SEDAR

Southeast Data, Assessment, and Review

SEDAR 92
Stock Assessment Report

Atlantic Blueline Tilefish

March 2025

SEDAR
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405

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SECTION I: Introduction

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Overview

SEDAR 82 addressed the stock assessments for Atlantic Blueline Tilefish. The assessments were conducted by the SEFSC. Two Topical Working Groups (TWG) was convened by SEDAR to review and provide recommendations on data and modeling modifications from SEDAR 50. One TWG focused its discussion on age data and met three times via webinar in October – December 2024. The second TWG focused on landing streams north of Cape Hatteras and meet five times between April and September 2024.

The Stock Assessment Report is organized into 2 sections. Section I – Introduction contains a brief description of the SEDAR Process, Assessment and Management Histories for the species of interest, and the management specifications requested by the Cooperator. Section II is the Assessment Process report. This section details the assessment model, as well as documents any data recommendations that arise for new data sets presented during this assessment process, or changes to data sets used previously.

The final Stock Assessment Reports (SAR) for Atlantic blueline tilefish were disseminated to the public in March 2025. The Council's Scientific and Statistical Committee (SSC) will review the SAR for its stock. The SSCs are tasked with recommending whether the assessments represent Best Available Science, whether the results presented in the SARs are useful for providing management advice and developing fishing level recommendations for the Council. An SSC may request additional analyses be conducted or may use the information provided in the SAR as the basis for their Fishing Level Recommendations (e.g., Overfishing Limit and Acceptable Biological Catch). The South Atlantic Fishery Management Council's SSC will review the southern assessment model at its April 2025 meeting. A subgroup of SSC members from the Mid-Atlantic and South Atlantic Councils will review the northern model in late April or early May. Additional discussions at the SA and Mid-Atlantic SSCs will occur to determine OFL and ABC recommendations. Both Councils will receive those results at their respective June 2025 meetings. Documentation on SSC recommendations is not part of the SEDAR process and is handled through each Council.

1 SEDAR PROCESS DESCRIPTION

SouthEast Data, Assessment, and Review (**SEDAR**) is a cooperative Fishery Management Council process initiated in 2002 to improve the quality and reliability of fishery stock assessments in the South Atlantic, Gulf of Mexico, and US Caribbean. SEDAR seeks improvements in the scientific quality of stock assessments and the relevance of information available to address fishery management issues. SEDAR emphasizes constituent and stakeholder participation in assessment development, transparency in the assessment process, and a rigorous and independent scientific review of completed stock assessments.

SEDAR is managed by the Caribbean, Gulf of Mexico, and South Atlantic Regional Fishery Management Councils in coordination with NOAA Fisheries and the Atlantic and Gulf States Marine Fisheries Commissions. Oversight is provided by a Steering Committee composed of NOAA Fisheries representatives: Southeast Fisheries Science Center Director and the Southeast Regional Administrator; Regional Council representatives: Executive Directors and Chairs of the South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils; a representative

from the Highly Migratory Species Division of NOAA Fisheries, and Interstate Commission representatives: Executive Directors of the Atlantic States and Gulf States Marine Fisheries Commissions.
SEDAR workshops are public meetings organized by SEDAR staff and the lead Cooperator. Workshop participants are drawn from state and federal agencies, non-government organizations, Council members, Council advisors, and the fishing industry with a goal of including a broad range of disciplines and perspectives. All participants are expected to contribute to the process by preparing working papers, contributing, providing assessment analyses, and completing the workshop report.

2 SOUTH ATLANTIC MANAGEMENT OVERVIEW

The following summary describes only those management actions that likely affect blueline tilefish fisheries and harvest.

Original SAMFC FMP

The Fishery Management Plan (FMP), Regulatory Impact Review, and Final Environmental Impact Statement for the Snapper Grouper Fishery of the South Atlantic Region, approved in 1983 and implemented in August of 1983, establishes a management regime for the fishery for snappers, groupers and related demersal species of the Continental Shelf of the southeastern United States in the exclusive economic zone (EEZ) under the area of authority of the South Atlantic Fishery Management Council (Council) and the territorial seas of the states, extending from the North Carolina/Virginia border through the Atlantic side of the Florida Keys to 83° W longitude. Regulations apply only to federal waters.

2.1 Fishery Management Plans and Amendments

SAFMC FMP Amendments affecting blueline tilefish

FMP/Amendment	Description of Action	Effective Date
FMP (1983)	- Gear limitations – poisons, explosives, fish traps, trawls - Designated modified habitats or artificial reefs as Special Management Zones (SMZs)	08/31/83
Amendment 1 (1988a)	- Prohibited trawl gear to harvest fish south of Cape Hatteras, NC and north of Cape Canaveral, FL. - Directed fishery defined as vessel with trawl gear and ≥200 lbs s-g on board. - Established rebuttable assumption that vessel with snapper grouper species on board had harvested such fish in EEZ.	01/12/89

FMP/Amendment	Description of Action	Effective Date
Amendment 4 (1991)	- Prohibited gear: fish traps except black sea bass traps north of Cape Canaveral, FL; entanglement nets; longline gear inside 50 fathoms; bottom longlines to harvest wreckfish; powerheads and bangsticks in designated SMZs off S. Carolina. - Required permits (commercial & for- hire) and specified data collection regulations - Established an assessment group and annual adjustment procedure (framework) - No retention of snapper grouper spp. caught in other fisheries with gear prohibited in snapper grouper fishery if captured snapper grouper had no bag limit or harvest was prohibited. If had a bag limit, could retain only the bag limit. - Charter/headboats and excursion boat possession limits extended	01/01/92
Amendment 6 (1993)	- Set up separate commercial Total Allowable Catch (TAC) levels for golden tilefish and snowy grouper - Established commercial trip limits for snowy grouper, golden tilefish, speckled hind, and warsaw grouper - Included golden tilefish in grouper recreational aggregate bag limits - Prohibited sale of warsaw grouper and speckled hind - 100% logbook coverage upon renewal of permit - Created of the Oculina Experimental Closed Area - Specified data collection needs for evaluation of possible future IFQ system	07/27/94

FMP/Amendment	Description of Action	Effective Date
Amendment 7 (1994a)	- Required dealer, charter and headboat federal permits - Allowed sale under specified conditions - Specified allowable gear and made allowance for experimental gear - Allowed multi-gear trips in N. Carolina - Added localized overfishing to list of problems and objectives - Adjusted bag limit and crew specs. for charter and head boats - Modified framework procedure	01/23/95
Amendment 8 (1997a)	- Established program to limit initial eligibility for snapper grouper fishery: Must demonstrate landings of any species in SG FMU in 1993, 1994, 1995 or 1996; and have held valid SG permit between 02/11/96 and 02/11/97. - Granted transferable permit with unlimited landings if vessel landed ≥ 1,000 lbs. of snapper grouper spp. in any of the years - Granted non-transferable permit with 225 lb. trip limit to all other vessels - Modified problems, objectives, OY, and overfishing definitions - Expanded Council's habitat responsibility - Allowed retention of snapper grouper spp. in excess of the bag limit on permitted vessels fishing in the EEZ off North Carolina with a sink net - Allowed retention of snapper grouper spp. in excess of bag limit on permitted vessel fishing in the South Atlantic EEZ with a single bait net or cast net on board - Allowed permitted vessels to possess filleted fish harvested in the Bahamas under certain conditions.	12/14/98

FMP/Amendment	Description of Action	Effective Date
Amendment 9 (1998a)	- Specified 5-fish aggregate grouper bag limit, which includes tilefish species, including blueline tilefish. - Vessels with longline gear aboard may only possess snowy, warsaw, yellowedge, and misty grouper, and golden, blueline and sand tilefish.	02/24/99
Amendment 10 (1998b)	-Identified EFH and established HAPCs for species in the SG FMU.	07/14/00
Amendment 11 (1998c)	- MSY proxy = 30% static SPR - OY = 40% static SPR - Approved definitions for overfished and overfishing: MSST = [(1-M) or 0.5 whichever is greater]*BMSY. MFMT = FMSY	12/02/99
Amendment 13A (2003)	- Extended for an indefinite period the regulation prohibiting fishing for and possessing snapper grouper spp. within the Oculina Experimental Closed Area.	04/26/04
Amendment 14 (2007)	- Established eight deepwater Type II marine protected areas (MPAs) to protect a portion of the population and habitat of long-lived deepwater snapper grouper species.	02/12/09
Amendment 15B (2008)	- Prohibited the sale of bag-limit caught snapper grouper species. - Adjusted commercial renewal periods and transferability requirements. - Implemented plan to monitor and assess bycatch.	02/15/10
Amendment 16 (2009)	- Reduced 5-fish aggregate grouper bag limit, which includes tilefish species including blueline tilefish, to a 3-fish aggregate. - Captain and crew on for-hire trips cannot retain the bag limit of species within the 3-fish grouper aggregate, which includes blueline tilefish.	07/29/09

FMP/Amendment	Description of Action	Effective Date
Amendment 17A (2010a)	-Required use of non-stainless steel circle hooks when fishing for snapper grouper species with hook-and-line gear north of 28 deg. N latitude in the South Atlantic EEZ.	03/03/11
Amendment 17B (2010b)	- Updated the framework procedure for specification of OFL, ABC, ACLs, and ACTs. - Established prohibition on possession of deepwater snapper grouper species, including blueline tilefish, seaward of 240 feet in the South Atlantic EEZ.	01/31/11
Amendment 19 (Comprehensive Ecosystem-based Amendment 1) (2010c)	- Provided presentation of spatial information for Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPC) designations under the Snapper Grouper FMP - Designated deepwater coral HAPCs	07/22/10
Comprehensive ACL Amendment (Amendment 25) (2011a)	- Established species groupings. Blueline tilefish in included in the Deepwater Complex (along with yellowedge grouper, silk snapper, misty grouper, queen snapper, sand tilefish, black snapper, and blackfin snapper) - Blueline tilefish ABC = 592,6024 based on SSC recommendation. - Blueline tilefish allocations = 47.39% commercial; 52.61% recreational - Established the following for the Deepwater Complex: ABC/ACL= 675,908 pounds ww. Commercial ACL = 343,869 pounds ww. Recreational ACL = 332,039 pounds ww. Recreational ACT = 205,516 pounds ww.	04/16/12

FMP/Amendment	Description of Action	Effective Date
Comprehensive ACL Amendment (Amendment 25) (2011a) CONTINUED	In-season and post-season AMs: Commercial - If the commercial sector ACL for the Deepwater Complex is met or projected to be met, all purchase and sale is prohibited and harvest and/or possession is limited to the bag limit. If the commercial sector ACL is exceeded and one of the species in the complex is overfished, the Regional Administrator shall publish a notice to reduce the commercial sector ACL in the following season by the amount of the overage. Recreational - If the recreational sector ACL for the Deepwater Complex is exceeded, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the fishing season as necessary.	04/16/12
Amendment 23 (Comprehensive Ecosystem-based Amendment 2) (2011b)	- Designated the Deepwater MPAs as EFH-HAPCs	01/30/12
Amendment 18A (2012a)	- Improved the accuracy, timing, and quantity of fisheries statistics	07/1/12
Amendment 27 (2013a)	- Modified the crew member limit on dual-permitted snapper grouper vessels. - Modified the restriction on retention of bag limit quantities of some snapper grouper species by captain and crew of for-hire vessels. - Minimized regulatory delay when adjustments to snapper grouper species' ABC, ACLs, and ACTs are needed as a result of new stock assessments.	01/27/2014

FMP/Amendment	Description of Action	Effective Date
Amendment 31 (2014a)	- Included under the Generic charter/headboat reporting amendment, that required electronic logbook reporting for headboat vessels and modified timeline of reporting to weekly intervals.	01/27/14
Amendment 32 (2014b)	- Ended overfishing of blueline tilefish; - Separated blueline tilefish from the deepwater complex; - Re-defined MSY for blueline tilefish; - Specified ACLs for blueline tilefish and the deepwater complex (blueline listed below): 2015: Total ACL=35,632 lbs ww Comm=17,841; Rec = 17,791 2016: Total ACL=53,457 lbs ww Comm=26,766; Rec=26,691 2017: Total ACL=71,469 lbs ww Comm=35,785; Rec=35,685 2018 and beyond: Total ACL=87,974 lbs ww; Comm=44,048; Rec=43,925 - Specified AMs for blueline tilefish; - Revised AMs for the deepwater complex; - Specified recreational ACTs for blueline tilefish - Specified 100 lb gw commercial trip limit - Specified 1 blueline tilefish per vessel during May-August	03/30/15
Amendment 33 Dolphin Wahoo Amendment 7 and Snapper Grouper Amendment 33 (2015a)	- Specified the condition of any dolphin, wahoo, and snapper-grouper fillets; - Described how the recreational bag limit is determined for any fillets; - Prohibited the sale or purchase of any dolphin, wahoo, or snapper-grouper recreationally harvested in The Bahamas; - Specified the required documentation to be onboard any vessels that have these fillets; - Specified transit and stowage provisions for any vessels with fillets.	12/28/2015

FMP/Amendment	Description of Action	Effective Date
Amendment 36 (2016a)	- Established SMZs to enhance protection for snapper-grouper species in spawning condition, including speckled hind and warsaw grouper.	07/31/2017
Amendment 39 (Generic For-Hire Reporting Amendment) (2017)	- Weekly electronic reporting for charter vessel operators with a federal for-hire permit; - Reduce the time allowed for headboat operators to complete electronic reports; - Requires location reporting by charter vessels with the same detail currently required for headboat vessels.	01/04/21
Amendment 26 (Bycatch Reporting Amendment) (2019a)	- Modify bycatch and discard reporting for commercial and for-hire vessels.	03/30/20
Amendment 4 (2019b)	- Modification to sea turtle release gear and SG framework	01/08/20
Amendment 52 (2023)	- Adjust the recreational bag limit for blueline tilefish: 2 fish/person/day, no captain/crew retention; - Modify recreational accountability measures: Remove the current recreational accountability measure that closes the recreational sector in-season. The National Marine Fisheries Service will annually announce the length of the recreational fishing season based on catch rates from the previous season. The fishing season will start on May 1 and end on the date the National Marine Fisheries Service projects the recreational annual catch limit will be met.	12/07/2023

2.2 Generic Amendments

None

2.3 Regulatory Amendments

SAFMC Regulatory Amendments affecting blueline tilefish

Amendment	Description of Action	Effective Date
Regulatory Amendment 1 (1987)	- Prohibited fishing in SMZs except with hand-held hook-and-line and spearfishing gear.	03/27/87
Regulatory Amendment 2 (1988b)	- Established 2 artificial reefs off Ft. Pierce, FL as SMZs.	03/30/89
Regulatory Amendment 3 (1989)	- Established artificial reef at Key Biscayne, FL as SMZ. Fish trapping, bottom longlining, spear fishing, and harvesting of Goliath grouper prohibited in SMZ.	11/02/90
Regulatory Amendment 5 (1992)	- Established 8 SMZs off S. Carolina, where only handheld, hook-and-line gear and spearfishing (excluding powerheads) was allowed.	07/31/93
Regulatory Amendment 7 (1998d)	- Established 10 SMZs at artificial reefs off South Carolina.	01/29/99
Regulatory Amendment 8 (2000)	- Established 12 SMZs at artificial reefs off Georgia; revised boundaries of 7 existing SMZs off Georgia to meet CG permit specs; restricted fishing in new and revised SMZs.	11/15/00
Regulatory Amendment 11 (2011c)	- Eliminated the 240 ft closure for six deepwater species, including blueline tilefish.	5/10/12
Regulatory Amendment 12 (2012b)	- Adjusted the ACL and OY for golden tilefish; - Revised recreational AMs for golden tilefish.	10/9/12
Regulatory Amendment 13 (2013b)	- Revised the ABCs, ACLs (including sector ACLs), and ACTs implemented by the Comprehensive ACL Amendment. The revisions may prevent a disjunction between the established ACLs and the landings used to determine if AMs are triggered.	7/17/13

Amendment	Description of Action	Effective Date
Regulatory Amendment 21 (2014c)	- Modified the definition of the overfished threshold (MSST) for red snapper, blueline tilefish, gag, black grouper, yellowtail snapper, vermilion snapper, red porgy, and greater amberjack.	11/6/14
Regulatory Amendment 20 (2015b)	- Increased the recreational and commercial ACLs for snowy grouper; - Adjusted the rebuilding strategy; - Increased the commercial trip limit to 200 lbs gw; - Modified the recreational fishing season to 1 fish/vessel/day May-August.	8/20/15
Regulatory Amendment 25 (2016b)	- Adopts new ABC recommendation of 224,100 lbs ww; - Sets ACL=OY=78%ABC=174,798 lbs ww; - Commercial ACL=87,521; Recreational ACL=87,277 lbs ww; - Increases bag limit to 3 fish/person/day during May- August within the aggregate grouper bag limit; - Increases commercial trip limit to 300 lbs gw.	07/13/2016
Regulatory Amendment 27 (Vision Blueprint Commercial) (2019c)	- Commercial trip limit modifications: January 1-April 30: 100 lb May 1-December 31: 300 lb	02/26/2020
Regulatory Amendment 29 (2020a)	- Best fishing practices & powerheads	7/15/2020
Abbreviated Framework 3: Blueline Tilefish (2020b)	- Modified commercial and recreational ACLs for blueline tilefish: Commercial: 117,148 lbs ww Recreational: 116,820 lbs ww	08/17/20
Regulatory Amendment 34 (2020c)	- At the request of the two state agencies, 30 Special Management Zones off NC & 4 off SC were established at artificial reef sites	05/03/21

2.4 Secretarial Amendments

None

2.5 Emergency and Interim Rules

Emergency Action effective September 3, 1999: reopen the Amendment 8 Snapper Grouper Permit application process.

Emergency Action Effective 4/17/2014 through 4/18/2015: Separated blueline tilefish from the Deepwater Complex and established annual catch limits for blueline tilefish. Put in place temporary annual catch limits for blueline tilefish based upon the equilibrium yield at 75%F_{MSY} (224,100 lbs ww) and existing sector allocations (50.07% commercial and 49.93% recreational): Commercial ACL=112,207 lbs ww; Recreational ACL=111,893 lbs ww. Put in place temporary in-season AMs for blueline tilefish.

2.6 Control Dates

Notice of Control Date effective July 30, 1991: Anyone entering federal snapper grouper fishery (other than for wreckfish) in the EEZ off S. Atlantic states after 07/30/91 was not assured of future access if limited entry program developed.

Notice of Control Date effective October 14, 2005: The Council is considering management measures to further limit participation or effort in the commercial fishery for snapper grouper species (excluding Wreckfish).

Notice of Control Date effective March 8, 2007: The Council may consider measures to limit participation in the snapper grouper for-hire fishery.

Notice of Control Date effective January 31, 2011: Anyone entering federal snapper grouper fishery off S. Atlantic states after 09/17/10 was not assured of future access if limited entry program is developed.

Notice of Control Date effective June 15, 2016: Fishermen entering the federal for-hire recreational sector for the Snapper Grouper fishery after June 15, 2016, will not be assured of future access should a management regime that limits participation in the sector be prepared and implemented.

Notice of Control Date effective June 15, 2016: Fishermen entering the federal for-hire recreational sector for the Snapper Grouper fishery after June 15, 2016, will not be assured of future access should a management regime that limits participation in the sector be prepared and implemented.

Notice of Control Date effective December 5, 2023 (under consideration): Federal permit holders that have not reported catch from the for-hire component of the recreational sectors of these fisheries, to the Southeast For-Hire Integrated Electronic Reporting (SEFHIER) program in the Atlantic on or prior to December 5, 2023, will not be assured of future access if the South Atlantic Fishery Management Council decides to limit future participation in these fisheries.

2.7 Management Program Specifications

Table 2.7.1. General Management Information

Species	Blueline Tilefish
Management Unit	Southeastern US
Management Unit Definition	NC/VA border southward to the SAFMC/GMFMC boundary
Management Entity	South Atlantic Fishery Management Council
Management Contacts SERO / Council	SAFMC: Michael Schmidtke SERO: Rick DeVictor
Current stock exploitation status	Overfishing
Current stock biomass status	Not overfished

Table 2.7.2. Specific Management Criteria

(Provide details on the management criteria to be estimated in this assessment) Note: mp = million pounds; gw = gutted weight.

Criteria	South Atlantic (South of Cape Hatteras, NC) – Current (SEDAR 50)		
	Definition	Base Run Values	Median of Base Run MCBs
MSST[1]	(75% of SSB_{MSY}) (1000 lbs ww)	1,100	1,089
MFMT	F_{MSY}, if available; $F_{30\%SPR}$ proxy [2]	0.146	0.148
F_{MSY}	F_{MSY}	0.146	0.148
MSY	Yield at F_{MSY} (1000 lbs ww), landings and discards	212	216
B_{MSY}[3]	Total spawning stock (1000 lbs ww)	1,467	1452
R_{MSY}	Recruits at MSY	Not Estimated	Not Estimated
F Target	75% F_{MSY}	0.109	0.111

Yield at F_{TARGET} (equilibrium)	Landings and discards, pounds and numbers	Not Estimated	Not Estimated
M	Natural mortality, average across ages	0.17	0.17
Terminal F	Exploitation ($F_{current}=F_{2013-2015}$)	0.134	0.134
Terminal Biomass[3]	Biomass	1,549	1,549
Exploitation Status	F/MFMT	0.92	0.86
Biomass Status[3]	B/MSST	1.41	1.55
	B/B_{MSY}	1.06	1.16
Generation Time			
TREBUILD (if appropriate)			

1. MSST definition was changed after the completion of SEDAR 32 through Snapper Grouper Regulatory Amendment 21.

2. If an acceptable estimate of F_{MSY} is not provided by the assessment a proxy value may be considered. The current F_{MSY} proxy for this stock is F30% SPR; other values may be recommended by the assessment process for consideration by the SSC.

3. Biomass values reported for management parameters and status determinations should be based on the biomass metric recommended through the Assessment process and SSC. This may be total, spawning stock or some measure thereof, and should be applied consistently in this table.

NOTE: "Proposed" columns are for indicating any definitions that may exist in FMPs or amendments that are currently under development and should therefore be evaluated in the current assessment. Please clarify whether landings parameters are 'landings' or 'catch' (Landings + Discard). If 'landings', please indicate how discards are addressed.

Table 2.7.3. Stock Rebuilding Information

N/A

Table 2.7.4. General Projection Information.

First Year of Management	2026
Interim basis	ACL, if landings are within 10% of the ACL; average landings otherwise

Projection Outputs	
Landings	Pounds and numbers
Discards	Pounds and numbers
Exploitation	F & Probability F>MFMT
Biomass (total or SSB, as appropriate)	B & Probability B>MSST (and Prob. B>BMSY if under rebuilding plan)
Recruits	Number

Table 2.7.5. Base Run Projections Specifications. Long Term and Equilibrium conditions.

Criteria	Definition	If overfished	If overfishing	Neither overfished nor overfishing
Projection Span	Years	$T_{REBUILD}$	10	10
Projection Values	$F_{CURRENT}$	X	X	X
	F_{MSY}	X	X	X
	75% F_{MSY}	X	X	X
	$F_{REBUILD}$	X		
	F=0	X		

NOTE: Exploitation rates for projections may be based upon point estimates from the base run (current process) or upon the median of such values from the MCBs evaluation of uncertainty. The critical point is that the projections be based on the same criteria as the management specifications.

Table 2.7.6. **P-Star Projections.** Short term specifications for OFL and ABC recommendations. Additional P-star projections may be requested by the SSC once the ABC control rule is applied.

Criteria		Overfished	Not overfished
Projection Span	Years	5	5
Probability Values	OFL: P*=50%	Probability of stock rebuild	Probability of overfishing
	ABC: P*=30%	Probability of stock rebuild	Probability of overfishing

Table 2.7.7. Quota Calculation Details

Current Acceptable Biological Catch (ABC) and Total Annual Catch Level (ACL) Value for Blueline Tilefish	2024 ABC=233,968 pounds whole weight Total ACL=ABC=233,968 pounds whole weight

Commercial ACL for blueline tilefish for 2024	117,148 pounds whole weight
Recreational ACL for blueline tilefish in 2024	116,820 pounds whole weight
Next Scheduled Quota Change	N/A
Annual or averaged quota?	Annual
If averaged, number of years to average	N/A
Does the quota include bycatch/discard?	No

How is the quota calculated - conditioned upon exploitation or average landings?
The quota (ACL) was most recently specified through SG Abbreviated Framework 3, which set ACL=ABC for 2020-2022 and beyond until modified. ABC for the region was the sum of ABCs derived for Atlantic blueline tilefish south of Cape Hatteras, NC, and between Cape Hatteras, NC, and the Virginia-North Carolina (VA-NC) border. For south of Cape Hatteras, a P* of 30% was applied to projections of future landings to derive ABC. For north of Cape Hatteras, a data-limited model (detailed HERE) was applied to estimate ABC for that portion of the population, then was apportioned to north and south of the VA-NC border. The data-limited approach estimated the ABC directly, without estimating OFL or applying P*.

Does the quota include bycatch/discard estimates? If so, what is the source of the bycatch/discard values? What are the bycatch/discard allowances?
Projections include discards but ABC is specified based on landings only.

Are there additional details of which the analysts should be aware to properly determine quotas for this stock?
Note Amendment 52, which implemented a lower bag limit and changes how the recreational season is set, beginning with the 2024 recreational season.

