Appendix F: Process Used to Estimate Discards - DRAFT

Snowy Grouper
Estimation of Increased Snowy Grouper Bycatch Associated With Regulations in Amendment 13C

Three scenarios are presented providing very rough estimates of possible increased bycatch associated with regulations imposed through Amendment 13C. Scenario 1 is intended to be the most likely scenario while Scenarios 2 and 3 provide minimum and maximum estimates. The Council and SSC chose Scenario 1 as their preferred to construct a rebuilding strategy that includes discards.

In addition to the 3 Scenarios listed in Table a, two additional scenarios (Scenarios 4 and 5) were requested by the SSC. These scenarios are slight modifications of Scenario 1. Scenario 4 is identical to Scenario 1 with the exception that is assumed 25% of longline trips are made to catch snowy grouper. Scenario 5 differs from Scenario 1 in that it is assumed 75% of longline trips are made to catch snowy grouper. The SSC felt that scenario 2 and 3 are unrealistic and should be dropped from the analysis. The assumptions for the five scenarios are shown below (Tables a and b).

Table a. Assumptions for three scenarios.

Scenario 1	Scenario 2	Scenario 3
Snowy grouper trip limit will keep fishery open all year.	Snowy grouper trip limit will keep fishery open all year.	Snowy grouper trip limit will keep fishery open all year.
Fishing year for golden tilefish starts September 1.	Fishing year for golden tilefish starts September 1.	Fishing year for golden tilefish starts September 1.
50% of longline trips are made to catch snowy grouper despite reduced trip limit and quota.	Longline fishermen avoid snowy grouper.	Catch of snowy grouper with longline is similar to pre-Amendment 13C conditions.
After the golden tilefish quota is met, longline fishermen stop fishing for golden tilefish and no longer use longline gear.	N/A	After the golden tilefish quota is met, longline fishermen stop fishing for golden tilefish and no longer use longline gear.
In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.	In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.	In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.
Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and	Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and	Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and

Scenario 1	Scenario 2	Scenario 3
blackbelly rosefish.	blackbelly rosefish.	blackbelly rosefish.
There is some bycatch from targeting mid-shelf species.	There is some bycatch from targeting mid-shelf species.	There is some bycatch from targeting mid-shelf species.
Release mortality is 100%	Release mortality is 100%	Release mortality is 100%

Table b. Estimated increased bycatch associated with Amendment 13C given assumptions of five scenarios. Pounds whole weight.

	Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**
2008 Expected Landings	91,647	89,461	104,314	91,647	91,647
2008 Dead Discards	18,128	4,832	31,191	14,213	25,737
Landings + Dead Discards	109,775	94,293	135,505	105,960	117,384
2008 ABC	102,960	102,960	102,960	102,960	102,960
Amount of Dead Discards in Excess of ABC	6,815	0	32,545	3,000	14,424

Table c. Estimated increased bycatch associated with Amendment 13C given assumptions of five scenarios. Pounds gutted weight.

	Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**	**Scenario 5**
2008 Expected Landings	77,667	75,814	88,402	77,667	77,667
2008 Dead Discards	15,363	4,095	26,433	12,045	21,811
Landings + Dead Discards	93,030	79,909	114,835	89,797	99,478
2008 ABC	87,254	87,254	87,254	87,254	87,254
Amount of Dead Discards in Excess of ABC	5,776	0	27,581	2,543	12,224

Table d. Rebuilding strategy (lbs whole weight) that takes into consideration the expected increase in dead discards expected from management measures in Amendment 13C based on Scenario 1.

Year	Biomass	TAC in preferred that does not include dead discards = ABC	Amount of Dead Discards in Excess of ABC	Revised TAC (incorporates dead discards)
2008	1,220,214	102,960	6,815	96,145
2009	1,298,522	117,769	8,460	109,309
2010	1,393,320	117,769	8,460	109,309
2011	1,494,733	117,769	8,460	109,309
2012	1,635,829	117,769	8,460	109,309
2013	1,772,515	117,769	8,460	109,309
2014	1,893,769	158,321	11,552	146,769
2015	1,986,364	158,321	11,552	146,769
2016	2,087,776	158,321	11,552	146,769
2017	2,162,733	158,321	11,552	146,769
2018	2,239,895	158,321	11,552	146,769
2019	2,321,466	202,918	13,935	188,983
2020	2,407,446	202,918	13,935	188,983
2021	2,517,677	202,918	13,935	188,983
2022	2,581,611	202,918	13,935	188,983
2023	2,680,819	202,918	13,935	188,983
2024	2,786,641	239,921	16,503	223,418
2025	2,879,235	239,921	16,503	223,418
2026	2,965,215	239,921	16,503	223,418
2027	3,040,172	239,921	16,503	223,418
2028	3,143,790	239,921	16,503	223,418
2029	3,249,611	274,468	19,271	255,197
2030	3,351,024	274,468	19,271	255,197
2031	3,454,641	274,468	19,271	255,197
2032	3,562,668	274,468	19,271	255,197
2033	3,681,717	274,468	19,271	255,197
2034	3,765,493	300,629	22,117	278,512
2035	3,877,928	300,629	22,117	278,512
2036	3,974,932	300,629	22,117	278,512
2037	4,067,526	300,629	22,117	278,512
2038	4,168,938	300,629	22,117	278,512
2039	4,272,555	314,818	23,797	291,021

Snowy Grouper
Commercial Incidental Catch

Regulations in Amendment 13C would decrease the quota over three years from 151,000 lbs gw in 2006 to 84,000 lbs gw in 2008. The trip limit would decrease from 275 lbs gw in 2006 to 100 lbs gw in 2008.

Snowy Scenario #1. Use data from 2000-2005, include longline gear in the estimation of incidental catch. Note: This is considered to be the most likely scenario. Two other scenarios will be conducted to bracket this estimate.

In this Scenario it is assumed:

- Snowy grouper fishery will remain open all year. Quotas for snowy grouper and/or deep water aggregate will not be met until end of year.
- Some longline fishermen catch snowy grouper despite reduced trip limit and quota. The number of longline trips that catch snowy grouper is half what is was before Amendment 13C. (Some longline fishermen indicate they will avoid locations where snowy grouper occur because of the small trip limit. It is not possible to determine what percentage of longline fishermen will avoid snowy grouper.)
- Fishing year for golden tilefish will change through Amendment 15 to start on September 1.
- After the golden tilefish quota is met, longline fishermen stop fishing for golden tilefish and no longer use longline gear. Since tilefish dominate longline reef fish landings, it is assumed longline fishermen will no longer use this gear for reef fish when the quota is met.
- After vermilion snapper or golden tilefish quota is met catch of snowy grouper is due to hook and line fishermen targeting co-occurring species (incidental catch).
- A deep-water unit including snowy grouper is not established through Amendment 15. If a deep water unit is established, bycatch of snowy grouper, particularly post quota bycatch would be reduced substantially since there would be no fishing for co-occurring species in the unit when a quota was met.
- In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.
- Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and blackbelly rosefish.
- There is also limited co-occurrence of snowy grouper with vermilion snapper, almaco jack, scamp, gag, and greater amberjack with snowy grouper. Incidental catch is assumed to be limited to trips that catch the above species and less than 100 lbs ww of snowy grouper with hook and line gear.
- Release mortality is 100% (SEDAR 4 2004).
- Logbook and MRFSS indicates few snowy grouper were discarded prior to Amendment 13C. It is assumed the stock assessment accounted for any discards prior to implementation of Amendment 13C.

Step 1 – Identify species caught on trips that that target snowy grouper.

Table 1. Species caught on trips that caught at least 100 lbs ww of snowy grouper with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
GROUPER,SNOWY	2,855	406	1,159,523	36.89	36.89
SNAPPER,VERMILION	1,035	491	508,022	16.16	53.06
TILEFISH,BLUELINE	1,454	169	245,567	7.81	60.87
GROUPER,GAG	513	305	156,471	4.98	65.85
SCAMP	924	142	130,884	4.16	70.01
AMBERJACK,GREATER	482	252	121,426	3.86	73.88
JACK,ALMACO	640	179	114,468	3.64	77.52
TRIGGERFISH,GRAY	687	130	89,150	2.84	80.35
GROUPER,RED	768	104	80,182	2.55	82.90
SNAPPER,RED	685	94	64,543	2.05	84.96
DOLPHINFISH	644	72	46,534	1.48	86.44
BARRELFISH	314	145	45,626	1.45	87.89
AMBERJACK,LESSER	204	152	31,013	0.99	88.88
KING MACKEREL	330	90	29,761	0.95	89.82
GROUPER,BLACK	191	142	27,114	0.86	90.69

Table 2. Species caught on trips that caught at least 100 lbs ww of snowy grouper with longline gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
TILEFISH	503	1,776	893,139	40.38	40.38
GROUPER,SNOWY	590	850	501,662	22.68	63.07
BLACK BELLIED ROSEFISH	306	1,000	305,925	13.83	76.90
TILEFISH,BLUELINE	387	490	189,616	8.57	85.47
SHARK,SANDBAR	76	1,330	101,106	4.57	90.04
GROUPER,YELLOWEDGE	338	267	90,338	4.08	94.13

On hook and line trips that target snowy grouper the most commonly caught species are vermilion snapper, blueline tilefish, and gag (Table 1). Golden tilefish are infrequently caught on snowy grouper hook and line trips probably because golden tilefish and snowy grouper occupy different habitat types. Snowy grouper prefer a rock habitat; whereas, golden tilefish burrow in a sand/mud habitat. Although vermilion snapper, scamp, gag, red grouper, and others are taken on snowy grouper trips, there is little overlap in habitat with these species and snowy grouper. Some juvenile snowy grouper are caught when fishermen target mid-shelf species. Snowy grouper generally occur in deeper water. Snowy grouper are likely taken on trips that include mid-shelf species because fishermen fish in different locations and different depths on a fishing trip.

The most commonly caught species on trips that catch greater than 100 lbs ww of snowy grouper with longline gear are golden tilefish, blackbelly rosefish, blueline tilefish, sandbar shark, and yellowedge grouper (Table 2). As mentioned previously, golden tilefish prefer a different habitat type from snowy grouper. However, longline fishermen

will sometimes set gear in area that will overlap rocks and mud resulting in a catch that includes golden tilefish and snowy grouper. The Snapper Grouper Advisory Panel has stated that longline fishermen can avoid snowy grouper.

Step 2 – Use data from 2000-2005 to predict if and when golden tilefish and vermilion snapper would close in the future, on average.

Table 3. Average landings by month for golden tilefish during 2000-2005. The 295,000 lb gutted weight (gw) quota would have been met during May, on average based on a September 1 start date.

Month	avg gw	cum
1	17,493	161,392
2	22,851	184,243
3	31,606	215,849
4	52,029	267,878
5	46,134	314,012
6	41,173	355,185
7	19,163	374,348
8	36,292	410,640
9	30,482	30,482
10	45,288	75,770
11	38,012	113,782
12	30,117	143,899

Table 4. Average landings by month for vermilion snapper during 2000-2005. The 1.1 million lb gutted weight (gw) quota would not be met, on average.

Month	avg gw	Cum
1	49,965	49,965
2	42,558	92,523
3	72,611	165,135
4	70,749	235,884
5	71,125	307,010
6	77,583	384,593
7	67,329	451,922
8	91,045	542,967
9	91,738	634,705
10	106,638	741,343
11	97,765	839,108
12	54,271	893,379

Step 3 – Determine monthly catch of snowy grouper during 2000-2005 for proposed trip limits in Amendment 13C.

The quota for snowy grouper will be 151,000 lbs gw and 84,000 lbs gw in 2007 and 2008, respectively. The trip limit will be 175 lbs gw in 2007 and 100 lbs gw in 2008.

Table 5. Monthly catch (lbs gw) of snowy grouper for various trip limits based on data from 2000-2005.

Month	2007 Trip limit	2008 Trip limit
1	7,588	5,649
2	9,957	7,102
3	11,293	7,913
4	13,186	9,050
5	10,095	7,069
6	9,218	6,477
7	6,622	4,884
8	7,106	5,261
9	7,952	5,786
10	6,692	4,961
11	4,580	3,402
12	4,481	3,310
Total	98,769	70,865
Quota	118,000	84,000

During September through May, Table 5 reflects the expected catch of snowy grouper will all gear types with the 175 lbs gw trip limit in 2007 and 100 lbs gw trip limit in 2008. During June-August, Table 5 reflects the expected catch of snowy grouper with only hook and line gear since the longline fishery would be closed, on average. Based on data from 2000-2005, the snowy grouper quota would not be met (Table 5). The total catch would be slightly less than the proposed quotas in 2007 and 2008.

Step 4 – Determine catch of snowy grouper on trips that target at least 100 lbs of co-occurring species.

Table 6. Incidental catch of snowy grouper from fishermen targeting golden tilefish, blueline tilefish, blackbelly rosefish and mid-shelf species during 2000-2005.

Month	avg gw
1	2,455
2	3,326
3	7,255
4	10,764
5	12,915
6	8,271
7	6,799
8	3,318
9	4,580
10	3,726
11	2,772
12	1,890

Table 6 represents the average landings of snowy grouper that occurred on trips that took at least 100 lbs of co-occurring species. This is considered to be the “incidental catch” as

it is considered to be the total catch of snowy grouper on trips that target co-occurring species such as golden tilefish, blackbelly rosefish, blueline tilefish, vermilion snapper, etc. It is assumed that fishermen do not target golden tilefish or use longline gear during June through August because the golden tilefish quota would be met.

Step 5 - Subtract the monthly catch for a trip limit from the monthly incidental catch. This will provide a maximum estimate of the number of discards associated with the new trip limit, assuming fishermen continue to fish for other species.

Table 7. Incidental catch of snowy grouper from targeting co-occurring species, catch associated with trip limits, and estimated discards. The trip limits are 175 lbs gw (2007); and 100 lbs gw (2008).

mth	Incidental Catch	2007 Trip limit	2008 Trip limit	2007 Discards	2008 Discards
1	2,455	7,588	5,649		
2	3,326	9,957	7,102		
3	7,255	11,293	7,913		
4	10,764	13,186	9,050		1,714
5	12,915	10,095	7,069	36	5,845
6	8,271	9,218	6,477		1,794
7	6,799	6,622	4,884	177	1,914
8	3,318	7,106	5,261		
9	4,580	7,952	5,786		
10	3,726	6,692	4,961		
11	2,772	4,580	3,402		
12	1,890	4,481	3,310		
	68,070	98,769	70,865	213	11,268

Table 7 includes the average of the total catch of snowy grouper on trips targeting co-occurring species during 2000-2005, which is considered to be the “incidental catch” as well as the expected catch with the 175 lbs gw trip limit in 2007 and 100 lbs gw trip limit in 2008. If the incidental catch is greater than the trip limit catch then discarding of snowy grouper would occur (Table 7).

Step 6 – Determine total harvested and discarded dead.

Table 8. Pounds (gutted weight) harvested from trip limit, estimated discards, and total (harvested + dead discards). Based on data from 2000-2005. 100% release mortality is assumed.

	2007	2008
Quota	118,000	84,000
Harvested	98,769	70,865
Discards Open Season	213	11,268

Discards Post Quota	0	0
Total	98,982	82,133

If it is assumed that fishermen will not avoid locations where snowy grouper occur, then the amount of snowy grouper harvested plus those discarded will exceed the quota specified in Amendment 13C during 2008.

Snowy Grouper
Recreational Incidental Catch
A small percentage of snowy grouper has been taken by the recreational sector (~4%) in recent years (1999-2003). Furthermore, very little of the recreational snowy grouper catch is taken by headboat fishermen. Few data are available to determine the effect that lowering the bag limit will have on the increase in the number of discards.

