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Estimated discards of Southeastern Mutton Snapper (*Lutjanus analis*) from vertical line commercial fishing vessels

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June 2023

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Introduction

The general approach for estimating commercial discards in the Southeastern United States (US) utilizes catch-per-unit-effort (CPUE) from the supplementary discard logbook program and total fishing effort from the Coastal Fisheries Logbook Program (CFLP) to estimate total discards. Total discards include fish released alive, released dead, and released in unknown condition. Mutton Snapper (*Lutjanus analis*) discards were estimated from vertical line vessels from 1993-2022.

Methods

The method used to calculate discards of Southeastern Mutton Snapper using discard logbook data followed the approach recommended in SEDAR 32 (McCarthy 2013). This has become the standard method to estimate discards from the commercial fishery in cases where observer data are insufficient for discard calculation.

Data Sources

Coastal Logbook

In 1990, the Southeast Fisheries Science Center (SEFSC) initiated the Coastal Fisheries Logbook Program (CLFP) for the commercial fishing vessels catching species managed under the Gulf of Mexico Reef Fish Fishery Management Plan (Gulf of Mexico Fishery Management Council). In 1992, the program was expanded to include commercial fishing vessels catching species managed under the South Atlantic Snapper-Grouper Fishery Management Plan (South Atlantic Fishery Management Council). By 1999, the CFLP collected the commercial fishing and non-fishing activity (i.e. monthly no fishing reports) of fishers with South Atlantic Snapper and Grouper, Gulf of Mexico Reef Fish, King Mackerel, Spanish Mackerel, and Atlantic Dolphin and Wahoo permits. For more information about CFLP data collection and sampling over time see Atkinson (2021b) and Poffenberger (2003). For Southeastern Mutton Snapper discard estimation, data reported during the complete calendar years 1993-2022 were considered.

Discard Logbook

In August 2001, the SEFSC initiated a program to collect commercial fishing vessel discard data from the Gulf of Mexico and South Atlantic fisheries. A reporting form was developed that supplemented the existing vessel coastal logbook forms that were mandatory for those fisheries (Poffenberger and McCarthy, 2004). Data collection for the discard logbook program involves, each year, a 20% random sample of vessels with Gulf of Mexico reef fish, South Atlantic snapper-grouper, King Mackerel, Spanish Mackerel, Dolphin/Wahoo, and shark permits selected to report the number of animals discarded by species.

To ensure that the sample was representative of vessels with those Federal permits fishing in the Gulf of Mexico and South Atlantic, the universe of permitted vessels was stratified by region (Gulf of Mexico and South Atlantic) and gear fished. Fishing gear strata include handline, bandit rig, trolling, longline, fish trap, gillnet, and diving. A random sample was selected, without replacement, from each stratum. In 2017, the selection criteria changed where vessel selection

was stratified by active fishing vessels and vessels that only reported no fishing reported the previous year or new vessels to the fishery. Vessel selection is no longer stratified by region and gear because of the lack of information on new vessels to the fishery or vessels that submitted only no fishing reports. The selected fishers were instructed to complete a supplemental discard form for every fishing trip that they made. Trips with no discards were reported as such.

Reported data include the numbers of discards by species, estimated condition of the fish when released, reason for release (due to regulations or unmarketable/unwanted), the gear fished, and the fishing area where the animal was discarded. Traditionally, there are six options for the condition of released fish: all animals are dead, majority of the animals are dead, all animals are alive when released, majority of animals are alive, the fish are kept but not sold, and the condition of the animals is unknown. In 2022, an additional option was added to indicate all fish were released with a descending tool.

Commercial discards from the supplemental logbook program may be under reported. Fishers remain in reporting compliance by returning discard logbooks with reports of "no discards". For example, from 2002-2010 the percentage of discard reports from vertical line vessels returned with "no discards" increased from 42 to 73 percent in southern Florida (McCarthy, 2011).

Observer Programs

Commercial observer data was analyzed to assess immediate discard mortality of Mutton Snapper and general discard length distribution. There is limited observer coverage in the South Atlantic beginning in 2007 and restricted to vertical line vessels. In the Gulf of Mexico, the Reef Fish Observer Program (RFOP) began collecting data in July 2006 for vertical line and longline vessels. However, sampling is lacking in southern Florida. Given the spatial distribution of Mutton Snapper, observer data were not considered to estimate discards. For more information about commercial observer data, see Atkinson et al (2021a), Scott-Denton et al. (2011), GSAFF (2008, 2010, and 2013) and Enzenauer et al. (2015).

Spatial Boundary

Data from the Southeastern US were considered for this analysis. The reported fishing areas from the CFLP are shown in Figure 1. The Southeastern US is separated into two regions: 1) the Gulf of Mexico (GOM) consisting of fishing areas 1-21, and 2) the South Atlantic (SATL) including fishing areas south of 37 degrees latitude to areas south of US 1 in the Florida Keys. Analyses for Mutton Snapper were further divided into subregions defined by Florida Fish and Wildlife Conservation Commission (FWC) which are also represented in Figure 1. These subregions include West of Florida (FL), Northwest (NW) FL, Southwest (SW) FL, FL Keys, Southeast (SE) FL, Northeast (NE) FL, and North of FL.

Relevant Management History of Southeastern Mutton Snapper

In the Gulf of Mexico, the minimum size limit of Mutton Snapper, 12" total length, became effective in 1990. In November 1999, the size limit increased to 16" total length. The minimum size limit changed once more in August 2018 to 18" total length.

In the South Atlantic, a 12" total length minimum size limit was implemented in 1992. In 1995, the size limit increased to 16" total length and then once more in February 2018 to 18" total length.