2.8 Federal Management and Regulatory Timelines for Blueline Tilefish

Table 2.8.1 South Atlantic Blueline Tilefish Commercial Regulatory History
prepared by: Michael Schmidtke

Year	ACL (lbs ww)	Days Open	Fishing Season	Reason for Closure	Season Start Date (first day implemented)	Season End Date (last day effective)	Retention (Trip) Limit (lbs gw)	Retention Limit Start Date	Retention Limit End Date
1994-2011		365	open		1-Jan	31-Dec	NA	1-Jan	31-Dec
2012 [A]	343,869 [A]	251	open		1-Jan	8-Sep	NA	1-Jan	31-Dec
		113	closed	ACL met	9-Sep	31-Dec	NA		
2013 [A]	376,469 [A]	365	open		1-Jan	31-Dec	NA	1-Jan	31-Dec
2014 [A,B]	376,469 [A]	107	open		1-Jan	17-Apr	NA	1-Jan	17-Apr
	112,207 [B]	66	open		18-Apr	23-Jun	NA	18-Apr	31-Dec
		190	closed	ACL met	24-Jun	31-Dec			
2015 [B,C]	112,207 [B]	88	open		1-Jan	29-Mar	NA	1-Jan	31-Dec
	17,841 [C]	8	open		30-Mar	7-Apr	100	31-Mar	7-Apr
		267	closed	ACL met	8-Apr	31-Dec			
2016[D]	26,766	151	open		1-Jan	31-May	100	1-Jan	31-May
		41	closed	ACL met	1-Jun	12-Jul		1-Jun	12-Jul
	87,521	47	open		13-Jul	29-Aug	300	13-Jul	29-Aug
		123	closed	ACL met	30-Aug	31-Dec		30-Aug	31-Dec
2017	87,521	198	open		1-Jan	17-Jul	300	1-Jan	17-Jul
		97	closed	ACL projected to be met	18-Jul	23-Oct		18-Jul	23-Oct
	87,521	7	open		24-Oct	31-Oct	300	24-Oct	31-Oct
		60	closed	ACL met	1-Nov	31-Dec		1-Nov	31-Dec
2018	87,521	233	open		1-Jan	21-Aug	300	1-Jan	21-Aug
		131	closed	ACL met	22-Aug	31-Dec		22-Aug	31-Dec
2019	87,521	210	open		1-Jan	29-Jul	300	1-Jan	29-Jul
		154	closed	ACL met	30-Jul	31-Dec		30-Jul	31-Dec
2020 [E, F]	117,148 [E]	222	open		1-Jan	10-Aug	100	1-Jan	30-Apr
							300 [F]	1-May	10-Aug

Year	ACL (lbs ww)	Days Open	Fishing Season	Reason for Closure	Season Start Date (first day implemented)	Season End Date (last day effective)	Retention (Trip) Limit (lbs gw)	Retention Limit Start Date	Retention Limit End Date
		142	closed	ACL met	11-Aug	31-Dec		11-Aug	31-Dec
2021	117,148	212	open		1-Jan	31-Jul	100	1-Jan	30-Apr
							300	1-May	31-Jul
		152	closed	ACL met	1-Aug	31-Dec		1-Aug	31-Dec
2022	117,148	245	open		1-Jan	2-Sep	100	1-Jan	30-Apr
							300	1-May	2-Sep
		119	closed	ACL met	3-Sep	31-Dec		3-Sep	31-Dec
2023	117,148	213	open		1-Jan	1-Aug	100	1-Jan	30-Apr
							300	1-May	1-Aug
2023		39	closed	ACL projected to be met	2-Aug	10-Sep		2-Aug	10-Sep
	117,148	5	open		11-Sep	16-Sep	300	11-Sep	16-Sep
		105	closed	ACL met	17-Sep	31-Dec		17-Sep	31-Dec

***** Fishing year is the calendar year. Size limits and multispecies aggregate retention limits have not been used in management of the commercial sector of the blueline tilefish fishery.
[A] Annual catch limit (ACL) is for entire Deepwater Complex (yellowedge grouper, blueline tilefish, silk snapper, misty grouper, queen snapper, sand tilefish, black snapper, and blackfin snapper). (Comprehensive ACL Amendment [Snapper Grouper [SG] Amendment 25]; effective 04/16/12)
[B] Blueline tilefish temporarily removed from Deepwater Complex and given a species-specific ACL. (Emergency Rule; effective 4/17/14)
[C] Blueline tilefish permanently removed from the Deepwater Complex and species-specific ACL established. (SG Amendment 32; effective 03/30/15)
[D] Commercial ACL increased to 87,521 lbs ww and commercial trip limit increased to 300 lbs gw. (SG Regulatory Amendment 25; effective 07/13/2016)
[E] ACLs increased in response to SEDAR 50 (2017). (SG Abbreviated Framework 3; effective 08/17/20)
[F] Commercial trip limit modified. January-April: 100 lbs gw; May-December: 300 lbs gw. (SG Regulatory Amendment 27; effective 02/26/2020)

Table 2.8.2 South Atlantic Blueline Tilefish Recreational Regulatory History
prepared by: Michael Schmidtke

Year	ACL (lbs ww)	Days Open	Fishing Season	Reason for Closure	Season Start Date (first day implemented)	Season End Date (last day effective)	Daily Retention Limit (unit/day)	Retention Limit Start Date	Retention Limit End Date	Daily Aggregate Retention Limit (fish/person/day)	Aggregate Retention Limit Start Date	Aggregate Retention Limit End Date
1994 [A]		365	open		1-Jan	31-Dec	5/person [A]	27-Jun	31-Dec	5 [A]	27-Jun	31-Dec
1995-1998		365	open		1-Jan	31-Dec	5/person	1-Jan	31-Dec	5	1-Jan	31-Dec
1999 [B]		365	open		1-Jan	31-Dec	5/person	1-Jan	31-Dec	5	1-Jan	23-Feb
										5 [B]	24-Feb	31-Dec
2000-2008		366	open		1-Jan	31-Dec	5/person	1-Jan	31-Dec	5	1-Jan	31-Dec
2009 [C, D]		209	open		1-Jan	28-Jul	5/person	1-Jan	28-Jul	5	1-Jan	28-Jul
		156	open		29-Jul	31-Dec	3/person [C, D]	29-Jul	31-Dec	3 [C, D]	29-Jul	31-Dec
2010		365	open		1-Jan	31-Dec	3/person	1-Jan	31-Dec	3	1-Jan	31-Dec
2011		365	open		1-Jan	31-Dec	3/person	1-Jan	31-Dec	3	1-Jan	31-Dec
2012 [E]		106	open		1-Jan	15-Apr	3/person	1-Jan	31-Dec	3	1-Jan	31-Dec
	332,039 [E]	260	open		16-Apr	31-Dec						
2013	334,556	365	open		1-Jan	31-Dec	3/person	1-Jan	31-Dec	3	1-Jan	31-Dec
2014 [F]	334,556	106	open		1-Jan	16-Apr	3/person	1-Jan	31-Dec	3	1-Jan	31-Dec
	111,893 [F]	259	open		17-Apr	31-Dec						
2015 [F, G]	111,893 [F]	88	open		1-Jan	29-Mar	3/person	1-Jan	29-Mar	3	1-Jan	31-Dec
		32	closed	Implementation of May-Aug season	30-Mar	30-Apr						
	17,791 [G]	40	open		1-May	9-Jun	1/vessel [G]	1-May	9-Jun			
		205	closed	ACL met	10-Jun	31-Dec						
2016 [H]		121	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	26,691	73	open		1-May	12-Jul	1/vessel	1-May	12-Jul			
	87,277 [H]	50	open		13-Jul	31-Aug	3/person [H]	13-Jul	31-Aug			
		122	closed	End of season	1-Sep	31-Dec		1-Sep	31-Dec			
2017		120	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	87,277	123	open		1-May	31-Aug	3/person	1-May	31-Aug			
		122	closed	End of season	1-Sep	31-Dec		1-Sep	31-Dec			

Year	ACL (lbs ww)	Days Open	Fishing Season	Reason for Closure	Season Start Date (first day implemented)	Season End Date (last day effective)	Daily Retention Limit (unit/day)	Retention Limit Start Date	Retention Limit End Date	Daily Aggregate Retention Limit (fish/person/day)	Aggregate Retention Limit Start Date	Aggregate Retention Limit End Date
2018		120	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	87,277	123	open		1-May	31-Aug	3/person	1-May	31-Aug			
		122	closed	End of season	1-Sep	31-Dec		1-Sep	31-Dec			
2019		120	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	87,277	123	open		1-May	31-Aug	3/person	1-May	31-Aug			
2019		122	closed	End of season	1-Sep	31-Dec		1-Sep	31-Dec			
2020 [I]		121	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	116,820 [I]	123	open		1-May	31-Aug	3/person	1-May	31-Aug			
		122	closed	End of season	1-Sep	31-Dec		1-Sep	31-Dec			
2021		120	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	116,820	123	open		1-May	31-Aug	3/person	1-May	31-Aug			
		122	closed	End of season	1-Sep	31-Dec		1-Sep	31-Dec			
2022		120	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	116,820	86	open		1-May	25-Jul	3/person	1-May	25-Jul			
		159	closed	ACL projected to be met	26-Jul	31-Dec		26-Jul	31-Dec			
2023		120	closed		1-Jan	30-Apr		1-Jan	30-Apr	3	1-Jan	31-Dec
	116,820	123	open		1-May	31-Aug	3/person	1-May	26-Jul			
		122	closed	ACL projected to be met	1-Sep	31-Dec		1-Sep	31-Dec			

* Fishing year is the calendar year. Size limits have not been used in management of the recreational sector of the blueline tilefish fishery.

[A] Aggregate grouper bag limit (includes gag, scamp, red grouper, black grouper, speckled hind, snowy grouper, warsaw grouper, rock hind, red hind, coney, graysby, misty grouper, yellowedge grouper, yellowmouth grouper, yellowfin grouper, tiger grouper, golden tilefish, blueline tilefish, and sand tilefish) of 5/person/day; specifies 1 speckled hind and 1 warsaw grouper in 5 grouper aggregate. (Snapper Grouper [SG] Amendment 6; effective 06/27/1994)

[B] Aggregate grouper bag limit specifies no more than 2 fish can be gag or black grouper (SG Amendment 9; effective date 02/24/1999)

[C] Reduced aggregate grouper bag limit of 3/person/day; no more than 1 fish in aggregate bag may be gag or black grouper; captain and crew may not retain bag limit (Amendment 16; effective date 07/29/2009)

[D] Prohibited sale of bag-limit caught snapper grouper species, including blueline tilefish (SG Amendment 15B; effective date:12/16/2009)

[E] Annual catch limit (ACL) is for entire Deepwater Complex (yellowedge grouper, blueline tilefish, silk snapper, misty grouper, queen snapper, sand tilefish, black snapper, and blackfin snapper). (Comprehensive ACL Amendment [SG Amendment 25]; effective 04/16/12)

[F] Blueline tilefish temporarily removed from Deepwater Complex and given a species-specific ACL. (Emergency Rule; effective 4/17/14)

[G] Blueline tilefish permanently removed from the Deepwater Complex and species-specific ACL established. 1 blueline tilefish per vessel within the aggregate grouper bag limit. May-August recreational season established. (SG Amendment 32; effective 03/30/15)

[H] ACLs revised. Bag limit increased to 3 fish/person/day during May-August within the aggregate grouper bag limit. (SG Regulatory Amendment 25; effective 07/13/2016)

[I] ACLs revised. (SG Abbreviated Framework 3; effective 08/17/2020)

SG Amendment 52 (effective 12/07/2023) reduced the recreational bag limit for blueline tilefish to 2 fish/person/day. Captain and crew may not retain the bag limit. Also, the National Marine Fisheries Service will annually announce the length of the recreational season based on catch rates from the previous season. The recreational season will begin each year on May 1.

2.9 South Atlantic States Regulatory History

North Carolina:

There are currently no North Carolina state-specific regulations for blueline tilefish. North Carolina has complemented federal regulations for all snapper grouper species via proclamation authority since 1991. Between 1992 and 2005, species-specific regulations were added to the proclamation authority contained in rule 15A NCAC 03M .0506. Specific to blueline tilefish, this rule was amended effective May 24, 1999 (following Amendment 9 to the SAFMC Snapper- Grouper FMP, eff. 2/24/99) to include the following Sub-item: (q) It is unlawful to possess any species of the Snapper-grouper complex except snowy, warsaw, yellowedge, and misty groupers; **blueline**, golden and sand tilefishes; while having longline gear aboard a vessel.

In 2002, North Carolina adopted its Inter-Jurisdictional Fishery Management Plan (IJ FMP), which incorporates all ASMFC and council-managed species by reference and adopts all federal regulations as minimum standards for management. In completing the 2008 update to the IJ FMP, all species-specific regulations were removed from rule 15A NCAC 03M .0506, and proclamation authority to implement changes in management was moved to rule 15A NCAC 03M .0512. Information updates to the IJ FMP were completed and approved in 2015 and 2022 and contained no additional regulatory changes. Since the 2008 IJ FMP update, all snapper grouper regulations were contained in a single proclamation, which was updated anytime an opening/closing of a particular species in the complex occurred, as well as any changes in allowable gear, required permits, etc. Beginning in 2015, commercial and recreational regulations have been contained in separate proclamations. The most current Snapper Grouper proclamations (and all previous versions) can be found using this link: https://www.deq.nc.gov/about/divisions/marine-fisheries/rules-proclamations-and-size-and-bag-limits/fisheries-management-proclamations.

15A NCAC 03M .0506 SNAPPER-GROUPER COMPLEX

(a) In the Atlantic Ocean, it is unlawful for an individual fishing under a Recreational Commercial Gear License with seines, shrimp trawls, pots, trotlines or gill nets to take any species of the Snapper-Grouper complex.

(b) The species of the snapper-grouper complex listed in the South Atlantic Fishery Management Council Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region are hereby incorporated by reference and copies are available via the Federal Register posted on the Internet at www.safmc.net and at the Division of Marine Fisheries, P.O. Box 769, Morehead City, North Carolina 28557 at no cost.

History Note: Authority G.S. 113-134; 113-182; 113-221; 143B-289.52;
Eff. January 1, 1991;
Amended Eff. April 1, 1997; March 1, 1996; September 1, 1991;
Temporary Amendment Eff. December 23, 1996;

Amended Eff. August 1, 1998; April 1, 1997; Temporary Amendment Eff. January 1, 2002; August 29, 2000; January 1, 2000; May 24, 1999;
Amended Eff. October 1, 2008; May 1, 2004; July 1, 2003; April 1, 2003; August 1, 2002; Readopted Eff. April 1, 2019.

15A NCAC 03M .0512 COMPLIANCE WITH FISHERY MANAGEMENT PLANS

(a) In order to comply with management requirements incorporated in Federal Fishery Management Council Management Plans or Atlantic States Marine Fisheries Commission Management Plans or to implement state management measures, the Fisheries Director may, by proclamation, take any or all of the following actions for species listed in the Interjurisdictional Fisheries Management Plan:
(1) Specify size;
(2) Specify seasons;
(3) Specify areas;
(4) Specify quantity;
(5) Specify means and methods; and
(6) Require submission of statistical and biological data.
(b) Proclamations issued under this Rule shall be subject to approval, cancellation, or modification by the Marine Fisheries Commission at its next regularly scheduled meeting or an emergency meeting held pursuant to G.S. 113-221.1.
History Note: Authority G.S. 113-134; 113-182; 113-221; 113-221.1; 143B-289.4;
Eff. March 1, 1996;
Amended Eff. October 1, 2008;
Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. January 9, 2018.

South Carolina:

Sec. 50-5-2730 of the SC Code states:
"Unless otherwise provided by law, any regulations promulgated by the federal government under the Fishery Conservation and Management Act (PL94-265) or the Atlantic Tuna Conservation Act (PL 94-70) which establishes seasons, fishing periods, gear restrictions, sales restrictions, or bag, catch, size, or possession limits on fish are declared to be the law of this State and apply statewide including in state waters."

As such, SC blueline tilefish regulations are (and have been) pulled directly from the federal regulations as promulgated under Magnuson. I am not aware of any separate blueline tilefish regulations that have been codified in the SC Code.

Georgia:

There are currently no GA state regulations for blueline tilefish. However, the authority rests with the GA Board of Natural Resources to regulate this species if deemed necessary in the future.

Florida Atlantic and Monroe County Blueline Tilefish Regulation History

Year	Minimum Size Limit	Recreational Daily Harvest Limits	Commercial Daily Harvest Limits	Regulation Changes	Rule Change Effective Date
1980	None	None	None		
1981	None	None	None		
1982	None	None	None		
1983	None	None	None		
1984	None	None	None		
1985	None	None	None		
1986	None	None	None	Use of longline gear by commercial fishermen prohibited in state waters. Reef fish must be landed in whole condition	Dec. 11, 1986
1987	None	2 fish or 250 pounds per person, whichever is greater	None		
1988	None	2 fish or 250 pounds per person, whichever is greater	None		
1989	None	2 fish or 100 pounds per person, whichever is greater	None		
1990	None	2 fish or 100 pounds per person, whichever is greater	None		
1991	None	2 fish or 100 pounds per person, whichever is greater	None		
1992	None	2 fish or 100 pounds per person, whichever is greater	None		
1993	None	2 fish or 100 pounds per person, whichever is greater	None		
1994	None	2 fish or 100 pounds per person, whichever is greater	None		

Year	Minimum Size Limit	Recreational Daily Harvest Limits	Commercial Daily Harvest Limits	Regulation Changes	Rule Change Effective Date
1995	None	2 fish or 100 pounds per person, whichever is greater	None		
1996	None	2 fish or 100 pounds per person, whichever is greater	None		
1997	None	2 fish or 100 pounds per person, whichever is greater	None		
1998	None	2 fish or 100 pounds per person, whichever is greater	None		
1999	None	2 fish or 100 pounds per person, whichever is greater	None		
2000	None	2 fish or 100 pounds per person, whichever is greater	None		
2001	None	2 fish or 100 pounds per person, whichever is greater	None		
2002	None	2 fish or 100 pounds per person, whichever is greater	None		
2003	None	2 fish or 100 pounds per person, whichever is greater	None		
2004	None	2 fish or 100 pounds per person, whichever is greater	None		
2005	None	2 fish or 100 pounds per person, whichever is greater	None		
2006	None	2 fish or 100 pounds per person, whichever is greater	None		
2007	None	2 fish or 100 pounds per person, whichever is greater	None		
2008	None	2 fish or 100 pounds per person, whichever is greater	None		
2009	None	2 fish or 100 pounds per person, whichever is greater	None		

Year	Minimum Size Limit	Recreational Daily Harvest Limits	Commercial Daily Harvest Limits	Regulation Changes	Rule Change Effective Date
2010	None	2 fish or 100 pounds per person, whichever is greater	None		
2011	None	2 fish or 100 pounds per person, whichever is greater	None		
2012	None	2 fish or 100 pounds per person, whichever is greater	None		
2013	None	2 fish or 100 pounds per person, whichever is greater	None		
2014	None	2 fish or 100 pounds per person, whichever is greater	None		
2015	None	2 fish or 100 pounds per person, whichever is greater	None		
2016	None	2 fish or 100 pounds per person, whichever is greater	None		
2017	None	2 fish or 100 pounds per person, whichever is greater	None		
2018	None	2 fish or 100 pounds per person, whichever is greater	None		
2019	None	2 fish or 100 pounds per person, whichever is greater	Same as federal waters	Designated Blueline Tilefish as a "restricted species," requiring commercial harvesters to possess a Restricted Species endorsement on their Saltwater Products License, as well as a federal South Atlantic Snapper Grouper commercial permit.	July 1, 2019
2020	None	2 fish or 100 pounds per person, whichever is greater	Same as federal waters		
2021	None	3 per person within the 3-fish grouper aggregate bag limit	Same as federal waters	Established a three fish recreational bag limit for blueline tilefish, within the three-fish aggregate limit for grouper and tilefish in Atlantic state waters and all	Jan. 1, 2021

Year	Minimum Size Limit	Recreational Daily Harvest Limits	Commercial Daily Harvest Limits	Regulation Changes	Rule Change Effective Date
				state waters of Monroe County. Sets the blueline tilefish recreational season to be May 1 through August 31 in Atlantic state waters and all state waters of Monroe County. Requires non-stainless-steel, non-offset circle hooks north of 28 degrees north latitude and non-stainless-steel hooks south of 28 degrees north latitude when fishing for reef fish with hook and line using natural bait.	
2022	None	3 per person within the 3-fish grouper aggregate bag limit	Same as federal waters		
2023	None	3 per person within the 3-fish grouper aggregate bag limit greater	Same as federal waters	Requires the possession or a descending device or venting tool that is rigged and ready for use on board a vessel when harvesting or attempting to harvest, including catch and release, of reef fish in state waters. Also, requires the use of such device/tool if a fish is exhibiting signs of barotrauma prior to release.	April 1, 2023

July 1, 2019

- Designated Blueline Tilefish as a "restricted species," requiring commercial harvesters to possess a Restricted Species endorsement on their Saltwater Products License, as well as a federal South Atlantic Snapper Grouper commercial permit.

January 1, 2021

- Requires non-stainless-steel, non-offset circle hooks north of 28 degrees north latitude and non-stainless-steel hooks south of 28 degrees north latitude when fishing for reef fish with hook and line using natural bait.
- Established a three fish recreational bag limit for blueline tilefish, within the three-fish

aggregate limit for grouper and tilefish in Atlantic state waters and state waters of Monroe County.
- Sets the blueline tilefish recreational season to be May 1 through August 31 in Atlantic state waters and state waters of Monroe County.

April 1, 2023
- Requires the possession or a descending device or venting tool that is rigged and ready for use on board a vessel when harvesting or attempting to harvest, including catch and release, of reef fish in state waters. Also, requires the use of such device/tool if a fish is exhibiting signs of barotrauma prior to release.

3 MID ATLANTIC MANAGEMENT OVERVIEW

MAMFC Golden Tilefish and Blueline Tilefish FMP History:
Amendment 6 in 2017 added blueline tilefish to the original golden tilefish FMP. However, earlier actions related to golden tilefish are included due to indirect impacts on blueline tilefish since the directed golden tilefish fishery does catch some blueline tilefish.

Original Tilefish FMP (2001)

Established management of the Golden Tilefish fishery; Limited entry into the commercial fishery; Implemented system for dividing Total allowable landings (TAL) among three fishing categories. Other elements included a stock rebuilding strategy; permits and reporting requirements for commercial vessels, operators, and dealers; gear restrictions; and a framework adjustment process.

3.1 Fishery Management Plans and Amendments

Amendment 2 (2007)

Standardized bycatch reporting methodology

Amendment 1 (2009)

Implemented an individual fishing quota (IFQ) program for the commercial fishery; established new reporting requirements; imposed gear modifications;
addressed recreational fishing issues; reviewed the EFH components of the FMP.

Amendment 3 (2011)

Established Acceptable Biological Catches (ABCs) and Annual Catch Limits (ACLs) to avoid overfishing and ensure accountability.

Amendment 4 (2015)

Implemented a new Standardized Bycatch Reporting Methodology

Amendment 5 (2017)

Implemented management measures to prevent the development of new, and expansion of existing, commercial fisheries on certain forage species in the Mid-Atlantic

Framework 3 (2017)

Implemented a requirement for vessels that hold party/charter permits for Council-managed species to submit vessel trip reports electronically (eVTRs) while on a trip carrying passenger for hire.

Amendment 6 (2017)

Incorporated blueline tilefish (*Caulolatilus microps*) as a managed species in the Tilefish Fishery Management Plan and established blueline tilefish management measures, including, annual catch limit process, sector allocations, possession limits, fishing season, permitting, and reporting requirements.

Framework 4 (2018)

Established a process for setting constant multi-year ABCs and clarified the process for setting ABCs for each of the four types of ABC control rules.

Framework 5 (2020)

Established a requirement for commercial vessels with federal permits for all species managed by the Mid-Atlantic and New England Councils to submit vessel trip reports electronically within 48 hours after entering port at the conclusion of a trip.

Framework 6 (2020)

Modified the Council's ABC control rule and risk policy. The revised risk policy is intended to reduce the probability of overfishing as stock size falls below the target biomass while allowing for increased risk and greater economic benefit under higher stock biomass conditions. This action also removed the typical/atypical species distinction currently included in the risk policy.

3.2 Generic Amendments

None

3.3 Regulatory Amendments

None

3.4 Secretarial Amendments

None

3.5 Emergency and Interim Rules

Emergency Action effective June 4, 2015-June 3, 2016

http://www.greateratlantic.fisheries.noaa.gov/nr/2015/June/14tileblemergencyactionphl.pdf

Recreational:

-Must hold a valid Greater Atlantic Region open access tilefish charter/party vessel permit to possess or land blueline tilefish and must follow all recordkeeping and reporting requirements.
-The recreational possession limit for charter/party and private recreational anglers is seven blueline tilefish per person, per trip.

Commercial
-Must hold a valid Greater Atlantic Region open access commercial tilefish vessel permit to possess or land blueline tilefish, and must follow all recordkeeping and reporting requirements.
-The commercial blueline tilefish possession limit is 300 pounds per trip.

3.6 Control Dates

On December 14, 2015, NMFS published a control date for the commercial and party/charter sectors of the blueline tilefish fishery north of the Virginia/North Carolina border: http://www.greateratlantic.fisheries.noaa.gov/nr/2015/December/15bltilefishcontroldatephl.pdf.

3.7 Management Program Specifications

Table 3.7.1 General Management Information Mid-Atlantic

Species	Blueline Tilefish
Management Unit	Mid-Atlantic/Northeast US
Management Unit Definition	NC/VA border northward to the Canadian boundary
Management Entity	Mid-Atlantic Fishery Management Council
Management Contacts Council/GARFO/NEFSC	MAFMC: Hannah Hart GARFO: Doug Potts NEFSC: Paul Nitschke
Current stock exploitation status	?
Current stock biomass status	?

Table 3.7.2 Management Parameters

Criteria	Mid-Atlantic SSC		
	Definition	Value	Effective date
Acceptable Biological Catch (ABC)	SSC Determination, based on Data Limited Toolbox (DLMTool) for MSE (https://cran.r-project.org/web/packages/DLMtool/DLMtool.pdf)	87,031 pounds	2017 – 2018

	SSC Determination, based on an updated information to the DLMTool	100,520 pounds	2019-2021
	SSC Determination, based on status quo (2017-2021)	100,520 pounds	2022-2024

Table 3.7.3. Stock Rebuilding Information
N/A

Quota Calculation Details

Final Blueline Tilefish Subcommittee Report - At its meeting on March 16th, 2016 the Mid-Atlantic SSC reviewed a preliminary draft from a Working Group report and agreed that use of the DLMTool is the most appropriate approach for developing an ABC recommendation for Blueline Tilefish. The SSC also emphasized that the ABC would be for a sub-unit of Blueline Tilefish located in the mid-Atlantic region, and would not be applicable to the entire coast. Based on performance measures determined before simulations were conducted (i.e., a P(overfishing) < 50%, P(overfished) < 50%, and relative yields between 30 – 100%), the SSC Blueline Tilefish Working Group recommended an ABC calculated as the average of the median ABCs derived from the average catch, average catch in the last five years, MCD, and MCD 4010 management procedures as 39,477 kg (87,031 pounds). Similar recommendations were recommended by the Mid-Atlantic SSC in 2017.

Later, in 2017, the 50th Southeast Data, Assessment, and Review (SEDAR 50) benchmark assessment for blueline tilefish was conducted. Within the assessment, blueline tilefish were split into two separate stocks, north and south of Cape Hatteras, North Carolina. ABC recommendations were set for the region south of Cape Hatteras (not overfished, overfishing not occurring), but data limitations restricted an ABC recommendation for the region north of Cape Hatteras, which encompasses part of the South Atlantic and the Mid-Atlantic management areas. To assist in developing an ABC recommendation, the Mid- and South Atlantic Councils/SSCs, as well as staff from the Northeast and Southeast Fisheries Science Centers developed a joint subcommittee to rerun the DLMTool for the region north of Cape Hatteras. The results were partitioned at the Council boundaries using coastwide catch data from the recently completed pilot tilefish survey funded by the MAFMC out of SUNY Stony Brook.

At their March 2018 meeting, the Mid-Atlantic SSC reviewed the output from the most recent blueline tilefish DLMTool runs (as recommended by the Joint Mid- and South Atlantic Blueline Tilefish Subcommittee) as well as the output from the SEDAR 50 benchmark stock assessment and provided recommendations for annual OFL and ABC levels for 2019-2021[1]. The blueline tilefish ABCs for 2019-2021 were derived using the DLMTool. The SSC also concluded that the MSY estimate based on the DLMTool analysis for the region north of Cape Hatteras is an estimate of the OFL, not the ABC (as recommended by the joint subcommittee), which enabled

[1] The March 2018 SSC meeting report is available at: http://www.mafmc.org/ssc.

the SSC to use the P* approach[2] and the Council's risk policy in setting ABC specifications. This was considered a reasonable recommendation for 2019-2021 (with annual reviews) due to limited data and broad uncertainties (e.g. max age, short time series, no estimate of recruitment, etc.) within the fishery.

Since the SSC lacked information on the estimate of stock biomass relative to B_{MSY}, a ratio of $B/B_{MSY} = 1$ was applied as a default value for the P* (i.e., P* = 0.4 under the MAFMC's risk policy). The SSC also assumed a typical life history (similar to golden tilefish). Based on this application of the Council's risk policy, the resulting SSC-recommended ABC was 179,500 pounds for 2019-2021 for the region north of Cape Hatteras. The SSC then followed the recommendation of the Joint Mid- and South Atlantic Blueline Tilefish Subcommittee to allocate 56% of that ABC to the MAFMC (VA/NC border – north) and 44% to the South Atlantic Fishery Management Council. The basis for this percentage breakdown came from the catch results and random stratified design of the Pilot Blueline Tilefish Longline Survey (SUNY Stony Brook-Frisk et al. 2018). Using the 56% allocation, the MAFMC ABC for 2019-2021 is 100,520 pounds.

Following the 2018 approach detailed above, the SSC recommended a status quo ABC for the 2022-2024 fishing year, given the lack of information on stock size, productivity, or stock structure.

3.8 Federal Management and Regulatory Timelines for Blueline Tilefish

Table 3.8.1. Mid-Atlantic Blueline Commercial and Recreational Regulatory History

Year	Com. ACL (pounds)	Com. possession limit (pounds)	Com. fishing season	Com. season end date (reason for closure)	Rec. ACL (pounds)	Rec. possession limit (# fish)	Rec. fishing season
2016	NA	300	Jan 1 – Dec 31	Dec 31	NA	7	Jan 1 – Dec 31
2017	23,498	300	Jan 1 – Dec. 31	Dec 31	63,533	3/5/7[a]	May 1 – Oct 31
2018	23,498	300	Jan 1 – Dec. 31	Dec 31	63,533	3/5/7[a]	May 1 – Oct 31
2019	27,140	500[b]	Jan 1 – Dec. 31	Dec 31	73,380	3/5/7[a]	May 1 – Oct 31
2020	27,140	500[b]	Jan 1 – Dec. 31	Nov 21	73,380	3/5/7[a]	May 1 – Oct 31
2021	27,140	500[b]	Jan 1 – Dec. 31	Dec 31	73,380	3/5/7[a]	May 1 – Oct 31
2022	27,140	500[b]	Jan 1 – Dec. 31	Dec 31	73,380	3/5/7[a]	May 1 – Oct 31
2023	27,140	500[b]	Jan 1 – Dec. 31	Sept 5	73,380	3/5/7[a]	May 1 – Oct 31

[2] Acceptable probability of overfishing (P*) as a function of stock size was adopted by the MAFMC in an Omnibus Amendment (July 2011). The threshold acceptable probability of overfishing is 0.4 for species with a typical life history and 0.35 for those with an atypical life history. The acceptable probability of overfishing is zero if relative biomass (projected biomass divided by the expected biomass if the stock was fished at the maximum fishing mortality rate threshold) is less than 0.1. The acceptable probability of overfishing increases to its threshold as relative biomass approaches 1. Whether a species is deemed typical or atypical depends on the degree to which its life history has been incorporated in the development of fishing mortality reference points.

2024	27,140	500[b]	Jan 1 – Dec. 31	*Not available*	73,380	3/5/7[a]	May 15 – Nov 14

[a] Recreational possession limit of 3/5/7 fish when fishing from a private boat/permitted for-hire vessel without a U.S. Coast Guard Certificate of Inspection/permitted for hire vessel with a current Coast Guard Certificate of Inspection

[b] The commercial possession limit starts at 500 pounds on Jan 1 of the fishing year until 70% of the commercial total allowable landings (TAL) has been met. Then, the commercial trip limit is reduced to 300 pounds for the remainder of the year or until 100% of the TAL is landed.

Permitting and Reporting Requirements

Commercial

Open access permit for commercial harvest and sale of blueline tilefish and incidental caught golden tilefish. Federally permitted commercial fishing vessels are also required to submit vessel trip reports electronically within 48 hours of the end of a trip.

