CALCULATED RED GROUPER LONGLINE DISCARDS BY VESSELS WITH FEDERAL PERMITS IN THE GULF OF MEXICO: ADDENDUM

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Introduction

In plenary discussion at the red grouper SEDAR data workshop, concerns were raised regarding the completeness of red grouper discard reporting to the discard logbook program. The number of calculated discards for handline trips during the period 1990-2005 was much greater (more than five million discards) than discards calculated for longline vessels (fewer than 1 million discards). Red grouper landings reported by longline vessels, however, were greater than those reported by handline vessels (approximately 58.5 million pounds by longline vessels and 23.5 million pounds reported landed by handline vessels from 1990-2005). This suggested that red grouper discards reported by longline vessels may have been underreported and that calculations of total longline discards based upon those incomplete data are inaccurate. Observer data taken during commercial longline trips, fisheries independent longline survey data, and discard data collected by a commercial fisherman were available to examine the issue of discard underreporting on commercial longline trips.

Longline Data

Two data sets were examined to investigate the reliability of the coastal logbook longline discard data. The first of these consisted of data collected by observers recording catches from longline vessels in the eastern Gulf of Mexico during 1994 and 1995. This program was conducted by the NMFS Galveston laboratory and was described by Scott-Denton (1996). Total lengths, weights, and disposition (landed, discarded, used as bait) was recorded for all fish caught. The ratio of the number of red grouper discards per pound of red grouper landed was calculated from the available observer data. That ratio was used because in recent years the coastal logbook program has received discards data reported in number of fish and landings reported in pounds. Only those data collected from statistical areas (NMFS shrimp grids) 1-10 were included in the calculations. Fish used as bait were considered landed fish.

Relevant data collected during fisheries independent bottom longline surveys conducted by the NMFS Pascagoula laboratory were also used to determine the number of red grouper discards per red grouper pound landed. The longline survey data included total length and weight of fish caught using bottom longlines at various stations in the eastern Gulf of Mexico. NMFS longline survey methods were described by Grace and Henwood (1997). All red grouper less than 508 mm (20 inches) total length were classified as potential discards and all red grouper 508 mm and larger were classified as potential landings. Only data from longline sets from stations with water depths 20 fathoms or greater were included in these calculations, because the commercial longline fishery off most of the Florida west coast is restricted to waters 20 fathoms and deeper. Potential discards per pound landed was calculated from the longline survey data by dividing the number of red grouper that would have been discarded due to size restrictions by the weight of red grouper that exceeded the minimum size and would have, presumably, been landed. Sufficient data from the NMFS longline survey to make such calculations were only available for 2004 and 2005.

Discards were calculated from coastal logbook data using the least squares means (lsmeans) of discards per hook, computed using a generalized linear model of factors that had a significant affect on the number of discards reported from longline trips (see SEDAR 12-DW-17). The lsmeans of discards per hook were then multiplied by the total longline hooks fished, as reported to the coastal logbook program, to calculate total red grouper discards. Discards were also calculated using values for discards per hook that were two standard deviations above and below calculated lsmeans. Discards per pound per year were calculated by dividing the calculated number of red grouper discards for a year by the pounds of red grouper reported as landed for that year.

Calculated discards and discards per pound from the longline fishery, observers and the fishery independent longline survey are presented in Table 1. Discards per pound landed calculated from observer data are provided for 1994-95 and potential discards per pound of potential landings for longline survey data for 2004-05 (Table 1). Red grouper discards per pound landed calculated from the NMFS longline observer data and potential discards per pound of potential landings from the longline survey data are much higher than the discards per pound landed calculated from the coastal logbook data. This supports the suggestion that discards are underreported to the coastal logbook program by longline vessels.

