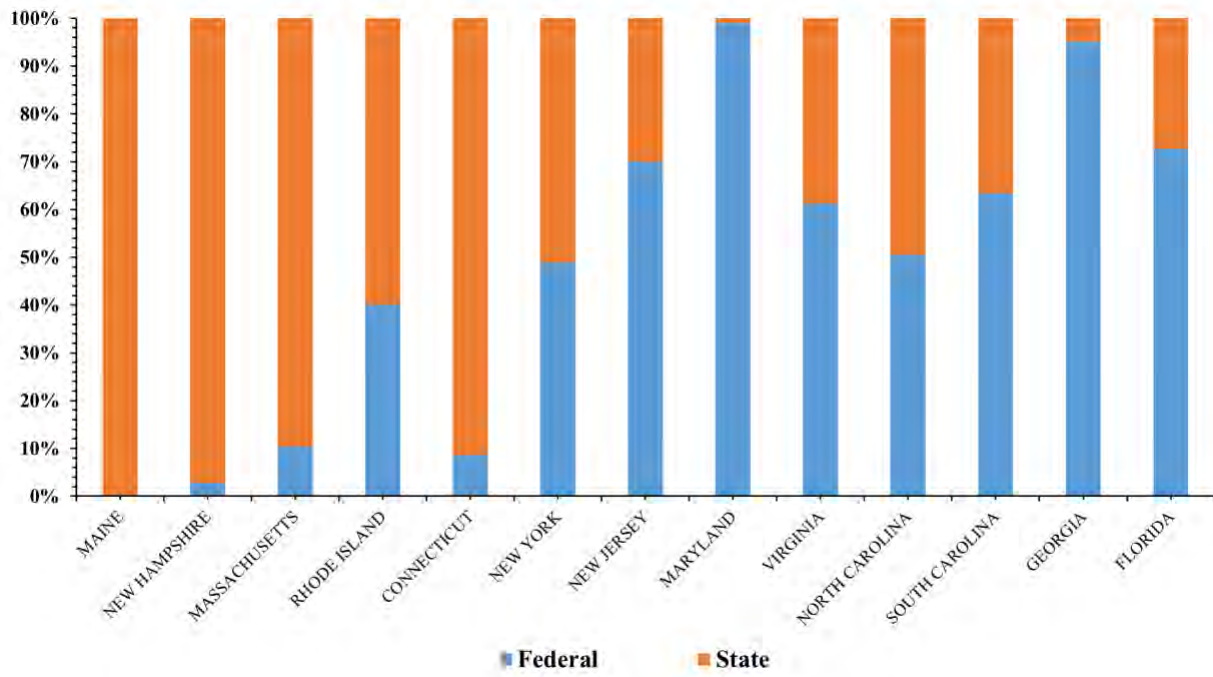


Figure 26. Percentage of recreational discards in federal and state waters for each state.

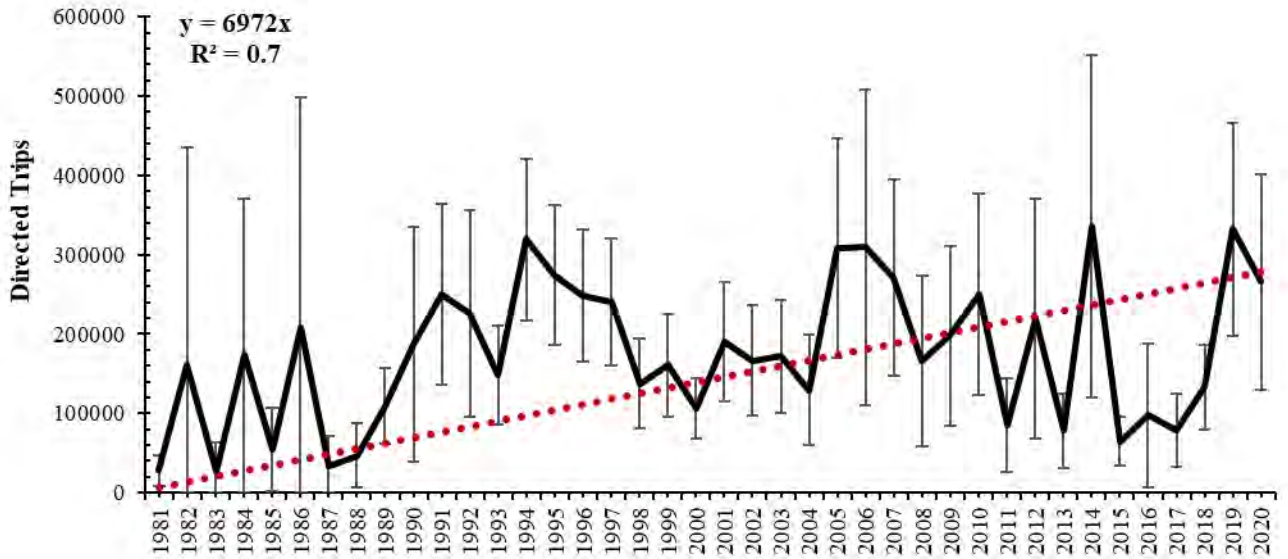


Figure 27. Directed trips for bonito with 95% confidence intervals from 1981-2022.

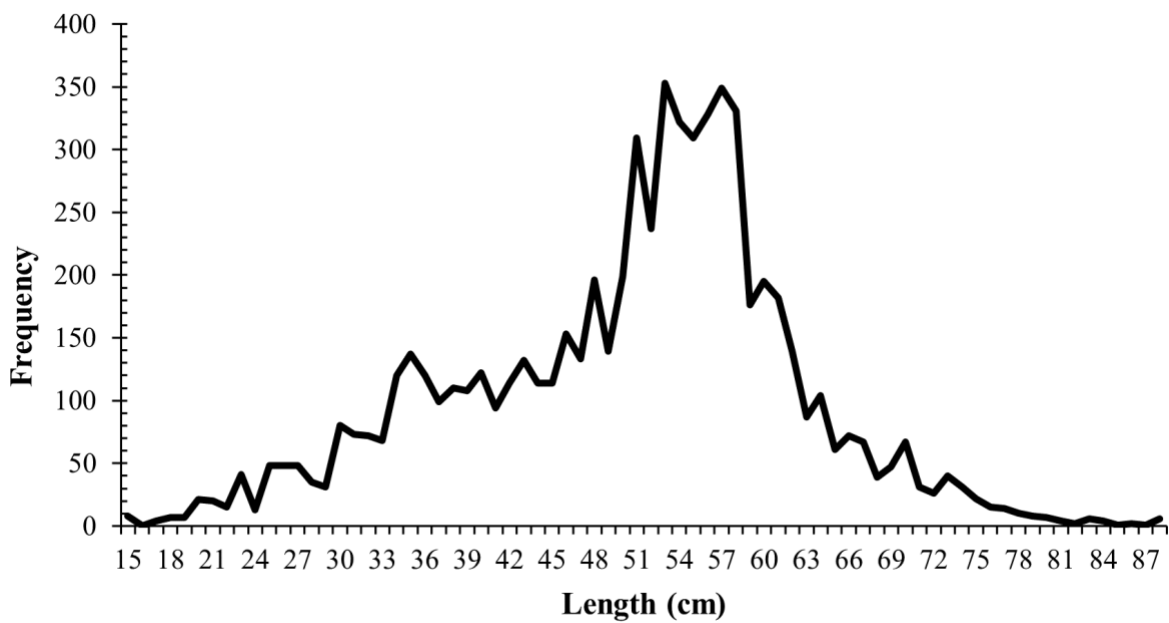


Figure 28. The aggregated length-frequency of the entire MRIP data set.

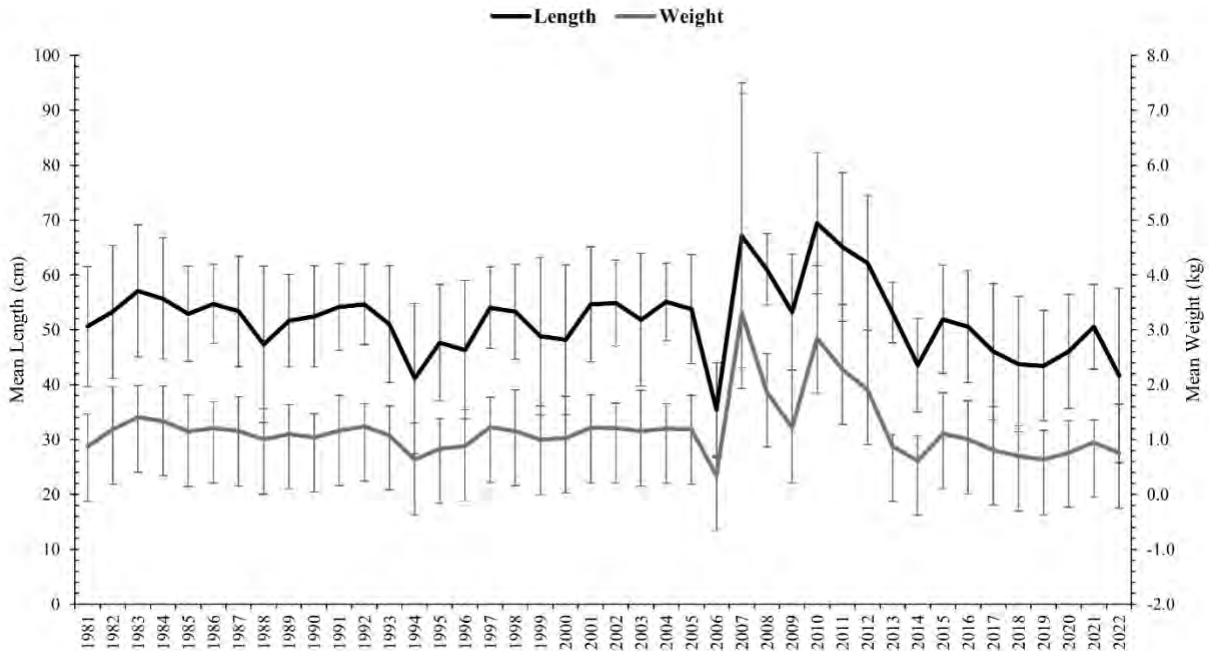


Figure 29. The mean length (Black) and mean weight (Gray) of MRIP sampled fish from 1981 to 2022, error bars based on standard deviation.

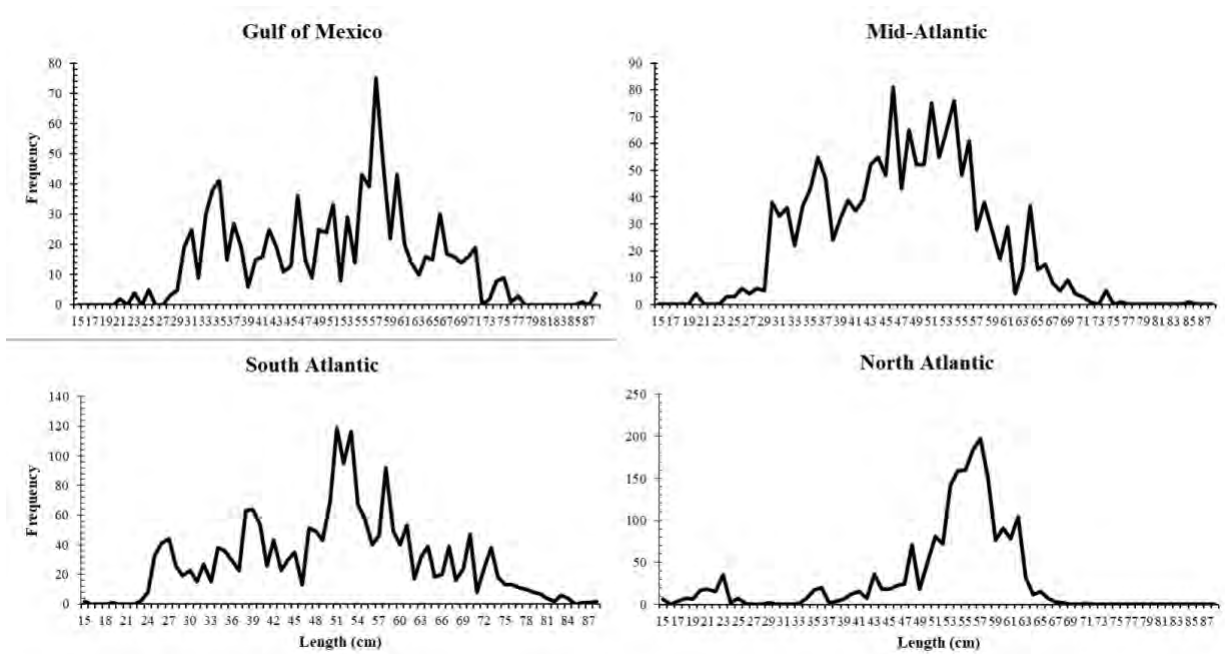


Figure 30. The length frequency distributions for the four regions with data from 1981-2022.

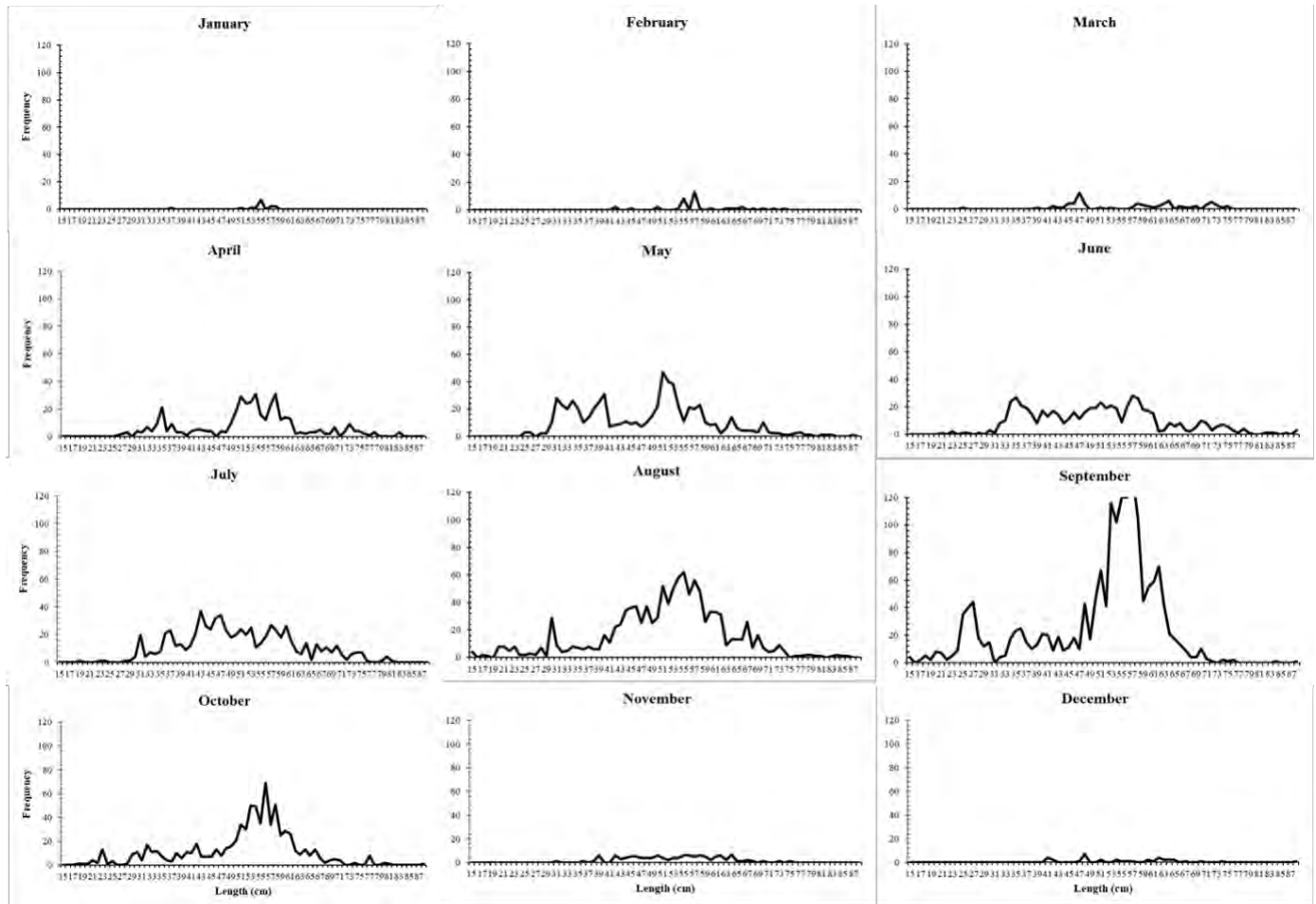


Figure 31. The length frequency distributions for by month from 1981-2022.

