

Interim Assessment Report South Atlantic Vermilion Snapper

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INTRODUCTION

In an attempt to improve efficiency and increase assessment throughput, catch advice for South Atlantic Vermilion Snapper is being provided using an index-based approach. Using this approach, one computes an adjustment to catch advice from a recent index of abundance. The adjustment is computed from the ratio of recent index values to a reference index value. The reference value corresponds to a benchmark or target from the stock assessment.

This report documents the application of an index-based approach for the South Atlantic Vermilion Snapper stock. It then compares projected values of catch and a fishery independent index from the recent assessment with empirical estimates, to evaluate the performance of projections and recent management.

MATERIALS AND METHODS

Methods for computing adjustments to catch advice are based on Huynh et al. (2020, their Eq. 6 and 7). These authors presented methods of scaling a reference catch (C_{ref}) by an

index based adjustment a . These methods incorporate uncertainty in the index into computation of a by using a recent average index value (\tilde{I}_{rcn}), rather than the value from a single year, and by including a measure of index error ($\hat{\sigma}$) in the calculation (see below).

In the current method, the adjustment a is computed as the ratio of an average of the $n_{\text{yr}} = 3$ most recent years of the abundance index (\tilde{I}_{rcn}) and the reference year (I_{ref}):

$$a = \frac{\tilde{I}_{\text{rcn}} + \hat{\sigma}}{I_{\text{ref}} + \hat{\sigma}} \quad (1)$$

The inclusion of index error $\hat{\sigma}$ into both the numerator and denominator of Eq. 1 lessens the adjustment (i.e. a closer to 1) as error in the index increases. Thus the more uncertainty there is in the reference index of abundance, the smaller the suggested change in catch advice.

The index of abundance used here was developed from the SERFS trap survey, updated through 2022 by Bubleby et al. (2023). The reference stock assessment was SEDAR 55 (SEDAR 2018), in which the SERFS trap survey was combined with video data resulting in a trap/video index (Table 1). Both indices are centered around a mean of 1. Based on guidance from Huynh et al. (2020), the standard deviation of the index, $\hat{\sigma}$, was computed as the standard deviation of the residuals from the assessment model fit to the SERFS trap/video index from SEDAR 55:

$$\hat{\sigma} = sd(I_{\text{bam,ob}} - I_{\text{bam,pr}}) \quad (2)$$

For comparison with the current SERFS trap survey index, the projected trap video index through 2023, based on the SEDAR 55 $P^* = 0.40$ projection (see SEDAR 2008, Table 21 and Fig. 58) is provided. Removals (landings and discards) estimated and projected from the SEDAR 55 assessment and current removals data downloaded from the NOAA Fisheries

One Stop Shop (accessed 2023-08-28) are also provided for comparison. Removals included commercial landings and recreational landings and discards, reported for North Carolina, South Carolina, Georgia, and Florida-East. According to the most recent data workshop for South Atlantic Vermilion Snapper (SEDAR 2008), negligible landings were reported north of the NC-VA line, so landings in South Atlantic Vermilion Snapper assessments have been restricted to these areas. Note also that although current estimates of commercial discards were not available from this source, commercial discarding was a relatively small source of fishing mortality in the last assessment (see SEDAR 2018, Table 10 and Fig. 27).

RESULTS AND DISCUSSION

Summary results for the computation of the interim adjustments are provided in Table 2. The reference value of the current index from the last year of SEDAR 55 ($y_{\text{ref}} = 2016$) was $I_{\text{ref}} = 0.88$. The average of the last three years of the index was $\tilde{I}_{\text{rcn}} = 0.96$. The value of the standard deviation of the index was $\hat{\sigma} = 0.61$. The computed adjustment value was $a = 1.05$ corresponding to an increase in catch of about 5%.

The estimate of $\hat{\sigma}$ was relatively large, due to the poor fit to the trap/video index in SEDAR 55 (Fig. 1). Difficulty fitting that index was addressed in the text of the SEDAR 55 report (SEDAR 2018) and explored through nine separate sensitivity runs including three where the index was upweighted.