Recreational (Party/Charter)

Open access permit that allows vessel operators to take passengers for hire to recreationally fish for tilefish. Federally permitted for-hire fishing vessels are also required to submit vessel trip reports electronically within 48 hours of the end of a trip.

Private Recreational Tilefish Vessel Permit

Open access permit that allows private recreational vessels to fish for and/or retain tilefish in waters north of the North Carolina/Virginia line. Private recreational tilefish anglers must also fill out and submit an electronic vessel trip report within 24 hours of returning to port for trips where tilefish were targeted and/or retained. Reports can be submitted through any NOAA Fisheries approved electronic reporting system.

3.9 Mid Atlantic States Regulatory History

Virginia – Commercial daily trip limit of 300 pounds; Recreational daily possession limit of 3/5/7 fish when fishing from a private or rental boat/permitted for-hire vessel without a current U.S. Coast Guard Certificate of Inspection/permitted for hire vessel with a current Coast Guard Certificate of Inspection, and a recreational season from May 1 – October 31.

Blueline tilefish management history in Virginia state waters

Table 1: Recreational regulation history for tilefish in Virginia. All regulations refer to the aggregated "tilefish" complex, as defined in Virginia's tilefish-grouper regulation Chapter 4 VAC 20-1120-10 et seq., "Pertaining to Tilefish and Grouper," to be blueline tilefish, golden tilefish, or sand tilefish (unless otherwise noted).

Measure	Year
Establishment of possession limit of 7 per person	2007
Establishment of recreational landing permit and mandatory reporting	2009
Reduce number of requirements for recreational mandatory reporting	2016
Modified recreational possession limits for blueline tilefish for any person:	2018

• Fishing from a private/rental vessel shall be three fish. • Fishing from a for-hire vessel that has been issued a valid Tilefish Charter/Party Permit but does not have a current U.S. Coast Guard Certificate of Inspection shall be five fish. • Fishing from a for-hire vessel that have both a valid Tilefish Charter/Party Permit and a current U.S. Coast Guard Certificate of Inspection shall be seven fish.	
Established a recreational blueline tilefish season of May 1 – October 31	2018

Table 2: Commercial regulation history for tilefish in Virginia. All regulations refer to the aggregated "tilefish" complex, as defined in Virginia's tilefish-grouper regulation Chapter 4 VAC 20-1120-10 et seq., "Pertaining to Tilefish and Grouper," to be blueline tilefish, golden tilefish, or sand tilefish (unless otherwise noted).

Measure	Year
Establishment of daily trip limit of 300 pounds	2007
Change daily trip limit to 500 pounds	2012
Establishment of daily trip limit for blueline tilefish of 200 pounds	2012
Change daily trip limit to 500 pounds whole weight or 455 pounds gutted weight	2012
Change daily trip limit for blueline tilefish to 300 pounds whole weight or 273 pounds gutted weight	2012

Maryland – Requirement to follow federal limits and season, permit and reporting requirements.

Blueline tilefish management history in Maryland state waters

Effective June 28, 2010, a commercial 300 pounds combined tilefish and Recreational 7 combined tilefish possession limit was established. The limits for tilefish remained unchanged until March 30, 2015, when the commercial limit for tilefish was changed to 455 pounds gutted weight, which may not include more than 273 pounds of blueline tilefish. And were again later modified to follow federal water measures.

New Jersey – Commercial daily trip limit of 500 pounds. When 70 percent of the commercial total allowable landings has been landed, the Regional Administrator will reduce the possession limit to 300 pounds per trip by notice in the Federal Register. Recreational daily possession limit of 3/5/7 fish when fishing from a private or rental boat/permitted for-hire vessel without a current U.S. Coast Guard Certificate of Inspection/permitted for hire vessel with a current Coast Guard Certificate of Inspection, and a recreational season from May 1 – October 31.

Blueline tilefish management history in New Jersey state waters

Effective September 8, 2015, New Jersey state regulations were implemented and mirrored Federal emergency rule (300 pounds commercial blueline, 7 blueline per person recreational). Regulations have since been updated to reflect federal regulations as they have been modified.

Delaware – Requirement to follow federal commercial limits and season, permit and reporting requirements. Recreational daily possession limit of 3/5/7 fish when fishing from a private or rental boat/permitted for-hire vessel without a current U.S. Coast Guard Certificate of Inspection/permitted for hire vessel with a current Coast Guard Certificate of Inspection, and a recreational season from May 1 – October 31

Blueline tilefish management history in Delaware state waters

Effective January 11, 2016, blueline and golden tilefish in combination carry a recreational limit of seven fish per person per day aboard a vessel, with a commercial harvest combination limit of 300 pounds of tilefish per day. Regulations were later updated to match federal measures following implementation of Amendment 6 to the Tilefish FMP

New York – Requirement to follow federal limits and season, permit and reporting requirements.

4 ASSESSMENT HISTORY AND REVIEW

The distribution of Blueline Tilefish extends into three separate council regions from Gulf waters near Texas, along the Atlantic Coast to New Jersey. It is therefore managed separately by the Gulf, South Atlantic, and Mid-Atlantic Fishery Management Councils in their respective regions. However, it has only formally been assessed in the South Atlantic Council Region.

In 2004, data relevant to assessment of Blueline Tilefish were assembled, though an official stock assessment was not conducted (SEDAR 2004). The first stock assessment of blueline tilefish in the South Atlantic was completed in 2013 during SEDAR 32 (2013). The primary model was a statistical catch-at-age model (Beaufort Assessment Model; BAM) coded using AD Model Builder (ADMB), while an age-aggregated production model (AAPM; using ASPIC software) and an age-structured production model (ASPM) were considered secondary models. The stock was found to be undergoing overfishing, since current fishing mortality toward the end of the assessment (geometric mean F from 2009-2011) exceeded F_{MSY} ($F_{2009\text{-}2011}/F_{MSY}$ = 2.37), and was found to be overfished since the 2011 spawning biomass was below the Minimum Stock Size Threshold (SSB_{2011}/MSST = 0.909). Trends in stock status from both production models were similar to the catch-at-age model.

As a part of the SEDAR 50 Benchmark Assessment process, a stock identification workshop was held from June 28-30, 2016 in Raleigh, NC (SEDAR 50 Stock ID Work Group. 2016).

Participants considered many data sources including distribution of blueline tilefish observed in surveys, catches, and genetic data. The main conclusion of the working group, supported by genetic studies, was that blueline tilefish were one biological population from the West Florida Shelf into the Atlantic and as far north as they are found (~Massachusetts). However, for the SEDAR 50 stock assessment of Atlantic blueline tilefish data and modeling focused on the Atlantic, in providing management advice to the South Atlantic Fishery Management Council (Council, Science Center and Regional Office Leadership, 2016). Note however that data was also provided and models were run for the Gulf as supporting analysis (SEDAR 2017).

Due to high aging error in Blueline Tilefish identified in early 2016, an aging workshop was held on August 29-30, 2016 in Beaufort, NC, with participants from multiple labs, including South Carolina Department of Natural Resources (SCDNR) and the NOAA Beaufort Lab which both aged thousands of blueline tilefish. Instead of converging on a set of best methods for aging Blueline Tilefish, the assembled team of experts found that problems with aging were more serious than previously thought. As stated in the Aging Workshop Report "The consensus of the participants of the workshop is that Blueline Tilefish could not be precisely aged at this time" (Potts et al. 2016). So although SEDAR 32 used Blueline Tilefish age data in 2013, the aging methodology was considered unreliable for use in SEDAR 50 stock assessment models in 2016. This conclusion led to a major change in the modeling framework used in SEDAR 50, described below.

During the SEDAR 50 data workshop (January 23-27, 2017, Charleston, SC), participants gathered many data sources to use for assessment modeling, such as landings, discards, and indices of abundance, and estimated life history parameters from meta-analysis. Due to the conclusions of the 2016 age workshop, the 2017 data workshop did not develop age compositions or recommend any other data inputs based on blueline tilefish ages (SEDAR 2017). While reviewing the available data for that Atlantic, participants determined that spatial changes in fishing effort over time, especially an increase in fishing effort north of Cape Hatteras NC after 2005, prevented the development of coastwide fishery dependent indices of abundance. The spatial range of the fishery dependent indices that were developed was from the Florida Keys to Cape Hatteras NC., and no indices of abundance were available for the area north of Cape Hatteras. No fishery independent indices of abundance were recommended for use.

Given the available data, separate assessments were conducted on two spatial areas: 1. a southern region from the Florida Keys to Cape Hatteras, NC and 2. a northern region from Cape Hatteras, NC to the northern extent of the Atlantic range (~Massachusetts).

Due to the lack of valid age data, the assessment could not use the fully age-structured BAM as initially intended. Instead, for the southern region, the analytical team applied three main approaches varying in complexity: 1. an ASPM using a modified version of BAM, 2. an AAPM using ASPIC software (Prager, 1994; Prager, 2015), and 3. a suite of data limited approaches using DLMtool software (Carruthers et al. 2022). The ASPM and AAPM were both considered by the Assessment Panel to provide management advice, while the DLMtool analysis was

conducted for comparison with approaches applied in the northern region. The SEDAR 50 Assessment Panel recommend the AAPM as the primary model to provide management advice with the ASPM as a supporting analysis. The subsequent CIE Review panel recommended that the ASPM be the primary model to provide management advice, with the AAPM as a supporting analysis. Ultimately the South Atlantic SSC preferred the recommendation of the SEDAR 50 Assessment Panel and recommended that the AAPM to provide advice for management, and subsequent management was in fact based on the AAPM results. The AAPM found that the stock in the southern region was not overfished (B_{2015}/MSST = 1.41) and overfishing was not occurring ($F_{2013–2015}/F_{MSY}$ = 0.92) in the terminal year of the assessment (2015).

For the northern region, the analytical team applied the same suite of data limited approaches applied in the southern region. But in this case, these were the only methods available given the more serious limitations of the data, including a lack of indices of abundance for the northern region. Data for the northern region included a time series of removals for the Atlantic north of Cape Hatteras, a time series of length composition data from the commercial longline fleet north of Cape Hatteras, and life history inputs identified from meta-analysis of other species (SEDAR 2017; Klibansky 2017). The data limited approaches do not provide estimates of biological reference points or stock or fishing status, but do provide guidance for setting catch levels in the form of distributions of total allowable catch (TAC). In the SEDAR 50 process, the inputs and results of the DLMtool analysis for the northern region were provided to a MAFMC-SAFMC SSC Joint Blueline Tilefish Subcommittee. The Subcommittee completed further analysis using DLMtool to provide Allowable Biological Catch (ABC) recommendations (Schmidtke, 2018).

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Schmidtke, M. 2018. Blueline Tilefish ABC Recommendation for North of Cape Hatteras, NC. MAFMC-SAFMC SSC Joint Blueline Tilefish Subcommittee internal Memorandum. March 1, 2018.

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Stock ID Work Group Meeting. SEDAR50-DW12. SEDAR, North Charleston, SC. 40 pp.

SEDAR. 2017. SEDAR 50 : Atlantic Blueline Tilefish Assessment Report. SEDAR, North Charleston SC page 542. URL http://sedarweb.org/sedar-50.

5 REGIONAL MAPS

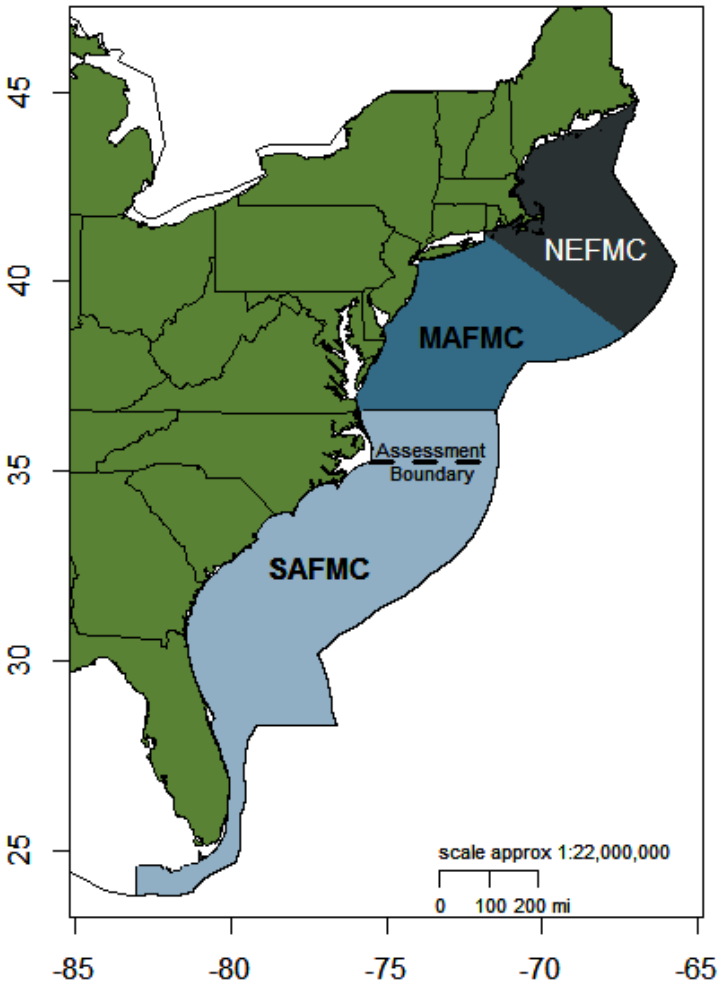

Figure 4.1: SAFMC and MAFMC jurisdictional boundaries. Boundary between MAFMC and NEFMC is for display purposes only. SEDAR 92 developed models for two regions: Cape Hatteras, NC south through the SAFMC/GMFMC jurisdictional line and Cape Hatteras, NC north through the MAFMC jurisdiction.

6 SEDAR ABBREVIATIONS

ABC	Acceptable Biological Catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
ADMB	AD Model Builder (software program)
ALS	Accumulated Landings System: SEFSC fisheries data collection program
AMRD	Alabama Marine Resources Division

APAIS	Access Point Angler Intercept Survey
ASMFC	Atlantic States Marine Fisheries Commission
B	Biomass (stock) level
BAM	Beaufort Assessment Model
B_{msy}	B capable of producing MSY on a continuing basis
BSIA	Best Scientific Information Available
CHTS	Coastal Household Telephone Survey
CFMC	Caribbean Fishery Management Council
CIE	Center for Independent Experts
CPUE	Catch Per Unit Effort
EEZ	Exclusive Economic Zone
F	Fishing mortality (instantaneous)
FES	Fishing Effort Survey
FIN	Fisheries Information Network
F_{MSY}	F to produce MSY under equilibrium conditions
F_{OY}	F rate to produce OY under equilibrium
$F_{XX\% SPR}$	F rate resulting in retaining XX% of the maximum spawning production under equilibrium conditions
F_{max}	F maximizing the average weight yield per fish recruited to the fishery
F_o	F close to, but slightly less than, Fmax
FL FWCC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Fish and Wildlife Research Institute
GA DNR	Georgia Department of Natural Resources
GLM	General Linear Model
GMFMC	Gulf of Mexico Fishery Management Council
GSMFC	Gulf States Marine Fisheries Commission
GULF FIN	GSMFC Fisheries Information Network
HMS	Highly Migratory Species
LDWF	Louisiana Department of Wildlife and Fisheries
M	natural mortality (instantaneous)
MARFIN	Marine Fisheries Initiative
MARMAP	Marine Resources Monitoring, Assessment, and Prediction
MDMR	Mississippi Department of Marine Resources
MFMT	Maximum Fishing Mortality Threshold: value of F above which overfishing is deemed to be occurring
MRFSS	Marine Recreational Fisheries Statistics Survey: combines a telephone survey of households to estimate number of trips with creel surveys to estimate catch and effort per trip
MRIP	Marine Recreational Information Program
MSA	Magnuson Stevens Act

MSST	Minimum Stock Size Threshold: value of B below which the stock is deemed to be overfished
MSY	Maximum Sustainable Yield
NC DMF	North Carolina Division of Marine Fisheries
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
OST	Office of Science and Technology, NOAA
OY	Optimum Yield
SAFMC	South Atlantic Fishery Management Council
SC DNR	South Carolina Department of Natural Resources
SEAMAP	Southeast Area Monitoring and Assessment Program
SEDAR	Southeast Data, Assessment and Review
SEFIS	Southeast Fishery-Independent Survey
SEFSC	Southeast Fisheries Science Center, NMFS
SERFS	Southeast Reef Fish Survey
SERO	Southeast Regional Office, NMFS
SRFS	State Reef Fish Survey (Florida)
SRHS	Southeast Region Headboat Survey
SPR	Spawning Potential Ratio: B relative to an unfished state of the stock
SSB	Spawning Stock Biomass
SS	Stock Synthesis
SSC	Scientific and Statistical Committee
TIP	Trip Interview Program: biological data collection program of the SEFSC and Southeast States
TPWD	Texas Parks and Wildlife Department
Z	total mortality (M+F)

Atlantic Blueline Tilefish Assessment Report

SEDAR Operational Assessment

Southeast Fisheries Science Center

National Marine Fisheries Service

Last revision: March 28, 2025

Document History

March 28, 2025 Original release.

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1 Introduction

1.1 Workshop Time and Place

The SEDAR 92 Operational Assessment process updated the previous SEDAR 50 stock assessment Atlantic Blueline Tilefish. The assessment was conducted by the SEFSC within the SEDAR process. Two Topical Working Groups (TWG) were convened by SEDAR to review and provide recommendations on data to use in SEDAR 92. The Landing Streams TWG focused on landings and discards north of Cape Hatteras and met five times via webinar between April and September 2024. The Life History TWG focused its discussion on age data and met three times via webinar between October and December 2024.

1.2 Terms of Reference

1. Update the approved SEDAR 50 Atlantic Blueline Tilefish models with previously provided data,adding all new and recent available data sufficient for use in the stock assessment through 2023. Dataproviders may decide to include preliminary or partial 2024 data that could be used in the stockassessment models or projection analyses. Data inclusion for the stock assessment models and projectionanalyses will be determined by the lead analyst based on quantity and quality of the most recent data. Incorporate the latest ASPIC model for South of Cape Hatteras to the Gulf and South Atlantic Councilboundary and the latest DLM model for North of Cape Hatteras. Include any configurations and updatesto data calculation methodologies and detail the changes made between the 2017 SEDAR 50 AtlanticBlueline Tilefish benchmark assessment models and the proposed SEDAR 92 models.

2. Consider new and updated information on life history, discard mortality, commercial and recreationallandings and discards. Note any particular concerns or problems with data collected in 2020 and beyond. Document any changes or corrections made and provide updated input data tables. Provide commercialand recreational landings and discards in pounds and numbers.

3. Update model parameter estimates and their variances, model uncertainties, estimates of stock status andmanagement benchmarks, and provide the probability of overfishing occurring at specified futureharvest and exploitation levels. Investigate asymmetric distributions for incorporating MRIP parameters.

4. Address as many of the recommendations as possible of the South Atlantic SSC Catch Level Projections workgroup outlined on page 16 of the final workgroup report found here: https://safmc.net/documents/a03a_catch-level-projections-wg-report-draft_final-pdf/

5. Convene a topical working group including SSC representatives, industry representatives, and outside experts to meet via webinar or in-person. This group of specialists will evaluate the following subject and document specific changes in input data or deviations from the SEDAR 50 model. Include the Mid-Atlantic Council in the topical working group process.

    - Review and recommend catch and landing streams for North of Cape Hatteras. Explore whether information could be used to develop higher level assessment approach.
    - Review the South Atlantic Deepwater longline Survey for potential incorporation into the assessment.

6. Explore using appropriate CVs for the landings data to capture the uncertainty in the model results as an alternate run or a base run.

7. Develop a stock assessment report to address these TORs and fully document the input data, methods,and results.

1.3 List of Participants

Analytical Team

Nikolai Klibansky, Lead Analyst ..... NMFS/SEFSC
Kyle Shertzer, Assessment Support ..... NMFS/SEFSC
Erik Williams, Assessment Support ..... NMFS/SEFSC

Appointees (Landing Streams TWG)

Andrew Cathey, Co-Chair ..... NMFS/SEFSC
Julie Defillippi-Simpson, Co-Chair ..... ACCSP
Ken Brennan ..... NMFS/SEFSC
Anna-Mai Christmas-Svajdlenka ..... ACCSP
Gary Decossas ..... NMFS/SEFSC
Dewey Hemilright ..... Industry
Nikolai Klibansky ..... NMFS/SEFSC
Matt Nuttall ..... NMFS/SEFSC
Bev Sauls ..... FLFWC
Byron Shults ..... Industry
Kevin Thompson ..... NMFS/SEFSC
Steve Turner ..... SAFMC SSC
Meredith Whitten ..... SAFMC SSC/NCDMF
Erik Williams ..... NMFS/SEFSC

Appointees (Life History TWG)

Beverly Barnett ..... NMFS/SEFSC
Walter Bubley ..... SAFMC SSC/SCNDR
Derek Chamberlin ..... NOAA
Elizabeth Gooding ..... SCDNR
Dewey Hemilright ..... Industry
Yan Jiao ..... VA Tech
Cynthia Jones ..... ODU
Nikolai Klibansky ..... NMFS/SEFSC
Jon Low ..... VA Tech
Jill Olin ..... MTU
Andy Ostrowski ..... NMFS/SEFSC
Walt Rogers ..... NMFSS/SEFSC
Tracey Smart ..... SCDNR
Kevin Spanik ..... SCDNR
Erik Williams ..... NMFS/SEFSC

Data Providers and Observers

Kelly Adler ..... NMFS/SEFSC
Sydney Alhale ..... NMFS/SEFSC
Sarina Atkinson ..... NMFS/SEFSC
Samatha Binion-Rock ..... NMFS/SEFSC
Christopher Bradshaw FLFWC

Rob Cheshire ..... NMFS/SEFSC
Matthew Green ..... NOAA
Eric Hiltz ..... SCDNR
Kevin Kolmos ..... SCDNR
Dominique Lazarre ..... SERO
Michelle Masi ..... SERO
Ryan Nichols ..... NMFS/SEFSC
Paul Nitschke ..... NEFSC
Michael Opiekun ..... ACCSP
Michaela Pawluk ..... NMFS/SEFSC
Douglas Potts ..... NMFS/SEFSC
Marcel Reichert SAFMC/SSC
Kyle Shertzer ..... NMFS/SEFSC
Michelle Willis ..... SCDNR

Council Representatives
Skip Feller ..... MAFMC
Trish Murphy ..... SAFMC

Staff
Chip Collier ..... SAFMC Staff
Judd Curtis ..... SAFMC Staff
Hannah Hart ..... MAFMC Staff
Kathleen Howington ..... SEDAR
Meisha Key ..... SEDAR
Julie Neer ..... SEDAR
Emily Ott ..... SEDAR
Mike Schmidtke ..... SAFMC Staff

1.4 Document List

Working papers were written specifically for SEDAR 92 and can be accessed at: https://sedarweb.org/assessments/sedar-92-atlantic-tilefish/.

Working Papers			
Document number	**Title**	**Authors**	**Date Received**
SEDAR92-WP01	General Recreational Survey Data for Blueline Tilefish in the Atlantic	Nuttall 2024	9/18/2024
SEDAR92-WP02	Estimated Commercial Discards of South Atlantic Blueline Tilefish (*Caulolatilus microps*) Using Limited Observer Data	Thompson et al. 2024	8/30/2024
SEDAR92-WP03	Blueline Tilefish Fishery Performance Report	SAFMC SGAP 2024	8/12/2024
SEDAR92-WP04	Headboat Data for Blueline Tilefish in the Southeast US Atlantic	Green et al. 2024	8/29/2024
SEDAR92-WP05	South Atlantic Blueline Tilefish (*Caulolatilus microps*) Length Compositions for Commercial Longline Landings North of Cape Hatteras	Pawluk 2024	9/20/2024
SEDAR92-WP06	Blueline Tilefish Growth Curve in US Atlantic Waters Based on South Carolina Department of Natural Resources Derived Ages	Bubley 2024	1/5/2025

Reference documents were written prior to the SEDAR 92 process for some other purpose and can be accessed at: https://sedarweb.org/assessments/sedar-92-atlantic-tilefish/.

Reference Documents		
Document number	**Title**	**Authors**
SEDAR92-RD01	Review of the South Atlantic Deepwater Longline Survey: SADLS Workgroup Recommendations	Reichert et al. 2024
SEDAR92-RD02	Estimated Catch of Blueline Tilefish in the Mid-Atlantic Region: Application of the Delphi Survey Process	Allen et al. 2016
SEDAR92-RD03	Validating blueline tilefish Caulolatilus microps ages in the US South Atlantic using bomb radiocarbon (F14C)	Spanik and Ballenger 2023
SEDAR92-RD04	Blueline Tilefish Fishery Information Document: April 2023	MAFMC 2023
SEDAR92-RD05	Reliability of the Discard Logbook for Use in Commercial Discard Estimates in the South Atlantic	Alhale et al. 2024
SEDAR92-RD06	Blueline Tilefish Fishery Information Document: June 2024 - revised August 2024	MAFMC 2024
SEDAR92-RD07	Marine Recreational Information Program Survey Design and Statistical Methods for Estimation of Recreational Fisheries Catch and Effort	NMFS OST 2023
SEDAR92-RD08	Blueline Tilefish Age Workshop II. SEDAR50-DW18.	Potts et al. 2016
SEDAR92-RD09	Application of the bomb radiocarbon chronometer with eye lens core $\Delta 14C$ for age validation in deepwater reef fishes	Patterson III and Chamberlin 2023
SEDAR92-RD10	Meta-analysis of growth parameters and estimation of natural mortality rate for blueline tilefish	Klibansky 2017

2 Data Review and Update

The input data for this assessment are described below.

2.1 Data Review

In this operational assessment, models were fitted to data sources developed during the SEDAR 50 DW with some modifications and additions made during the current SEDAR 92 process.

- Landings and discards
- Indices of abundance: commercial handline, commercial longline
- Length composition: commercial longline
- Life history: growth parameters

2.2 Data Update

2.2.1 Landings and Discards

A Landings Stream Topical Working Group (LS TWG; see Term of Reference 5) convened during five webinars between April 1 and September 23, 2024, to discuss updated time series of removals (landings and dead discards) of blueline tilefish in the Atlantic. Since the assessment is divided into two regions, divided at Cape Hatteras, NC, the TWG made recommendations for removals for each of these separate regions. Detailed descriptions of the removals series used for each of these regions are described in the respective Methods sections. All removals time series were extended to the terminal year of the assessment (2023). Differences from what was used in SEDAR 50 are emphasized here.

In SEDAR 50, commercial discards were estimated from the logbook data, which is no longer recommended (Thompson et al. 2024). In SEDAR 92 commercial observer data was used to estimate discards. Notably, a very high estimate of commercial discards for 2015 which appeared in the SEDAR 50 data is a more typical value in the current SEDAR 92 data. Commercial discards for the Mid-Atlantic (VA to MA) were provided by the Catch Accounting and Monitoring System (CAMS), which represents a change from SEDAR 50. The CAMS system is a collaboration between the Greater Atlantic Regional Fisheries Office (GARFO) and the Northeast Fisheries Science Center (NEFSC).

In SEDAR 50, recreational landings and discards in the Mid-Atlantic were estimated using an Amended Delphi approach (SEDAR 2017). For SEDAR 92 the LS TWG recommended using the Marine Recreational Information Program (MRIP; NMFS OST 2023) data for the private boat fleet for recreational landings and discards north of the NC-VA line. In addition, the LS TWG recommended using National Marine Fisheries Vessel Trip Reporting (VTR) program landings and discard estimates for charter and headboat fleets north of the NC-VA line.

Several working papers provide detailed documentation of several of the sources of removals used in this assessment, including general recreational removals from the Marine Recreational Information Program (MRIP; Nuttall 2024), recreational headboat removals from the Southeast Regional Headboat Survey (SRHS Green et al. 2024), and commercial discards from observer data (Thompson et al. 2024).

2.2.2 Indices of Abundance

Indices of abundance could not be updated for SEDAR 92 for the same reasons that restricted the time series in SEDAR 50. Regulations on other species affected the characterization of effort in the blueline tilefish indices, and made subsequent years of the index unreliable (Fitzpatrick 2017*a*;*b*). The indices and their corresponding CVs are shown in Table 2.

2.2.3 Length Compositions

Fork length data for the commercial longline fleet north of Cape Hatteras was provided for the assessment north of Cape Hatteras (Pawluk 2024), following SEDAR 50, and was updated through 2023. Length compositions were developed in 30-mm bins over the range 190–940 mm (labeled at bin center). All lengths below and above the minimum and maximum bins were pooled into the first and last bins, respectively.

2.2.4 Life History

As noted in the Assessment History section of this report, an aging workshop conducted during the SEDAR 50 benchmark assessment process had determined blueline tilefish age data to be unreliable (Potts et al. 2016) and therefore no age data or any other inputs based on blueline tilefish ages were used in the SEDAR 50 assessment. But in order to provide additional information to data limited approaches, SEDAR 50 data workshop members developed estimates of life history inputs based on a meta-analysis of other select species and studies (SEDAR 2017; Klibansky 2017). Those inputs included von Bertalanffy growth model parameters ($L_\infty = 690$, $K = 0.16$, $t_0 = -1.33$) and associated CVs ($CV_{L\infty} = 0.024$, $CV_K = 0.23$, $CV_{t0} = -0.18$).

