Addendum to SEDAR41-DW29: Discards of red snapper (*Lutjanus campechanus*) for the headboat fishery in the US South Atlantic

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SEDAR41-AW01

Submitted: 04 December 2015

Please cite this document as:

Fisheries Ecosystem Branch – National Marine Fisheries Service. 2015. Addendum to SEDAR41-DW29: Discards of red snapper (*Lutjanus campechanus*) for the headboat fishery in the US South Atlantic. SEDAR41-AW01. SEDAR, North Charleston, SC. 14 pp.

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Discards of red snapper (*Lutjanus campechanus*) for the headboat fishery in the US South Atlantic

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August 4-8, 2014

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 rates were compared to the MRFSS/MRIP At-Sea Observer program and Captain Steve Amick's discard rates for validation purposes and to determine whether the SRHS discard estimates should be used for a full or partial time series (2004-2013). Discard estimates prior to 2004 are calculated using a proxy method. For red snapper the MRFSS/MRIP CH, MRFSS/MRIP PR, Captain Steve Amick, and MRFSS/MRIP CH:SRHS, and SRHS dockside sample discard ratio methods were evaluated as proxy methods for calculating discards from the headboat fishery.

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 currently not validated within the SRHS.

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 rates from the SRHS were compared with the MRFSS/MFIP At-Sea Observer program discards rates 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 MRFSS /MRIP charter mode, MRFSS/MRIP private boat mode, Captain Steve Amick's discard ratio (SEDAR 24-Assessment Workshop Report, 2010), and the mean MRFSS/MRIP CH:SRHS discard ratio method used in SEDAR 28 (SEDAR 28-Assessment Workshop Report, 2012) were all considered as sources for proxy discard estimates.

Methods

SRHS vs MRFSS/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 (2004-2014) or for a partial time-series. Red snapper positive At-Sea Observer trips were compared to SRHS logbook trips to determine the adequacy of coverage by the At-Sea Observer program. The mean discard rate per trip by year and state for matched trips only were compared between the SRHS and At-Sea Observer program. The mean discard rate per trip by year and state were compared between the SRHS and At-Sea Observer program. These mean discard rates were also compared to the mean discard rate per trip by year from Captain Amick's discard data.

Discard proxy

Several sources for proxy discard estimates were considered. In SEDAR 24 Captain Steve Amick's own personal records were used to calculate discard ratios which were then applied to the SRHS landings to estimate discards. This was the recommended method for calculating headboat discards prior to 2007. The MRFSS/MRIP charter boat and private boat modes (b2/ab1) were also considered. In SEDAR 28 the mean MRFSS/MRIP CH:SRHS discard ratio method was used to mitigate the differences in magnitude between the MRFSS/MRIP CH discard ratios and the SRHS discard ratios. Discard ratios for all four sources were compared to the SRHS discard ratios.

The SRHS dockside sample method was developed based on analysis that the reported red snapper landings were well correlated with the numbers sampled in BPs (SEDAR 41-DW46). This method uses information on size limits to determine changes in the proportion of fish under a certain size over time. There were no size limits on red snapper until 1983, when a 12in TL

size limit was adopted. From the SRHS dockside samples calculate the mean ratio of fish less than 12in TL (1981-1983) and subtract from that the mean ratio of fish less than 12in TL (1984-1991) (if negative assume the proportion of discards is equal to the proportion of fish <12in TL in the dockside sample); apply that to the SRHS landings (1984-1991) to get the number of fish <12in TL discarded (1984-1991). Calculate the mean ratio of fish <20in TL (1981-1983) and subtract from that the mean ratio of fish <20in TL (1992-2003) (if negative assume the proportion of discards is equal to the proportion of fish <12in TL in the dockside sample); apply that to the SRHS landings (1992-2003) to estimate the number of fish <20in TL discarded (1992-2003).

In order to estimate discards during 1972-1980, a three year average discard ratio (1981-1983) was applied to the landings (1972-1980). This method was used for all of the discard proxy options.