Comparing the current trap index through 2016 with the SEDAR 55 estimated trap/video index showed similar differences (Fig. 2). But, the general trend in the current trap index from 2017 to 2022 is consistent with the projected index from SEDAR 55. Although the current index is considerably more variable than the predicted confidence intervals estimated.

The general agreement between the current and projected indices is probably due in part to the fact that observed removals are similar to projected removals (Fig. 3). Although the current estimated removals differed substantially from removals in SEDAR 55 prior to 2000, they are similar in years since.

These results suggest that recent management has been achieving catch levels consistent with the SEDAR 55 $P^* = 0.40$ projection, and that the projections are generally performing well. In conclusion, the computed adjustment near 1, and the agreement between the $P^* = 0.40$ projections and current landings and index data suggest that management of South Atlantic Vermilion Snapper is generally on track.

LITERATURE CITED

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- Huynh, Q. C., A. R. Hordyk, R. E. Forrest, C. E. Porch, S. C. Anderson, and T. R. Carruthers. 2020. The interim management procedure approach for assessed stocks: Responsive management advice and lower assessment frequency. *Fish and Fisheries* 21:663–679.
- SEDAR, 2008. SEDAR 17: South Atlantic Vermilion Snapper Stock Assessment Report.
- SEDAR. 2018. SEDAR 55 - South Atlantic Vermilion Snapper Assessment Report. SEDAR, North Charleston SC page 170. URL <http://sedarweb.org/sedar-55>.

TABLES

Table 1 Observed (ob) and predicted (pr) SERFS trap/video index from most recent stock assessment of South Atlantic Vermilion Snapper (bam). The current observed trap index is also provided (cur).

year	$I_{\text{cur,ob}}$	$I_{\text{bam,ob}}$	$I_{\text{bam,pr}}$
1990	0.56	0.59	1.02
1991	1.91	3.04	0.97
1992	1.38	1.12	0.87
1993	1.02	1.27	0.90
1994	2.61	2.23	0.95
1995	1.39	1.63	0.90
1996	1.30	1.12	0.80
1997	0.93	0.76	0.75
1998	0.94	0.74	0.79
1999	1.33	1.10	0.88
2000	1.41	1.39	0.93
2001	1.33	1.31	0.86
2002	1.92	1.82	0.80
2003	0.37	0.51	0.91
2004	0.54	0.68	0.96
2005	0.65	0.71	0.80
2006	0.45	0.45	0.72
2007	0.85	1.01	0.82
2008	1.02	0.97	0.94
2009	1.25	1.02	1.06
2010	0.53	0.62	1.15
2011	0.54	0.54	0.99
2012	0.37	0.41	0.92
2013	0.26	0.26	0.89
2014	0.40	0.40	0.78
2015	0.73	0.54	0.74
2016	0.88	0.77	0.75
2017	0.97		
2018	0.91		
2019	1.35		
2020			
2021	0.62		
2022	1.30		

Table 2 Index values and catch adjustments for South Atlantic Vermilion Snapper.

species	y_{ref}	I_{ref}	\tilde{I}_{rcn}	$\hat{\sigma}$	a
VermilionSnapper	2016	0.88	0.96	0.61	1.05

