

**ESTIMATES OF KING MACKEREL DISCARDS
for the
ATLANTIC AND GULF MIGRATORY GROUPS**

John Poffenberger¹
November 25, 2003

I. Introduction

A Southeast Data, Assessment, and Review (SEDAR) process has been established for king mackerel . As part of the Data Workshop for this SEDAR, discard data from the Southeast Fisheries (SEFSC) coastal fisheries logbook program are used to estimate the numbers of king mackerel that were discarded during the period 1998 through 2002.

In August 2001, the Southeast Fisheries Science Center (SEFSC) initiated a program to collect information on the numbers of fish that are being discarded in the Gulf of Mexico reef fish and South Atlantic snapper-grouper fisheries. To collect this information, the SEFSC developed a form that supplements the existing vessel logbooks that are currently mandatory for these fisheries.

To help reduce the reporting burden on the fishermen, a 20% sample of the vessels with a Gulf of Mexico, South Atlantic snapper-grouper, king mackerel, Spanish mackerel or shark permit were selected to report and the same vessel is not selected in subsequent years. To assure that the sample is representative of the total universe of vessels with these Federal permits, the universe of permitted vessels was stratified and a random sample was selected from each stratum. During the first year (8/1/2002 - 7/31/2003), three strata were used . One of the strata was geographical location where the vessel fished during 2000. There are two categories in this strata - the Gulf of Mexico (Florida Keys to the Texas-Mexican border) and the South Atlantic (which extends from the North Carolina - Virginia border to the Florida Keys). The second stratum was based on the type of gear. There are 5 categories in this stratum - handline, longline, trolling, trap and gill nets. The third stratum is based on the fishing activity of the vessels during calendar year 2000. There are two strata - vessels that made between 1 and 10 trips and vessels that made more than 10 trips. In all, there are 20 strata; however, there were too few boats that used gill nets in the Gulf of Mexico, so all of the boats that used gill nets in the Gulf were

¹Sustainable Fisheries Division, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL

combined into a single strata. Consequently, random selections were made in 19 strata.

Because of the inconsistency between the vessel's fishing activity during 2000 and the 8/1/2001 - 7/31/2002 reporting period, the fishing activity strata was dropped for the sample selection for the second year of the survey that began in 8/1/2002. As a result of this change, there are 10 strata for the second year of the survey instead of 19 as there were for the first year.

The selected fishermen were instructed to complete a supplemental discard form for every fishing trip that they made. If they did not have any discards for the trip, they were instructed to complete a discard form and write "no discards" on the form. It is very important that fishermen understand the need to report for every trip, even when they did not discard any fish. If they did not fish during a calendar month and submitted a no-fishing form, then they did not have to submit a discard form.

For the two survey years, there were a total of 9,848 trips for which discard forms were submitted. King mackerel discards were reported on 498 trips, for the Gulf and Atlantic migratory groups combined. Discards were reported on trips where four types of gear were used. These gear types are handline, bandit rig, trolling and gill nets. For purposes of this report, the data for trips where bandit rigs were used are combined with the trips where handline gear were reported, and the analyses are done for these two gear types combined.

In addition to the numbers of discards, fishermen are asked to record their best estimate of the condition of the fish (animals) when they were released. The fishermen are given 6 options for the condition of released fish. These options are; 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. The fishermen are also asked to specify a reason why the fish (animals) were discarded. The choices are that the fish are discarded because of regulations or because the fish are unmarketable or unwanted.

II. Methods

The Federal regulations for king mackerel have established two migratory groups for this species. The boundary for these two groups shifts at different times during the year. The southern boundary for the Atlantic migratory group is the Flager-Volusia county line in Florida and this boundary is in effect from April 1 through October 31 of each year. During the remainder of the year, November 1 through March 31, the boundary shifts south to the Monroe-Collier county line. The northern boundary for this group is Maine. The Gulf migratory group is defined as the area south from the Flager/Volusia county line to the Texas/Mexico border for April 1 through October 31 and shifts south to the Monroe-Collier county line for November 1 through March 31. The Gulf migratory group is further disaggregated into a western and eastern zone, and the dividing boundary for these zones is the Florida/Alabama state line. Separate fishery quotas have been established for the two migratory groups and the Gulf quota has been further divided into quotas for each of the two zones. The quota for the eastern zone is

further disaggregated into quotas for northern and southern subzones. For purposes of this report, the analyses are done for the Gulf and Atlantic migratory groups and no further disaggregations are used.

The numbers of discards are summarized for two categories, (1) king mackerel and (2) all other species, for each trip. Using this data set, the means and standard deviations for the numbers of king mackerel discards are calculated separately for each of the two survey years and the two migratory groups. The two years are treated separately because the selection criteria were slightly different for the two survey years. In addition, the means and standard deviations are calculated for two separate scenarios. First, the calculations are made for only trips where king mackerels were reportedly discarded (i.e., $n = 498$) and the second set of summary statistics are made for all trips, including those where king mackerel were not discarded (i.e., $n = 9,848$). These statistics are presented in Tables 1 and 2 for the two survey years, respectively.