Data Filtering

The coastal logbook data were filtered using the methods recommended during SEDARs 32 and 41 (McCarthy, 2013 and 2015b). Data were filtered to remove possible erroneous data by eliminating trips that fished across multiple regions (i.e., the South Atlantic and Gulf of Mexico) and trips fishing more than 24 hours per day. Trips with reported effort greater than the 99.5 percentile of the distribution of the data (by gear) were filtered out of analyses. While data were filtered for the previous assessment (SEDAR 15A), this analysis is using updated methods which may result in slight differences in total trips and effort from SEDAR 15A.

Fishers remain in reporting compliance by returning discard logbooks with reports of "no discards". During the SEDAR 32 data workshop the issue of possible underreporting of commercial discards was discussed at length. The working group recommended that data be filtered to remove records from vessels that never reported discards of any species during a year. The SEDAR 32 working group also acknowledged that some commercial fishing trips may not have had discards of any species and discussed the likely maximum number of trips by a vessel without a report of discards. Therefore, following the SEDAR 32 and 41 commercial working groups' recommendations, the mean number of trips it takes vessels to report a discard of any species is calculated by region and gear. Vessels that take more than 2 standard deviations from the mean to report a discard of any species are excluded in analyses. Lastly from the SEDAR 32 workshop, it was generally felt that the likelihood of reef fish caught on trips targeting mackerel is extremely low. Therefore, data from trips with 100% mackerel landings were excluded from discard estimations.

Discard Calculation Procedure

Discard rates of vertical line vessels were calculated as the mean rate (discards per hook hour fished) during the years 2002-2022 by region (Gulf of Mexico and South Atlantic) and minimum size limit. There was insufficient data to calculate a mean discard rate by subregion. However, to get total estimated discards by subregion, annual total effort (hook hours) by region, subregion, and size limit was multiplied by the mean discard rate from the appropriate strata to calculate stratum specific discards. The total discards of Mutton Snapper were calculated as the sum of discards across all strata. For years prior to 2002 (the first full year of discard data), the region specific mean discard rate for a 16" total length minimum size limit was used to calculate discards for the years 1993-2001 when only effort data were available. No discard data were available during the 12" total length size regulation. Therefore, discard estimates of Mutton Snapper reported in this paper from 1993-1994 in the South Atlantic and 1993-1999 in the Gulf of Mexico should be considered an underestimate. They are provided here for a consistent time series to compare to SEDAR 15A.

Total discards calculated as the sum of,

*Discards within a stratum = mean stratum specific discard rate * stratum specific total Effort.*

Total effort of vertical line vessels within a stratum was computed as hook hours fished,

*total Effort = number of reels * average hooks per reel * total time fished.*

Standard error and coefficient of variation (CV) estimates were calculated from the stratum specific mean discard rates.

Results and Discussion

From 2002-2022, the majority of discards of Mutton Snapper were reported by fishers in the FL Keys and SE FL (Table 1). No trips reported discards of Mutton Snapper in NW FL or West of FL and very few trips reported discards in SW FL, NE FL, and North of FL. In the Gulf of Mexico, very few trips reported catch of Mutton Snapper West of FL and NW FL relative to SW FL and the FL Keys (Table 2 and Table 3). In the previous SEDAR, 15A, the data for calculating commercial discards were filtered for fishing areas 1-8 in the Gulf of Mexico. In order to align with the defined subregions specified for SEDAR 79, coastal logbook and discard logbook data were filtered in the Gulf of Mexico to include only FL Keys and SW FL. SEDAR 15A also filtered South Atlantic data to include fishing areas south of 31 degrees latitude or fishing areas off Florida and Georgia. For SEDAR 79, data in the FL Keys, SE FL, and NE FL were considered. The number of reported logbook trips and pounds of Mutton Snapper landed in the South Atlantic are shown in Table 4 and Table 5. Additional supporting evidence for filtering the data spatially for Mutton Snapper are highlighted in Figure 2 and Table 6. Most fish are discarded due to size limit regulations and Mutton Snapper are generally larger in subregions outside of the FL Keys and SE FL.

Calculated annual total discards (in number) of Southeastern Mutton Snapper from vertical line vessels are provided in Table 7 and annual estimates with associated error bars are in Figure 3. Again, note that estimated discards during a 12-inch TL minimum size limit is an underestimate because no discard data was collected during this management regime. Discards of Southeastern Mutton Snapper ranged from 7,500 fish in 1995 to 3,000 fish in 2008. From 1993-2022 the percent of discards to the total logbook catch for the same Southeast subregions was about 5-20% (Figure 4). The average weight of a discarded fish from the commercial observer data, 1.42 pounds, was used to convert numbers of fish to total whole pounds. Table 8 shows the mean discard rate by region and minimum size limit. There was insufficient data to calculate a mean discard rate by subregion. Total logbook effort was summarized by subregion (Table 9) and applied to the appropriate mean discard rate to estimate discards by subregion. NMFS is aware of instances of under-reporting in logbook submissions from the FL Keys area during the years 2018-2020. This under-reporting may impact the results of any analysis of logbook reported effort for federal species that occur in the FL Keys area during that time period (Personal communication from Southeast Fisheries Science Center).

The SEDAR 15A discards were calculated using a general linear model which is no longer considered the preferred method for estimating discards. Described further in McCarthy (2015a), a standardized discard rate as a model approach is an inappropriate method for discard calculation. Rather a nominal discard rate which considers a range of discard rates due to

differing fishing practices across the fishery is likely a better depiction of the fleet and should not be standardized out. Therefore, estimates for SEDAR 79 will differ from SEDAR 15A (Figure 5).

Immediate Discard Mortality

There are two sources of data for analyzing immediate discard mortality of Mutton Snapper: fisher reported discard logbook data and observer reported data. Table 10 summarizes the fisher reported condition of Mutton Snapper discards by subregion. Due to confidentiality rules, dispositions were combined into alive (all released alive, majority released alive, and released with a descending device), dead (all released dead and majority released dead), used as bait, and unknown. The limited commercial observer data can be found in Table 11 summarized by observer program. Across all data sources and subregions, the majority of Mutton Snapper were discarded alive in good condition.