FIGURES

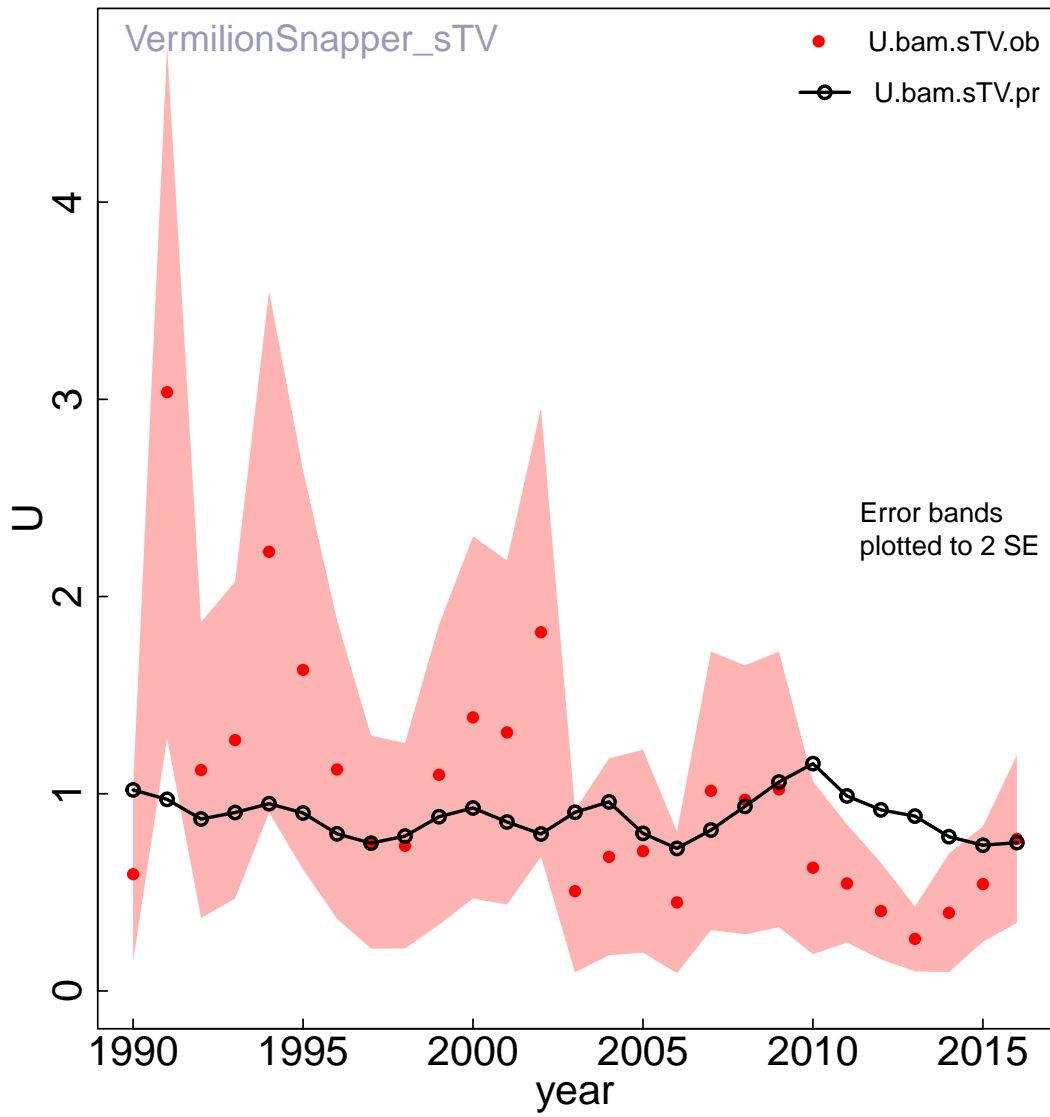


Fig. 1 Fishery independent index from the most recent stock assessment of South Atlantic Vermilion Snapper. U = index of abundance, sTV = survey Trap Video, ob = observed (filled red circles), pr = predicted (black line and open circles). For light red error bands $SE = CV * mean$.