Handline Data

Handline data, independent of the coastal logbook data, were examined to verify the reliability of the coastal logbook handline discard data. Gary Fitzhugh and Linda Lombardi (NMFS Panama City) provided a data set containing numbers of discards along with their total lengths from commercial handline trips. Those data were collected under cooperative research project (CRP) NA03NMF4540414 by commercial handline gear off Ft. Meyers, Florida during 2003 (SEDAR 12 data workshop report life history section, 2006). Discard data were collected during six fishing trips, however, only two of those trips could be definitively matched with trips reported to coastal logbook or Florida Trip Ticket data sets. Discard data from those two trips were matched with landings data from the coastal logbook program. The number of discards per pound of landed red grouper calculated from the CRP data is presented in Table 2. Discards per landed pound of red grouper calculated from the coastal logbook data for 2003 are also presented in Table 2. Discards and discard per pound landed ratios were also calculated using values plus and minus two standard deviations from the mean discards per hook/hour. This was similar to the method described above for longline calculations except handline calculations were based upon discards per hook/hour. When all 2003 data were included (Table 2, first line), the calculated discards per pound landed was three times higher for the coastal logbook data than the CRP data. If the coastal logbook data were limited to the same area as the CRP data, however, the discards per pound ratios from the two data sets were similar (Table 2, lines 2 and 3). Line 2 in Table 2 includes discards per pound landed of logbook trips that did not target red grouper; calculations shown in line 3 include logbook data of trips that did target red grouper. CRP did not specifically target red grouper throughout a trip and the discards per pound landed calculation from his data fall within two standard deviations of the nontargeted trips.

NMFS observer data from handline vessels in the eastern Gulf of Mexico (statistical areas 1-11) were available for a single year, 1995, and were compared to the calculated discards from handline vessels in that year. As with the longline observer data, total length and weight were recorded along with disposition of individual fish. The number of handline red grouper discards per pound of red grouper landed calculated from the NMFS handline observer and coastal logbook program data followed the methods described for longline data. Results of the red grouper handline discards per pound landed calculations are presented in Table 3. Discards per landed pound calculated from the handline observer data is similar to the discards per pound landed calculated from the coastal logbook data.

Length Frequency Comparisons

Length frequency of landed Gulf of Mexico red grouper was compared among areas (NMFS statistical grids) and gear by Chih (2006). Those data were collected as part of the Trip Interview Program (TIP). Areas 1-3 were defined as zone 1, areas 4 and 5 comprised zone 2, and areas 6 and greater were grouped in

zone 3. Frequency distributions for the period 1990-2005 are presented in Figure 1. The length frequency of red grouper landings from handline and longline vessels in zones 2 and 3 are similar, particularly in the smallest size classes, implying that discard frequency are also similar for these gears. In zone 1, a very low percentage of small fish are landed by handline vessels, but those size classes of red grouper are not landed by longline vessels. Discard frequencies of those size classes, therefore, probably differs slightly between handline and longline vessels in zone 1 (areas 1-3), however this zone accounts for a minority of the red grouper landings. Over the period 1990-2005, landings reported to the coastal logbook program from zone 1 (less than 14 million pounds from all gears) were less than half the landings reported from zone 3 (more than 29 million pounds). Zone 2 accounted for the majority of red grouper landings with more than 38 million pounds. These length frequency data suggest that overall differences between handline and longline vessels in red grouper discard frequency are probably minimal.

Length frequencies of Gulf of Mexico red grouper were also available from the longline survey, longline observer, and handline observer data sets and are presented in Figure 2. These data also include sublegal fish that would presumably have been discarded. Size frequency distributions of red grouper are similar between longline and handline vessels, particularly in the longline and handline observer data (Figure 2, B and C). The similarity in the size composition of the catch between longline and handline vessels, further supports the assumption that discard rates between these gears are, likewise, similar.

Longline Discard Calculations

Numbers of red grouper discards were calculated for longline vessels in the Gulf of Mexico reporting to the coastal logbook program by first identifying trips as targeting or not targeting red grouper. Trips targeting red grouper were identified from the coastal logbook dataset using the Stephens and MacCall (2004) approach, where trips are subset based upon the reported species composition of the landings. This method is intended to identify trips that targeted red grouper habitat and, therefore, had the potential of catching red grouper. In addition to stratifying by targeting, those data were further stratified by area fished. Trips were assigned to one of four areas: 1-5, 6, 7, or 8-10. Previous analyses (McCarthy, 2006) had identified targeting and area fished as having significant effects on red grouper discard rate for both longline and handline vessels. Given that discards to landings ratios, as well as, size frequency of red grouper catch were similar between longline and handline observer data; the handline discards to landings ratios were applied to longline landings for the calculation of longline discards. Handline discards to landings ratios were calculated for each targeting/area stratum. Longline landings for each stratum were multiplied by the appropriate discards to landings ratio to calculate longline discards (Table 4). Longline discards were also calculated for each year by summing discards for each targeting/area stratum by year (Table 5).