Tables

Table 1: Discard logbook trips and fisher reported discard number of Mutton Snapper by subregion from vertical line vessels between 2002-2022.

Region	Subregion	Number of trips	Discard number
GOM	FL Keys	142	742
GOM	SW FL	5	8
SATL	FL Keys	326	1,150
SATL	NE FL	17	85
SATL	North of FL	3	15
SATL	SE FL	588	2,265

Table 2: Coastal logbook vertical line trips in the Gulf of Mexico with reported catch of Mutton Snapper (MS) and all other species (Other) by subregion. The * indicates confidential data.

	Gulf of Mexico							
	FL Keys		SW FL		NW FL		West of FL	
Year	MS	Other	MS	Other	MS	Other	MS	Other
1993	890	3,297	147	2,602	6	2,274	7	3,268
1994	829	3,425	140	3,069	26	2,963	*	2,772
1995	764	3,645	171	3,134	23	2,830	7	2,687
1996	503	2,527	176	2,991	8	2,620	13	3,730
1997	530	2,351	123	3,149	15	2,620	8	3,999
1998	391	1,707	142	3,228	13	3,351	15	4,201
1999	340	2,075	118	3,573	22	3,659	11	3,932
2000	318	1,937	98	3,615	20	3,694	16	3,970
2001	339	2,040	143	3,209	23	3,704	14	3,934
2002	422	2,015	100	2,863	20	4,180	13	4,018
2003	415	1,847	86	2,891	12	3,931	17	4,223
2004	350	1,641	140	2,816	16	3,833	10	4,118
2005	285	1,502	109	2,356	8	3,128	12	3,321
2006	287	1,393	145	2,182	15	2,990	12	3,308
2007	223	1,093	57	1,777	12	2,796	4	1,521
2008	237	1,114	42	1,892	21	2,901	*	1,362
2009	200	1,311	45	2,229	19	2,979	7	1,462
2010	170	1,146	61	1,459	12	2,139	*	972
2011	172	1,227	79	1,500	12	2,477		1,239
2012	191	1,267	86	1,680	13	2,413	*	1,393
2013	144	1,138	64	1,995	3	1,745	*	1,459
2014	157	1,161	88	2,334	5	1,654	*	1,862
2015	137	721	112	2,445	4	1,441	*	2,133
2016	123	687	102	2,373	3	1,577	*	2,267
2017	71	505	128	2,373	*	1,847		2,132
2018	127	604	147	2,118	*	1,518	*	1,865
2019	70	460	133	2,176	3	1,439	6	1,921
2020	113	459	143	2,008	*	1,203	*	1,625
2021	55	334	113	2,044	*	1,245	4	1,402
2022	35	257	102	1,279	*	1,044	*	1,094

Table 3: Coastal logbook vertical line catch in the Gulf of Mexico of Mutton Snapper (MS) and all other species (Other) by subregion. The * indicates confidential data. Catch is reported in whole weight pounds.

	Gulf of Mexico							
	FL Keys		SW FL		NW FL		West of FL	
Year	MS	Other	MS	Other	MS	Other	MS	Other
1993	28,710	1,079,479	10,845	2,070,087	187	2,381,662	112	5,046,558
1994	50,562	1,164,953	7,324	2,178,332	1,344	3,405,131	*	4,713,057
1995	42,117	1,239,945	6,718	2,236,857	761	3,251,399	121	4,777,128
1996	32,556	846,840	7,768	2,141,354	412	2,479,579	308	6,622,791
1997	35,853	896,810	5,811	2,232,092	264	2,206,822	129	7,700,436
1998	31,397	726,514	6,849	2,447,938	494	2,415,714	1,922	7,793,786
1999	27,821	1,027,673	6,287	2,603,338	4,066	2,657,526	200	7,262,342
2000	21,628	832,975	6,698	3,109,315	998	2,722,756	143	6,838,820
2001	17,735	847,164	9,882	2,940,456	542	3,215,832	532	7,032,814
2002	17,084	885,616	6,002	2,676,206	610	3,827,787	199	7,118,716
2003	14,842	759,923	4,068	2,307,505	371	3,146,456	422	7,516,880
2004	20,209	932,389	12,194	2,501,982	1,884	3,306,961	322	6,873,986
2005	16,240	741,618	6,469	2,322,833	83	3,220,311	331	5,552,592
2006	12,761	787,355	10,592	2,016,438	646	2,829,940	441	5,897,830
2007	10,565	587,974	3,127	1,722,381	291	3,406,714	78	4,728,517
2008	9,722	669,295	2,750	2,021,878	747	4,032,651	*	4,244,909
2009	10,345	942,765	2,011	2,677,265	945	4,527,830	654	4,606,569
2010	10,211	821,003	4,148	1,961,660	145	3,082,054	*	3,697,922
2011	6,183	1,000,106	12,172	2,111,424	364	4,550,694		3,922,997
2012	7,262	1,048,223	13,044	2,698,198	434	4,276,247	*	4,408,202
2013	7,237	913,368	8,768	2,530,908	70	3,163,796	*	4,584,391
2014	6,778	1,132,632	7,042	3,046,739	1,124	2,863,361	*	5,452,801
2015	4,521	686,895	16,993	3,128,276	29	2,335,299	*	6,681,607
2016	4,253	621,832	14,112	2,515,647	41	2,452,089	*	6,660,228
2017	10,215	650,817	12,672	2,262,088	*	2,797,100		6,366,639
2018	17,220	707,457	6,796	1,894,066	*	2,535,808	*	5,886,312
2019	2,747	646,824	4,976	1,952,534	54	2,423,440	26	6,196,080
2020	4,915	466,553	5,462	2,057,408	*	2,180,274	*	5,742,807
2021	2,572	492,693	3,840	2,606,699	*	2,198,430	50	5,379,207
2022	1,226	409,755	5,195	2,023,798	*	1,976,733	*	4,837,586

Table 4: Coastal logbook vertical line trips in the South Atlantic with reported catch of Mutton Snapper (MS) and all other species (Other) by subregion.

