



2024 Southern Flounder Stock Assessment Update

DEPARTMENT OF ENVIRONMENTAL QUALITY

Marine Fisheries

Marine Fishery Commission | Anne L. Markwith, Holly White, and Dr. CJ Schlick |
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Presentation Overview

- Review of southern flounder biological information and assessment history
- Model specifics and data inputs
- Results
- Stock status
- Conclusions

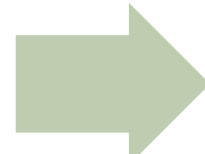
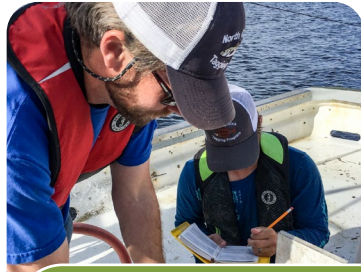
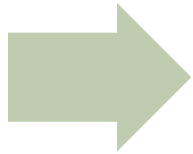


Why are we here?

Fisheries Reform Act (FRA) requirements triggered

- End overfishing in two years
- End overfished status in ten years

Required by Amendment 2 to be started immediately for more comprehensive management strategies



2019 Southern Flounder Stock Assessment Update

- Data through 2017
- Overfished
- Overfishing occurring

Amendment 2

- Adopted Aug. 2019
- 62% reduction 2019 and 72% reduction 2020 forward
- Seasonal management

Starts rebuilding schedule, overfished status to be ended by 2028

Amendment 3

- Adopted May 2022
- 72% reduction
- Quota management with pound for pound paybacks

Pulse check on how coastwide management is working

2024 Southern Flounder Stock Assessment Update

Background Information



A map of the southeastern United States and the Gulf of Mexico. The land is shown in shades of green and brown, while the water is light blue. A red and yellow pixelated area indicates the species range, extending from the coast of North Carolina down to Texas. A thick purple diagonal line is drawn across the Gulf of Mexico, separating the South Atlantic from the Gulf of Mexico.

Species Range

- Occur from North Carolina to Texas
- Two different stocks
 - South Atlantic
 - Gulf of Mexico

Life History

- Demersal (bottom-dwelling)
- Marine and brackish water
- Female max age and size: 9 years and 33 inches
- Male max age and size: 6 years and 20 inches
- Female length at 50 percent maturity ~16 inches

Source: Hollensead, L.D. 2018. Dissertation. UNCW, Wilmington.

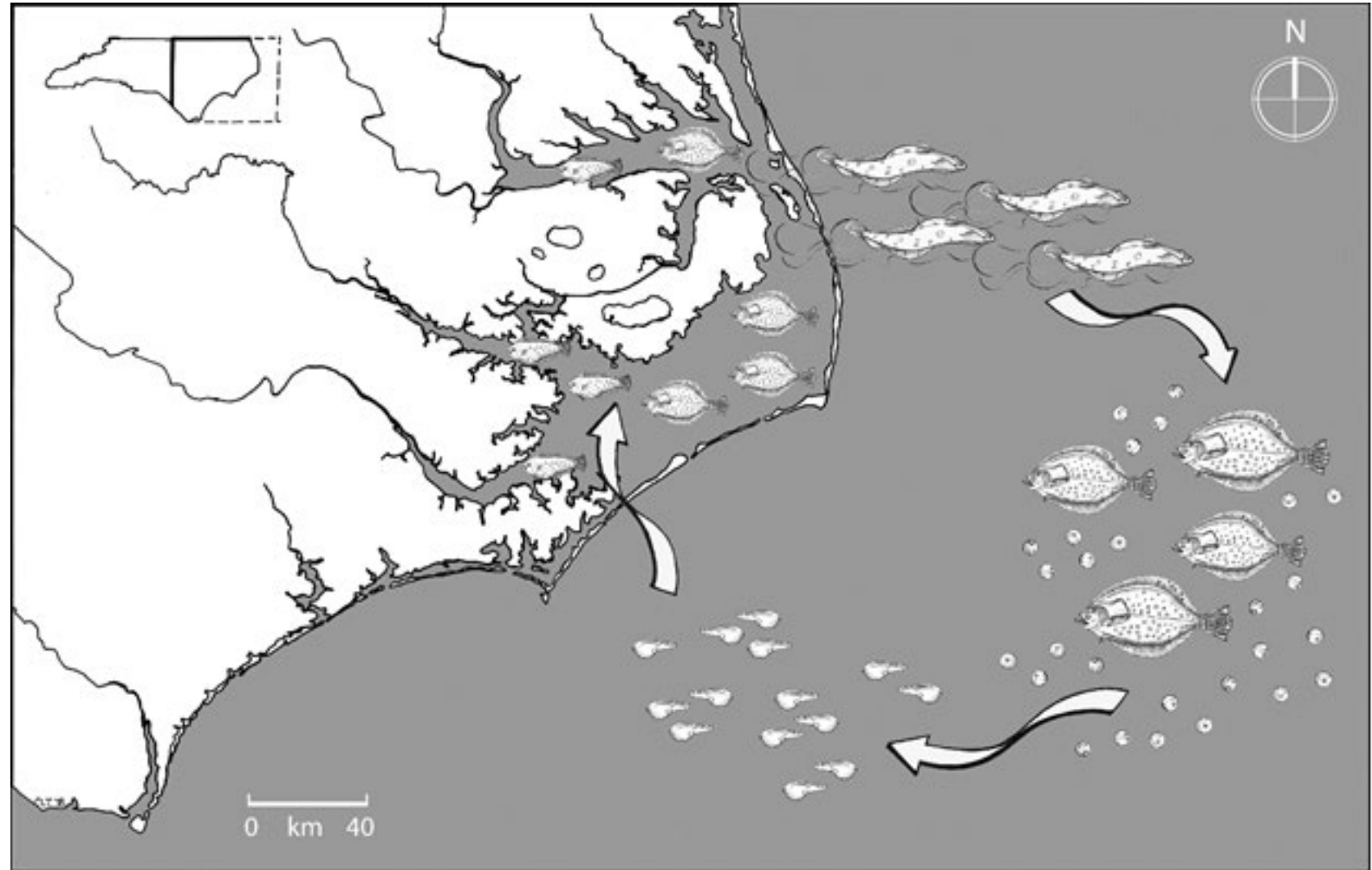


Fig. 1. Generalized life-history cycle for southern flounder off North Carolina and the Southeast US Atlantic continental shelf.



Stock Assessment History

- Past Benchmark Assessments: 2005, 2009, 2014, and **2018**
 - All concluded stock was overfished with overfishing occurring
 - 2018 first coastwide stock assessment
- Last 2 updates used the 2018 model
 - Passed peer review in 2018
- Years in models:
 - 2018 Benchmark: 1989-2015
 - 2019 Update: 1989-2017
 - **2024 Update: 1989-2022**



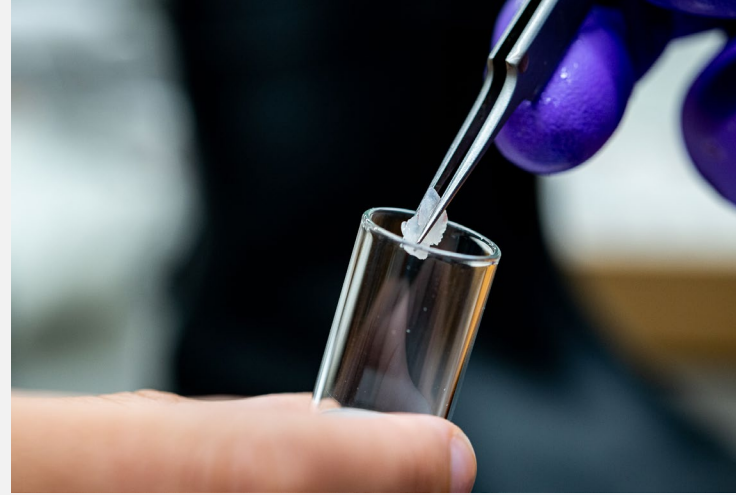
Data Inputs



ABUNDANCE + BIOLOGY + CATCH



The relative index of the number of Southern Flounder in a stock.



Information on growth, maturity, and natural mortality.