Calculated longline discards varied considerably during 1990-1992. This is also the period during which only 20% of Florida vessels were required to report to the coastal logbook program. Variation in the calculated discards may reflect sampling error during the period. From 1993 to 2005, the calculated number of discards is relatively constant with the fewest discards (410,837) calculated for 1994. During the period, the highest number of discards (668,593) was calculated for 1999. The discard calculations presented here are approximately 10 times greater than earlier calculations (McCarthy, 2006). Overall, calculated discards from longlines are almost twice the total calculated handline discards.

Literature Cited

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Table 1. Calculated red grouper discards and discards per pound landed from longline vessel coastal logbook reports, NMFS longline observer data, and the NMFS longline survey.

Year	Calculated Discards	Calculated Discards (+2 St. Dev.)	Calculated Discards (-2 St. Dev.)	Pounds Landed	Discards/Lb	Discards/Lb (+2 St. Dev.)	Discards/Lb (-2 St. Dev.)	Observer Data ('94-'95) and Longline Survey Data ('04-'05) Discards/Lb
1994	60,492	81,194	39,791	2,806,842	0.0216	0.0289	0.0142	0.2149
1995	46,246	63,031	29,461	2,698,092	0.0171	0.0234	0.0109	0.1440
2004	62,178	82,691	41,665	4,023,130	0.0155	0.0206	0.0104	0.1068
2005	46,110	61,699	30,521	3,629,712	0.0127	0.0170	0.0084	0.0934

Table 2. Calculated red grouper discards and discards per pound landed from handline vessels coastal logbook reports and CRP collected discard data. * indicates calculations made with data from trips in areas 1-5 that did not target red grouper. ** indicates calculations made with data from trips in areas 1-5 that targeted red grouper. The CRP discards per pound landed ratio was calculated from data collected on only two handline trips.

Year	Calculated Discards	Calculated Discards (+2 St. Dev.)	Calculated Discards (-2 St. Dev.)	Pounds Landed	Discards/Lb	Discards/Lb (+2 St. Dev.)	Discards/Lb (-2 St. Dev.)	CRP Data Discards/Lb
2003	327,169	368,484	285,854	1,337,413	0.2446	0.2755	0.2137	0.0852
2003*	8,944	10,025	7,863	113,609	0.0787	0.0882	0.0692	0.0852
2003**	47,397	53,712	41,083	418,798	0.1132	0.1283	0.0981	0.0852

Table 3. Calculated red grouper discards and discards per pound landed from handline vessel coastal logbook reports and NMFS handline observer data.

Year	Calculated Discards	Calculated Discards (+2 St. Dev.)	Calculated Discards (-2 St. Dev.)	Pounds Landed	Discards/Lb	Discards/Lb (+2 St. Dev.)	Discards/Lb (-2 St. Dev.)	Observer Data Discards/Lb
1995	244,543	275,966	213,119	1,226,666	0.1994	0.225	0.1737	0.183

Table 4. Longline calculated discards by area fished and red grouper targeting. Calculated discards are in number of red grouper; landings are in pounds (whole weight) of red grouper. Discards/lb landed ratios are those calculated from handline data in the appropriate area/targeting stratum. Calculations include a 5x expansion of data for the years 1990-1992 because only 20% of Florida trips were required to report to the logbook program during that period.