Discard ratios for all five sources were compared to the SRHS discard ratios (2004-2014).

Results

SRHS vs MRFSS/MRIP At-Sea Observer comparison

The NC, SC and GA discard rates did not agree between the SRHS and At-Sea survey (Figure 1). This can be attributed to low sample sizes in the MRFSS/MRIP At-Sea Observer program in these states (Table 1). In FL where sample sizes in the MRFSS/MRIP At-Sea Observer program are larger, the discard rates followed the same pattern between the two surveys from 2007-2014. The overall South Atlantic discard rate, which is driven by FL, for both surveys followed the same pattern between 2007-2014 (Figure 2). When comparing the overall and matched trips, the mean (per trip) discard rates were higher in 2005-2006 in the matched trips (Figure 3), however the pattern is similar to the overall trips. Captain Amick's discard rate followed the same pattern but at a much lower magnitude as both the overall trips and the matched trips until 2010 when the discard rate in both the At-Sea Observer program and SRHS decreased.

Discard Proxy

The RWG compared the red snapper discard ratios from the SRHS to the five proxy sources. Captain Amick's discard ratios agree well with the SRHS from 2004-2006, with differences in magnitude from 2007-2009. The MRFSS/MRIP CH discard ratios agree well with the SRHS from 2004-2009. However, there are extreme differences in magnitude between the SRHS and MRFSS/MRIP CH from 2010-2014 (Figure 4a). The MRFSS/MRIP PR discard ratio follows the same pattern as the SRHS from 2005-2009, however from 2010 to 2014 it appears to show

the opposite trend of the SRHS. The MRFSS/MRIP CH:SRHS discard ratio method follows the same pattern as the MRFSS/MRIP CH discard ratio, but with reductions in magnitude (Figure 4b). The SRHS dockside sample method cannot be directly compared to the SRHS discards in 2004-2014.

Discussion

SRHS vs MRFSS/MRIP At-Sea Observer comparison

The SRHS and MRFSS/MRIP At-Sea Observer discard ratios in FL exhibit the same pattern and similar magnitude from 2007-2014 in both the overall and matched trips only. This validates the SRHS discard estimates in those years. The 2005-2006 discard rates in FL exhibit a similar pattern with differences in magnitude in the overall trips.

The following options were presented for consideration by the RWG.

Option 1: Use the SRHS discard estimates 2007-2014.
Option 2: Use the SRHS discard 2004-2014.

Decision: Option 2. The At-Sea Observer and SRHS discard rates generally agreed in FL in both the overall and matched only trips. This validates the SRHS logbook discard information.

Discard Proxy

No one proxy method agrees with the SRHS discard rate for the entire SRHS time series (2004-2014). The MRFSS/MRIP CH discard rate and Captain Amick's discard rates both agree with the SRHS in the early years, however the MRFSS CH follows the SRHS pattern longer despite differences in magnitude in the later years. Captain Amick's discard ratio is also limited to one vessel within one state while the MRFSS/MRIP CH ratio encompasses the entire South Atlantic and provides a slightly longer time series (MRFSS/MRIP CH begins in 1981, Captain Amick's begins in 1983). When comparing the discard rates of the MRFSS/MRIP CH and Captain Amick's ratio in years before discards were added to the SRHS the two agree well from 2001-2005, but in prior years do not follow the same pattern. The MRFSS/MRIP CH discard ratio shows a more gradual increase in discards from the early 1980s to 2000 than Captain Amick's discard ratio. For these reasons Captain Amick's discard ratio was not recommended for consideration. The MRFSS/MRIP PR discard ratio proxy doesn't agree with the SRHS discard rate for much of the time series and is higher than either the MRFSS/MRIP CH or Captain Amick's discard ratio methods, and therefore is not recommended for consideration. The

MRFSS/MRIP CH:SRHS discard ratio follows the same pattern as the MRFSS/MRIP CH proxy but with reductions in magnitude except in 2010. In 2010 the fishery was closed, therefore this distinct increase in discards is expected. Due to the large differences in magnitude the MRFSS/MRIP CH proxy was not recommended for consideration. The MRFSS/MRIP CH:SRHS proxy method resulted in unexplainable variability in the discard estimates during the 1990s-early 2000s. It also resulted in large numbers of discards in years before the 12in TL minimum size limit was in effect. The SRHS dockside sample proxy method did not display such variability. The calculated discards using the MRFSS/MRIP CH:SRHS discard ratio proxy method and the SRHS dockside sample method are presented with the SRHS discards in Figure 5.

