Headboat Discards for Red snapper in the Gulf of Mexico

by Vivian M. Matter and John F. Walter

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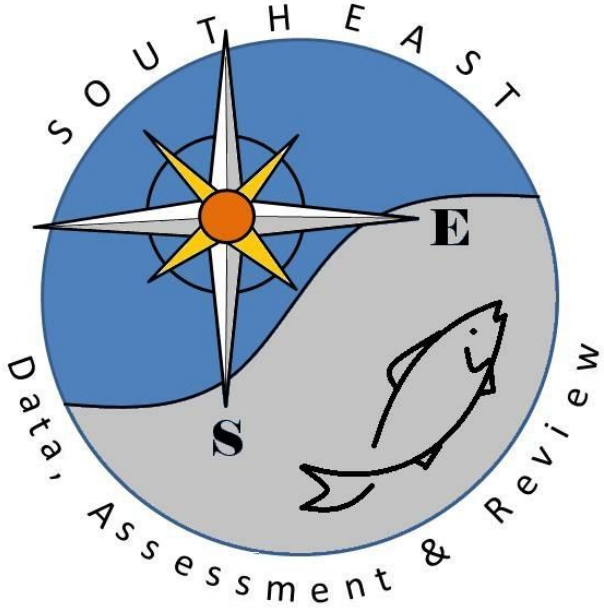

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Introduction

The Southeast Region Headboat Survey (SRHS) covers the Gulf of Mexico headboats starting in 1986 and collects vessel-reported landings and discard estimates in number and weight (Matter SEDAR31-DW4). Section 4.4.2 of the SEDAR 31 Data Workshop Report laid out the recommendations for generating discards for the headboat fishery using a combination of SRHS information, headboat observer estimates and a MRFSS/MRIP proxy fishery for the historical time series. The detailed methodology and the resulting discards rates and discards are presented here.

Issues:
1. SRHS self-reporting of discards appears to underestimate total discards and to substantially underestimate discards between 2004 and 2007 when compared to the few years of headboat observer estimated discards.
2. SRHS only has discards information beginning in 2004.

Need: To obtain a relatively consistent time series of headboat discards that tracks both the trend and magnitude for years 1981-2011.

Solution: To obtain the trend in discards it was necessary to determine a set of headboats that consistently reported the magnitude of their discards. The discard rate of these 'consistent' vessels was used to obtain the trend in discards for 2004-2011. Then the ratio of headboat observer to 'representative' SRHS was used to scale up the SRHS estimates. Finally the best-predicting MRIP proxy data series was used to predict headboat discard rates for 1981-2003.

Methods and Results

1) Use discard rates from SRHS headboats with consistent patterns of reporting for 2004-2011

To select these headboat vessels the following criteria were employed:

a) The vessel must have reported catch and discards for at least two of the four years in the year groups 2004-2007 and 2008-2011.

b) If the average 2004-2007 total discards (alive, dead for all species)/sum catch ratio is greater than 2008-2011 total discard/sum catch ratio then keep these vessels as it is likely not affected by the under-reporting in early years.

c) To obtain representative remaining vessels, we test for a significant increase in the discard rate between 2004 and 2007 and 2008-2011 that would likely be a function of a change in reporting rather than an actual change in discards. This is particularly true as the size composition of the population has increased and other sources of information indicate that discards have generally decreased during this time period. We calculate the ratio of the total discards /total catch for each year and then use a 1-tailed t-test, assuming homogenous variances to test for a significant increase in discard rates. We retain vessels that showed no significant increase in discard rates between the two stanzas.

d) Remaining 'representative' vessels are then used to calculate the headboat discard rates by East and West Gulf of Mexico.

2) Scale the resulting rates using observer data

Observer data from West Florida, Alabama, and Texas were used to scale the headboat discard rates obtained in step 1, above. These discard rates were multiplied by the ratio of the means between the Observer Program discard rates and the 'representative' headboat discard rates to obtain the scaled headboat discard rates for 2004 to 2011. The observer data could not be disaggregated into open and closed season due to the small sample size of at-sea trips. Figure 1 shows the SRHS discard rates for all vessels and consistently reporting vessels.