The issues raised at the SEDAR 50 aging workshop had not been resolved prior to the SEDAR 92 benchmark process, thus the assessment team did not initially plan to update life history information for the current operational assessment. No webinars were planned to address life history in the original assessment schedule which ran from Apr-Nov 2024. However, during Landing Stream TWG webinars, SAFMC staff raised concerns that the life history information was not being updated, and the SEFSC was asked to form the LH TWG. Council staff suggested that the use of blueline tilefish age data be reconsidered in light of a recently published bomb radiocarbon study (Spanik and Ballenger 2023). The SEFSC agreed to form the LH TWG and dedicate additional staff resources to meet this request, and the SEDAR 92 schedule was extended to accommodate three additional webinars between October and December 2024. Early in the activity of the LH TWG, the group agreed to limit the scope of the webinars in order to avoid extending the assessment further. Thus the LH TWG considered if existing blueline tilefish age data provided by the South Carolina Department of Natural Resources (SCDNR) could be used to estimate growth parameters, and if the resulting estimates should be used to update inputs for the DLMtool (Carruthers et al. 2022) analysis applied north of Cape Hatteras. It was not the intention of the LH TWG to fully address the concerns of the SEDAR 50 aging workshop, or to evaluate the use of the age data for age compositions.

Members of the LH TWG did not all agree that the publication of the Spanik and Ballenger (2023) study validated the SCDNR age data set, partly based on methodological concerns raised by other recent authors (Patterson III and Chamberlin 2023). Nonetheless, the LH TWG worked together to identify a set of growth parameter estimates based on this data to use in SEDAR 92. After considering many possible von Bertalanffy growth models developed by SCDNR staff, including separate sex models, regional models, and models based on different time periods, the LH TWG selected a growth model fit to data for combined sexes and regions, excluding samples collected prior to 1990 (Bubley 2024). Growth parameter estimates for the model ($L_\infty = 679.01$, $K = 0.16$, $t_0 = -6.16$) and associated CVs ($CV_{L\infty} = 0.014$, $CV_K = 0.141$, $CV_{t0} = -0.19$) were recommended for use in SEDAR 92, to replace values used

in SEDAR 50. In the end, most of the new growth parameters and CVs submitted for SEDAR 92 were very similar to those used in SEDAR 50, with the exception of the t_0 values. The LH TWG had discussed fixing the very low t_0 estimate at a more reasonable value (nearer to zero), but ultimately decided to use the estimated value.

3 Stock Assessment Approach

3.1 Stock Structure

Following SEDAR 50, stock assessment of blueline tilefish in the Atlantic was divided into southern and northern regions, separated at Cape Hatteras, NC. The assessment was split largely because fishing effort north of Cape Hatteras increased substantially after 2005, while the available indices of abundance did not adequately represent that area. More detailed explanation is provided in the Stock Structure section of the SEDAR 50 Assessment Report (SEDAR 2017) and the preceding Stock ID Workshop Report (SEDAR 50 Stock ID Work Group 2016). The southern region extends from Cape Hatteras, NC, south to the Council boundary at Key West, FL. The northern region extends north of Cape Hatteras to the northern extent of the blueline tilefish range (i.e. waters off of Massachusetts).

3.2 Modeling Framework

Following SEDAR 50, the analytical team applied an age-aggregated surplus production model (AAPM) using ASPIC software for the southern region and data limited methods (DLM) using R package DLMtool (Carruthers et al. 2022) for the northern region.

3.3 Potential habitat area

Although not explicitly used in modeling, a map of potential blueline tilefish habitat areas was produced for SEDAR 50 and is reprinted in the current report. Blueline tilefish habitat has been described in various ways, relative to depth, temperature, and sediment type, but during the SEDAR 50 Stock ID Workshop, and later at the Assessment Workshop, it was determined that the best way available to define potential blueline tilefish habitat was to simply identify areas within the narrow depth range from which most blueline tilefish have been caught (73-183 m; 40-100 fathoms). The stratum defined by this depth range was computed using Geographic Information Systems (GIS) software. The amount of potential blueline tilefish habitat (area in km^2) within each region was then determined by dividing the depth stratum by latitude and calculating how much of that depth stratum fell within the polygon bounding each region (Figure 1).

4 Stock Assessment Models and Results

4.1 South of Cape Hatteras: Age-aggregated Production Model (ASPIC)

4.1.1 Methods

4.1.1.1 Overview

An age-aggregated logistic surplus production model, implemented in ASPIC (Version 7.03; Prager 2015), was used to estimate stock status of blueline tilefish south of Cape Hatteras. This model focuses on the dynamics of the removals as they relate to the indices of abundance, without incoporating any age data or age-structure when modeling the population.

4.1.1.2 Data Sources

Data sources supplied to an AAPM include a time series of removals (i.e. landings plus dead discards) and one or more indices of abundance (i.e. catch per unit of effort). These inputs are in units of biomass (i.e. weight).

4.1.1.3 Removals

As noted in SEDAR 50, large increases in landings of Atlantic blueline tilefish north of Cape Hatteras occurred after 2005 (Figure 2). These removals have generally remained at higher levels through the terminal year of the current assessment (2023). Initially most of this increase occurred in North Carolina, but there has been an increase in Mid-Atlantic removals in recent years. While commercial landings were the primary source of removals in the Atlantic through 2005, increases since 2006 are predominantly due to recreational landings (Figure 3). Dead discards have remained a fairly small percentage of removals. Focusing on the southern region, most removals have occurred in Florida (Figure 4) with an increasing proportion of recreational landings in recent years, often exceeding the commercial landings (Figure 5). Time series of landings and dead discards for the southern region are provided in Table 1.

Commercial

Commercial landings for the southern region from handline, longline, and 'other' fleets from 1958-2023, were provided in pounds by the Atlantic Coastal Cooperative Statistics Program (ACCSP). Commercial discards for the southern region from the handline fleet from 1993-2023, were provided in pounds, based on observer data (Thompson et al. 2024).

Recreational

Recreational landings in the southern region from private and charter boat fleets from 1981-2023, were provided in pounds by the the Marine Recreational Information Program (MRIP; Nuttall 2024). In most years and areas from 1981-2023, recreational headboat landings in the southern region were provided in pounds by the Southeast Regional Headboat Survey (SRHS; Green et al. 2024). However, in the Florida Keys from 1981 to 1985 and from Virginia northward since 1981, headboat landings were included in the MRIP data.

Recreational discards in the southern region from private and charter boat fleets from 1981-2023 were provided in numbers by MRIP. Numbers were converted to pounds using mean weights for the landings provided by MRIP. Mean weights were computed at several hierarchical strata (species, region, year, state, mode, wave), generally applying mean weights from finer strata when a sufficient number of fish was measured. These mean weights were multiplied by the number of discards in the corresponding stratum to compute discards in pounds. Mean weights in the MRIP data were generally 4.5 to 5.5 lb. Recreational headboat discards in the southern region from 1981-2023 were provided in numbers by the SRHS. Numbers were converted to pounds using mean weights computed from SRHS landings data. Mean weights were computed by state and year and then smoothed within each state with a nine year moving average. This approach allows spatial and temporal variation in mean weight to be applied to the numbers while minimizing the effect of noise in the data due to small sample sizes in some years. Mean weights in the SRHS data were generally 4 to 5 lb in most regions, but were much smaller (1 to 2 lb) in south Florida for most years between 1990 and 2015.

Dead Discards

Since some discarded fish survive after release, discard mortality rates were applied to discards to calculate dead discards. For commercial discards, a discard mortality rate of 0.95 was applied for all years. For recreational discards,

a discard mortality rate of 0.82 for all years. These discard mortality rates were specified during the SEDAR 50 Data Workshop, and were not updated during the SEDAR 92 assessment process.

Indices of Abundance

The two fishery dependent indices of abundance used in the SEDAR 50 base model were used here for blueline tilefish: commercial handline (1993-2007) and commercial longline (1993-2006; Table 2; Figure 6). As detailed in SEDAR 50 documentation (Fitzpatrick 2017*a*;*b*) the time series of both of these indices ended several years before the terminal year of that assessment due to regulations on other species which affected the characterization of effort in the blueline tilefish indices, and made subsequent years of the index unreliable.

4.1.1.4 Model Configuration and Equations

Production modeling used the model formulation and ASPIC software (version 7.03) of Prager (1994; 2015). This is an observation-error estimator of the continuous-time form of the Schaefer (logistic) production model (Schaefer 1954; 1957). Estimation was conditioned on catch, which assumes that catch was estimated without error. The logistic model for population growth is the simplest form of a differential equation which satisfies a number of ecologically realistic constraints, such as a carrying capacity (a consequence of limited resources). When written in terms of stock biomass, this model specifies that

$$\frac{dB_t}{dt} = rB_t - \frac{r}{K}B_t^2 \tag{1}$$

where B_t is biomass in year t, r is the intrinsic rate of increase in absence of density dependence, and K is carrying capacity (Schaefer 1954; 1957). This equation may be rewritten to account for the effects of fishing by introducing an instantaneous fishing mortality term, F_t :

$$\frac{dB_t}{dt} = (r - F_t)B_t - \frac{r}{K}B_t^2 \tag{2}$$

By writing the term F_t as a function of catchability coefficients and effort expended by fishermen in different fisheries, Prager (1994) showed how to estimate model parameters from time series of yield and effort.

During SEDAR 50 this AAPM was configured using various combinations of removals, indices, starting dates, prior distributions and starting values, resulting in hundreds of configurations. Many of these runs were completed during early model development while others incorporated small changes to data inputs or model specifications suggested by SEDAR 50 Assessment Workshop (AW) panel members during the AW. After considering many possible configurations, the SEDAR50 AW Panel judged two runs to be equally plausible, and developed a base model ensemble, averaging these two individual runs.

4.1.1.5 Biological reference points

Biological reference points (benchmarks) were calculated based on maximum sustainable yield (MSY). Computed benchmarks included MSY, fishing mortality rate at MSY (F_{MSY}), and total biomass at MSY (B_{MSY}).

4.1.1.6 Configuration of base runs

The SEDAR 50 AW Panel identified two model runs that were considered equally plausible. The two model configurations differed in the indices that they included. The same configurations were used in the current assessment:

- Run 02 Include only handline index.
- Run 03 Include only longline index.

Run 02 included only the commercial handline index while run 03 included only the commercial longline index. Both runs contained removals from 1958 to 2023, and since removals were minimal prior to 1973, the value of B_1/K in the model was fixed a 1.0. All other fitted parameters were initialized with the same starting values and were allowed to vary over wide ranges during the fitting process. The results of these two models were combined into a base model ensemble, averaging the two individual runs, into order to provide a single set of results to inform management.

4.1.1.7 Sensitivity analyses

Sensitivity runs are intended to demonstrate directionality of results with changes in inputs or simply to explore model behavior, and are not necessarily considered equally plausible to the base model. In this case there was only one sensitivity run:

- S1: (Run 06) Include handline and longline indices in the same AAPM

4.1.1.8 Parameters Estimated

The ASPIC model fits three main parameters (B_1/K, MSY, and F_{MSY}) as well as catchability coefficients (q_i) for each index i. Note that in the models presented here, B_1/K was fixed at 1.0 to reflect that removals prior to the start of the time series were likely to have resulted in limited impact on stock abundance. Several other parameters can then be derived from these estimates: $r = 2F_{\text{MSY}}$, $K = 2\text{MSY}/F_{\text{MSY}}$ and $B_{\text{MSY}} = K/2$. These parameters were estimated in both the handline and longline models, and then the model estimates were averaged to produce final estimates.

4.1.1.9 Benchmark/Reference Point Methods

Reference points estimated were F_{MSY}, MSY, and B_{MSY}. Based on F_{MSY}, three possible values of F at optimum yield (OY) were considered ($F_{\text{OY}} = 65\%F_{\text{MSY}}$, $F_{\text{OY}} = 75\%F_{\text{MSY}}$, and $F_{\text{OY}} = 85\%F_{\text{MSY}}$). The maximum fishing mortality threshold (MFMT) is defined by the SAFMC as F_{MSY}, and the minimum stock size threshold (MSST) is defined as $75\%B_{\text{MSY}}$. Overfishing is defined as $F >$ MFMT. Overfished status was defined as $B <$ MSST. Standard errors of benchmarks were approximated by the bootstrap analysis (§4.1.1.10).

Current status of the stock is represented by B in the terminal year of the assessment (2023), and current status of the fishery is represented by the geometric mean of F from the last three years (2021-2023; F_{current}). Recent SEDAR assessments have considered the mean over the terminal three years to be a more robust metric. Since this assessment resulted in two equally plausible models, the status determinations were made by comparing average B with average B_{MSY}, and average $F_{\text{current}}$with average F_{MSY}.

4.1.1.10 Uncertainty and Measures of Precision

To evaluate the uncertainty in the model fit and parameter estimates of the base runs, 1000 bootstrap runs were conducted for each of the two models. Percentile confidence intervals were also then calculated for parameters from all 2000 runs (i.e. 1000 runs from each of the two base runs).

Bootstrapping was conducted using the bootstrap program (`BOT`) mode in ASPIC software (Prager 2015). In `BOT` mode, ASPIC fits the data as usual, then saves predicted values and computes normalized inflated residuals. It then generates a resampled dataset for each bootstrap trial, as a function of the predicted values, observation standard deviation, and randomly drawn residuals for each year. The resampled dataset is then fit, the results are saved, and the algorithm proceeds to the next run until all runs are completed.

4.1.1.11 Projections

Projections were run to predict stock status and yield up to five years after the assessment (2024-2028).

The structure of the projection model was the same as that of the assessment model, and parameter estimates were those from the assessment. Three different sets of projections were run, with F held constant during the projection period at F_{MSY}, F_{current}, or F_{target}, where $F_{\text{target}} = 0.75\% F_{\text{MSY}}$

Uncertainty in future time series was quantified through stochastic projections that extended the bootstrap fits of the stock assessment model. The data input to the projections includes the F and B time series from the observed run and each bootstrap run, and the corresponding B_{MSY} and F_{MSY} values from each. In this case, the projection procedure was supplied with B and F data from all bootstrap runs, as well as average B and F series from the observed handline and longline runs (i.e. runs 02 and 03). ASPIC estimates yield using equation 6 of Prager (1994). Further details of the projection procedure used by ASPIC are provided in detail by the ASPIC User's Guide (Prager 2015).

Central tendencies were represented by the deterministic projections of the average B and F series, as well as by medians of the bootstrap projections. Precision of projections was represented graphically by the 10^{th} and 90^{th} percentiles of the replicate projections.

4.1.2 Results

4.1.2.1 Model Fit

For the ASPIC base runs of blueline tilefish south of Cape Hatteras, trends in predicted indices were very similar, although the longline model predicted a more rapid increase toward the unfished biomass after the end of the index (Figure 7, 8; Table 3). The predicted indices follow the general trend in the indices for both models, though do not follow most of the short term increases and decreases.

4.1.2.2 Parameter Estimates

Average estimates of the main ASPIC model parameters as well as benchmarks and status indicators are presented in Table 4.

4.1.2.3 Total biomass

Average estimated biomass was at virgin levels until the mid-1970s when landings began to gradually increase (Figure 9). Estimated biomass then decreased gradually until 1982 when a spike in landings occurred, primarily comprised of commercial landings caught in Florida, and to a lesser degree, increased commercial landings off South Carolina (Figure 4). Peaking in 1982 at approximately 10 times pre-1980 levels, the spike led to a drop in estimated biomass. After 1982, landings in south Florida and South Carolina decreased rapidly until the late 1980s, at which point they were similar to levels observed in the early years of the fishery. The indices began in the early 1990s, as landings gradually decreased. Landings continued to decrease to a low in 2011, caused by a deepwater closure for blueline tilefish (which lasted from January 31, 2011 to May 10, 2012). After 2011, landings increased again, averaging about 140 thousand pounds per year through 2023, excluding 2013 when recreational landings spiked in Florida and total removals exceeded 420 thousand pounds (Table 1).

4.1.2.4 Fishing mortality

The time series of average estimated fishing mortality (F; Figure 10) generally reflects the pattern in the removals time series (Figures 4 and 5). Estimated F remained very low until the early 1980s, spiking in 1982, then decreasing rapidly until 1989. Another substantial increase followed, peaking in the mid 1990s before gradually decreasing to a low in 2011, the year of the deepwater closure. The F series also shows the 2013 landings spike, and then a general decline through 2023 as landings remained steady and biomass increased. Current F (geometric mean F from 2021 to 2023; F_{current}= 0.053) is lower than in nearly all years since 1980.

4.1.2.5 Benchmarks / Reference Points

Average estimates of benchmarks from the handline and longline runs and median values from the bootstrap analysis are summarized in Table 4. Estimates of MSY-related quantities were $F_{\text{MSY}} = 0.19$, MSY = 247 klb, and $B_{\text{MSY}} =$ 1337 klb. Distributions of these benchmarks are shown in Figure 11.

4.1.2.6 Status of the Stock and Fishery

Time series of estimated stock status (B_{2023}/MSST) showed a nearly unexploited stock until the early 1980s when stock status dropped from $> 2.5MSST$ to below $0.5MSST$ by 1987 (Figure 12). Biomass subsequently remained below the current estimate of $MSST$ until 2010. Biomass has continued to increase in recent years and remains well above $MSST$ in 2023 and is not currently overfished (B_{2023}/MSST = 1.98). Although bootstrapping shows there is a wide range of B_{2023}/MSST values, there is little statistical uncertainty in the status estimate, with more than 95% of bootstrap runs showing B_{2023}/MSST > 1.0 (Figures 11, 12, and 13).

The time series of estimated F/F_{MSY} suggests that fishing mortality of blueline tilefish in the US South Atlantic had been above the current estimate of F_{MSY} for most years between 1981 and 2003, a period of over 20 years. Since then F has been below F_{MSY} in all years except 2013. Based on the three most recent years, $F_{\text{current}} < F_{\text{MSY}}$, and overfishing is not currently occurring ($F_{2021-2023}/F_{\text{MSY}} = 0.28$). The range in $F_{2021-2023}/F_{\text{MSY}}$ from the bootstrap runs is fairly narrow and there is little statistical uncertainty in the fishing status, with $> 95\%$ of estimates of $F_{2021-2023}/F_{\text{MSY}} < 1.0$ (Figure 11, 13, and 14).

4.1.2.7 Sensitivity

Main model parameters and status indicators for the sensitivity run is presented in Table 3. Including handline and longline indices in the same model (Run 06) resulted in a model that was very similar to the handline only model (Run 02) in terms of both parameter estimates and status trends (Table 3; Figures 7 and 15). This is apparently due to the much smaller error bars around the handline index versus the longline index, which causes it to be fit much more more closely when the indices are included in the same run.

4.1.2.8 Projections

Projections all show B/MSST above 1.0 for all years from 2024-2029, whether considering the expected value or the median of the projections (Figure 16). The probability of $B > \text{MSST}$ in 2029 was 0.96 (Table 5).

4.1.3 Discussion

4.1.3.1 Comments on the Assessment

The averaged estimates from the ASPIC handline and longline models indicate that blueline tilefish in the Atlantic south of Cape Hatteras, NC, is neither overfished nor undergoing overfishing. Results of uncertainty analysis suggest little uncertainty in stock or fishing status (Figure 13). However, the stock dynamics for this model are largely determined from years when indices of abundance were available and the current assessment largely represents an extended projection analysis from SEDAR 50. The only new data added during SEDAR 92 were additional years of removals. The levels of removals from this population since the end of the indices of abundance (2006 and 2007) were fortunately fairly low compared to historic years, and show little sign of increase since even the beginning of the indices (1993). Thus while it is hardly ideal to conduct a stock assessment with indices of abundance which end 16 years before the terminal year of the assessment, the results show little signs of concern with the current catch levels.

4.1.3.2 Comments on the Projections

Projections should be interpreted in light of the model assumptions and key aspects of the data. Some major considerations are the following:

- In general, projections of fish stocks are highly uncertain, particularly in the long term (e.g., beyond 5–10 years).
- Projections conducted in ASPIC only included uncertainty in indices, based on bootstrapping residuals, and did not include structural (model) uncertainty. That is, projection results are conditional on one set of functional forms used to describe population dynamics.
- $F_{\text{current}}$was assumed to be equal to the geometric mean F from the last three years of the assessment period (2021-2023).

4.2 North of Cape Hatteras: Data limited methods (DLMtool)

As mentioned in a previous section, none of the indices of abundance available for SEDAR 50 represented trends in abundance north of Cape Hatteras. Therefore stock assessment of blueline tilefish north of Cape Hatteras was conducted using a separate approach. This section of the Report documents analyses of available data for blueline tilefish north of Cape Hatteras to provide guidance to management of the resource in that region.

4.2.1 Methods

4.2.1.1 Overview

In SEDAR 50, blueline tilefish in the northern region were modeled using a set of data limited approaches, due to data limitations. Most notably, there were no valid age compositions or indices of abundance for blueline tilefish in the northern region. These limitations remained for SEDAR 92, thus data were updated where possible, and the same data limited approaches were applied. Analyses were conducted using the R package `DLMtool` (version 6.0.6 Carruthers et al. 2022; R Core Team 2016).

4.2.1.2 Data Sources

Data sources supplied to `DLMtool` included a time series of removals (i.e. landings plus dead discards), length compositions, and life history parameters.

4.2.1.3 Removals

Commercial

Commercial landings for the northern region were provided in pounds by the ACCSP, from 1958-2023 for handline, longline, and 'other' fleets. Commercial discards for the northern region, from Cape Hatteras, NC to the NC-VA border were provided in pounds, based on observer data from 1993-2023 from the vertical line fleet (Thompson et al. 2024). Commercial discards north of the NC-VA line were provided in pounds by the Catch Accounting and Monitoring System (CAMS), from 2019-2023 from the gillnet, hook and line, pot, and trawl fleets.

Recreational

Much of the work of the Landings Stream Topical Working Group (LS TWG) was focused on identifying and developing time series of recreational removals north of Cape Hatteras. The recommended time series which were combined and used in the DLM analysis are described here.

For recreational landings and discards from the private boat fleet from 1981-2023 MRIP data were used for the entire region north of Cape Hatteras, NC. For the charter boat and headboat fleets from 2003-2023, VTR data (provided in pounds) was used for the region north of the NC-VA line. For charter boat landings and discards between Cape Hatteras NC and the NC-VA line, VTR data were not available and the LS TWG recommended using the MRIP data from 1981-2023. For headboat landings and discards between Cape Hatteras NC and the NC-VA line, VTR data were also not available and the LS TWG recommended using the SRHS data from 1981-2023. Landings were provided in pounds while discards were provided in numbers and converted to pounds as described in §4.1.1 for SRHS and MRIP discards in the southern region.

Although commercial landings made up a large proportion of removals in the northern region from 2009 to 2014, recreational landings have made up similar or larger proportions from 2006-2008 and 2015-2023 Figure (17). Most removals in the northern region have been from NC north of Cape Hatteras (69%) with larger proportions from the Mid-Atlantic since 2014, especially in 2016 and 2021-2023 (Figure 18). The increase in Mid-Atlantic landings in those years can be attributed to MRIP private mode landings from Virginia and Maryland (Nuttall 2024). For DLMtool 'catch' time series input, all sources of removals for the northern region (pounds) were summed by year. Following SEDAR 50, the start year of the catch time series used in the DLM analysis was 2002 (Figure 19). Time series of landings and dead discards for the northern region are provided in Table 6.

Dead Discards Discard mortality rates were applied in the northern region as described in §4.1.1.

4.2.1.4 Length compositions

Length composition data (fork length, FL) from the commercial longline fleet were updated for SEDAR 92 (2006-2023; Pawluk (2024)). Length compositions were developed in 30-mm bins over the range 190–940 mm (labeled at bin center). All lengths below and above the minimum and maximum bins were pooled in the first and last bins, respectively (Figure 20). These lengths were also combined across all years to build an aggregate length frequency distribution to compute two additional DLMtool inputs: the length of fish in the first length mode ($Lc = 533$ mm) and the mean length of fish larger than Lc ($Lbar = 619$ mm; Figure 21). Length at full selection (LFS) was set equal to Lc. Note that in the version of `DLMtool` used in SEDAR 50 $Lbar$ and Lc were computed inside some functions and were not supplied by the user. In `DLMtool` (version 6.0.6) $Lbar$ and Lc inputs are specified as time series, but the MPs employed here do not use the entire time series or model interannual variability in length, thus a single value was repeated for all years in the input.

4.2.1.5 Life history

For several life history inputs, values in SEDAR 92 were the same as in SEDAR 50. A Beverton-Holt steepness parameter estimate and CV ($h = 0.836$; $CV_h = 0.24$) were based on a meta-analysis of marine demersal teleost fishes (Shertzer and Conn 2012). Weight-length equation parameters ($W = aL^b$; $a = 0.0000178$ and $b = 2.94$) and associated CVs ($CV_a = 0.08$ and $CV_b = 0.004$) and length at 50% maturity ($L_{50} = 305$) were based on data for blueline tilefish provided during SEDAR 50. Maximum age ($t_{\max} = 40$) was based on golden tilefish, and the natural mortality estimate was computed as a function of t_{max} following Then et al. (2014) ($M = 4.899 * 40^{-0.916} = 0.17$). The CV associated with M ($CV_M = 0.24$) was computed in SEDAR 50 as the value associated with a normal distribution, with a mean of 0.17 and 97.5 percentile at 0.25, which was an upper estimate for M. The upper estimate of M was associated with a minimum estimate of t_{max} of 26 years. This minimum estimate of t_{max} was identified by the SEDAR 50 Data Workshop Life History Working Group based on the bomb radio-carbon study of blueline tilefish conducted by SCDNR staff (SEDAR 2017, section II 2.4).

The SEDAR 92 LH TWG identified a new set of Von Bertalanffy growth parameter estimates for the current assessment, estimated from SCDNR length and age data for blueline tilefish (Bubley 2024) ($L_\infty = 679.01$, $K = 0.16$, $t_0 = -6.16$) and associated CVs ($CV_{L\infty} = 0.014$, $CV_K = 0.141$, $CV_{t0} = -0.19$).

4.2.1.6 Model Configuration and Equations

All available inputs were entered into a `DLMtool Data` object and the `TAC` function was then run on the `Data` object. This function first determines what methods can be used given the data, then it applies those methods. For this operational assessment, methods were limited to those applied in SEDAR 50, including several which were not ultimately used to inform management. In `DLMtool`, these methods are referred to as MPs (management procedures). Each of the MPs was run 1000 times, and each run randomly drew values of each of the relevant input data types (e.g. M, L_{50}) from a statistical distribution (usually normal). The spread of these distributions is determined by user specified CVs. For each MP, the function output is not a single estimate, but rather a distribution of MSY proxies which `DLMtool` refers to as TACs (Total Allowable Catches).

Five MPs applied in SEDAR 50 were appropriate for use here. A sixth, SPMSY, was applied in SEDAR 50 but was not ultimately used for management. It was not applied here because it assumes that the catch time series is proportional to abundance then applies a Schaefer surplus production model (see DLMtool help file for SPMSY). This assumption is not considered valid for blueline tilefish north of Cape Hatteras. The data inputs required by each MP are presented in Table 7 with `DLMtool` descriptions of each data input in Table 8. These methods are listed by their `DLMtool` abbreviations and briefly described below:

- AvC: Average catch over the entire the catch time series
- CC1: Average catch over the most recent 5 years of the catch time series
- CC4: 70% of average catch over the most recent 5 years of the catch time series
- Fdem_ML: Demographic F_{MSY} method that uses length frequency data in a calculation that estimates recent Z:

$$Z = K(Linf - Lbar)/(Lbar - Lc) \tag{3}$$

  where K and $Linf$ are parameters of a Von Bertalanffy growth model, Lc is the length at full vulnerability to fishing, and $Lbar$ is the mean length of fish greater than Lc. The method was developed by Beverton and Holt (1956) to be applied to a population at equilibrium and has been reprinted in later works (e.g. Hilborn and Walters 1992; Gedamke and Hoenig 2006). The MP then subtracts M to estimate F_{recent} and then estimates B_{current} as the most recent year of catch divided by 1-exp(-F_{recent}). Then using the life history data, it applies the Euler-Lotka equation (Gotelli 2008, Chap. 3) and solves for r. Then calculates $r/2 = F_{\text{MSY}}$. This estimate of F_{MSY} is then multiplied by B_{current} to estimate a TAC.
- YPR_ML: Estimates B_{current} with the same method as described above for Fdem_ML. This method then conducts a yield-per-recruit analysis to determine the value of F at which the slope of the $YPR = f(F)$ curve is 10% of the slope of this curve at the origin; this value, termed $F_{0.1}$, is used as the F_{MSY} proxy. A TAC is then calculated as the product of this F_{MSY} proxy and the estimate of current abundance.

4.2.2 Results

Distributions of TACs from north of Cape Hatteras DLM analysis are plotted in Figure 22. Quantiles of these distributions for each MP are summarized in Table 9. However two of the methods used in SEDAR 50 (Fdem_ML and YPR_ML produced unreasonably high median TAC estimates (10-20 times as high as the highest catch). The distributions are also extremely wide to the point of being uninformative. Upon further investigation it was determined that this was partly due to conflict between estimates of Z and the input M, resulting in a negative estimate

of F_{recent}. These methods also assume that the population is at equilbrium, which is likely violated given the catch history. Hilborn and Walters (1992) strongly discourage the use of Equation 3 for estimating Z if the population is not at equilibrium. Therefore, these two methods are not recommended for further consideration in this assessment.