	South Atlantic							
	FL Keys		SE FL		NE FL		North of FL	
Year	MS	Other	MS	Other	MS	Other	MS	Other
1993	905	4,893	704	2,928	145	1,321	148	3,304
1994	1,015	5,580	788	3,960	208	1,431	114	4,190
1995	873	5,933	710	3,794	235	1,304	175	4,207
1996	1,013	7,228	940	4,026	141	1,217	163	3,938
1997	1,213	8,514	1,022	4,781	211	1,206	155	4,315
1998	943	7,399	1,027	5,590	181	1,226	152	4,173
1999	691	7,387	632	5,142	171	928	152	3,405
2000	714	6,715	495	4,579	169	1,017	139	3,120
2001	894	6,916	629	4,946	146	954	153	3,321
2002	922	6,630	775	5,303	155	1,063	146	3,612
2003	1,047	6,707	778	6,418	110	854	167	2,936
2004	855	6,006	637	6,021	108	838	209	2,821
2005	675	5,382	554	5,017	122	849	245	2,901
2006	596	5,044	374	6,133	101	910	248	3,152
2007	629	4,808	386	6,637	123	1,230	251	3,436
2008	652	4,955	402	6,694	76	1,601	181	3,281
2009	662	5,088	546	8,046	96	2,357	149	3,192
2010	675	4,505	403	7,561	61	1,480	128	2,661
2011	634	4,449	387	7,989	62	1,537	134	2,255
2012	544	4,308	336	6,835	118	1,564	102	2,231
2013	482	3,937	292	6,317	179	1,762	132	2,461
2014	648	4,682	420	7,005	219	2,454	94	2,814
2015	596	4,701	340	6,022	312	2,294	134	2,492
2016	594	5,074	392	6,184	192	2,007	101	2,878
2017	560	4,934	304	5,908	186	2,398	138	2,884
2018	578	4,321	227	5,742	183	2,556	179	2,638
2019	515	3,994	237	6,102	228	2,544	197	2,826
2020	438	3,070	211	5,069	225	2,589	317	2,566
2021	389	2,770	215	4,423	145	2,441	261	2,229
2022	328	2,607	218	3,891	136	1,788	171	1,896

Table 5: Coastal logbook vertical line catch in the South Atlantic of Mutton Snapper (MS) and all other species (Other) by subregion. Catch is reported in whole weight pounds.

	FL Keys		SE FL		NE FL		North of FL	
Year	MS	Other	MS	Other	MS	Other	MS	Other
1993	28,830	1,038,734	26,741	682,964	4,195	1,042,658	4,894	2,953,270
1994	26,897	1,255,664	36,015	833,975	8,815	1,317,839	3,570	3,413,192
1995	27,394	1,393,287	26,366	804,995	10,463	1,358,464	5,606	3,767,664
1996	46,761	1,654,613	36,644	849,055	4,792	1,082,317	6,355	3,474,324
1997	52,659	1,940,398	45,362	1,021,352	11,857	1,037,158	5,015	3,631,977
1998	48,312	1,704,359	45,723	1,053,042	13,752	906,868	6,279	3,407,802
1999	33,660	1,768,441	26,308	1,117,173	14,265	707,428	5,441	3,331,614
2000	26,857	1,773,356	32,773	1,030,743	8,206	826,054	3,585	3,209,686
2001	28,243	1,661,998	27,050	993,436	6,399	728,186	3,438	3,533,857
2002	40,899	1,733,648	36,391	1,073,203	6,180	693,004	3,866	3,279,274
2003	40,365	1,719,035	30,241	1,558,996	6,432	548,728	5,687	2,779,249
2004	31,870	1,728,066	28,899	1,648,178	6,169	584,282	5,569	3,001,741
2005	24,560	1,745,576	16,900	1,374,562	8,850	545,204	7,286	3,147,755
2006	17,932	1,420,423	13,253	1,917,700	3,872	522,355	10,172	3,152,540
2007	23,289	1,294,287	10,626	1,870,985	5,924	924,037	7,516	3,560,370
2008	24,610	1,485,029	13,684	1,941,158	2,226	1,076,174	5,226	3,499,400
2009	27,487	1,777,299	15,499	2,597,186	3,089	1,370,306	3,989	2,961,883
2010	29,314	1,787,346	13,898	2,685,023	2,970	996,362	3,525	2,728,525
2011	23,551	1,807,262	14,045	2,625,382	6,871	1,041,379	4,304	2,461,913
2012	28,285	1,932,581	13,470	1,955,799	10,720	1,021,760	3,945	2,203,297
2013	21,100	1,658,279	10,419	1,691,019	16,297	1,032,531	5,333	2,287,626
2014	19,030	1,673,628	14,996	2,134,534	18,376	1,303,597	3,772	2,282,154
2015	21,828	1,990,510	10,761	1,692,934	23,345	1,171,991	9,053	2,064,485
2016	25,143	2,038,750	14,457	2,163,496	11,313	951,386	6,639	2,161,185
2017	21,402	2,457,174	11,726	2,110,966	9,514	915,231	4,688	2,140,008
2018	25,727	1,561,323	12,188	2,056,865	10,974	938,563	9,222	2,004,050
2019	21,823	1,565,596	8,516	2,076,869	15,898	998,760	10,963	2,041,099
2020	19,119	1,203,158	9,557	1,653,226	14,536	943,058	15,985	1,975,301
2021	18,457	1,343,897	9,087	1,399,499	8,959	778,170	13,635	1,605,058
2022	15,417	1,356,477	8,840	1,092,087	10,233	535,393	9,333	1,461,239

Table 6: Discard logbook reported percentage of Mutton Snapper discards from 2002-2022 by discard reason from vertical line vessels.