3) Use MRIP data as a proxy for hind-casting headboat discard rates for 1981-2003

The MRIP discard rates for all modes combined, charterboat mode, and private mode were calculated for 2004-2011. Separate linear regressions between the scaled discard rates obtained in step 2 and each MRIP mode were obtained to determine the best predictor of headboat discards. The proxy (all modes, charterboat mode, or private mode) whose discard rates had the strongest positive correlation to the 2004-2011 headboat discard rates was selected. In the East Gulf of Mexico, MRIP discard rates from all modes had the strongest positive correlation to the scaled headboat discard rates. In the West Gulf of Mexico, MRIP discard rates from the charterboat mode had the strongest positive correlation to the scaled headboat discard rates. The resulting linear regression models were then used to predict headboat discard rates from the MRIP proxy. Predictive equations are shown below:

East Gulf (where x=MRIP all modes discard ratio):

$y=1.4613x$

$R^2=0.872$

$P=0.0002$

West Gulf (where x=MRIP charterboat mode discard ratio):

$y=0.4164x$
$R^2=0.866$
$P=0.0008$

Discard rates for 1981-2011 are shown in Table 1 and Figure 2.

4) Apply discard rates to headboat landings to obtain total headboat discards

To obtain the total discards the annual discard ratios obtained in step 3, above were multiplied by the headboat landings. Headboat discard estimates are shown in Table 2 and Figure 3.

References

Matter, V. 2012. SEDAR31-DW4 Recreational Survey Data for Red snapper in the Gulf of Mexico. National Marine Fisheries Service, Southeast Fisheries Science Center, Fisheries Statistics Division, Miami, FL.

Southeast Data, Assessment, and Review (SEDAR). 2012. SEDAR 31, Section II: Data Workshop Report, Gulf of Mexico Red Snapper.

Tables

Table 1. Discard rates used estimate headboat discards by year and Gulf region.

year	East	West
1981		0.0000
1982		0.0070
1983		0.0034
1984		0.0000
1985		0.0000
1986	0.1036	0.0191
1987	0.1702	0.0035
1988	0.1837	0.0036
1989	0.5322	0.0937
1990	2.0340	0.8920
1991	2.1098	0.4857
1992	1.4902	0.3319
1993	1.0654	0.3268
1994	1.3412	0.7052
1995	0.9315	0.4889
1996	2.2504	0.4553
1997	2.7289	0.2448
1998	1.8080	0.2091
1999	2.5680	0.1290
2000	3.0006	0.1656
2001	3.3929	0.2742
2002	3.0063	0.2667
2003	2.9807	0.4741
2004	1.3452	0.7165
2005	1.1356	0.7456
2006	6.1126	0.9256
2007	5.4227	1.0261
2008	6.4109	1.4979
2009	4.3877	0.4770
2010	4.3457	0.6110
2011	4.8232	0.6572

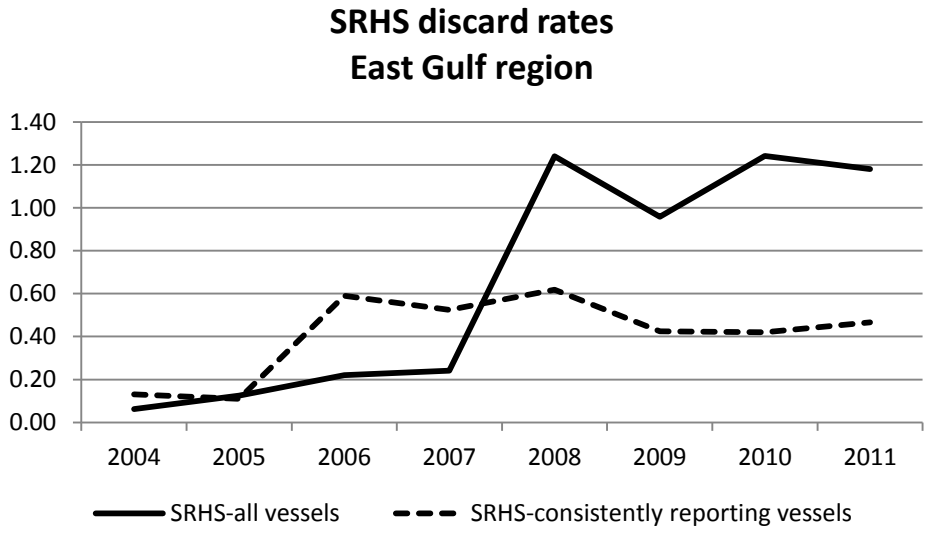
Table 2. Headboat discard estimates by year and Gulf region.