To demonstrate the source of the issue with the current application of these two methods, the conflict between estimates of Z and M can be illustrated by substituting data input values into Equation 3

$Z = 0.16(679.01 - 619)/(619 - 533) = 0.11$

and

$Z - M = F = 0.11 - 0.17 = -0.06$

In simulation runs, more than 50% of runs yield negative F_{recent}, which were filtered out by `DLMtool`. When a bootstrapping algorithm results in such a large proportion of invalid results, it is concerning, and may suggest misspecification of inputs or that the method is not appropriate for the stock. Since the single mode of the bootstrap distribution of F_{recent} was negative, the filtered distribution was right skewed with a maximum frequency near zero. These remaining F_{recent} tended to be very low, resulting in very high estimates of B_{current}, resulting in very high TAC estimates. Note that the official `DLMtool` functions applied in this assessment only return the TAC estimates to the user. Intermediate estimates (e.g. F_{recent}, B_{current}) were investigated by creating modified versions of the MPs that returned additional values as a supplementary analysis.

The remaining catch-based MPs produced TAC distributions within the range of observed catches (Figure 23; Table 10).

4.2.3 Discussion

The two MPs ultimately used to inform management in SEDAR 50 (Fdem_ML and YPR_ML) produced similar TAC distributions with modes within the range of distributions of the other MPs (SEDAR 2017, their Figure 61). But these methods did not produce valid results in the current assessment. The reasons for the different results may be due to multiple factors, since both the length data and growth parameters inputs and the `DLMtool` code have changed since SEDAR 50.

The three `DLMtool` methods applied to data for the blueline tilefish north of Cape Hatteras yielded TAC distributions which largely overlapped. A composite distribution of TACs from these three methods (Figure 23; shaded polygon) was centered roughly over the center of the distribution of the average catch method (AvC). The distribution of the CC1 method was shifted to higher TAC values because it is based solely on recent years of catch, which were higher than earlier in the time series. Unfortunately these methods do not describe stock dynamics, or estimate population size, current status, or trends. They simply resample from catches that have occurred in recent decades since exploitation increased. The catch time series developed for the `DLMtool` analysis shows substantial variability between years, but a general linear increase in catch since 2002 of approximately 25 thousand lb per year (Figure 19). Thus while these methods summarize catch data over different periods of time, there is no available information to indicate that recent levels of catch can be sustained.

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4.4 Tables

Table 1. Observed time series of removals (L = landings, D = dead discards) by fleet (c = commercial, r = recreational), and summed across fleets (Total), south of Cape Hatteras. All values are in units of 1000 lb whole weight.

Year	L_c	L_r	D_c	D_r	Total
1958	0.191	0.000	0.000	0.000	0.191
1959	0.099	0.000	0.000	0.000	0.099
1960	0.000	0.000	0.000	0.000	0.000
1961	0.000	0.000	0.000	0.000	0.000
1962	0.734	0.000	0.000	0.000	0.734
1963	0.727	0.000	0.000	0.000	0.727
1964	0.107	0.000	0.000	0.000	0.107
1965	5.520	0.000	0.000	0.000	5.520
1966	1.032	0.000	0.000	0.000	1.032
1967	2.431	0.000	0.000	0.000	2.431
1968	1.134	0.000	0.000	0.000	1.134
1969	0.802	0.000	0.000	0.000	0.802
1970	2.164	0.000	0.000	0.000	2.164
1971	4.307	0.000	0.000	0.000	4.307
1972	2.552	0.000	0.000	0.000	2.552
1973	10.974	0.000	0.000	0.000	10.974
1974	25.949	0.000	0.000	0.000	25.949
1975	44.836	0.000	0.000	0.000	44.836
1976	44.382	0.000	0.000	0.000	44.382
1977	30.911	0.000	0.000	0.000	30.911
1978	71.084	0.000	0.000	0.000	71.084
1979	58.622	0.000	0.000	0.000	58.622
1980	144.486	0.000	0.000	0.000	144.486
1981	410.068	7.256	0.000	0.000	417.324
1982	1057.417	37.086	0.000	0.000	1094.503
1983	539.528	13.404	0.000	0.000	552.932
1984	409.166	77.582	0.000	0.000	486.748
1985	315.644	2.596	0.000	0.000	318.240
1986	243.436	2.179	0.000	0.000	245.615
1987	115.375	4.705	0.000	0.000	120.080
1988	91.432	1.201	0.000	0.000	92.633
1989	96.977	0.432	0.000	0.000	97.409
1990	138.129	0.757	0.000	0.000	138.886
1991	181.123	0.802	0.000	15.356	197.281
1992	204.080	2.782	0.000	1.946	208.808
1993	176.976	21.996	1.633	0.000	200.605
1994	147.191	0.146	1.776	0.000	149.113
1995	140.052	12.308	1.825	0.000	154.185
1996	111.085	11.676	1.816	0.000	124.577
1997	161.408	0.350	2.238	0.000	163.996

Table 1. (continued)

Year	L_c	L_r	D_c	D_r	Total
1998	88.411	0.259	1.755	0.023	90.448
1999	82.743	1.880	1.522	4.082	90.227
2000	91.954	0.323	1.032	0.085	93.394
2001	107.186	1.054	1.353	0.000	109.593
2002	84.858	9.483	1.268	1.424	97.033
2003	75.236	52.319	1.298	12.764	141.617
2004	57.859	17.489	1.245	0.199	76.793
2005	58.493	7.949	1.254	10.844	78.540
2006	65.885	14.341	1.366	0.002	81.595
2007	41.964	13.157	1.621	0.764	57.506
2008	35.374	31.511	1.329	0.009	68.223
2009	47.440	56.420	1.790	6.193	111.843
2010	65.418	76.913	1.388	0.067	143.786
2011	9.151	9.949	0.923	0.034	20.058
2012	23.068	134.967	1.015	1.158	160.207
2013	70.280	336.345	1.305	14.850	422.781
2014	90.098	77.934	1.091	20.558	189.681
2015	51.633	57.956	0.642	16.089	126.320
2016	56.907	42.425	1.271	6.219	106.822
2017	67.144	112.374	1.460	21.058	202.036
2018	66.146	89.900	1.542	4.065	161.653
2019	62.536	45.563	1.392	0.007	109.498
2020	48.799	114.045	1.288	4.635	168.768
2021	40.852	45.807	1.135	5.228	93.022
2022	38.693	38.819	1.466	0.525	79.503
2023	35.648	102.755	0.879	0.433	139.715

Table 2. Observed indices of abundance (U) and CVs from commercial handline (cHL) and commercial longline (cLL).

Year	U_{cHL}	U_{cLL}	CV_{cHL}	CV_{cLL}
1993	0.925	1.388	0.117	0.270
1994	0.783	0.673	0.087	0.282
1995	0.753	1.354	0.095	0.333
1996	0.992	0.512	0.074	0.355
1997	1.106	1.064	0.064	0.257
1998	0.751	0.595	0.081	0.314
1999	0.735	0.796	0.070	0.294
2000	0.819	0.460	0.073	0.303
2001	1.086	0.566	0.074	0.304
2002	0.908	2.468	0.075	0.255
2003	0.946	0.903	0.084	0.292
2004	0.965	0.659	0.092	0.347
2005	1.089	1.431	0.095	0.330
2006	1.681	1.132	0.090	0.459
2007	1.460	.	0.081	.

Table 3. Parameter estimates from selected ASPIC surplus production model runs. B_{MSY}, $MSST$, and MSY are in units of 1000 pounds. Lik_{total} = total likelihood. The numerator in F/F_{MSY} is the geometric mean F from the last three years of the assessment (2021-2023) and the numerator in B/B_{MSY} is biomass in the terminal year of the assessment (2023). HL = handline, LL = longline

Run	RunName	F/F_{MSY}	B/B_{MSY}	$B/MSST$	B_{MSY}	$MSST$	MSY	F_{MSY}	Lik_{total}
2	HL	0.3746	1.299	1.732	1459	1094.0	216.0	0.1480	3.573
3	LL	0.2177	1.706	2.275	1214	910.7	278.6	0.2294	12.140
6	HLLL	0.3574	1.334	1.778	1438	1078.0	220.4	0.1533	16.030

Table 4. Estimated status indicators, benchmarks, and related quantities from ASPIC, averaged between the handline and longline models for the Atlantic south of Cape Hatteras. Also presented are median values and measures of precision (standard errors, SE) from the bootstrap analysis. Rate estimates (F) are in units of y^{-1}; status indicators are dimensionless; and biomass estimates are in units of 1000 pounds, as indicated.

Quantity	Units	Estimate	Median	SE
F_{MSY}	y^{-1}	0.189	0.178	0.099
$85\%F_{\mathrm{MSY}}$	y^{-1}	0.160	0.151	0.084
$75\%F_{\mathrm{MSY}}$	y^{-1}	0.142	0.134	0.074
$65\%F_{\mathrm{MSY}}$	y^{-1}	0.123	0.116	0.064
B_{MSY}	1000 lb	1337	1352	307
MSST	1000 lb	1003	1014	230
MSY	1000 lb	247	242	60
$L_{85\%\mathrm{MSY}}$	1000 lb	242	236	58
$L_{75\%\mathrm{MSY}}$	1000 lb	232	226	56
$L_{65\%\mathrm{MSY}}$	1000 lb	217	212	52
$F_{2021-2023}/F_{\mathrm{MSY}}$	—	0.28	0.29	1.00
B_{2023}/MSST	—	1.98	2.03	0.48
$B_{2023}/B_{\mathrm{MSY}}$	—	1.48	1.52	0.36

Table 5. Projection results with fishing mortality fixed at $F = F_{P^*_{30\%}}$ starting in 2026 . For years prior to 2026 , $F = F_{\text{current}}$. F = fishing mortality rate (per year), $P(B > B_{\text{MSY}})$ = proportion of stochastic projection replicates exceeding B_{MSY}, $P(B > \text{MSST})$ = proportion of stochastic projection replicates exceeding MSST*, B_{median} = median biomass (1000 lbs) estimate among projections, B = deterministic biomass (1000 lbs) estimate, Y = deterministic yield (1000 lbs) estimate, Sum Y = cumulative sum of deterministic yield (1000 lbs). Yield includes landings and dead discards. Note that observed dead discards were 7, 3 and 1% of total removals from 2021 to 2023 respectively.*

Year	F(per yr)	$P(B > B_{\text{MSY}})$	$P(B > \text{MSST})$	B_{median}	B	Y	Sum Y
2024	0.053	0.92	0.96	1995	2011	108	108
2025	0.053	0.94	0.97	2037	2083	112	220
2026	0.138	0.95	0.97	2078	2139	287	506
2027	0.138	0.95	0.97	1961	2027	273	780
2028	0.138	0.93	0.97	1883	1946	264	1044
2029		0.92	0.96	1825	1887		

Table 6. Observed time series of removals (L = landings, D = dead discards) by fleet (c = commercial, r = recreational), and summed across fleets (Total), north of Cape Hatteras. All values are in units of 1000 lb whole weight.

Year	L_c	L_r	D_c	D_r	Total
1958	0.175	0.000	0.000	0.000	0.175
1959	0.176	0.000	0.000	0.000	0.176
1960	0.000	0.000	0.000	0.000	0.000
1961	0.000	0.000	0.000	0.000	0.000
1962	0.353	0.000	0.000	0.000	0.353
1963	0.177	0.000	0.000	0.000	0.177
1964	0.619	0.000	0.000	0.000	0.619
1965	0.000	0.000	0.000	0.000	0.000
1966	0.000	0.000	0.000	0.000	0.000
1967	0.000	0.000	0.000	0.000	0.000
1968	0.000	0.000	0.000	0.000	0.000
1969	0.000	0.000	0.000	0.000	0.000
1970	0.000	0.000	0.000	0.000	0.000
1971	0.000	0.000	0.000	0.000	0.000
1972	0.000	0.000	0.000	0.000	0.000
1973	0.000	0.000	0.000	0.000	0.000
1974	0.000	0.000	0.000	0.000	0.000
1975	0.000	0.000	0.000	0.000	0.000
1976	0.000	0.000	0.000	0.000	0.000
1977	0.000	0.000	0.000	0.000	0.000
1978	31.483	0.000	0.000	0.000	31.483
1979	9.936	0.000	0.000	0.000	9.936
1980	10.618	0.000	0.000	0.000	10.618
1981	25.395	0.000	0.000	0.000	25.395
1982	25.205	9.644	0.000	0.000	34.849
1983	31.734	0.000	0.000	0.000	31.734
1984	42.095	0.000	0.000	0.000	42.095
1985	21.218	0.000	0.000	0.000	21.218
1986	20.804	0.000	0.000	0.000	20.804
1987	26.229	10.471	0.000	0.000	36.700
1988	29.705	0.000	0.000	0.000	29.705
1989	28.191	1.715	0.000	0.000	29.906
1990	43.350	0.000	0.000	0.000	43.350
1991	62.660	0.000	0.000	0.000	62.660
1992	77.369	0.000	0.000	0.000	77.369
1993	39.473	0.000	0.171	0.000	39.644
1994	42.349	0.000	0.211	0.000	42.560
1995	31.013	0.000	0.113	0.000	31.126
1996	37.149	1.270	0.329	0.000	38.748
1997	58.391	9.471	0.406	0.000	68.268

Table 6. (continued)

Year	L_c	L_r	D_c	D_r	Total
1998	19.367	0.000	0.150	0.000	19.517
1999	33.391	0.000	0.149	0.000	33.540
2000	20.444	0.000	0.104	0.000	20.548
2001	20.601	24.039	0.200	0.000	44.840
2002	178.084	0.000	0.232	0.012	178.328
2003	43.988	5.875	0.176	0.680	50.719
2004	18.999	1.134	0.066	0.000	20.200
2005	25.483	10.122	0.089	3.849	39.543
2006	107.228	321.264	0.133	3.600	432.225
2007	43.806	395.038	0.193	147.075	586.112
2008	376.992	389.623	0.212	0.000	766.827
2009	427.642	176.947	0.165	0.399	605.154
2010	372.837	71.301	0.070	7.476	451.684
2011	132.629	54.757	0.010	2.385	189.781
2012	341.838	118.195	0.063	15.272	475.367
2013	223.017	96.279	0.087	0.708	320.091
2014	267.443	155.130	0.066	1.104	423.743
2015	95.320	117.043	0.015	1.254	213.632
2016	67.805	873.710	0.106	108.991	1050.613
2017	34.778	243.066	0.192	0.731	278.766
2018	40.064	199.606	3.395	11.533	254.599
2019	63.886	182.491	12.307	1.624	260.308
2020	100.864	797.699	7.824	4.714	911.101
2021	105.434	490.870	3.737	45.817	645.858
2022	99.982	482.058	7.039	105.812	694.891
2023	112.958	761.869	3.098	9.214	887.139

Table 7. Data inputs required by each DLMtool management procedure (MP). Row names represent the names of DLMtool Data object slots. Column names represent the names of DLMtool MPS. Descriptions of each input are provided in Table 8

	AvC	CC1	CC4	Fdem_ML	YPR_ML
Cat	X	X	X	X	X
CV_Cat		X	X	X	X
CV_LFS					X
CV_Mort				X	X
CV_steep				X	
CV_vbK				X	X
CV_vbLinf				X	X
CV_vbt0				X	X
L50				X	
Lbar				X	X
Lc				X	X
LFS					X
LHYear	X	X	X		
MaxAge				X	X
Mort				X	X
steep				X	
vbK				X	X
vbLinf				X	X
vbt0				X	X
wla				X	
wlb				X	
Year	X	X	X		

Table 8. Descriptions of slots in DLMtool Data objects used by MPs applied in the current analysis. Reprinted from MSEtool::DataDescription table for slots used in the MPs selected.

Slot	Description
Cat	Total annual catches. Matrix of nsim rows and nyears columns. Non-negative real numbers
CV_Cat	Coefficient of variation in annual catches. Matrix nsim rows and either 1 or nyear columns. Positive real numbers. Note: built-in MPs use only the first value of CV_Cat for all years.
CV_LFS	Coefficient of variation in length at full selection. Vector nsim long. Positive real numbers
CV_Mort	Coefficient of variation in natural mortality rate. Vector nsim long. Positive real numbers
CV_steep	Coefficient of variation in steepness. Vector nsim long. Positive real numbers
CV_vbK	Coefficient of variation in the von Bertalanffy K parameter. Vector nsim long. Positive real numbers
CV_vbLinf	Coefficient of variation in maximum length. Vector nsim long. Positive real numbers
CV_vbt0	Coefficient of variation in age at length zero. Vector nsim long. Positive real numbers
L50	Length at 50 percent maturity. Vector nsim long. Positive real numbers
Lbar	Mean length of catches over Lc. Matrix of nsim rows and nyears columns. Positive real numbers
Lc	Modal length of catches. Matrix of nsim rows and nyears columns. Positive real numbers
LFS	Shortest length at full selection. Vector nsim long. Positive real numbers
LHYear	The last historical year of the simulation (before projection). Single value. Positive integer
MaxAge	Maximum age. Vector nsim long. Positive integer
Mort	Natural mortality rate. Vector nsim long. Positive real numbers
steep	Steepness of stock-recruitment relationship. Vector nsim long. Value in the range of one-fifth to 1
vbK	The von Bertalanffy growth coefficient K. Vector nsim long. Positive real numbers
vbLinf	Maximum length. Vector nsim long. Positive real numbers
vbt0	Theoretical age at length zero. Vector nsim long. Non-positive real numbers
wla	Weight-Length parameter alpha. Vector nsim long. Positive real numbers
wlb	Weight-Length parameter beta. Vector nsim long. Positive real numbers
Year	Years that corresponding to catch and relative abundance data. Vector nyears long. Positive integer

Table 9. Quantiles of TAC (total allowable catch) distributions from all `DLMtool` management procedures applied north of Cape Hatteras. Column names AvC, CC1, CC4, Fdem_ML, and YPR_ML are abbreviations for management procedures defined in the main text

Quantile	AvC	CC1	CC4	Fdem_ML	YPR_ML
2.5%	309	380	260	983	1941
5%	327	406	277	1649	2549
10%	353	448	307	2713	3507
25%	390	535	365	6890	6162
50%	449	646	443	16010	13099
75%	511	794	549	37087	33267
90%	584	963	672	69270	92846
95%	628	1099	739	90836	179223
97.5%	674	1216	810	119478	312380

Table 10. Quantiles of TAC (total allowable catch) distributions from select `DLMtool` *management procedures applied north of Cape Hatteras. Column names AvC, CC1, and CC4 are abbreviations for management procedures defined in the main text. Values in the TOTAL column are computed from a distribution combining the results of all management procedures in this table.*

Quantile	AvC	CC1	CC4	TOTAL
2.5%	309	380	260	290
5%	327	406	277	315
10%	353	448	307	350
25%	390	535	365	405
50%	449	646	443	495
75%	511	794	549	622
90%	584	963	672	785
95%	628	1099	739	898
97.5%	674	1216	810	1033

4.5 Figures

Figure 1. Map of potential Blueline Tilefish habitat in the Atlantic, divided into major regions, from the southern SAFMC boundary (near Key West) north through the Mid-Atlantic. Potential habitat was defined based on the depth range (73-183 m; 40-100 fathoms) that Blueline Tilefish are found in. The sizes of the potential habitat area within each major region are (km^2 units): 0. FL south of Cape Canaveral = 4,394; 1. FL north of Cape Canaveral = 1763; 2. GA = 1,020; 3. SC = 3,999; 4. NC south of Cape Hatteras = 1,274; NC north of Cape Hatteras = 984; 6. Mid-Atlantic (north of Cape Hatteras)=32,060.

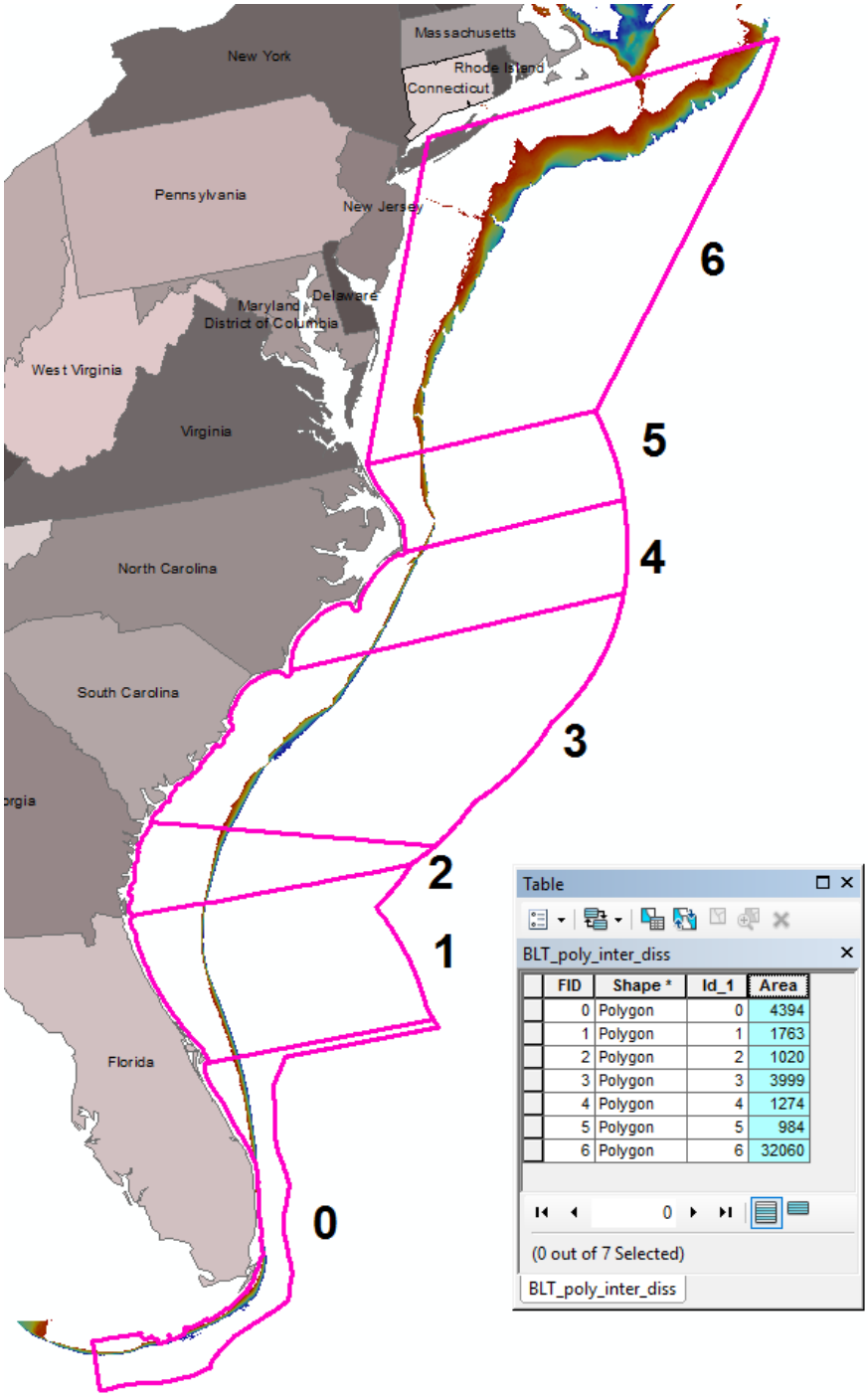


Figure 2. Atlantic removals by aggregated area, from the southern SAFMC boundary (near Key West) north through the Mid-Atlantic. Removals include commercial and recreational landings and dead discards. They are aggregated here into the smallest common areas that most of the removals could be aggregated into. The proportion of total removals for all years combined, from each area, is presented in the legend in parentheses next to the name of the area.

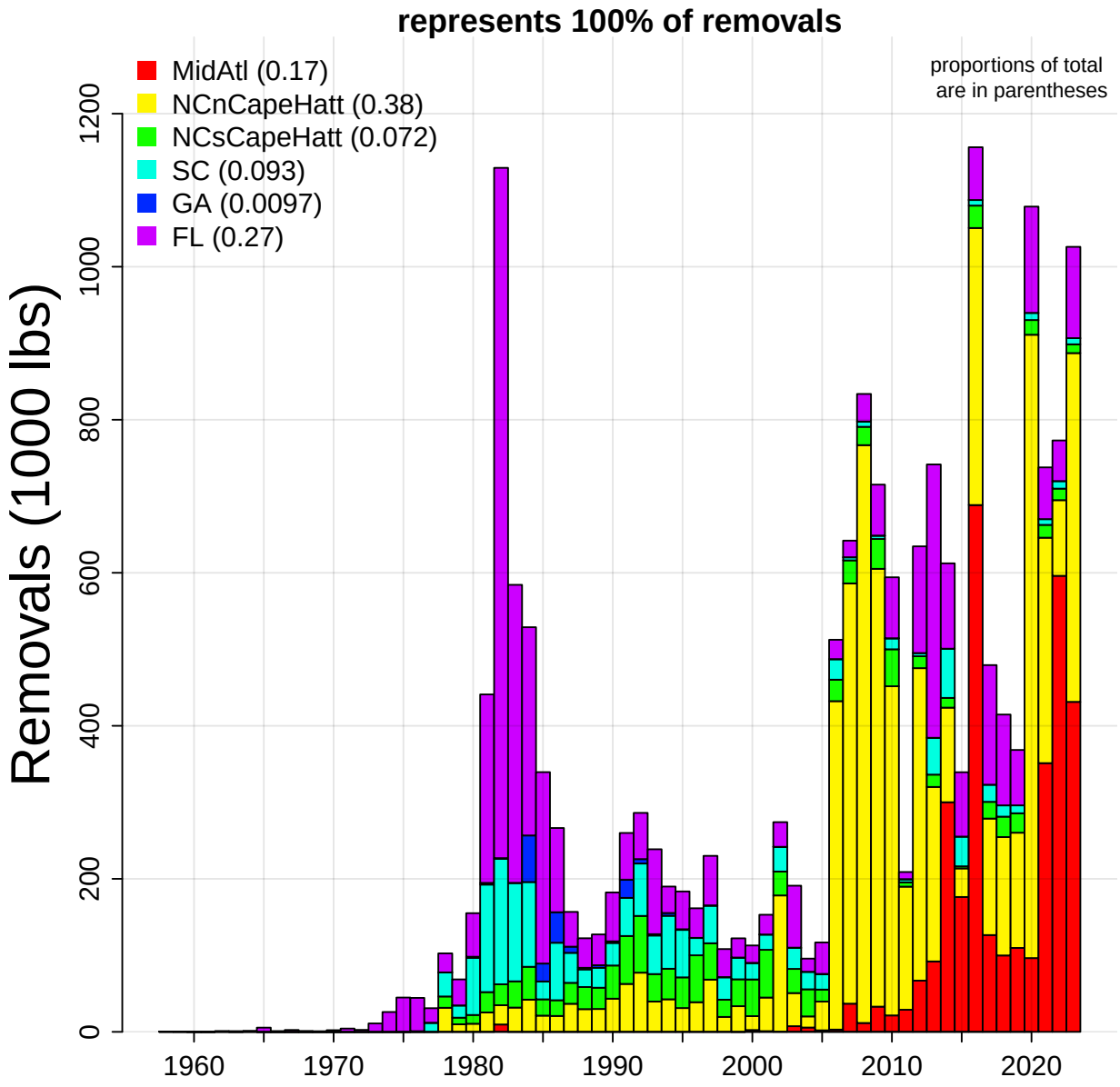


Figure 3. All Atlantic removals by fleet, from the southern SAFMC boundary (near Key West) north through the Mid-Atlantic. The proportion of total removals for all years combined, from each area, is presented in the legend in parentheses next to the name of the area. Land = landings, Disc = dead discards, Com = commercial, Rec = recreational.

