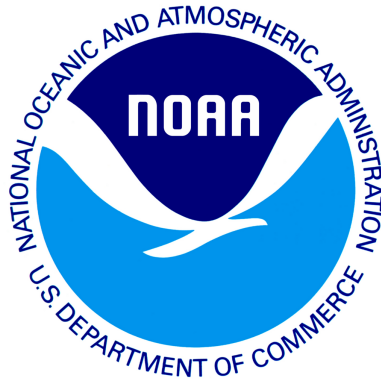


draft working paper for peer review only



Black Sea Bass

2024 Management Track Assessment Report

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National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts

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This assessment of the Black Sea Bass (*Centropristis striata*) stock is a Level-2 2024 management track assessment which updates the 2023 research track assessment model using the WHAM framework to fit a spatially explicit model specified for two regions, North or South of Hudson Canyon. Prior to the 2023 research track, the last management track assessment for this stock was in 2021, using data through 2019 (NEFSC 2022). Based on the 2021 management track assessment the stock was not overfished, and overfishing was not occurring. Stock status was not part of the terms of reference for the 2023 research track. This assessment updates commercial and recreational fishery catch data, survey indices of abundance, weights and maturity at age, and the spatially explicit WHAM assessment model and reference points through 2023. Additionally, stock projections have been updated through 2026. This report reflects recommendations made during the research track peer review December 5-7, 2023.

State of Stock: Based on the management track assessment, the Black Sea Bass (*Centropristis striata*) stock is not overfished and overfishing is not occurring (Figures 1-2). Spawning stock biomass (SSB) in 2023 was estimated to be 24,572 (mt) which is 219% of the biomass target (SSB_{MSY} proxy = 11,225; Figure 1). The 2023 fully selected fishing mortality was estimated to be 0.82 which is 77% of the overfishing threshold proxy (F_{MSY} proxy = 1.071; Figure 2).

Table 1: Catch and status table for Black Sea Bass. All weights are in (mt) recruitment is in (000s) and F_{Full} is the fishing mortality on fully selected individuals (age 8). Model results are from the current management track assessment.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	<i>Data</i>									
Commercial catch in North	1,008	1,097	1,389	2,346	1,903	1,986	1,712	1,777	2,439	2,079
Recreational catch in North	3,332	4,341	5,964	5,063	3,375	4,148	4,069	4,521	3,310	2,666
Commercial catch in South	486	368	309	368	301	512	584	695	634	608
Recreational catch in South	827	637	832	1,579	1,160	1,078	1,426	2,524	2,059	2,330
Catch for Assessment	5,653	6,444	8,494	9,355	6,739	7,724	7,790	9,518	8,442	7,683
	<i>Model Results</i>									
Spawning Stock Biomass	18,394	16,825	18,112	17,606	18,532	20,128	20,789	23,512	24,680	24,572
F_{Full}	0.871	0.908	1	1.328	0.934	1.034	1.025	1.074	0.888	0.825
Recruits (age 1)	24,438	26,400	60,657	34,300	17,069	42,494	42,800	28,143	56,405	60,230

Table 2: Comparison of reference points estimated in the 2021 management track assessment and the current management track assessment. An $F_{40\%}$ proxy was used for the overfishing threshold and was based on average recruitment since 1999. It is difficult to compare the $F_{40\%}$ between the two models because of how fundamentally differently they were calculated. In this management track assessment, F is the fully selected fishing mortality summed across regions and fleets and reflects a maximum value.

	2021	2024
F_{MSY} proxy	0.46	1.07
SSB_{MSY} (mt)	14,092	11225 (8273 - 15229)
MSY (mt)	4,773	3649 (2681 - 4966)
Median recruits (age 1) (000s)	32,088	33,571
<i>Overfishing</i>	No	No
<i>Overfished</i>	No	No

Projections: Short term (three year) projections were conducted in WHAM, which propagates uncertainty in the fleet selectivity, numbers at age, and environmental covariates. For projection specifications, recruitment was averaged for years after 1999 and the most recent 5-year average of age specific maturity, weight-at-age, fleet selectivity, and natural mortality estimates were used, and the ABC catch was used in the first projection year followed by F_{MSY} proxy in subsequent years.

