Discards of scamp (*Rhomboplites aurorubens*) for the headboat fishery in the US South Atlantic

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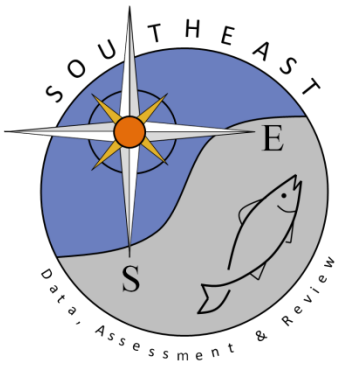

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Abstract

The Southeast Region Headboat Survey (SRHS) was modified in 2004 to collect self-reported discards for each reported trip. These self-reported data are currently not validated within the SRHS. The SRHS discard proportions were compared to the MRIP At-Sea Observer program discard proportions for validation purposes and to determine whether the SRHS discard estimates should be used for a full or partial time series (2004-2018). Discard estimates prior to 2004 are calculated using a proxy method. For scamp MRIP CH mode, MRIP PR mode, and the mean MRIP CH:SRHS discard ratio method were considered as sources for proxy discard estimates for headboat discards. Due to variability in the MRIP CH mode and PR mode discard and landings estimates, a mean SRHS discard ratio method was also considered, as well as a three year rolling average of the MRIP CH mode and mean MRIP CH:SRHS discard ratio method.

Introduction

The Southeast Region Headboat Survey (SRHS) logbook form was modified in 2004 to collect self-reported discards for each reported trip. From 2004-2012 this was described on the form as the number of fish by species released alive and number released dead. Port agents instructed each captain on criteria for determining the condition of discarded fish. A fish is considered "released alive" if it is able to swim away on its own. If the fish floats off or is obviously dead or unable to swim, it is considered "released dead". As of Jan 1, 2013 the SRHS began collecting logbook data electronically. Changes to the trip report were also made at this time, one of which removed the condition category for discards i.e., released alive vs. released dead. The new form now collects only the total number of fish released regardless of condition. These self-reported data are not currently validated within the SRHS. Due to species identification issues both scamp grouper (*Mycteroperca phenax*) and yellowmouth grouper (*Mycteroperca interstitialis*) were included in this analysis.

The MRFSS/MRIP At-Sea Observer program was launched in NC and SC in 2004 and in GA and FL in 2005 to collect more detailed information on recreational headboat catch, particularly for discarded fish. Headboat vessels are randomly selected throughout the year in each state, and the east coast of Florida is further stratified into northern and southern sample regions. Biologists board selected vessels with permission from the captain and observe a subset of anglers as they fish on the recreational trip. Data collected include number and species of fish landed and discarded.

The discard proportions (b2/ab1b2) from the SRHS were compared with the MRFSS/MFIP At-Sea Observer program discard proportions in order to assess the validity of these discard estimates. Because discards were not added to the SRHS until 2004, a proxy is used to estimate headboat mode discards for previous years and any years in which At-sea validation does not support the SRHS discard estimates. The MRIP CH mode, MRIP

PR mode, and the mean MRIP CH:SRHS discard ratio method used in SEDAR 28 (SEDAR 28-Assessment Workshop Report, 2012) were considered as sources for proxy discard estimates for headboat discards. Due to variability in the MRIP CH mode and PR mode discard and landings estimates, a mean SRHS discard ratio method was also considered, as well as a three year rolling average of the MRIP CH mode and mean MRIP CH:SRHS discard ratio method.

Methods

SRHS vs MRIP At-Sea Observer comparison

The purpose of this analysis was to validate the SRHS discard estimates and determine if these data should be used for the entire time-series (2004-2018) or for a partial time-series. In the South Atlantic, the At-Sea Observer Survey operates mainly in west Florida, with limited coverage in Alabama in certain years. No trips were sampled in the At-Sea Observer Survey in 2008. In the SRHS, 10,810 Scamp logbook records were collected in the South Atlantic from 2004-2018. Of these records, 6,692 trips reported discards of scamp. In the At-Sea Observer Program, only 237 observed trips were positive for scamp, 172 of which had scamp discards. Due to the differences in magnitude of the number of trips sampled within the At-Sea Observer Program and SRHS, the discard proportion was compared only for those trips where scamp were discarded.