The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, were landed whole, and were available for identification and enumeration by the interviewers.

- Type B - Fishes that were caught but were either not kept or not available for identification.

    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.

    - Type B2 - Fishes that were caught and released alive.

All catch types A, B1 and B2 are recorded on a per person basis. Type A catch, which is recorded for only the leader, was divided by the number of people that contributed to the total A catch. Some or all of the people contributing to the A catch are also interviewed for type B1 and B2 catch, and those are recorded on an individual basis. If the number of people contributing to the A catch was greater than the number of people contributing to the B catch, an estimate was made to account for possible under reporting of the B catch.

Scenario 1: Identify a midpoint between Scenario 2 and Scenario 3.

Scenario 2: Identify the minimum amount of discards that could occur with a decrease in the bag limit. Assumptions:
- Fishermen stop fishing when the bag limit for snowy grouper.
- Fishermen currently retain all snowy grouper caught.
    - Release mortality is 100%.

Scenario 3: Determine the maximum amount of discards that could occur with a decrease in the bag limit. Assumptions:

- Recreational effort will not decrease. Overall mortality will remain the same. The reduced bag limit will only increase the number of dead discards.
- Fishermen currently retain all snowy grouper caught.
- Release mortality is 100%.

Table 9. The number of fish retained (A + B1) and expected reduction in the number of fish retained for lower bag limits. Based on data from 2000-2005.

Variable	Sum num	Percent
A	317	
B1_est	7	
Baglimit6	324	0.00
Baglimit5	319	1.54
Baglimit4	296	8.64
Baglimit3	263	18.83
Baglimit2	217	33.02
Baglimit1	147	54.63

Reducing the bag limit would be expected to reduce the number of retained snowy grouper by approximately 55% (Table 9). However, sample size available for analyses is very small so these values are uncertain.

Table 10. Average landings of snowy grouper (lbs ww) during 1999-2004, expected harvest (lbs ww), and discards (lbs ww) after Amendment 13C regulations of 1 fish per person per day go into place. Assumes 100% release mortality.

	Scenario 1	Scenario 2	Scenario 3
1999-2004 landings	17,691	17,691	17,691
Harvested 2007	8,026	8,026	8,026
Discards 2007	4,832	0	9,665

During 1999-2004, the total recreational landings averaged 17,691 lbs ww. Under Scenario 3, a reduction in the bag limit to 1 fish per person per day would result in a total of 8,026 lbs ww harvested and 9,665 lbs ww released as dead discards. Under Scenario 2, it would be assumed that there would be no discards and that fishermen would stop fishing once them met the 1 fish bag limit. Scenario 1 represents a midpoint between Scenarios 2 and 3 in the magnitude of dead discards.

Table 11. Estimated total recreational (4,832 lbs ww) and commercial catch and dead discards (pounds whole weight) during 2006-2008 associated with a commercial quota, and recreational bag limit. Also shown is the ABC from the preferred rebuilding strategy.

Year	Landings	Dead Discards	Total	TAC
2007	124,574	5,083	129,657	144,560
2008	91,647	18,128	109,775	102,960

The addition of discards to landings would exceed TAC in 2008.

Snowy Grouper

Snowy Scenario #2. Use data from 2000-2005, do not include longline gear in the estimation of incidental catch.

In this Scenario it is assumed:

- Snowy grouper fishery will remain open all year. Quotas for snowy grouper and/or deep water aggregate will not be met until end of year.
- Longline fishermen will avoid snowy grouper.
- After vermilion snapper quota is met catch of snowy grouper is due to hook and line fishermen targeting co-occurring species (incidental catch).
- A deep-water unit including snowy grouper is not established through Amendment 15. If a deep water unit is established, bycatch of snowy grouper, particularly post quota bycatch would be reduced substantially since there would be no fishing for co-occurring species in the unit when a quota was met.
- In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.
- Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and blackbelly rosefish with hook and line gear.
- There is also limited co-occurrence of snowy grouper with vermilion snapper, almaco jack, scamp, gag, and greater amberjack with snowy grouper. Incidental catch is assumed to be limited to trips that catch the above species and less than 100 lbs ww of snowy grouper with hook and line gear.
- Release mortality is 100% (SEDAR 4 2004).
- Logbook and MRFSS indicates few snowy grouper were discarded prior to Amendment 13C. It is assumed the stock assessment accounted for any discards prior to implementation of Amendment 13C.

Step 1 – Identify species caught on trips that that target snowy grouper.

Table 1. Species caught on trips that caught at least 100 lbs ww of snowy grouper with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
GROUPER,SNOWY	2,855	406	1,159,523	36.89	36.89
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GROUPER,GAG	513	305	156,471	4.98	65.85
SCAMP	924	142	130,884	4.16	70.01
AMBERJACK,GREATER	482	252	121,426	3.86	73.88
JACK,ALMACO	640	179	114,468	3.64	77.52
TRIGGERFISH,GRAY	687	130	89,150	2.84	80.35
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On hook and line trips that target snowy grouper the most commonly caught species are vermilion snapper, blueline tilefish, and gag (Table 1). Golden tilefish are infrequently caught on snowy grouper hook and line trips probably because golden tilefish and snowy grouper occupy different habitat types. Snowy grouper prefer a rock habitat; whereas, golden tilefish burrow in a sand/mud habitat. Although vermilion snapper, scamp, gag, red grouper, and others are taken on snowy grouper trips, there is little overlap in habitat with these species and snowy grouper. Some juvenile snowy grouper are caught when fishermen target mid-shelf species. Snowy grouper generally occur in deeper water. Snowy grouper are likely taken on trips that include mid-shelf species because fishermen fish in different locations and different depths on a fishing trip.

Step 2 – Use data from 2000-2005 to predict if and when vermilion snapper would close in the future, on average

Table 2. Average landings by month for vermilion snapper during 2000-2005. The 1.1 million lb gutted weight (gw) quota would not be met.

Month	avg gw	Cum
1	49,965	49,965
2	42,558	92,523
3	72,611	165,135
4	70,749	235,884
5	71,125	307,010
6	77,583	384,593
7	67,329	451,922

8	91,045	542,967
9	91,738	634,705
10	106,638	741,343
11	97,765	839,108
12	54,271	893,379

Step 3 – Determine monthly catch of snowy grouper during 2000-2005 for proposed trip limits in Amendment 13C.

The quota for snowy grouper will be 151,000 lbs gw and 84,000 lbs gw in 2007 and 2008, respectively. The trip limit will be 175 lbs gw in 2007 and 100 lbs gw in 2008.

Table 3. Monthly catch (lbs gw) of snowy grouper for various trip limits based on data from 2000-2005. Snowy grouper would not be taken with longline gear. The trip limits are 175 lbs gw (2007); and 100 lbs gw (2008).

Month	2007 Trip limit	2008 Trip limit
1	7,364	5,447
2	9,204	6,580
3	10,634	7,562
4	12,388	8,680
5	13,734	9,569
6	12,579	8,838
7	9,125	6,657
8	8,540	6,362
9	6,186	4,663
10	5,757	4,353
11	3,687	2,805
12	3,794	2,840
Total	102,993	74,358
Quota	118,000	84,000

Based on data from 2000-2005, the snowy grouper quota would not be met (Table 5). The total catch would be slightly less than the proposed quotas in 2007 and 2008.

Step 4 – Determine catch of snowy grouper on trips that target at least 100 lbs of co-occurring species.

Table 4. Incidental catch of snowy grouper from fishermen targeting golden tilefish, blueline tilefish, blackbelly rosefish and mid-shelf species during 2000-2005.

Month	Incidental Catch
1	996
2	921
3	1,007
4	1,660
5	2,325
6	2,167

7	1,915
8	1,470
9	976
10	745
11	632
12	522
	15,336

Table 4 represents the average landings of snowy grouper that occurred on trips that took at least 100 lbs of co-occurring species. This is considered to be the "incidental catch" as it is considered to be the total catch of snowy grouper on trips that target co-occurring species such as golden tilefish, blackbelly rosefish, blueline tilefish, vermilion snapper, etc.

Step 5 - Subtract the monthly catch for a trip limit from the monthly incidental catch. This will provide a maximum estimate of the number of discards associated with the new trip limit, assuming fishermen continue to fish for other species.

Table 5. Incidental catch of snowy grouper from targeting co-occurring species, catch associated with trip limits, and estimated discards. The trip limits are 175 lbs gw (2007); and 100 lbs gw (2008).

Month	Incidental Catch	2007 Trip limit	2008 Trip limit	2007 Discards	2008 Discards
1	996	6,855	5,094		
2	921	8,479	6,106		
3	1,007	9,285	6,637		
4	1,660	10,706	7,530		
5	2,325	12,230	8,537		
6	2,167	11,131	7,872		
7	1,915	8,428	6,213		
8	1,470	8,540	6,362		
9	976	6,186	4,663		
10	745	5,757	4,353		
11	632	3,687	2,805		
12	522	3,794	2,840		

Discards are determined by: incidental catch – catch for a trip limit. If the incidental catch is greater than the trip limit catch then discarding of snowy grouper would occur (Table 5). Based on this scenario, catch associated with the trip limit would exceed the incidental catch.

Step 6 – Determine total harvested and discarded dead.

Table 6. Pounds (gutted weight) harvested from trip limit, estimated discards, and total (harvested + dead discards). Based on data from 2000-2005. 100% release mortality is assumed.

	2007	2008
Quota	118,000	84,000
Harvested	107,094	76,316
Discards Open Season	0	0
Discards Post Quota	0	0
Total	107,094	76,316

If it is assumed that fishermen will not take snowy grouper with longline gear, then the incidental catch of snowy grouper would not exceed the allowable catch from the trip limit.

Snowy Grouper
Recreational Incidental Catch
A small percentage of snowy grouper has been taken by the recreational sector (~4%) in recent years (1999-2003). Furthermore, very little of the recreational snowy grouper catch is taken by headboat fishermen. Few data are available to determine the effect that lowering the bag limit will have on the increase in the number of discards.

The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, were landed whole, and were available for identification and enumeration by the interviewers.

- Type B - Fishes that were caught but were either not kept or not available for identification.

    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.

    - Type B2 - Fishes that were caught and released alive.

All catch types A, B1 and B2 are recorded on a per person basis. Type A catch, which is recorded for only the leader, was divided by the number of people that contributed to the total A catch. Some or all of the people contributing to the A catch are also interviewed for type B1 and B2 catch, and those are recorded on an individual basis. If the number of people contributing to the A catch was greater than the number of people contributing to the B catch, an estimate was made to account for possible under reporting of the B catch.

Scenario 1: Determine the maximum amount of discards that could occur with a decrease in the bag limit. Assumptions:

- Recreational effort will not decrease. Overall mortality will remain the same. The reduced bag limit will only increase the number of dead discards.
- Fishermen currently retain all snowy grouper caught.
- Release mortality is 100%.

Scenario 2: identify the minimum amount of discards that could occur with a decrease in the bag limit. Assumptions:

- Fishermen stop fishing when the bag limit for snowy grouper.
- Fishermen currently retain all snowy grouper caught.
- Release mortality is 100%.

Scenario 3: Identify a midpoint between Scenario 1 and Scenario 2.

Table 7. The number of fish retained (A + B1) and expected reduction in the number of fish retained for lower bag limits. Based on data from 2000-2005.

Variable	Sum num	Percent
A	317	
B1_est	7	
Baglimit6	324	0.00
Baglimit5	319	1.54
Baglimit4	296	8.64
Baglimit3	263	18.83
Baglimit2	217	33.02
Baglimit1	147	54.63

Reducing the bag limit would be expected to reduce the number of retained snowy grouper by approximately 55% (Table 10). However, sample size available for analyses is very small so these values are uncertain.

Table 8. Average landings of snowy grouper (lbs ww) during 1999-2004, expected harvest (lbs ww), and discards (lbs ww) after Amendment 13C regulations of 1 fish per person per day go into place. Assumes 100% release mortality.

	Scenario 1	Scenario 2	Scenario 3
1999-2004 landings	17,691	17,691	17,691
Harvested 2007	8,026	8,026	8,026
Discards 2007	4,832	0	9,665

During 1999-2004, the total recreational landings averaged 17,691 lbs ww. Under Scenario 3, a reduction in the bag limit to 1 fish per person per day would result in a total of 8,026 lbs ww harvested and 9,665 lbs ww released as dead discards. Under Scenario 2, it would be assumed that there would be no discards and that fishermen would stop fishing once them met the 1 fish bag limit. Scenario 1 represents a midpoint between Scenarios 2 and 3 in the magnitude of dead discards.

Table 9. Estimated total recreational (4,832 lbs ww) and commercial catch and dead discards (pounds whole weight) during 2006-2008 associated with a commercial quota, and recreational bag limit. Also shown is the TAC from the preferred rebuilding strategy.

Year	Landings	Dead Discards	Total	ABC
2007	120,218	4,832	125,050	144,560
2008	89,461	4,832	94,293	102,960

The addition of discards to landings would not exceed.

Snowy Grouper

Snowy Scenario #3. Use data from 2000-2005, include longline gear in the estimation of incidental catch. Note: This is not considered to be a likely scenario.

In this Scenario it is assumed:

- Snowy grouper fishery will remain open all year. Quotas for snowy grouper and/or deep water aggregate will not be met until end of year.
- Longline fishermen catch snowy grouper despite reduced trip limit and quota. The number of longline trips that catch snowy grouper is the same as before Amendment 13C.
- After the golden tilefish quota is met, longline fishermen stop fishing for golden tilefish and no longer use longline gear. Since tilefish dominate longline reef fish landings, it is assumed longline fishermen will no longer use this gear for reef fish when the quota is met.
- After vermilion snapper or golden tilefish quota is met catch of snowy grouper is due to hook and line fishermen targeting co-occurring species (incidental catch).
- Fishing year for golden tilefish will change through Amendment 15 to start on September 1.
- A deep-water unit including snowy grouper is not established through Amendment 15.
- In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.
- Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and blackbelly rosefish.
- There is also limited co-occurrence of snowy grouper with vermilion snapper, almaco jack, scamp, gag, and greater amberjack with snowy grouper. Incidental catch is assumed to be limited to trips that catch the above species and less than 100 lbs ww of snowy grouper with hook and line gear.
- Release mortality is 100% (SEDAR 4 2004).
- Logbook and MRFSS indicates few snowy grouper were discarded prior to Amendment 13C. It is assumed the stock assessment accounted for any discards prior to implementation of Amendment 13C.

Step 1 – Identify species caught on trips that that target snowy grouper.