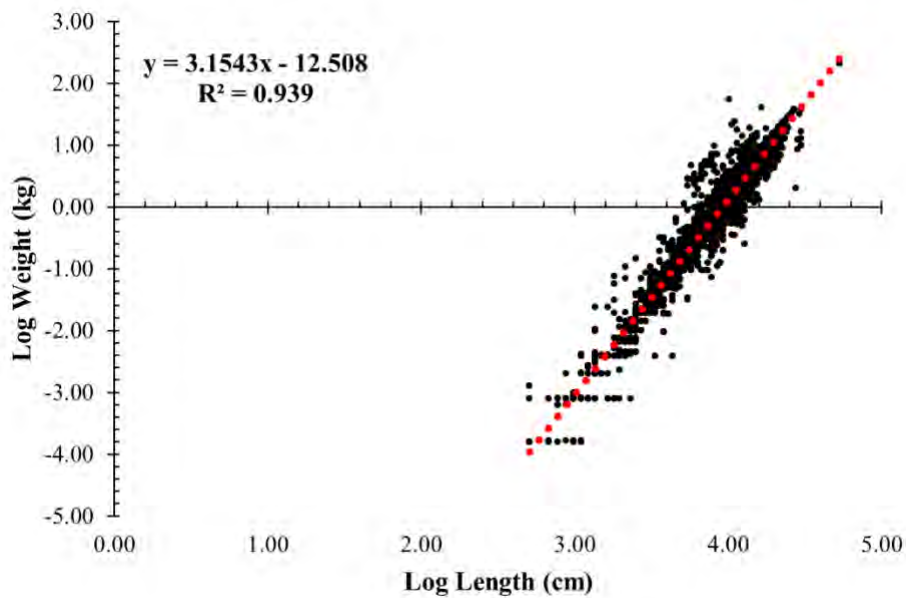


Figure 32. The logarithmic length-weight relationship on all data from 1981-2022.

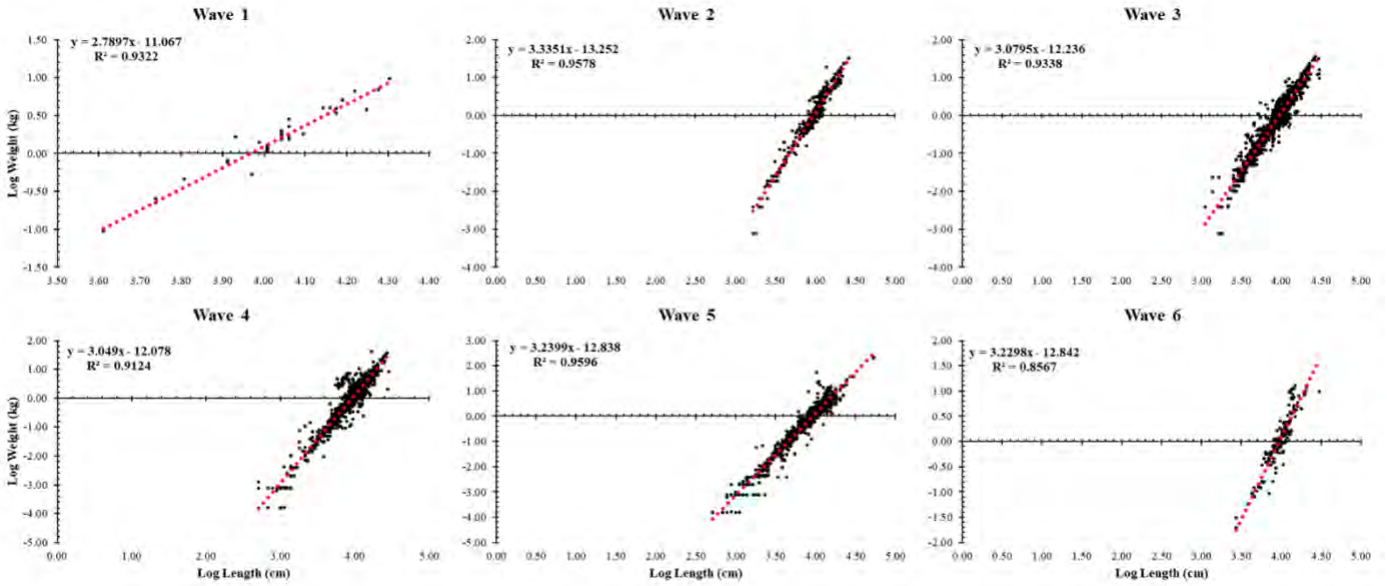


Figure 33. The logarithmic length-weight relationship for waves 1-6 using all data from 1981-2022.

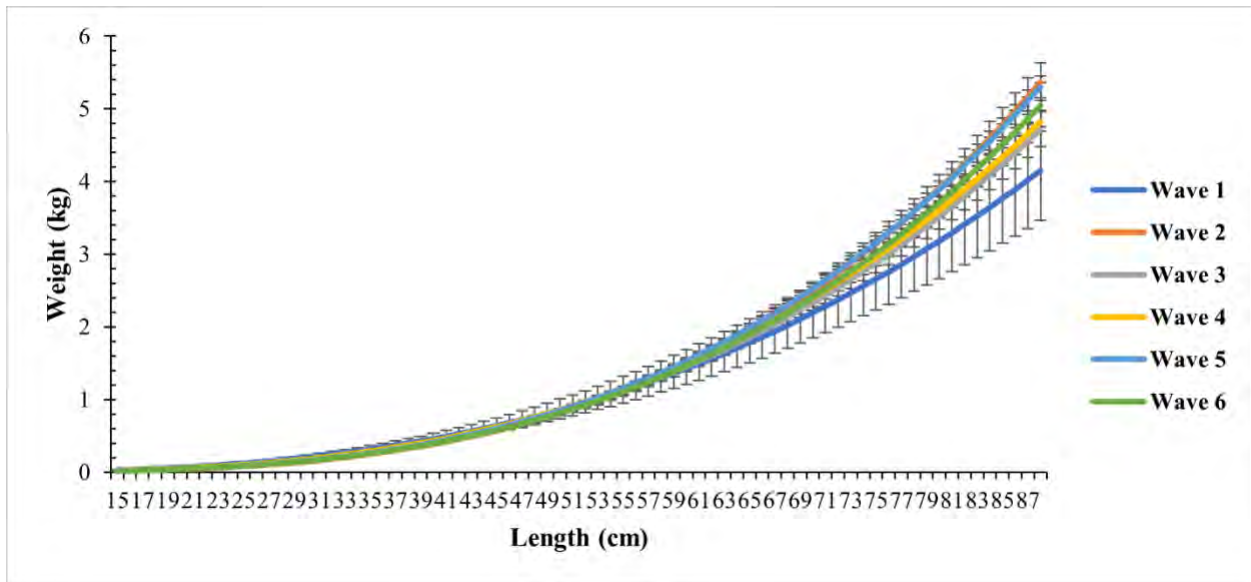


Figure 34. The predicted weights at length for waves 1-6 with 95% confidence intervals.

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 Commission
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	47000	4700	71800	123500
1951	40000	600	7700	48300
1952	58400	7800	8600	74800
1953	137500	12800	30500	180800
1954	170300	112000	5900	288200
1955	119300	12900	4800	137000
1956	54000	2300	700	57000
1957	66900	7400	6500	80800
1958	49400	3300	2300	55000
1959	149900	96100	3300	249300
1960	121800	54200	600	176600
1961	90900	45500	600	137000
1962	93400	69400	2300	165100
1963	99900	109900	500	210300
1964	25400	37700	100	63200
1965	100000	81700	100	181800
1966	21300	9600	4100	35000
1967	17000	22600	5700	45300
1968	60500	21800	6000	88300
1969	21700	184100	2900	208700
1970	18600	122800	7200	148600
1971	8000	56500	6300	70800
1972	6500	38600	2900	48000
1973	9700	68000	10000	87700
1974	9700	91000	5400	106100
1975	38400	155000	10700	204100
1976	5500	40400	21100	67000
1977	53900	126300	17800	198000
1978	91000	269100	5777	365877
1979	112600	414400	29930	556930
1980	45200	133600	98227	277027
1981	57300	187100	82645	327045
1982	60500	41100	100723	202323
1983	67800	132800	39533	240133

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




Year	Mid-Atlantic	North Atlantic	South Atlantic	Total
1984	64000	171400	38725	274125
1985	60500	77300	6440	144240
1986	75600	38000	4664	118264
1987	76700	74200	35291	186191
1988	139600	57000	59086	255686
1989	116400	153600	152864	422864
1990	138558	40551	22438	201547
1991	159659	27248	21875	208782
1992	253286	245658	63061	562005
1993	74803	131025	106720	312548
1994	149876	130015	118854	398745
1995	94619	96606	34718	225943
1996	196957	49356	16268	262581
1997	236290	50901	42372	329563
1998	96332	61337	21353	179022
1999	106185	51388	23291	180864
2000	81956	9938	13343	105237
2001	56564	6501	16531	79596
2002	21617	9136	15456	46209
2003	27293	5027	27379	59699
2004	50456	6552	9303	66311
2005	75574	12684	11672	99930
2006	21873	19243	12137	53253
2007	80073	17395	17404	114872
2008	35555	4493	17515	57563
2009	37559	25821	10454	73834
2010	41823	4646	16454	62923
2011	38901	20224	16712	75837
2012	8635	8166	15896	32697
2013	17328	11910	14457	43695
2014	47004	23100	11461	81565
2015	3578	40740	22278	66596
2016	2634	14457	15183	32274
2017	3660	26764	14619	45043
2018	12090	16811	18691	47592
2019	4939	42989	17848	65776
2020	10055	30165	18221	58441
2021	2400	13706	9272	25378
Overall	44%	41%	15%	
10-Year 	23% 	46% 	32%	

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

Year	CT	DE	FL	EAST	GA	ME	MD	MA	NH	NJ	NY	NC	RI	SC	VA
1950	0	0	64000	0	0	0	4300	0	200	3100	7800	400	0	43700	
1951	0	0	7700	0	0	1100	200	0	12400	500	0	400	0	26000	
1952	0	0	8600	0	0	700	7800	0	36000	5900	0	0	0	15800	
1953	0	500	30500	0	0	8000	100	0	109600	9900	0	12700	0	9500	
1954	0	0	5900	0	0	0	20400	0	123700	31400	0	91600	0	15200	
1955	0	0	4800	0	0	1700	700	0	65400	41300	0	12200	0	10900	
1956	0	0	700	0	0	500	2200	0	34500	4700	0	100	0	14300	
1957	0	0	6500	0	0	4400	1000	0	51200	3900	0	6400	0	7400	
1958	0	0	2300	0	0	800	0	0	23000	0	0	3300	0	25600	
1959	0	0	3300	0	0	0	10600	0	95500	35800	0	85500	0	18600	
1960	0	0	600	0	0	100	25300	0	45000	62700	0	28900	0	14000	
1961	0	0	600	0	0	300	16800	0	40600	27100	0	28700	0	22900	
1962	0	0	2300	0	0	1100	8700	0	22600	65500	0	60700	0	4200	
1963	500	0	500	0	0	0	48100	0	54800	39500	0	61300	0	5600	
1964	0	0	100	0	0	0	13800	0	5900	5600	0	23900	0	13900	
1965	0	0	100	0	0	100	14800	0	51400	13000	0	66900	0	35500	
1966	0	0	4100	0	0	0	3200	0	17100	1800	0	6400	0	2400	
1967	0	0	5700	0	0	300	22400	0	8500	5700	0	200	0	2500	
1968	0	0	6000	0	0	0	11800	0	32900	25900	0	10000	0	1700	
1969	0	0	2900	0	0	0	3300	0	2200	18500	0	180800	0	1000	
1970	200	0	7200	0	0	0	8700	0	1100	14600	0	113900	0	2900	
1971	0	0	6300	0	0	0	12700	0	1100	6900	0	43800	0	0	
1972	0	0	2900	0	0	0	4500	0	800	2300	0	34100	0	3400	
1973	0	0	10000	0	0	0	11500	0	800	5200	0	56500	0	3700	
1974	0	0	5400	0	0	0	13800	0	2100	6400	0	77200	0	1200	
1975	0	0	10700	0	0	0	29300	0	1400	37000	0	125700	0	0	
1976	0	0	21100	0	0	0	15000	0	1200	4300	0	25400	0	0	
1977	0	0	17800	0	0	0	900	0	3000	50900	0	125400	0	0	
1978	0	0	5777	0	0	100	110600	0	3400	86600	0	158500	0	900	
1979	0	0	29706	0	0	0	138900	0	18500	92900	224	275500	0	1200	
1980	0	0	80941	0	0	0	52000	0	4500	39100	17286	81600	0	1600	
1981	0	0	78706	0	0	0	119600	0	11300	44600	3939	67500	0	1400	
1982	0	0	69974	0	0	0	18200	0	18700	41500	30749	22900	0	300	
1983	0	0	28492	0	0	0	88600	0	8100	59300	11041	44200	0	400	

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

Year	CT	DE	FL	EAST	GA	ME	MD	MA	NH	NJ	NY	NC	RI	SC	VA
1984	0	0	37832	0	0	400	43900	0	13100	50400	893	127500	0	100	
1985	200	0	4991	0	0	0	29100	0	36100	24000	1449	48000	0	400	
1986	0	0	3738	0	0	0	20700	0	54400	20500	926	17300	0	700	
1987	5000	0	28568	0	0	0	48600	0	55800	20700	6723	20600	0	200	
1988	1700	0	55973	0	0	600	300	0	131500	6700	3113	55000	0	800	
1989	900	0	148442	0	0	0	77400	0	105800	8600	4422	75300	0	2000	
1990	400	0	18376	0	0	1969	3734	0	125555	645	4062	36417	0	10389	
1991	800	0	16972	0	0	27142	4285	0	129080	1247	4903	22163	0	2190	
1992	300	0	51403	0	0	105020	87063	0	130370	17035	11658	158295	0	861	
1993	185	0	91137	0	0	3750	17263	0	49168	20889	15583	113577	0	996	
1994	0	0	81481	0	0	13	63547	0	52917	93274	37373	66468	0	3672	
1995	146	0	0	0	0	875	39487	25	71433	21637	34718	56948	0	674	
1996	0	0	0	0	0	0	13750	0	170963	25701	16268	35606	0	293	
1997	0	0	0	0	0	0	25642	0	205472	30367	42372	25259	0	451	
1998	0	0	0	0	0	0	24161	0	66764	29568	21353	37176	0	0	
1999	413	0	0	0	0	0	29724	0	47360	58825	23291	21251	0	0	
2000	235	0	0	0	0	0	996	0	55683	26273	13343	8707	0	0	
2001	56	0	0	0	0	0	0	0	48151	8413	16531	6445	0	0	
2002	0	0	0	0	0	0	2817	0	12794	8823	15456	6319	0	0	
2003	0	0	0	0	0	121	522	0	20320	6852	27379	4505	0	0	
2004	1943	0	0	0	0	1302	806	0	42194	6892	9303	3803	0	68	
2005	96	0	0	0	0	0	1561	0	68716	6855	11672	11027	0	3	
2006	724	0	0	0	0	10500	1328	0	5771	5579	9771	17191	2366	23	
2007	97	0	0	0	0	0	493	0	67098	12975	16085	16805	1319	0	
2008	5	0	0	0	0	0	247	0	27159	8396	16576	4241	939	0	
2009	5	0	0	0	0	0	0	0	20084	17475	9981	25816	473	0	
2010	20	0	0	0	0	0	0	0	7223	34292	15686	4626	768	308	
2011	622	0	0	0	0	118	494	0	18730	20053	11039	19108	5673	0	
2012	6	0	0	0	0	68	1201	0	4402	4165	11343	6959	4553	0	
2013	151	0	0	0	0	0	530	0	3901	12585	10506	11229	3951	842	
2014	46	0	0	0	0	0	1578	0	38823	8049	9081	21476	2380	132	
2015	20	0	0	0	0	84	1761	0	1742	1752	20989	38959	1289	0	
2016	32	0	0	0	0	104	1547	0	747	1783	15183	12878	0	0	
2017	55	0	0	0	0	41	1038	0	1231	2388	11345	25671	3274	0	
2018	99	0	0	0	0	0	3498	0	11037	1053	13848	13214	4843	0	
2019	147	0	0	0	0	0	999	0	3095	1844	14045	41843	3803	0	
2020	210	0	0	0	0	0	1198	0	9473	582	15926	28757	2295	0	
2021	46	0	0	0	0	0	171	0	1664	736	7351	13489	1921	0	
Overall	0%	0%	10%	0%	0%	2%	12%	0%	25%	14%	5%	29%	0%	3%	
10-Year	0%	0%	0%	0%	0%	0%	3%	0%	15%	7%	26%	43%	6%	0%	