Although the means and standard deviations for the two survey years are presented separately in Table 1 and 2, the data from the two periods are combined and the summary statistics are calculated from the combined discard data. The summary statistics for the two migratory groups for the entire two years are presented in Table 3.

Estimates of the numbers of discards for king mackerel based on the mean and standard deviation from Table 3 are provided in the next section.

III. Results

Although the SEFSC initiated the reef fish/snapper-grouper logbook programs in the early 1990's, regulations were not mandated that require vessels that have a king mackerel permit to report their fishing until January 1998. Consequently, estimates of the total discards of king mackerel are provided for 1998 through 2002. The estimated numbers of discards for the three gear types for which discards were reported (handlines, trolling and gill nets) are presented in Table 4. The estimated numbers of discards are calculated using the mean discards per trip and one standard deviation from the mean (Table 3, bottom portion) multiplied times the total numbers of trips by gear and area that were reported to the logbook program. From Table 4, the number of king mackerel discarded per year range from about 4,100 to 30,000 for the Atlantic group and from Table 5, the ranges is from 5,100 to 44,000 for the Gulf group.

As explained in the Introduction, fishermen are asked to provide their estimate of the condition of the fish when they were released. The discard reporting form allows the fishermen to pick one of the following six options: (1) all discards were dead, (2) the majority of the discards were dead, (3) all discards were alive, (4) the majority of the discards were alive, (5) the catch were kept, but not sold (i.e., eaten or used as bait, etc.), and (6) unable to determine the condition of the released fish. The percentage of the reported king mackerel discards by type of gear for each of these six categories are presented in Table 6. The percentages by condition by migratory group are presented in Table 6a and Table 6b for the Atlantic and Gulf group,

respectively.

As part of the discard reporting, fishermen are also asked to identify the reason that the animals were discarded. They are given two choices; (1) regulations or (2) market conditions. The percentages of the king mackerel discards by the three gear types for the two reasons are presented in Table 7.

Table 1. The means and standard deviations for the numbers of king mackerel discarded by gear type for only those trips where king mackerel discards were reported during the two survey periods.

Gear type	Survey year, 8/1/2001 - 7/31/2002									
	South Atlantic Region					Gulf of Mexico Region				
	Mean	Std. Dev.	Min	Max	Trips	Mean	Std. Dev.	Min	Max	Trips
Handline*	4.04	3.76	1	21	49	5.11	4.82	1	22	73
Trolling	1.53	1.26	1	6	15	2.83	2.37	1	10	24
Gill Net	0.00	0.00	0	0	0	0.00	0.00	0	0	0

Gear type	Survey year, 8/1/2002 - 7/31/2003									
	South Atlantic Region					Gulf of Mexico Region				
	Mean	Std. Dev.	Min	Max	Trips	Mean	Std. Dev.	Min	Max	Trips
Handline*	3.33	3.44	1	24	60	4.43	8.08	1	75	84
Trolling	4.38	4.94	1	25	112	6.64	6.86	1	42	77
Gill Net	6.50	4.61	1	12	4	0.00	0.00	0	0	0

* Includes both bandit rig and handline gear.

Table 2. The means and standard deviations for the numbers of king mackerel discarded by gear type for all trips reported for the two survey years, including those where discards of king mackerel were not reported.

Gear type	Survey year, 8/1/2001 - 7/31/2002									
	South Atlantic Region					Gulf of Mexico Region				
	Mean	Std. Dev.	Min	Max	Trips	Mean	Std. Dev.	Min	Max	Trips
Handline*	0.20	1.20	0	21	1,006	0.30	1.68	0	22	1,232
Trolling	0.05	0.36	0	6	449	0.26	1.08	0	10	266
Gill Nets	0.00	0.00	0	0	90	0.00	0.00	0	0	51
Other	0.00	0.00	0	0	129	0.00	0.00	0	0	252

Gear type	Survey year, 8/1/2002 - 7/31/2003									
	South Atlantic Region					Gulf of Mexico Region				
	Mean	Std. Dev.	Min	Max	Trips	Mean	Std. Dev.	Min	Max	Trips
Handline*	0.14	0.96	0	24	1,466	0.15	1.70	0	75	2,434
Trolling	0.62	2.40	0	25	798	0.73	3.07	0	42	703
Gill Net	0.05	0.68	0	12	549	0.00	0.00	0	0	20
Other	0.00	0.00	0	0	144	0.00	0.00	0	0	259

* Includes both bandit rig and handline gear.

Table 3. The means and standard deviations for the numbers of king mackerel discarded by gear type and region (Gulf and S. Atlantic) for both survey periods combined.