Table 1. Species caught on trips that caught at least 100 lbs ww of snowy grouper with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
GROUPER,SNOWY	2,855	406	1,159,523	36.89	36.89
SNAPPER,VERMILION	1,035	491	508,022	16.16	53.06
TILEFISH,BLUELINE	1,454	169	245,567	7.81	60.87
GROUPER,GAG	513	305	156,471	4.98	65.85
SCAMP	924	142	130,884	4.16	70.01
AMBERJACK,GREATER	482	252	121,426	3.86	73.88
JACK,ALMACO	640	179	114,468	3.64	77.52
TRIGGERFISH,GRAY	687	130	89,150	2.84	80.35
GROUPER,RED	768	104	80,182	2.55	82.90
SNAPPER,RED	685	94	64,543	2.05	84.96
DOLPHINFISH	644	72	46,534	1.48	86.44
BARRELFISH	314	145	45,626	1.45	87.89
AMBERJACK,LESSER	204	152	31,013	0.99	88.88
KING MACKEREL	330	90	29,761	0.95	89.82
GROUPER,BLACK	191	142	27,114	0.86	90.69

Table 2. Species caught on trips that caught at least 100 lbs ww of snowy grouper with longline gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
TILEFISH	503	1,776	893,139	40.38	40.38
GROUPER,SNOWY	590	850	501,662	22.68	63.07
BLACK BELLIED ROSEFISH	306	1,000	305,925	13.83	76.90
TILEFISH,BLUELINE	387	490	189,616	8.57	85.47
SHARK,SANDBAR	76	1,330	101,106	4.57	90.04
GROUPER,YELLOWEDGE	338	267	90,338	4.08	94.13

On hook and line trips that target snowy grouper the most commonly caught species are vermilion snapper, blueline tilefish, and gag (Table 1). Golden tilefish are infrequently caught on snowy grouper hook and line trips probably because golden tilefish and snowy grouper occupy different habitat types. Snowy grouper prefer a rock habitat; whereas, golden tilefish burrow in a sand/mud habitat. Although vermilion snapper, scamp, gag, red grouper, and others are taken on snowy grouper trips, there is little overlap in habitat with these species and snowy grouper. Some juvenile snowy grouper are caught when fishermen target mid-shelf species. Snowy grouper generally occur in deeper water. Snowy grouper are likely taken on trips that include mid-shelf species because fishermen fish in different locations and different depths on a fishing trip.

The most commonly caught species on trips that catch greater than 100 lbs ww of snowy grouper with longline gear are golden tilefish, blackbelly rosefish, blueline tilefish, sandbar shark, and yellowedge grouper (Table 2). As mentioned previously, golden tilefish prefer a different habitat type from snowy grouper. However, longline fishermen

will sometimes set gear in area that will overlap rocks and mud resulting in a catch that includes golden tilefish and snowy grouper. The Snapper Grouper Advisory Panel has stated that longline fishermen can avoid snowy grouper.

Step 2 – Use data from 2000-2005 to predict if and when golden tilefish and vermilion snapper would close in the future, on average.

Table 3. Average landings by month for golden tilefish during 2000-2005. The 295,000 lb gutted weight (gw) quota would have been met during May with a September 1 start date.

Month	avg gw	cum
1	17,493	161,392
2	22,851	184,243
3	31,606	215,849
4	52,029	267,878
5	46,134	314,012
6	41,173	355,185
7	19,163	374,348
8	36,292	410,640
9	30,482	30,482
10	45,288	75,770
11	38,012	113,782
12	30,117	143,899

Table 4. Average landings by month for vermilion snapper during 2000-2005. The 1.1 million lb gutted weight (gw) quota would not be met.

Month	avg gw	Cum
1	49,965	49,965
2	42,558	92,523
3	72,611	165,135
4	70,749	235,884
5	71,125	307,010
6	77,583	384,593
7	67,329	451,922
8	91,045	542,967
9	91,738	634,705
10	106,638	741,343
11	97,765	839,108
12	54,271	893,379

Step 3 – Determine monthly catch of snowy grouper during 2000-2005 for proposed trip limits in Amendment 13C.

The quota for snowy grouper will be 151,000 lbs gw and 84,000 lbs gw in 2007 and 2008, respectively. The trip limit will be 175 lbs gw in 2007 and 100 lbs gw in 2008.

Table 5. Monthly catch (lbs gw) of snowy grouper for various trip limits based on data from 2000-2005.

Month	2007 Trip limit	2008 Trip limit
1	9,250	7,588
2	12,584	9,957
3	14,482	11,293
4	17,143	13,186
5	18,835	14,429
6	17,496	13,589
7	13,093	10,406
8	12,585	10,319
9	6,055	7,952
10	8,170	6,692
11	5,720	4,580
12	5,549	4,481
Total	140,963	114,471
Quota	118,000	84,000

During September through May, Table 5 reflects the expected catch of snowy grouper will all gear types with the 175 lbs gw in 2007 and 100 lbs gw in 2008. During June-August, Table 5 reflects the expected catch of snowy grouper with only hook and line gear since the longline fishery would be closed, on average. Based on data from 2000-2005, the snowy grouper quota would not be met (Table 5). The total catch would be slightly less than the proposed quotas in 2007 and 2008.

Step 4 – Determine catch of snowy grouper on trips that target at least 100 lbs of co-occurring species.

Table 6. Incidental catch of snowy grouper from fishermen targeting golden tilefish, blueline tilefish, blackbelly rosefish and mid-shelf species during 2000-2005. It is assumed that fishermen do not target golden tilefish or use longline gear during June-August because the golden tilefish quota would be met.

Month	avg gw
1	2,666
2	5,372
3	11,228
4	15,922
5	17,340
6	8,271
7	6,799
8	3,318
9	7,162
10	4,724
11	4,085

12	2,499

Table 6 represents the average landings of snowy grouper that occurred on trips that took at least 100 lbs of co-occurring species. This is considered to be the "incidental catch" as it is considered to be the total catch of snowy grouper on trips that target co-occurring species such as golden tilefish, blackbelly rosefish, blueline tilefish, vermilion snapper, etc. It is assumed that fishermen do not target golden tilefish or use longline gear during June through August because the golden tilefish quota would be met.

Step 5 - Subtract the monthly catch for a trip limit from the monthly incidental catch. This will provide a maximum estimate of the number of discards associated with the new trip limit, assuming fishermen continue to fish for other species.

Table 7. Incidental catch of snowy grouper from targeting co-occurring species, catch associated with trip limits, and estimated discards. The trip limits are 175 lbs gw (2007); and 100 lbs gw (2008).

month	Incidental Catch	2007 Trip limit	2008 Trip limit	2007 Discards	2008 Discards
1	2,666	7,588	5,649		
2	5,372	9,957	7,102		
3	11,228	11,293	7,913		3,315
4	15,922	13,186	9,050	2,736	6,872
5	17,340	14,429	9,955	2,912	7,386
6	8,271	13,589	9,436		
7	6,799	10,406	7,494		
8	3,318	10,319	7,543		
9	7,162	7,952	5,786		1,376
10	4,724	6,692	4,961		
11	4,085	4,580	3,402		683
12	2,499	4,481	3,310		
	89,386	114,471	81,600	5,647	19,631

Table 7 includes the average of the total catch of snowy grouper on trips targeting co-occurring species during 2000-2005, which is considered to be the "incidental catch" as well as the expected catch with the 175 lbs gw trip limit in 2007 and 100 lbs gw trip limit in 2008. If the incidental catch is greater than the trip limit catch then discarding of snowy grouper would occur (Table 7).

Step 6 – Determine total harvested and discarded dead.

Table 8. Pounds (gutted weight) harvested from trip limit, estimated discards, and total (harvested + dead discards). Based on data from 2000-2005. 100% release mortality is assumed.

	2007	2008
Quota	118,000	84,000
Harvested	114,471	81,600

Discards Open Season	5,647	19,631
Discards Post Quota	0	0
Total	120,118	101,231

If it is assumed that fishermen will not avoid locations where snowy grouper occur, then the amount of snowy grouper harvested plus those discarded will exceed the quota specified in Amendment 13C during 2007 and 2008.

Snowy Grouper
Recreational Incidental Catch
A small percentage of snowy grouper has been taken by the recreational sector (~4%) in recent years (1999-2003). Furthermore, very little of the recreational snowy grouper catch is taken by headboat fishermen. Few data are available to determine the effect that lowering the bag limit will have on the increase in the number of discards.
The MRFSS system classifies recreational catch into three categories:

Type A - Fishes that were caught, were landed whole, and were available for identification and enumeration by the interviewers.
Type B - Fishes that were caught but were either not kept or not available for identification.

Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
Type B2 - Fishes that were caught and released alive.

All catch types A, B1 and B2 are recorded on a per person basis. Type A catch, which is recorded for only the leader, was divided by the number of people that contributed to the total A catch. Some or all of the people contributing to the A catch are also interviewed for type B1 and B2 catch, and those are recorded on an individual basis. If the number of people contributing to the A catch was greater than the number of people contributing to the B catch, an estimate was made to account for possible under reporting of the B catch.

Scenario 1: Determine the maximum amount of discards that could occur with a decrease in the bag limit. Assumptions:
- Recreational effort will not decrease. Overall mortality will remain the same. The reduced bag limit will only increase the number of dead discards.
- Fishermen currently retain all snowy grouper caught.
- Release mortality is 100%.

Scenario 2: Identify the minimum amount of discards that could occur with a decrease in the bag limit. Assumptions:
- Fishermen stop fishing when the bag limit for snowy grouper.
- Fishermen currently retain all snowy grouper caught.
- Release mortality is 100%.

Scenario 3: Identify a midpoint between Scenario 1 and Scenario 2.

Table 9. The number of fish retained (A + B1) and expected reduction in the number of fish retained for lower bag limits. Based on data from 2000-2005.

Variable	Sum num	Percent
A	317	
B1_est	7	
Baglimit6	324	0.00
Baglimit5	319	1.54
Baglimit4	296	8.64
Baglimit3	263	18.83
Baglimit2	217	33.02
Baglimit1	147	54.63

Reducing the bag limit would be expected to reduce the number of retained snowy grouper by approximately 55% (Table 9). However, sample size available for analyses is very small so these values are uncertain.

Table 10. Average landings of snowy grouper (lbs ww) during 1999-2004, expected harvest (lbs ww), and discards (lbs ww) after Amendment 13C regulations of 1 fish per person per day go into place. Assumes 100% release mortality.

	Scenario 1	Scenario 2	Scenario 3
1999-2004 landings	17,691	17,691	17,691
Harvested 2007	8,026	8,026	8,026
Discards 2007	4,832	0	9,665

During 1999-2004, the total recreational landings averaged 17,691 lbs ww. Under Scenario 3, a reduction in the bag limit to 1 fish per person per day would result in a total of 8,026 lbs ww harvested and 9,665 lbs ww released as dead discards. Under Scenario 2, it would be assumed that there would be no discards and that fishermen would stop fishing once them met the 1 fish bag limit. Scenario 1 represents a midpoint between Scenarios 2 and 3 in the magnitude of dead discards.

Table 11. Estimated total recreational (8,026 lbs ww) and commercial catch and dead discards (pounds whole weight) during 2006-2008 associated with a commercial quota, and recreational bag limit. Also shown is the TAC from the preferred rebuilding strategy.

Year	Landings	Dead Discards	Total	TAC
2007	143,102	14,690	157,791	144,560
2008	104,314	31,191	135,505	102,960

The addition of discards to landings would exceed TAC in 2007 and 2008.

Snowy Grouper
Commercial Incidental Catch
Regulations in Amendment 13C would decrease the quota over three years from 151,000 lbs gw in 2006 to 84,000 lbs gw in 2008. The trip limit would decrease from 275 lbs gw in 2006 to 100 lbs gw in 2008.

Snowy Scenario #4. Use data from 2000-2005, include longline gear in the estimation of incidental catch.

In this Scenario it is assumed:
- Snowy grouper fishery will remain open all year. Quotas for snowy grouper and/or deep water aggregate will not be met until end of year.
- Some longline fishermen catch snowy grouper despite reduced trip limit and quota. The number of longline trips that catch snowy grouper is 25% what is was before Amendment 13C. (Some longline fishermen indicate they will avoid locations where snowy grouper occur because of the small trip limit. It is not possible to determine what percentage of longline fishermen will avoid snowy grouper.)
- Fishing year for golden tilefish will change through Amendment 15 to start on September 1.
- After the golden tilefish quota is met, longline fishermen stop fishing for golden tilefish and no longer use longline gear. Since tilefish dominate longline reef fish landings, it is assumed longline fishermen will no longer use this gear for reef fish when the quota is met.
- After vermilion snapper or golden tilefish quota is met catch of snowy grouper is due to hook and line fishermen targeting co-occurring species (incidental catch).
- A deep-water unit including snowy grouper is not established through Amendment 15. If a deep water unit is established, bycatch of snowy grouper, particularly post quota bycatch would be reduced substantially since there would be no fishing for co-occurring species in the unit when a quota was met.
- In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.
- Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and blackbelly rosefish.
- There is also limited co-occurrence of snowy grouper with vermilion snapper, almaco jack, scamp, gag, and greater amberjack with snowy grouper. Incidental catch is assumed to be limited to trips that catch the above species and less than 100 lbs ww of snowy grouper with hook and line gear.
- Release mortality is 100% (SEDAR 4 2004).
- Logbook and MRFSS indicates few snowy grouper were discarded prior to Amendment 13C. It is assumed the stock assessment accounted for any discards prior to implementation of Amendment 13C.

Step 1 – Identify species caught on trips that that target snowy grouper.

Table 1. Species caught on trips that caught at least 100 lbs ww of snowy grouper with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
GROUPER,SNOWY	2,855	406	1,159,523	36.89	36.89
SNAPPER,VERMILION	1,035	491	508,022	16.16	53.06
TILEFISH,BLUELINE	1,454	169	245,567	7.81	60.87
GROUPER,GAG	513	305	156,471	4.98	65.85
SCAMP	924	142	130,884	4.16	70.01
AMBERJACK,GREATER	482	252	121,426	3.86	73.88
JACK,ALMACO	640	179	114,468	3.64	77.52
TRIGGERFISH,GRAY	687	130	89,150	2.84	80.35
GROUPER,RED	768	104	80,182	2.55	82.90
SNAPPER,RED	685	94	64,543	2.05	84.96
DOLPHINFISH	644	72	46,534	1.48	86.44
BARRELFISH	314	145	45,626	1.45	87.89
AMBERJACK,LESSER	204	152	31,013	0.99	88.88
KING MACKEREL	330	90	29,761	0.95	89.82
GROUPER,BLACK	191	142	27,114	0.86	90.69

Table 2. Species caught on trips that caught at least 100 lbs ww of snowy grouper with longline gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
TILEFISH	503	1,776	893,139	40.38	40.38
GROUPER,SNOWY	590	850	501,662	22.68	63.07
BLACK BELLIED ROSEFISH	306	1,000	305,925	13.83	76.90
TILEFISH,BLUELINE	387	490	189,616	8.57	85.47
SHARK,SANDBAR	76	1,330	101,106	4.57	90.04
GROUPER,YELLOWEDGE	338	267	90,338	4.08	94.13

On hook and line trips that target snowy grouper the most commonly caught species are vermilion snapper, blueline tilefish, and gag (Table 1). Golden tilefish are infrequently caught on snowy grouper hook and line trips probably because golden tilefish and snowy grouper occupy different habitat types. Snowy grouper prefer a rock habitat; whereas, golden tilefish burrow in a sand/mud habitat. Although vermilion snapper, scamp, gag, red grouper, and others are taken on snowy grouper trips, there is little overlap in habitat with these species and snowy grouper. Some juvenile snowy grouper are caught when fishermen target mid-shelf species. Snowy grouper generally occur in deeper water. Snowy grouper are likely taken on trips that include mid-shelf species because fishermen fish in different locations and different depths on a fishing trip.

The most commonly caught species on trips that catch greater than 100 lbs ww of snowy grouper with longline gear are golden tilefish, blackbelly rosefish, blueline tilefish, sandbar shark, and yellowedge grouper (Table 2). As mentioned previously, golden tilefish prefer a different habitat type from snowy grouper. However, longline fishermen

will sometimes set gear in area that will overlap rocks and mud resulting in a catch that includes golden tilefish and snowy grouper. The Snapper Grouper Advisory Panel has stated that longline fishermen can avoid snowy grouper.

Step 2 – Use data from 2000-2005 to predict if and when golden tilefish and vermilion snapper would close in the future, on average.

Table 3. Average landings by month for golden tilefish during 2000-2005. The 295,000 lb gutted weight (gw) quota would have been met during May, on average based on a September 1 start date.