The following options were presented for consideration by the RWG.

Option 1: Use the MRFSS/MRIP CH discard ratio proxy method 1972-2003.
Option 2: Use the SRHS dockside sample proxy method 1972-2003.

Decision: Option 2. The SRHS dockside sample method uses information collected directly from the SRHS to estimate discards based management measures (i.e. size limits). It was concluded this method would most accurately reflect changes in discards which were due in large part to changes in management. MRIP CH:SRHS discard ratio method followed the same pattern, or agreed well with the SRHS discard ratio in 2004-2009. However, this method produced highly variable discard estimates for this species.

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Tables

Table 1. Number of red snapper positive trips reported in the SRHS and number of At-Sea Observer trips positive for red snapper by year and state, 2004-2014. No red snapper positive trips were sampled in the At-Sea Observer program in 2004.

	FL		GA		NC		SC		South Atlantic	
Year	SRHS reported trips (n)	At-Sea Observer trips sampled (n)	SRHS reported trips (n)	At-Sea Observer trips sampled (n)	SRHS reported trips (n)	At-Sea Observer trips sampled (n)	SRHS reported trips (n)	At-Sea Observer trips sampled (n)	SRHS reported trips (n)	At-Sea Observer trips sampled (n)
2004	1,326		146		69		256		1,797	
2005	1,168	41	129	1	23	1	150	6	1,470	49
2006	1,190	28	98	3	69	1	114	3	1,471	35
2007	1,323	58	79	2	30	7	158	3	1,590	70
2008	1,808	55	101	3	78	9	127	2	2,114	69
2009	2,162	49	152	7	79	2	160		2,553	58
2010	1,699	42	99	2	115	11	171		2,084	55
2011	1,513	41	99	1	52	8	206		1,870	50
2012	1,572	46	52	4	84	15	95	1	1,803	66
2013	1,428	45	67	10	77	18	60		1,632	73
2014	1,516	48	107	6	108	9	79		1,810	63

Table 2. Proportion of red snapper positive At-Sea Observer trips matched to SRHS reported trips, 2005-2014. No red snapper positive trips were sampled in the At-Sea Observer program in 2004.

Year	FL	GA	NC	SC	South Atlantic
2005	0.021	0.008	-	0.027	0.020
2006	0.013	0.020	-	0.018	0.014
2007	0.021	0.013	-	0.006	0.019
2008	0.022	-	0.026	0.016	0.020
2009	0.016	0.039	-	-	0.016
2010	0.020	0.020	0.026	-	0.019
2011	0.018	0.010	0.077	-	0.017
2012	0.022	0.038	0.131	0.011	0.027
2013	0.023	0.104	0.052	-	0.027
2014	0.026	0.047	0.065	-	0.028