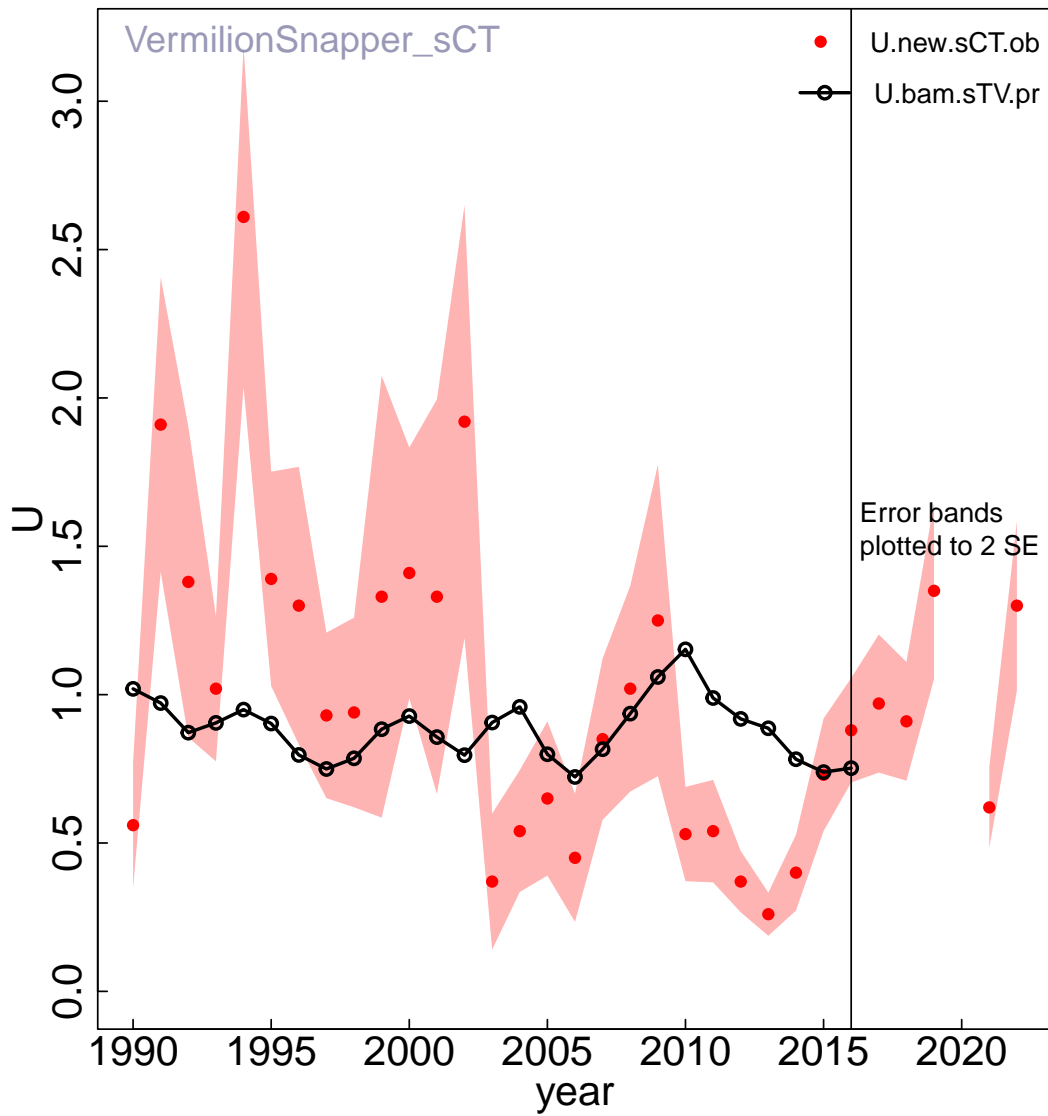


Fig. 2 Current SERFS trap index (filled red circles) for South Atlantic Vermilion Snapper and SERFS trap/video index (black line and open circles) from the most recent stock assessment of South Atlantic Vermilion Snapper . For light red error bands, $SE = CV * mean$. Blue lines represent the projected trap/video index from SEDAR 55, from the $P^* = 0.40$ projection: base = solid with points, stochastic median = dashed, stochastic 5th and 95th percentiles = dotted. U = index of abundance, sCT = survey Chevron Trap, sTV = survey Trap Video, ob = observed, pr = predicted.