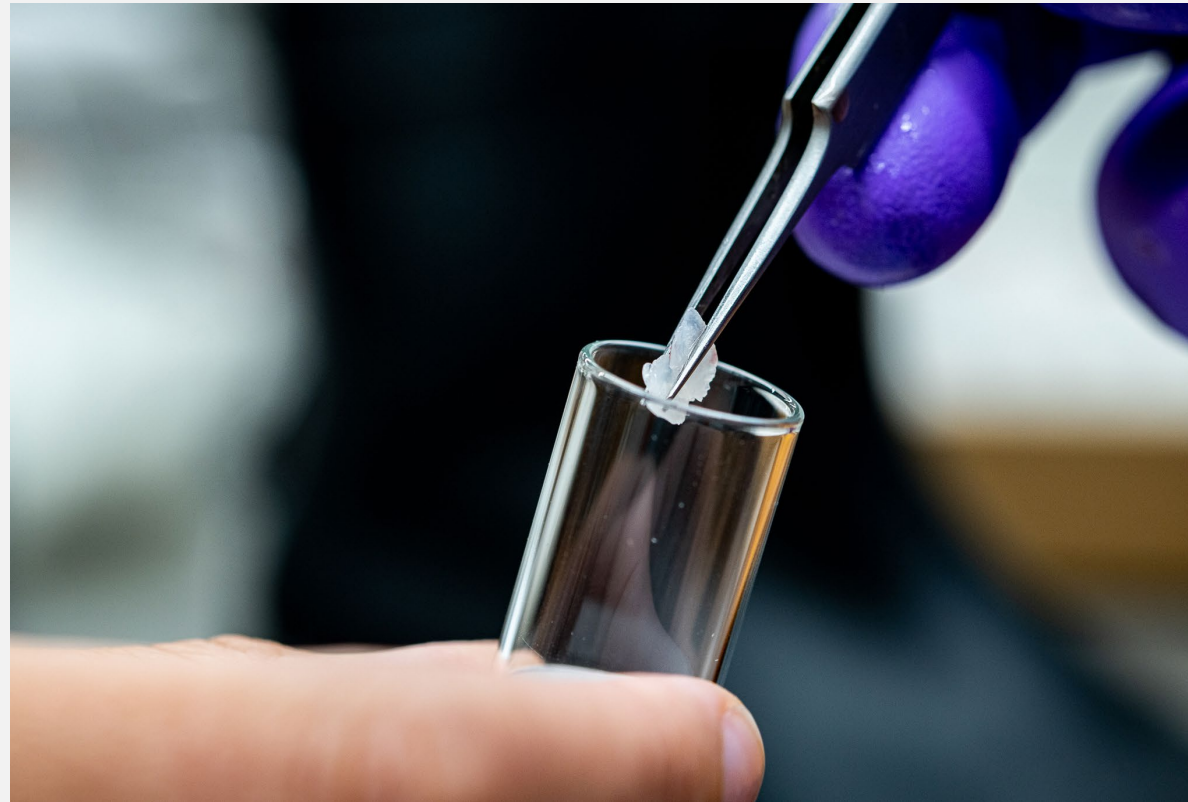
The amount of southern flounder removed from a stock by commercial fishing, recreational fishing, and shrimp trawl.

= STOCK ASSESSMENT

ABUNDANCE

BIOLOGY

CATCH



Information on growth, maturity, and natural mortality.

Model Specifics and Biological Inputs

- Age Structured Assessment Program (ASAP)
- Pooled across Unit Stock: North Carolina, South Carolina, Georgia, & Florida (East Coast)
- 1989-2022



Model Specifics and Biological Inputs

- Birth date: Jan. 1
- Sex combined
- Age 1-4 plus group
- Age-specific natural mortality (Lorenzen 1996)
- Maturity based on previous study (Midway and Scharf 2012) - 100% mature by age 4



ABUNDANCE

BIOLOGY

CATCH



The relative index of the number of Southern Flounder in a stock.

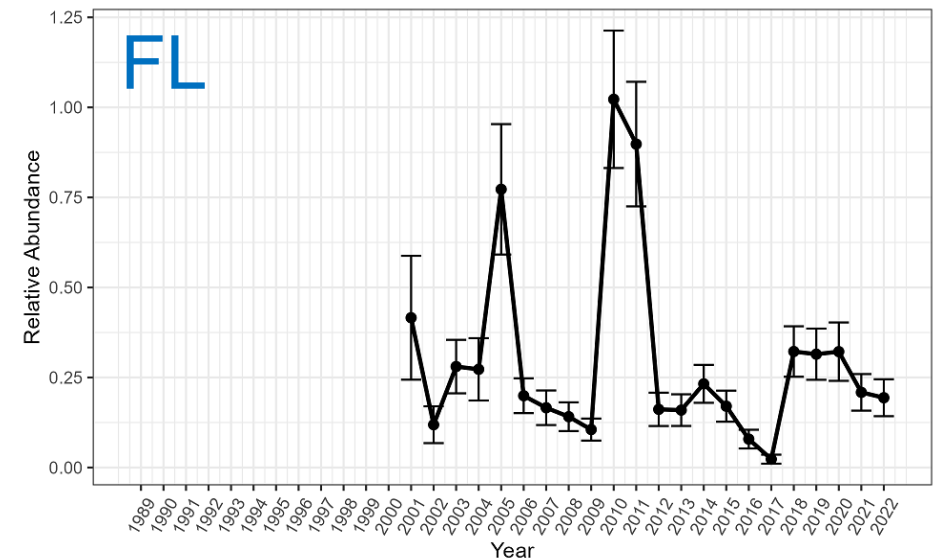
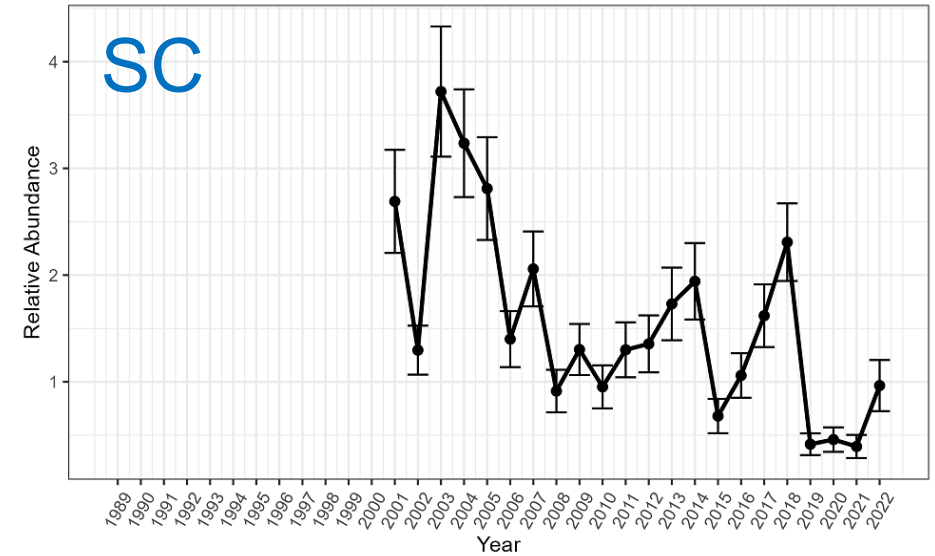
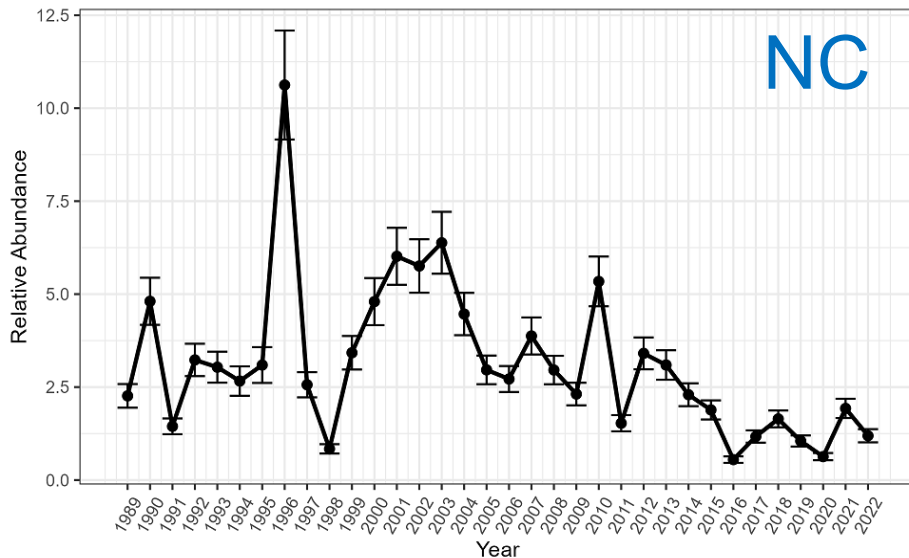
ABUNDANCE

BIOLOGY

CATCH

Recruitment Surveys

- NC120 Trawl Survey (2003-2022)
- SC Electrofishing Survey (2001-2022)
- FL Trawl Survey (2001-2022)