Month	avg gw	cum
1	17,493	161,392
2	22,851	184,243
3	31,606	215,849
4	52,029	267,878
5	46,134	314,012
6	41,173	355,185
7	19,163	374,348
8	36,292	410,640
9	30,482	30,482
10	45,288	75,770
11	38,012	113,782
12	30,117	143,899

Table 4. Average landings by month for vermilion snapper during 2000-2005. The 1.1 million lb gutted weight (gw) quota would not be met, on average.

Month	avg gw	Cum
1	49,965	49,965
2	42,558	92,523
3	72,611	165,135
4	70,749	235,884
5	71,125	307,010
6	77,583	384,593
7	67,329	451,922
8	91,045	542,967
9	91,738	634,705
10	106,638	741,343
11	97,765	839,108
12	54,271	893,379

Step 3 – Determine monthly catch of snowy grouper during 2000-2005 for proposed trip limits in Amendment 13C.

The quota for snowy grouper will be 151,000 lbs gw and 84,000 lbs gw in 2007 and 2008, respectively. The trip limit will be 175 lbs gw in 2007 and 100 lbs gw in 2008.

Table 5. Monthly catch (lbs gw) of snowy grouper for various trip limits based on data from 2000-2005.

Month	2007 Trip limit	2008 Trip limit
1	7,588	5,649
2	9,957	7,102
3	11,293	7,913
4	13,186	9,050
5	10,095	7,069
6	9,218	6,477
7	6,622	4,884
8	7,106	5,261
9	7,952	5,786
10	6,692	4,961
11	4,580	3,402
12	4,481	3,310
Total	98,769	70,865
Quota	118,000	84,000

During September through May, Table 5 reflects the expected catch of snowy grouper will all gear types with the 175 lbs gw trip limit in 2007 and 100 lbs gw trip limit in 2008. During June-August, Table 5 reflects the expected catch of snowy grouper with only hook and line gear since the longline fishery would be closed, on average. Based on data from 2000-2005, the snowy grouper quota would not be met (Table 5). The total catch would be slightly less than the proposed quotas in 2007 and 2008.

Step 4 – Determine catch of snowy grouper on trips that target at least 100 lbs of co-occurring species.

Table 6. Incidental catch of snowy grouper from fishermen targeting golden tilefish, blueline tilefish, blackbelly rosefish and mid-shelf species during 2000-2005.

mth	Incidental Catch
1	2,038
2	2,299
3	4,273
4	8,604
5	11,311
6	8,271
7	6,799
8	3,318
9	3,803
10	1,756
11	1,914
12	1,360

Table 6 represents the average landings of snowy grouper that occurred on trips that took at least 100 lbs of co-occurring species. This is considered to be the “incidental catch” as

it is considered to be the total catch of snowy grouper on trips that target co-occurring species such as golden tilefish, blackbelly rosefish, blueline tilefish, vermilion snapper, etc. It is assumed that fishermen do not target golden tilefish or use longline gear during June through August because the golden tilefish quota would be met.

Step 5 - Subtract the monthly catch for a trip limit from the monthly incidental catch. This will provide a maximum estimate of the number of discards associated with the new trip limit, assuming fishermen continue to fish for other species.

Table 7. Incidental catch of snowy grouper from targeting co-occurring species, catch associated with trip limits, and estimated discards. The trip limits are 175 lbs gw (2007); and 100 lbs gw (2008).

mth	Incidental Catch	2007 Trip limit	2008 Trip limit	2007 Discards	2008 Discards
1	2,038	7,588	5,649		
2	2,299	9,957	7,102		
3	4,273	11,293	7,913		
4	8,604	13,186	9,050		
5	11,311	10,095	7,069	1,216	4,242
6	8,271	9,218	6,477		1,794
7	6,799	6,622	4,884	177	1,914
8	3,318	7,106	5,261		
9	3,803	7,952	5,786		
10	1,756	6,692	4,961		
11	1,914	4,580	3,402		
12	1,360	4,481	3,310		
	55,748	98,769	70,865	1,393	7,950

Table 7 includes the average of the total catch of snowy grouper on trips targeting co-occurring species during 2000-2005, which is considered to be the “incidental catch” as well as the expected catch with the 175 lbs gw trip limit in 2007 and 100 lbs gw trip limit in 2008. If the incidental catch is greater than the trip limit catch then discarding of snowy grouper would occur (Table 7).

Step 6 – Determine total harvested and discarded dead.

Table 8. Pounds (gutted weight) harvested from trip limit, estimated discards, and total (harvested + dead discards). Based on data from 2000-2005. 100% release mortality is assumed.

	2007	2008
Quota	118,000	84,000
Harvested	98,769	70,865
Discards Open Season	1,393	7,950

Discards Post Quota	0	0
Total	100,162	78,815

If it is assumed that fishermen will not avoid locations where snowy grouper occur, then the amount of snowy grouper harvested plus those discarded will exceed the quota specified in Amendment 13C during 2008.

Snowy Grouper
Recreational Incidental Catch
A small percentage of snowy grouper has been taken by the recreational sector (~4%) in recent years (1999-2003). Furthermore, very little of the recreational snowy grouper catch is taken by headboat fishermen. Few data are available to determine the effect that lowering the bag limit will have on the increase in the number of discards.

The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, were landed whole, and were available for identification and enumeration by the interviewers.

- Type B - Fishes that were caught but were either not kept or not available for identification.

    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.

    - Type B2 - Fishes that were caught and released alive.

All catch types A, B1 and B2 are recorded on a per person basis. Type A catch, which is recorded for only the leader, was divided by the number of people that contributed to the total A catch. Some or all of the people contributing to the A catch are also interviewed for type B1 and B2 catch, and those are recorded on an individual basis. If the number of people contributing to the A catch was greater than the number of people contributing to the B catch, an estimate was made to account for possible under reporting of the B catch.

Scenario 1: Identify a midpoint between Scenario 2 and Scenario 3.

Scenario 2: Identify the minimum amount of discards that could occur with a decrease in the bag limit. Assumptions:
- Fishermen stop fishing when the bag limit for snowy grouper.
- Fishermen currently retain all snowy grouper caught.
    - Release mortality is 100%.

Scenario 3: Determine the maximum amount of discards that could occur with a decrease in the bag limit. Assumptions:
- Recreational effort will not decrease. Overall mortality will remain the same. The reduced bag limit will only increase the number of dead discards.

- Fishermen currently retain all snowy grouper caught.
- Release mortality is 100%.

Table 9. The number of fish retained (A + B1) and expected reduction in the number of fish retained for lower bag limits. Based on data from 2000-2005.

Variable	Sum num	Percent
A	317	
B1_est	7	
Baglimit6	324	0.00
Baglimit5	319	1.54
Baglimit4	296	8.64
Baglimit3	263	18.83
Baglimit2	217	33.02
Baglimit1	147	54.63

Reducing the bag limit would be expected to reduce the number of retained snowy grouper by approximately 55% (Table 9). However, sample size available for analyses is very small so these values are uncertain.

Table 10. Average landings of snowy grouper (lbs ww) during 1999-2004, expected harvest (lbs ww), and discards (lbs ww) after Amendment 13C regulations of 1 fish per person per day go into place. Assumes 100% release mortality.

	Scenario 1	Scenario 2	Scenario 3
1999-2004 landings	17,691	17,691	17,691
Harvested 2007	8,026	8,026	8,026
Discards 2007	4,832	0	9,665

During 1999-2004, the total recreational landings averaged 17,691 lbs ww. Under Scenario 3, a reduction in the bag limit to 1 fish per person per day would result in a total of 8,026 lbs ww harvested and 9,665 lbs ww released as dead discards. Under Scenario 2, it would be assumed that there would be no discards and that fishermen would stop fishing once them met the 1 fish bag limit. Scenario 1 represents a midpoint between Scenarios 2 and 3 in the magnitude of dead discards.

Table 11. Estimated total recreational (4,832 lbs ww) and commercial catch and dead discards (pounds whole weight) during 2006-2008 associated with a commercial quota, and recreational bag limit. Also shown is the ABC from the preferred rebuilding strategy.

Year	Landings	Dead Discards	Total	TAC
2007	124,574	6,476	131,049	144,560
2008	91,647	14,213	105,860	102,960

The addition of discards to landings would exceed TAC in 2008.

Snowy Grouper
Commercial Incidental Catch
Regulations in Amendment 13C would decrease the quota over three years from 151,000 lbs gw in 2006 to 84,000 lbs gw in 2008. The trip limit would decrease from 275 lbs gw in 2006 to 100 lbs gw in 2008.

Snowy Scenario #5. Use data from 2000-2005, include longline gear in the estimation of incidental catch.

In this Scenario it is assumed:
- Snowy grouper fishery will remain open all year. Quotas for snowy grouper and/or deep water aggregate will not be met until end of year.
- Some longline fishermen catch snowy grouper despite reduced trip limit and quota. The number of longline trips that catch snowy grouper is 75% what is was before Amendment 13C. (Some longline fishermen indicate they will avoid locations where snowy grouper occur because of the small trip limit. It is not possible to determine what percentage of longline fishermen will avoid snowy grouper.)
- Fishing year for golden tilefish will change through Amendment 15 to start on September 1.
- After the golden tilefish quota is met, longline fishermen stop fishing for golden tilefish and no longer use longline gear. Since tilefish dominate longline reef fish landings, it is assumed longline fishermen will no longer use this gear for reef fish when the quota is met.
- After vermilion snapper or golden tilefish quota is met catch of snowy grouper is due to hook and line fishermen targeting co-occurring species (incidental catch).
- A deep-water unit including snowy grouper is not established through Amendment 15. If a deep water unit is established, bycatch of snowy grouper, particularly post quota bycatch would be reduced substantially since there would be no fishing for co-occurring species in the unit when a quota was met.
- In determining incidental catch, a species is targeted if at least 100 lbs whole weight (ww) is taken on a trip.
- Incidental catch of snowy grouper is due to fishermen targeting blueline tilefish, golden tilefish, and blackbelly rosefish.
- There is also limited co-occurrence of snowy grouper with vermilion snapper, almaco jack, scamp, gag, and greater amberjack with snowy grouper. Incidental catch is assumed to be limited to trips that catch the above species and less than 100 lbs ww of snowy grouper with hook and line gear.
- Release mortality is 100% (SEDAR 4 2004).
- Logbook and MRFSS indicates few snowy grouper were discarded prior to Amendment 13C. It is assumed the stock assessment accounted for any discards prior to implementation of Amendment 13C.

Step 1 – Identify species caught on trips that that target snowy grouper.

Table 1. Species caught on trips that caught at least 100 lbs ww of snowy grouper with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
GROUPER,SNOWY	2,855	406	1,159,523	36.89	36.89
SNAPPER,VERMILION	1,035	491	508,022	16.16	53.06
TILEFISH,BLUELINE	1,454	169	245,567	7.81	60.87
GROUPER,GAG	513	305	156,471	4.98	65.85
SCAMP	924	142	130,884	4.16	70.01
AMBERJACK,GREATER	482	252	121,426	3.86	73.88
JACK,ALMACO	640	179	114,468	3.64	77.52
TRIGGERFISH,GRAY	687	130	89,150	2.84	80.35
GROUPER,RED	768	104	80,182	2.55	82.90
SNAPPER,RED	685	94	64,543	2.05	84.96
DOLPHINFISH	644	72	46,534	1.48	86.44
BARRELFISH	314	145	45,626	1.45	87.89
AMBERJACK,LESSER	204	152	31,013	0.99	88.88
KING MACKEREL	330	90	29,761	0.95	89.82
GROUPER,BLACK	191	142	27,114	0.86	90.69

Table 2. Species caught on trips that caught at least 100 lbs ww of snowy grouper with longline gear during 2000-2005.

COMMON	Obs	Mean	Sum ww	percent	cum %
TILEFISH	503	1,776	893,139	40.38	40.38
GROUPER,SNOWY	590	850	501,662	22.68	63.07
BLACK BELLIED ROSEFISH	306	1,000	305,925	13.83	76.90
TILEFISH,BLUELINE	387	490	189,616	8.57	85.47
SHARK,SANDBAR	76	1,330	101,106	4.57	90.04
GROUPER,YELLOWEDGE	338	267	90,338	4.08	94.13

On hook and line trips that target snowy grouper the most commonly caught species are vermilion snapper, blueline tilefish, and gag (Table 1). Golden tilefish are infrequently caught on snowy grouper hook and line trips probably because golden tilefish and snowy grouper occupy different habitat types. Snowy grouper prefer a rock habitat; whereas, golden tilefish burrow in a sand/mud habitat. Although vermilion snapper, scamp, gag, red grouper, and others are taken on snowy grouper trips, there is little overlap in habitat with these species and snowy grouper. Some juvenile snowy grouper are caught when fishermen target mid-shelf species. Snowy grouper generally occur in deeper water. Snowy grouper are likely taken on trips that include mid-shelf species because fishermen fish in different locations and different depths on a fishing trip.

The most commonly caught species on trips that catch greater than 100 lbs ww of snowy grouper with longline gear are golden tilefish, blackbelly rosefish, blueline tilefish, sandbar shark, and yellowedge grouper (Table 2). As mentioned previously, golden tilefish prefer a different habitat type from snowy grouper. However, longline fishermen

will sometimes set gear in area that will overlap rocks and mud resulting in a catch that includes golden tilefish and snowy grouper. The Snapper Grouper Advisory Panel has stated that longline fishermen can avoid snowy grouper.

Step 2 – Use data from 2000-2005 to predict if and when golden tilefish and vermilion snapper would close in the future, on average.

Table 3. Average landings by month for golden tilefish during 2000-2005. The 295,000 lb gutted weight (gw) quota would have been met during May, on average based on a September 1 start date.

Month	avg gw	cum
1	17,493	161,392
2	22,851	184,243
3	31,606	215,849
4	52,029	267,878
5	46,134	314,012
6	41,173	355,185
7	19,163	374,348
8	36,292	410,640
9	30,482	30,482
10	45,288	75,770
11	38,012	113,782
12	30,117	143,899

Table 4. Average landings by month for vermilion snapper during 2000-2005. The 1.1 million lb gutted weight (gw) quota would not be met, on average.

Month	avg gw	Cum
1	49,965	49,965
2	42,558	92,523
3	72,611	165,135
4	70,749	235,884
5	71,125	307,010
6	77,583	384,593
7	67,329	451,922
8	91,045	542,967
9	91,738	634,705
10	106,638	741,343
11	97,765	839,108
12	54,271	893,379

Step 3 – Determine monthly catch of snowy grouper during 2000-2005 for proposed trip limits in Amendment 13C.

The quota for snowy grouper will be 151,000 lbs gw and 84,000 lbs gw in 2007 and 2008, respectively. The trip limit will be 175 lbs gw in 2007 and 100 lbs gw in 2008.

Table 5. Monthly catch (lbs gw) of snowy grouper for various trip limits based on data from 2000-2005.

Month	2007 Trip limit	2008 Trip limit
1	7,588	5,649
2	9,957	7,102
3	11,293	7,913
4	13,186	9,050
5	10,095	7,069
6	9,218	6,477
7	6,622	4,884
8	7,106	5,261
9	7,952	5,786
10	6,692	4,961
11	4,580	3,402
12	4,481	3,310
Total	98,769	70,865
Quota	118,000	84,000

During September through May, Table 5 reflects the expected catch of snowy grouper will all gear types with the 175 lbs gw trip limit in 2007 and 100 lbs gw trip limit in 2008. During June-August, Table 5 reflects the expected catch of snowy grouper with only hook and line gear since the longline fishery would be closed, on average. Based on data from 2000-2005, the snowy grouper quota would not be met (Table 5). The total catch would be slightly less than the proposed quotas in 2007 and 2008.