Discard Reason	Gulf of Mexico		South Atlantic			
	FL Keys	SW FL	FL Keys	SE FL	NE FL	North of FL
Regulations	100 %	100 %	97 %	89 %	100 %	100 %
Market Conditions	-	-	2 %	0 %	-	-
Unreported	-	-	1 %	11 %	-	-

Table 7: Calculated discards (in number) of Mutton Snapper from the commercial vertical line fishery by subregion. SE represents the standard error calculated from the mean discard rates and applied to the estimated discards.

	Gulf of Mexico				South Atlantic					
	FL Keys		SW FL		FL Keys		SE FL		NE FL	
Year	Number	SE	Number	SE	Number	SE	Number	SE	Number	SE
1993	742	129	2,649	460	778	61	344	27	1,141	90
1994	832	144	2,736	475	852	67	507	40	1,701	134
1995	992	172	3,088	536	1,112	88	530	42	1,858	146
1996	665	115	2,883	500	1,240	98	458	36	1,555	123
1997	646	112	2,715	471	1,576	124	576	45	1,478	116
1998	489	85	2,712	470	1,091	86	506	40	908	72
1999	649	113	2,911	505	1,114	88	416	33	725	57
2000	806	140	2,887	501	1,084	85	448	35	697	55
2001	390	68	2,310	401	925	73	428	34	660	52
2002	716	124	2,128	369	908	72	429	34	740	58
2003	336	58	2,091	363	843	66	429	34	623	49
2004	253	44	2,157	374	737	58	424	33	586	46
2005	214	37	1,819	316	630	50	374	29	463	36
2006	239	41	1,976	343	575	45	376	30	447	35
2007	175	30	1,671	290	509	40	393	31	757	60
2008	169	29	1,380	239	477	38	411	32	690	54
2009	233	40	2,276	395	618	49	470	37	782	62
2010	187	33	2,349	407	483	38	474	37	482	38
2011	236	41	1,394	242	537	42	522	41	621	49
2012	306	53	1,742	302	555	44	445	35	507	40
2013	349	61	2,307	400	551	43	385	30	612	48
2014	260	45	3,640	632	566	45	525	41	803	63
2015	180	31	4,563	792	750	59	413	33	825	65
2016	173	30	2,976	516	679	54	449	35	657	52
2017	103	18	2,077	360	651	51	385	30	647	51
2018	221	54	3,209	770	904	126	632	89	866	121
2019	350	100	3,620	1,035	789	114	657	95	923	133
2020	202	58	3,799	1,086	727	105	515	74	951	137
2021	199	57	3,829	1,094	737	106	409	59	675	97
2022	205	59	2,310	660	610	88	612	88	735	106

Table 8: Mean commercial discard rate and coefficient of variation (CV) by region and size limit. Discard rates were based on discard logbook data from 2002-2022.

Region	Minimum Size Limit	Discard Rate	Discard Rate CV
Gulf of Mexico	16" TL	0.00367	0.17347
Gulf of Mexico	18" TL	0.00849	0.28579
South Atlantic	16" TL	0.00477	0.07879
South Atlantic	18" TL	0.00798	0.14419

Table 9: Total coastal logbook effort and associated trips used in the discard estimation. This summarized data is after filtered spatially and based on standard procedure identified in SEDAR 32 and 41 (McCarthy, 2013 and 2015b).

	Gulf of Mexico				South Atlantic					
	FL Keys		SW FL		FL Keys		SE FL		NE FL	
Year	Trips	Effort	Trips	Effort	Trips	Effort	Trips	Effort	Trips	Effort
1993	3,148	202,103	2,362	721,903	4,774	163,016	2,697	72,146	1,205	239,202
1994	3,317	226,819	2,794	745,514	5,454	178,630	3,599	106,340	1,380	356,602
1995	3,464	270,407	2,932	841,399	5,796	233,144	3,406	111,078	1,237	389,366
1996	2,343	181,134	2,995	785,512	6,936	259,822	3,465	96,090	1,193	325,986
1997	2,294	175,922	3,149	739,744	8,357	330,358	4,065	120,813	1,166	309,810
1998	1,584	133,146	3,197	739,030	7,172	228,742	3,964	106,041	1,068	190,362
1999	1,904	176,745	3,528	793,139	7,120	233,407	3,443	87,095	816	151,873
2000	1,745	219,565	3,538	786,685	6,458	227,265	3,133	93,860	847	146,179
2001	1,788	106,229	3,137	629,502	6,644	193,974	3,304	89,681	816	138,341
2002	1,684	195,009	2,823	579,819	6,351	190,256	3,953	89,852	890	155,201
2003	1,569	91,516	2,837	569,738	6,376	176,730	4,288	90,015	661	130,580
2004	1,427	68,996	2,710	587,814	5,865	154,472	4,006	88,964	675	122,784
2005	1,203	58,194	2,299	495,634	5,133	132,068	3,516	78,290	665	97,056
2006	1,144	65,121	2,074	538,532	4,714	120,617	3,526	78,865	636	93,787
2007	878	47,688	1,614	455,197	4,669	106,634	4,029	82,410	840	158,768
2008	940	46,162	1,717	375,902	4,832	100,015	4,018	86,178	1,038	144,677
2009	1,078	63,535	2,113	620,120	4,992	129,558	4,709	98,468	1,564	163,818
2010	955	51,072	1,367	640,034	4,364	101,288	4,800	99,344	1,042	101,082
2011	1,002	64,338	1,350	379,859	4,246	112,470	5,457	109,514	1,157	130,171
2012	1,058	83,271	1,534	474,644	4,189	116,277	4,827	93,251	1,140	106,218
2013	1,020	95,218	1,859	628,722	3,863	115,533	4,420	80,611	1,313	128,266
2014	968	70,855	2,126	991,951	4,568	118,682	5,321	110,042	1,946	168,280
2015	642	48,975	2,310	1,243,365	4,631	157,132	4,270	86,555	1,674	172,954
2016	569	47,240	2,182	810,855	5,000	142,387	4,571	94,138	1,421	137,778
2017	401	28,157	2,096	565,901	4,863	136,538	4,136	80,672	1,774	135,676
2018	458	39,196	1,818	580,944	4,263	118,941	3,938	81,815	1,831	113,844
2019	405	41,188	1,829	426,404	3,924	98,868	3,994	82,341	1,928	115,623
2020	408	23,738	1,768	447,491	2,989	91,059	3,198	64,486	1,873	119,149
2021	281	23,429	1,767	450,970	2,673	92,307	2,670	51,274	1,737	84,542
2022	253	24,173	1,278	272,052	2,616	76,382	3,908	76,604	1,789	92,046