Discard proxy

Several sources for proxy discard estimates were considered. In SEDAR 28 the mean MRIP CH:SRHS discard ratio method was used to mitigate the differences in magnitude between the MRIP CH discard ratios and the SRHS discard ratios. This method is currently the SEDAR Best Practice for calculating headboat discards. The MRIP CH mode (b2/ab1), MRIP PR mode (b2/ab1), and the mean MRIP CH:SRHS discard ratio method used in SEDAR 28 (SEDAR 28-Assessment Workshop Report, 2012) were considered as sources for proxy discard estimates for headboat discards. Due to variability in the MRIP CH mode and PR mode discard and landings estimates, a mean SRHS discard ratio method was also considered, as well as a three year rolling average of the MRIP CH mode and mean MRIP CH:SRHS discard ratio methods. Discard ratios for both sources were compared to the SRHS discard ratios. Additionally, a cross correlation analysis was used to first determine if lagging the discard estimates with the landings would identify a stronger relationship (strong year class in one year (discards) could be seen in following years (landings)), and secondly provide an objective approach to identify a preferred recommendation. Discards were assumed to be negligible prior to 1992 due to a lack of size limit.

Results

SRHS vs MRIP At-Sea Observer comparison

In the state of Florida the discard proportions between the SRHS and At-Sea survey matched trips have similar magnitude in 2006-2019 (Figure 1). Low sample sizes in the MRIP At-Sea Observer program could explain the differences in magnitude between the SRHS and the At-Sea program (Tables 1 and 2). Due to the very low proportion of matched trips (Table 2), the matched trips were not compared. When comparing the overall trips,

the mean (per trip) discard proportions are very in the overall trips from the At-Sea Observer program in FLE. In SC the mean (per trip) discard proportions in the At-Sea Observer program and SRHS follow the same pattern with differences in magnitude. However, in nearly all years from 2008-2018 in the At-Sea Observer program the discard proportion is greater than 0.90 and in many years is 1.0, which may indicate some observer bias.

Discard Proxy

The RWG compared the scamp discard proportions from the SRHS to the seven proxy sources. The MRIP CH discard proportions are highly variable (Figure 2, MRIP PR mode not shown), but the overall trend is similar to the SRHS discard ratio in 2004-2018. The MRIP CH:SRHS discard ratio method follows the same pattern as the MRIP CH discard ratio, but with significant increases in magnitude and variability of the estimates. The 3yr rolling averages of these two methods reduced the variability of the discard ratios, but compensate for the differences in magnitude and also potentially reduced any year class signal in the discard estimates. The cross correlation analysis determined a lag of zero had the highest correlation with the SRHS landings for the South Atlantic. The mean SRHS discard ratio (2004-2018) method had the strongest relationship with the landings with a lag of zero for the South Atlantic (Figure 3). The calculated discards using all sources are presented in Figure 4.

Discussion

SRHS vs MRIP At-Sea Observer comparison

The SRHS and MRIP At-Sea Observer discard proportions in FLE exhibit a similar magnitude and pattern from 2006-2018 in the overall trips. This validates the SRHS discard estimates in those years. The inclusion of the SRHS discard estimates in 2004-2005 eliminated the variability of the MRIP PR and CH mode discard estimates. Analysis of discard proportions in NC, SC, and GA was affected due to very low sample sizes in the At-Sea Observer program.

The following options were considered.

Option 1: Use the SRHS discard estimates in all areas 2004-2018 and the preferred proxy method 1981-2003.
Option 2: Use the preferred proxy method (to be determined by the RWG) in all areas in all years (2004-2018).

Recommendation: Option 1. The SRHS discard estimates are validated by the At-Sea Observer discard proportion comparison in FLE 2006-2018. The inclusion of the SRHS discard estimates in 2004-2005 eliminated the variability of the MRIP PR and CH mode discard estimates in those years.