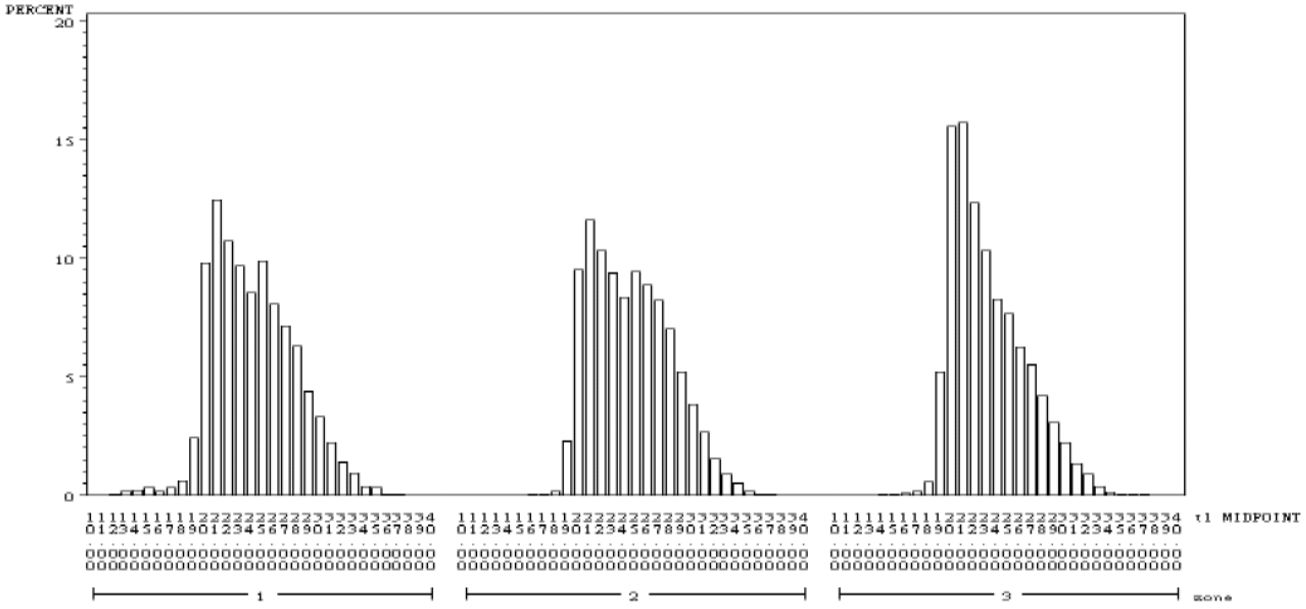
Area	Targeting	Longline Landings	Discards/Lb Landed	Calculated Discards
1-5	N	3,698,347	0.093177960	344,604
1-5	Y	42,345,456	0.129267559	5,473,894
6	N	779,620	0.153061539	119,330
6	Y	8,216,348	0.175972040	1,445,847
7	N	216,058	0.188771494	40,786
7	Y	1,471,537	0.219894515	323,583
8-10	N	177,194	2.995051121	530,704
8-10	Y	1,505,186	0.427376476	643,281
Total		58,409,746		8,922,029

Table 5. Longline calculated yearly discards; landings are in pounds (whole weight) of red grouper, calculated discards are reported as number of red grouper. Calculations for 1990-1992 include a 5x expansion because only 20% of Florida trips were required to report to the logbook program.

Year	Landings	Calculated Discards
1990	2,973,347	392,423
1991	5,416,980	823,212
1992	2,694,136	368,905
1993	3,570,115	526,157
1994	2,806,842	410,837
1995	2,698,092	524,889
1996	3,489,131	581,653
1997	3,758,160	627,643
1998	3,533,230	539,625
1999	4,681,540	668,593
2000	3,603,542	551,148
2001	4,030,249	620,265
2002	3,865,969	584,435
2003	3,635,568	538,007
2004	4,023,130	594,490
2005	3,629,712	569,746
Total	58,409,746	8,922,029

Figure 1. Length frequency histograms of red grouper Gulf of Mexico landings by gear (A. handline and B. longline) and zone (zone 1=areas 1-3, zone 2=areas 4 and 5, zone 3=areas 6 and greater).