Table 10: Discard logbook reported percentage of Mutton Snapper discards (from 2002-2022) by disposition from commercial vertical line vessels.

Disposition	Gulf of Mexico		South Atlantic			
	FL Keys	SW FL	FL Keys	SE FL	NE FL	North of FL
Alive	99.7%	100%	95.3%	85.4%	100%	100%
Bait	0.3%	-	3.4%	13.2%	-	-
Dead	-	-	1%	1.2%	-	-
Unknown	-	-	0.3%	0.2%	-	-

Table 11: Percent of Mutton snapper reported for each disposition and when discarded, the condition of the fish when hauled on board. These data are summarized from 2007-2022 for each vertical line commercial observer program. Reef Fish Observer Program (RFOP) collect data only in the Gulf of Mexico (GOM) and began sampling in 2007. The South Atlantic Vertical Line Observer Program (SAVLOP) collect data only in the South Atlantic (SATL) and began in 2018.

				Disposition %		Further Breakdown of Released Fish: Condition % Upon Arrival to Vessel		
Observer Program	Region	N trips	N fish	Kept	Released	Alive, Good	Alive, Barotrauma	Dead
RFOP	GOM	60	354	69.77	30.23	98.13	0.93	0.93
SAVLOP	SATL	73	264	93.18	6.82	83.33	16.67	0

Figures

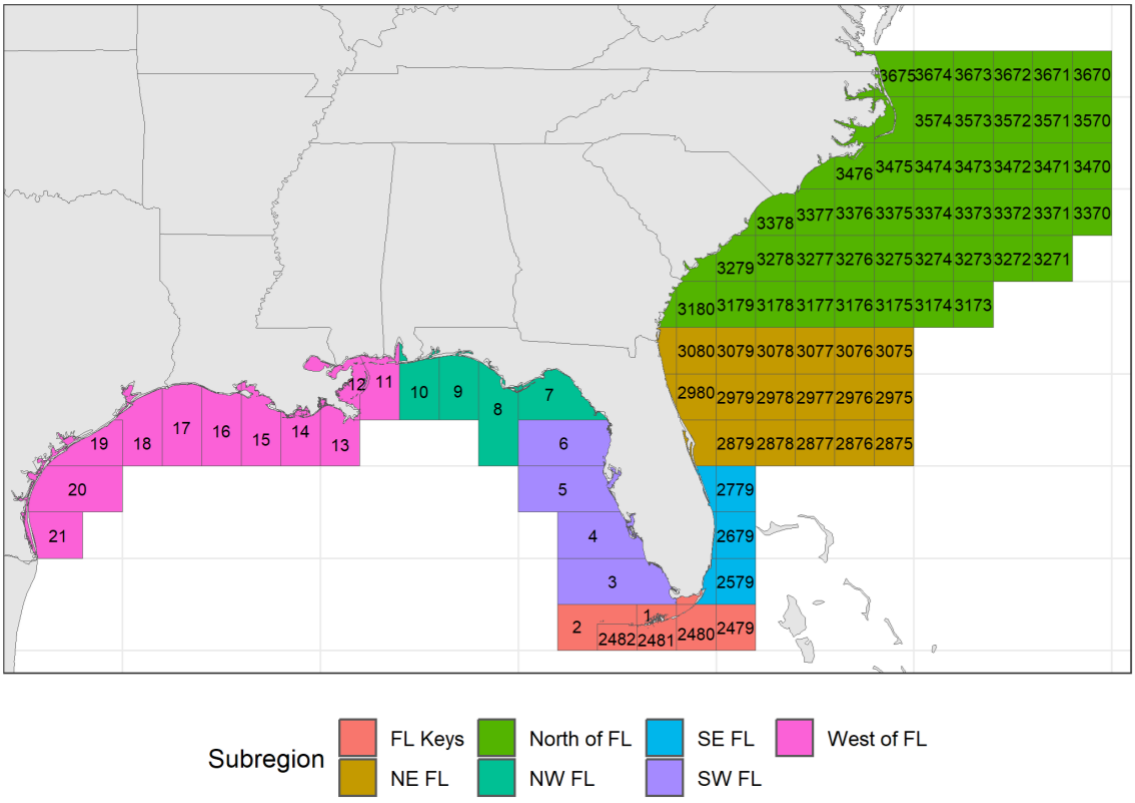

Figure 1: Southeastern fishing areas from the Coastal Fisheries Logbook Program (CFLP) and categorized by subregion.