Discard Proxy

The MRIP PR and CH modes showed highly variable discard ratios which did not agree with the SRHS discard ratios and therefore were not recommended for use. The variability within the MRIP CH mode discard ratios in turn affected the mean MRIP CH:SRHS discard ratio method, significantly increasing the variability and magnitude of the discard estimates. In an effort to reduce the variability of the MRIP CH mode and MRIP CH:SRHS discard ratio methods a three year rolling average discard ratio from each method was applied to the SRHS landings estimates. A mean SRHS discard:landings ratio was also examined, using a mean of years 2004-2008 and 2004-2018. The MRIP charter mode three year rolling average, mean MRIP CH:SRHS discard ratio method three year rolling average, mean SRHS discard ratio (2004-2008), and mean SRHS discard ratio (2004-2018) were compared to the SRHS discard estimates (SEDAR68-DW33, 2020). The cross correlation analysis was used to first determine if lagging the discard estimates with the landings would identify a stronger relationship (strong year class in one year (discards) could be seen in following years (landings)), and secondly provide an objective approach to identify a preferred recommendation. The following options were presented for consideration:

- Option 1: Apply the MRIP private boat discard:landings ratio to estimated headboat landings to estimate headboat discards from 1992-2003.
- Option 2: Apply the MRIP charterboat discard:landings ratio to estimated headboat landings to estimate headboat discards from 1992-2003.
- Option 3: Apply a three year rolling average MRIP charterboat discard:landings ratio to estimated headboat landings to estimate headboat discards (1992-2003).
- Option 4 - Mean MRIP CH:SRHS discard ratio method: Calculate the ratio of the mean ratio of SRHS discard:landings (2004-2018) and MRIP CH discard:landings (2004-2018). Apply this ratio to the yearly MRIP charterboat discard:landings ratio (1992-2003) to estimate the yearly SRHS discard:landings ratio (1992-2003). This ratio is then applied to the SRHS landings (1992-2003) to estimate headboat discards (1992-2003).
- Option 5: Apply a three year rolling average of the mean MRIP CH:SRHS discard ratio method to estimated headboat landings to estimate headboat discards (1992-2003).
- Option 6: Apply a mean SRHS discard:landings ratio (2004-2008) to estimated headboat landings to estimate headboat discards (1992-2003).
- Option 7: Apply a mean SRHS discard:landings ratio (2004-2018) to estimated headboat landings to estimate headboat discards (1992-2003).

Recommendation: Use the SRHS mean (2004-2018) discard ratio proxy method 1992-2003 and the SRHS discards 2004-2018. The cross correlation analysis determined a lag of zero had the highest correlation with the SRHS landings for the South Atlantic. The mean SRHS discard ratio (2004-2018) method had the strongest relationship with the landings with a lag of zero for the South Atlantic. The final SRHS discards estimates (1992-2018) and SRHS landings (1981-2018) are shown in Figure 5.

Literature Cited

SEDAR. 2013. SEDAR 28 – South Atlantic Cobia Stock Assessment Report. SEDAR, North Charleston SC. 616 pp. Available online at: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=28

Tables

Table 1. Number of scamp positive trips reported in the SRHS and number of At-Sea Observer trips positive for scamp by year and state, 2004-2018. No scamp positive trips were sampled in the At-Sea Observer program in 2004 or 2008.

	FLE		GA		SC		NC		South Atlantic	
Year	At-Sea Observer trips (n)	SRHS trips (n)	At-Sea Observer trips (n)	SRHS trips (n)	At-Sea Observer trips (n)	SRHS trips (n)	At-Sea Observer trips (n)	SRHS trips (n)	At-Sea Observer trips (n)	SRHS trips (n)
2004		299		104		175		485		1,063
2005	17	373	1	72	14	115	21	346	53	906
2006	12	338	2	87	15	120	7	449	36	994
2007	16	282		38	5	98	6	553	27	971
2008	14	457		60	13	94	4	362	31	973
2009	9	563	4	70	5	75		387	18	1,095
2010	6	363		36	6	116		420	12	935
2011	4	207	1	36	5	73	3	340	13	656
2012	1	251	1	21	6	68	2	250	10	590
2013	2	145	2	17	3	49		243	7	454
2014	4	97		13	3	70		287	7	467
2015	2	115	1	20	1	91		247	4	473
2016	1	116		12	3	72	3	281	7	481
2017	6	83		7		46	1	291	7	427
2018	1	66		16	1	31	3	212	5	325

Table 2. Proportion of scamp positive At-Sea Observer trips matched to SRHS reported trips by year and state, 2004-2018. No scamp positive trips were sampled in the At-Sea Observer program in 2004.