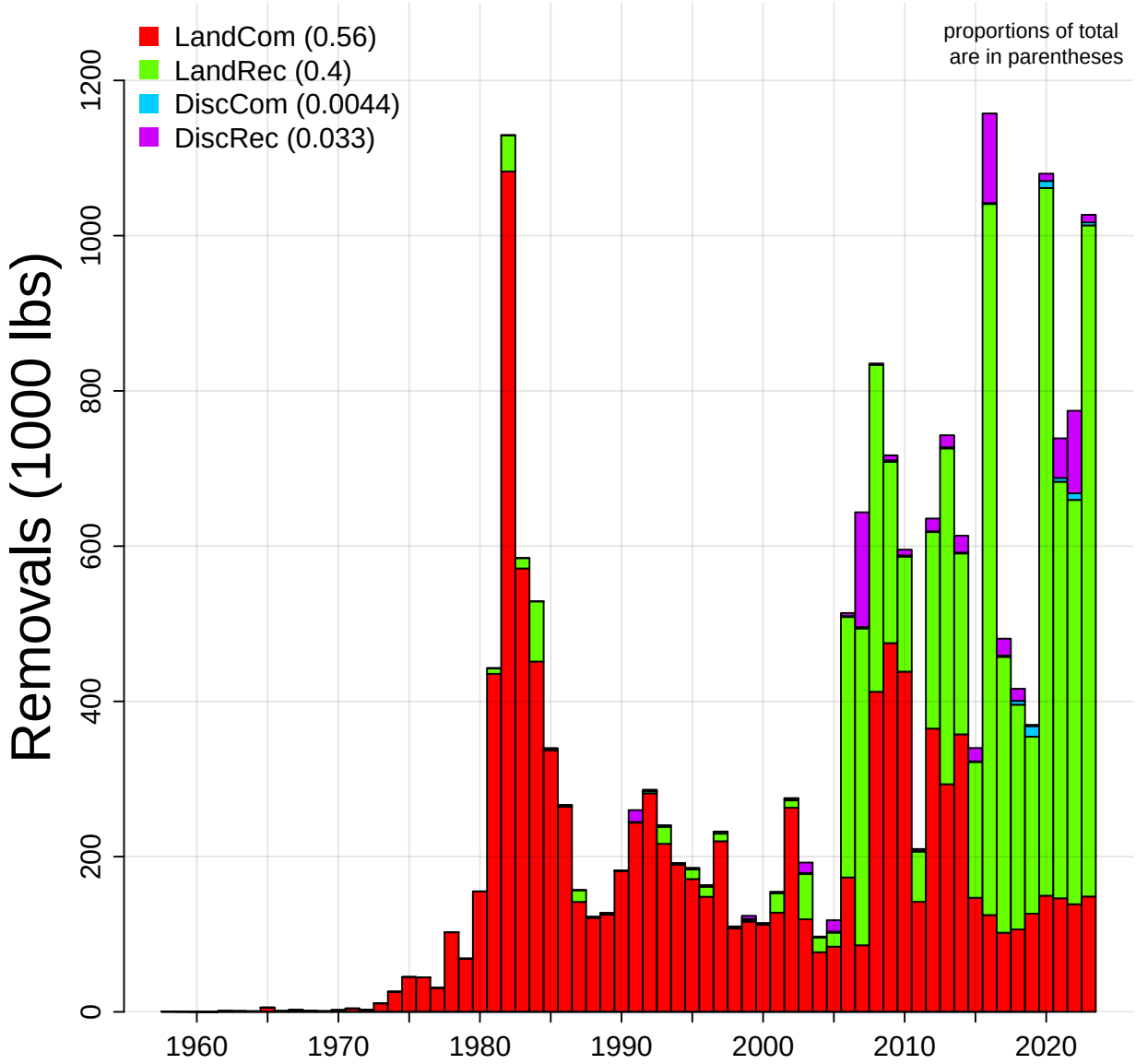


Figure 4. Removals from Cape Hatteras south to the southern SAFMC boundary (near Key West), by aggregated area, supplied to the ASPIC models. Removals include commercial and recreational landings and dead discards. They are aggregated here into the smallest common areas that most of the removals could be aggregated into. The proportion of total removals per square km for all years combined, from each area, is presented in the legend in parentheses next to the name of the area.

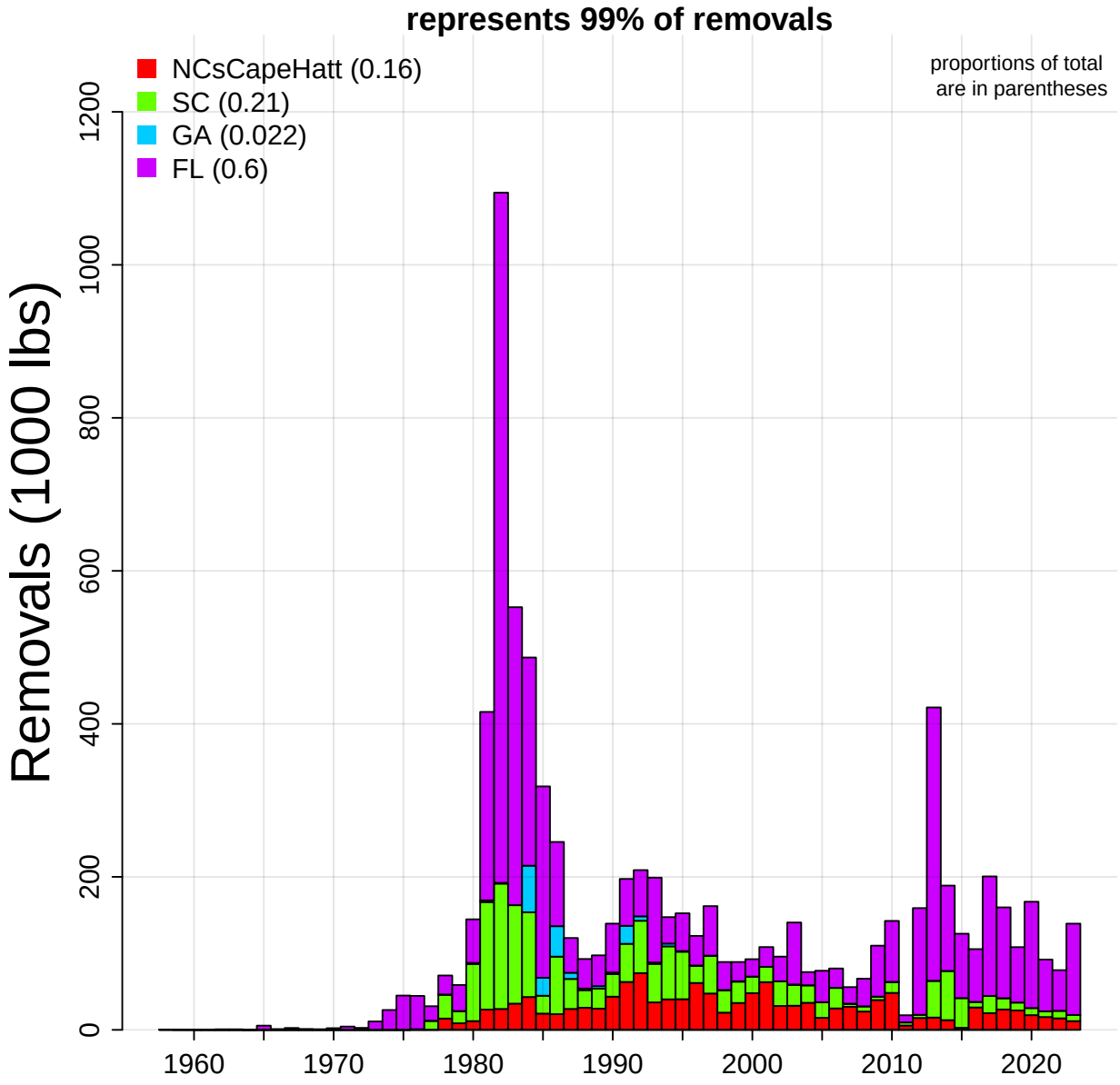


Figure 5. Removals south of Cape Hatteras, by fleet, supplied to the ASPIC models. The proportion of total removals for all years combined, from each area, is presented in the legend in parentheses next to the name of the area. Land = landings, Disc = dead discards, Com = commercial, Rec = recreational.

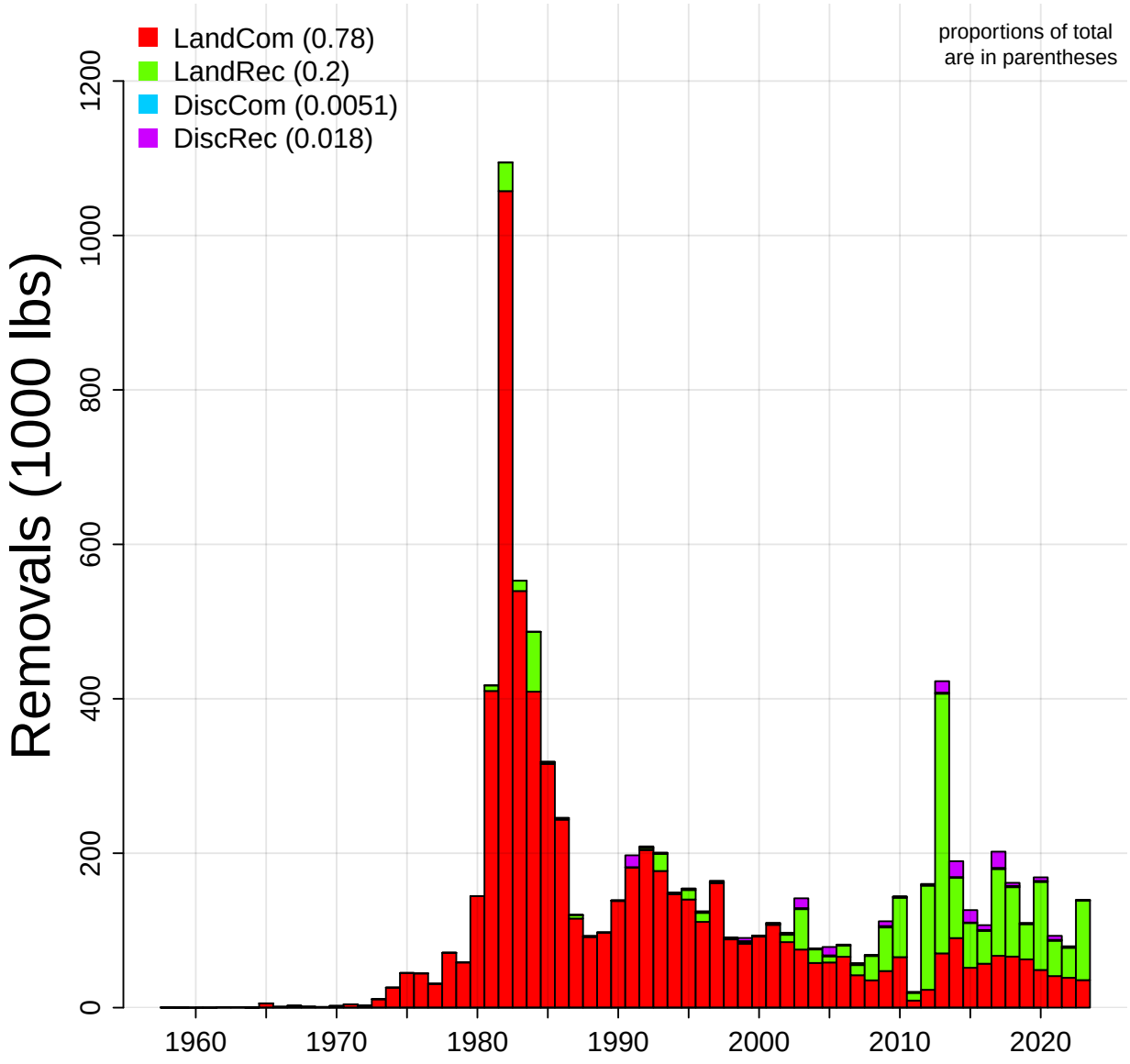


Figure 6. Indices of abundance and error bands used in fitting the ASPIC models for the So. Atl., including the commercial handline index (ComHL) and commercial longline index (ComHL). Shaded areas represent ±2 standard errors (SE) for each year of each index, calculated from annual CVs.

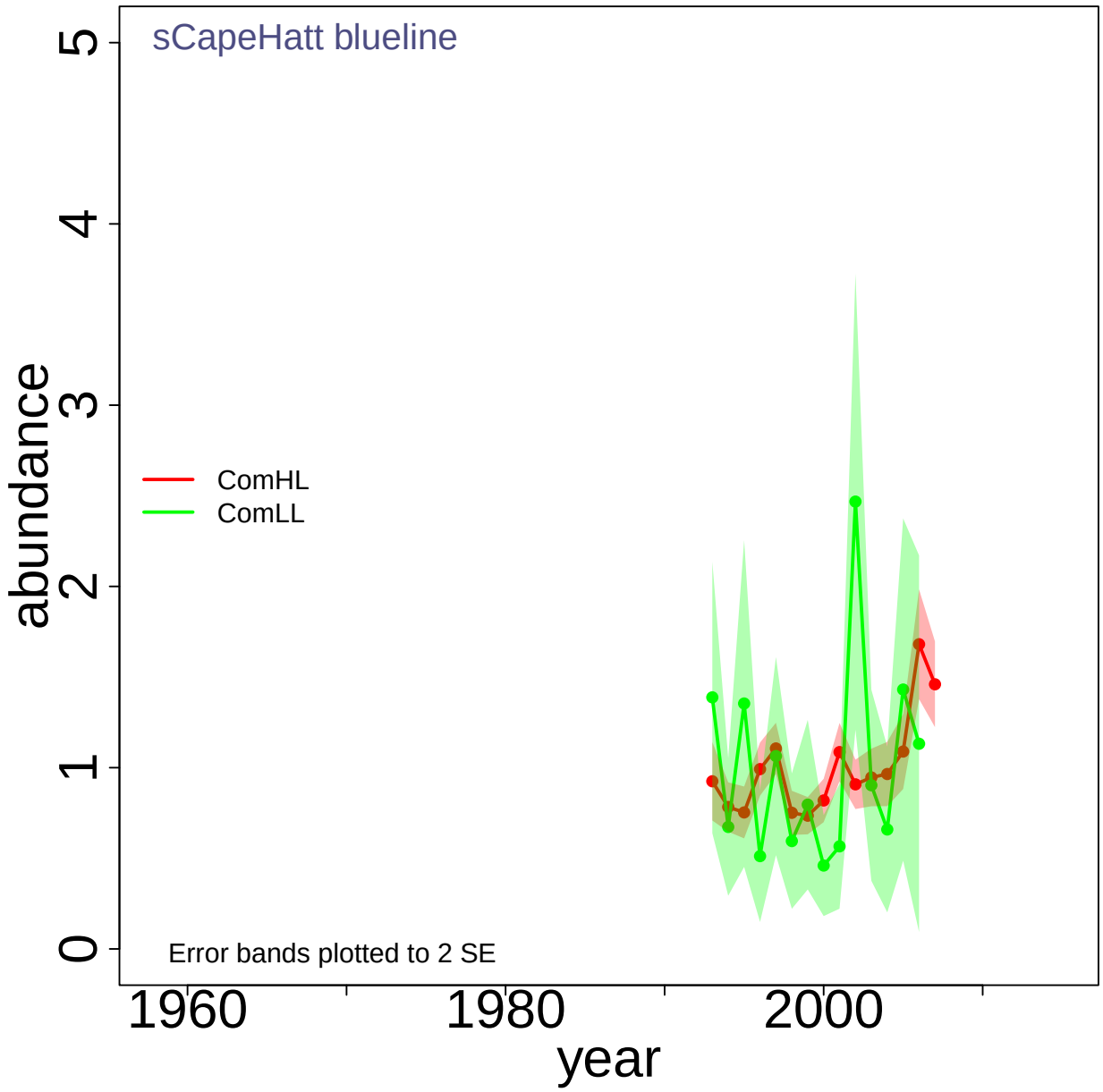


Figure 7. ASPIC handline model (Run 02) for the So. Atl. Fits to indices (upper panel) and B and F ratio plots (lower panel) for ASPIC Run 02. Note that the last year plotted in the B/B_{MSY} series is a one year projection (2016) while the last year of the F/F_{MSY} series is the terminal year of the assessment (2023). The B and F trends plotted here were not used directly to make status determinations, but are shown to enable comparisons with the sensitivity runs.

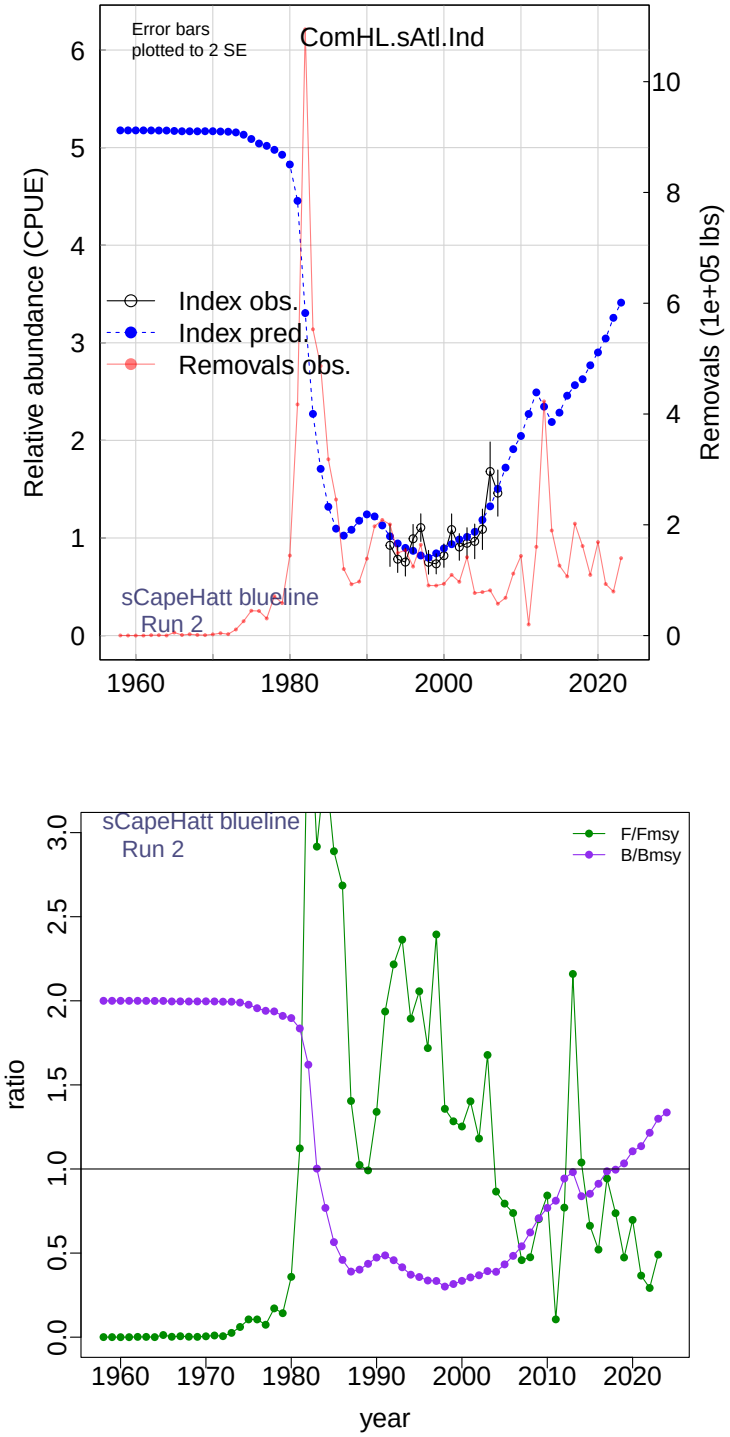


Figure 8. ASPIC longline model (Run 03) for the So. Atl. Fits to indices (upper panel) and B and F ratio plots (lower panel) for ASPIC Run 03. Note that the last year plotted in the B/B_{MSY} series is a one year projection (2016) while the last year of the F/F_{MSY} series is the terminal year of the assessment (2023). The B and F trends plotted here were not used directly to make status determinations, but are shown to enable comparisons with the sensitivity runs.

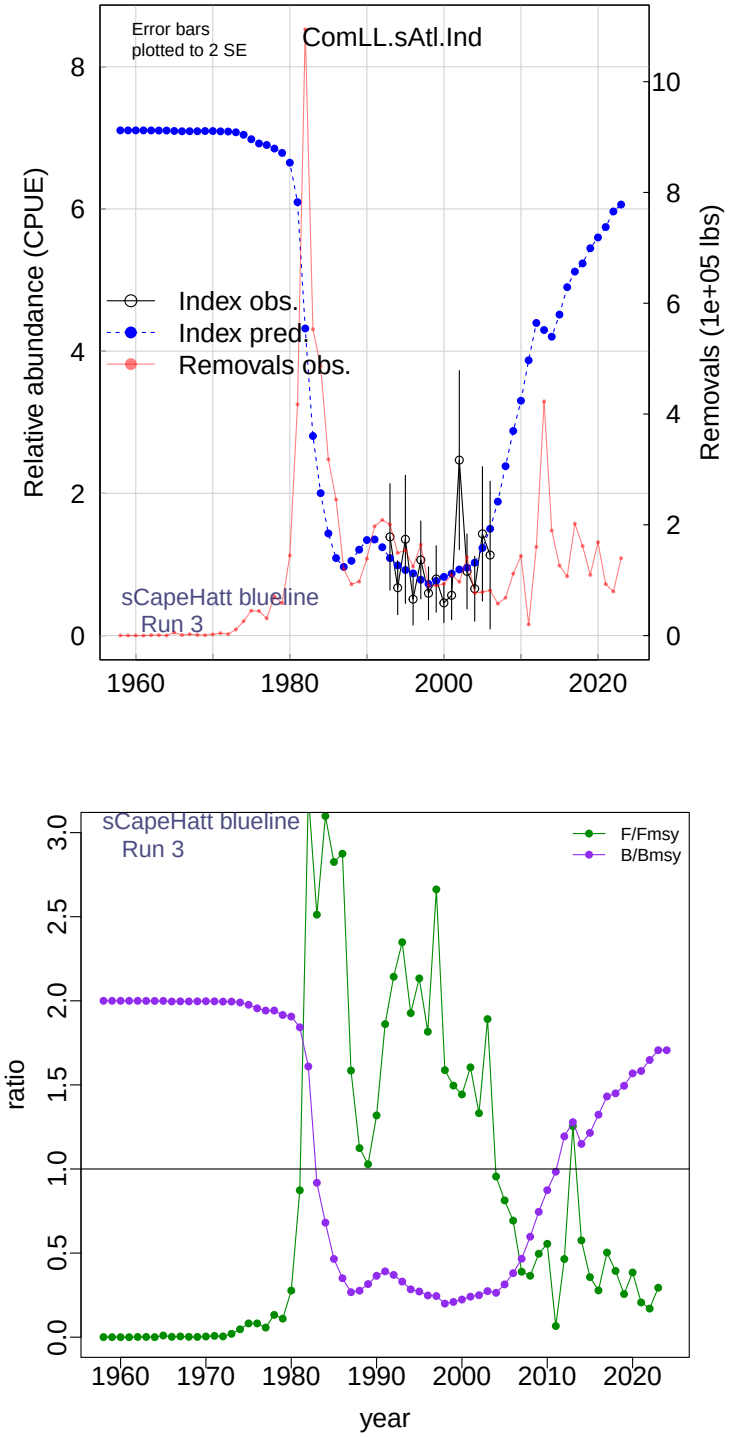


Figure 9. Estimated biomass series (B) combining Runs 02 and 03 from ASPIC for the So. Atl. Solid line indicates average B series for handline and longline models. The jagged dashed line represents the median B and blue error bands indicate 5^{th} and 95^{th} percentiles of the combined bootstrap trials. Horizontal dashed and dotted lines indicate average B_{MSY} and MSST *for combined handline and longline models.*

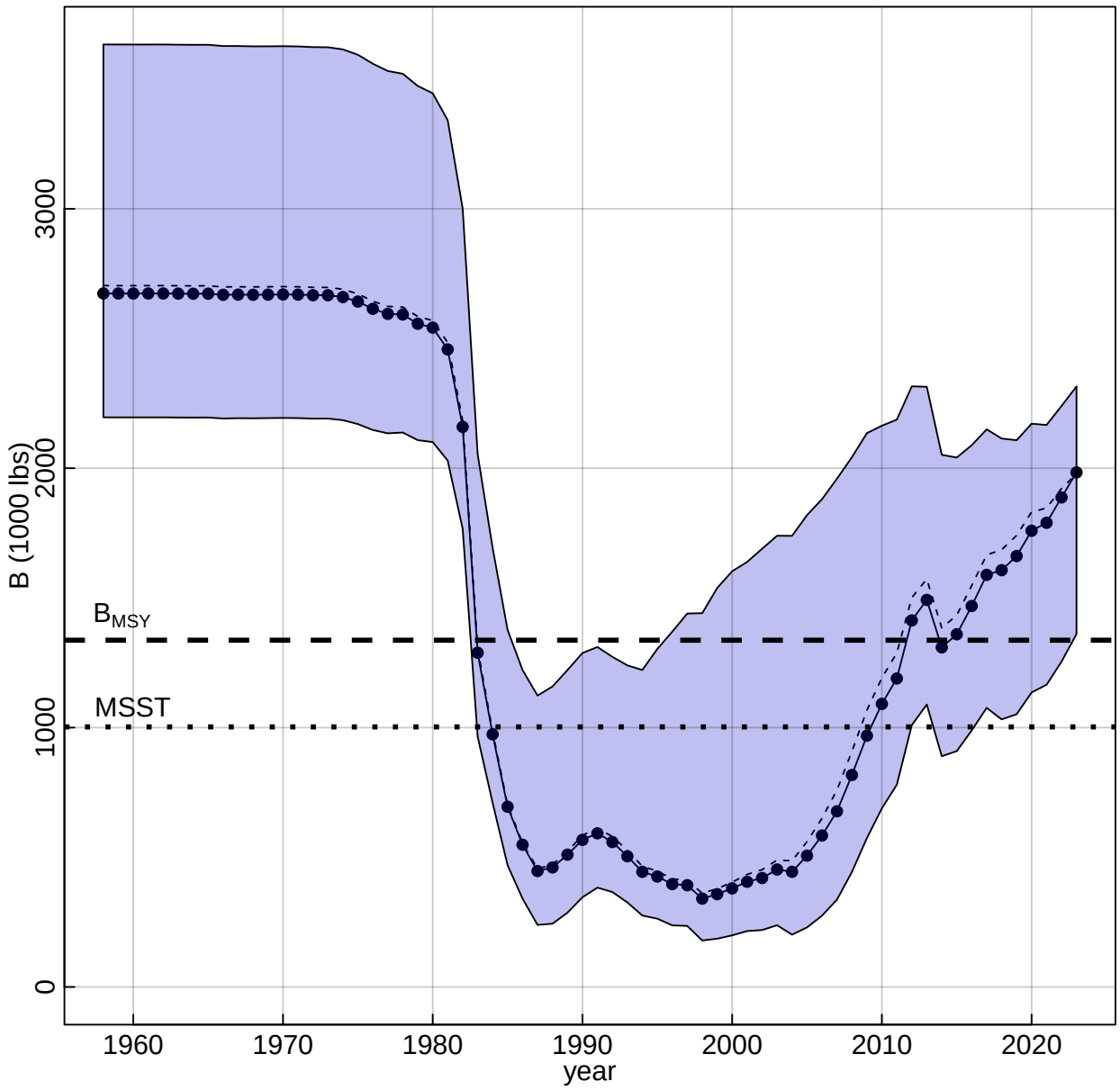


Figure 10. Estimated fishing mortality series (F) combining Runs 02 and 03 from ASPIC for the So. Atl. Solid line indicates average F series for handline and longline models. The jagged dashed line represents the median F and blue error bands indicate 5^{th} and 95^{th} percentiles of the combined bootstrap trials. Horizontal dashed and dotted lines indicate average F_{MSY} and $F_{2021-2023}$ (F_{current}; geometric mean F from 2021-2023) for handline and longline models

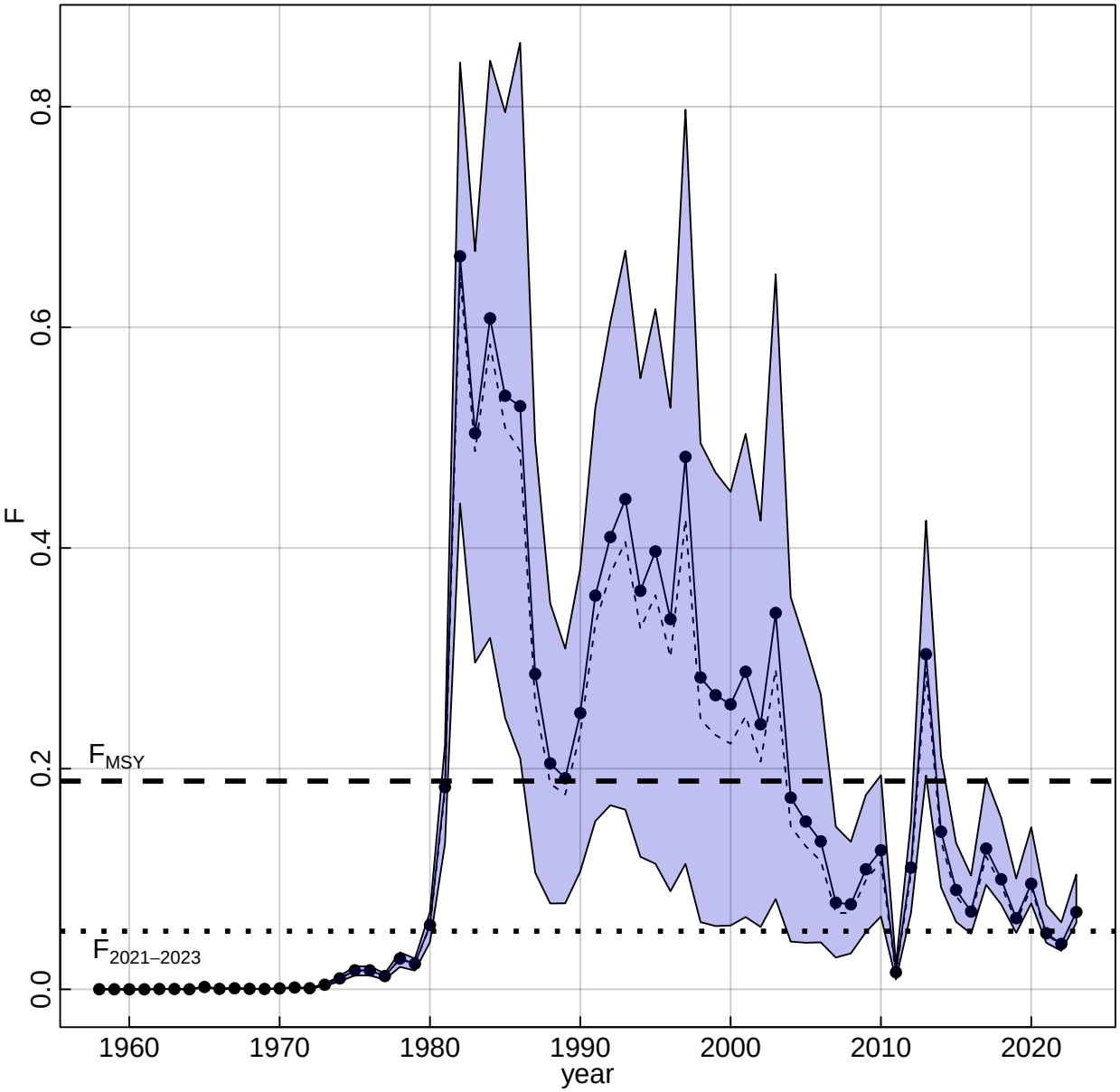


Figure 11. Distributions of ASPIC parameter estimates for combined bootstrap runs associated with both base runs (Run 02 and 03) for the So. Atl.. Bootstrapping was conducted for each model separately, then the resulting bootstrap results were merged to create composite distributions. Note however that the estimates from this assessment (plotted here as thick vertical orange lines) represent mean values from Runs 02 and 03. Dotted lines represent 5^{th} and 95^{th} percentiles, dashed line represents the median of the bootstrap runs.