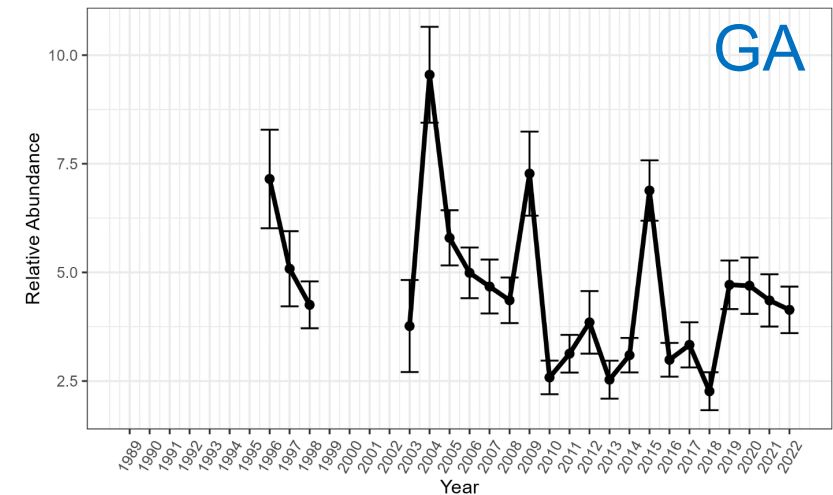
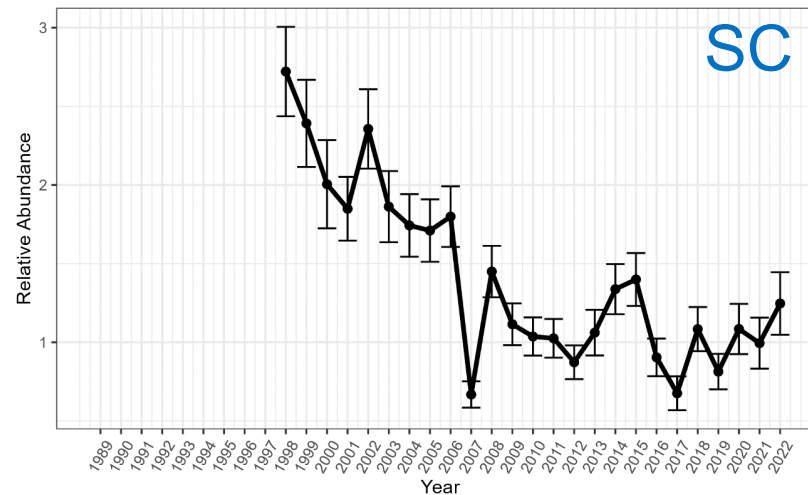
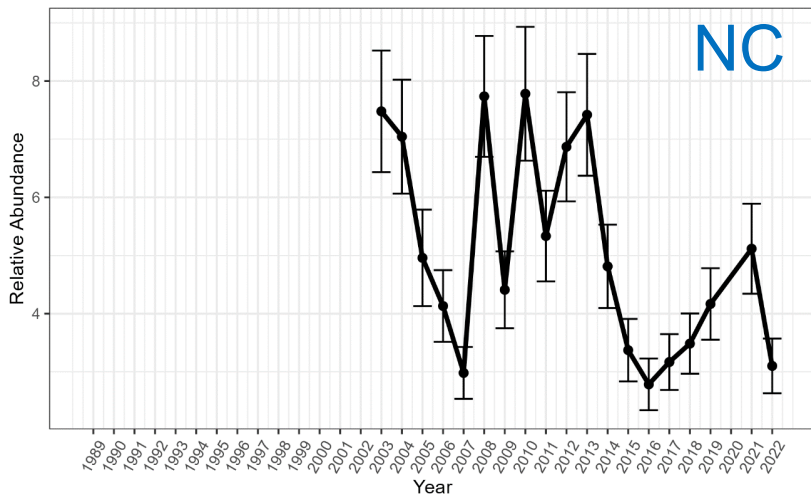
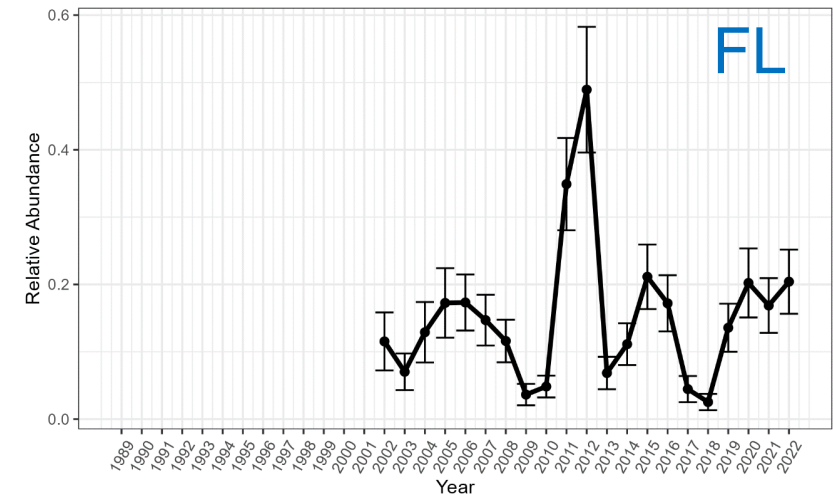
ABUNDANCE

BIOLOGY

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Adult Surveys

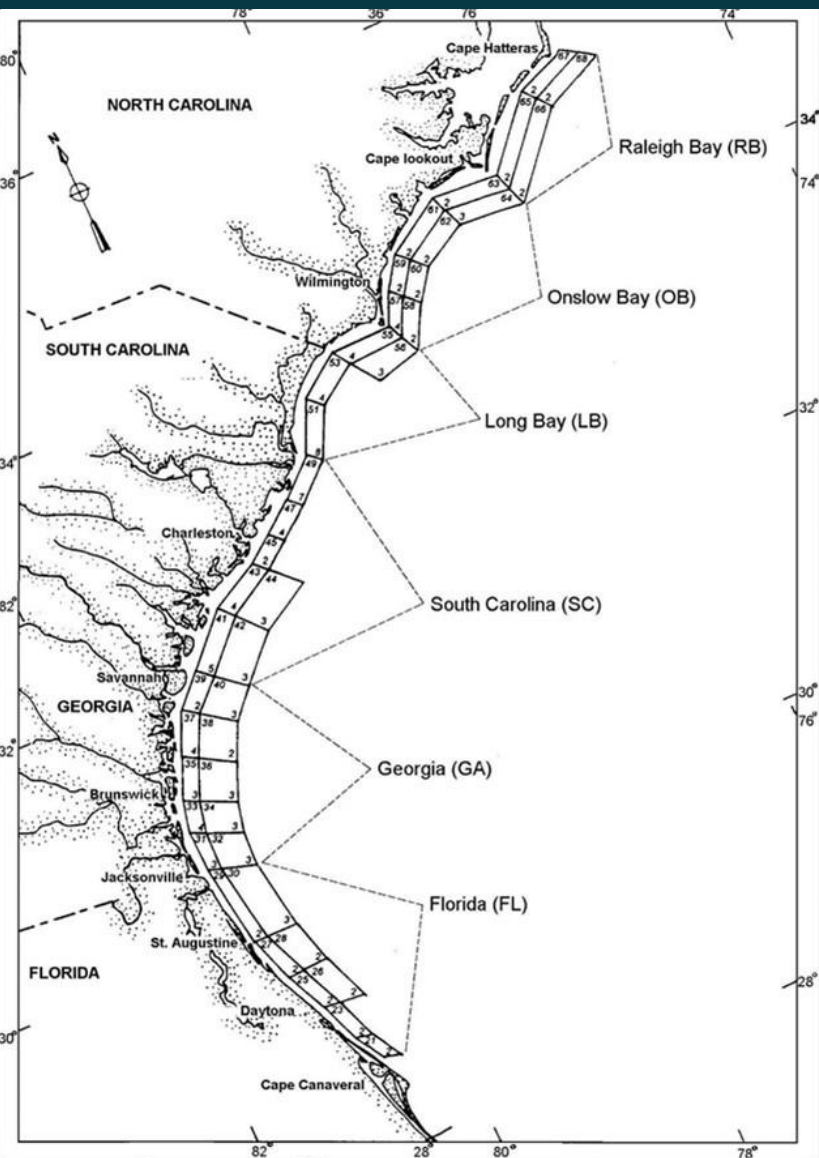
- NC915 Gill-net Survey (2003-2022)
- SC Trammel Net Survey (1994-2022)
- GA Trawl Survey (1996-2022)
- FL Trawl Survey (2002-2022)