Year	FLE	GA	SC	NC	South Atlantic
2004	-	-	-	-	-
2005	0.008	0.014	0.017	0.043	0.023
2006	-	0.023	0.050	0.011	0.013
2007	0.004	-	0.041	0.009	0.010
2008	0.011	-	0.053	0.011	0.014
2009	0.009	0.057	-	-	0.008
2010	0.011	-	0.017	-	0.006
2011	-	0.028	0.068	0.009	0.014
2012	-	0.048	0.029	0.008	0.008
2013	-	0.118	-	-	0.004
2014	-	-	-	-	-
2015	-	0.050	-	-	0.002
2016	-	-	0.014	0.011	0.008
2017	0.024	-	-	0.003	0.007
2018	0.015	-	0.032	0.014	0.015

Figures

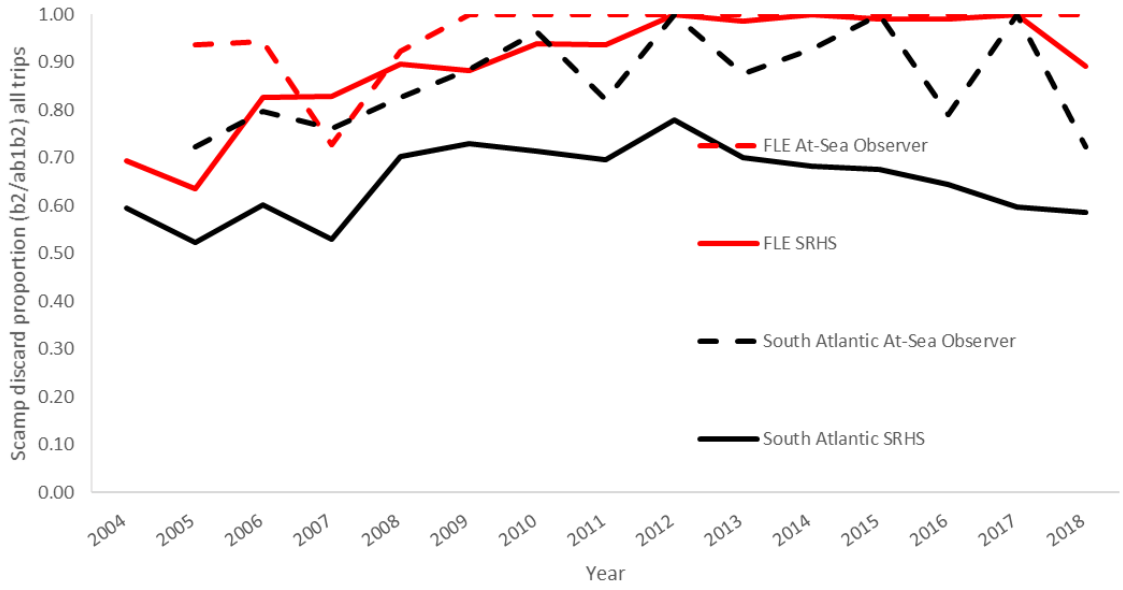

Figure 1a. Mean discard proportion per trip by year in the SRHS and At-sea Observer program in FLE and the overall South Atlantic, 2004-2018. There were no scamp positive trips sampled in the At-sea Observer program in 2004.