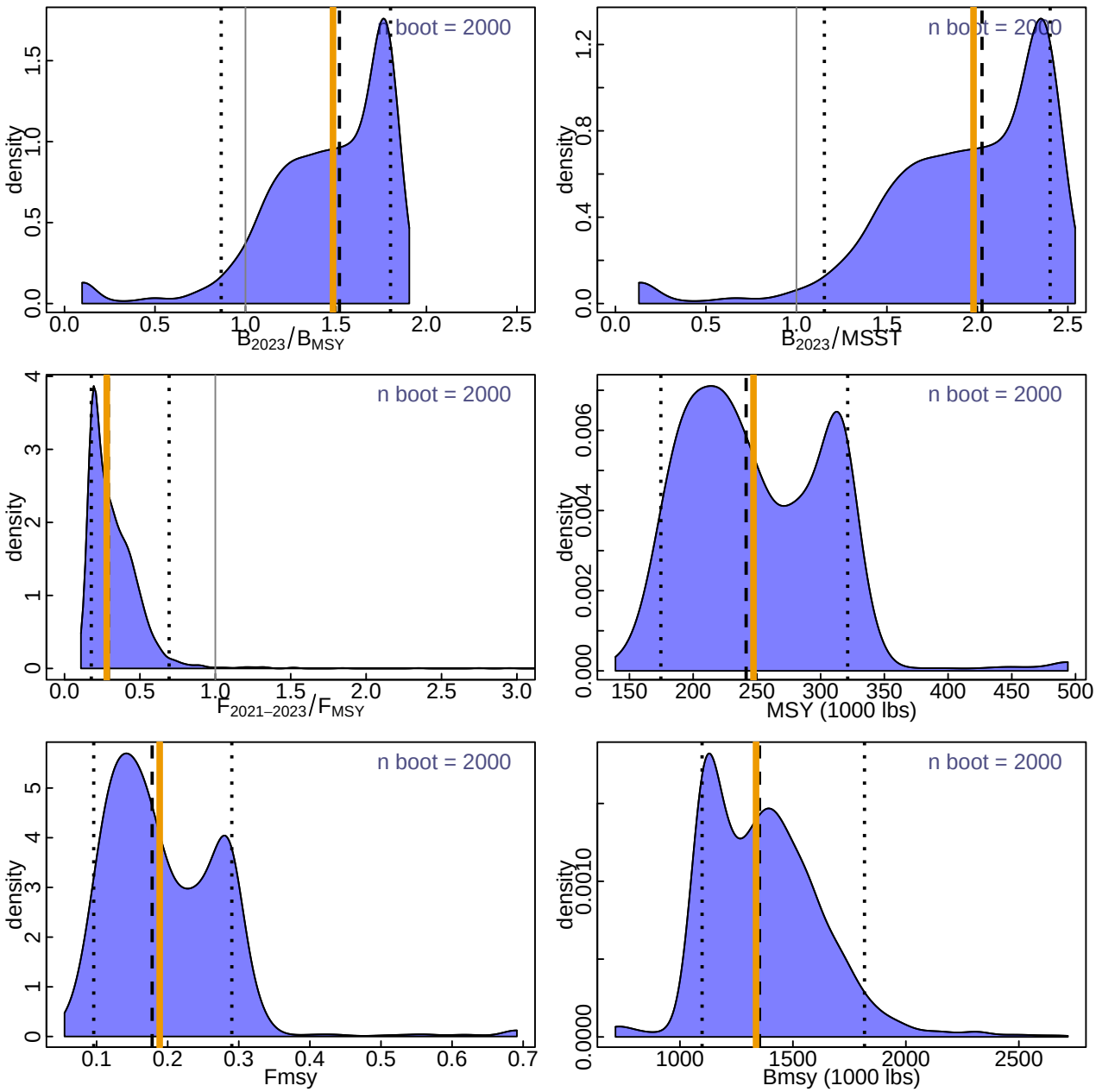


Figure 12. Estimated biomass series (B) relative to MSST *combining Runs 02 and 03 from* ASPIC *for the So. Atl. Solid line indicates average B series relative to average* MSST *(*$0.75B_{\mathrm{MSY}}$*), for handline and longline models. The dashed line represents the median B/*MSST *and blue error bands indicate* 5^{th} *and* 95^{th} *percentiles of the combined bootstrap trials.*

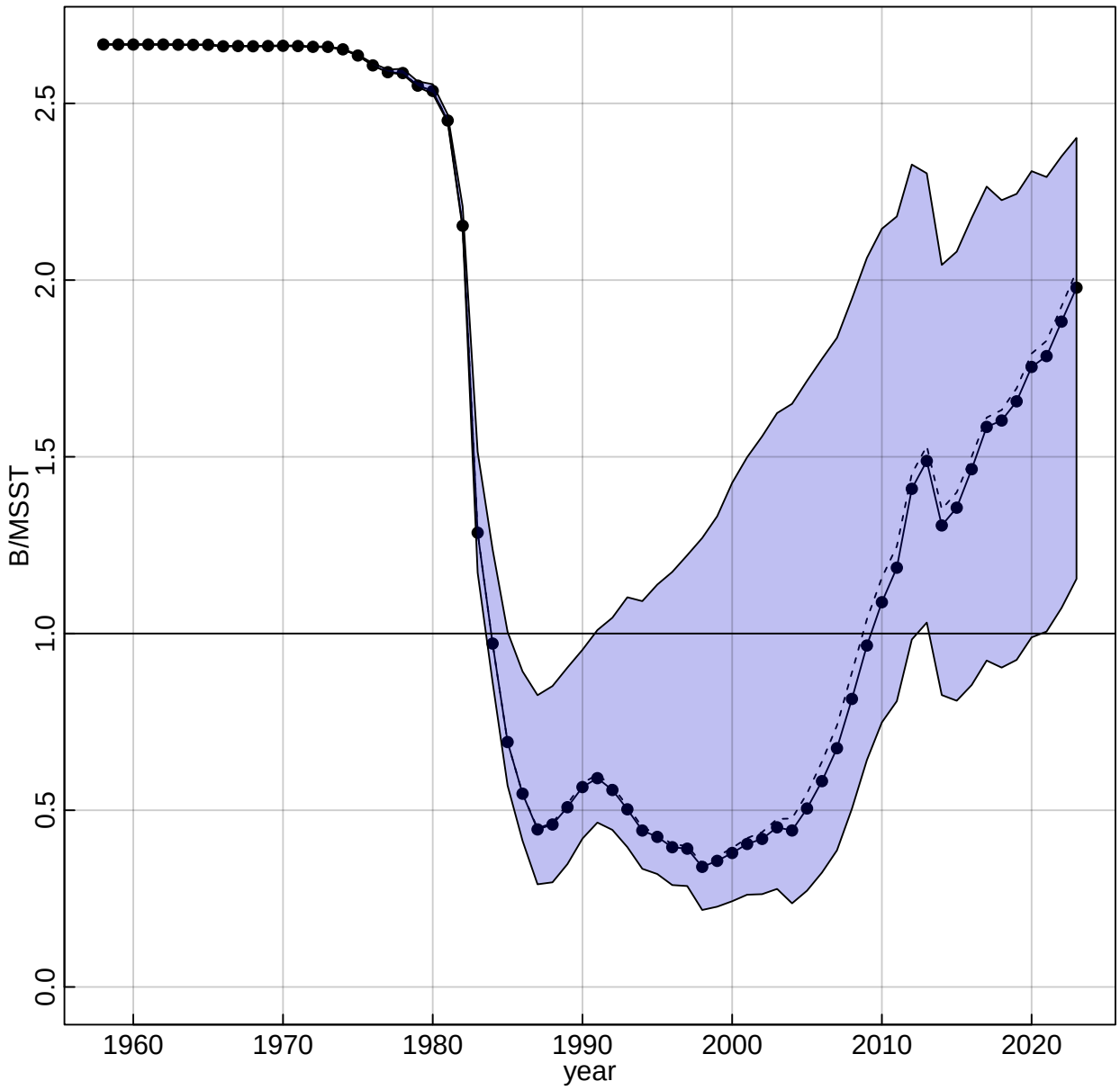


Figure 13. Phase plots of ASPIC F and B status estimates for combined bootstrap runs associated with both base runs (Run 02 and 03) from ASPIC for the So. Atl. Bootstrapping was conducted for each model separately, then the resulting bootstrap results were added together to create composite distributions. The intersection of crosshairs indicates average estimate from the base runs; lengths of crosshairs defined by 5^{th} and 95^{th} percentiles. Percent of runs falling in each quadrant indicated.

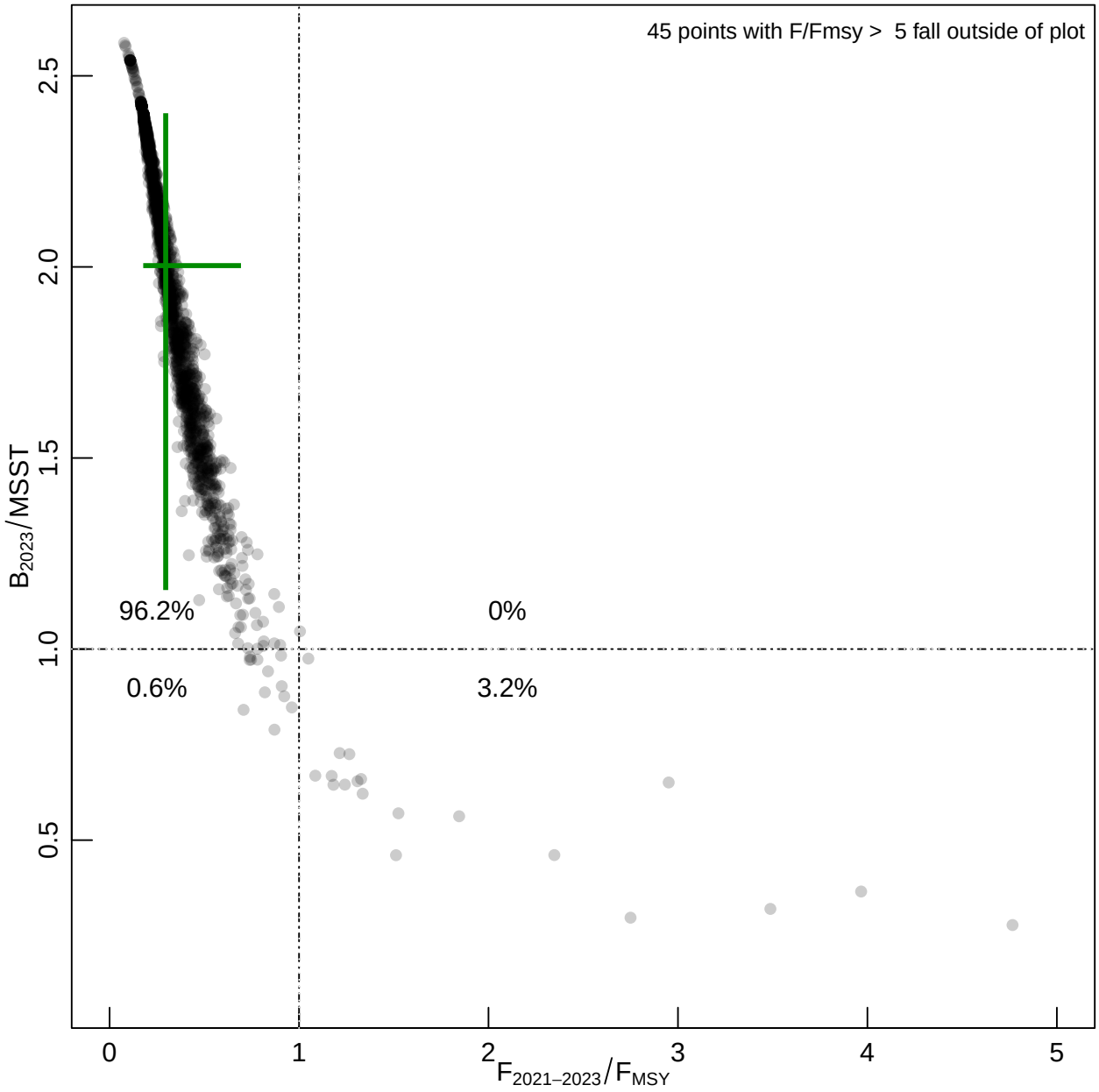


Figure 14. Estimated fishing mortality series (F) relative to F_{MSY} combining Runs 02 and 03 from ASPIC for the So. Atl. Solid line indicates average F series relative to average F_{MSY}, for handline and longline models. The dashed line represents the median F/F_{MSY} and blue error bands indicate 5^{th} and 95^{th} percentiles of the combined bootstrap trials.

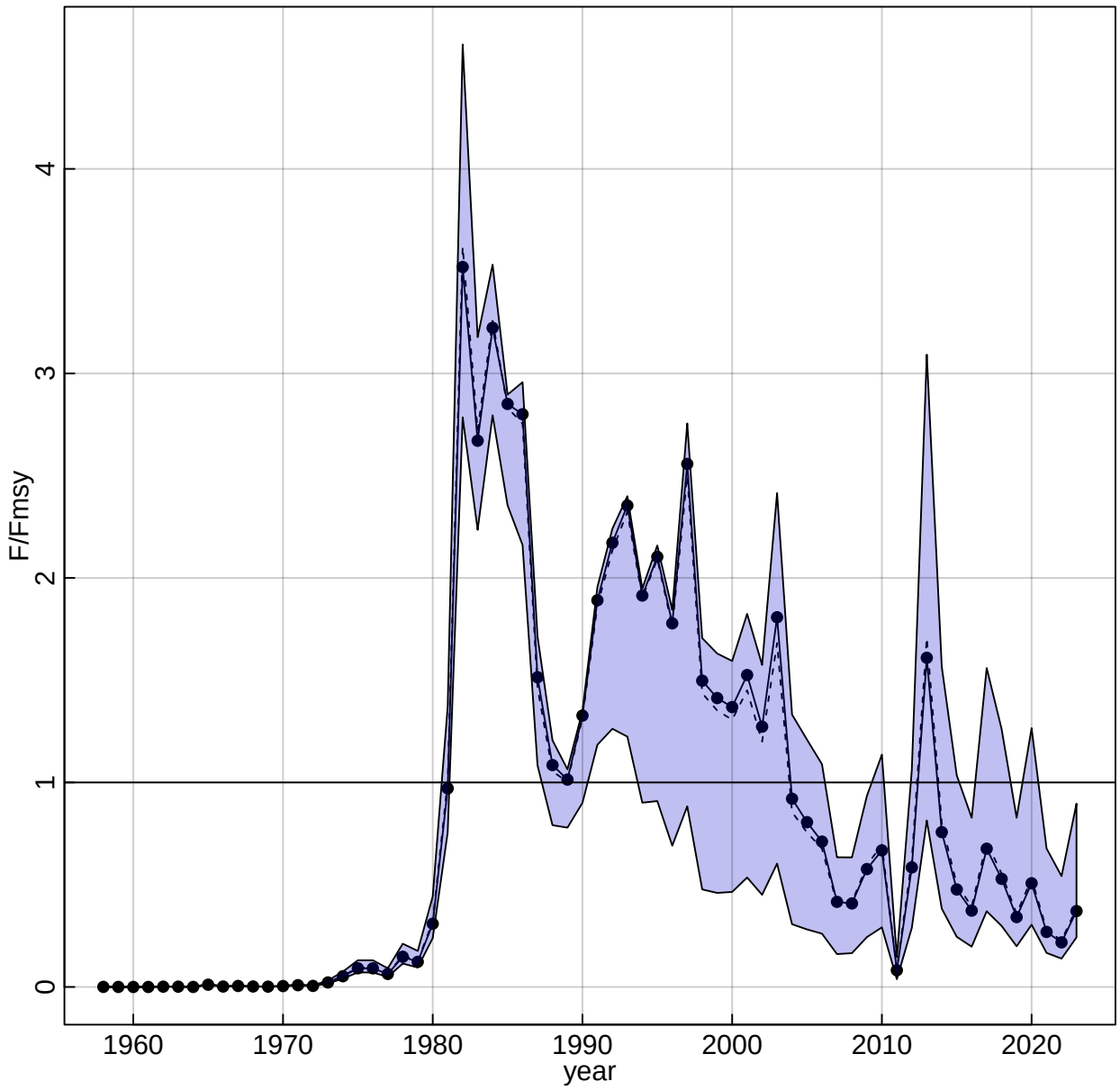
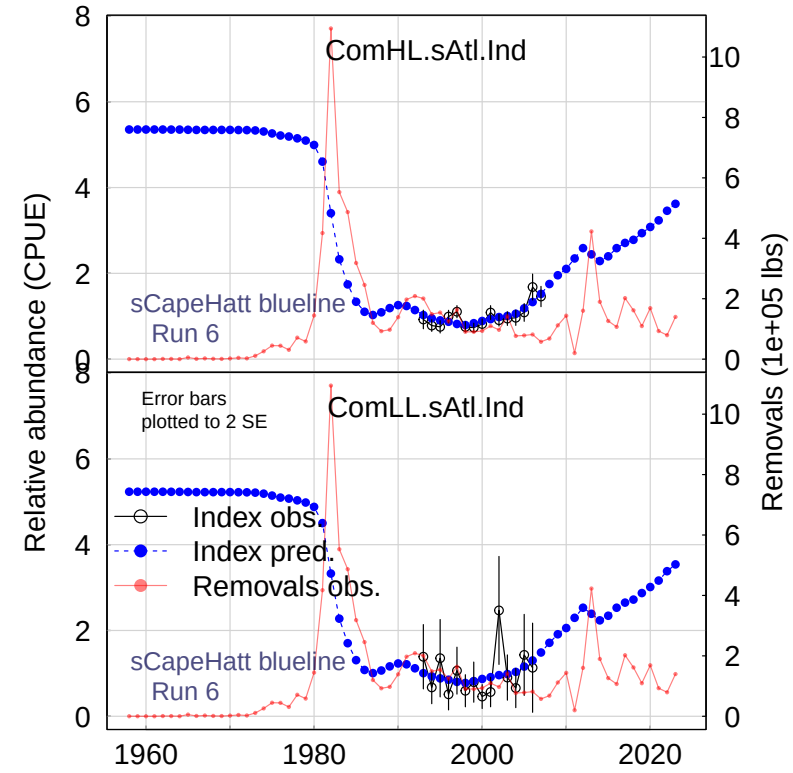


Figure 15. Sensitivity to indices: ASPIC Run 06 for the So. Atl. Fits to indices (upper panel) and B and F ratio plots (lower panel) for ASPIC Run 06. Note that the last year plotted in the B/B_{MSY} series is a one year projection (2016) while the last year of the F/F_{MSY} series is the terminal year of the assessment (2023).



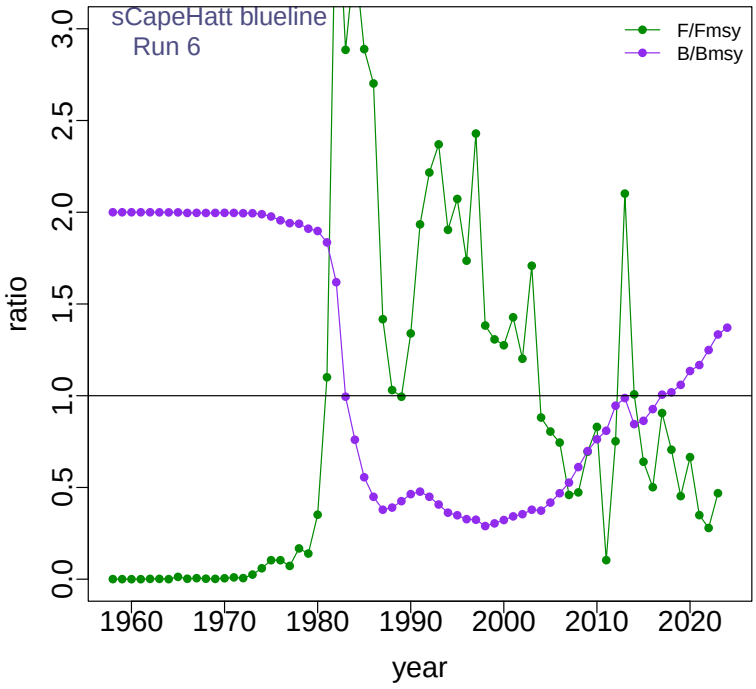


Figure 16. Plots of F, F/F_{MSY}, B, B/B_{MSY}, Y, and B/MSST for five year projections from ASPIC for the South Atlantic region with fishing mortality fixed at the F value that provides $P^* = 0.30$, starting in 2026. Solid circles represent values projected by the assessment model while open circles represent values produced by the projection code. The solid and dashed lines are the deterministic estimates and medians of the bootstrap projections, respectively. The blue error bands indicate 10^{th} and 90^{th} percentiles of the bootstrap trials.

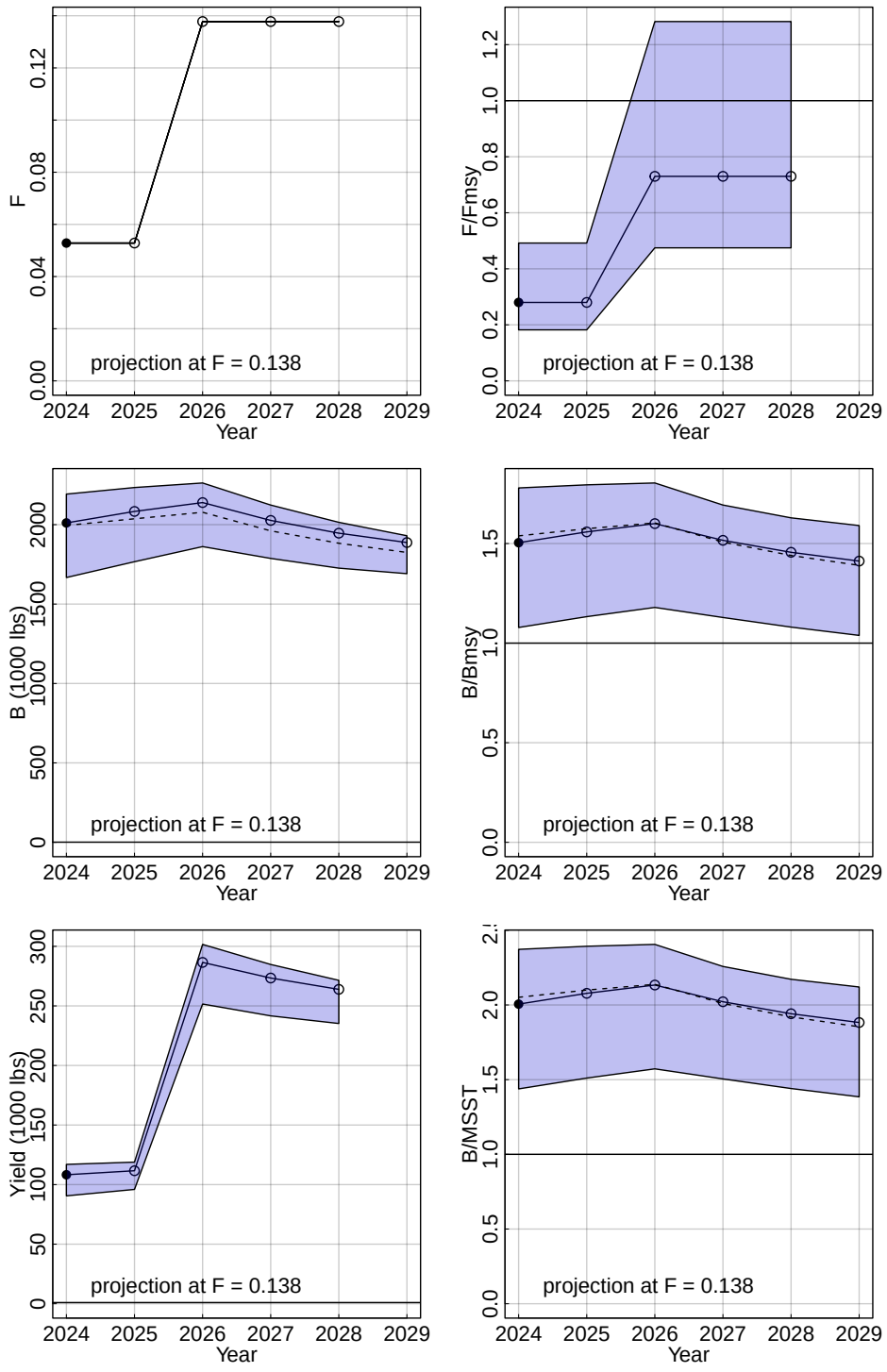


Figure 17. Removals north of Cape Hatteras, by fleet. The proportion of total removals for all years combined, from each area, is presented in the legend in parentheses next to the name of the area. Land = landings, Disc = dead discards, Com = commercial, Rec = recreational.

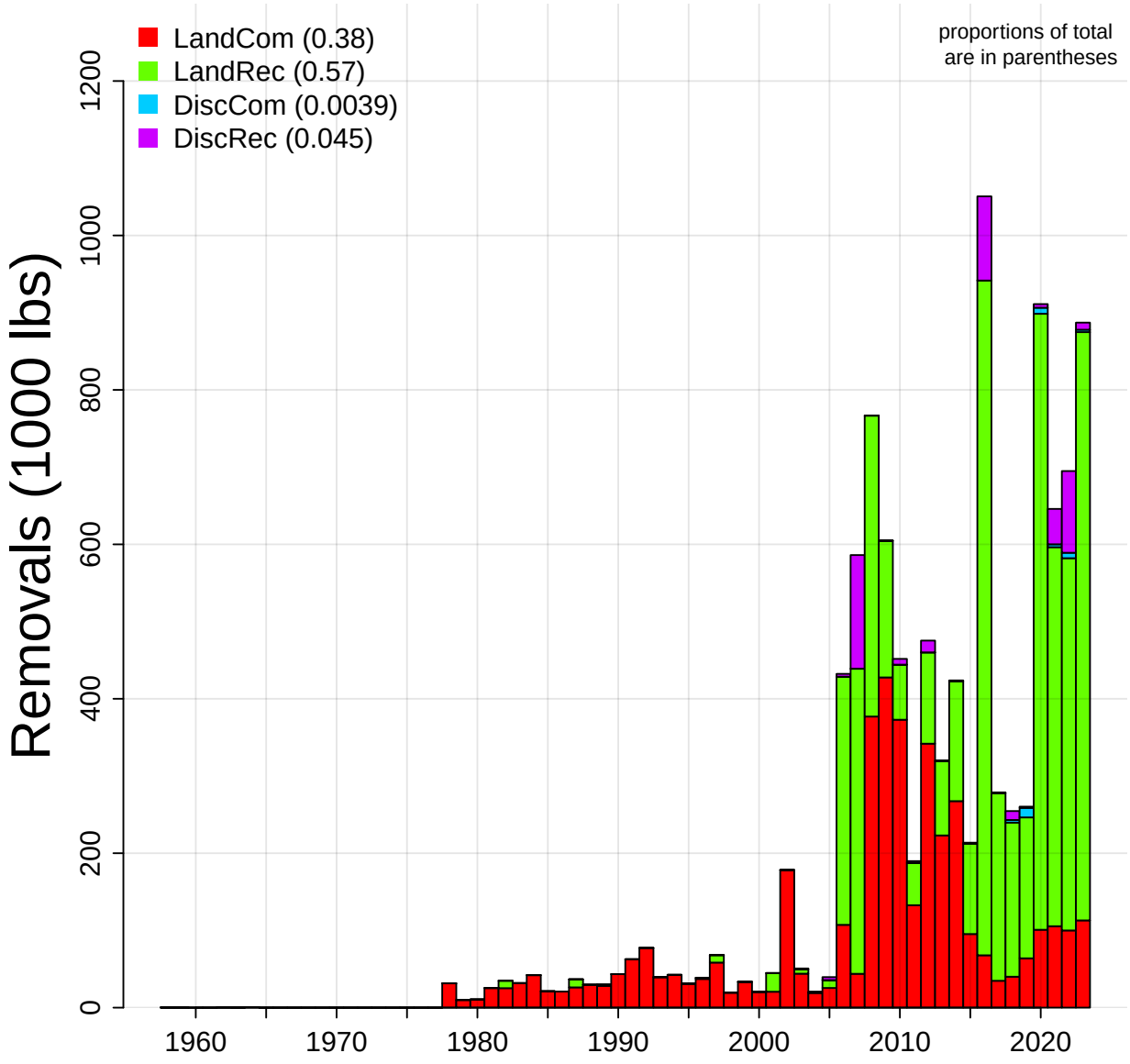


Figure 18. Removals from Cape Hatteras north through the Mid-Atlantic, by aggregated area. Removals include commercial and recreational landings and dead discards. They are aggregated here into the smallest common areas that most of the removals could be aggregated into. The proportion of total removals per square km for all years combined, from each area, is presented in the legend in parentheses next to the name of the area.