A. Red grouper total length of handline landings from zones 1-3, 1990-2005



B. Red grouper total length of longline landings from zones 1-3, 1990-2005

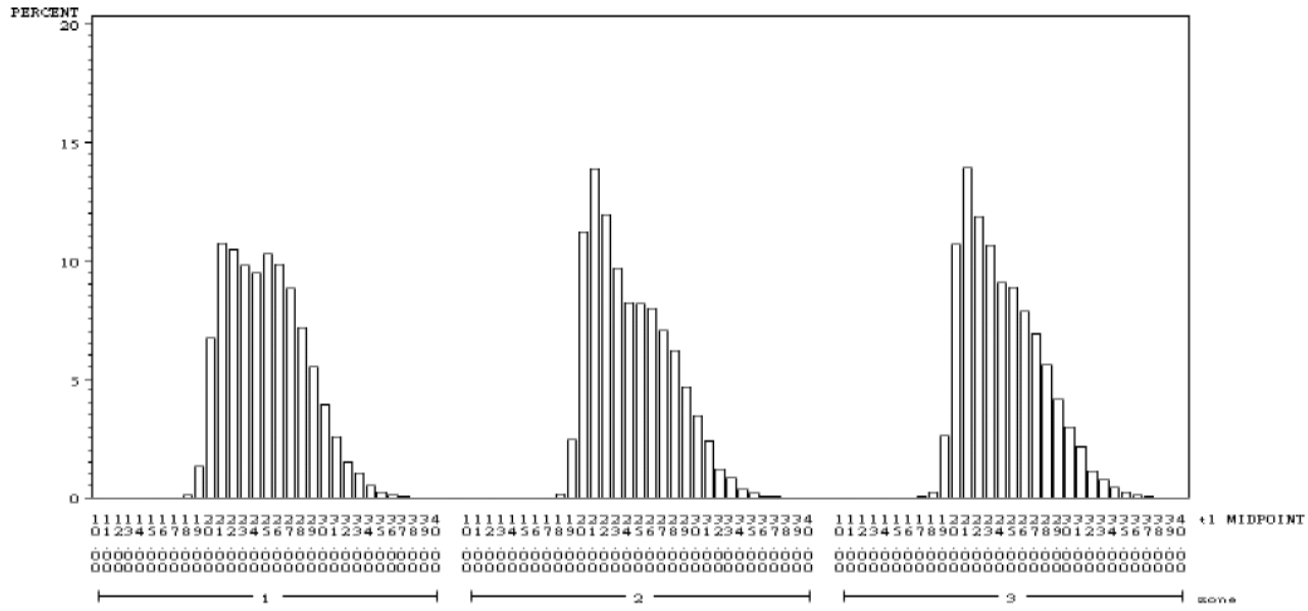
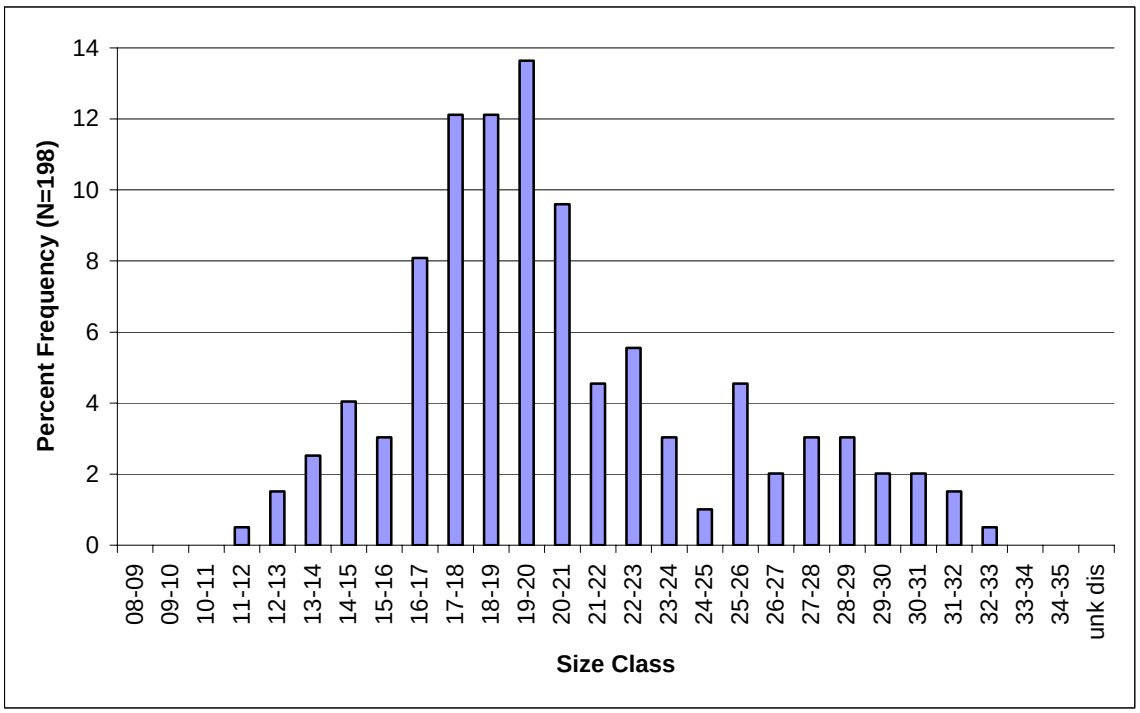
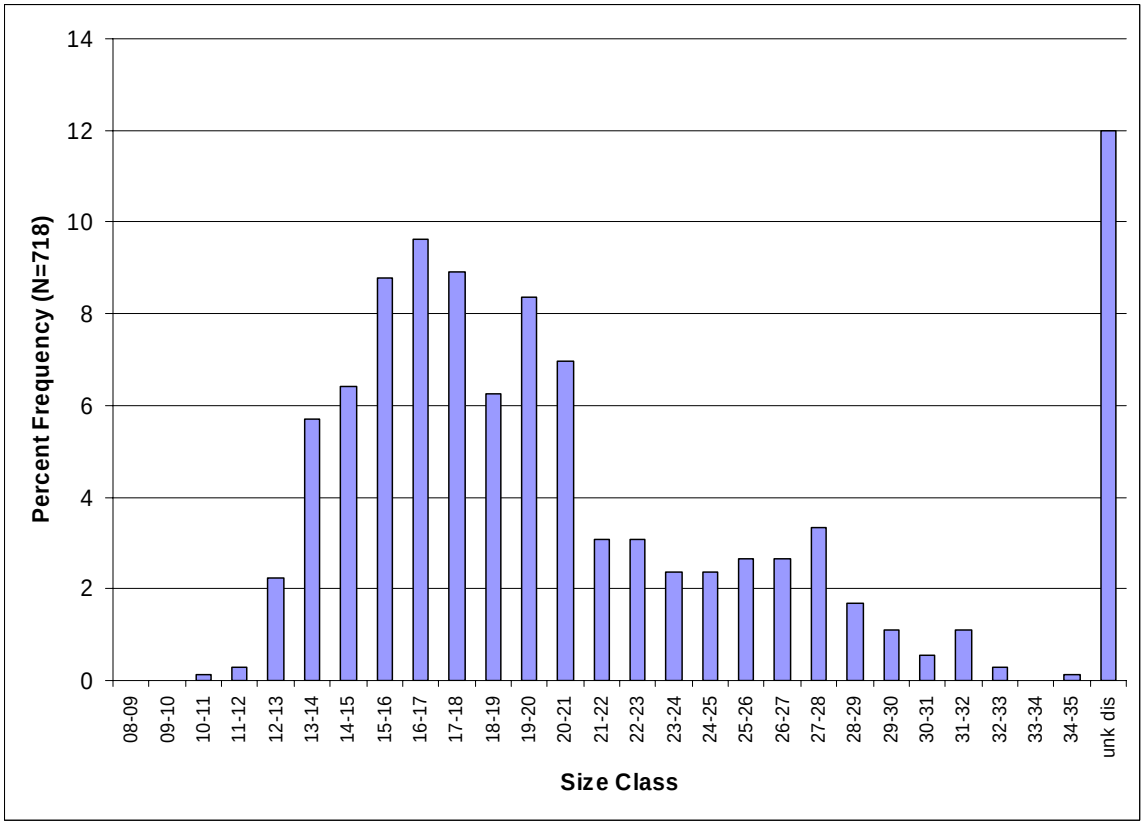


Figure 2. Length frequency histograms of Gulf of Mexico red grouper by gear from NMFS longline survey and longline and handline observer data.

A. Longline red grouper length frequency from NMFS longline survey data, 2004-2005.



B. Longline red grouper length frequency from NMFS observer data, 1994-1995.



C. Handline red grouper length frequency from NMFS observer data, 1995.