Figures

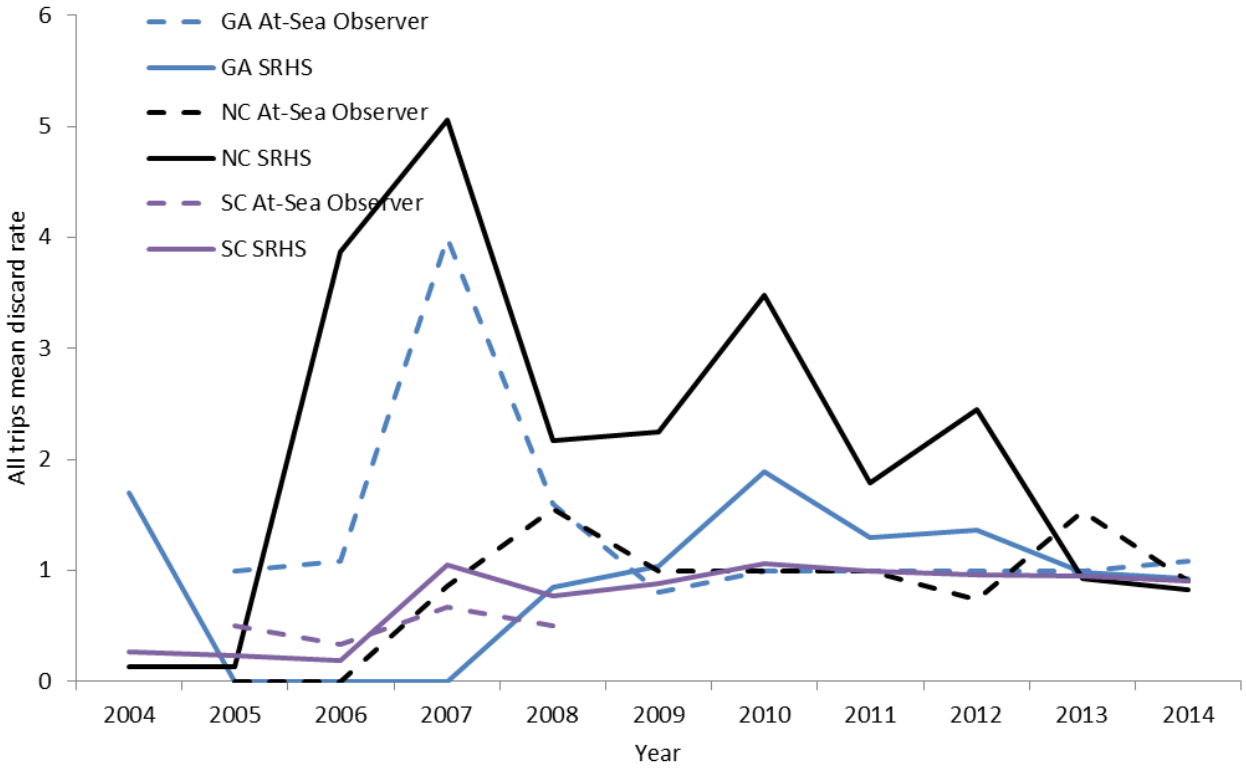

Figure 1. Mean discard rate per trip by year and state for NC, SC and GA in the SRHS and At-sea Observer program, 2004-2014. There were no red snapper positive trips in the At-sea Observer program in 2004.