Step 4 – Determine catch of snowy grouper on trips that target at least 100 lbs of co-occurring species.

Table 6. Incidental catch of snowy grouper from fishermen targeting golden tilefish, blueline tilefish, blackbelly rosefish and mid-shelf species during 2000-2005.

mth	Incidental Catch
1	2,561
2	4,551
3	8,734
4	13,756
5	14,873
6	8,271
7	6,799
8	3,318
9	6,112
10	3,926
11	3,754
12	2,116

Table 6 represents the average landings of snowy grouper that occurred on trips that took at least 100 lbs of co-occurring species. This is considered to be the "incidental catch" as it is considered to be the total catch of snowy grouper on trips that target co-occurring species such as golden tilefish, blackbelly rosefish, blueline tilefish, vermilion snapper, etc. It is assumed that fishermen do not target golden tilefish or use longline gear during June through August because the golden tilefish quota would be met.

Step 5 - Subtract the monthly catch for a trip limit from the monthly incidental catch. This will provide a maximum estimate of the number of discards associated with the new trip limit, assuming fishermen continue to fish for other species.

Table 7. Incidental catch of snowy grouper from targeting co-occurring species, catch associated with trip limits, and estimated discards. The trip limits are 175 lbs gw (2007); and 100 lbs gw (2008).

mth	Incidental Catch	2007 Trip limit	2008 Trip limit	2007 Discards	2008 Discards
1	2,561	7,588	5,649		
2	4,551	9,957	7,102		
3	8,734	11,293	7,913		821
4	13,756	13,186	9,050		4,706
5	14,873	10,095	7,069	4,778	7,803
6	8,271	9,218	6,477		1,794
7	6,799	6,622	4,884	177	1,914
8	3,318	7,106	5,261		
9	6,112	7,952	5,786		326
10	3,926	6,692	4,961		
11	3,754	4,580	3,402		352
12	2,116	4,481	3,310		
	78,772	98,769	70,865	4,954	17,716

Table 7 includes the average of the total catch of snowy grouper on trips targeting co-occurring species during 2000-2005, which is considered to be the "incidental catch" as well as the expected catch with the 175 lbs gw trip limit in 2007 and 100 lbs gw trip limit in 2008. If the incidental catch is greater than the trip limit catch then discarding of snowy grouper would occur (Table 7).

Step 6 – Determine total harvested and discarded dead.

Table 8. Pounds (gutted weight) harvested from trip limit, estimated discards, and total (harvested + dead discards). Based on data from 2000-2005. 100% release mortality is assumed.

	2007	2008
Quota	118,000	84,000
Harvested	98,769	70,865

Discards Open Season	4,954	17,716
Discards Post Quota	0	0
Total	103,723	88,581

If it is assumed that fishermen will not avoid locations where snowy grouper occur, then the amount of snowy grouper harvested plus those discarded will exceed the quota specified in Amendment 13C during 2008.

Snowy Grouper
Recreational Incidental Catch
A small percentage of snowy grouper has been taken by the recreational sector (~4%) in recent years (1999-2003). Furthermore, very little of the recreational snowy grouper catch is taken by headboat fishermen. Few data are available to determine the effect that lowering the bag limit will have on the increase in the number of discards.

The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, were landed whole, and were available for identification and enumeration by the interviewers.

- Type B - Fishes that were caught but were either not kept or not available for identification.

    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.

    - Type B2 - Fishes that were caught and released alive.

All catch types A, B1 and B2 are recorded on a per person basis. Type A catch, which is recorded for only the leader, was divided by the number of people that contributed to the total A catch. Some or all of the people contributing to the A catch are also interviewed for type B1 and B2 catch, and those are recorded on an individual basis. If the number of people contributing to the A catch was greater than the number of people contributing to the B catch, an estimate was made to account for possible under reporting of the B catch.

Scenario 1: Identify a midpoint between Scenario 2 and Scenario 3.

Scenario 2: Identify the minimum amount of discards that could occur with a decrease in the bag limit. Assumptions:

- Fishermen stop fishing when the bag limit for snowy grouper.
- Fishermen currently retain all snowy grouper caught.
    - Release mortality is 100%.

Scenario 3: Determine the maximum amount of discards that could occur with a decrease in the bag limit. Assumptions:

- Recreational effort will not decrease. Overall mortality will remain the same. The reduced bag limit will only increase the number of dead discards.
- Fishermen currently retain all snowy grouper caught.
- Release mortality is 100%.

Table 9. The number of fish retained (A + B1) and expected reduction in the number of fish retained for lower bag limits. Based on data from 2000-2005.

Variable	Sum num	Percent
A	317	
B1_est	7	
Baglimit6	324	0.00
Baglimit5	319	1.54
Baglimit4	296	8.64
Baglimit3	263	18.83
Baglimit2	217	33.02
Baglimit1	147	54.63

Reducing the bag limit would be expected to reduce the number of retained snowy grouper by approximately 55% (Table 9). However, sample size available for analyses is very small so these values are uncertain.

Table 10. Average landings of snowy grouper (lbs ww) during 1999-2004, expected harvest (lbs ww), and discards (lbs ww) after Amendment 13C regulations of 1 fish per person per day go into place. Assumes 100% release mortality.

	Scenario 1	Scenario 2	Scenario 3
1999-2004 landings	17,691	17,691	17,691
Harvested 2007	8,026	8,026	8,026
Discards 2007	4,832	0	9,665

During 1999-2004, the total recreational landings averaged 17,691 lbs ww. Under Scenario 3, a reduction in the bag limit to 1 fish per person per day would result in a total of 8,026 lbs ww harvested and 9,665 lbs ww released as dead discards. Under Scenario 2, it would be assumed that there would be no discards and that fishermen would stop fishing once them met the 1 fish bag limit. Scenario 1 represents a midpoint between Scenarios 2 and 3 in the magnitude of dead discards.

Table 11. Estimated total recreational (4,832 lbs ww) and commercial catch and dead discards (pounds whole weight) during 2006-2008 associated with a commercial quota, and recreational bag limit. Also shown is the ABC from the preferred rebuilding strategy.

Year	Landings	Dead Discards	Total	TAC
2007	124,574	10,678	135,252	144,560
2008	91,647	25,737	117,384	102,960

The addition of discards to landings would exceed TAC in 2008.

Estimation of Increased Red Porgy Bycatch Associated With Regulations in Amendment 13C

Six scenarios are presented providing very rough estimates of possible increased bycatch associated with regulations imposed through Amendment 13C. Scenarios 1-3 are based on data from 2001-2005. Scenario 1 is a likely scenario unless there is an increase in effort. Under this scenario an increase in the magnitude of dead discards would not be expected with an increase in the allowable catch. However, under Scenarios 2 and 3, an increase in bycatch could occur if the increase in allowable catch resulted in an increase in effort. The Council chose Scenario 2 as their preferred to construct a rebuilding strategy that includes discards.

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Scenarios 4-6 were suggested by the SSC. Under Scenario 4, it is assumed conditions in the red porgy fishery will return to those observed during 1995-1998. In Scenarios 5 and 6, it is assumed effort will be greater than it was in 1995-1998. The assumptions for the six scenarios are shown below.

Table a. Assumptions for Scenarios 1-3.

Scenario 1	Scenario 2	Scenario 3
Use data from 2001-2005.	Use data from 2001-2005.	Use data from 2001-2005.
Commercial effort is not increased.	Commercial effort is not increased.	Commercial effort is not increased.
If reported landings by a fishermen were less than 50 lbs ww then landings in the future will be the same.	If reported landings were less than 25 lbs ww then landings in the future will be the same. Fishermen who caught less than the 50 lb ww trip limit catch but greater than 24 lbs ww will catch the same proportion of the 210 lb ww trip limit.	Fishermen who caught less than the 50 lb ww trip limit will catch the same proportion of the 210 lb ww trip limit.
If reported landings were greater than 50 lbs ww, but less than or equal to the 210 lb ww trip limit, then landings will be equal to the new trip limit.	If reported landings were greater than 50 lbs ww, but less than or equal to the 210 lb ww trip limit, then landings will be equal to the new trip limit.	If reported landings were greater than 50 lbs ww, but less than or equal to the 210 lb ww trip limit, then landings will be equal to the new trip limit.
If landings exceeded the new trip limit then landings in the future will also exceed the trip limit.	If landings exceeded the new trip limit then landings in the future will also exceed the trip limit.	If landings exceeded the new trip limit then landings in the future will also exceed the trip limit.
Assessment accounts for discard mortality prior to implementation of Amendment 13C	Assessment accounts for discard mortality prior to implementation of Amendment 13C	Assessment accounts for discard mortality prior to implementation of Amendment 13C
Release mortality is 35% commercial and 8% recreational.	Release mortality is 35% commercial and 8% recreational.	Release mortality is 35% commercial and 8% recreational.
Recreational effort will not increase. Increasing the bag limit to three fish will allow legal sized fish, formerly discarded, to be retained.	Recreational effort will increase.	Recreational effort will increase.
30% of red porgy discarded by recreational fishermen during 2001-2005 were legal size.	10% of red porgy discarded by recreational fishermen during 2001-2005 were legal size.	None of the red porgy discarded by recreational fishermen during 2001-2005 were legal size.

Table b. Assumptions for Scenarios 4-6.

Scenario 4	Scenario 5	Scenario 6
Use data from 1995-1998.	Use data from 1995-1998.	Use data from 1995-1998.
Effort is similar to that in 1995-1998.	Effort is greater than in 1995-1998. Recreational fishermen will meet the recreational allocation. Commercial trips that caught at least 125 lbs during 1995-1998 will now meet the trip limit.	Effort is greater than in 1995-1998. Recreational fishermen will meet the recreational allocation. Commercial trips that caught at least 125 lbs during 1995-1998 will now meet the trip limit.
Magnitude of landings and dead discards associated with 120 fish per trip (210 lb ww) based on applying trip limit, January-April spawning season closure and reduction provided by 14" total length size limit to 1995-1998 data.	Magnitude of landings and dead discards associated with 120 fish per trip (210 lb ww) based on applying trip limit, January-April spawning season closure and reduction provided by 14" total length size limit to 1995-1998 data.	Magnitude of landings and dead discards associated with 120 fish per trip (210 lb ww) based on applying trip limit, January-April spawning season closure and reduction provided by 14" total length size limit to 1995-1998 data.
Release mortality is 35% commercial and 8% recreational (SEDAR 1 2002).	Release mortality is 35% commercial and 8% recreational.	Release mortality is 86% commercial and 5% recreational.
Magnitude of new landings and dead discards based on 14" size limit and 3 fish bag limit to 1995-1998 data.	Magnitude of new landings and dead discards based on 14" size limit and 3 fish bag limit to 1995-1998 data.	Magnitude of new landings and dead discards based on 14" size limit and 3 fish bag limit to 1995-1998 data.

Table c. Estimated increased bycatch associated with Amendment 13C given assumptions of three scenarios. Pounds gutted weight.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
2007 Expected Commercial Landings	122,961	127,000	127,000	118,970	127,000	122,676
2007 Expected Recreational Landings	116,937	137,000	137,000	114,485	137,000	137,000
2007 Increased Dead Discards	0	16,689	19,985	6,608	10,468	74,908
Landings + Dead Discards	239,898	280,689	283,985	240,063	274,469	334,584
Quota + recreational allocation = ABC*	264,000	264,000	264,000	264,000	264,000	264,000
Amount of Dead Discards in Excess of ABC	0	16,689	19,985	0	10,469	70,584

Table d. Estimated increased bycatch associated with Amendment 13C given assumptions of three scenarios. Pounds whole weight.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
2007 Expected Commercial Landings	127,879	132,080	132,080	123,729	132,080	127,583
2007 Expected Recreational Landings	121,614	142,480	142,480	119,064	142,480	142,480
2007 Increased Dead Discards	0	17,357	20,785	6,872	10,887	77,904
Landings + Dead Discards	249,494	291,917	295,345	249,666	285,447	347,967
Quota + recreational allocation*	274,560	274,560	274,560	274,560	274,560	274,560
Amount of Dead Discards in Excess of ABC	0	17,357	20,785	0	10,887	73,407

* Amendment 15 would increase the ABC in 2008.

Table e. Estimated increased bycatch associated with Amendment 13C based on Scenario 2. ABC = allowable biological catch. Pounds whole weight.

Year	Biomass	TAC in preferred that does not include dead discards = ABC	Amount of Dead Discards in Excess of ABC	Revised TAC (Incorporates discards)
2007	5,344,001	296,609	17,357	279,252
2008	5,502,734	412,999	17,718	395,281
2009	5,696,741	412,999	17,718	395,281
2010	5,839,159	412,999	17,718	395,281
2011	6,017,977	460,766	19,767	440,999
2012	6,203,417	460,766	19,767	440,999
2013	6,391,065	460,766	19,767	440,999
2014	6,580,920	507,614	21,777	485,837
2015	6,775,191	507,614	21,777	485,837
2016	6,969,461	507,614	21,777	485,837
2017	7,165,940	507,614	21,777	485,837

Table f. Estimated increased bycatch associated with Amendment 13C based on Scenario 2. ABC = allowable biological catch. Pounds gutted weight.

Year	Biomass	TAC in preferred that does not include dead discards = ABC	Average Dead Discards	Revised TAC (Incorporates discards)
2007	5,138,463	285,201	16,689	268,512
2008	5,291,090	397,114	17,036	380,078
2009	5,477,635	397,114	17,036	380,078
2010	5,614,576	397,114	17,036	380,078
2011	5,786,516	443,044	19,007	424,037
2012	5,964,824	443,044	19,007	424,037
2013	6,145,254	443,044	19,007	424,037
2014	6,327,808	488,090	20,939	467,151
2015	6,514,606	488,090	20,939	467,151
2016	6,701,405	488,090	20,939	467,151
2017	6,890,327	488,090	20,939	467,151

Red Porgy
Commercial Incidental Catch

Regulations in Amendment 13C would increase the trip limit to 120 fish (210 lbs ww) and establish a quota of 127,000 lbs gw. The management measures will increase the allowable catch and therefore decrease bycatch. However, if effort is increased to previous levels there is a chance that the quota could be met before the end of the year and post-quota bycatch could occur.

Scenario #1. Analyses were conducted using logbook data from August 2006.
Assumptions:
- If reported landings by a fishermen were less than 50 lbs ww then landings in the future will be the same.
- If reported landings were greater than 50 lbs ww, but less than or equal to the new trip limit, then landings will be equal to the new trip limit.
- If landings exceeded the new trip limit then landings in the future will also exceed the trip limit.
- Trips reporting landings during January through April the spawning season closure were assumed to also occur in the future.
- Assessment accounts for dead discards as well as increase in discards associated with a rebuilding stock prior to implementation of Amendment 13C.
- Assessment does not account for any increase in the dead discards associated with Amendment 13C.
- Once the quota is met all post quota mortality is due to fishermen targeting co-occurring species with hook and line gear.
- Release mortality is 35% (SEDAR 1 2002).

Step 1 – Identify species caught on trips that that target red porgy.