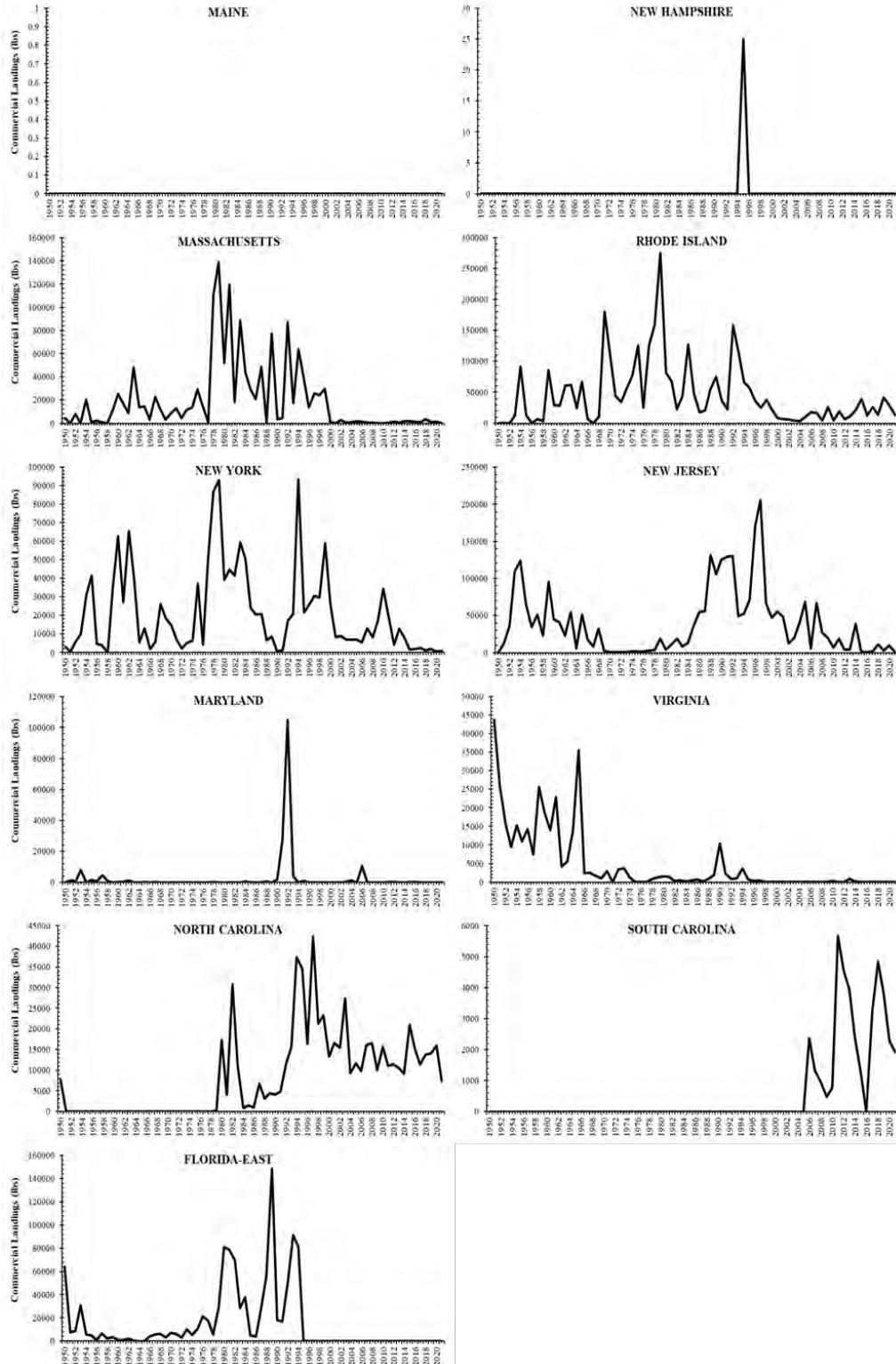


Figure A2.1. Commercial landings (lbs.) 1950-2021 by state.

Table A2.3. Recreational landings (lbs.) 1981-2021 by region.

Year	Mid-Atlantic	North Atlantic	South Atlantic	Total Landings
1981	274941	0	1938204	2213145
1982	10146854	5062	1375596	11527512
1983	79947	599581	343470	1022998
1984	3417905	62922	638573	4119400
1985	564986	38685	143248	746919
1986	194353	2199329	0	2393682
1987	488097	176015	81437	745549
1988	1291161	164711	34337	1490209
1989	2273506	62019	371569	2707094
1990	409385	79954	156947	646286
1991	641291	468851	105260	1215402
1992	885716	146126	101063	1132905
1993	140060	207281	60980	408321
1994	145355	389903	68461	603719
1995	104330	147020	45611	296961
1996	166987	85191	5395	257573
1997	211247	184146	184053	579446
1998	250598	65720	154317	470635
1999	96900	111305	44469	252674
2000	11096	29758	74702	115556
2001	46615	186485	41181	274281
2002	19556	145031	97116	261703
2003	489345	76968	6684	572997
2004	496395	81789	48476	626660
2005	8803	269866	10758	289427
2006	12686	62512	4458	79656
2007	6356	555329	52726	614411
2008	933	36883	65984	103800
2009	98082	60446	13799	172327
2010	38319	26983	17712	83014
2011	35420	89852	287461	412733
2012	0	137943	96059	234002
2013	44705	61165	99252	205122
2014	198443	113832	91230	403505
2015	47369	53927	102409	203705
2016	37463	6704	25442	69609
2017	201751	52898	9579	264228
2018	94509	146748	55059	296316
2019	247845	243009	125031	615885
2020	60177	195039	179891	435107
2021	18351	79058	113110	210519
Overall	61%	20%	19%	
10-Year	32%	37%	31%	

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

Year	CT	DE	FL	EAST	GA	MD	MA	NJ	NY	NC	RI	SC	VA	NH	ME
1981	0	0	1911323	0	0	0	256539	18402	26515	0	366	0	0	0	0
1982	0	0	1291789	0	0	0	10119563	27291	83807	5062	0	0	0	0	0
1983	0	0	341955	0	6557	0	73390	0	0	599581	1515	0	0	0	0
1984	19178	0	601192	0	52210	0	3323401	42294	15540	43744	21841	0	0	0	0
1985	0	21652	134337	0	32404	0	234371	275510	8911	38685	0	1049	0	0	0
1986	8098	0	0	0	70667	483412	28541	71844	0	1707819	0	23301	0	0	0
1987	28620	0	66165	0	0	2390	174787	103031	14910	145005	362	210279	0	0	0
1988	40532	0	26392	0	810508	3377	288019	69197	6016	120802	1929	123437	0	0	0
1989	26952	14573	244001	0	171987	1971	1923087	145514	116393	33096	11175	18345	0	0	0
1990	26129	9469	130434	0	7859	9098	263177	82565	22547	44727	3966	46315	0	0	0
1991	12491	410	5642	0	8677	202248	302915	329289	94896	254112	4722	0	0	0	0
1992	10655	377	67883	952	27672	83083	75043	774917	23078	52388	10102	7707	0	0	0
1993	30175	0	0	686	0	126175	0	138153	49289	50931	11691	1907	0	0	0
1994	83035	0	14068	0	0	298462	92482	41493	23713	8406	30680	11380	0	0	0
1995	0	0	0	0	5858	122341	47567	39844	41312	24679	4299	11061	0	0	0
1996	0	0	0	0	0	62300	134711	22750	5395	22891	0	9526	0	0	0
1997	172	0	0	0	0	50876	93068	118179	162981	133098	21072	0	0	0	0
1998	4753	7564	0	0	19701	0	175400	45197	145838	60967	8479	2736	0	0	0
1999	0	2480	0	0	0	6074	26308	68112	38658	105231	5811	0	0	0	0
2000	0	0	1711	13375	0	18468	11096	0	69580	11290	3411	0	0	0	0
2001	16257	0	15503	0	0	146012	46615	0	23603	24216	2075	0	0	0	0
2002	0	2945	0	0	4841	52117	11770	0	97116	92914	0	0	0	0	0
2003	0	0	0	0	47384	36771	411244	6572	6684	40197	0	24145	0	0	0
2004	0	0	0	0	0	50241	496395	0	48253	31548	223	0	0	0	0
2005	0	0	0	3477	26	258162	8777	0	9387	11704	1371	0	0	0	0
2006	0	0	0	0	0	62512	12344	342	4458	0	0	0	0	0	0
2007	204867	0	0	0	0	267251	6356	0	34694	83211	18032	0	0	0	0
2008	0	0	26892	0	0	36577	0	933	39092	306	0	0	0	0	0
2009	0	0	0	0	0	60133	98082	0	13799	313	0	0	0	0	0
2010	0	0	223	0	0	26932	38319	0	8018	51	9471	0	0	0	0
2011	0	0	0	3408	16275	89852	19141	0	287461	0	0	4	0	0	0
2012	0	0	0	8616	0	76917	0	0	95947	68	112	0	1457	59501	0
2013	0	0	0	0	174	0	44531	0	99252	61165	0	0	0	0	0
2014	8067	355	0	0	13	98646	181485	16590	91230	7119	0	0	0	0	0
2015	0	0	0	1960	0	48295	0	46716	102409	5628	0	653	4	0	0
2016	1400	0	2562	0	0	5304	37463	0	22128	0	752	0	0	0	0
2017	622	0	0	0	37	8325	200907	35	9579	43951	0	772	0	0	0
2018	13415	4427	168	1770	28049	93679	51343	0	42880	36722	12011	10690	2932	0	0
2019	39273	1074	0	3585	2183	101523	228776	15812	122932	102213	2099	0	0	0	0
2020	18	0	0	146	1171	133210	41213	14407	179805	61134	86	3386	677	0	0
2021	1393	0	0	0	0	53098	8779	9572	104790	16319	8320	0	8248	0	0
Overall	1%	0%	12%	0%	3%	8%	50%	6%	6%	10%	0%	1%	0%	0%	0%
10-Year	2%	0%	0%	1%	1%	21%	27%	3%	29%	11%	1%	1%	0%	2%	0%

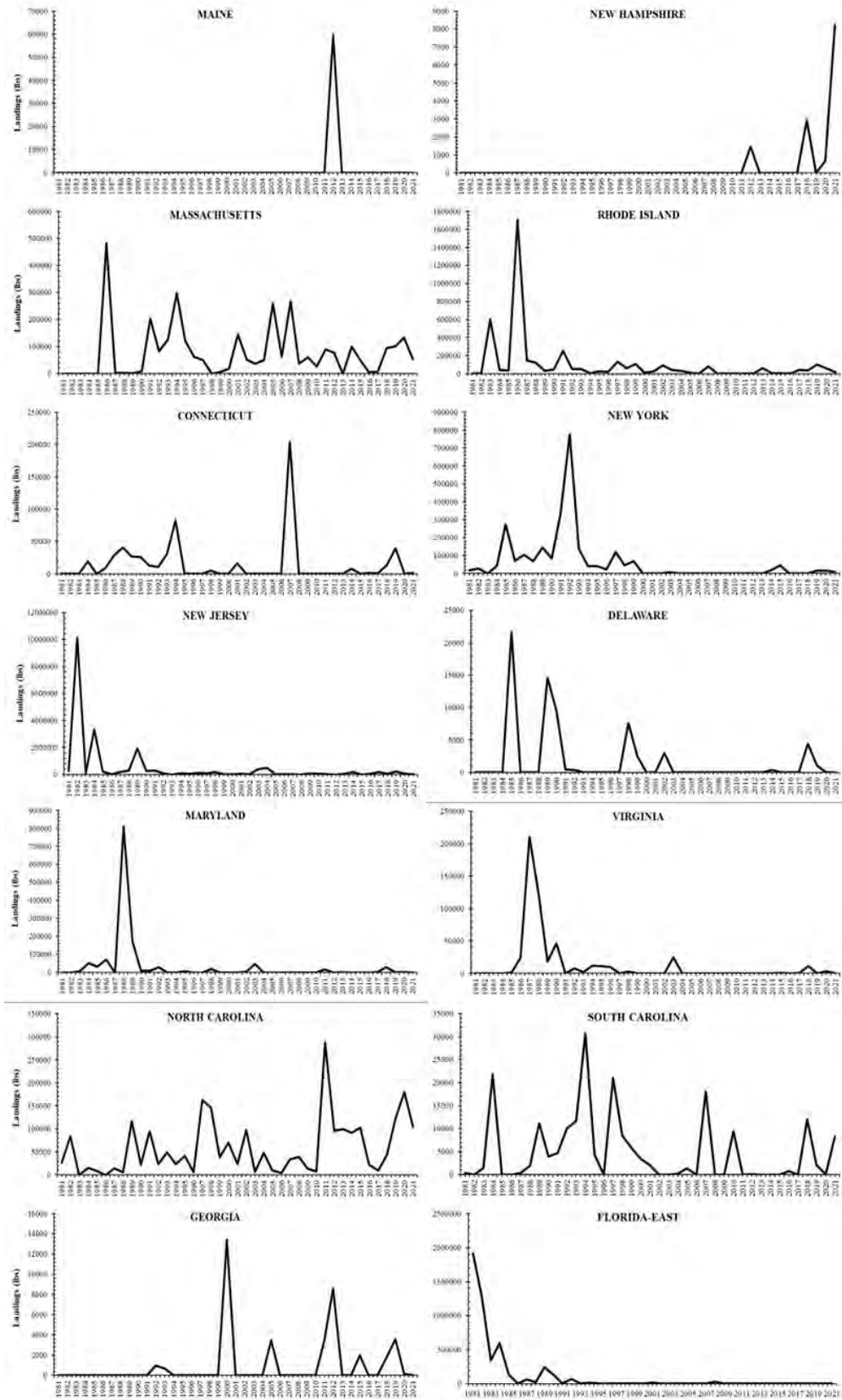


Figure A2.2. Recreational landings (lbs.) 1981-2021 by state.

Table A2.5. 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%	94%	6%	0%	0%	0%	0%	2%	98%
1982	0%	98%	2%	0%	100%	0%	0%	4%	96%
1983	57%	7%	36%	0%	89%	11%	0%	26%	74%
1984	0%	99%	1%	0%	31%	69%	41%	12%	47%
1985	0%	39%	61%	0%	100%	0%	0%	0%	100%
1986	0%	38%	62%	21%	78%	1%	0%	0%	0%
1987	0%	65%	35%	0%	6%	94%	0%	3%	97%
1988	2%	72%	26%	0%	35%	65%	0%	5%	95%
1989	0%	54%	46%	15%	39%	45%	1%	42%	57%
1990	2%	12%	86%	9%	23%	68%	83%	11%	6%
1991	20%	14%	66%	89%	3%	9%	0%	50%	50%
1992	7%	3%	90%	30%	4%	66%	0%	13%	87%
1993	0%	19%	81%	49%	6%	44%	0%	30%	70%
1994	0%	12%	88%	19%	12%	69%	1%	53%	47%
1995	0%	0%	100%	28%	14%	58%	0%	24%	76%
1996	0%	6%	94%	17%	8%	76%	0%	89%	11%
1997	0%	39%	61%	0%	34%	66%	0%	15%	85%
1998	0%	9%	91%	1%	5%	94%	83%	8%	9%
1999	0%	2%	98%	23%	2%	75%	0%	33%	67%
2000	0%	0%	100%	0%	44%	56%	0%	83%	17%
2001	0%	0%	100%	0%	5%	95%	24%	33%	43%
2002	0%	0%	100%	0%	54%	46%	0%	0%	100%
2003	0%	12%	88%	23%	30%	47%	0%	56%	44%
2004	0%	3%	97%	0%	14%	86%	0%	2%	98%
2005	0%	10%	90%	13%	5%	82%	0%	8%	92%
2006	0%	100%	0%	0%	0%	100%	0%	0%	100%
2007	0%	100%	0%	44%	13%	43%	0%	6%	94%
2008	0%	100%	0%	0%	1%	99%	0%	74%	26%
2009	0%	0%	100%	0%	2%	98%	0%	88%	12%
2010	0%	0%	100%	100%	0%	0%	0%	100%	0%
2011	0%	14%	86%	0%	0%	100%	0%	3%	97%
2012	0%	0%	0%	0%	1%	99%	0%	19%	81%
2013	0%	0%	100%	0%	1%	99%	0%	7%	93%
2014	0%	9%	91%	40%	14%	46%	0%	4%	96%
2015	0%	1%	99%	5%	1%	93%	0%	3%	97%
2016	0%	0%	100%	0%	46%	54%	0%	29%	71%
2017	0%	96%	4%	0%	1%	99%	0%	35%	65%
2018	5%	4%	91%	5%	0%	95%	0%	11%	89%
2019	8%	27%	65%	47%	4%	50%	0%	6%	94%
2020	32%	8%	60%	22%	1%	77%	0%	3%	97%
2021	0%	1%	99%	21%	1%	78%	0%	5%	95%
2022	0%	19%	81%	29%	3%	69%	0%	13%	87%