ABUNDANCE

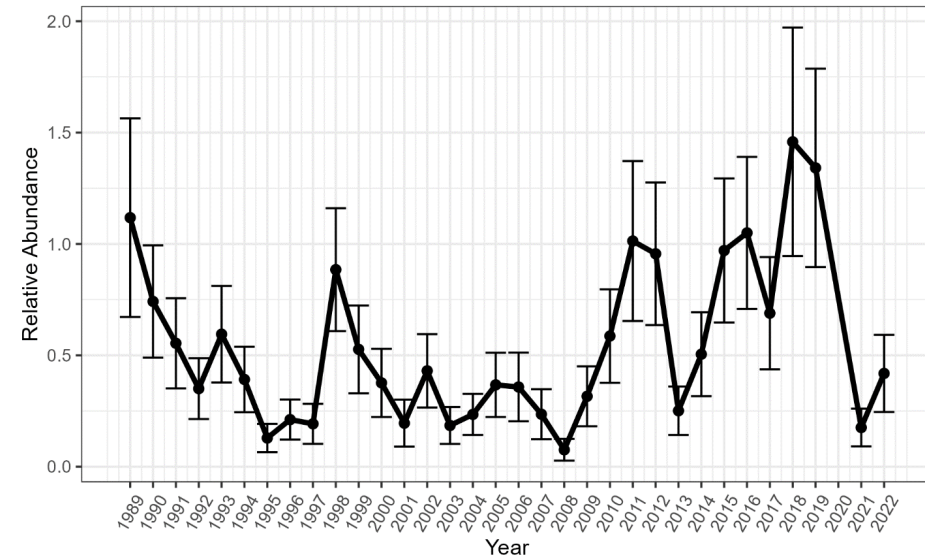
BIOLOGY

CATCH



Year	STATE																									
	Florida					Georgia					South Carolina						North Carolina									
	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67		
1989	4.4	4.4	4.8	4.2	4.5	7.5	12.5	8.8	12.7	7.8	11.1	8.7	3.7	11.1	20.7	25.3	12.2	12.0	10.8	3.5	3.3	7.8	8.0	3.5		
1990		8.1	7.8	8.6	8.0	10.9	14.0	10.8	15.8	7.9	20.2	15.8	8.4	16.2	29.0	32.7	16.4	15.1	17.0	6.4	4.2	8.3	7.2	7.9		
1991	7.4	7.4	7.0	7.8	8.2	11.9	15.9	12.5	16.9	9.0	20.3	17.5	7.7	14.7	25.5	32.0	15.4	16.8	16.9	3.5	3.6	7.8	9.4	8.5		
1992	8.5	8.3	8.1	8.2	8.2	12.3	15.7	11.2	15.3	7.5	20.1	15.8	6.2	14.6	25.3	30.6	15.3	17.3	14.3	7.4	7.6	7.2	6.9	7.2		
2014	14.6	15.4	15.1	19.7	15.2	19.3	20.2	23.1	15.5	19.4	15.1	7.2	14.4	14.1	12.0	15.3	15.0	14.1	17.0	18.9	14.6	15.9	20.1	15.1		
2015	15.0	15.1	17.5	21.3	18.4	21.4	18.1	22.2	13.8	20.5	17.7	7.5	15.7	14.6	10.6	13.7	15.1	18.4	17.6	22.0	15.1	18.9	7.4	15.0		
2016	14.3	14.4	18.2	22.1	10.6	21.4	14.2	22.2	17.8	15.0	20.3	8.7	13.9	14.3	10.5	14.6	14.7	17.5	18.6	22.0	15.1	18.3	17.4	14.2		
2017	11.8	14.5	19.6	16.9	17.6	10.5	18.1	6.2	14.4	17.6	18.4	6.9	12.9	15.6	10.8	14.4	14.3	17.5	13.3	14.8	10.9	14.7	10.2	3.2		
2018	11.2	15.1	18.6	10.6		15.0	14.9	18.5	14.5	17.8	11.7	10.4	14.7	15.5	11.9	15.3	14.8	18.4								
2019					13.1	13.7	16.5	16.7	12.2	13.5	13.8	9.3	13.4	14.0	10.4	14.3	14.5	18.1	13.4	18.1	6.8					
2021	1.8	3.9	4.2		7.2	12.2	9.4	7.9	7.2	3.7	9.0	5.8	7.1	7.7	5.8	7.7	7.6	9.9	7.5	9.6	5.2					
2022				9.3	8.9	11.2	7.3	5.5	3.8	5.7	5.4	5.8	7.3	7.0	5.3	7.3	7.2	8.9	7.5	9.0	7.3	9.1				

Adult Coastwide Survey: SEAMAP



ABUNDANCE

BIOLOGY

CATCH

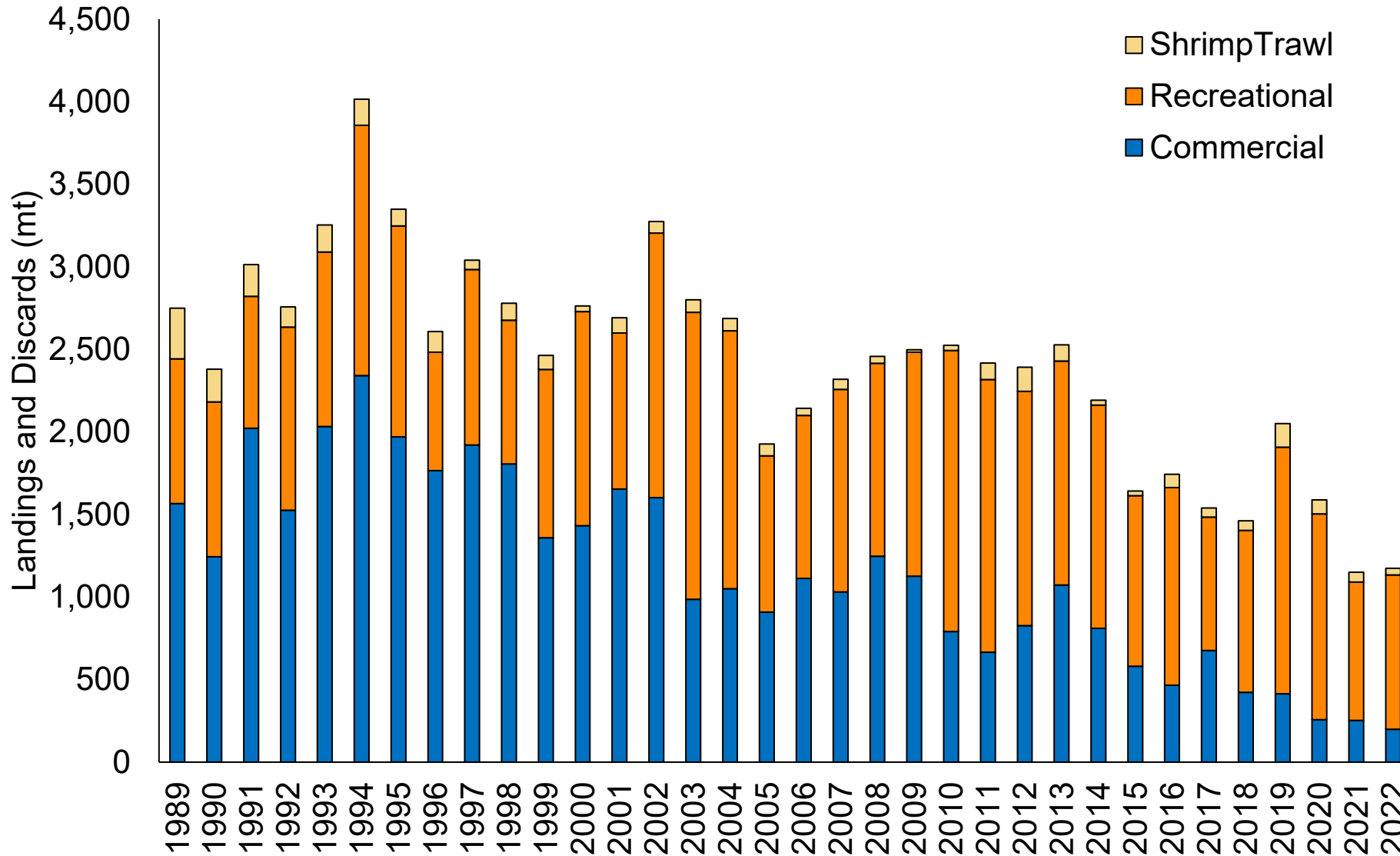


The amount of southern flounder removed from a stock by commercial fishing, recreational fishing, and shrimp trawl.