Table 1. Species caught on trips that caught at least 100 lbs of red porgy with all gear during 1995.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	3,495	660	2,305,273	33.48	33.48
GROUPER,GAG	2,727	252	687,850	9.99	43.47
SCAMP	3,247	187	607,512	8.82	52.30
TRIGGERFISH,GRAY	2,723	157	426,717	6.20	58.50
GROUPER,RED	2,777	153	423,592	6.15	64.65
AMBERJACK,GREATER	1,626	247	401,936	5.84	70.49
JACK,ALMACO	1,526	152	232,381	3.38	73.86
SNAPPER,RED	2,357	93	218,092	3.17	77.03
PORGY,RED,UNC	3,885	52	202,626	2.94	79.97
GROUPER,SNOWY	975	145	141,514	2.06	82.03
GROUPER,BLACK	552	203	111,982	1.63	83.66
GRUNT,WHITE	1,237	90	110,929	1.61	85.27
DOLPHINFISH	1,636	61	100,503	1.46	86.73
KING MACKEREL	1,526	63	95,557	1.39	88.11
SEA BASSE,ATLANTIC,BLACK,UNC	1,884	50	93,783	1.36	89.48

Step 2 – Use data from 2000-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2000-2005, the quota proposed for vermilion snapper would not have been met.

Table 2. Average landings by month for vermilion snapper during 2001-2005.

month	ww	gw	cum
1	66,749	60,134	60,134
2	56,788	51,160	111,294
3	97,439	87,783	199,078
4	94,961	85,551	284,628
5	94,835	85,437	370,065
6	103,679	93,405	463,470
7	89,856	80,951	544,421
8	121,368	109,340	653,761
9	122,506	110,366	764,128
10	142,027	127,952	892,080
11	130,117	117,223	1,009,303
12	72,895	65,671	1,074,974

Based on data from 2001-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of red porgy on trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, gray triggerfish, red grouper, and greater amberjack).

Table 3. Incidental catch of red porgy. Average landings of red porgy on hook and line trips targeting co-occurring species during 2001-2005. Dead discards determined by applying a 35% release mortality.

Month	gw	Dead discards
1	600	210
2	123	43
3	62	22
4	154	54
5	5,473	1,915
6	6,012	2,104
7	6,417	2,246
8	5,986	2,095
9	4,054	1,419
10	3,894	1,363
11	4,657	1,630
12	3,527	1,234
total	40,958	14,335

Table 3 shows the estimated catch of red porgy that would occur if fishermen targeted co-occurring species including vermilion snapper, gag, scamp, gray triggerfish, red grouper and greater amberjack. Also provided is an estimate of dead discards that would occur if the fishery was closed. It is assumed that the red porgy assessment update incorporated dead discards during the January-April closure. Dead discards are estimated by applying a 35% release mortality rate.

Step 4 – Estimate the average catch of red porgy during 2001-2005.

Table 4. Average monthly catch of red porgy based on landings during 2001-2005 (Logbook).

Month	gw
1	742
2	187
3	114
4	407
5	6,668
6	6,852
7	7,069
8	6,757
9	4,482
10	4,328
11	5,200
12	4,094
Total	46,901

Table 5. Average monthly catch of red porgy based on landings during 2001-2005 (ALS).

Month	gw
1	848
2	108
3	44
4	183
5	12,185
6	8,135
7	7,820
8	7,284
9	5,224
10	4,760
11	5,573
12	4,453
Total	56,616

The average catch of red porgy during 2001-2005 (Table 4) was only slightly greater than the incidental catch (Table 3) of red porgy that would occur if fishermen targeted co-occurring species. Therefore, it is likely that since 2001, red porgy have largely been taken incidentally to fishermen targeting co-occurring species. It is assumed that the red

porgy assessment update incorporated estimates of dead discards that occurred through regulations implemented prior to Amendment 13C.

Step 5 – Estimate the increased catch of red porgy that would occur with a 210 lb ww trip limit using data from 2001-2005

Step 5 assumes: if reported landings by a fishermen were less than 50 lbs ww then landings in the future will be the same; if reported landings were greater than 50 lbs ww, but less than or equal to the new trip limit, then landings will be equal to the new trip limit; and if landings exceeded the new trip limit then landings in the future will also exceed the trip limit.

Table 6. Average monthly catch of red porgy based on landings during 2001-2005 (Logbook) based on assumptions in Step 5.

Month	gw
1	1,428
2	358
3	200
4	581
5	14,946
6	15,423
7	15,162
8	14,576
9	9,823
10	9,349
11	10,249
12	9,160
Total	101,255

Table 7. Average monthly catch of red porgy based on landings during 2001-2005 adjusted to ALS based on difference between red porgy landings in Logbook and ALS database.

Month	gw
1	1,633
2	206
3	77
4	261
5	27,311
6	18,312
7	16,771
8	15,711
9	11,449
10	10,281
11	10,984
12	9,965
Total	122,961

Based on the assumptions in Step 5, the catch of red porgy would not exceed the 127,000 lb gw quota with a 210 lb trip limit.

Red porgy

Recreational PQBM

- Regulations in Amendment 13C would increase the bag limit from 1 fish to 3 fish per person per day.

Scenario 1

Determine the number of dead discards that could occur with a increase in the size limit.

Assumptions:

- Recreational effort will not increase. Increasing the bag limit to three fish will allow legal sized fish, formerly discarded, to be retained.
- Release mortality is 8% (SEDAR 2 2003).
- Increased dead discards from increasing minimum size limit to 14" TL was incorporated into the assessment update.
- Assessment accounts for increased discards associated with a rebuilding stock. 30% of red porgy currently discarded are legal size fish (>= 14" TL).
- Recreational portion of the total allowable catch is 137,000 lbs gw
- A closure of the fishery would occur when the recreational allocation was met.

Step 1. Estimate current recreational landings.

Table 8. Landings (gw) of caught on MRFSS and headboat trips during 2001-2005

Month	HB gw	mrfss gw	sum gw
1	151	1,571	1,721
2	108	1,571	1,679
3	831	2,437	3,268
4	3,317	2,437	5,754
5	6,328	6,854	13,182
6	7,296	6,854	14,149
7	8,199	6,648	14,848
8	5,908	6,648	12,557
9	2,940	2,203	5,143
10	3,154	2,203	5,357
11	1,128	818	1,946
12	225	818	1,043
Total	39,586	41,060	80,646

Average landings during 2001-2005 was 80,646 lbs gw. A bag limit analyses of MRFSS data suggests that if 30% of the discarded fish are legal size, a bag limit of 3 fish would increase the retained catch by 44%.

Step 2. Estimate the increase in landings that would occur by increasing the bag limit to 3 fish assuming 30% of fish released under the 1 fish bag limit were legal.

Table 9. Number of red porgy harvested (A+B1) and released (B2) during 2001-2005.

Month	HB gw	mrfss gw	sum gw	44% inc	cum
1	151	1,571	1,721	2,496	2,496
2	108	1,571	1,679	2,434	4,930
3	831	2,437	3,268	4,738	9,668
4	3,317	2,437	5,754	8,343	18,011
5	6,328	6,854	13,182	19,114	37,125
6	7,296	6,854	14,149	20,517	57,642
7	8,199	6,648	14,848	21,529	79,171
8	5,908	6,648	12,557	18,207	97,379
9	2,940	2,203	5,143	7,457	104,836
10	3,154	2,203	5,357	7,767	112,603
11	1,128	818	1,946	2,821	115,424
12	225	818	1,043	1,512	116,937

Assuming no increase in effort, increasing the bag limit to 3 fish per person would increase the retained catch to 116, 937 lbs gw and decrease the number of red porgy that are discarded.

Therefore, in Scenario 1, neither the commercial quota nor the recreational allocation would be exceeded.

Red Porgy
Commercial Incidental Catch

Scenario #2. Use data from 2001-2005.

In this Scenario it is assumed:
- Fishing pressure will increase due to the increased trip limit.
- Fishermen who caught less than the 50 lb trip limit catch but greater than 24 lbs gw will catch the same proportion of the 210 lb trip limit. Landings greater than the 210 lb trip limit or less than 25 lbs ww are retained and not changed. Fishermen who landed 50 lbs ww or less than or equal to the new trip limit attain the 210 lb ww trip limit.
- Assessment accounts for dead discards as well as increase in discards associated with a rebuilding stock prior to implementation of Amendment 13C.
- Assessment does not account for any increase in the dead discards associated with Amendment 13C.
- Once the quota is met all post quota mortality is due to fishermen targeting co-occurring species with hook and line gear.
- Release mortality is 35% (SEDAR 1 2002).

Step 1 – Identify species caught on trips that that target red porgy.

Table 1. Species caught on trips that caught at least 100 lbs of red porgy with all gear during 2001-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	3,495	660	2,305,273	33.48	33.48
GROUPER,GAG	2,727	252	687,850	9.99	43.47
SCAMP	3,247	187	607,512	8.82	52.30
TRIGGERFISH,GRAY	2,723	157	426,717	6.20	58.50
GROUPER,RED	2,777	153	423,592	6.15	64.65
AMBERJACK,GREATER	1,626	247	401,936	5.84	70.49
JACK,ALMACO	1,526	152	232,381	3.38	73.86
SNAPPER,RED	2,357	93	218,092	3.17	77.03
PORGY,RED,UNC	3,885	52	202,626	2.94	79.97
GROUPER,SNOWY	975	145	141,514	2.06	82.03
GROUPER,BLACK	552	203	111,982	1.63	83.66
GRUNT,WHITE	1,237	90	110,929	1.61	85.27
DOLPHINFISH	1,636	61	100,503	1.46	86.73
KING MACKEREL	1,526	63	95,557	1.39	88.11
SEA BASSE,ATLANTIC,BLACK,UNC	1,884	50	93,783	1.36	89.48

Step 2 – Use data from 2000-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2000-2005, the quota proposed for vermilion snapper would not have been met.

Table 2. Average landings by month for vermilion snapper during 2000-2005.

Month	avg gw	cum
1	49,965	49,965
2	42,558	92,523
3	72,611	165,135
4	70,749	235,884
5	71,125	307,010
6	77,583	384,593
7	67,329	451,922
8	91,045	542,967
9	91,738	634,705
10	106,638	741,343
11	97,765	839,108
12	54,271	893,379

Based on data from 2000-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of red porgy on trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, gray triggerfish, red grouper, and greater amberjack).

Table 3. Incidental catch of red porgy. Average landings of red porgy on hook and line trips targeting co-occurring species during 1995. Dead discards determined by applying a 35% release mortality.

Month	gw	Dead discards
1	600	210
2	123	43
3	62	22
4	154	54
5	5,473	1,915
6	6,012	2,104
7	6,417	2,246
8	5,986	2,095
9	4,054	1,419
10	3,894	1,363
11	4,657	1,630
12	3,527	1,234
total	40,958	14,335

Table 3 shows the estimated catch of red porgy that would occur if fishermen targeted co-occurring species including vermilion snapper, gag, scamp, gray triggerfish, red grouper and greater amberjack. Also provided is an estimate of dead discards that would occur if the fishery was closed. It is assumed that the red porgy assessment update incorporated dead discards during the January-April closure. Dead discards are estimated by applying a 35% release mortality rate.

Step 4 – Estimate the average catch of red porgy during 2001-2005.

Table 4. Average monthly catch of red porgy based on landings during 2001-2005 (Logbook).

Month	gw
1	742
2	187
3	114
4	407
5	6,668
6	6,852
7	7,069
8	6,757
9	4,482
10	4,328
11	5,200
12	4,094
Total	46,901

Table 5. Average monthly catch of red porgy based on landings during 2001-2005 (ALS).

Month	gw
1	848
2	108
3	44
4	183
5	12,185
6	8,135
7	7,820
8	7,284
9	5,224
10	4,760
11	5,573
12	4,453
Total	56,616

Step 5 – Estimated the average monthly catch of red porgy that might occur from a 210 lbs ww trip limit assuming fishermen who previously caught 25 - 49 lbs ww of the 50 lb ww trip limit now catch the same proportion of the 210 lb ww trip limit. Landings less than 25 lbs ww or greater than the new trip limit are retained and not changed. Landings equal to 50 lbs ww or less than or equal to the new trip limit are set equal to the 210 lb ww trip limit.

Table 6. Average monthly catch of red porgy based on landings during 2001-2005 (Logbook) based on assumptions in Step 5.

Month	gw
1	2,802
2	689
3	339
4	812
5	25,578
6	27,642
7	26,822
8	24,848
9	16,573
10	16,266
11	19,091
12	15,580
Total	177,043

Table 7. Average monthly catch of red porgy based on landings during 2001-2005 adjusted to ALS based on difference between red porgy landings in Logbook and ALS database based on assumptions in Step 5.

month	gw	Cum
1	3,203	3,203
2	397	3,599
3	130	3,730
4	364	4,094
5	46,739	50,832
6	32,821	83,653
7	29,670	113,322
8	26,782	140,105
9	19,317	159,422
10	17,888	177,310
11	20,461	197,771
12	16,949	214,720

Based on the assumptions in Step 5, the catch of red porgy would meet the 127,000 lb gw quota in August.

Step 6 – Estimate dead discards and landings after quota for red porgy is met. Adjusted for ALS.

Table 8. Estimated monthly catch of red porgy based on landings and dead discards during 2001-2005 adjusted to ALS based on difference between red porgy landings in Logbook and ALS database based on assumptions in Step 5. Pounds gutted weight.

Month	gw	Cum	Adjusted Dead Discards	Sum dead discards + expected catch
1	3,203	3,203	240	3,443
2	397	3,599	25	422
3	130	3,730	8	139
4	364	4,094	24	388
5	46,739	50,832	3,500	50,239
6	32,821	83,653	2,499	35,319
7	29,670	113,322	2,484	32,154
8	13,678	127,000	1,153	14,831
9	0	127,000	1,654	1,654
10	0	127,000	1,499	1,499
11	0	127,000	1,747	1,747
12	0	127,000	1,343	1,343
			16,176	143,176

Based on assumptions in Scenario 2, the increased dead discard plus the expected catch would exceed the allowable biological catch of 127,000 lbs gw by 16,176 gw.

Red porgy
Recreational PQBM
- Regulations in Amendment 13C would increase the bag limit from 1 fish to 3 fish.

Scenario 2
- Determine the number of dead discards that could occur with a increase in the size limit. Assumptions:
- Recreational effort will increase so that the recreational portion of the total allowable catch (137,000 lbs gw) is met.
- 10% of red porgy formerly discarded are legal size.
- Increased effort will increase the discard of undersized fish.
- Release mortality is 8%.
- Assessment accounts for dead discards that occurred prior to implementation of Amendment 13C.
- Assessment accounts for increased discards associated with a rebuilding stock.
- A closure of the fishery would occur when the recreational allocation was met.

Step 1. Estimate current recreational landings.
Table 9. Average landings (gw) of caught on MRFSS and headboat trips during 2001-2005

Month	HB gw	mrfss gw	Sum gw
1	151	1,571	1,721
2	108	1,571	1,679
3	831	2,437	3,268
4	3,317	2,437	5,754
5	6,328	6,854	13,182
6	7,296	6,854	14,149
7	8,199	6,648	14,848
8	5,908	6,648	12,557
9	2,940	2,203	5,143
10	3,154	2,203	5,357
11	1,128	818	1,946
12	225	818	1,043
Total	39,586	41,060	80,646

Average landings during 2001-2005 was 80,646 lbs gw. A bag limit analyses of MRFSS data suggests that if 10% of the discarded fish are legal size, a bag limit of 3 fish would increase the retained catch by 20%.

Step 2. Estimate the increase in landings that would occur by increasing the bag limit to 3 fish assuming 10% of fish released under the 1 fish bag limit were legal.

Table 10. Increase in recreational harvest expected by increasing the bag limit to 3 fish.