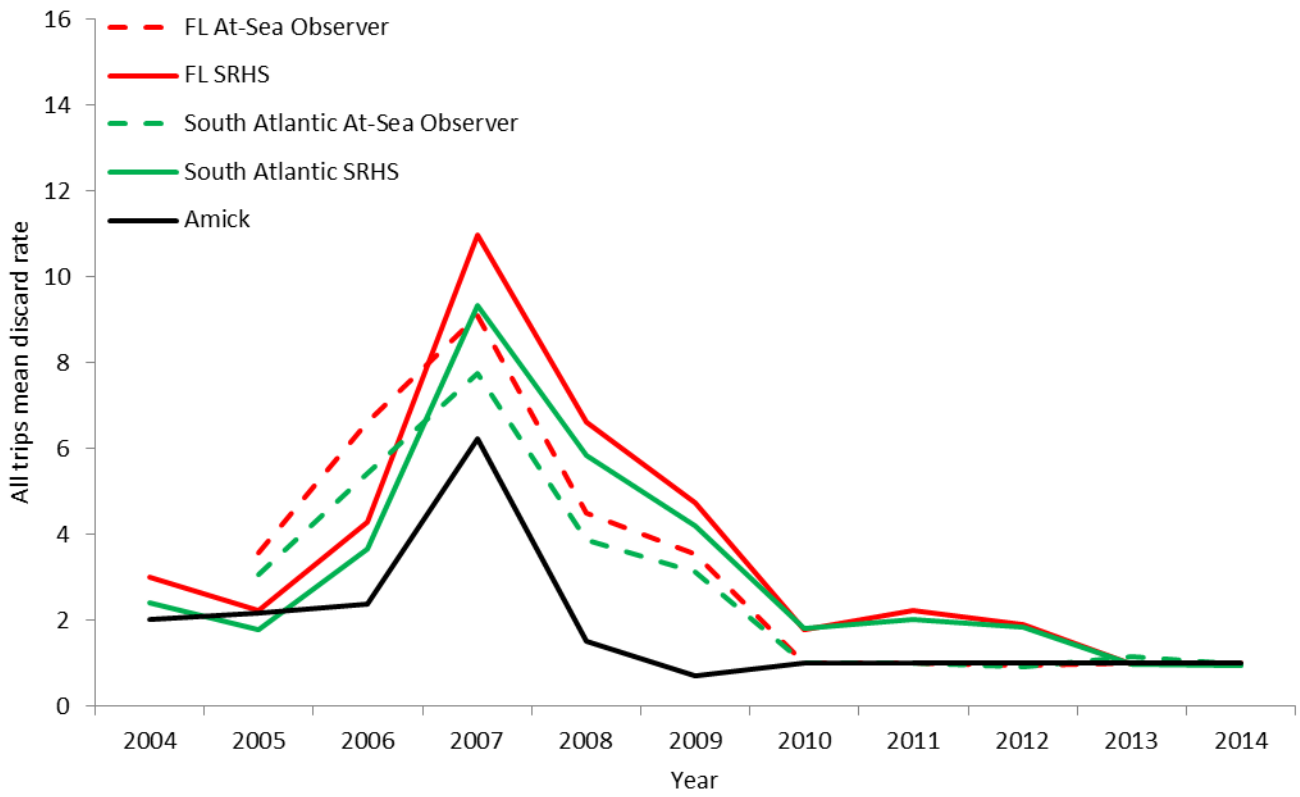

Figure 2. Mean discard rate per trip by year for Captain Steve Amick's discard data, the SRHS, and At-sea Observer program in FL and the South Atlantic combined, 2004-2014. There were no red snapper positive trips in the At-sea Observer program in 2004.