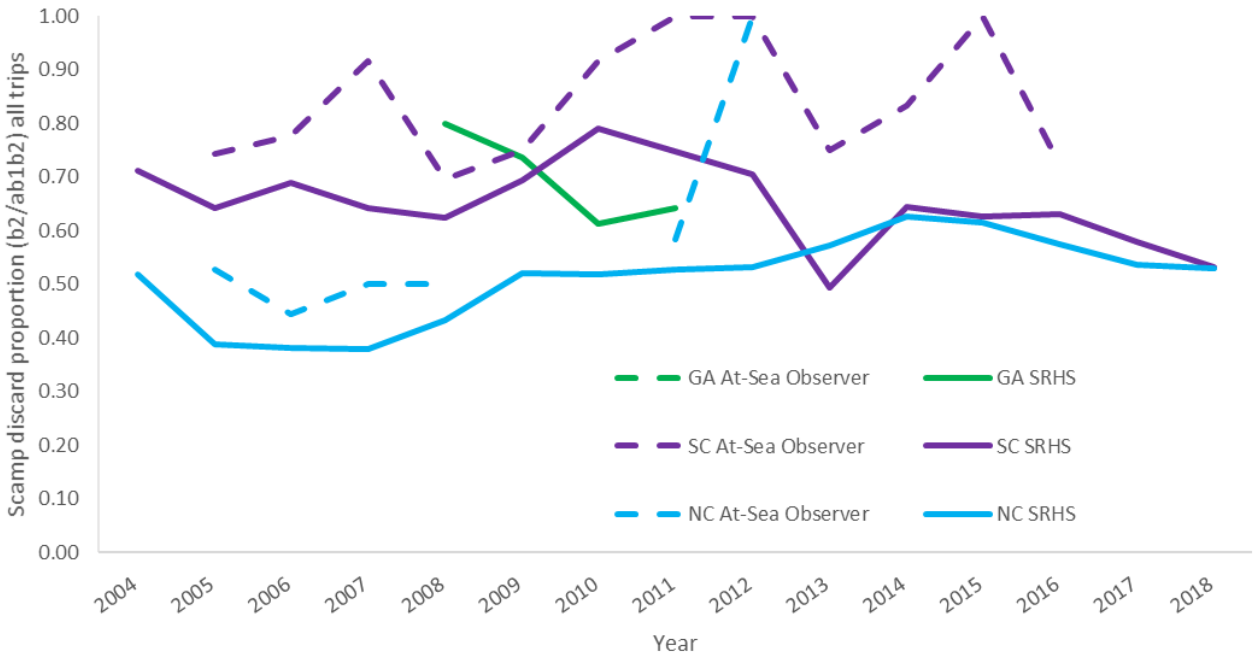

Figure 1b. Mean discard proportion per trip by year in the SRHS in NC, SC, and GA. There were no scamp positive trips sampled in the At-sea Observer program in 2004.

Figure 2. MRIP CH, mean MRIP CH:SRHS (2004-2018), MRIP CH (3yr rolling average), mean MRIP CH:SRHS (3yr rolling average, 2004-2018), SRHS (2004-2008) mean, and SRHS (2004-2018) mean discard ratio methods (1981-2018), and SRHS discard ratios (2004-2018) in NC, SC, GA, and FLE. Note differences in scale.