Table 3: Short term projections of total fishery catch and spawning stock biomass for Black Sea Bass based on a harvest scenario of ABC as an interim catch for 2024 and F_{MSY} proxy for 2025-2026. Catch in 2024 was assumed to be 7557 (mt).

Year	Catch (mt)	SSB (mt)	F_{Full}
2024	7557	20987 (9701 - 45407)	1.036
Year	Catch (mt)	SSB (mt)	F_{Full}
2025	6193	17442 (6043 - 50338)	1.071
2026	4916	14024 (4195 - 46882)	1.071

Special Comments:

- What are the most important sources of uncertainty in this stock assessment? Explain, and describe qualitatively how they affect the assessment results (such as estimates of biomass, F, recruitment, and population projections).

The largest source of uncertainty is the NEFSC bottom trawl survey data in spring 2023, which only surveyed on Georges Bank and therefore lacked index information for the Gulf of Maine, Southern New England, or the Southern region between Hudson Canyon to Cape Hatteras. The bottom trawl survey is only one of several that inform the model-based index time series used in assessment (VAST), but its spatial (area weighting = 0.8) and temporal (60 year) coverage make it highly influential. The VAST index value in the South for 2023 was the greatest in the time series, likely driving the upward trend in the most recent years. Sensitivity tests were done to exclude the VAST index in either the South or from both regions but neither changed the stock status. Another source of uncertainty stemmed from the fact that no length information on individuals in the unclassified market category have been sampled since 2020. Calculating the catch at length for 2021-2023 necessitated borrowing information from before 2020 which introduces additional uncertainty. The 2023 research track peer review panel requested sensitivity tests on the natural mortality rate (fixed at 0.4), the estimated initial fishing mortality rate and the influence of individual indices on the model results. These sensitivity tests were performed for the accepted research track model and the updated 2024 management track model. The results of sensitivity tests are included in the supplemental materials.

- Does this assessment model have a retrospective pattern? If so, is the pattern minor, or major? (A major retrospective pattern occurs when the adjusted SSB or F_{Full} lies outside of the approximate joint confidence region for SSB and F_{Full}).

The 7-year Mohn's ρ , relative to SSB, was -0.462 in the North and 0.155 in the South in the 2021 assessment and was 0.042 in the North and -0.167 in the South in 2023. The 7-year Mohn's ρ , relative to F, was 0.615 in the North and -0.156 in the South in the 2021 assessment and was -0.02 in the North and 0.117 in the South in 2023. There was not a major retrospective pattern for this assessment because the ρ adjusted estimates of 2023 SSB ($SSB_{\rho}=26433$) and 2023 F ($F_{\rho}=0.808$) were inside the approximate 90% confidence regions around SSB (18,392 - 38,212) and F (0.575 - 1.14). No retrospective adjustment of spawning stock biomass or fishing mortality in 2023 was required.

- Based on this stock assessment, are population projections well determined or uncertain? If this stock is in a rebuilding plan, how do the projections compare to the rebuilding schedule?

Population projections for Black Sea Bass are reasonably well determined. The projected biomass from the

2021 management track assessment was within the 95% confidence bounds of the biomass estimated in the current assessment. This stock is not in a rebuilding plan.

- Describe any changes that were made to the current stock assessment, beyond incorporating additional years of data and the effect these changes had on the assessment and stock status.

No changes were made to the accepted 2023 research track assessment, other than the incorporation of 2022-2023 data. However, because the research track assessment is not used to determine stock status, the comparisons of reference points, biomass, fishing mortality, and recruitment herein are made to the 2021 management track assessment results which may explain some of the discrepancy in results.

- If the stock status has changed a lot since the previous assessment, explain why this occurred.

The stock status of Black Sea Bass did not change since the previous assessment (the 2021 management track assessment).

- Provide qualitative statements describing the condition of the stock that relate to stock status.

The Black Sea Bass stock shows consistently strong levels of recruitment that have sustained a high spawning stock biomass in the North and have increased the spawning stock biomass in the South. This pattern influences the age structure in the North and South, with a higher percentage of older age classes (6-8) in the previous 10 years than is observed earlier in the time series.

- Indicate what data or studies are currently lacking and which would be needed most to improve this stock assessment in the future.