Month	HB gw	mrfss gw	sum gw	20% inc	cum
1	151	1,571	1,721	2,065	2,065
2	108	1,571	1,679	2,015	4,080
3	831	2,437	3,268	3,921	8,001
4	3,317	2,437	5,754	6,905	14,906
5	6,328	6,854	13,182	15,819	30,725
6	7,296	6,854	14,149	16,979	47,704
7	8,199	6,648	14,848	17,817	65,521
8	5,908	6,648	12,557	15,068	80,589
9	2,940	2,203	5,143	6,172	86,761
10	3,154	2,203	5,357	6,428	93,189
11	1,128	818	1,946	2,335	95,524
12	225	818	1,043	1,252	96,775

If 10% of the discarded red porgy were legal size, the total recreational catch would be expected to be 96,775 lbs gw if effort was not increased. Recreational catch could increased by a factor of 1.42 to meet the 137,000 lbs gw recreational allocation. It is assumed that the percentage of undersized fish would increase by the same amount.

Step 3. Estimate discards during 2001-2005 and decrease in discards expected from increasing the bag limit to 3 fish.

Table 11. Average landings during 2001-2005, estimate of current discards (dead and living), expected landings from increasing the bag limit to 3, and expected decrease in discards associated with an increase in the bag limit.

Month	sum gw 2001-2005	current disc	20% inc with 3 fish bag	discards with 3 fish bag
1	1,721	1,033	2,065	826
2	1,679	1,007	2,015	806
3	3,268	1,961	3,921	1,568
4	5,754	3,452	6,905	2,762
5	13,182	7,909	15,819	6,328
6	14,149	8,490	16,979	6,792
7	14,848	8,909	17,817	7,127
8	12,557	7,534	15,068	6,027
9	5,143	3,086	6,172	2,469
10	5,357	3,214	6,428	2,571
11	1,946	1,167	2,335	934
12	1,043	626	1,252	501
Total	80,646	48,388	96,775	38,710

MRFSS data indicate about 60% of the red porgy caught by commercial fishermen are discards. SEDAR 1 (2002) indicates approximately 8% of the discarded red porgy would die. Assuming that 10% of the red porgy formerly discarded were legal fish, it is expected that a bag limit of 3 fish would provide a 20% increase in harvest and a 20% decrease in the amount of discarded fish.

Step 4. Estimate the increase in discards that would occur if effort was increased to meet the recreational allocation of 137,000 lbs gw.

Table 12. Estimate of increased harvest associated with increase effort to achieve the 137,000 lbs allocation, estimate of increased discards, difference between increased discards and current level of discards, and estimate of dead discards assuming 8% release mortality.

Month	New harvest with increased effort	New discards with 3 fish bag and increased effort	Difference from increased discards and current from assessment	Dead discards (8% release mort)
1	2,924	1,170	137	11
2	2,852	1,141	133	11
3	5,551	2,220	260	21
4	9,774	3,910	457	37
5	22,394	8,958	1,048	84
6	24,037	9,615	1,125	90
7	25,223	10,089	1,181	94
8	21,331	8,533	998	80
9	8,737	3,495	409	33
10	9,100	3,640	426	34
11	3,305	1,322	155	12
12	1,772	709	83	7
Total	137,000	54,800	6,412	513

If effort increased to achieve the 137,000 lbs gw recreational allocation, the expected discards would be 54,800 lbs gw. If it is assumed that the assessment included discards prior to implementation of Amendment 13C, the increase in discards would be 6,412 lbs gw. If release mortality is 8% then the estimate of dead discards would 513 lbs gw.

Step 5. Estimate the dead discards that will occur from the 127,000 lb quota from amendment 13C and 137,000 lb recreational allocation proposed in Amendment 15. Gutted Weight.

Table 13. Estimate of commercial and recreational dead discards that could result from management measures in Amendment 13C.

Commercial Quota gw	Recreational Allocation gw	ABC gw	Dead Discards	ABC + Dead Discards
127,000	137,000	264,000	16,689	280,689

Red Porgy
Commercial Incidental Catch

Scenario #3. Use data from 2001-2005.

In this Scenario it is assumed:
- Fishing pressure will increase due to the increased trip limit.
- Fishermen who caught less than the 50 lb trip limit catch will catch the same proportion of the 210 lb trip limit. Landings greater than the proposed trip limit are retained and not changed. Fishermen who landed 50 lbs ww or less than or equal to the new trip limit attain the 210 lb ww trip limit.
- Assessment accounts for dead discards as well as increase in discards associated with a rebuilding stock prior to implementation of Amendment 13C.
- Assessment does not account for any increase in the dead discards associated with Amendment 13C.
- Once the quota is met all post quota mortality is due to fishermen targeting co-occurring species with hook and line gear.
- Release mortality is 35% (SEDAR 1 2002).

Step 1 – Identify species caught on trips that that target red porgy.

Table 1. Species caught on trips that caught at least 100 lbs of red porgy with all gear during 2001-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	3,495	660	2,305,273	33.48	33.48
GROUPER,GAG	2,727	252	687,850	9.99	43.47
SCAMP	3,247	187	607,512	8.82	52.30
TRIGGERFISH,GRAY	2,723	157	426,717	6.20	58.50
GROUPER,RED	2,777	153	423,592	6.15	64.65
AMBERJACK,GREATER	1,626	247	401,936	5.84	70.49
JACK,ALMACO	1,526	152	232,381	3.38	73.86
SNAPPER,RED	2,357	93	218,092	3.17	77.03
PORGY,RED,UNC	3,885	52	202,626	2.94	79.97
GROUPER,SNOWY	975	145	141,514	2.06	82.03
GROUPER,BLACK	552	203	111,982	1.63	83.66
GRUNT,WHITE	1,237	90	110,929	1.61	85.27
DOLPHINFISH	1,636	61	100,503	1.46	86.73
KING MACKEREL	1,526	63	95,557	1.39	88.11
SEA BASSE,ATLANTIC,BLACK,UNC	1,884	50	93,783	1.36	89.48

Step 2 – Use data from 2000-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2000-2005, the quota proposed for vermilion snapper would not have been met.

Table 2. Average landings by month for vermilion snapper during 2000-2005.

Month	avg gw	cum
1	49,965	49,965
2	42,558	92,523
3	72,611	165,135
4	70,749	235,884
5	71,125	307,010
6	77,583	384,593
7	67,329	451,922
8	91,045	542,967
9	91,738	634,705
10	106,638	741,343
11	97,765	839,108
12	54,271	893,379

Based on data from 2000-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of red porgy on trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, gray triggerfish, red grouper, and greater amberjack).

Table 3. Incidental catch of red porgy. Average landings of red porgy on hook and line trips targeting co-occurring species during 1995. Dead discards determined by applying a 35% release mortality.

Month	gw	Dead discards
1	600	210
2	123	43
3	62	22
4	154	54
5	5,473	1,915
6	6,012	2,104
7	6,417	2,246
8	5,986	2,095
9	4,054	1,419
10	3,894	1,363
11	4,657	1,630
12	3,527	1,234
total	40,958	14,335

Step 4 – Estimate the average catch of red porgy during 2001-2005.

Table 4. Average monthly catch of red porgy based on landings during 2001-2005 (Logbook).

Month	gw
1	742
2	187
3	114
4	407
5	6,668
6	6,852
7	7,069
8	6,757
9	4,482
10	4,328
11	5,200
12	4,094
Total	46,901

Table 5. Average monthly catch of red porgy based on landings during 2001-2005 (ALS).

Month	gw
1	848
2	108
3	44
4	183
5	12,185
6	8,135
7	7,820
8	7,284
9	5,224
10	4,760
11	5,573
12	4,453
Total	56,616

Step 5 – Estimate the average monthly catch of red porgy that might occur from a 210 lbs ww trip limit assuming fishermen who previously caught 1 - 49 lbs ww of the 50 lb ww trip limit now catch the same proportion of the 210 lb ww trip limit. Landings greater than the new trip limit are retained and not changed. Landings equal to 50 lbs ww or less than or equal to the new trip limit are set equal to the 210 lb ww trip limit.

Table 6. Average monthly catch of red porgy based on landings during 2001-2005 (Logbook) based on assumptions in Step 5.

Month	gw
1	4,610
2	1,334
3	498
4	988

5	33,829
6	36,843
7	34,707
8	33,867
9	26,139
10	28,068
11	31,873
12	23,440
Total	256,196

Table 7. Average monthly catch of red porgy based on landings during 2001-2005 adjusted to ALS based on difference between red porgy landings in Logbook and ALS database based on assumptions in Step 5.

month	gw	Cum
1	5,269	5,269
2	768	6,037
3	191	6,229
4	443	6,672
5	61,815	68,487
6	43,745	112,232
7	38,391	150,623
8	36,504	187,127
9	30,466	217,593
10	30,868	248,461
11	34,160	282,621
12	25,500	308,120

Based on the assumptions in Step 5, the catch of red porgy would meet the 127,000 lb gw quota with a 210 lb trip limit in July.

Step 6 – Estimate dead discards and landings after quota for red porgy is met. Adjusted for ALS.

Table 8. Estimated monthly catch of red porgy based on landings and dead discards during 2001-2005 adjusted to ALS based on difference between red porgy landings in Logbook and ALS database based on assumptions in Step 5. Pounds gutted weight.

Month	gw	Cum	Adjusted Dead Discards	Sum dead discards + expected catch
1	5,269	5,269	240	5,509
2	768	6,037	25	793
3	191	6,229	8	200
4	443	6,672	24	467
5	61,815	68,487	3,500	65,315
6	43,745	112,232	2,499	46,244
7	14,768	127,000	2,484	17,252

Month	gw	Cum	Adjusted Dead Discards	Sum dead discards + expected catch
8	0	127,000	2,258	2,258
9	0	127,000	1,654	1,654
10	0	127,000	1,499	1,499
11	0	127,000	1,747	1,747
12	0	127,000	1,343	1,343
				144,280

Based on assumptions in Scenario 3, the increased dead discard plus the expected catch would exceed the allowable biological catch of 127,000 lbs gw by 17,280 gw.

Red porgy
Recreational PQBM
- Regulations in Amendment 13C would increase the bag limit from 1 fish to 3 fish.

Scenario 3
Determine the number of dead discards that could occur with a increase in the size limit.
Assumptions:
- Recreational effort will increase so that the recreational portion of the total allowable catch (137,000 lbs gw) is met.
- All red porgy formerly discarded are less than legal size.
- Increased effort will increase the discard of undersized fish.
- Release mortality is 8%.
- Assessment accounts for dead discards that occurred prior to implementation of Amendment 13C.
- Assessment accounts for increased discards associated with a rebuilding stock.
- A closure of the fishery would occur when the recreational allocation was met.

Step 1. Estimate current recreational landings.
Table 9. Average landings (gw) of caught on MRFSS and headboat trips during 2001-2005

Month	HB gw	mrfss gw	Sum gw
1	151	1,571	1,721
2	108	1,571	1,679
3	831	2,437	3,268
4	3,317	2,437	5,754
5	6,328	6,854	13,182
6	7,296	6,854	14,149
7	8,199	6,648	14,848
8	5,908	6,648	12,557
9	2,940	2,203	5,143
10	3,154	2,203	5,357
11	1,128	818	1,946
12	225	818	1,043
Total	39,586	41,060	80,646

Average landings during 2001-2005 was 80,646 lbs gw. A bag limit analyses of MRFSS data suggests that if 30% of the discarded fish are legal size, a bag limit of 3 fish would increase the retained catch by 44%.

Step 2. Estimate the increase in landings that would occur by increase harvest to the recreational allocation of 137,000 lbs gw assuming all fish released are less than the 14" TL minimum size limit.

Table 10. Estimate of increased dead discards associated with increasing recreational harvest to meet recreational allocation of 137,000 lbs gw.

Month	HB gw	mrfss gw	sum gw 2001-2005	current disc	New harvest with increased effort	New discards with increased effort	Difference from increased discards and current from assessment	Dead discards (8% release mort)
1	151	1,571	1,721	1,033	2,924	1,754	722	58
2	108	1,571	1,679	1,007	2,852	1,711	704	56
3	831	2,437	3,268	1,961	5,551	3,331	1,370	110
4	3,317	2,437	5,754	3,452	9,774	5,865	2,412	193
5	6,328	6,854	13,182	7,909	22,394	13,436	5,527	442
6	7,296	6,854	14,149	8,490	24,037	14,422	5,932	475
7	8,199	6,648	14,848	8,909	25,223	15,134	6,225	498
8	5,908	6,648	12,557	7,534	21,331	12,799	5,265	421
9	2,940	2,203	5,143	3,086	8,737	5,242	2,156	173
10	3,154	2,203	5,357	3,214	9,100	5,460	2,246	180
11	1,128	818	1,946	1,167	3,305	1,983	816	65
12	225	818	1,043	626	1,772	1,063	437	35
	39,586	41,060	80,646	48,388	137,000	82,200	33,812	2,705

If none of the discarded red porgy were legal size prior to implementation of Amendment 13C, the total recreational catch would be expected to be 80,646 lbs gw if effort was not increased. Recreational catch could increased by a factor of 1.7 to meet the 137,000 lbs gw recreational allocation. It is assumed that the percentage of undersized fish would increase by the same amount.

Step 3. Estimate the increase in discards that would occur if effort was increased to meet the recreational allocation of 137,000 lbs gw.

Table 11. Estimate of increased harvest associated with increase effort to achieve the 137,000 lbs allocation, estimate of increased discards, difference between increased discards and current level of discards, and estimate of dead discards assuming 8% release mortality.

Month	sum gw 2001-2005	current disc	New harvest with increased effort	New discards with increased effort	Difference from increased discards and current from assessment	Dead discards (8% release mort)
1	1,721	1,033	2,924	1,754	722	58
2	1,679	1,007	2,852	1,711	704	56
3	3,268	1,961	5,551	3,331	1,370	110
4	5,754	3,452	9,774	5,865	2,412	193
5	13,182	7,909	22,394	13,436	5,527	442
6	14,149	8,490	24,037	14,422	5,932	475
7	14,848	8,909	25,223	15,134	6,225	498

Month	sum gw 2001-2005	current disc	New harvest with increased effort	New discards with increased effort	Difference from increased discards and current from assessment	Dead discards (8% release mort)
8	12,557	7,534	21,331	12,799	5,265	421
9	5,143	3,086	8,737	5,242	2,156	173
10	5,357	3,214	9,100	5,460	2,246	180
11	1,946	1,167	3,305	1,983	816	65
12	1,043	626	1,772	1,063	437	35
Total	80,646	48,388	137,000	82,200	33,812	2,705

If effort increased to achieve the 137,000 lbs gw recreational allocation, the expected discards would be 82,200 lbs gw. If it is assumed that the assessment included discards prior to implementation of Amendment 13C, the increase in discards would be 33,812 lbs gw. If release mortality is 8% then the estimate of dead discards would 2,705 lbs gw.

Step 4. Estimate the dead discards that will occur from the 127,000 lb quota from amendment 13C and 137,000 lb recreational allocation proposed in Amendment 15. Gutted Weight.

Table 12. Estimate of commercial and recreational dead discards that could result from management measures in Amendment 13C.

Commercial Quota	Recreational Allocation	ABC	Dead Discards	ABC + Dead Discards
127,000	137,000	264,000	19,985	283,985

Red Porgy
Commercial Incidental Catch

Regulations in Amendment 13C would increase the trip limit to 120 fish (210 lbs ww) and establish a quota of 127,000 lbs gw. The management measures will increase the allowable catch and would decrease bycatch unless there was an increase in effort. The SSC recommended data from 1995-1998 be used for analyses rather than 2001-2005. During 1995-1998, the commercial/recreational size limit for red porgy was 12" total length and there was not a January-April spawning season closure or restrictive bag limit. The 14" total length commercial/recreational size limit and 5 fish bag limit was implemented through Amendment 9 in 1999. The January-April spawning season closure and 1 fish bag limit was implemented through Amendment 12 in 2000.