Table A2.6. 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%	2%	98%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	0%	0%	0%	1%	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	0%	0%	0%	26%	74%	0%	0%	0%	0%	84%	16%	0%	0%	0%
1984	0%	100%	0%	0%	0%	0%	44%	6%	50%	0%	0%	0%	0%	100%	0%	0%	0%	0%
1985	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	63%	37%	0%	0%	0%
1986	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	52%	48%	96%	0%	4%
1987	0%	9%	91%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
1988	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	99%	1%	0%	0%	100%
1989	0%	42%	58%	0%	100%	0%	0%	56%	44%	0%	0%	0%	0%	15%	85%	0%	0%	100%
1990	0%	0%	100%	0%	99%	1%	100%	0%	0%	0%	0%	0%	0%	100%	0%	78%	6%	17%
1991	0%	0%	100%	0%	15%	85%	0%	0%	100%	0%	0%	0%	0%	34%	66%	99%	0%	1%
1992	0%	30%	70%	0%	100%	0%	0%	0%	100%	0%	100%	0%	0%	87%	13%	28%	0%	72%
1993	44%	4%	52%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	70%	4%	27%
1994	0%	7%	93%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	25%	13%	62%
1995	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	34%	6%	60%
1996	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	20%	5%	75%
1997	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	23%	77%
1998	0%	5%	95%	0%	33%	67%	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%
1999	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%	0%	88%
2000	0%	0%	0%	0%	0%	0%	0%	1%	99%	0%	0%	100%	0%	0%	0%	0%	47%	53%
2001	0%	0%	100%	0%	0%	0%	0%	71%	29%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2002	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	100%
2003	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	21%	79%	0%	8%	92%
2004	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	89%
2005	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	17%	83%	0%	100%	0%	9%	5%	86%
2006	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2007	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	92%	4%	4%
2008	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	99%
2010	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%
2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%
2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	1%	99%
2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%
2014	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	46%	15%	39%
2015	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	2%	98%
2016	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	58%	42%
2017	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%
2018	0%	0%	100%	100%	0%	0%	0%	100%	0%	0%	9%	91%	0%	0%	100%	0%	0%	100%
2019	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	6%	94%	0%	22%	78%	23%	9%	68%
2020	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	1%	99%
2021	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	99%
2022	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	29%	3%	69%

Table A2.6. 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			ME			NH		
	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR
1981	0%	99%	1%	0%	18%	82%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1982	0%	99%	1%	0%	0%	100%	0%	47%	53%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1983	62%	0%	38%	0%	0%	0%	0%	0%	0%	89%	11%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1984	0%	100%	0%	0%	0%	100%	0%	100%	0%	0%	1%	99%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1985	0%	0%	100%	0%	64%	36%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1986	0%	0%	100%	0%	34%	66%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	54%	46%	0%	0%	0%	0%	0%	0%
1987	0%	18%	82%	0%	88%	12%	0%	16%	84%	0%	5%	95%	0%	100%	0%	0%	94%	6%	0%	0%	0%	0%	0%	0%
1988	9%	12%	79%	0%	100%	0%	0%	26%	74%	0%	48%	52%	0%	0%	100%	0%	26%	74%	0%	0%	0%	0%	0%	0%
1989	0%	59%	41%	0%	32%	68%	3%	11%	85%	28%	40%	32%	0%	67%	33%	0%	5%	95%	0%	0%	0%	0%	0%	0%
1990	3%	12%	85%	0%	3%	97%	0%	56%	44%	0%	40%	60%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1991	1%	16%	83%	39%	11%	49%	0%	50%	50%	85%	5%	10%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1992	81%	0%	18%	0%	0%	100%	0%	26%	74%	38%	5%	57%	0%	66%	34%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1993	0%	0%	0%	0%	19%	81%	0%	13%	87%	2%	14%	83%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1994	0%	5%	95%	0%	7%	93%	1%	23%	76%	0%	20%	80%	0%	100%	0%	0%	91%	9%	0%	0%	0%	0%	0%	0%
1995	0%	0%	100%	0%	0%	100%	0%	16%	84%	0%	53%	47%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1996	0%	0%	100%	0%	0%	100%	0%	89%	11%	7%	15%	77%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1997	0%	2%	98%	0%	68%	32%	0%	16%	84%	0%	38%	62%	0%	13%	87%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1998	0%	0%	100%	0%	0%	100%	88%	8%	5%	1%	5%	94%	0%	15%	85%	0%	2%	98%	0%	0%	0%	0%	0%	0%
1999	0%	0%	100%	0%	3%	97%	0%	29%	71%	23%	2%	75%	0%	62%	38%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2000	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	39%	61%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2001	0%	0%	100%	0%	0%	0%	42%	2%	56%	0%	37%	63%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2002	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	85%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2003	0%	4%	96%	0%	100%	0%	0%	56%	44%	45%	51%	5%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2004	0%	3%	97%	0%	0%	0%	0%	1%	99%	0%	19%	81%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2005	0%	9%	91%	0%	0%	0%	0%	6%	94%	98%	2%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2006	0%	100%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2007	0%	100%	0%	0%	0%	0%	0%	9%	91%	0%	72%	28%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2008	0%	0%	0%	0%	100%	0%	0%	56%	44%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2009	0%	0%	100%	0%	0%	0%	0%	88%	12%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2010	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2011	0%	25%	75%	0%	0%	0%	0%	2%	98%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2012	0%	0%	0%	0%	0%	0%	0%	12%	88%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%	0%	0%	100%
2013	0%	0%	100%	0%	0%	0%	0%	7%	93%	0%	1%	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2014	0%	2%	98%	0%	78%	22%	0%	4%	96%	0%	13%	87%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2015	0%	0%	0%	0%	0%	100%	0%	1%	99%	48%	0%	52%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%
2016	0%	0%	100%	0%	0%	0%	0%	18%	82%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2017	0%	96%	4%	0%	100%	0%	0%	35%	65%	0%	1%	99%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2018	0%	8%	92%	0%	0%	0%	0%	14%	86%	12%	0%	88%	0%	0%	100%	0%	0%	100%	0%	0%	0%	80%	0%	20%
2019	9%	28%	63%	0%	11%	89%	0%	4%	96%	88%	0%	12%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2020	47%	2%	51%	0%	10%	90%	0%	2%	98%	70%	1%	29%	0%	100%	0%	0%	38%	62%	0%	0%	0%	0%	86%	14%
2021	0%	3%	97%	0%	0%	100%	0%	0%	100%	51%	2%	47%	0%	59%	41%	0%	0%	0%	0%	0%	0%	100%	0%	0%
2022	0%	18%	82%	0%	0%	0%	0%	11%	89%	34%	3%	63%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%



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

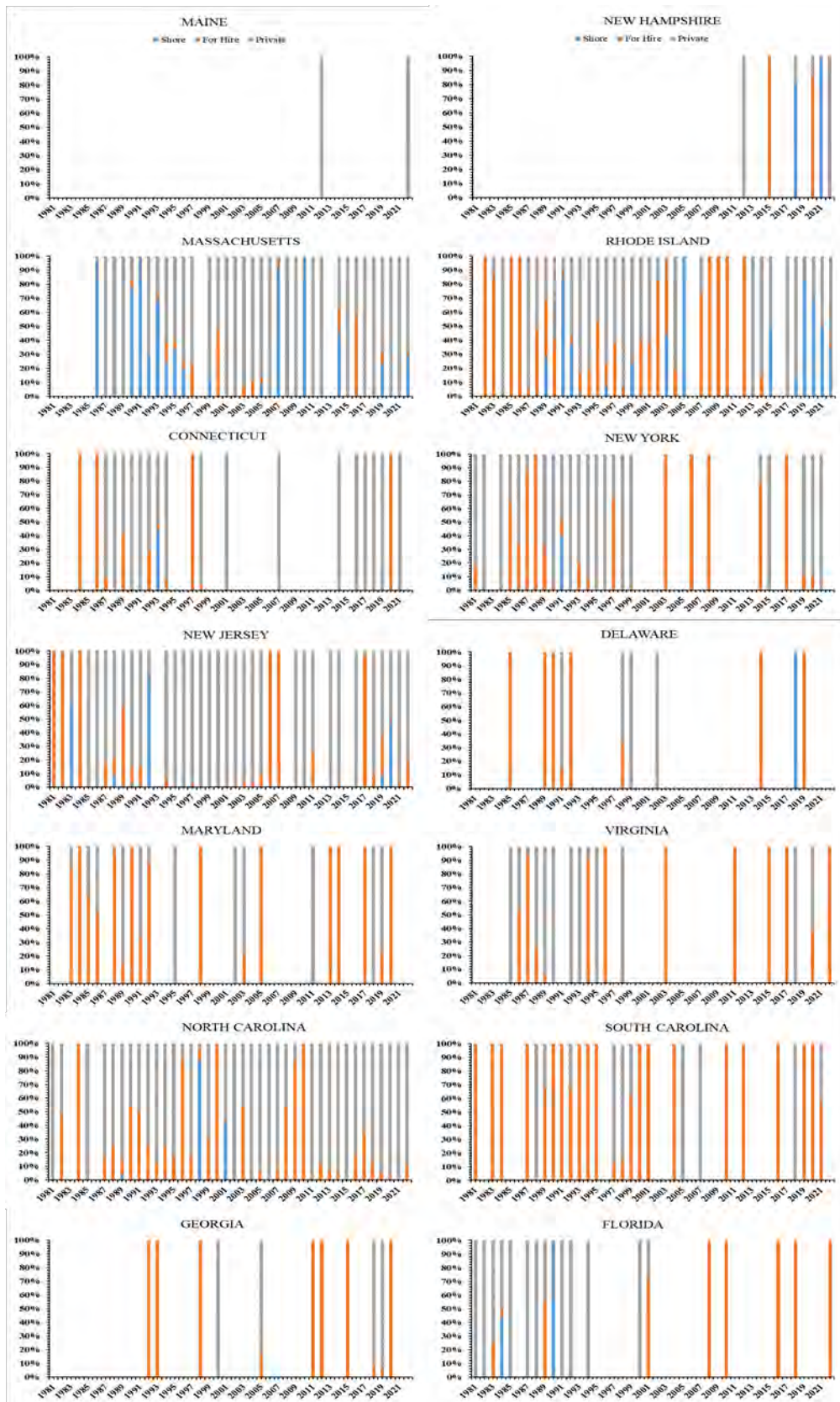


Figure A2.4 Percentage of recreational landing 1981-2021 by fishing mode for each state.

Table A2.7. 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	99%	1%	0%	0%	97%	3%
1982	100%	0%	100%	0%	75%	25%
1983	43%	57%	89%	11%	67%	33%
1984	98%	2%	31%	69%	28%	72%
1985	64%	36%	100%	0%	100%	0%
1986	84%	16%	79%	21%	0%	0%
1987	76%	24%	85%	15%	79%	21%
1988	96%	4%	71%	29%	77%	23%
1989	95%	5%	53%	47%	36%	64%
1990	66%	34%	41%	59%	14%	86%
1991	48%	52%	9%	91%	81%	19%
1992	83%	17%	10%	90%	24%	76%
1993	36%	64%	19%	81%	100%	0%
1994	60%	40%	1%	99%	79%	21%
1995	98%	2%	17%	83%	25%	75%
1996	100%	0%	4%	96%	100%	0%
1997	72%	28%	47%	53%	87%	13%
1998	97%	3%	48%	52%	6%	94%
1999	98%	2%	41%	59%	59%	41%
2000	0%	100%	46%	54%	100%	0%
2001	91%	9%	46%	54%	53%	47%
2002	40%	60%	64%	36%	34%	66%
2003	100%	0%	30%	70%	56%	44%
2004	100%	0%	14%	86%	48%	52%
2005	10%	90%	4%	96%	63%	37%
2006	97%	3%	100%	0%	100%	0%
2007	58%	42%	4%	96%	74%	26%
2008	0%	100%	0%	100%	59%	41%
2009	100%	0%	0%	100%	88%	12%
2010	8%	92%	0%	100%	100%	0%
2011	100%	0%	0%	100%	35%	65%
2012	0%	0%	44%	56%	67%	33%
2013	91%	9%	0%	100%	14%	86%
2014	91%	9%	24%	76%	14%	86%
2015	1%	99%	5%	95%	82%	18%
2016	100%	0%	41%	59%	48%	52%
2017	96%	4%	76%	24%	78%	22%
2018	94%	6%	20%	80%	75%	25%
2019	88%	12%	13%	87%	31%	69%
2020	50%	50%	36%	64%	18%	82%
2021	31%	69%	32%	68%	44%	56%
2022	100%	0%	21%	79%	36%	64%

Table A2.8. 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%	96%	4%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	74%	26%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	67%	33%	0%	0%	100%	0%	0%	0%
1984	100%	0%	0%	0%	24%	76%	0%	0%	100%	0%	0%	0%
1985	0%	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%
1986	43%	57%	0%	0%	0%	0%	0%	0%	100%	0%	4%	96%
1987	9%	91%	0%	0%	85%	15%	0%	0%	0%	0%	100%	0%
1988	0%	100%	0%	0%	86%	14%	0%	0%	100%	0%	100%	0%
1989	42%	58%	100%	0%	38%	62%	0%	0%	100%	0%	0%	100%
1990	0%	100%	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%
1991	0%	100%	100%	0%	0%	100%	0%	0%	100%	0%	1%	99%
1992	0%	100%	100%	0%	0%	100%	100%	0%	100%	0%	4%	96%
1993	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	5%	95%
1994	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	1%	99%
1995	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	12%	88%
1996	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
1997	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	20%	80%
1998	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	0%	0%
1999	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2000	0%	0%	0%	0%	99%	1%	100%	0%	0%	0%	12%	88%
2001	0%	100%	0%	0%	71%	29%	0%	0%	0%	0%	42%	58%
2002	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	100%
2003	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	8%	92%
2004	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11%	89%
2005	0%	0%	0%	0%	0%	0%	17%	83%	100%	0%	4%	96%
2006	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%
2007	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2008	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%
2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2010	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
2011	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	100%
2012	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
2013	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%
2014	0%	100%	100%	0%	0%	0%	0%	0%	100%	0%	24%	76%
2015	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
2016	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	52%	48%
2017	100%	0%	0%	0%	0%	0%	0%	0%	100%	0%	9%	91%
2018	44%	56%	0%	100%	0%	100%	100%	0%	100%	0%	23%	77%
2019	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	21%	79%
2020	0%	100%	0%	0%	0%	0%	100%	0%	100%	0%	50%	50%
2021	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	33%	67%
2022	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	21%	79%

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

Year	NJ		NY		NC		RI		SC		VA		ME		NH	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
1981	99%	1%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1982	100%	0%	94%	6%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1983	38%	62%	0%	0%	0%	0%	89%	11%	100%	0%	0%	0%	0%	0%	0%	0%
1984	98%	2%	79%	21%	100%	0%	1%	99%	100%	0%	0%	0%	0%	0%	0%	0%
1985	100%	0%	26%	74%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%
1986	100%	0%	56%	44%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%
1987	92%	8%	0%	100%	56%	44%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%
1988	88%	12%	68%	32%	26%	74%	93%	7%	100%	0%	100%	0%	0%	0%	0%	0%
1989	98%	2%	42%	58%	26%	74%	66%	34%	84%	16%	90%	10%	0%	0%	0%	0%
1990	66%	34%	74%	26%	78%	22%	74%	26%	100%	0%	39%	61%	0%	0%	0%	0%
1991	94%	6%	5%	95%	85%	15%	15%	85%	100%	0%	0%	0%	0%	0%	0%	0%
1992	0%	100%	90%	10%	57%	43%	22%	78%	100%	0%	100%	0%	0%	0%	0%	0%
1993	0%	0%	35%	65%	100%	0%	64%	36%	100%	0%	100%	0%	0%	0%	0%	0%
1994	63%	37%	43%	57%	40%	60%	17%	83%	100%	0%	100%	0%	0%	0%	0%	0%
1995	100%	0%	95%	5%	17%	83%	41%	59%	100%	0%	100%	0%	0%	0%	0%	0%
1996	100%	0%	100%	0%	100%	0%	15%	85%	0%	0%	100%	0%	0%	0%	0%	0%
1997	45%	55%	93%	7%	86%	14%	57%	43%	100%	0%	0%	0%	0%	0%	0%	0%
1998	95%	5%	100%	0%	6%	94%	52%	48%	15%	85%	100%	0%	0%	0%	0%	0%
1999	100%	0%	97%	3%	53%	47%	43%	57%	100%	0%	0%	0%	0%	0%	0%	0%
2000	0%	100%	0%	0%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2001	91%	9%	0%	0%	38%	62%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2002	0%	100%	0%	0%	34%	66%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2003	100%	0%	100%	0%	56%	44%	51%	49%	0%	0%	100%	0%	0%	0%	0%	0%
2004	100%	0%	0%	0%	48%	52%	19%	81%	100%	0%	0%	0%	0%	0%	0%	0%
2005	9%	91%	0%	0%	75%	25%	2%	98%	100%	0%	0%	0%	0%	0%	0%	0%
2006	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2007	58%	42%	0%	0%	60%	40%	29%	71%	100%	0%	0%	0%	0%	0%	0%	0%
2008	0%	0%	0%	100%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
2009	100%	0%	0%	0%	88%	12%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
2010	8%	92%	0%	0%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%
2011	100%	0%	0%	0%	35%	65%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%
2012	0%	0%	0%	0%	64%	36%	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%
2013	91%	9%	0%	0%	14%	86%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
2014	98%	2%	11%	89%	14%	86%	45%	55%	0%	0%	0%	0%	0%	0%	0%	0%
2015	0%	0%	0%	100%	82%	18%	52%	48%	0%	0%	100%	0%	0%	0%	100%	0%
2016	100%	0%	0%	0%	52%	48%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2017	96%	4%	100%	0%	78%	22%	88%	12%	0%	0%	100%	0%	0%	0%	0%	0%
2018	98%	2%	0%	0%	67%	33%	6%	94%	100%	0%	100%	0%	0%	0%	0%	100%
2019	90%	10%	59%	41%	27%	73%	10%	90%	100%	0%	0%	0%	0%	0%	0%	0%
2020	53%	47%	26%	74%	18%	82%	5%	95%	100%	0%	100%	0%	0%	0%	77%	23%
2021	65%	35%	0%	100%	40%	60%	47%	53%	100%	0%	0%	0%	0%	0%	0%	100%
2022	100%	0%	0%	0%	35%	65%	66%	34%	0%	0%	100%	0%	0%	100%	1%	99%