The Black Sea Bass assessment could be improved with sampling the length composition of the unclassified market category. Care should be taken to continue the existing sampling regime of the NEFSC Bottom Trawl survey as these data are an invaluable source of fisheries-independent information to inform abundance. The research track assessment in 2023 strongly recommended additional research on the recreational catch-per-angler survey to test for hyperstability and investigate the development of a commercial CPUE index.

- Are there other important issues?

*The review panel requested several sensitivity runs related to natural mortality, initial exploitation rate, and influence of individual surveys that are available on the Stock Assessment Supplementary Information website (*SASINF*).*

References:

Northeast Fisheries Science Center (NEFSC). 2022. Management Track Assessment June 2021. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 22-10, 79 p. <https://doi.org/10.25923/4m8f-2g46>

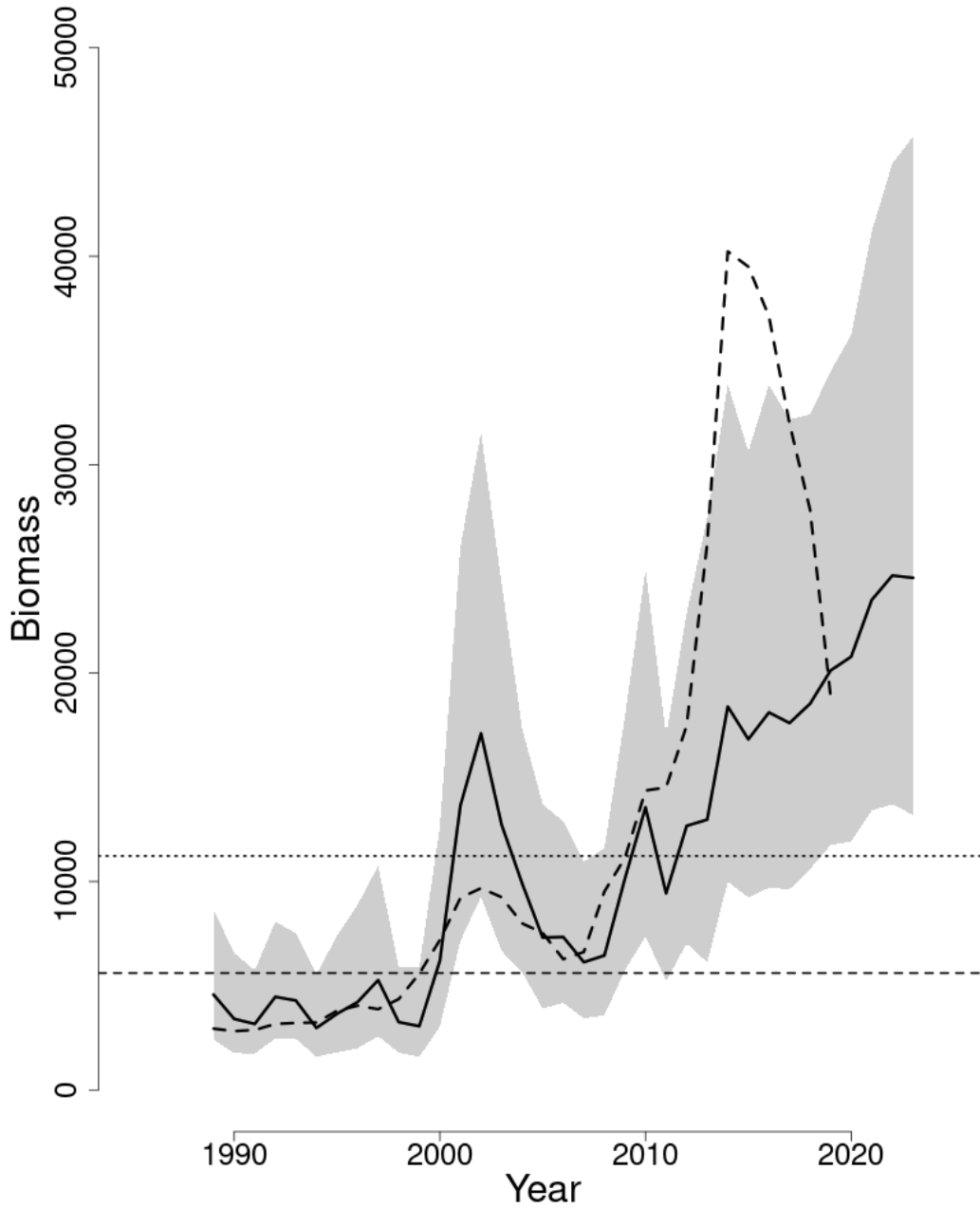


Figure 1: Trends in spawning stock biomass of Black Sea Bass between 1989 and 2023 from the current (solid line) and previous (dashed line) 2021 management track assessment and the corresponding $SSB_{Threshold} = 5,612$ ($\frac{1}{2} SSB_{MSY}$ proxy; horizontal dashed line) as well as SSB_{Target} (SSB_{MSY} proxy = 11,225; horizontal dotted line) based on the 2024 assessment. The approximate 95% lognormal confidence intervals are shown.