ABUNDANCE

BIOLOGY

CATCH

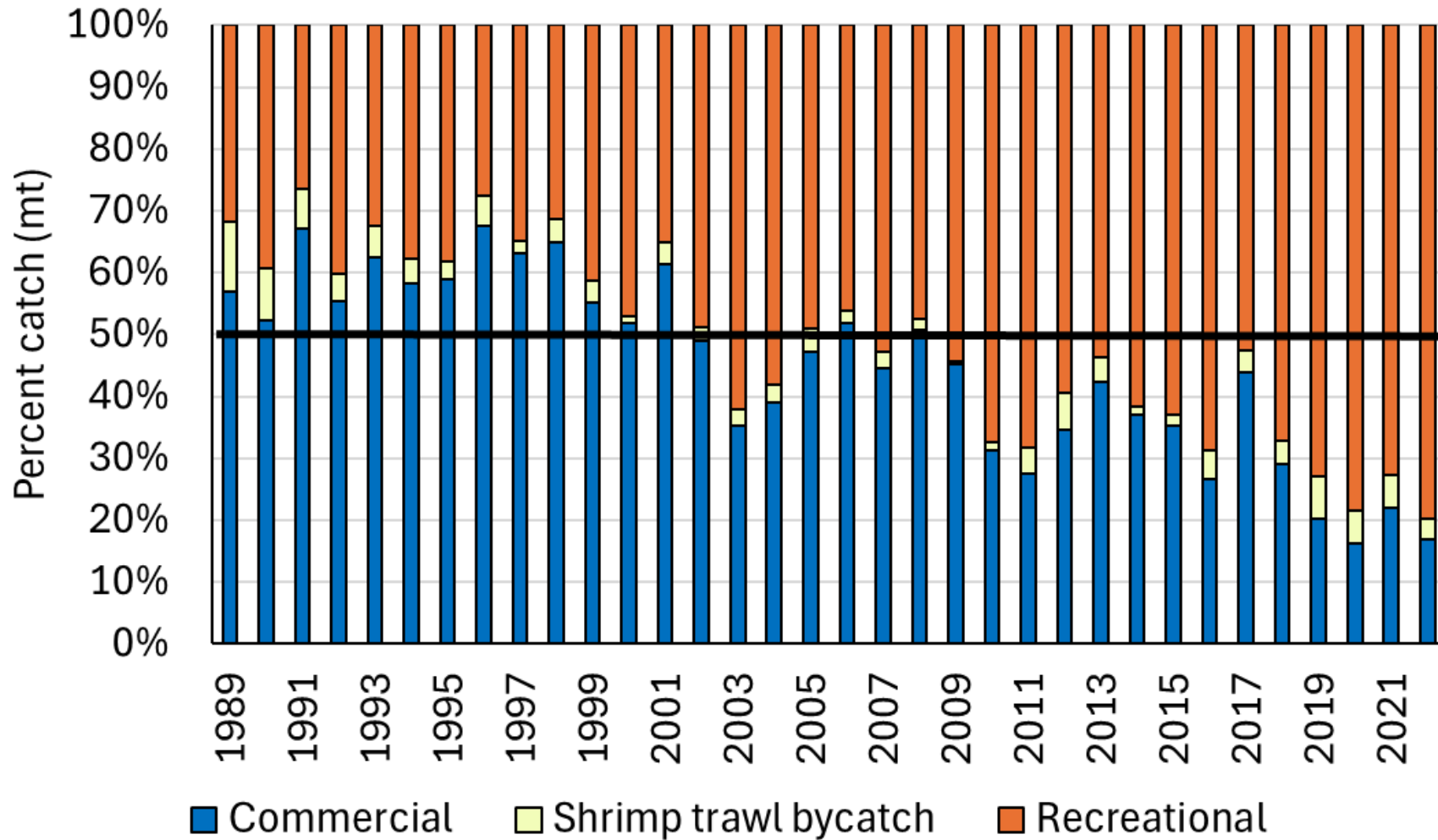


Harvest and Discards All States Combined

ABUNDANCE

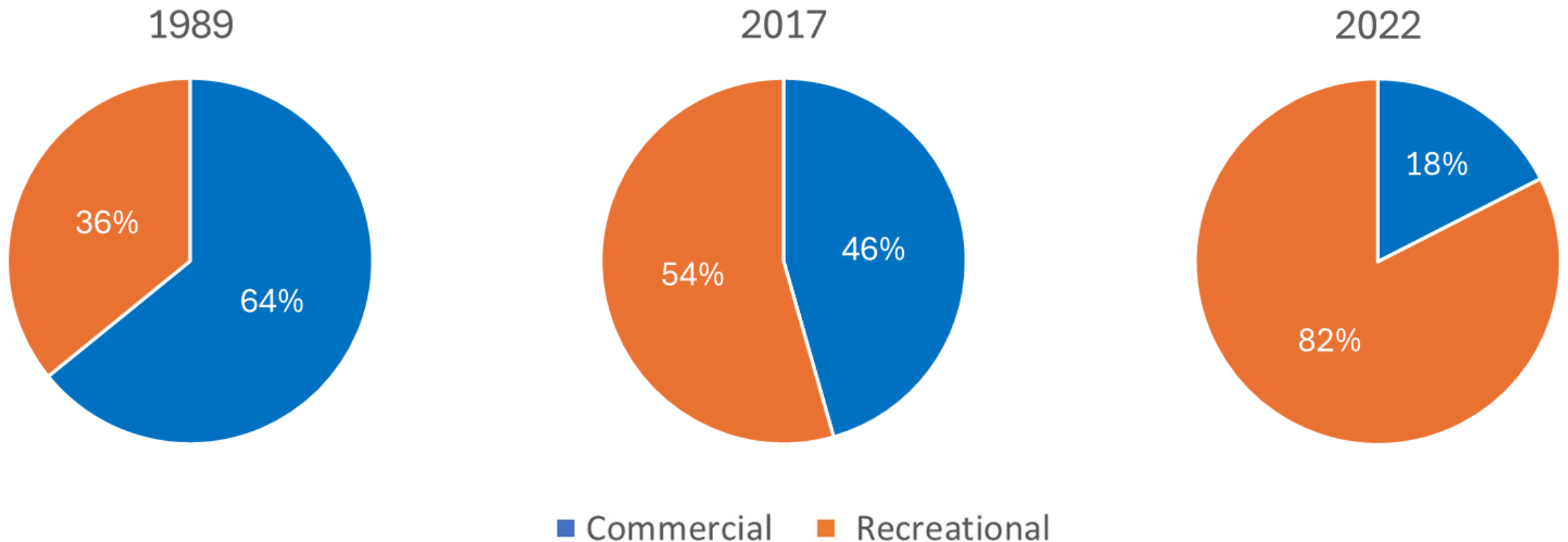
BIOLOGY

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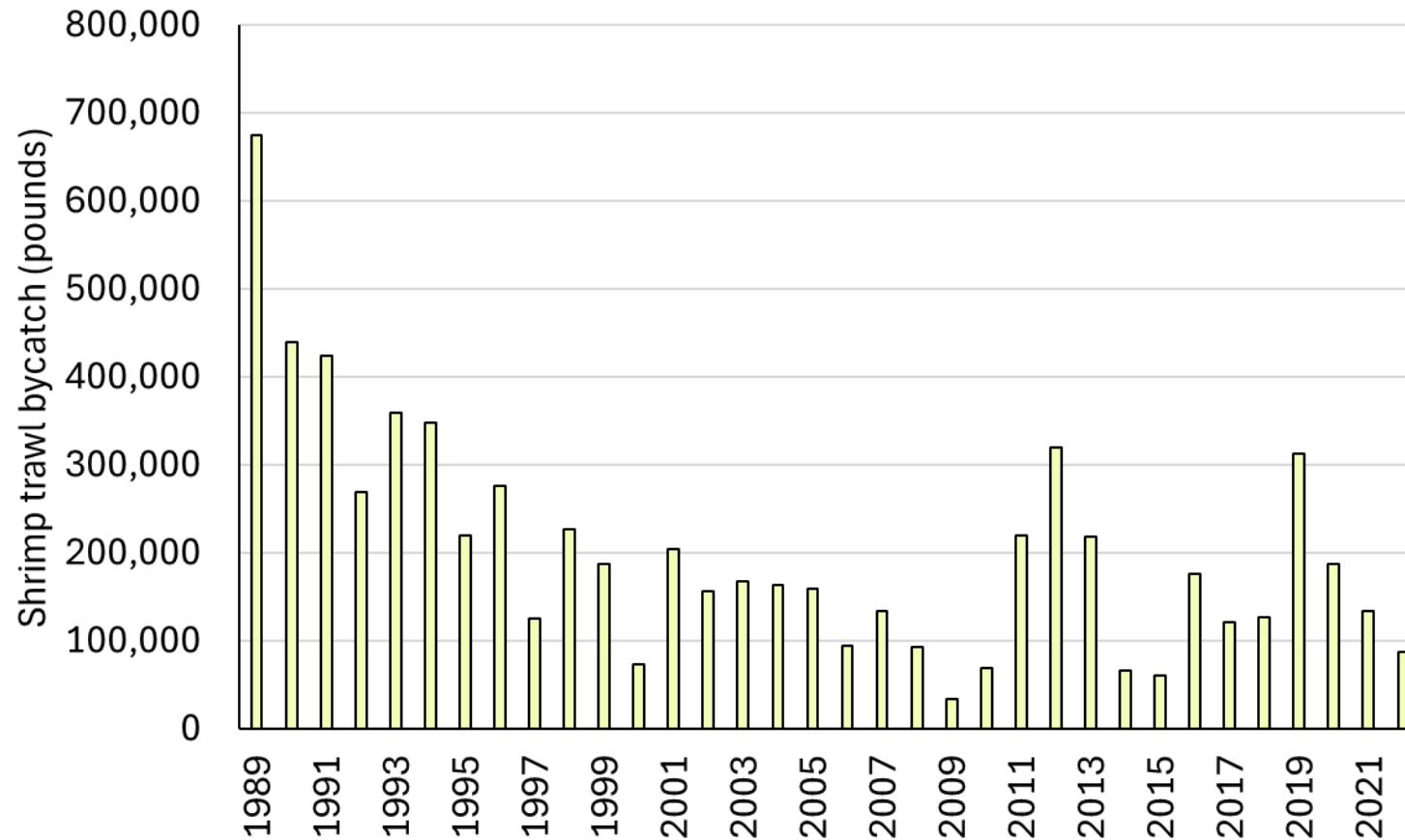