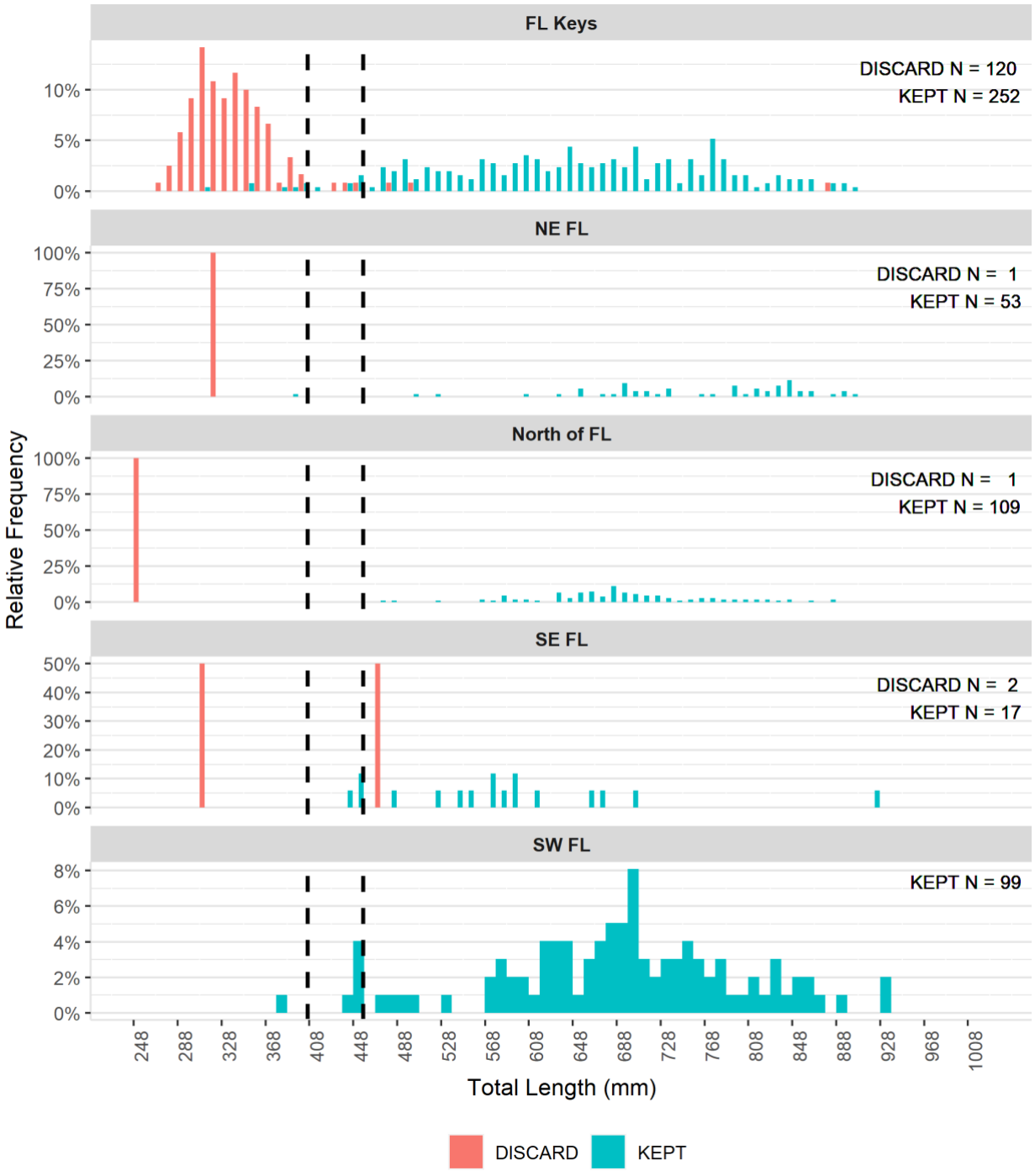

Figure 2: Commercial observer length frequencies of Mutton Snapper by subregion and disposition. Due to confidentiality rules, all observer program data were pooled from 2007-2022. Additionally, the two vertical lines indicate the 16" and 18" minimum size limit regulations.

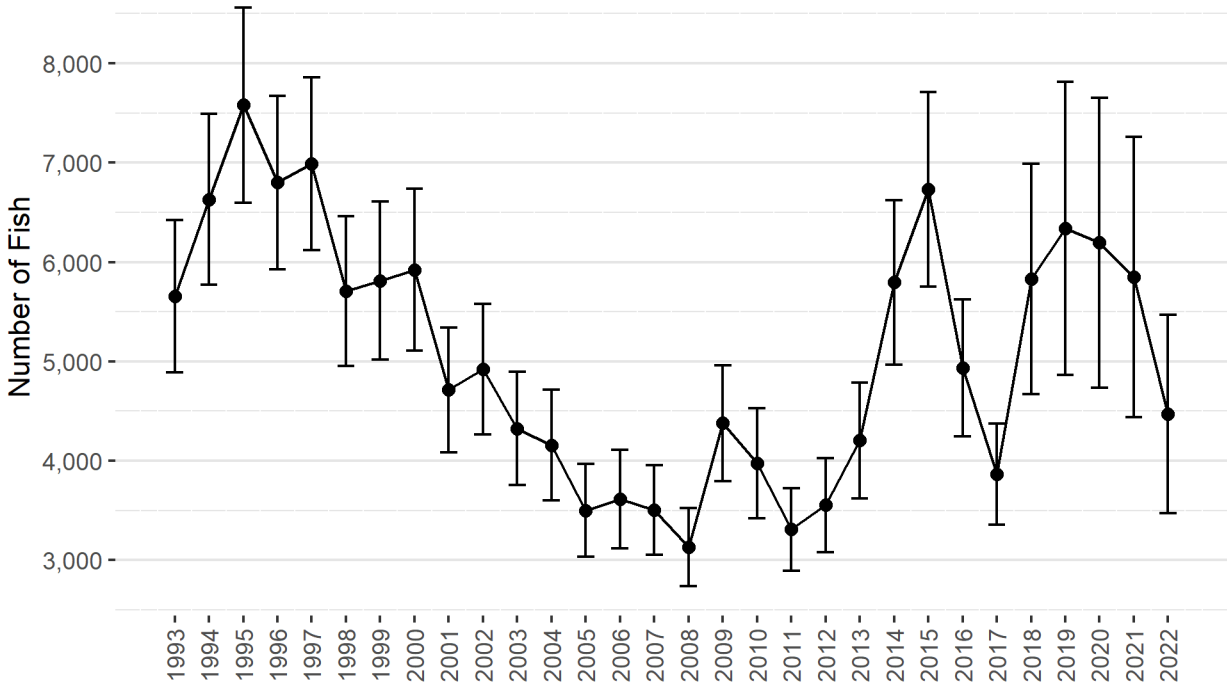

Figure 3: Calculated annual number of Muton Snapper commercial discards from 1993-2022.