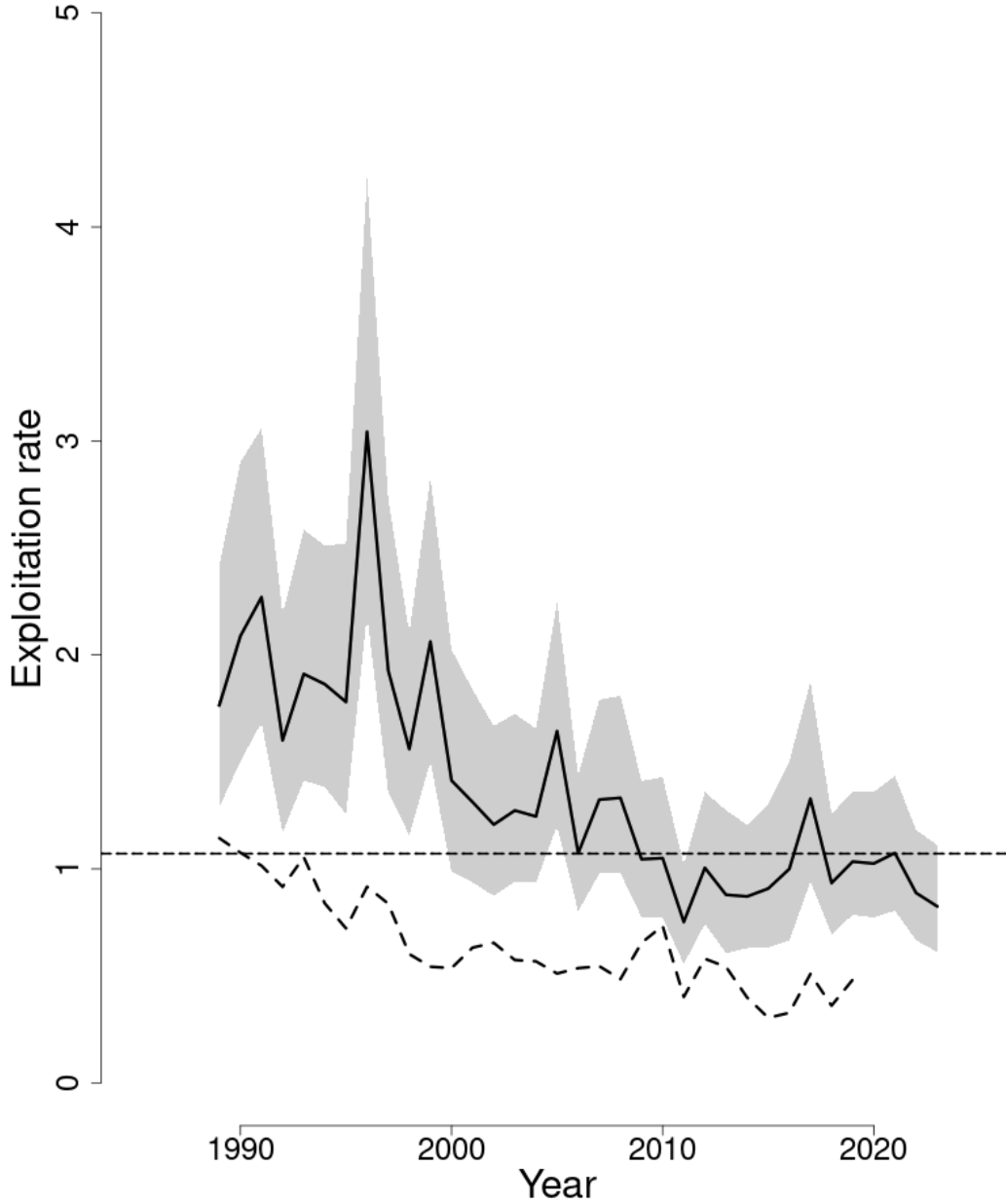


Figure 2: Trends in the fully selected fishing mortality (F_{Full}) of Black Sea Bass between 1989 and 2023 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ (F_{MSY} proxy=1.071; horizontal dashed line) based on the 2024 assessment. The approximate 95% lognormal confidence intervals are shown. It is difficult to compare the $F_{40\%}$ between the two models because of how fundamentally differently they were calculated. In this management track assessment, F is the fully selected fishing mortality summed across regions and fleets and reflects a maximum value.