Gear type	Trips where king mackerel were discarded									
	South Atlantic Region					Gulf of Mexico Region				
	Mean	Std. Dev.	Min	Max	Trips	Mean	Std. Dev.	Min	Max	Trips
Handline*	3.65	3.60	1	24	109	4.75	6.77	1	75	157
Trolling	4.05	4.75	1	25	127	5.73	6.31	1	42	101
Gill Net	6.50	4.61	1	12	4	0.00	0.00	0	0	101

Gear type	All trips reported in the two survey periods									
	South Atlantic Region					Gulf of Mexico Region				
	Mean	Std. Dev.	Min	Max	Trips	Mean	Std. Dev.	Min	Max	Trips
Handline*	0.16	1.07	0	24	2,472	0.20	1.70	0	75	3,665
Trolling	0.41	1.95	0	25	1,247	0.60	2.69	0	42	969
Gill Net	0.04	0.63	0	12	639	0.00	0.00	0	0	71

* Includes both bandit rig and handline gear.

Table 4. Estimated numbers of king mackerel discards by year and gear for the Atlantic migratory group, 1998 - 2002.

Year	Gill Nets			Handlines*			Trolling			Total all gear	
	No. Trips	Mean	Std. Dev.	No. Trips	Mean	Std. Dev.	No. Trips	Mean	Std. Dev.	Mean	Std. Dev.
1998	1,765	71	1,112	13,611	2,178	14,564	7,407	3,037	14,444	5,285	30,119
1999	1,566	63	987	11,946	1,911	12,782	7,395	3,032	14,420	5,006	28,189
2000	1,750	70	1,103	11,143	1,783	11,923	7,827	3,209	15,263	5,062	28,288
2001	1,678	67	1,057	11,925	1,908	12,760	7,643	3,134	14,904	5,109	28,721
2002	1,589	64	1,001	8,963	1,434	9,590	6,349	2,603	12,381	4,101	22,972

* Handlines include bandit rig gear.

Table 5. Estimated numbers of king mackerel discards by year and gear for the Gulf of Mexico migratory group, 1998 - 2002.

Year	Gill Nets			Handline*			Trolling			Total all gear	
	No. Trips	Mean	Std. Dev.	No. Trips	Mean	Std. Dev.	No. Trips	Mean	Std. Dev.	Mean	Std. Dev.
1998	1,013	0	0	17,457	3,491	29,677	4,506	2,704	12,121	6,195	41,798
1999	817	0	0	18,389	3,678	31,261	4,702	2,821	12,648	6,499	43,910
2000	605	0	0	17,815	3,563	30,286	5,014	3,008	13,488	6,571	43,773
2001	577	0	0	17,110	3,422	29,087	4,738	2,843	12,745	6,265	41,832
2002	544	0	0	13,386	2,677	22,756	4,102	2,461	11,034	5,138	33,791

* Handlines include bandit rig gear.

Table 6. The percentage of the reported discards for king mackerel by gear type by condition of the release.

Gear type	All discard appeared dead	Majority appeared dead	All discard appeared alive	Majority appeared alive	Kept but not sold	Unable to determine	Total
Handline*	1.1						1.1
Trolling	1.6	1.9	27.2	13.2	3.2	3.4	50.5
Gill Net	1.7	5.4	26.1	13.4	1.5	0.1	48.3
Total	4.5	7.3	53.3	26.6	4.7	3.5	100.0

* Handlines include bandit rig gear.

Table 6a. The percentage of the reported discards for king mackerel by gear type by condition of the release for the Atlantic migratory group.

Gear type	All discard appeared dead	Majority appeared dead	All discard appeared alive	Majority appeared alive	Kept but not sold	Unable to determine	Total
Handlines*	0.7	2.6	21.3	13.3	4.5		42.4
Trolling	3.0	12.5	23.9	13.4	2.0		54.8
Gill Nets	2.8	0.0	0.0	0.0	0.0		2.8
Total	6.5	15.0	45.2	26.8	6.5		100.0

* Handlines includes bandit rig gear.

Table 6b. The percentage of the reported discards for king mackerel by gear type by condition of the release for the Gulf migratory group.

Gear type	All discard appeared dead	Majority appeared dead	All discard appeared alive	Majority appeared alive	Kept but not sold	Unable to determine	Total
Handline*	2.2	1.4	31.3	13.1	2.3	5.9	56.3
Trolling	0.8	0.5	27.7	13.4	1.1	0.2	43.7
Total	3.0	1.9	59.1	26.5	3.5	6.0	100.0

* Handlines include bandit rig gear.

Table 7. The percentage of the reported discards for king mackerel by gear type by reasons for the releases.

Gear type	Regulations	Not marketable	Unreported	Total
Handline*	1.1	0.0		1.1
Trolling	45.5	2.5	2.5	50.5
Gill Net	42.4	5.4	0.5	48.3
Total	89.0	8.0	3.1	100.0

* Handlines include bandit rig gear.