Harvest and Discards All States Combined

Recreational and Commercial Fleets All States Combined

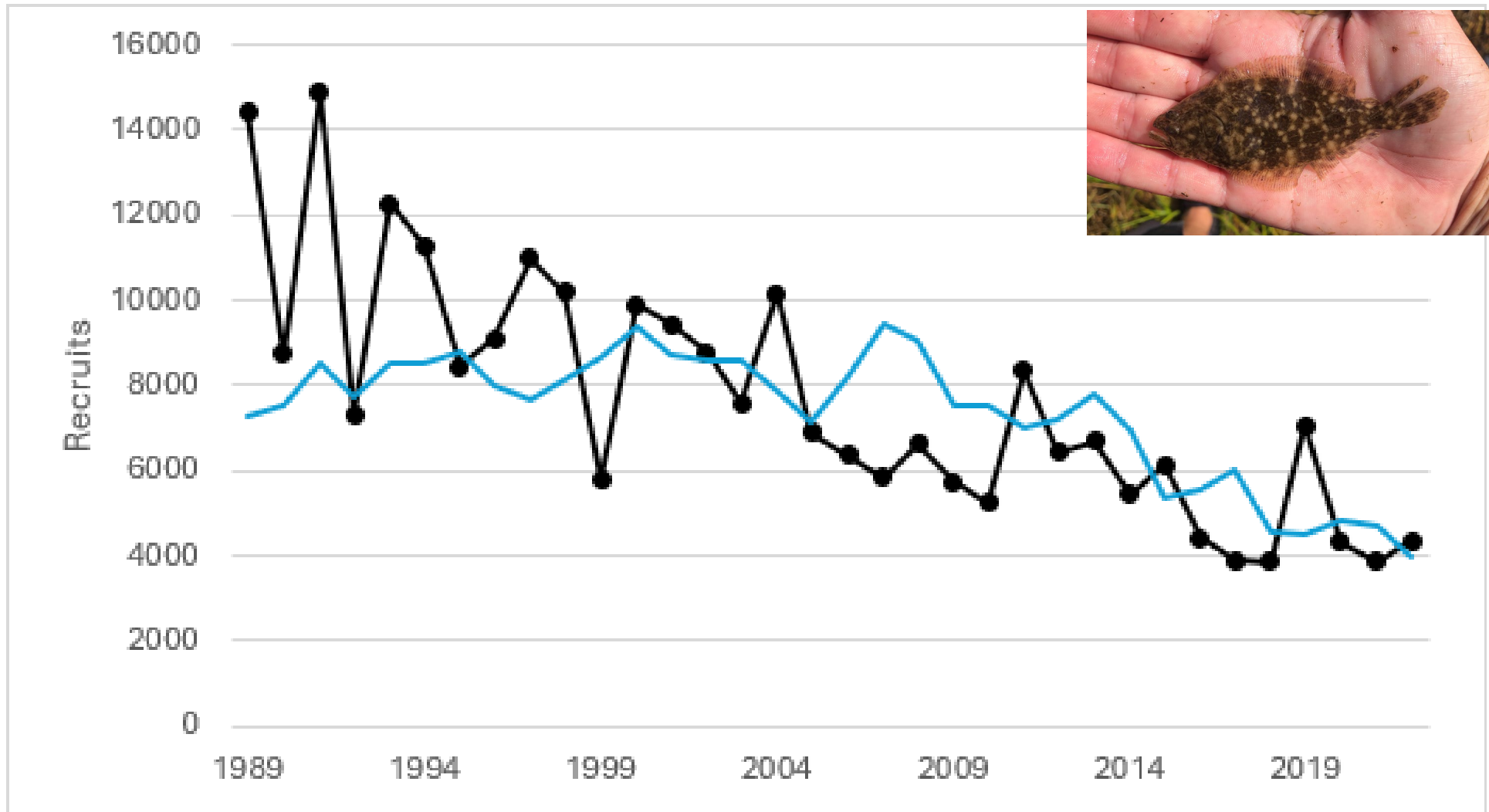


Commercial Shrimp Trawl Bycatch Fleet All States Combined



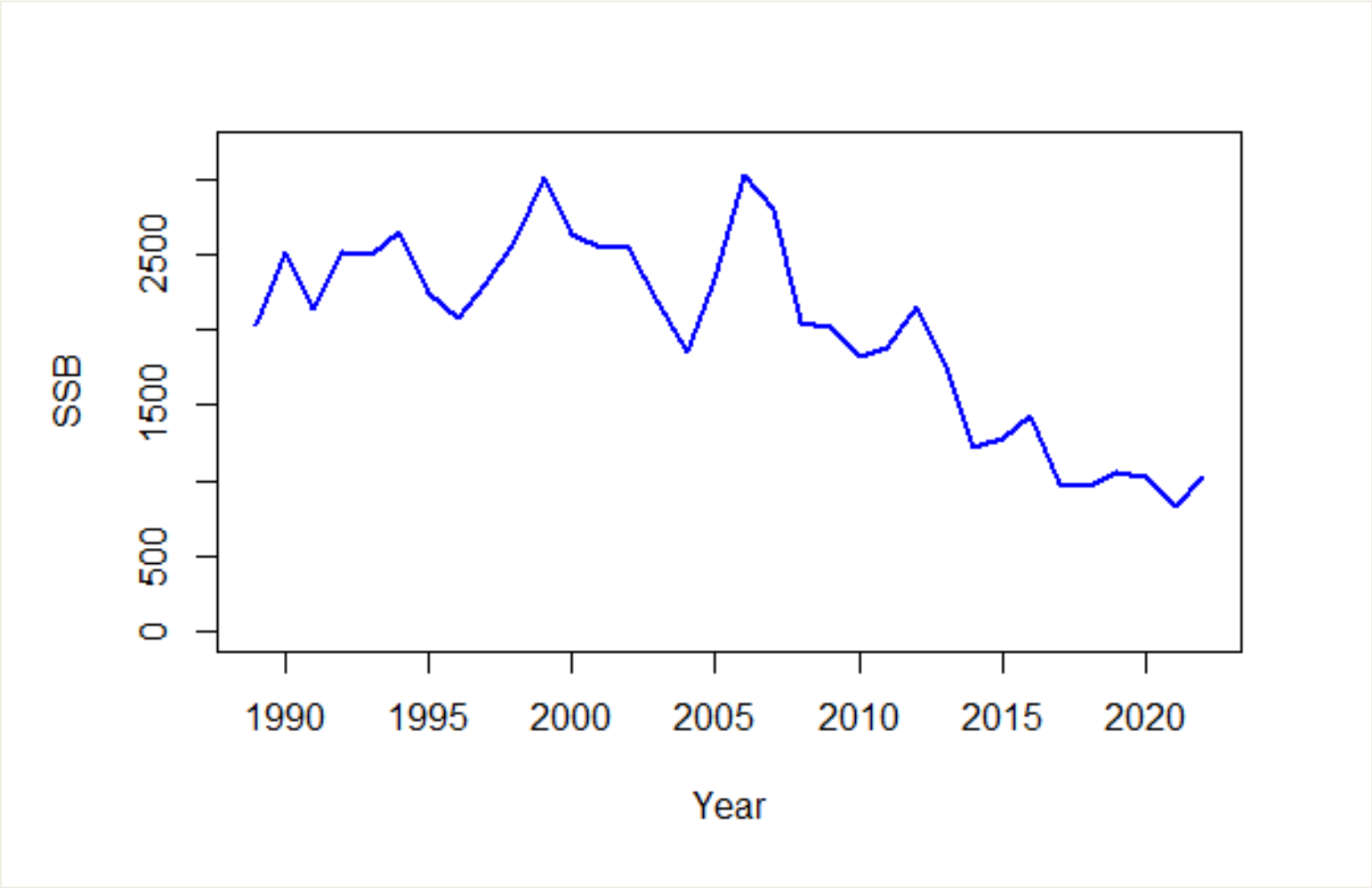
Results



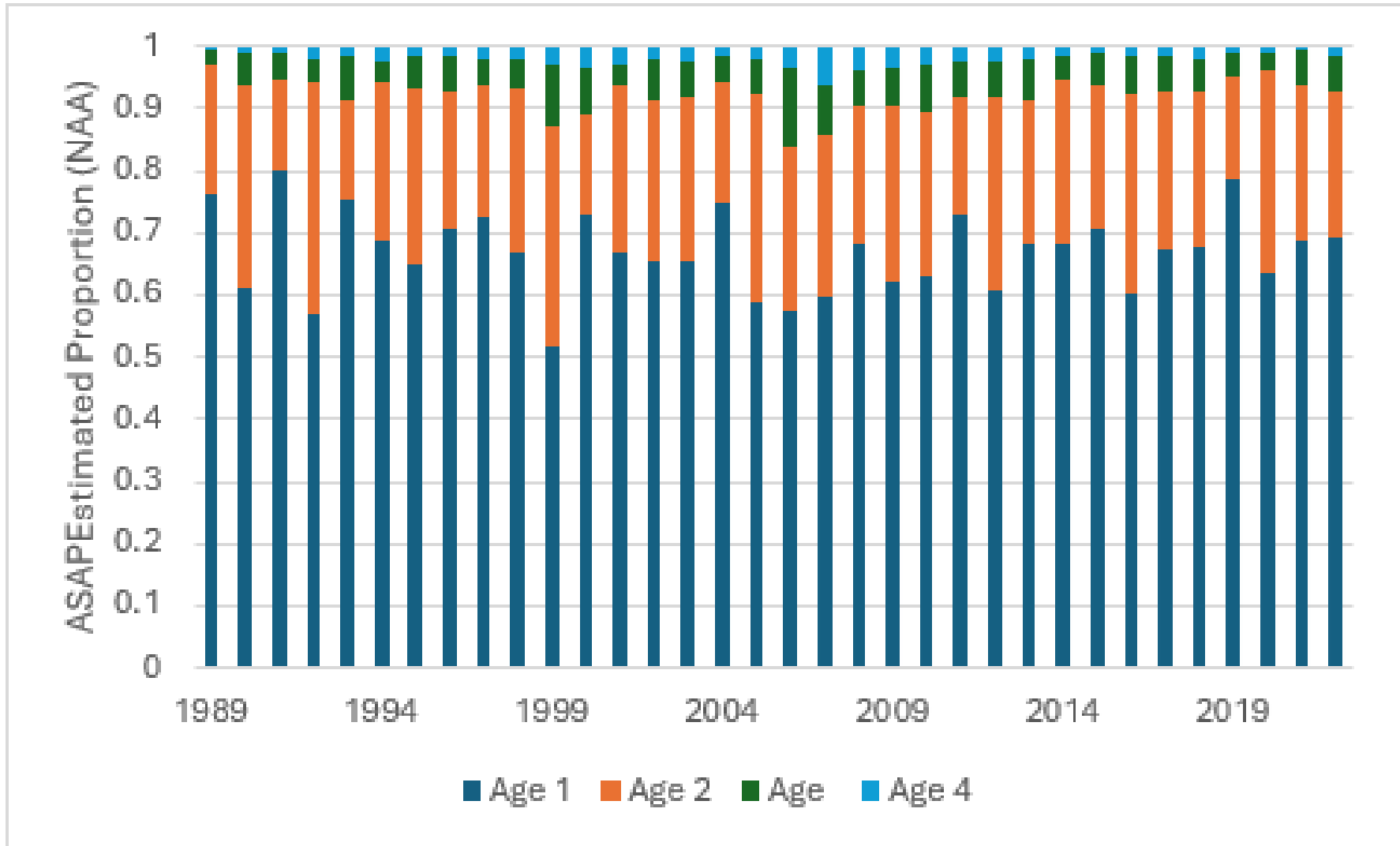


Results: Recruitment (Age 1)

Results: Female Spawning Stock Biomass



Results: Numbers at age



Stock Status



Reference Points

- Female Spawning Stock Biomass (SSB)
 - Target: $SSB_{35\%}$
 - Threshold: $SSB_{25\%}$
- Fishing Mortality (F)
 - Target: $F_{35\%}$