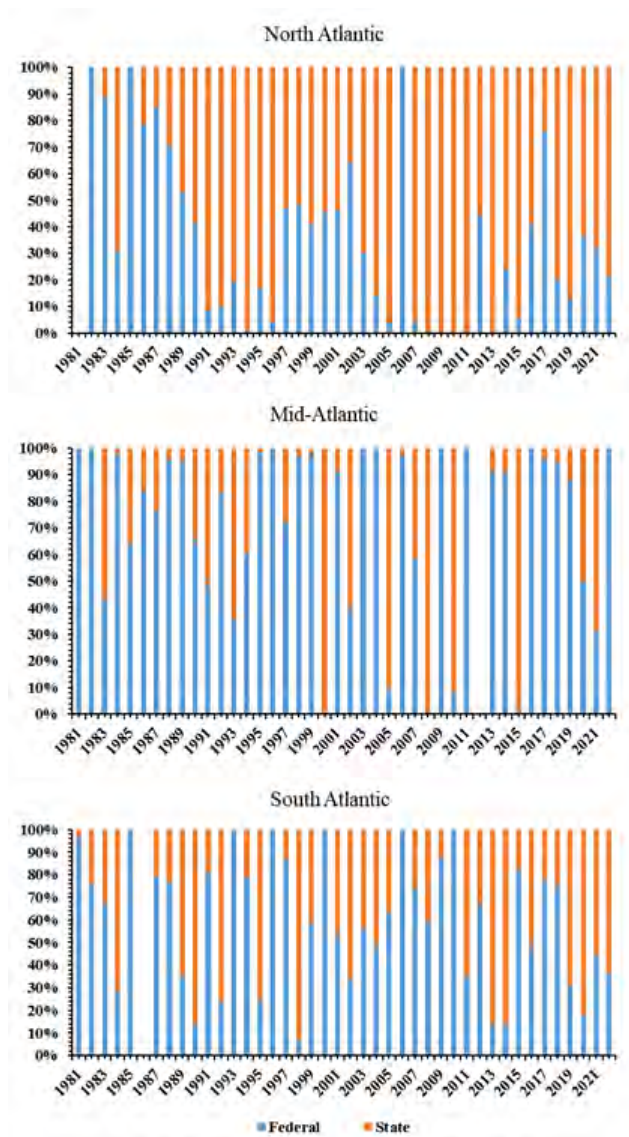


Figure A2.5. Percentage of recreational landing 1981-2021 in state and federal waters for each region.

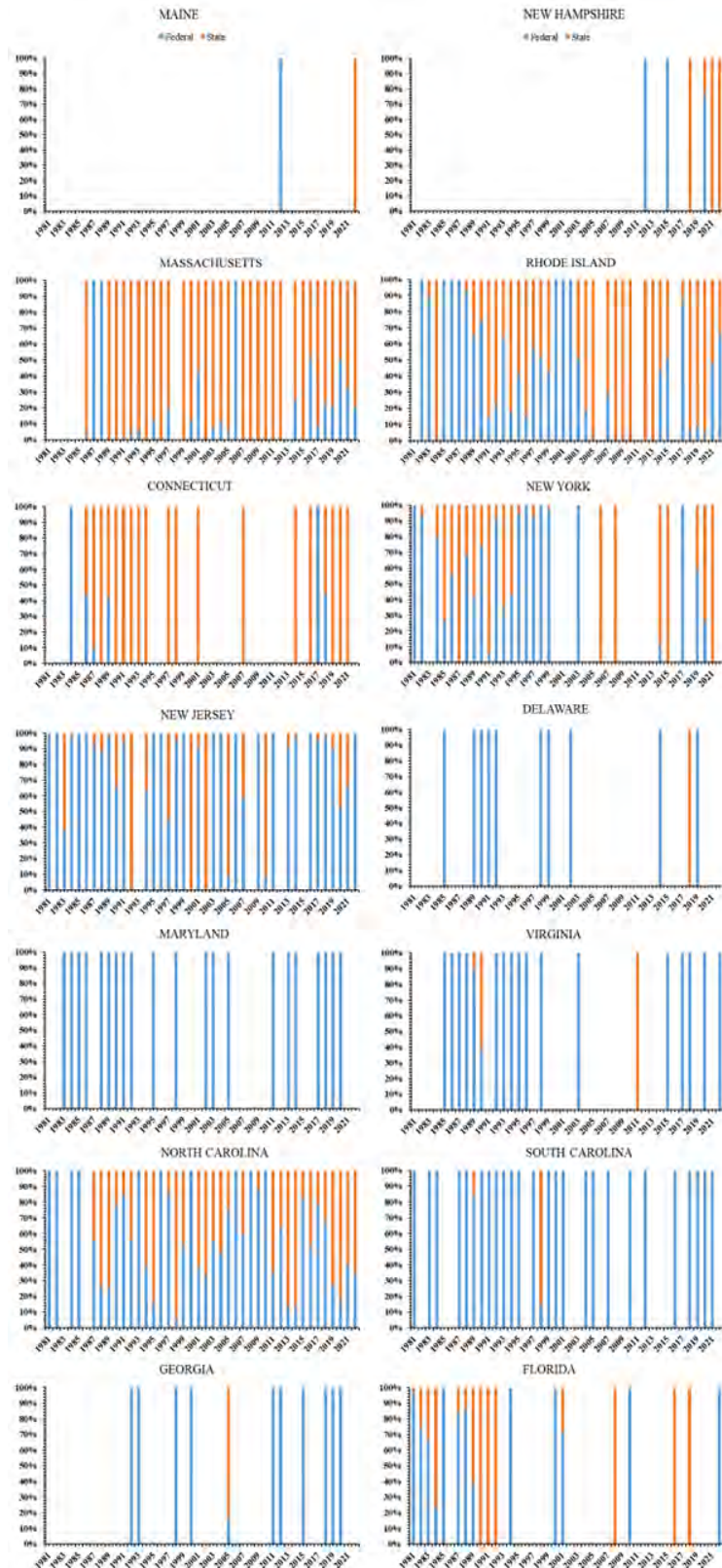


Figure A2.6. Percentage of recreational landing 1981-2021 in state and federal waters for each state.

Table A2.9. Recreational discards (individuals) 1981-2022 by region.

Year	Mid-Atlantic	North Atlantic	South Atlantic	Total Discards
1981	166496	6882	0	173378
1982	422974	0	0	422974
1983	55840	6365	0	62205
1984	117650	5000	0	122650
1985	81357	0	0	81614
1986	133696	0	368	134064
1987	339159	4513	1643	345315
1988	791460	1853	33354	826667
1989	278505	85	5647	286574
1990	66509	1008	1057	68574
1991	20114	4938	10413	36296
1992	11585	3202	3020	18656
1993	19547	7642	11733	38922
1994	52890	14752	18932	86574.9
1995	351181	15810	7163	374154
1996	2976	51932	11140	66048
1997	2946	16523	34367	53836
1998	54067	19873	20469	96099
1999	12647	45795	3759	62201
2000	64983	21908	17914	113016
2001	49204	21852	6489	80630
2002	209831	34670	30165	274666
2003	25949	6965	13049	50021
2004	289	31505	19082	51057
2005	8240	12313	42411	62964
2006	189336	42708	2755	234799
2007	0	33194	8810	42032
2008	0	11112	23411	34677
2009	0	2441	2561	5691
2010	139	14660	17279	32134
2011	4957	0	28618	33575
2012	0	251	14039	14290
2013	60946	12736	50273	123955
2014	257349	52277	62125	371751
2015	4561	18298	1783	24642
2016	4091	42615	12643	59349
2017	12914	745	49043	62873
2018	19901	419164	16222	455287
2019	25411	80319	27722	133701
2020	27011	28895	23817	95085
2021	20866	101587	8449	130902
2022	249793	113988	11773	375554
Mean	68%	21%	11%	-
10-Year	37%	47%	15%	-

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

Year	CT	DE	GA	MD	MA	NJ	NY	NC	RI	SC	VA	FL	ME	NH
1981	0	0	0	0	0	5634	303	0	6882	0	0	160559	0	0
1982	0	0	0	0	0	247795	0	0	0	0	0	175179	0	0
1983	0	0	0	1358	6365	0	0	0	0	0	0	54482	0	0
1984	0	0	0	0	0	0	0	0	5000	0	0	117650	0	0
1985	0	0	257	0	0	0	109	0	0	0	0	81248	0	0
1986	0	0	0	0	0	0	614	368	0	0	1653	131429	0	0
1987	0	0	0	0	0	66	1687	1609	4513	34	1198	336208	0	0
1988	0	0	0	711	1155	289811	0	32981	698	373	1332	499606	0	0
1989	0	3375	2337	0	0	76196	2487	4214	85	1433	1058	195389	0	0
1990	0	379	0	0	223	12699	17285	1057	785	0	299	35847	0	0
1991	0	5	831	0	1520	2480	4252	9622	3418	791	9361	4016	0	0
1992	0	0	849	0	2483	1236	2695	2747	719	273	1693	5961	0	0
1993	0	0	0	0	993	0	1355	1690	6649	10043	0	18192	0	0
1994	0	0	0.9	0	14254	35581	517	18932	498	0	8158	8634	0	0
1995	0	0	0	10700	12409	18611	68779	2407	3401	4756	1198	251893	0	0
1996	36055	0	0	1600	7326	0	0	10845	8551	295	0	1376	0	0
1997	0	0	0	0	10988	0	2924	29817	5535	4550	0	22	0	0
1998	3119	0	1690	0	5036	32444	20506	8837	11718	11632	0	1117	0	0
1999	0	0	0	0	1831	3429	9218	2682	43964	1077	0	0	0	0
2000	829	98	8211	0	15466	2684	0	9257	5613	8657	2384	59817	0	0
2001	3170	0	3085	2692	17297	0	0	5001	1385	1488	0	46512	0	0
2002	0	0	0	0	33532	0	19490	30165	1138	0	2045	188296	0	0
2003	882	1963	4058	9155	0	203	11707	12968	6083	0	2921	0	0	0
2004	4119	0	181	0	1966	0	0	19082	25420	0	0	289	0	0
2005	0	0	0	0	12301	5898	0	42363	12	48	0	2342	0	0
2006	0	0	0	0	42708	189336	0	2755	0	0	0	0	0	0
2007	11379	0	28	0	15073	0	0	4523	6742	4287	0	0	0	0
2008	0	0	154	0	9474	0	0	23411	1638	0	0	0	0	0
2009	0	0	689	0	2441	0	0	2561	0	0	0	0	0	0
2010	0	0	56	139	14660	0	0	16583	0	696	0	0	0	0
2011	0	0	0	0	0	0	0	28618	0	0	4957	0	0	0
2012	0	0	0	0	251	0	0	7858	0	6181	0	0	0	0
2013	0	0	0	0	2192	60412	534	4609	10544	45664	0	0	0	0
2014	1389	619	0	1645	41634	175714	1429	59925	9254	2200	0	77942	0	0
2015	0	0	0	0	12983	0	4561	1325	5315	458	0	0	0	0
2016	6045	0	0	0	13377	0	0	10196	23193	2447	0	4091	0	0
2017	0	0	171	4873	242	5623	2012	40094	503	8949	59	347	0	0
2018	10086	1648	0	4153	378413	12572	1528	11745	26211	4477	0	0	97	4357
2019	21662	15	249	5009	23917	8388	11999	24033	34740	3689	0	0	0	0
2020	0	2	15362	0	20509	17561	9448	23817	7337	0	0	0	0	1049
2021	25	0	0	0	96060	17363	3503	7793	5094	656	0	0	0	408
2022	1103	0	0	0	99486	221623	28170	11773	4466	0	0	0	0	8933
Overall	2%	0%	1%	1%	15%	23%	4%	8%	4%	2%	1%	40%	0%	0%
10-Year	2%	0%	1%	1%	38%	28%	3%	11%	7%	4%	0%	4%	0%	1%

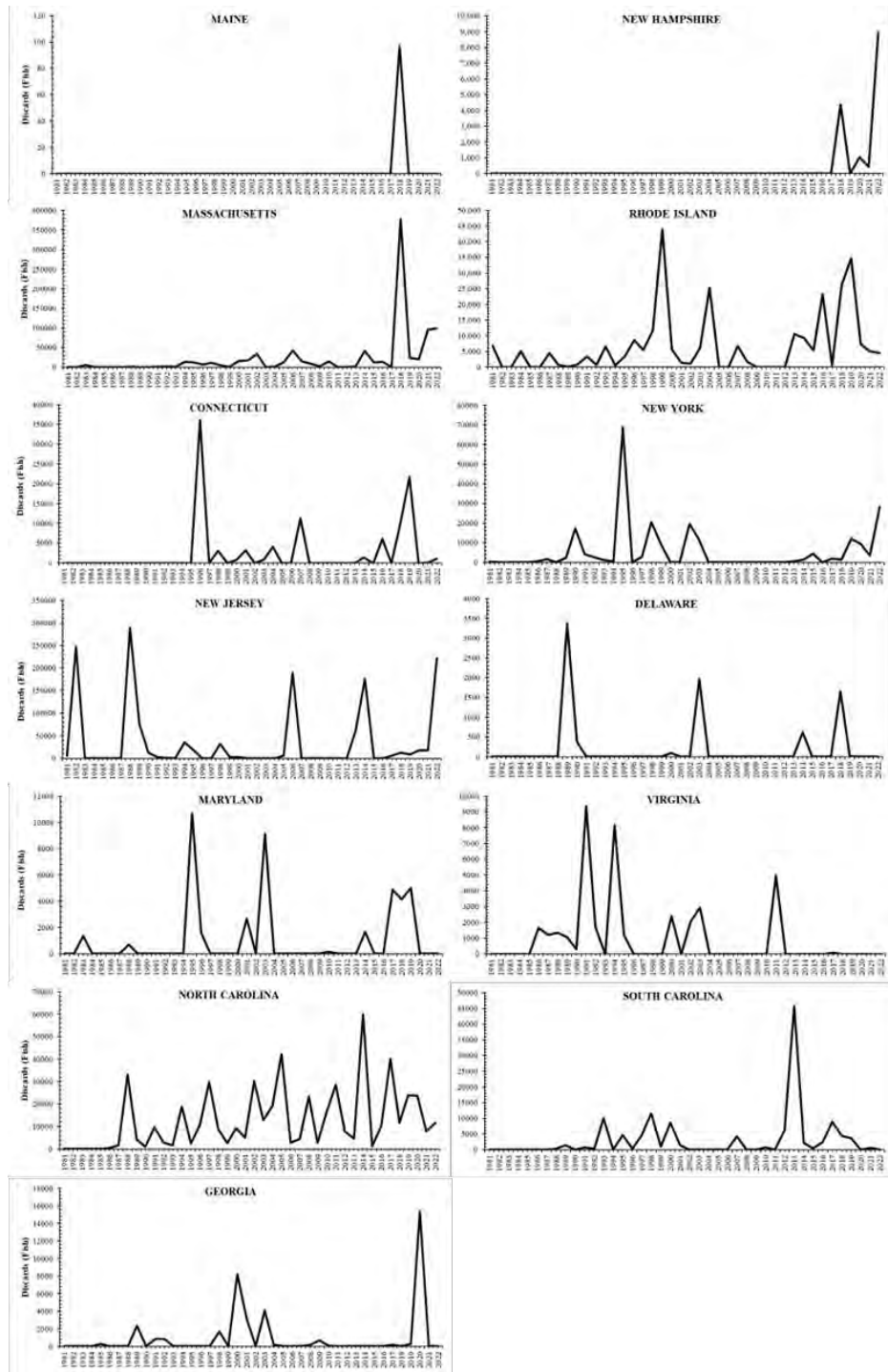


Figure A2.7. Recreational discards (individuals) from 1981-2021 by state.