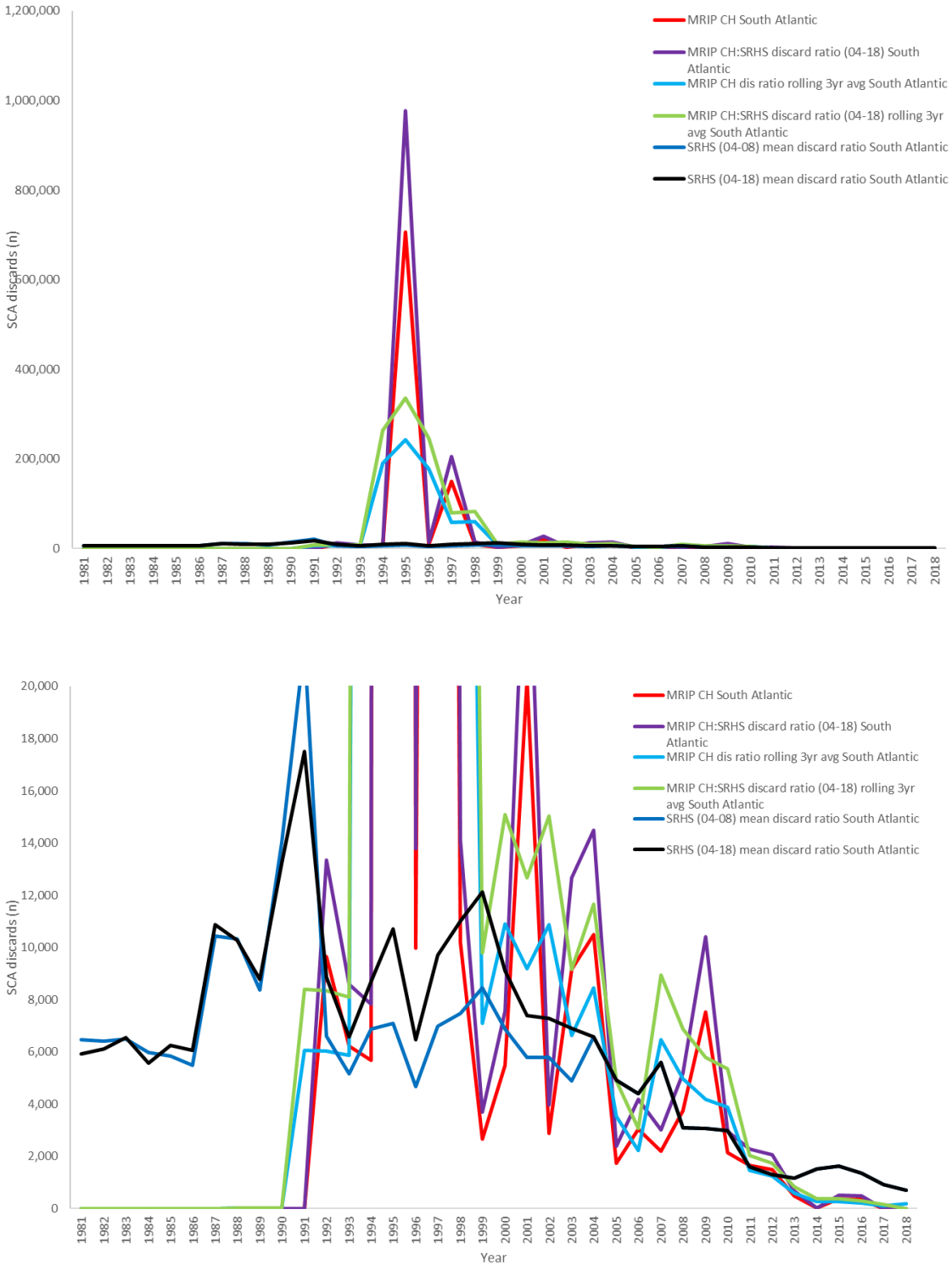

Figure 3. MRIP CH, mean MRIP CH:SRHS (2004-2018), MRIP CH (3yr rolling average), mean MRIP CH:SRHS (3yr rolling average, 2004-2018), SRHS (2004-2008) mean, and SRHS (2004-2018) mean discard proxy estimates (1981-2018), and SRHS discard estimates (2004-2018) in the South Atlantic. MRIP PR discard proxy estimates not shown.