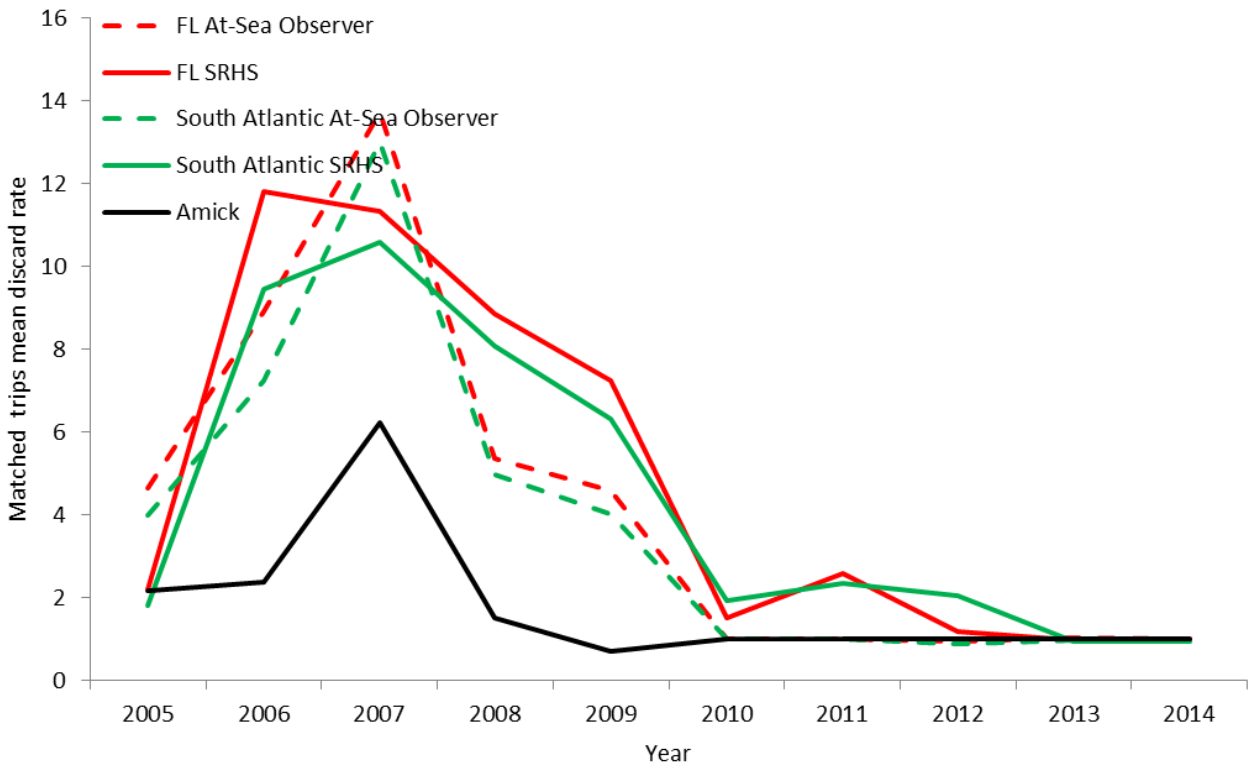

Figure 3. Mean discard rate per trip by year for Captain Steve Amick's discard data, the SRHS, and At-sea Observer program in FL and the South Atlantic combined from matched trips only, 2005-2014.