Table A2.11. Percentage of recreational discards 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%	94%	6%	0%	0%	0%	0%	2%	98%
1982	0%	98%	2%	0%	100%	0%	0%	4%	96%
1983	57%	7%	36%	0%	89%	11%	0%	26%	74%
1984	0%	99%	1%	0%	31%	69%	41%	12%	47%
1985	0%	39%	61%	0%	100%	0%	0%	0%	100%
1986	0%	38%	62%	21%	78%	1%	0%	0%	0%
1987	0%	65%	35%	0%	6%	94%	0%	3%	97%
1988	2%	72%	26%	0%	35%	65%	0%	5%	95%
1989	0%	54%	46%	15%	39%	45%	1%	42%	57%
1990	2%	12%	86%	9%	23%	68%	83%	11%	6%
1991	20%	14%	66%	89%	3%	9%	0%	50%	50%
1992	7%	3%	90%	30%	4%	66%	0%	13%	87%
1993	0%	19%	81%	49%	6%	44%	0%	30%	70%
1994	0%	12%	88%	19%	12%	69%	1%	53%	47%
1995	0%	0%	100%	28%	14%	58%	0%	24%	76%
1996	0%	6%	94%	17%	8%	76%	0%	89%	11%
1997	0%	39%	61%	0%	34%	66%	0%	15%	85%
1998	0%	9%	91%	1%	5%	94%	83%	8%	9%
1999	0%	2%	98%	23%	2%	75%	0%	33%	67%
2000	0%	0%	100%	0%	44%	56%	0%	83%	17%
2001	0%	0%	100%	0%	5%	95%	24%	33%	43%
2002	0%	0%	100%	0%	54%	46%	0%	0%	100%
2003	0%	12%	88%	23%	30%	47%	0%	56%	44%
2004	0%	3%	97%	0%	14%	86%	0%	2%	98%
2005	0%	10%	90%	13%	5%	82%	0%	8%	92%
2006	0%	100%	0%	0%	0%	100%	0%	0%	100%
2007	0%	100%	0%	44%	13%	43%	0%	6%	94%
2008	0%	100%	0%	0%	1%	99%	0%	74%	26%
2009	0%	0%	100%	0%	2%	98%	0%	88%	12%
2010	0%	0%	100%	100%	0%	0%	0%	100%	0%
2011	0%	14%	86%	0%	0%	100%	0%	3%	97%
2012	0%	0%	0%	0%	1%	99%	0%	19%	81%
2013	0%	0%	100%	0%	1%	99%	0%	7%	93%
2014	0%	9%	91%	40%	14%	46%	0%	4%	96%
2015	0%	1%	99%	5%	1%	93%	0%	3%	97%
2016	0%	0%	100%	0%	46%	54%	0%	29%	71%
2017	0%	96%	4%	0%	1%	99%	0%	35%	65%
2018	5%	4%	91%	5%	0%	95%	0%	11%	89%
2019	8%	27%	65%	47%	4%	50%	0%	6%	94%
2020	32%	8%	60%	22%	1%	77%	0%	3%	97%
2021	0%	1%	99%	21%	1%	78%	0%	5%	95%
2022	0%	19%	81%	29%	3%	69%	0%	13%	87%

Table A2.12. Percentage of recreational discards 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%	8%	92%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	0%	0%	10%	1%	89%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%	0%	100%	0%	0%
1984	0%	0%	0%	0%	0%	0%	0%	8%	92%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1986	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1987	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1988	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	100%
1989	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%
1990	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
1991	0%	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%	0%	73%	0%	27%
1992	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	82%	0%	18%
1993	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%
1994	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	0%	8%	54%	38%
1995	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	18%	82%	40%	0%	60%
1996	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%	21%	0%	79%
1997	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	32%	15%	53%
1998	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%
1999	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2000	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%
2001	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	27%	0%	73%
2002	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2003	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	100%	0%	10%	90%	0%	0%	0%
2004	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	2%	98%
2005	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	5%	95%
2006	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2007	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%
2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	100%	0%	100%	0%	0%
2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%
2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2014	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%	41%	0%	59%
2015	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	99%
2016	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	58%	1%	41%
2017	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%
2018	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	36%	0%	64%
2019	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	27%	73%	0%	4%	96%
2020	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%
2021	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2022	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	58%	0%	42%

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

Year	NJ			NY			NC			RI			SC			VA			ME			NH			
	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	SH	FH	PR	
1981	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1982	0%	100%	0%	0%	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%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1984	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1986	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1987	0%	100%	0%	0%	0%	100%	0%	2%	98%	0%	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1988	99%	0%	1%	0%	0%	0%	100%	0%	0%	0%	29%	71%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1989	100%	0%	0%	0%	33%	67%	0%	2%	98%	0%	0%	100%	0%	40%	60%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1990	0%	0%	100%	0%	0%	100%	0%	4%	96%	0%	74%	26%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1991	0%	0%	100%	0%	18%	82%	0%	0%	100%	0%	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1992	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1993	0%	0%	0%	0%	41%	59%	30%	22%	48%	0%	2%	98%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1994	0%	0%	100%	0%	0%	100%	81%	5%	13%	0%	0%	100%	0%	0%	0%	0%	92%	8%	0%	0%	0%	0%	0%	0%	0%
1995	0%	0%	100%	0%	0%	100%	0%	23%	77%	0%	8%	92%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
1996	0%	0%	0%	0%	0%	0%	0%	12%	88%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1997	0%	0%	0%	0%	0%	100%	0%	5%	95%	20%	20%	60%	0%	89%	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1998	0%	0%	100%	0%	0%	100%	72%	15%	13%	0%	0%	100%	0%	49%	51%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1999	0%	0%	100%	0%	0%	100%	0%	93%	7%	13%	0%	87%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2000	0%	0%	100%	0%	0%	0%	0%	6%	94%	81%	2%	17%	0%	9%	91%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2001	0%	0%	0%	0%	0%	0%	0%	2%	98%	0%	11%	89%	0%	11%	89%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2002	0%	0%	0%	100%	0%	0%	2%	2%	96%	0%	4%	96%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2003	0%	100%	0%	0%	0%	100%	0%	14%	86%	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
2004	0%	0%	0%	0%	0%	0%	0%	1%	99%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2005	0%	30%	70%	0%	0%	0%	0%	1%	99%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2006	0%	0%	100%	0%	0%	0%	0%	8%	92%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2007	0%	0%	0%	0%	0%	0%	0%	15%	85%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2008	0%	0%	0%	0%	0%	0%	0%	15%	85%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2009	0%	0%	0%	0%	0%	0%	0%	8%	92%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2010	0%	0%	0%	0%	0%	0%	0%	3%	97%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2011	0%	0%	0%	0%	0%	0%	0%	1%	99%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
2012	0%	0%	0%	0%	0%	0%	21%	9%	70%	0%	0%	0%	0%	1%	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2013	0%	0%	100%	0%	100%	0%	0%	23%	77%	0%	0%	100%	0%	1%	99%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2014	0%	0%	100%	0%	0%	100%	0%	0%	100%	2%	3%	95%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2015	0%	0%	0%	0%	0%	100%	0%	14%	86%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2016	0%	0%	0%	0%	0%	0%	0%	5%	95%	94%	0%	6%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2017	0%	0%	100%	0%	0%	100%	0%	4%	96%	0%	2%	98%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
2018	14%	0%	86%	0%	5%	95%	0%	3%	97%	38%	0%	62%	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
2019	19%	15%	66%	36%	0%	64%	0%	3%	97%	64%	0%	36%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2020	9%	0%	91%	12%	0%	88%	0%	1%	99%	42%	2%	55%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2021	0%	2%	98%	0%	0%	100%	31%	1%	68%	0%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2022	0%	3%	97%	0%	0%	100%	0%	3%	97%	4%	3%	93%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%

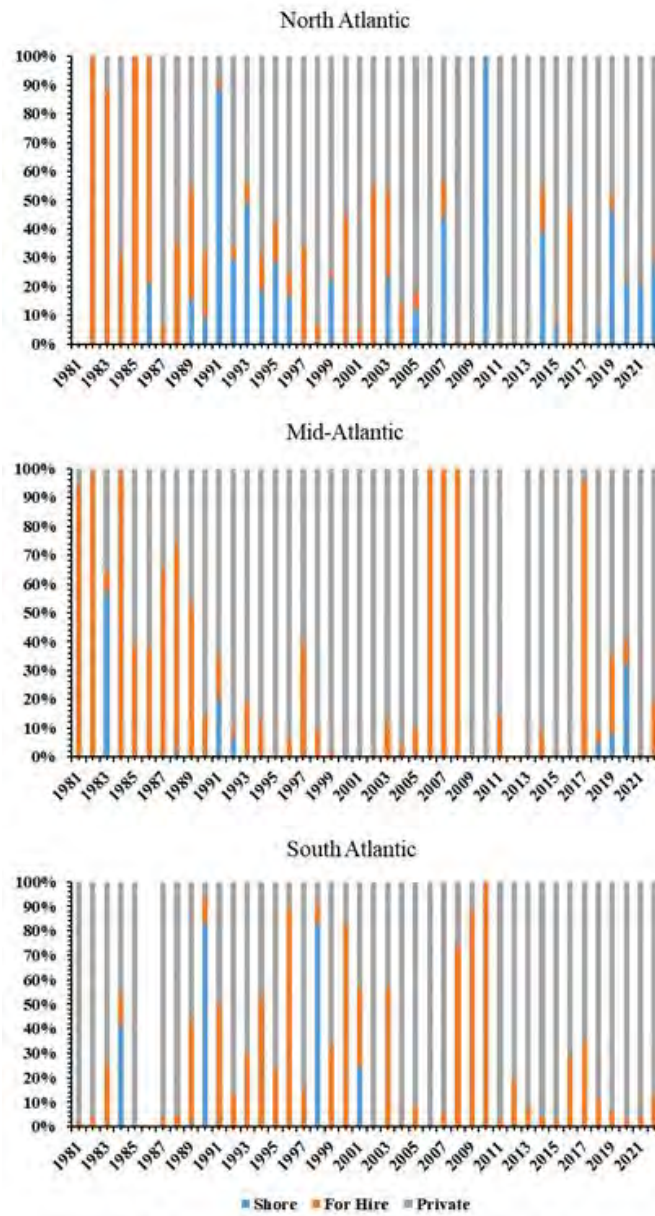


Figure A2.8. Percentage of recreational discards 1981-2021 by fishing mode for each region.

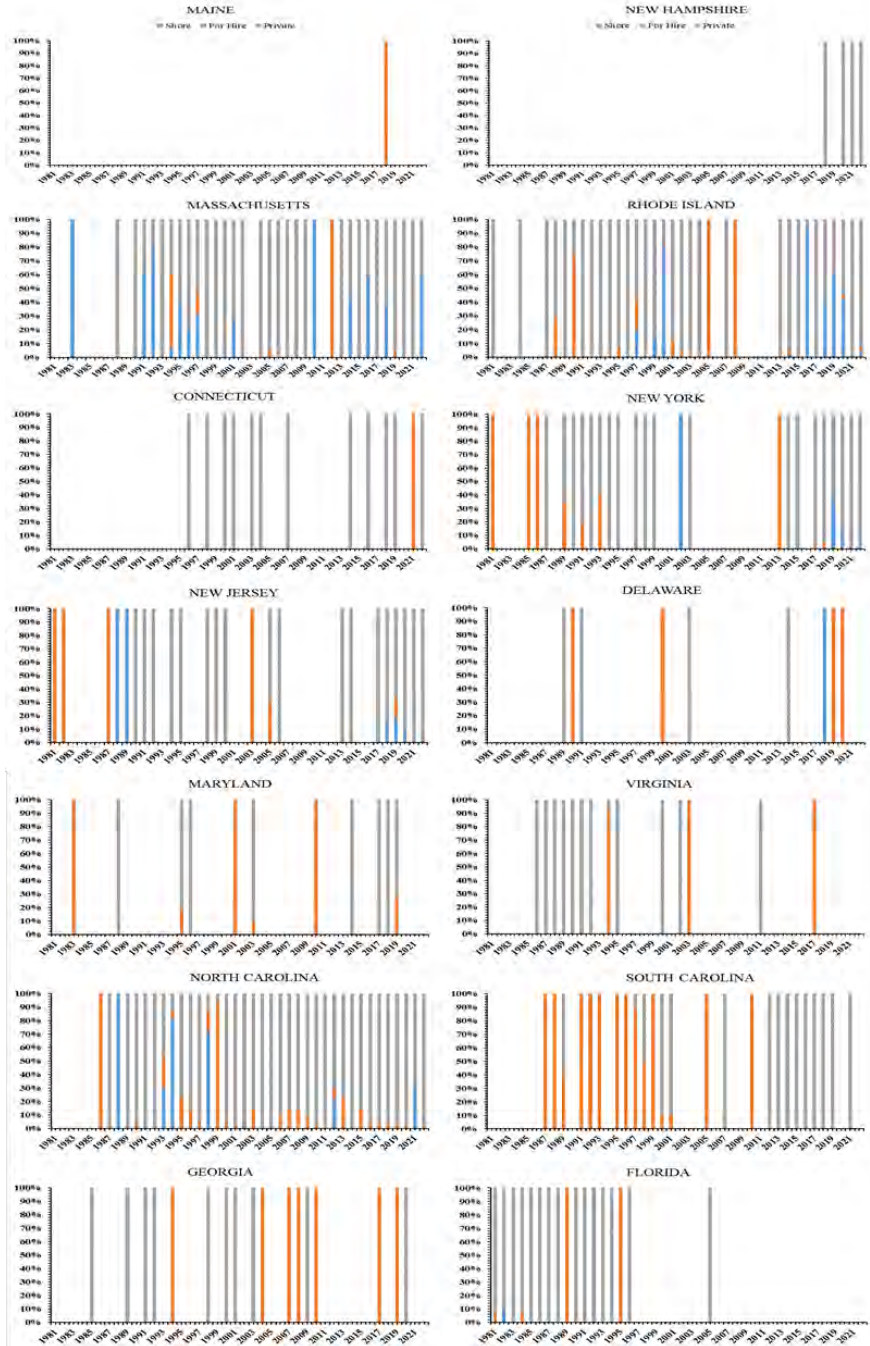


Figure A2.9. Percentage of recreational discards 1981-2021 by fishing mode for each state.

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%	100%	92%	8%
1982	100%	0%	0%	0%	36%	64%
1983	100%	0%	0%	100%	100%	0%
1984	0%	0%	100%	0%	87%	13%
1985	100%	0%	0%	0%	30%	70%
1986	61%	39%	0%	0%	82%	18%
1987	43%	57%	100%	0%	87%	13%
1988	1%	99%	38%	62%	8%	92%
1989	4%	96%	100%	0%	83%	17%
1990	69%	31%	100%	0%	83%	17%
1991	26%	74%	69%	31%	42%	58%
1992	46%	54%	0%	100%	84%	16%
1993	41%	59%	85%	15%	96%	4%
1994	14%	86%	4%	96%	17%	83%
1995	90%	10%	4%	96%	100%	0%
1996	100%	0%	16%	84%	100%	0%
1997	0%	100%	7%	93%	49%	51%
1998	97%	3%	37%	63%	31%	69%
1999	27%	73%	79%	21%	100%	0%
2000	2%	98%	0%	100%	100%	0%
2001	100%	0%	23%	77%	85%	15%
2002	9%	91%	3%	97%	28%	72%
2003	55%	45%	87%	13%	58%	42%
2004	0%	0%	74%	26%	54%	46%
2005	30%	70%	0%	100%	100%	0%
2006	100%	0%	0%	100%	81%	19%
2007	0%	0%	0%	100%	87%	13%
2008	0%	0%	15%	85%	54%	46%
2009	0%	0%	0%	100%	100%	0%
2010	100%	0%	0%	100%	100%	0%
2011	100%	0%	0%	0%	83%	17%
2012	0%	0%	0%	100%	79%	21%
2013	99%	1%	14%	86%	19%	81%
2014	98%	2%	1%	99%	45%	55%
2015	0%	100%	0%	100%	82%	18%
2016	0%	0%	25%	75%	68%	32%
2017	52%	48%	32%	68%	32%	68%
2018	66%	34%	13%	87%	86%	14%
2019	77%	23%	5%	95%	37%	63%
2020	52%	48%	6%	94%	69%	31%
2021	93%	7%	3%	97%	31%	69%
2022	89%	11%	25%	75%	87%	13%