year	East	West	Total
1981		0	0
1982		2,356	2,356
1983		1,124	1,124
1984		0	0
1985		0	0
1986	1,696	6,049	7,744
1987	1,648	1,114	2,763
1988	2,541	1,505	4,046
1989	5,746	34,888	40,634
1990	31,607	166,801	198,408
1991	32,870	128,563	161,434
1992	50,477	137,089	187,566
1993	39,714	149,917	189,631
1994	38,892	351,020	389,912
1995	21,497	173,347	194,844
1996	63,884	159,022	222,906
1997	132,184	85,033	217,218
1998	138,777	51,183	189,960
1999	173,167	12,732	185,899
2000	172,955	18,447	191,402
2001	174,019	31,910	205,929
2002	225,834	36,925	262,760
2003	211,693	74,855	286,548
2004	85,396	79,051	164,447
2005	53,136	74,551	127,687
2006	292,684	112,161	404,845
2007	344,900	113,193	458,093
2008	397,386	86,233	483,619
2009	357,992	36,251	394,243
2010	156,197	31,475	187,673
2011	333,703	33,291	366,994

Figures

Figure 1. SRHS discard rates from all vessels and consistently reporting vessels.

a) East Gulf of Mexico



b) West Gulf of Mexico

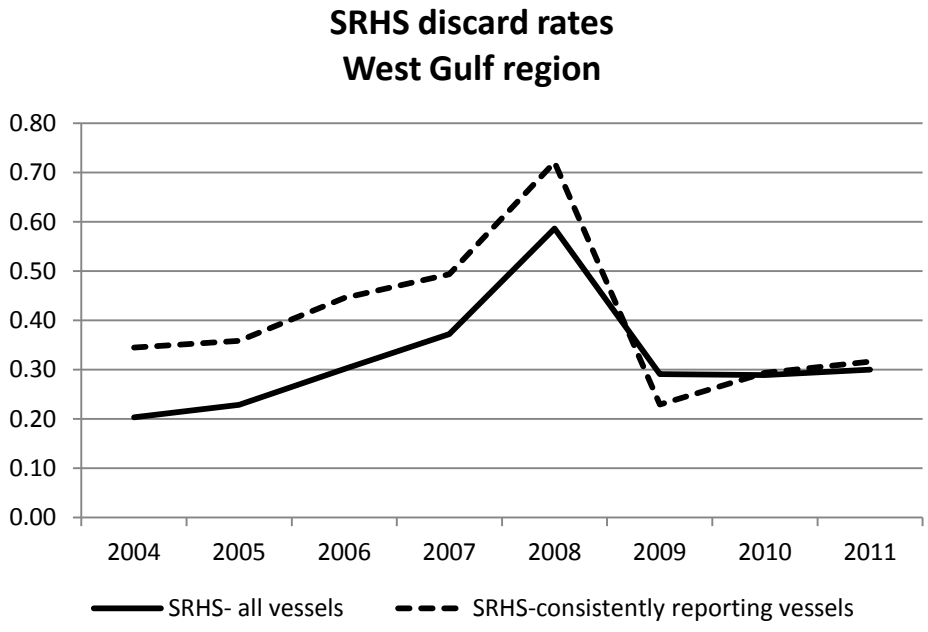
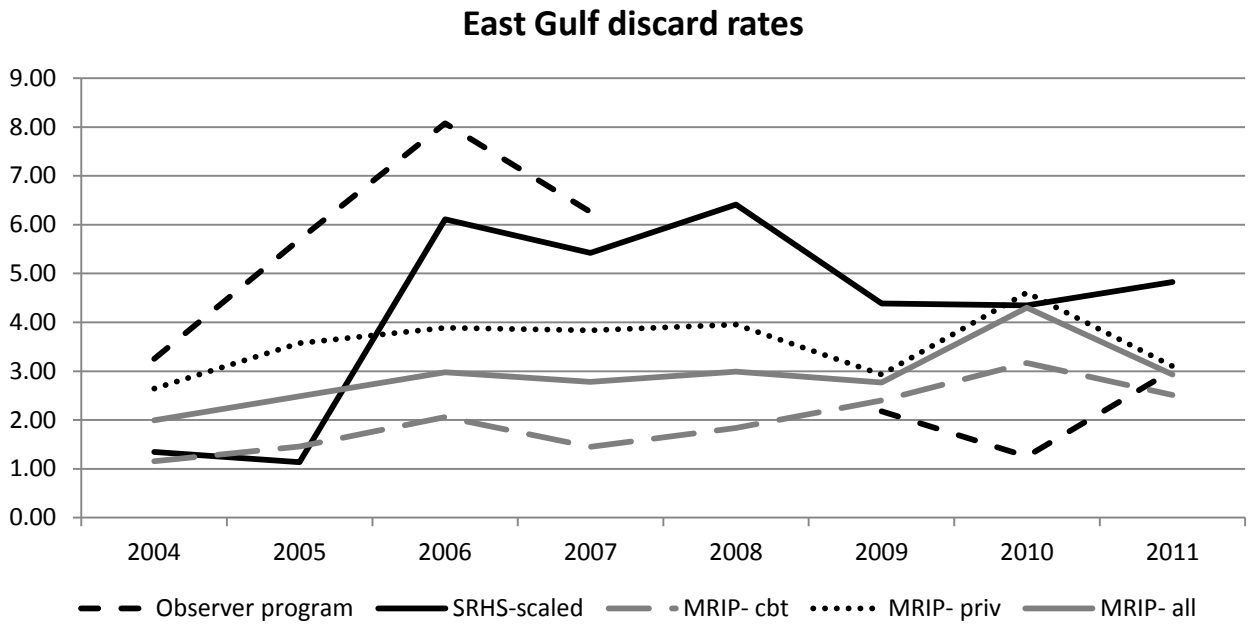