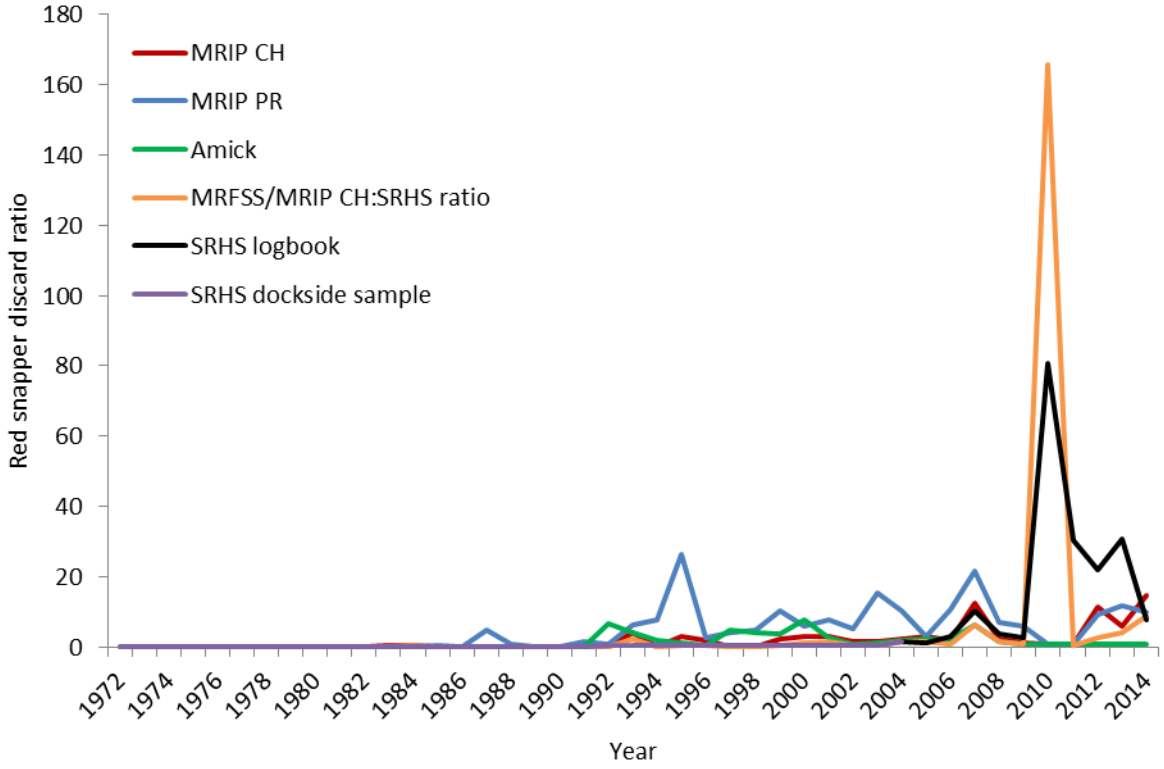

Figure 4a. MRFSS/MRIP CH (1972-2014), MRFSS/MRIP PR (1972-2014), Captain Amick (1983-2014), MRFSS/MRIP CH:SRHS discard ratio (1972-2014), SRHS dockside sample methods (1972-2003), and SRHS discard ratios (2004-2014).

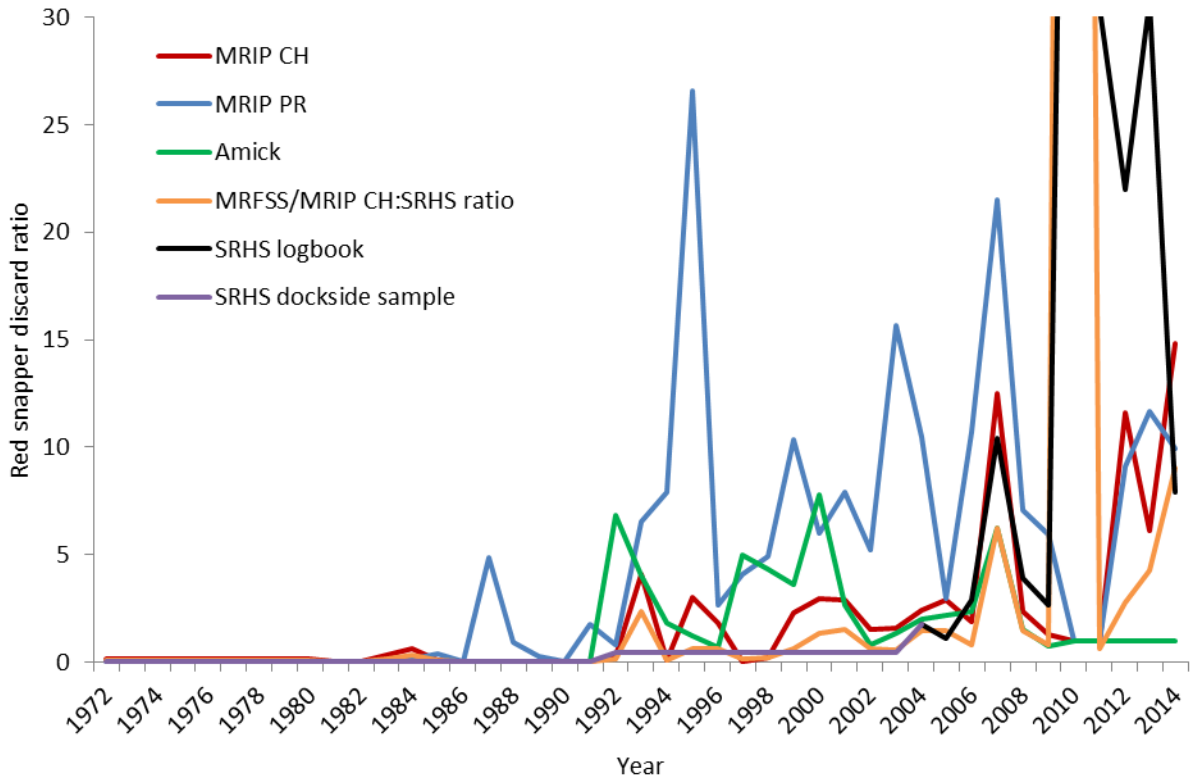

Figure 4b. MRFSS/MRIP CH (1972-2014), MRFSS/MRIP PR (1972-2014), Captain Amick (1983-2014), MRFSS/MRIP CH:SRHS discard ratio (1972-2014), SRHS dockside sample methods (1972-2003), and SRHS discard ratios (2004-2014), at reduced scale.