Table A2.14. Percentage of recreational discards 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%	92%	8%	0%	0%	0%	0%	0%	0%
1982	0%	0%	0%	0%	36%	64%	0%	0%	0%	0%	0%	0%
1983	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%
1984	0%	0%	0%	0%	87%	13%	0%	0%	0%	0%	0%	0%
1985	0%	0%	0%	0%	30%	70%	100%	0%	0%	0%	0%	0%
1986	0%	0%	0%	0%	81%	19%	0%	0%	0%	0%	0%	0%
1987	0%	0%	0%	0%	88%	12%	0%	0%	0%	0%	0%	0%
1988	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%
1989	0%	0%	0%	100%	100%	0%	100%	0%	0%	0%	0%	0%
1990	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	100%	0%
1991	0%	0%	100%	0%	100%	0%	100%	0%	0%	0%	0%	100%
1992	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	0%	100%
1993	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
1994	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%	2%	98%
1995	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%
1996	0%	100%	0%	0%	100%	0%	0%	0%	100%	0%	0%	100%
1997	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
1998	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%
1999	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2000	0%	100%	100%	0%	0%	0%	100%	0%	0%	0%	0%	100%
2001	0%	100%	0%	0%	0%	0%	100%	0%	100%	0%	28%	72%
2002	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2003	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	0%	0%
2004	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	2%	98%
2005	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
2006	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2007	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
2008	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
2009	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%
2010	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	100%
2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	80%	20%
2014	0%	100%	100%	0%	0%	0%	0%	0%	100%	0%	0%	100%
2015	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2016	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	67%
2017	0%	0%	0%	0%	0%	0%	0%	100%	92%	8%	100%	0%
2018	26%	74%	0%	100%	0%	0%	0%	0%	100%	0%	13%	87%
2019	0%	100%	100%	0%	0%	0%	100%	0%	100%	0%	4%	96%
2020	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	6%	94%
2021	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	2%	98%
2022	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	28%	72%

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

Year	NJ		NY		NC		RI		SC		VA		ME		NH	
	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State	Federal	State
1981	100%	0%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
1982	100%	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%	0%	0%	0%
1984	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1985	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1986	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	47%	53%	0%	0%	0%	0%
1987	100%	0%	0%	100%	52%	48%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%
1988	0%	100%	0%	0%	0%	100%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%
1989	0%	100%	88%	12%	67%	33%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%
1990	100%	0%	44%	56%	42%	58%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%
1991	0%	100%	100%	0%	8%	92%	100%	0%	100%	0%	0%	100%	0%	0%	0%	0%
1992	0%	100%	33%	67%	58%	42%	0%	100%	100%	0%	100%	0%	0%	0%	0%	0%
1993	0%	0%	41%	59%	70%	30%	98%	2%	100%	0%	0%	0%	0%	0%	0%	0%
1994	0%	100%	0%	100%	3%	97%	38%	62%	0%	0%	73%	27%	0%	0%	0%	0%
1995	92%	8%	88%	12%	100%	0%	17%	83%	100%	0%	100%	0%	0%	0%	0%	0%
1996	0%	0%	0%	0%	100%	0%	98%	2%	100%	0%	0%	0%	0%	0%	0%	0%
1997	0%	0%	0%	100%	42%	58%	20%	80%	100%	0%	0%	0%	0%	0%	0%	0%
1998	95%	5%	100%	0%	15%	85%	63%	37%	49%	51%	0%	0%	0%	0%	0%	0%
1999	100%	0%	0%	100%	100%	0%	82%	18%	100%	0%	0%	0%	0%	0%	0%	0%
2000	0%	100%	0%	0%	100%	0%	0%	100%	100%	0%	0%	100%	0%	0%	0%	0%
2001	0%	0%	0%	0%	71%	29%	11%	89%	100%	0%	0%	0%	0%	0%	0%	0%
2002	0%	0%	0%	100%	28%	72%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%
2003	100%	0%	0%	100%	45%	55%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%
2004	0%	0%	0%	0%	53%	47%	92%	8%	0%	0%	0%	0%	0%	0%	0%	0%
2005	30%	70%	0%	0%	100%	0%	100%	0%	0%	100%	0%	0%	0%	0%	0%	0%
2006	100%	0%	0%	0%	81%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2007	0%	0%	0%	0%	75%	25%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%
2008	0%	0%	0%	0%	53%	47%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2009	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2010	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2011	0%	0%	0%	0%	83%	17%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%
2012	0%	0%	0%	0%	62%	38%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%
2013	100%	0%	0%	100%	51%	49%	0%	100%	15%	85%	0%	0%	0%	0%	0%	0%
2014	99%	1%	0%	100%	43%	57%	3%	97%	100%	0%	0%	0%	0%	0%	0%	0%
2015	0%	0%	0%	100%	92%	8%	0%	100%	53%	47%	0%	0%	0%	0%	0%	0%
2016	0%	0%	0%	0%	68%	32%	0%	100%	65%	35%	0%	0%	0%	0%	0%	0%
2017	0%	100%	100%	0%	17%	83%	0%	100%	100%	0%	0%	100%	0%	0%	0%	0%
2018	67%	33%	42%	58%	81%	19%	0%	100%	100%	0%	0%	0%	0%	100%	0%	100%
2019	81%	19%	64%	36%	27%	73%	8%	92%	100%	0%	0%	0%	0%	0%	0%	0%
2020	80%	20%	0%	100%	48%	52%	8%	92%	0%	0%	0%	0%	0%	0%	0%	100%
2021	94%	6%	89%	11%	25%	75%	0%	100%	100%	0%	0%	0%	0%	0%	100%	0%
2022	100%	0%	0%	100%	87%	13%	1%	99%	0%	0%	0%	0%	0%	0%	0%	100%



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

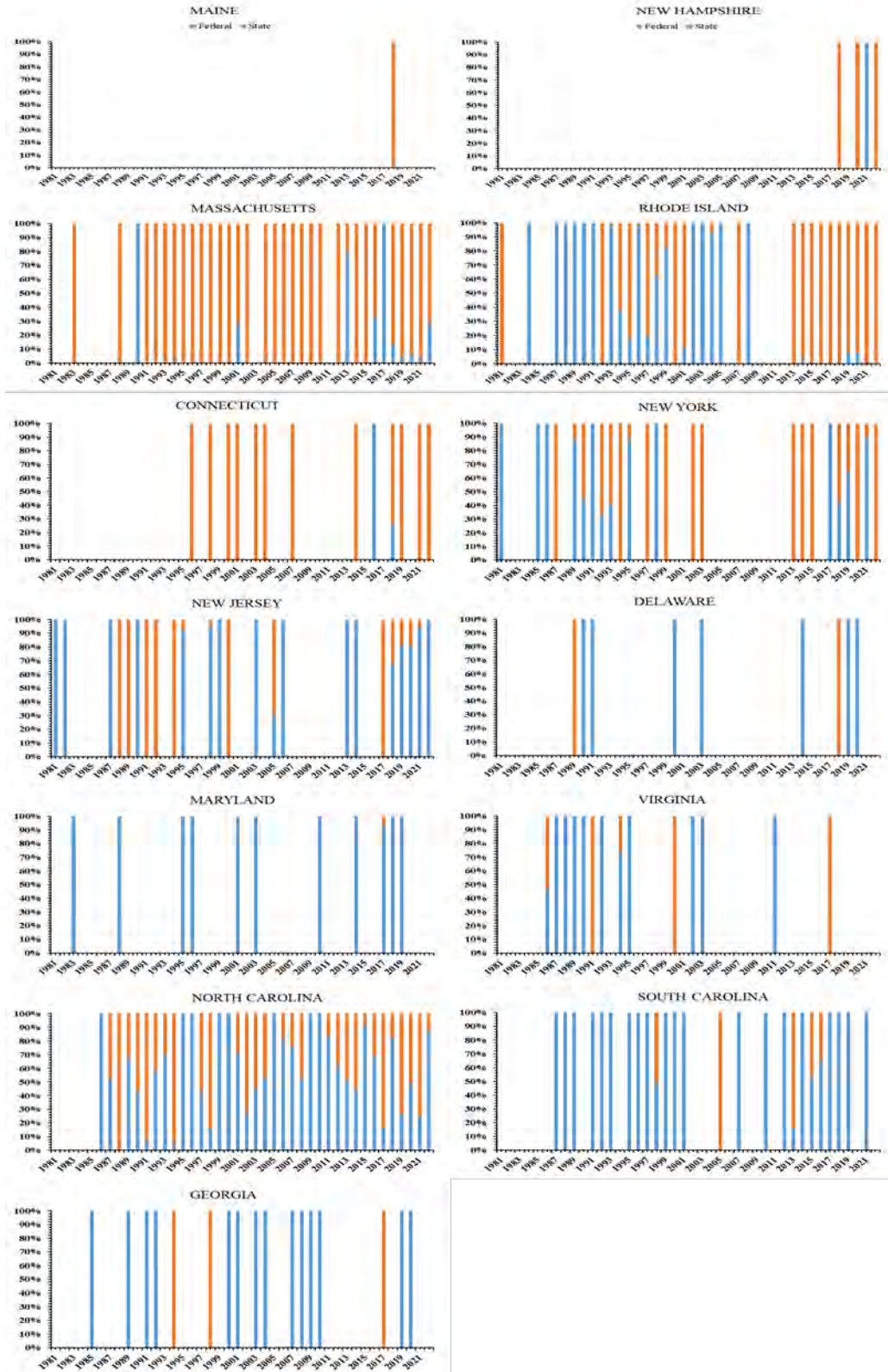


Figure A2.10. Percentage of recreational discards 1981-2021 in state and federal waters for each state.

APPENDIX 2 LENGTH AND WEIGHT

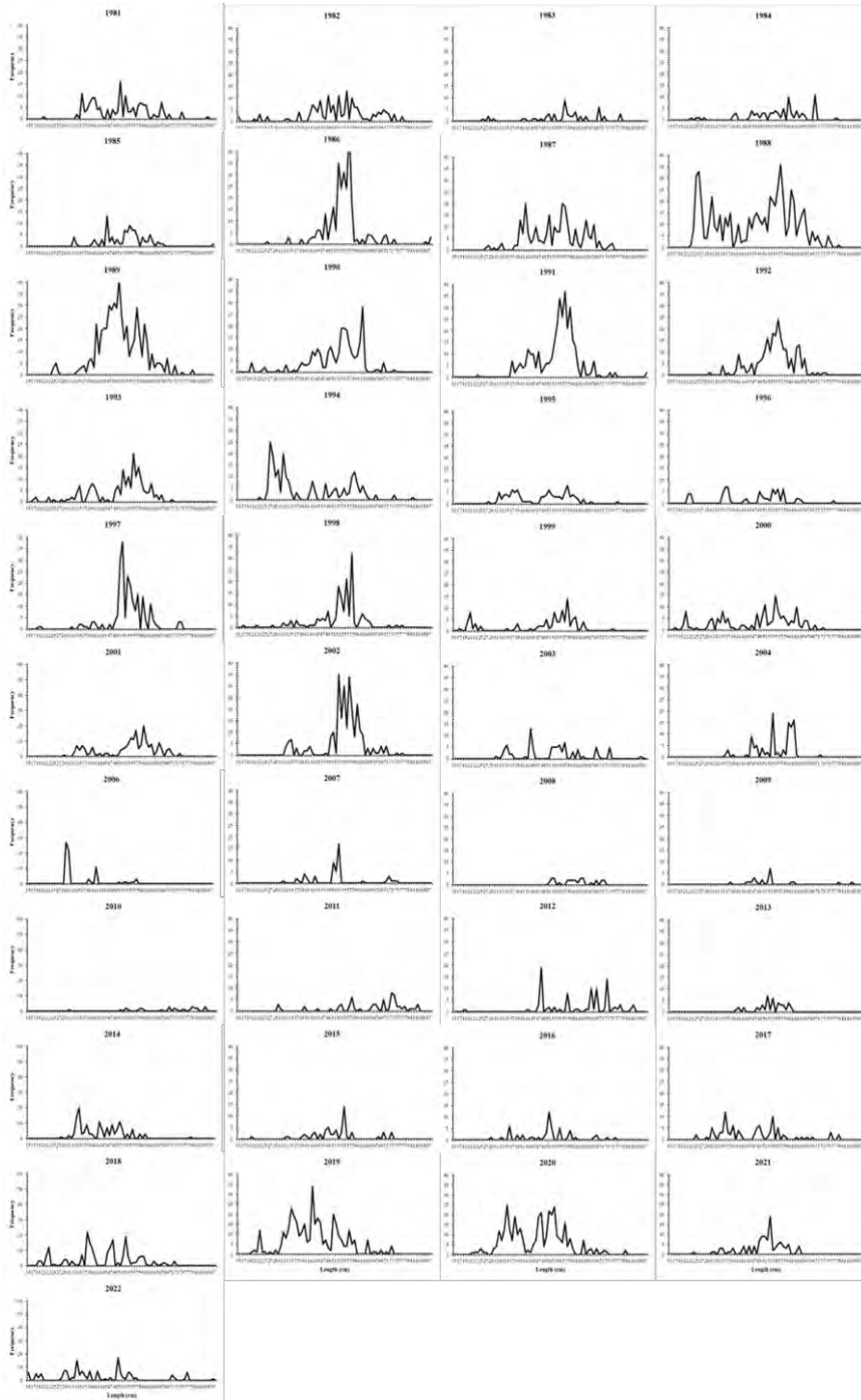


Figure A3.1. The length frequencies from all regions by year.

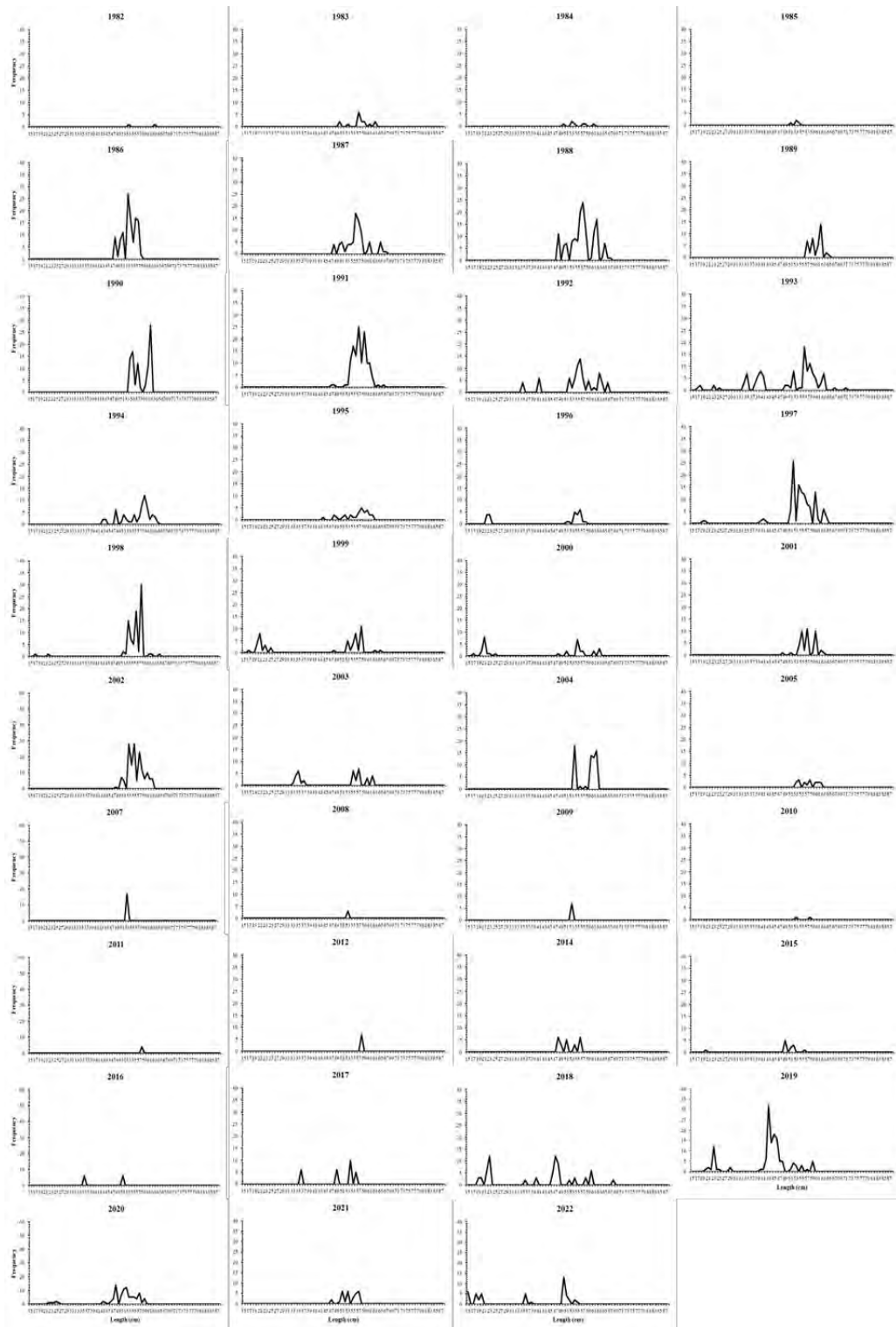


Figure A3.2. The length frequencies from the North Atlantic region by year.