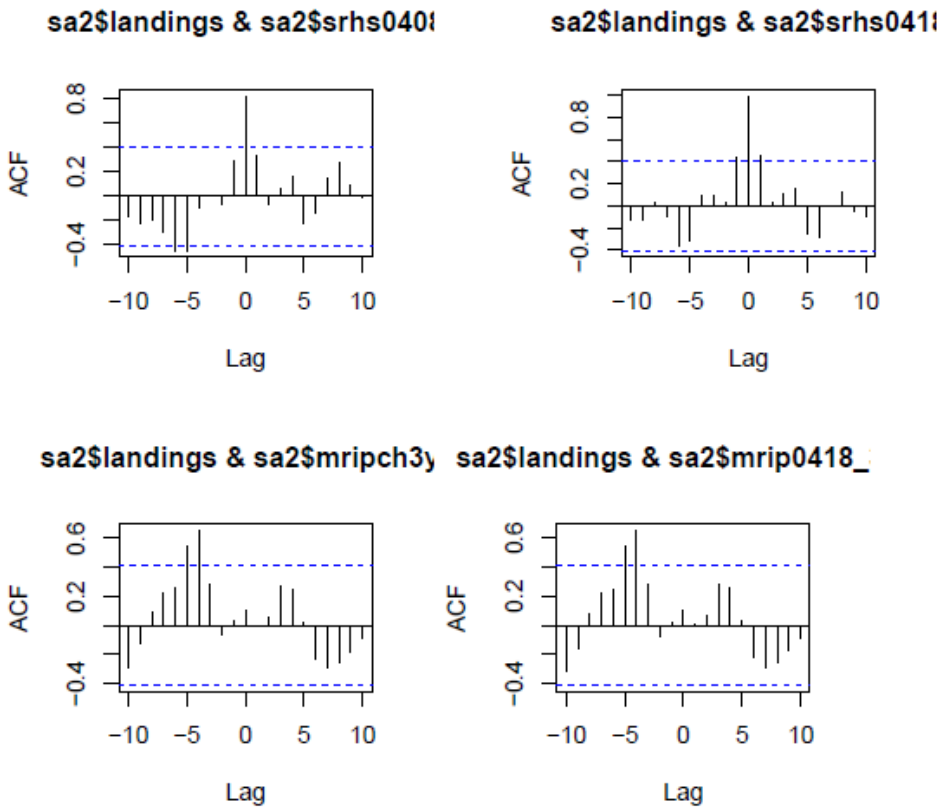

Figure 4. Cross correlation analysis comparing the SRHS (2004-2018) mean, SRHS (2004-2008) mean, MRIP CH (3yr rolling average), and mean SRHS:MRIP CH (3yr rolling average, 2004-2018) discard ratios.

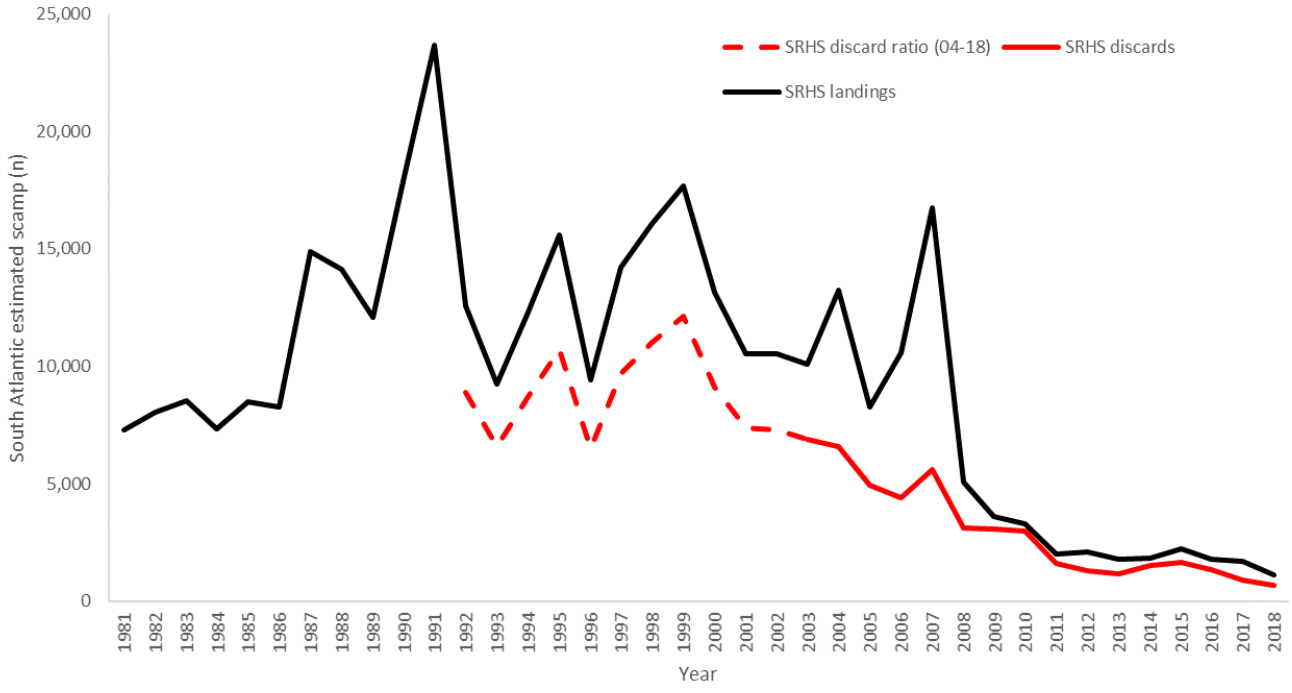

Figure 5. SRHS landings (1981-2018), discards (2004-2018), and calculated discards using the SRHS (2004-2018) mean discard ratio proxy method (1992-2018).