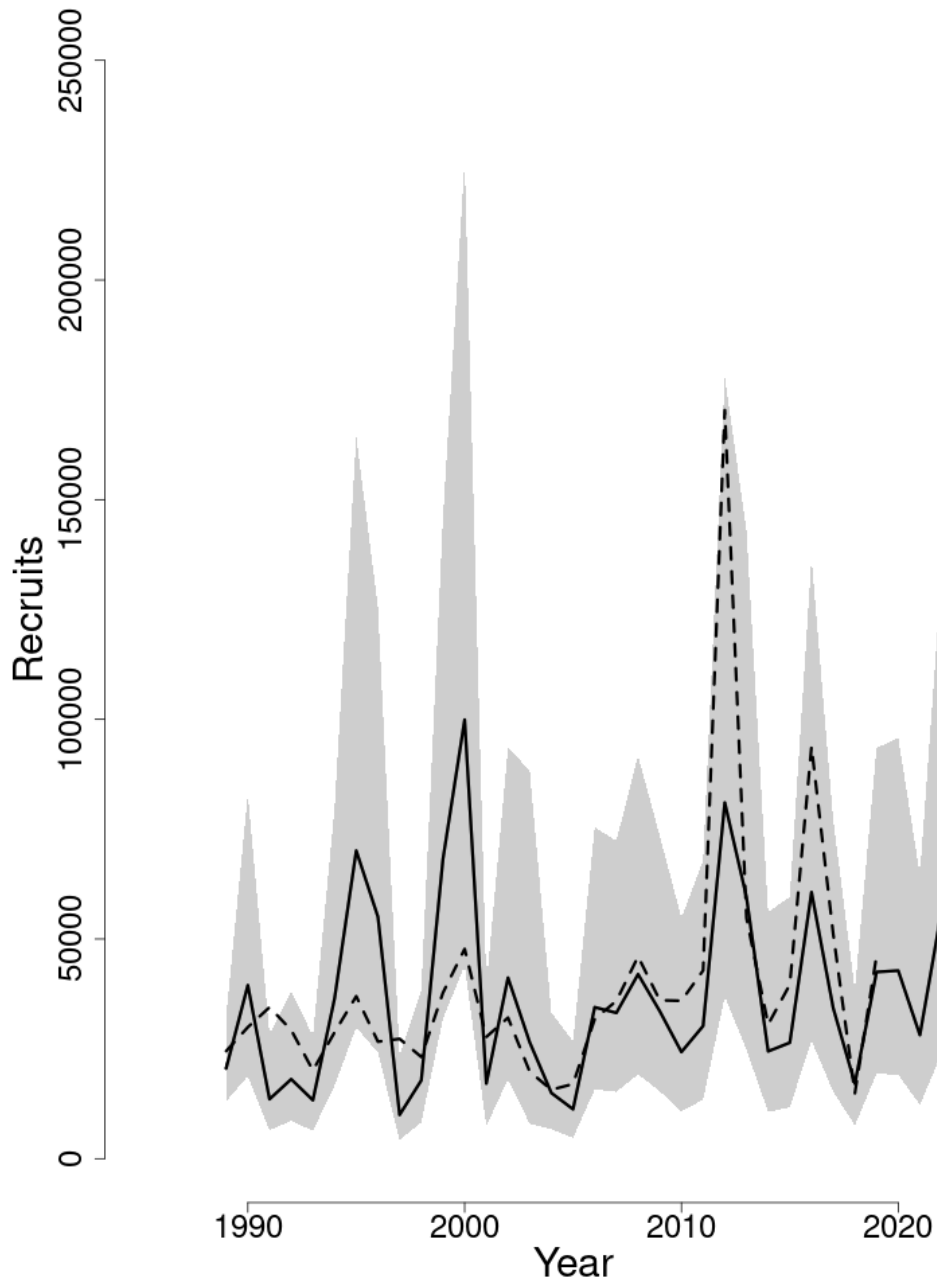


Figure 3: Trends in Recruits (age 1) (000s) of Black Sea Bass between 1989 and 2023 from the current (solid line) and previous (dashed line) assessment. The approximate 