 - Threshold: $F_{25\%}$



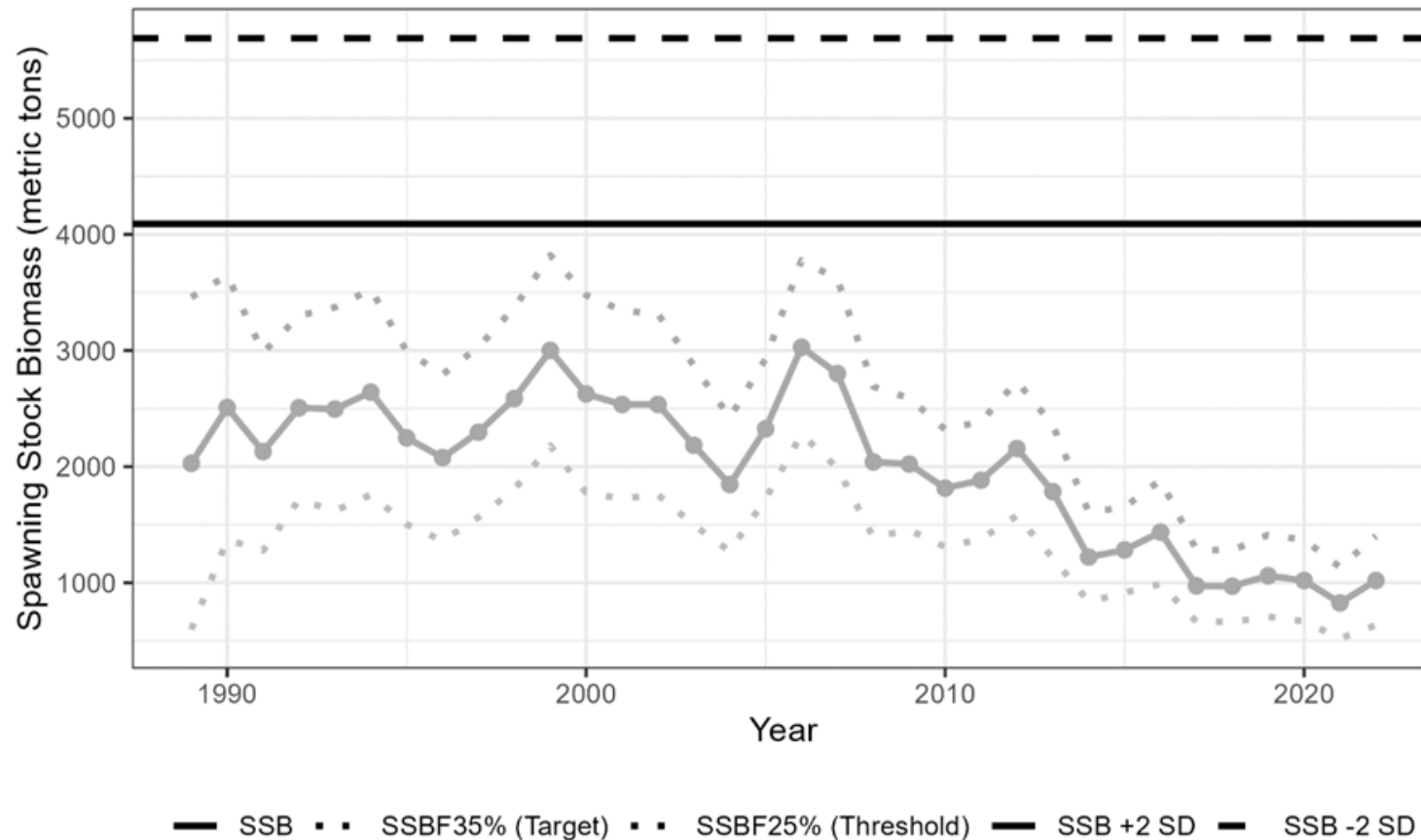
Determining Stock Status

- Female Spawning Stock Biomass (SSB)
 - If current stock size $<$ threshold ($SSB_{25\%}$), then stock is **overfished**
- Fishing Mortality (F)
 - If current $F >$ threshold ($F_{25\%}$), then **overfishing** is occurring



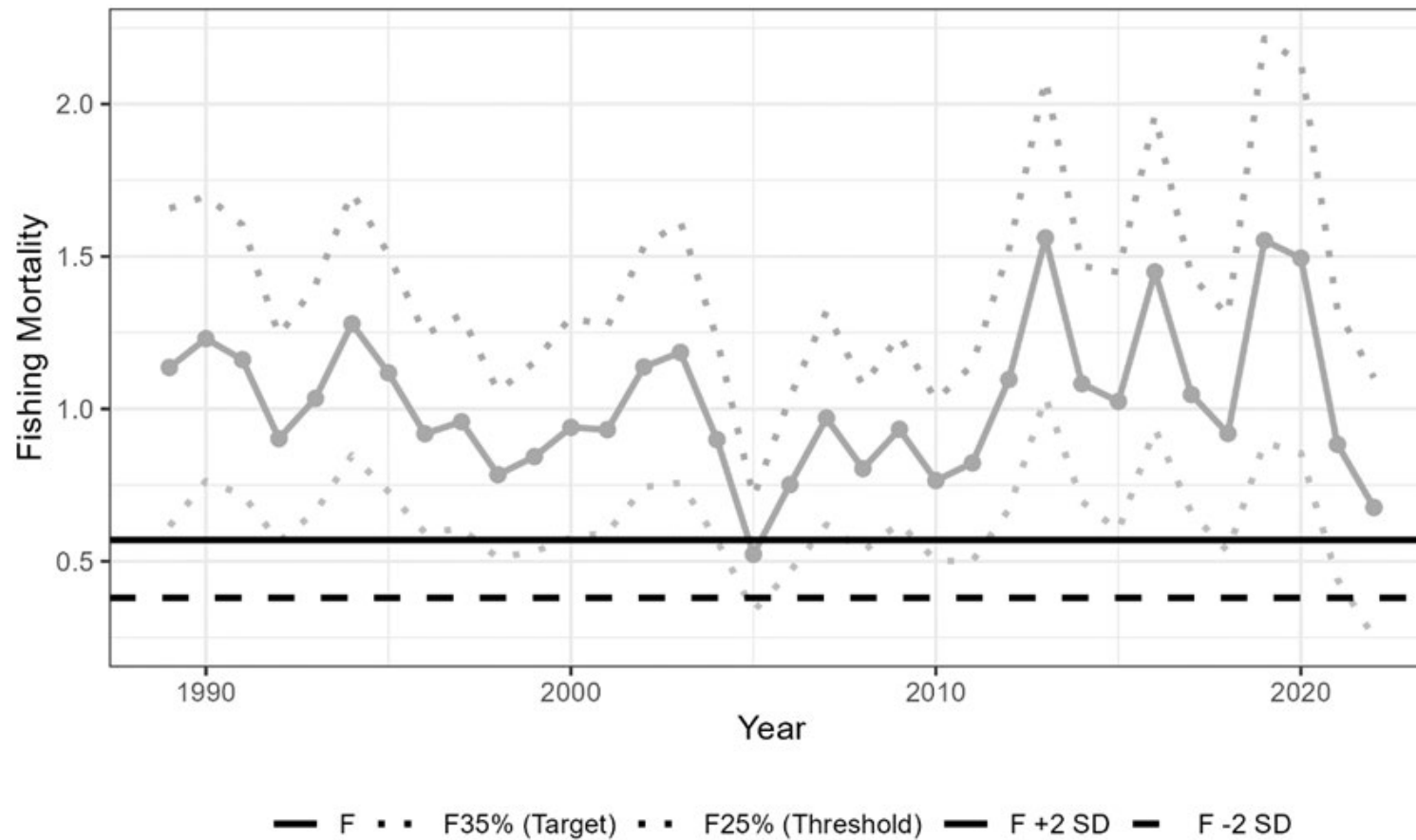
Spawning Stock Biomass

- **Overfished** (100% probability)
- 2022 spawner abundance 1,019 mt, which is less than threshold 4,092 mt
- **All states** in unit stock are overfished