Figure 2. MRIP, Observer program, and SRHS scaled discard rates.

a) East Gulf of Mexico



b) West Gulf of Mexico

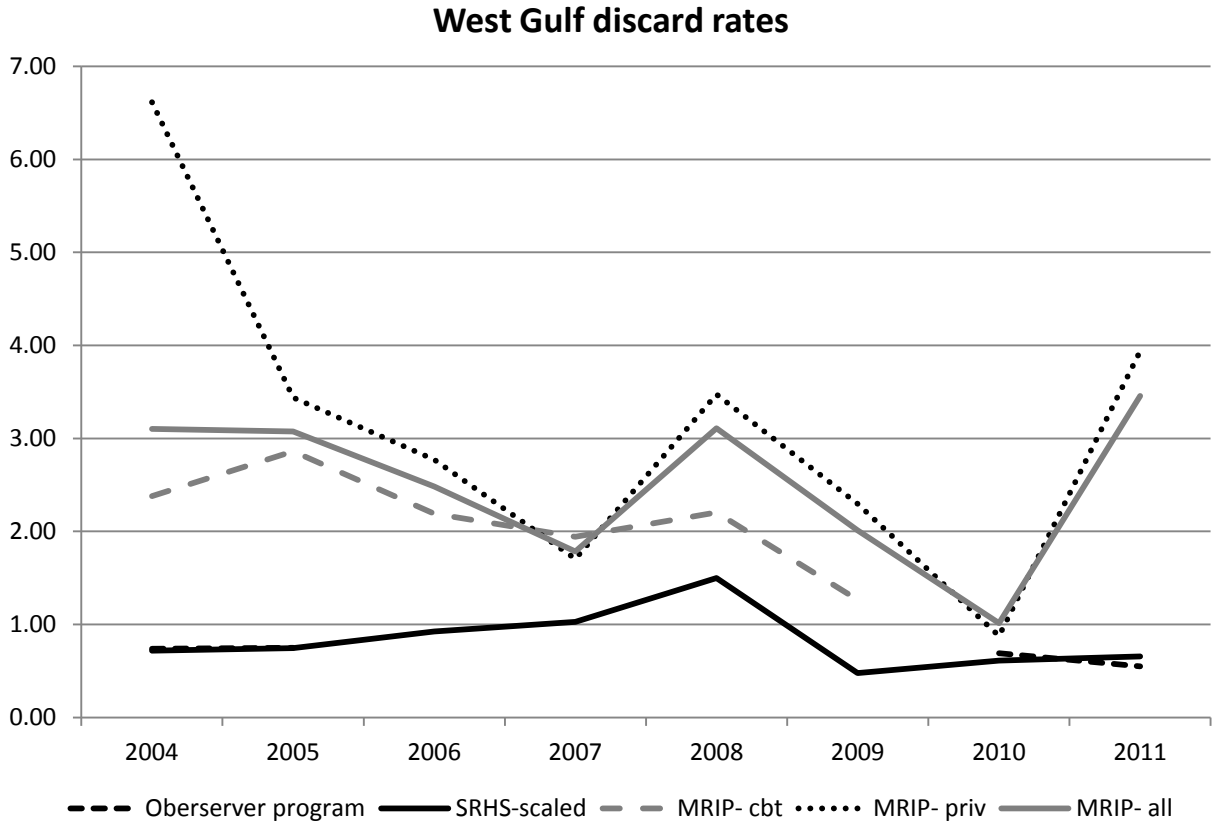


Figure 3. Headboat discard estimates by year and Gulf region.