95% lognormal confidence intervals are shown.

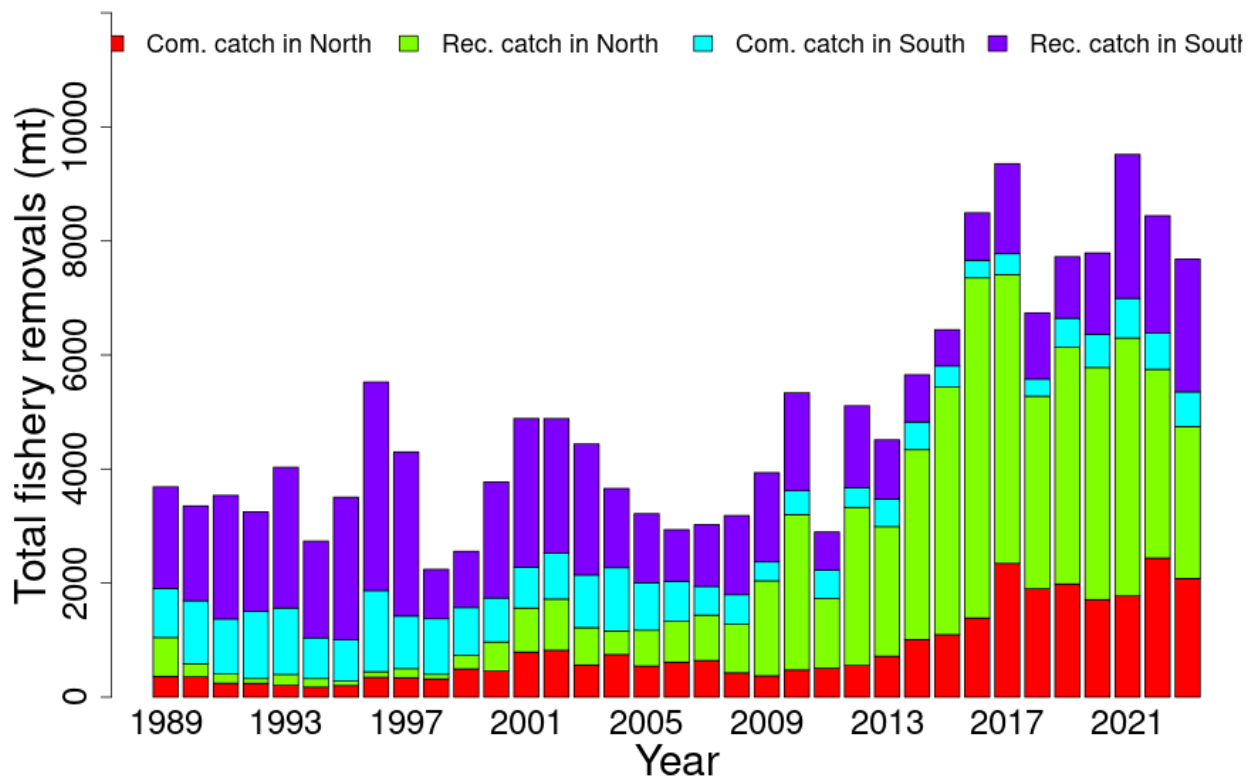


Figure 4: Total catch of Black Sea Bass between 1989 and 2023 by fleet (commercial or recreational) and region (North or South).