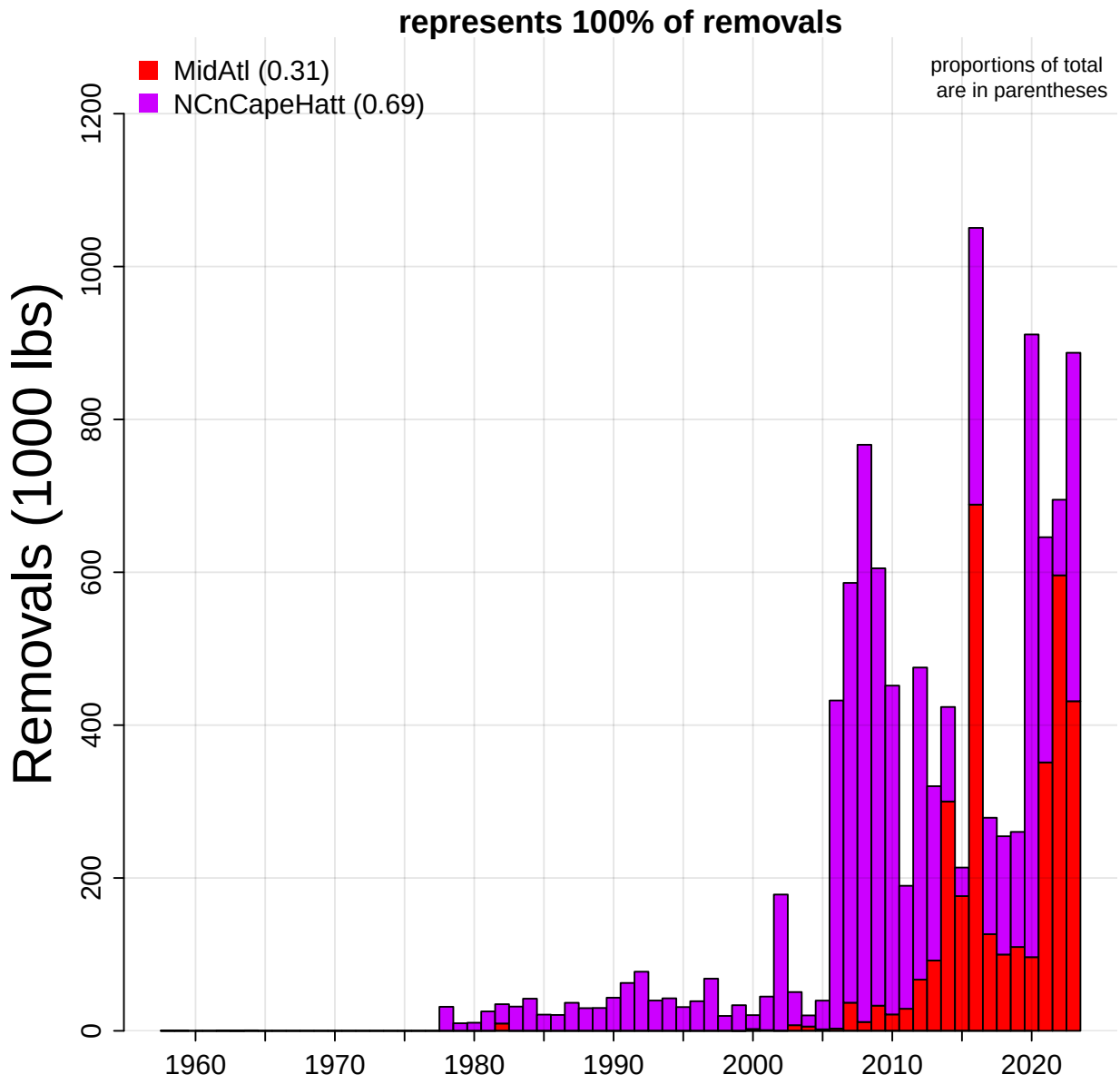


Figure 19. Catch time series north of Cape Hatteras DLM analysis. The figure shows the entire time series available and the portion of the time series used in analysis.

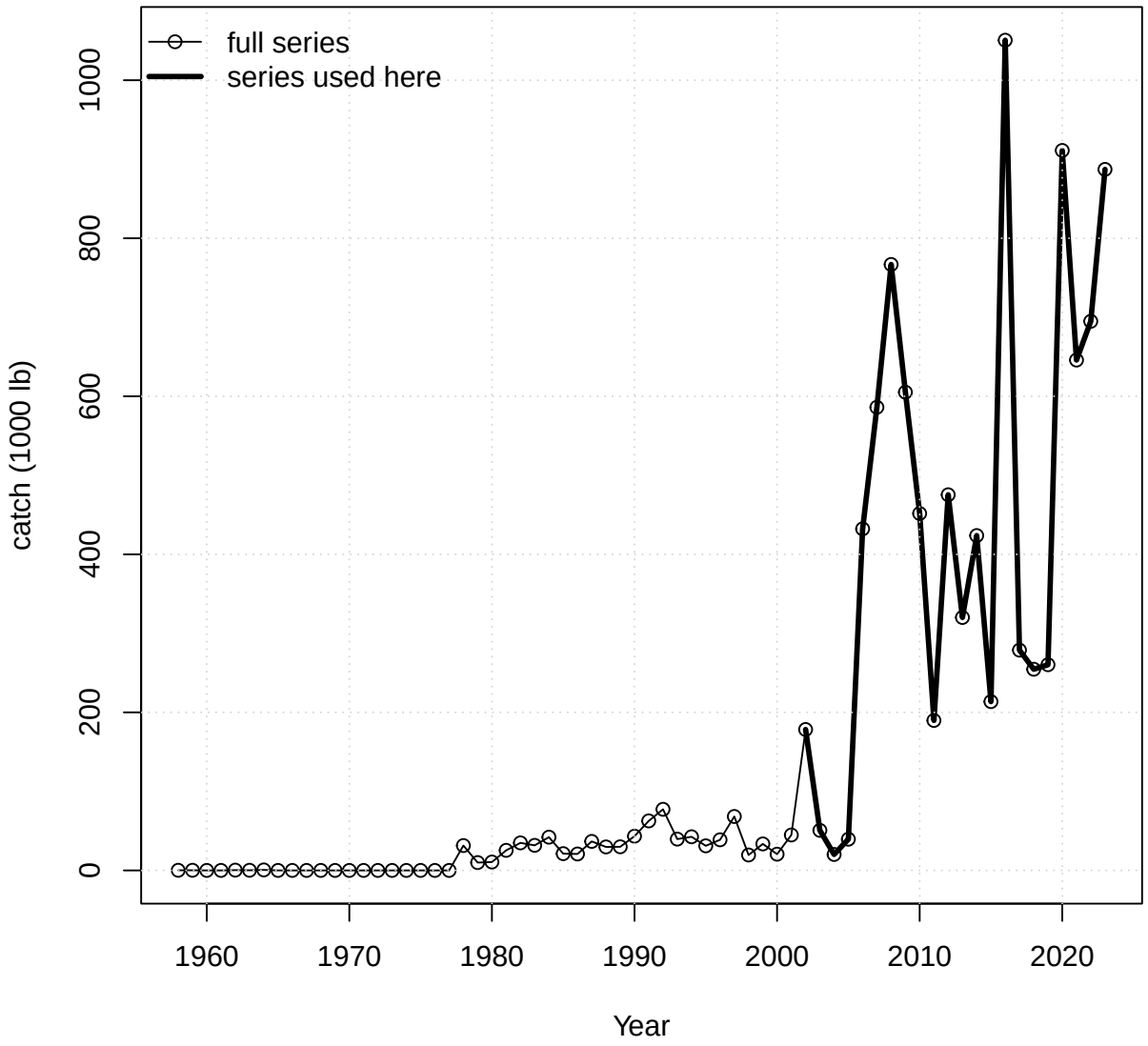


Figure 20. Stacked barplot of annual commercial longline length composition data used in north of Cape Hatteras DLM analysis.

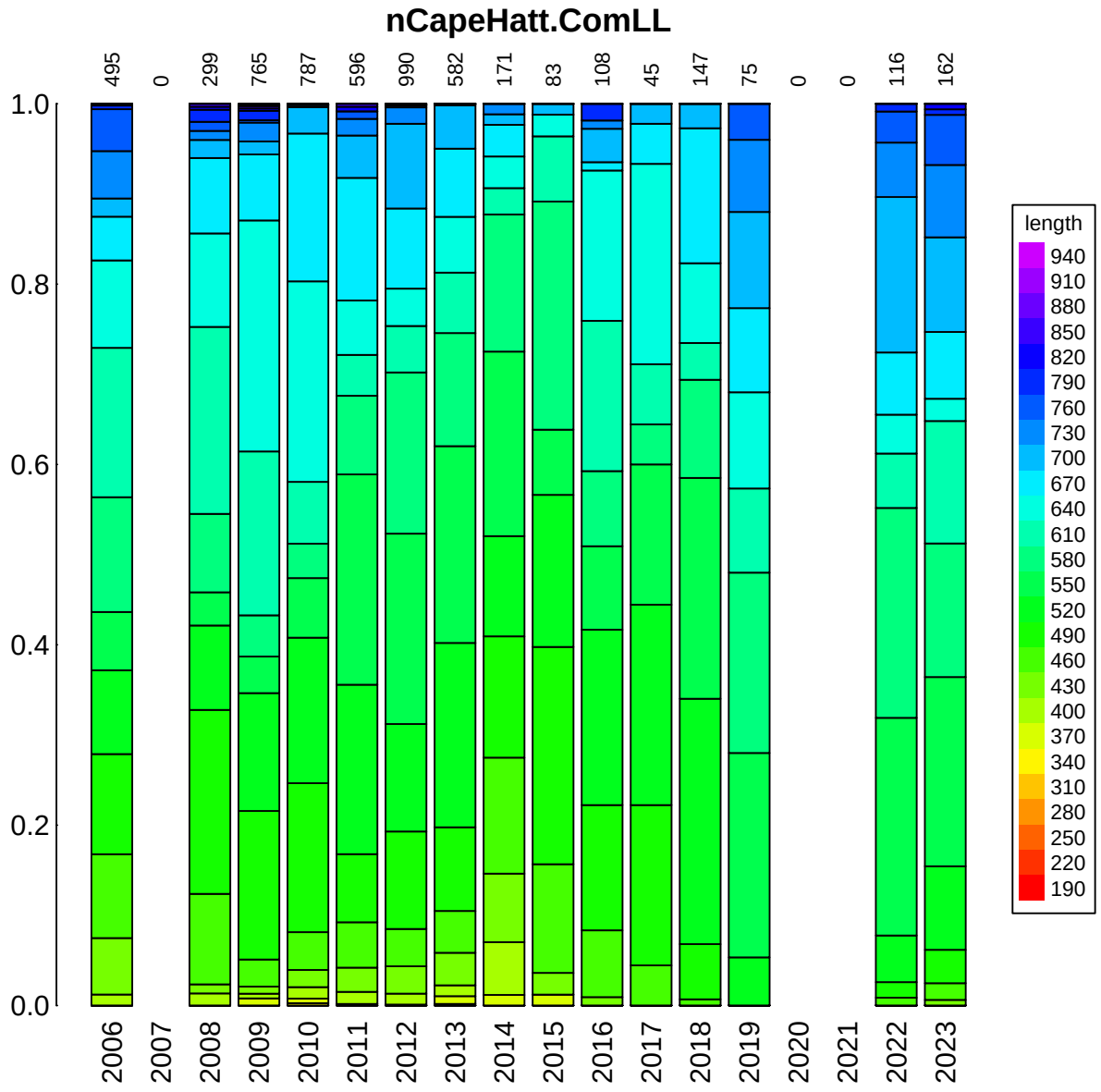


Figure 21. Aggregate commercial longline length composition data used in north of Cape Hatteras DLM analysis to compute the length of fish in the first length mode (Lc; indicated with an arrow) and the mean length of fish larger than Lc (Lbar; dashed vertical line). Green points indicate the peaks of length modes identified with a kernal density function.

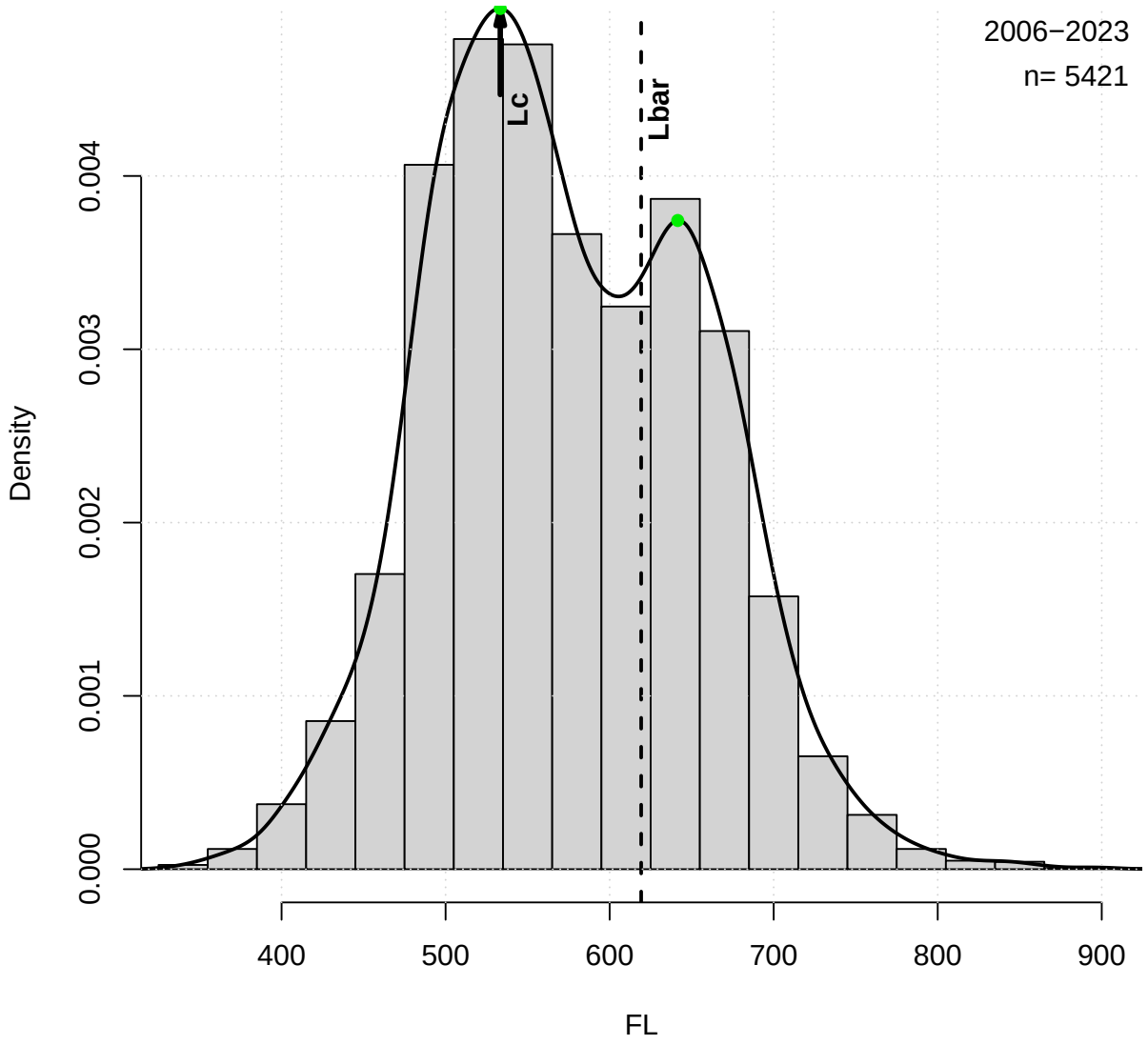


Figure 22. Kernal density estimates of TAC distributions from north of Cape Hatteras DLM analysis for all methods applied. Abbreviations for management procedures are indicated in the legend and show the color of the corresponding line. Densities are standardized to a maximimum of one, to improve visual comparison. Note that density lines for Fdem_ML and YPR_ML extend far beyond the plot range.

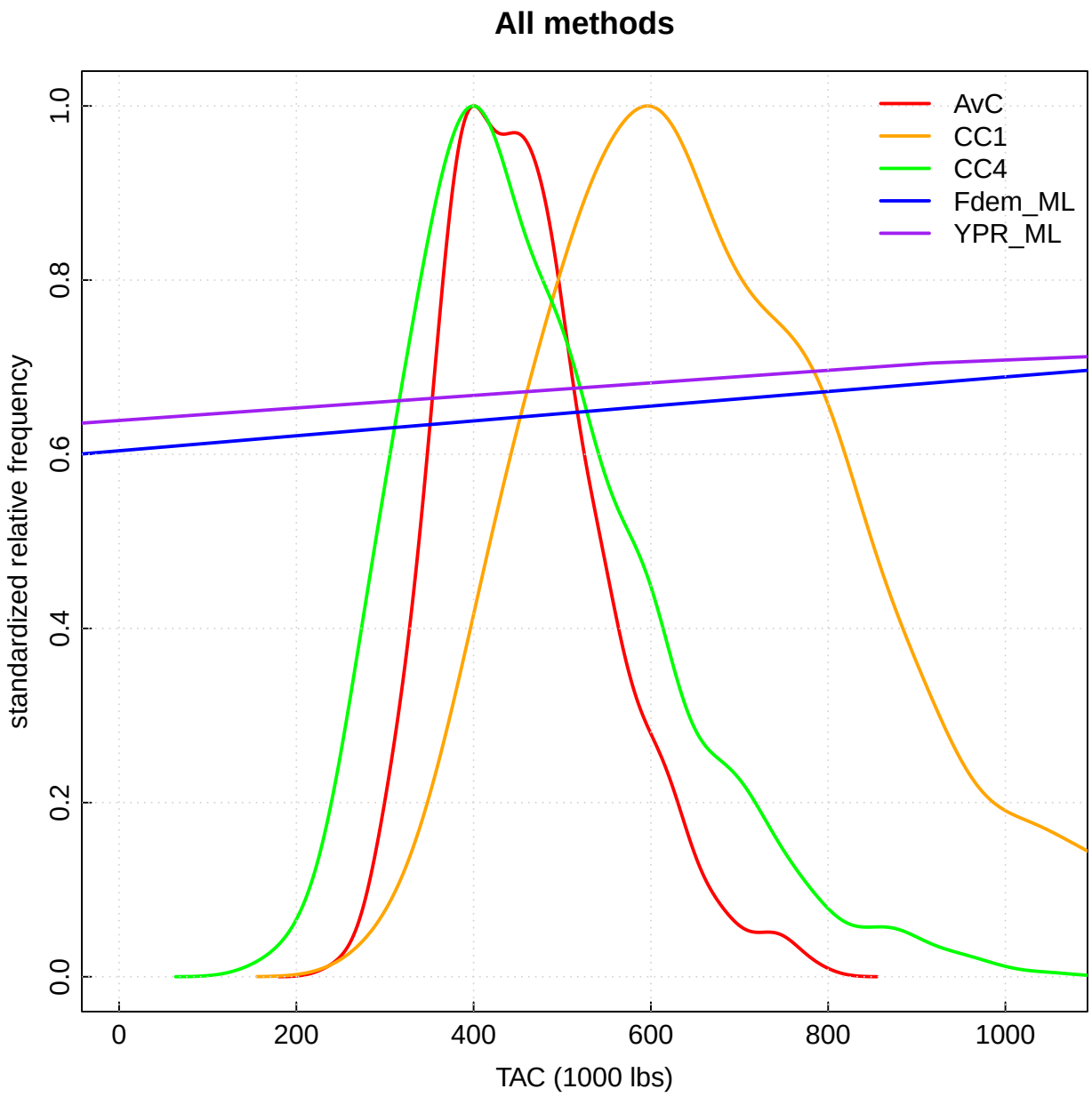
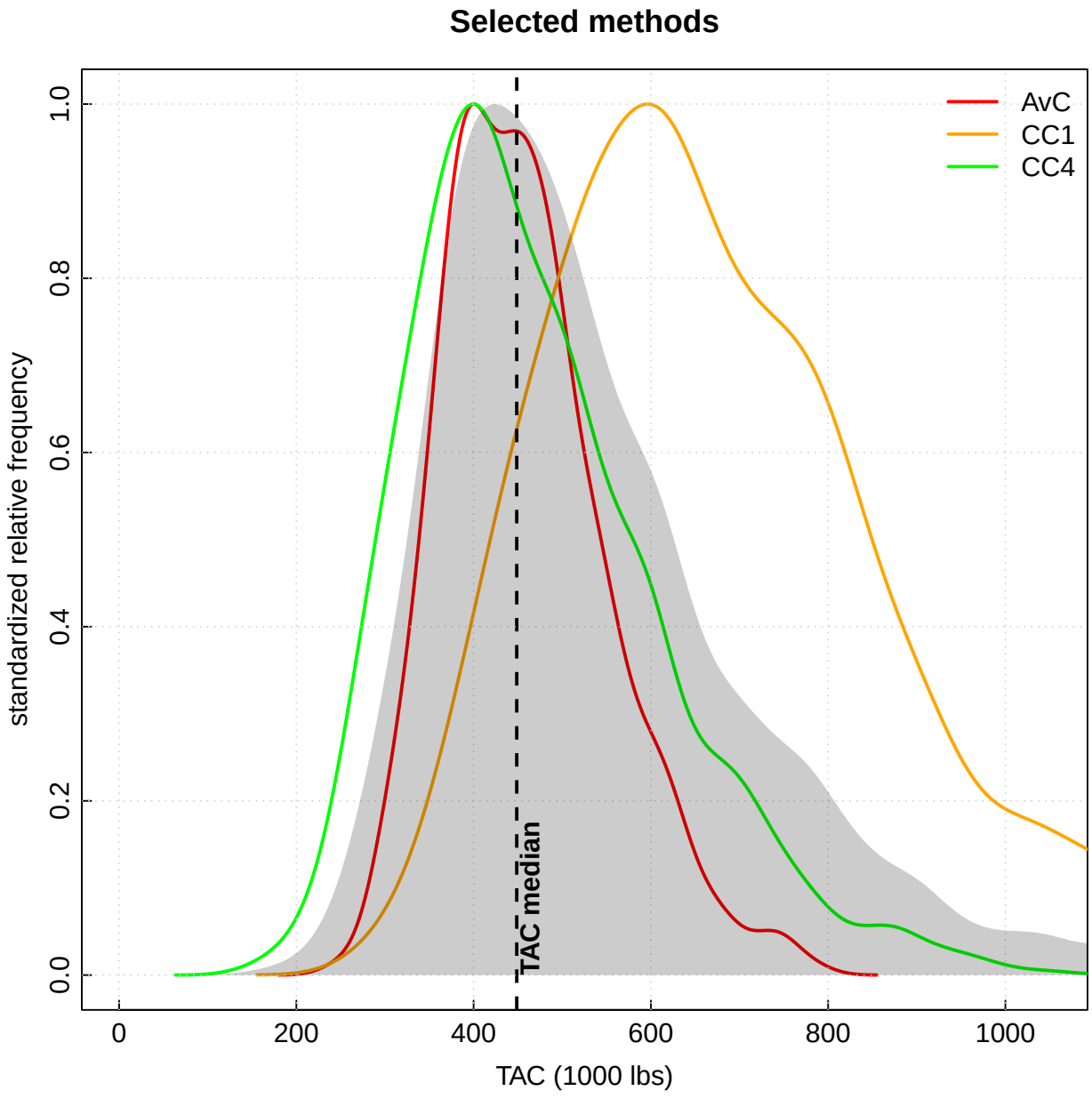


Figure 23. Kernal density estimates of TAC distributions from north of Cape Hatteras DLM analysis for selected methods. Abbreviations for management procedures are indicated in the legend and show the color of the corresponding line. Densities are standardized to a maximimum of one, to improve visual comparison. The gray shaded distribution represents the kernal density estimate for TACs from all methods. A vertical dashed line indicates the mediand of that aggregate distribution.



Appendix A Abbreviations and symbols

Table 11. Acronyms and abbreviations used in this report

Symbol	Meaning
ABC	Acceptable Biological Catch
AW	Assessment Workshop (here, for blueline tilefish)
ASY	Average Sustainable Yield
B	Total biomass of stock, conventionally on January 1
BAM	Beaufort Assessment Model (a statistical catch-age formulation)
CPUE	Catch per unit effort; used after adjustment as an index of abundance
CV	Coefficient of variation
CVID	SERFS combined chevron trap and video survey
DW	Data Workshop (here, for blueline tilefish)
F	Instantaneous rate of fishing mortality
$F_{30\%}$	Fishing mortality rate at which $F_{30\%}$ can be attained
F_{MSY}	Fishing mortality rate at which MSY can be attained
FL	State of Florida
FHWAR	The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Survey
GA	State of Georgia
GLM	Generalized linear model
K	Average size of stock when not exploited by man; carrying capacity
kg	Kilogram(s); 1 kg is about 2.2 lb.
klb	Thousand pounds; thousands of pounds
lb	Pound(s); 1 lb is about 0.454 kg
m	Meter(s); 1 m is about 3.28 feet.
M	Instantaneous rate of natural (non-fishing) mortality
MARMAP	Marine Resources Monitoring, Assessment, and Prediction Program, a fishery-independent data collection program of SCDNR
MCB	Monte Carlo/Bootstrap, an approach to quantifying uncertainty in model results
MFMT	Maximum fishing-mortality threshold; a limit reference point used in U.S. fishery management; often based on F_{MSY}
mm	Millimeter(s); 1 inch = 25.4 mm
MRFSS	Marine Recreational Fisheries Statistics Survey, a data-collection program of NMFS, predecessor of MRIP
MRIP	Marine Recreational Information Program, a data-collection program of NMFS, descended from MRFSS
MSST	Minimum stock-size threshold; a limit reference point used in U.S. fishery management. The SAFMC has defined MSST for blueline tilefish as $0.75\mathrm{SSB}_{\mathrm{MSY}}$.
MSY	Maximum sustainable yield (per year)
mt	Metric ton(s). One mt is 1000 kg, or about 2205 lb.
N	Number of fish in a stock, conventionally on January 1
NC	State of North Carolina
NMFS	National Marine Fisheries Service, same as "NOAA Fisheries Service"
NOAA	National Oceanic and Atmospheric Administration; parent agency of NMFS
OY	Optimum yield; SFA specifies that OY $\leq$ MSY.
PSE	Proportional standard error
R	Recruitment
SAFMC	South Atlantic Fishery Management Council (also, Council)
SC	State of South Carolina
SCDNR	Department of Natural Resources of SC
SDNR	Standard deviation of normalized residuals
SEDAR	SouthEast Data Assessment and Review process
SERFS	Southeast Regional Fishery-independent Sampling
SFA	Sustainable Fisheries Act; the Magnuson–Stevens Act, as amended
SL	Standard length (of a fish)
SRHS	Southeast Region Headboat Survey, conducted by NMFS-Beaufort laboratory
SPR	Spawning potential ratio
SSB	Spawning stock biomass; mature biomass of males and females
$\mathrm{SSB}_{\mathrm{MSY}}$	Level of SSB at which MSY can be attained
$\mathrm{SSB}_{\mathrm{F30\%}}$	Level of SSB at which $F_{30\%}$ can be attained
TIP	Trip Interview Program, a fishery-dependent biodata collection program of NMFS
TL	Total length (of a fish), as opposed to FL (fork length) or SL (standard length)
VPA	Virtual population analysis, an age-structured assessment
WW	Whole weight, as opposed to GW (gutted weight)
yr	Year(s)