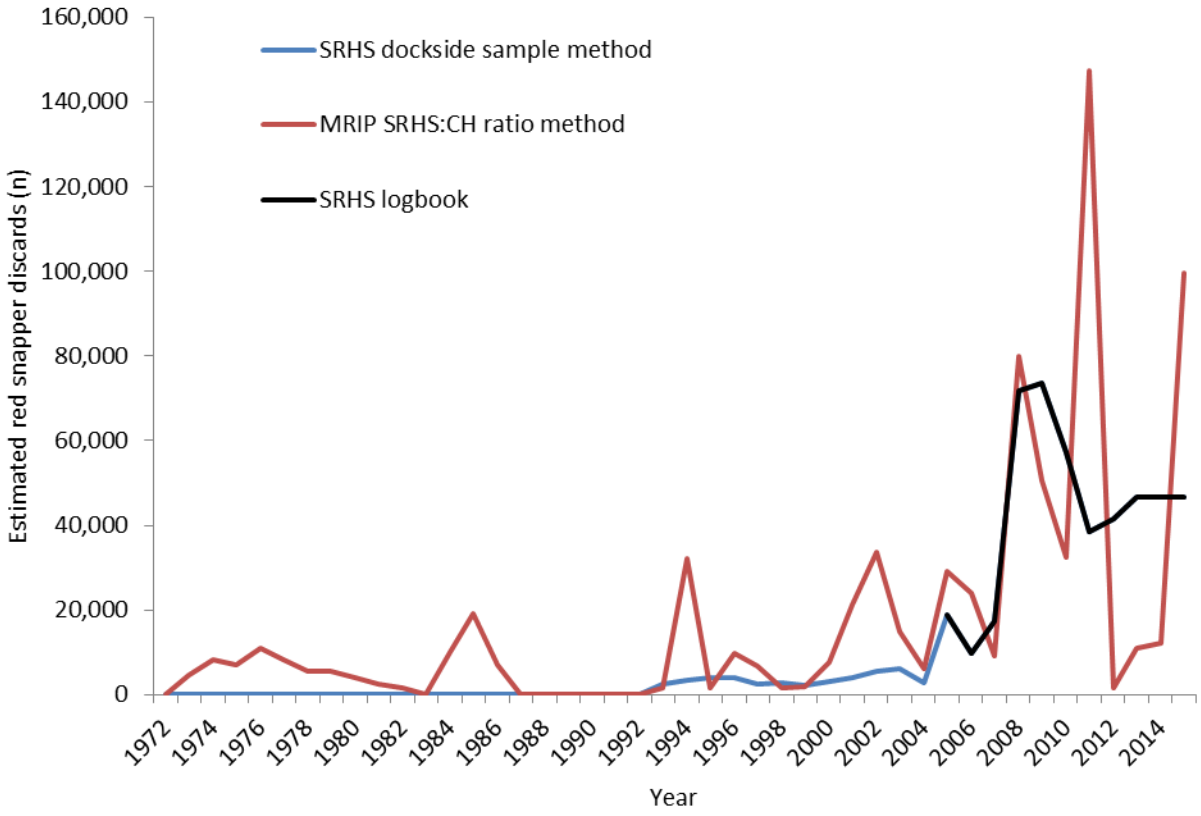

Figure 5. SRHS discards (2004-2014) with calculated discards using the MRFSS/MRIP CH:SRHS discard ratio (1972-2014) and SRHS dockside sample (1972-2003) methods.