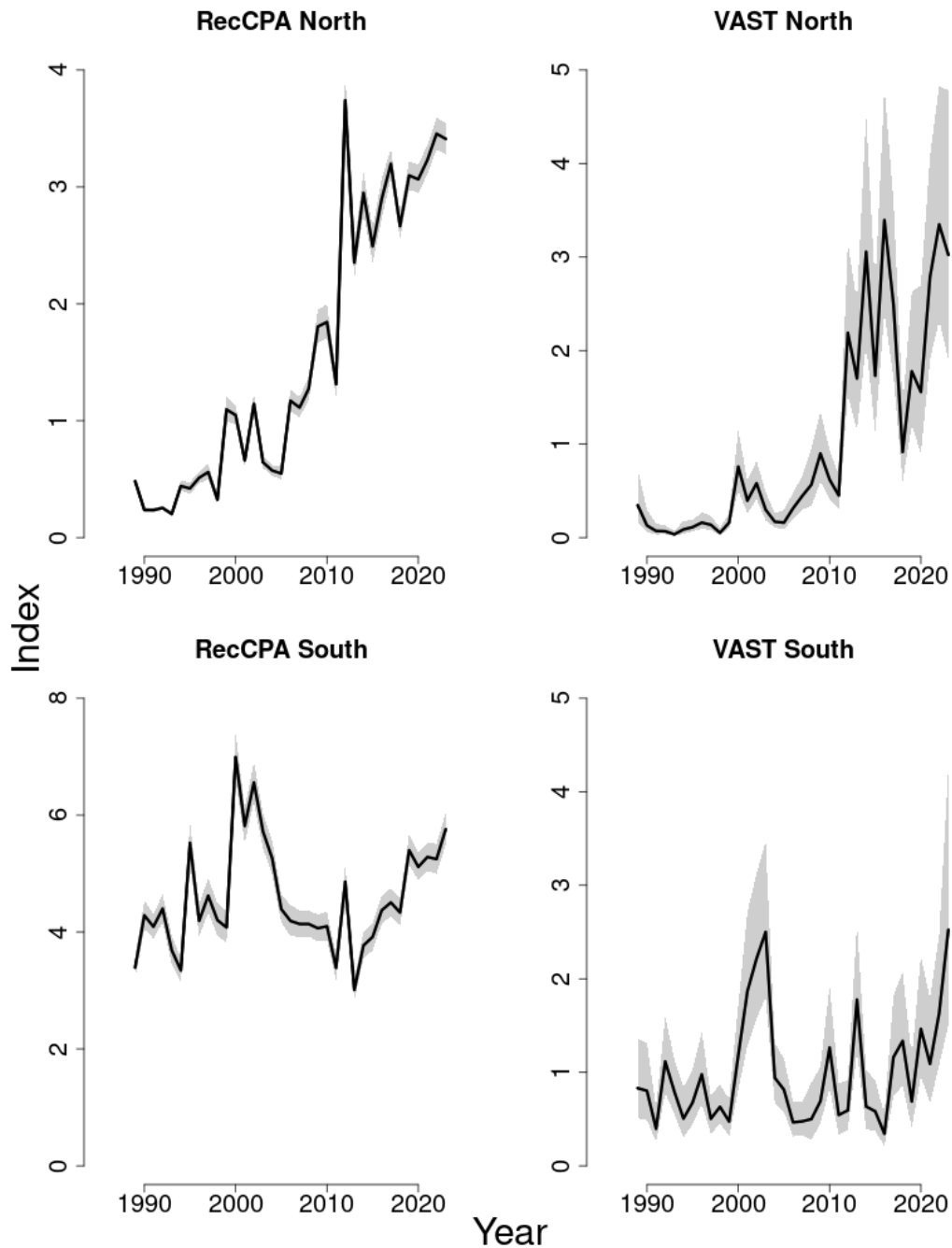


Figure 5: Indices of abundance for Black Sea Bass between 1989 and 2023 for the recreational catch-per-angler (RecCPA) and the Vector Autoregressive Spatio-Temporal Model (VAST) model in the North and South regions. The approximate 95% lognormal confidence intervals are shown.