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	2	53	63	58.0	7.07	1.0	1.4	1.21	0.316
1983	16	50	63	57.3	3.75	0.8	1.6	1.31	0.236
1984	7	50	61	55.1	3.72	0.8	1.3	1.10	0.176
1985	4	51	54	52.8	1.26	1.1	1.4	1.18	0.169
1986	115	48	58	53.5	2.70	0.8	1.9	1.12	0.211
1987	80	48	67	56.2	4.23	0.8	1.9	1.23	0.255
1988	146	48	67	56.7	4.55	0.7	1.8	1.24	0.255
1989	40	57	65	60.3	2.22	1.2	1.8	1.39	0.168
1990	90	54	62	58.3	3.27	1.0	1.9	1.28	0.231
1991	129	47	66	57.4	2.74	0.7	2.1	1.34	0.266
1992	81	35	66	55.3	7.44	0.5	1.8	1.38	0.235
1993	116	17	71	50.0	11.56	0.0	2.2	1.01	0.509
1994	64	43	64	56.1	5.43	0.5	2.0	1.29	0.426
1995	30	44	62	56.2	4.63	0.6	1.6	1.22	0.316
1996	27	22	58	45.3	15.16	0.1	1.5	0.87	0.547
1997	118	19	64	54.6	6.38	0.0	2.0	1.26	0.380
1998	86	17	65	55.2	6.06	0.0	1.8	1.15	0.367
1999	52	17	65	43.5	17.19	0.0	1.8	0.84	0.632
2000	33	17	63	41.4	18.05	0.0	1.7	0.76	0.644
2001	43	48	63	57.0	2.99	0.8	1.7	1.31	0.173
2002	152	48	62	55.7	3.06	0.8	1.8	1.22	0.226
2003	36	33	62	48.8	11.45	0.2	1.7	0.95	0.558
2004	63	54	62	58.9	3.29	1.0	1.7	1.45	0.245
2005	17	53	62	57.5	3.16	1.0	1.7	1.36	0.241
2006	4	57	58	57.8	0.50	1.1	1.5	1.38	0.179
2007	34	53	113	83.0	30.45	1.0	10.2	5.59	4.662
2008	3	53	53	53.0	0.00	1.0	1.0	0.98	0.000
2009	7	53	53	53.0	0.00	1.0	1.0	0.98	0.000
2010	2	53	58	55.5	3.54	1.0	1.3	1.12	0.189
2011	4	58	58	58.0	0.00	1.3	1.3	1.25	0.000
2012	7	58	58	58.0	0.00	1.3	1.3	1.25	0.000
2013	-	-	-	-	-	-	-	-	-
2014	23	48	56	51.7	3.26	0.5	1.5	0.90	0.309
2015	12	20	56	48.3	9.14	0.0	1.1	0.81	0.260
2016	12	36	51	43.5	7.83	0.3	0.9	0.61	0.291
2017	27	36	56	49.3	7.61	0.3	1.2	0.86	0.320
2018	71	19	68	40.5	14.69	0.0	2.2	0.62	0.529
2019	135	20	59	42.6	8.99	0.0	1.4	0.54	0.262
2020	90	22	59	50.0	7.87	0.0	1.6	0.92	0.338
2021	30	47	57	53.6	2.93	0.7	1.6	1.15	0.268
2022	46	15	55	36.0	15.70	0.0	1.2	0.52	0.444

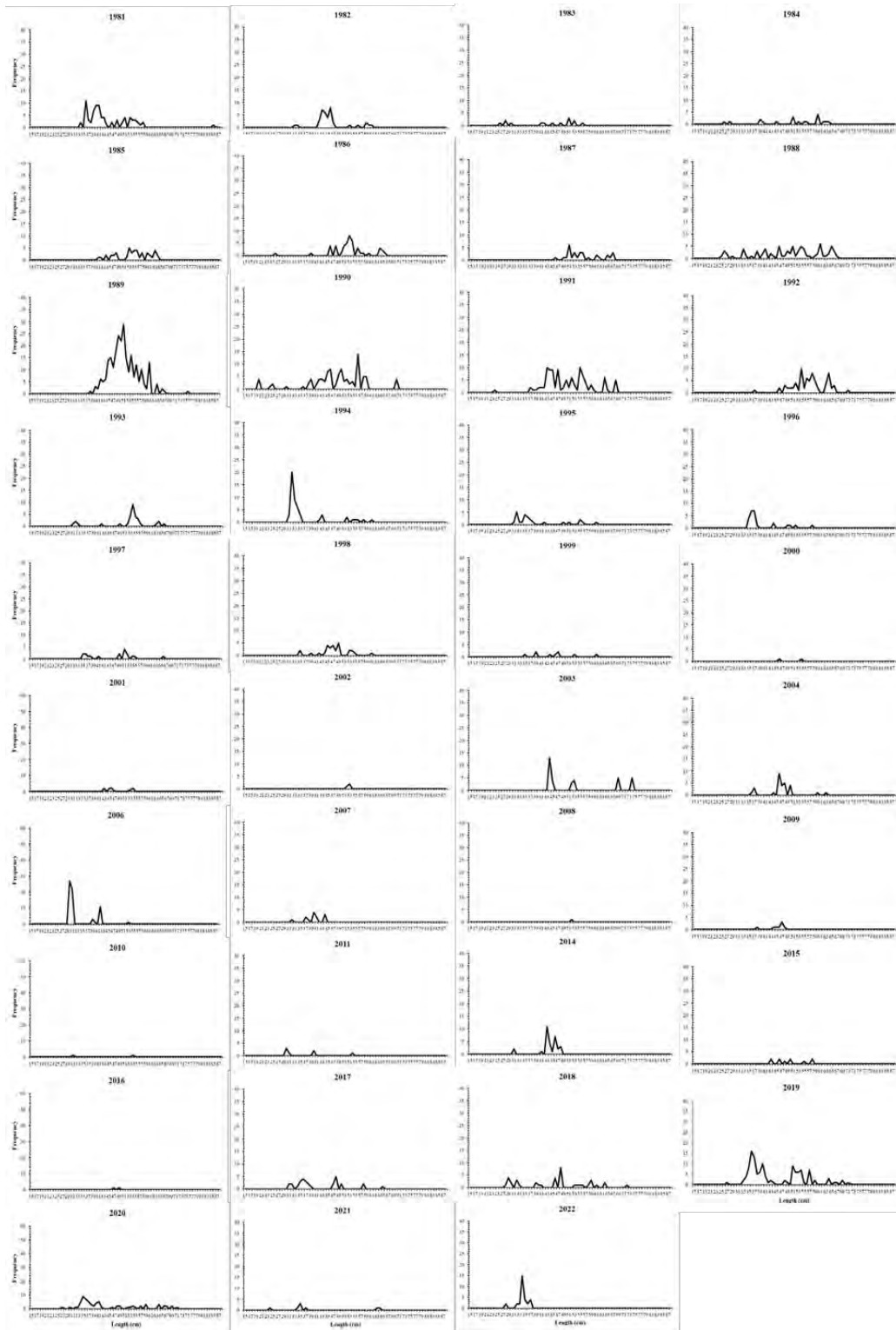


Figure A3.3. The length frequencies from the Mid-Atlantic region by year.

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	79	34	85	44.1	8.31	0.1	1.4	0.55	0.346
1982	38	33	61	46.0	6.07	0.3	1.7	0.73	0.365
1983	14	26	56	43.1	10.75	0.3	1.5	0.89	0.400
1984	19	26	64	50.7	11.55	0.3	1.9	1.10	0.509
1985	44	41	64	54.5	6.32	0.4	5.6	1.31	0.793
1986	46	26	66	52.9	6.98	0.1	3.3	1.30	0.671
1987	30	46	67	56.3	6.15	0.5	2.5	1.46	0.518
1988	79	25	67	49.4	11.78	0.0	2.2	1.04	0.687
1989	257	38	76	51.2	5.65	0.4	2.3	1.16	0.450
1990	100	20	70	48.1	10.31	0.0	1.7	0.88	0.448
1991	108	24	68	50.4	8.15	0.1	2.1	0.97	0.490
1992	73	37	71	56.8	5.95	0.5	2.4	1.31	0.334
1993	32	31	66	52.2	8.91	0.2	1.7	1.08	0.411
1994	52	31	61	36.5	8.14	0.2	1.7	0.38	0.387
1995	25	31	61	39.5	9.13	0.2	1.7	0.52	0.470
1996	25	35	58	39.4	6.30	0.3	1.3	0.45	0.273
1997	18	35	66	46.6	8.88	0.2	2.3	0.84	0.519
1998	29	35	61	47.3	5.52	0.3	2.0	0.87	0.432
1999	9	35	61	45.7	7.89	0.3	2.0	0.90	0.597
2000	2	46	54	50.0	5.66	0.6	1.0	0.84	0.268
2001	9	43	54	47.7	4.64	0.6	1.2	0.77	0.243
2002	3	52	53	52.7	0.58	1.0	1.4	1.19	0.207
2003	34	44	74	54.0	12.02	0.5	2.8	1.34	0.804
2004	29	36	63	46.8	5.68	0.2	1.4	0.69	0.232
2005	5	30	46	35.6	7.80	0.2	0.7	0.30	0.246
2006	65	30	53	33.3	5.26	0.2	1.1	0.25	0.160
2007	13	32	44	39.8	3.36	0.2	0.6	0.43	0.108
2008	1	52	52	52.0	-	0.9	0.9	0.87	-
2009	8	38	48	45.3	3.20	0.4	0.7	0.60	0.103
2010	2	31	54	42.5	16.26	0.3	1.3	0.80	0.694
2011	7	30	54	36.4	9.02	0.2	1.3	0.53	0.390
2012	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-
2014	31	31	48	43.8	3.88	0.2	0.7	0.56	0.121
2015	10	43	58	49.7	5.64	0.5	1.3	0.85	0.310
2016	2	47	49	48.0	1.41	0.8	0.8	0.80	0.006
2017	30	31	65	41.7	8.92	0.2	1.8	0.54	0.389
2018	39	28	72	45.5	11.95	0.1	2.5	0.76	0.544
2019	122	27	71	44.6	9.85	0.2	2.6	0.68	0.511
2020	70	27	71	44.4	11.86	0.2	2.6	0.71	0.653
2021	8	24	64	40.9	14.52	0.1	1.8	0.63	0.711
2022	31	28	37	34.1	2.08	0.1	0.4	0.27	0.049

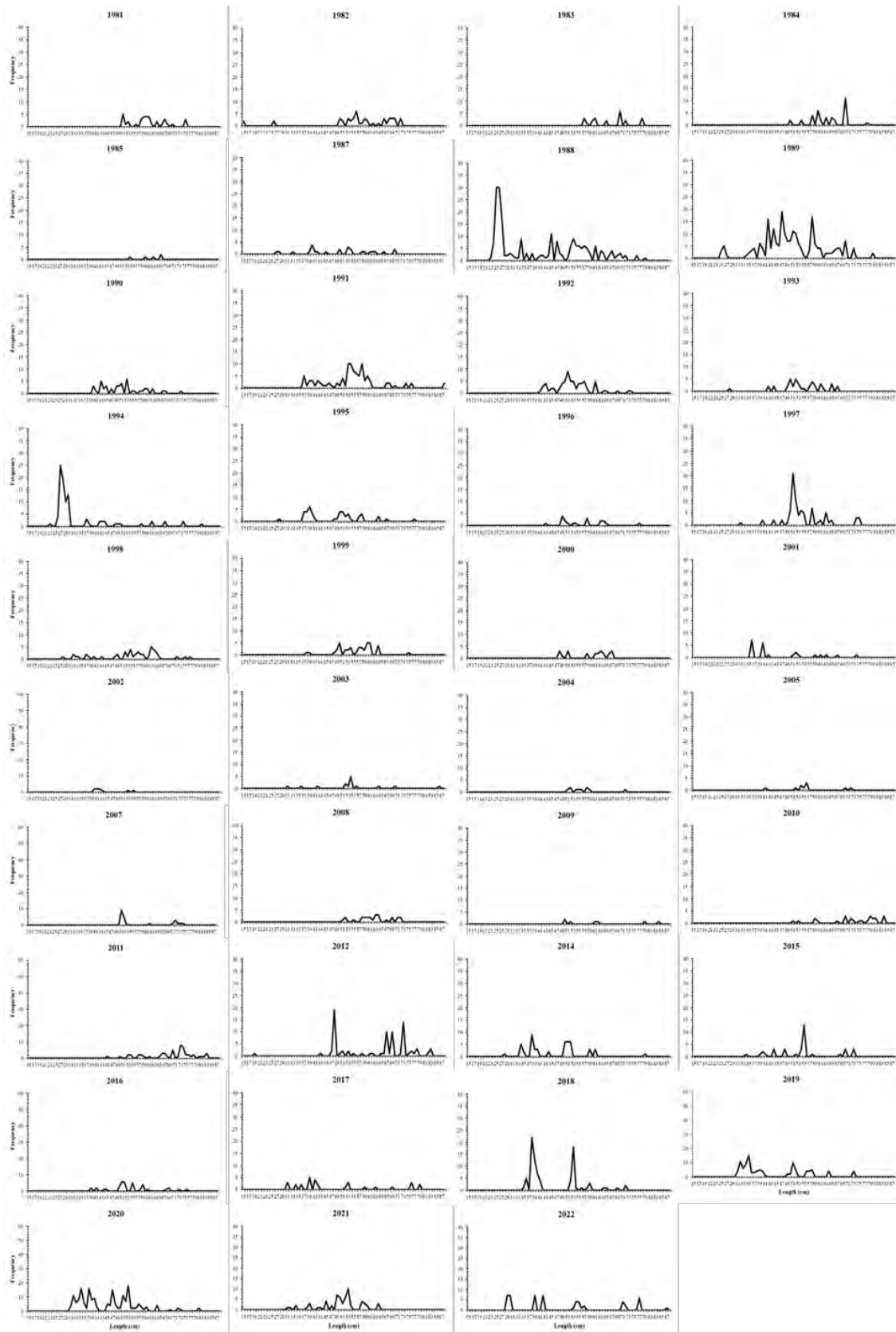


Figure A3.4. The length frequencies from the South Atlantic region by year.

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	36	51	75	60.6	6.86	0.5	3.1	1.46	0.593
1982	48	15	72	57.1	13.19	0.0	4.0	1.66	0.895
1983	22	57	78	66.4	7.08	1.2	2.6	1.85	0.508
1984	36	50	78	63.5	6.43	1.1	2.6	1.80	0.535
1985	5	54	66	61.8	5.02	1.2	2.4	1.63	0.476
1986	-	-	-	-	-	-	-	-	-
1987	26	27	70	49.7	12.14	0.1	2.2	0.94	0.636
1988	222	23	79	41.3	15.61	0.4	2.2	1.04	0.455
1989	213	25	80	50.5	10.81	0.0	3.7	0.97	0.631
1990	45	40	74	51.5	8.16	0.3	2.5	0.97	0.482
1991	101	37	88	54.2	9.99	0.3	5.0	1.27	0.852
1992	70	41	74	52.8	6.89	0.4	3.1	1.13	0.506
1993	41	28	67	54.0	7.71	0.1	2.8	1.33	0.608
1994	93	23	81	33.5	12.18	0.1	3.6	0.35	0.622
1995	44	28	77	47.8	10.09	0.2	2.3	0.82	0.563
1996	19	43	77	56.2	8.28	0.4	3.0	1.44	0.763
1997	84	32	75	54.6	7.77	0.2	3.6	1.23	0.667
1998	48	28	77	54.2	11.54	0.1	3.3	1.37	0.968
1999	41	38	75	56.1	6.84	0.4	2.6	1.21	0.575
2000	23	48	67	59.0	6.98	0.6	3.2	1.92	0.902
2001	23	36	74	46.3	11.64	0.3	2.7	0.79	0.669
2002	9	40	55	44.1	5.71	0.4	1.5	0.58	0.360
2003	15	31	86	54.1	13.07	0.2	3.5	1.22	0.901
2004	10	51	72	56.7	6.06	0.8	3.0	1.18	0.654
2005	10	41	72	56.6	8.81	0.6	3.0	1.25	0.856
2006	2	51	56	53.5	3.54	0.8	0.9	0.87	0.095
2007	22	51	75	58.6	10.13	0.8	3.1	1.47	0.849
2008	26	51	72	62.3	6.09	1.0	3.0	2.01	0.634
2009	7	50	84	62.6	13.90	0.8	4.8	2.15	1.499
2010	25	51	84	72.6	9.66	0.8	4.8	3.14	1.157
2011	54	45	83	69.3	9.09	0.8	4.6	2.58	1.048
2012	81	19	83	62.8	12.66	0.0	4.6	1.98	1.110
2013	-	-	-	-	-	-	-	-	-
2014	50	28	79	45.8	9.96	0.2	4.0	0.77	0.600
2015	36	34	73	54.3	10.24	0.3	3.2	1.30	0.874
2016	36	39	76	54.2	8.87	0.3	3.6	1.20	0.744
2017	30	31	79	48.8	15.92	0.2	3.6	1.05	1.207
2018	85	35	72	45.3	9.38	0.2	3.0	0.72	0.575
2019	105	31	73	43.1	11.53	0.2	3.2	0.71	0.763
2020	186	31	80	44.9	10.27	0.2	3.4	0.71	0.628
2021	62	31	64	50.2	7.44	0.2	1.8	0.89	0.385
2022	53	29	87	49.4	17.51	0.1	4.5	1.19	1.224