Fishing Mortality

- **Overfishing** (63.4% probability)
- 2022 fishing mortality 0.68, which is greater than threshold 0.57
- **All states** in unit stock are experiencing overfishing



Conclusions



Conclusions

- Stock is overfished
- Stock is experiencing overfishing
- Large proportion of smaller/younger fish comprise landings
- No evidence of recent high recruitment



Concerns

- Scaling of reference points
- Current model constrained in accounting for changes in selectivity
- Not enough time has elapsed since management implementation
- Recommend a benchmark stock assessment no earlier than terminal year 2026



Questions?

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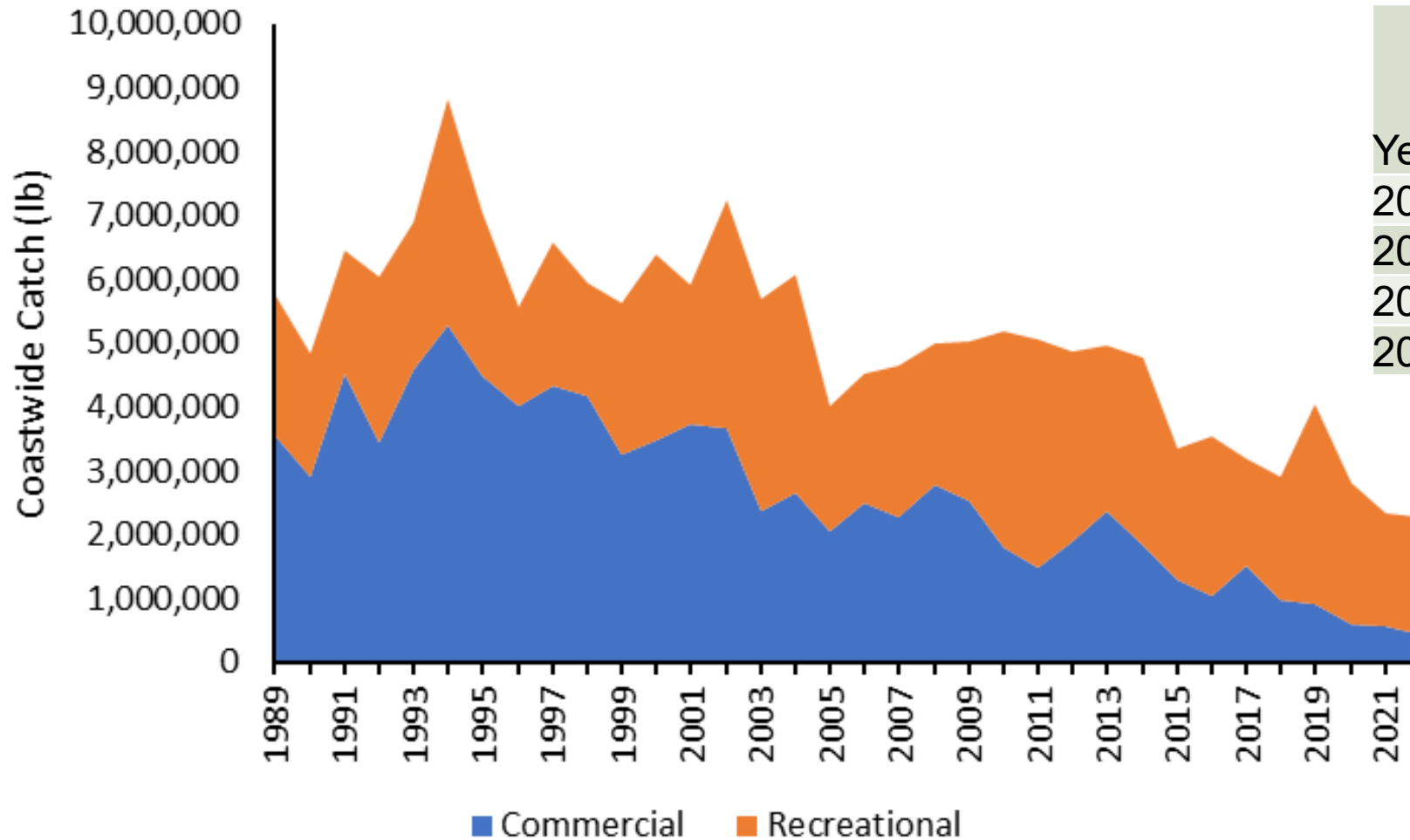


Other State Regulations

State	Size Limit	Daily Bag Limit	Commercial Trip Limits	Seasons	Management Effective Date
South Carolina	16"	5 per person per day—not to exceed 10 per boat per day	Commercial fishermen are held to recreational limits, trawling and trapping are exempt.	Open all year	July 2021
Georgia	12"	15 per person per day	Commercial fishermen must abide by season, creel, and size limits.	Open all year	1998
Florida	14"	5 per person per day	Commercial trip and vessel limit 150 fish from Dec. 1– Oct. 14, and 50 fish from Oct 15.–Nov. 30; a federal waters trawl bycatch limit of 150 flounder/trip from Dec. 1–Oct. 14, and 50 fish/trip from Oct. 15–Nov.	Oct. 15–Nov. 30 recreational closed season	March 2021

Coastwide Reductions Compared to 2017

2017 Total Catch= 3,204,121 lb



Year	Total Catch (lb)	Percent Reduction Compared to 2017 Catch
2019	4,031,796	26
2020	2,811,304	-12
2021	2,351,446	-27
2022	2,280,587	-29



State Specific Reductions Compared to 2017

Year	NC	SC*	GA*	FL*
2017	1,945,052	439,262	151,275	654,261

Year	NC	SC*	GA*	FL*
2019	-34.9	-41.2	0.1	259.5
2020	-51.6	-32.9	57.3	103.6
2021	-39.8	-6.0	72.7	-14.7
2022	-70.6	26.2	50.8	37.5



Study Details			Bycatch Characteristics	southern flounder
Study 1 Brown 2009	Study Period	7/2007 – 6/2008	Percent of Catch	<1%
	Area Fished	Ocean	Size Range	<355 mm
	Fishing Days Observed	143 (trips)	At-net Mortality	n/a
	Trawl Type	Otter		
	Number of Tows Sampled	314		
Study 2 Brown 2010	Study Period	7/2009 – 12/2009	Percent of Catch	<1%
	Area Fished	Pamlico Sound	Size Range	130 – 180 mm
	Fishing Days Observed	66 (trips)	At-net Mortality	n/a
	Trawl Type	Otter		
	Number of Tows Sampled	191		
Study 3 Brown 2015	Study Period	8/2012 – 8/2015	Percent of Catch	<1 – 2%
	Area Fished	Estuary and Ocean	Size Range	100 – 300 mm
	Fishing Days Observed	388	At-net Mortality	0 – 88%
	Trawl Type	Otter		
	Number of Tows Sampled	1,037		
Study 4 Brown 2016	Study Period	1/2015 – 11/2015	Percent of Catch	<1%
	Area Fished	Estuary	Size Range	80 – 130 mm
	Fishing Days Observed	62	At-net Mortality	
	Trawl Type	Skimmer		
	Number of Tows Sampled	238		
Study 5 Brown 2017	Study Period	1/2016 – 12/2016	Percent of Catch	<1%
	Area Fished	Estuary and Ocean	Size Range	-
	Fishing Days Observed	72	At-net Mortality	-
	Trawl Type	Otter and Skimmer		
	Number of Tows Sampled	218		
Study 6 Brown 2018	Study Period	7/2017 – 12/2017	Percent of Catch	<1 – 1%
	Area Fished	Estuary and Ocean	Size Range	-
	Fishing Days Observed	25	At-net Mortality	-
	Trawl Type	Otter and Skimmer		
	Number of Tows Sampled	70		

*Brown Studies
(Table 2.4.1
Shrimp Plan
Amendment 2)*