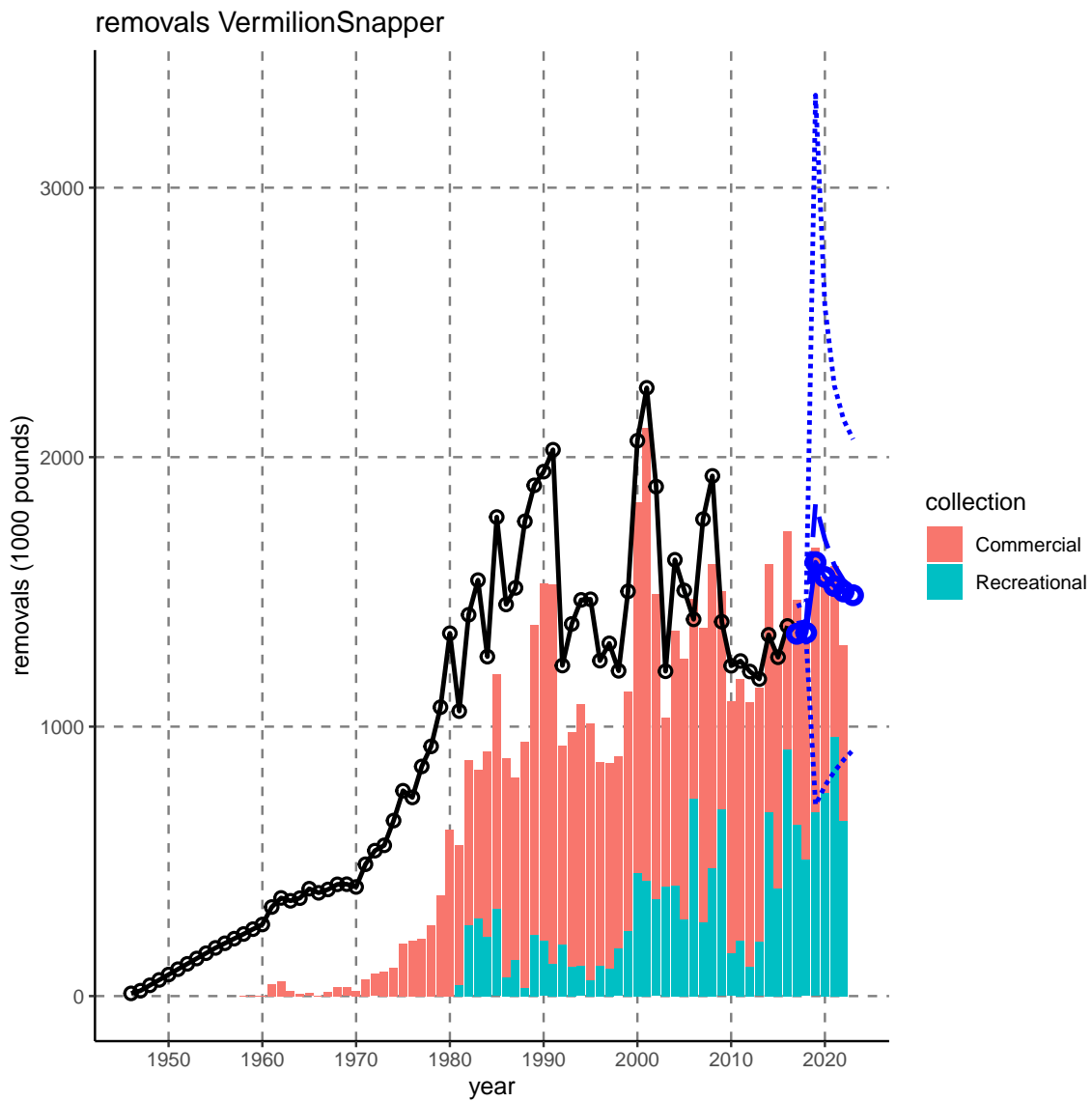


Fig. 3 Estimated removals (colored bars; commercial landings plus recreation landings and discards) for South Atlantic Vermilion Snapper, downloaded from the NOAA Fisheries One Stop Shop. The solid black line with open circles represents estimated removals (landings plus discards) from SEDAR 55. Blue lines represent the projected removals from SEDAR 55, from the $P^* = 0.40$ projection: base = solid with open circles, stochastic median = dashed, stochastic 5th and 95th percentiles = dotted.