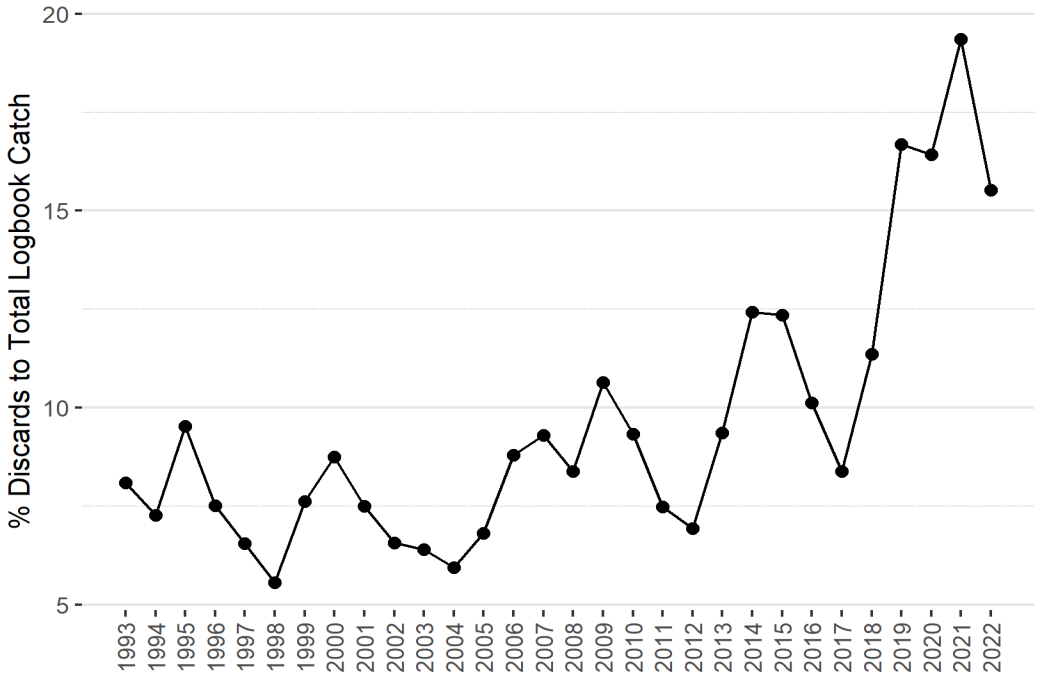

Figure 4: Calculated commercial discards of Mutton Snapper as a percentage of total logbook catch from the SW FL, FL Keys, SE FL, and NE FL subregions. A single mean weight of a discarded Mutton Snapper (1.42 pounds) was used to convert numbers to weight, but this might be insufficient to use in the earlier years where there was a 12-inch minimum size limit.

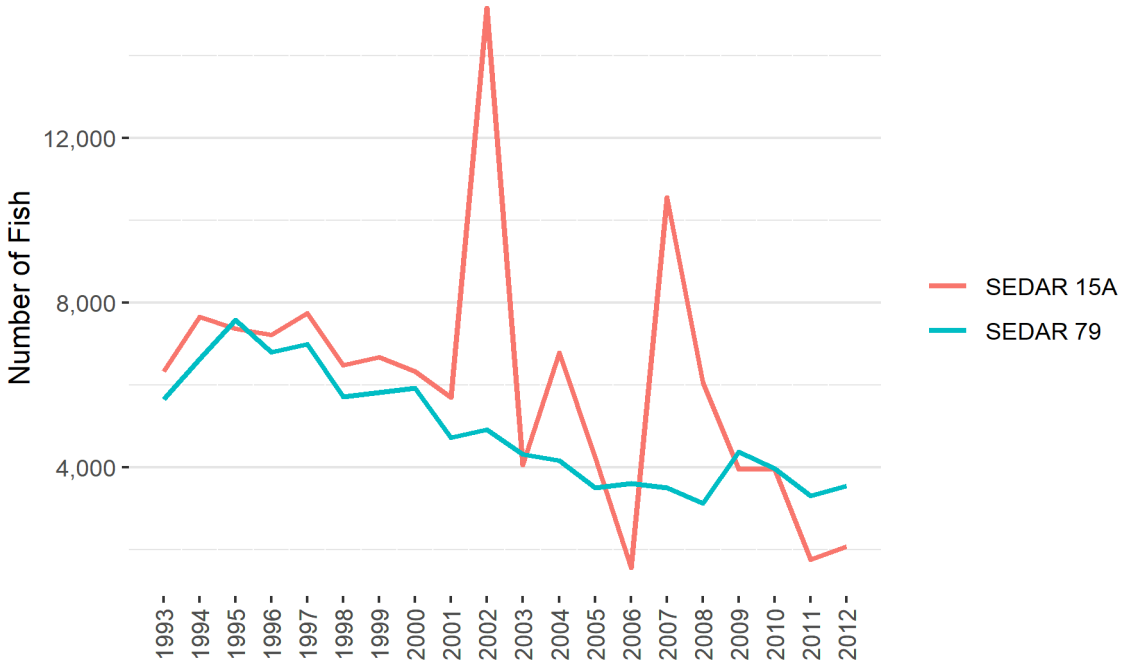

Figure 5: Estimated commercial discards of Mutton Snapper from SEDAR 15A to SEDAR 79. See text for discussion of observer differences.

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