Scenario #4. Analyses were conducted using logbook data from August 2006.
Assumptions:
- The red porgy assessment and assessment update took into consideration discards from the 2000 January-April spawning season closure, the 1999 increased size limit/reduced bag limit, and the increase in discards associated with increasing biomass.
- Assessment does not account for any increase in the dead discards associated with Amendment 13C.
- Effort will increase to those present during 1995-1998.
- Amendment 9 (1999) indicated a 14" size limit would result in a 25% reduction in harvest by weight.
- Release mortality is 35% (SEDAR 2 2003).

Step 1 – Identify species caught on trips that that target red porgy.

Table 1. Species caught on trips that caught at least 100 lbs of red porgy with all gear during 1995-1998.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	3,316	407	1,348,547	21.35%	21.35%
PORGY,RED,UNC	3,686	263	969,886	15.36%	36.71%
GROUPER,GAG	2,368	261	619,090	9.80%	46.52%
TRIGGERFISH,GRAY	2,591	237	613,806	9.72%	56.24%
SCAMP	2,999	176	528,694	8.37%	64.61%
AMBERJACK,GREATER	1,607	208	334,933	5.30%	69.91%
GROUPER,SNOWY	1,528	186	283,773	4.49%	74.40%
GROUPER,RED	2,105	111	233,465	3.70%	78.10%
SNAPPER,RED	2,023	68	138,421	2.19%	80.29%
DOLPHINFISH	1,486	92	136,082	2.15%	82.45%
TRIGGERFISH,OCEAN	379	318	120,385	1.91%	84.35%
GRUNT,WHITE	1,389	80	111,228	1.76%	86.12%
KING MACKEREL	1,413	69	97,051	1.54%	87.65%
SEA BASSE,ATLANTIC,BLACK,UNC	1,755	47	82,956	1.31%	88.97%
JACK,ALMACO	582	135	78,693	1.25%	90.21%

Step 2 – Use data from 2000-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2000-2005, the quota proposed for vermilion snapper would not have been met.

Table 2. Average landings by month for vermilion snapper during 2001-2005.

month	ww	gw	cum
1	66,749	60,134	60,134
2	56,788	51,160	111,294
3	97,439	87,783	199,078
4	94,961	85,551	284,628
5	94,835	85,437	370,065
6	103,679	93,405	463,470
7	89,856	80,951	544,421
8	121,368	109,340	653,761
9	122,506	110,366	764,128
10	142,027	127,952	892,080
11	130,117	117,223	1,009,303
12	72,895	65,671	1,074,974

Based on data from 2001-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of red porgy on trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, gray triggerfish, red grouper, and greater amberjack).

Table 3. Incidental catch (lbs gw) of red porgy. Average landings of red porgy on trips targeting co-occurring species during 1995-1998.

Month	incidental
1	15,007
2	18,389
3	17,214
4	19,365
5	27,628
6	28,010
7	27,054
8	26,922
9	17,367
10	16,898
11	16,032
12	16,496
	246,384

Table 3 shows the estimated catch of red porgy that would occur if fishermen targeted co-occurring species including vermilion snapper, gag, scamp, gray triggerfish, red grouper and greater amberjack.

Step 4 – Estimate the average catch of red porgy during 1995-1998.

Table 4. Average monthly catch of red porgy based on landings during 1995-1998 (Logbook).

Month	gw
1	22,703
2	28,264
3	30,156
4	27,787
5	34,758
6	35,959
7	36,224
8	34,437
9	19,432
10	20,341
11	18,913
12	20,325
	329,299

Step 5 – Estimate the catch of red porgy that would occur with a 50 lb ww trip limit using data from 1995-1998 taking into consideration reductions provided by the spawning season closure and 14" size limit.

Table 5. Average monthly catch of red porgy based on landings during 1995-1998 if there was a 50 lb ww trip limit and a 14" size limit (Logbook).

Month	gw
1	0
2	0
3	0
4	0
5	8,791
6	8,528
7	7,565
8	7,118
9	5,631
10	5,253
11	5,106
12	5,122
	53,114

Amendment 9 (1999) indicated that a 14" size limit would result in a 25% reduction in harvest by weight. Amendment 12 (2000) imposed a January-April spawning season closure. The average landings of red porgy during 2001-2005 was 46,901 lbs gw (logbook)

Step 6 – Estimate the expected dead discards (lbs gw) of red porgy that would occur with a 120 fish (210 lbs ww) trip limit using data from 1995-1998 taking into consideration reductions provided by the spawning season closure and 14" size limit.

Table 6. Expected landings, incidental catch, total discards, and dead discards associated with a 120 fish (210 lb trip limit), a 14" total length minimum size, and a January-April spawning season closure based on landings from 1995-1998 (Logbook).

Month	Expected landings	Incidental catch	Total discards	dead discards
1	0	15,007	15,007	5,253
2	0	18,389	18,389	6,436
3	0	17,214	17,214	6,025
4	0	19,365	19,365	6,778
5	20,201	27,628	7,427	2,600
6	19,426	28,010	8,584	3,004
7	18,056	27,054	8,998	3,149
8	16,427	26,922	10,495	3,673
9	11,878	17,367	5,489	1,921
10	10,931	16,898	5,967	2,088
11	10,601	16,032	5,431	1,901
12	11,449	16,496	5,047	1,767
	118,970	246,384	127,415	44,595

Amendment 13C would increase the trip limit from 50 lbs ww to 120 fish (210 lbs ww). Based on data from 1995-1998, the expected catch would be 118,970 lbs gw and the expected discards would be 44,495 lbs gw. A release mortality rate of 35% is used to determine the magnitude of dead discards.

Step 7 – Determine the difference between the magnitude of discards (lbs gw) used in the assessment update and expected discards based on 1995-1998 data.

Table 7. Expected dead discards associated with a 210 lb ww (120 fish) trip limit based on 1995-1998 data, average commercial dead discards from 2001-2005 used in red porgy assessment update, and estimate of dead discards greater than those incorporated in the assessment update.

Expected dead discards with 210 trip limit	Assessment dead discards	Increased dead discards
44,595	37,987	6,608

The magnitude of dead discards from the red porgy assessment update was converted from numbers to pounds using a factor of 1.5 from Amendment 9 (1999). If effort were to increase to levels observed in 1995-1998, the expected catch (118,970 lbs gw) would be less than the quota of 127,000 lbs gw and the magnitude of dead discards (44,595 gw

would be greater than the level of dead commercial discards (37,987 lbs gw) used in the assessment update.

Red porgy

Recreational PQBM

- Regulations in Amendment 13C would increase the bag limit from 1 fish to 3 fish per person per day.

Scenario 4

Determine the number of dead discards that could occur with a increase in the size limit.

Assumptions:

- Recreational effort will increase to levels similar to those observed during 1995-1998.
- An analyses provided in Amendment 12 indicates a 14" size limit and a 3 fish bag limit would provide a 47.5 reduction in weight of the headboat catch and a 35.9% reduction in weight of red porgy caught by other recreational fishermen.
- The bag/size limit analysis overestimated reduction that would be provided by the size and bag limit.
- Release mortality is 8% (SEDAR 2 2003).
- Increased dead discards from increasing minimum size limit to 14" TL and reducing the bag limit to 1 fish was incorporated into the assessment update.
- Assessment accounts for increased discards associated with a rebuilding stock. 30% of red porgy currently discarded are legal size fish (>= 14" TL).
- Recreational portion of the total allowable catch is 137,000 lbs gw

Step 1. Estimate recreational landings for 1995-1998.

Table 8. Landings (gw) of caught on MRFSS and headboat trips during 1995-1998

Month	HB gw	mrfss gw	sum gw
1	668	0	668
2	724	0	724
3	2,088	19,230	21,318
4	4,093	19,230	23,323
5	20,378	4,314	24,692
6	12,521	4,314	16,835
7	10,602	4,661	15,262
8	9,960	4,661	14,620
9	11,671	407	12,078
10	3,153	407	3,560
11	783	627	1,410
12	238	627	864
	76,876	58,479	135,355

Average landings during 1995-1998 was 135,355 lbs gw.

Step 2. Estimate the landings in 1995-1998 predicted with a 1 fish bag limit and a 14" size limit and compare to actual landings during 2001-2005.

Table 9. Estimated 1995-1998 landings of red porgy associated with a 14" size limit and 1 fish bag limit.

Month	HB gw	mrfss gw	sum gw
1	292	0	292
2	316	0	316
3	912	7,038	7,951
4	1,789	7,038	8,827
5	8,905	1,579	10,484
6	5,472	1,579	7,051
7	4,633	1,706	6,339
8	4,352	1,706	6,058
9	5,100	149	5,249
10	1,378	149	1,527
11	342	229	572
12	104	229	333
			54,998

Table 10. Landings (gw) of red porgy caught on MRFSS and headboat trips during 2001-2005

Month	HB gw	mrfss gw	sum gw
1	151	1,571	1,721
2	108	1,571	1,679
3	831	2,437	3,268
4	3,317	2,437	5,754
5	6,328	6,854	13,182
6	7,296	6,854	14,149
7	8,199	6,648	14,848
8	5,908	6,648	12,557
9	2,940	2,203	5,143
10	3,154	2,203	5,357
11	1,128	818	1,946
12	225	818	1,043
Total	39,586	41,060	80,646

Estimates from Amendment 12 indicated a 14" total length minimum size limit and a 1 fish bag limit would reduce headboat landings 56.3% by weight and reduce charter boat landings 63.4% by weight. The actual landings of red porgy during 2001-2005 with a 1 fish bag limit and 14" size limit was 1.47 times greater than what was predicted in Amendment 12 based on data from the 1990s. The higher actual values could be due to increased biomass, a greater number of recreational fishermen, or uncertainty in estimates of recreational landings.

Step 3. Estimate landings after a 3 fish bag limit and a 14" size limit is imposed.

Table 11. Expected landings (gw) of red porgy caught on MRFSS and headboat trips during 1995-1998 based on a 14" size limit and a 3 fish bag limit.

Month	HB gw	mrfss gw	sum gw
1	353	0	353
2	382	0	382
3	1,102	12,327	13,429
4	2,161	12,327	14,488
5	10,759	2,765	13,525
6	6,611	2,765	9,376
7	5,598	2,988	8,585
8	5,259	2,988	8,246
9	6,162	261	6,423
10	1,665	261	1,926
11	413	402	815
12	125	402	527
			78,076

A bag limit analyses provided in Amendment 12 indicates a 14" size limit and a 3 fish bag limit would provide a 47.5 reduction in weight of the headboat catch and a 35.9% reduction in weight of red porgy caught by other recreational fishermen. The expected landings with a 14" size limit and a 3 fish bag limit during 1995-1998 is an average of 78,076 lbs whole weight.

Step 4. Adjust estimated landings associated with a 3 fish bag limit and a 14" size limit in step 2 by a factor of 1.47.

Table 12. Inflated landings (gw) of red porgy caught on MRFSS and headboat trips determined by adjusting landings upwards by a factor 1.47.

Month	HB gw	mrfss gw	sum gw
1	517	0	517
2	561	0	561
3	1,616	18,075	19,691
4	3,169	18,075	21,244
5	15,777	4,055	19,832
6	9,694	4,055	13,749
7	8,208	4,381	12,589
8	7,711	4,381	12,092
9	9,036	383	9,418
10	2,441	383	2,824
11	606	589	1,195
12	184	589	773
			114,485

As analyses in Amendment 12 appeared to overestimate the reduction in landings that would be provided by a 14" total length size limit and a 1 fish bag limit, expected values based on analysis of 1995-1998 data were expanded by a factor of 1.47. Increasing the bag limit to 3 fish per person would increase the retained catch to 114,485 lbs gw, which is less than the recreational allocation of 137,000 lbs gw.

Step 5. Estimate the magnitude of MRFSS total discards (B2s) and dead discards associated with a 3 fish bag limit and 14" minimum size limit from 1995-1998 data and compare to discards used in red porgy assessment update.

Table 13. Expected headboat and MRFSS landings, estimated weight of new released fish (total discards) associated with reducing bag limit and increasing size limit during 1995-1998; weight of B2s from web site plus new B2s from management measures; and weight of total discards used in assessment. Numbers from assessment converted to weight by using a factor of 1.5 (Amendment 12).

Expected landings	New B2s	Old B2s	Total B2s	from assessment
114,485	59,601	41,621	101,222	159,150

Table 14. Expected headboat and MRFSS landings, estimated weight of new release fish (dead discards) associated with reducing bag limit and increasing size limit during 1995-1998; weight of dead discards from web site plus new dead discards from management measures; and weight of dead discards used in assessment.

Expected landings	dead discards	old dead discards	total dead discards	dead discards from assessment
114,485	4,768	3,330	8,098	12,732

The estimate of dead discards (8,098 lbs gw) associated with a 3 fish bag limit and 14" size limit would not exceed the value of dead discards used in the red porgy assessment update.

Step 6. Estimate the increase in dead discards that will occur from the 127,000 lb quota, 120 fish trip limit, and 3 fish bag limit from Amendment 13C and 137,000 lb recreational allocation proposed in Amendment 15. Gutted Weight.

Table 15. Estimate of commercial and recreational dead discards that could result from management measures in Amendment 13C.

Commercial Quota	Recreational Allocation	ABC	Expected landings	Expected Increased Dead Discards	Expected Landings plus Dead Discards
127,000	137,000	264,000	233,455	6,608	240,063

Based on data from 1995-1998, the expected landings plus dead discards would not exceed the ABC specified in Amendment 15.

Red Porgy
Commercial Incidental Catch

Regulations in Amendment 13C would increase the trip limit to 120 fish (210 lbs ww) and establish a quota of 127,000 lbs gw. The management measures will increase the allowable catch and would decrease bycatch unless there was an increase in effort. The SSC recommended data from 1995-1998 be used for analyses rather than 2001-2005. During 1995-1998, the commercial/recreational size limit for red porgy was 12" total length and there was not a January-April spawning season closure or restrictive bag limit. The 14" total length commercial/recreational size limit and 5 fish bag limit was implemented through Amendment 9 in 1999. The January-April spawning season closure and 1 fish bag limit was implemented through Amendment 12 in 2000.

Scenario #5. Analyses were conducted using logbook data from August 2006.
Assumptions:
- The red porgy assessment and assessment update took into consideration discards from the 2000 January-April spawning season closure, the 1999 increased size limit/reduced bag limit, and the increase in discards associated with increasing biomass.
- Assessment does not account for any increase in the dead discards associated with Amendment 13C.
- Effort will increase to levels greater than during 1995-1998.
- Trips that took at least 125 lbs ww during 1995-1998 will take the 120 fish (210 lb) trip limit.
- Incidental catch of red porgy will increase. The magnitude of increase will be the same as the magnitude of increased catch of red porgy.
- Amendment 9 (1999) indicated a 14" size limit would result in a 25% reduction in harvest by weight.
- Release mortality is 35% (SEDAR 2 2003).

Step 1 – Identify species caught on trips that that target red porgy.

Table 1. Species caught on trips that caught at least 100 lbs of red porgy with all gear during 1995-1998.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	3,316	407	1,348,547	21.35%	21.35%
PORGY,RED,UNC	3,686	263	969,886	15.36%	36.71%
GROUPER,GAG	2,368	261	619,090	9.80%	46.52%
TRIGGERFISH,GRAY	2,591	237	613,806	9.72%	56.24%
SCAMP	2,999	176	528,694	8.37%	64.61%
AMBERJACK,GREATER	1,607	208	334,933	5.30%	69.91%
GROUPER,SNOWY	1,528	186	283,773	4.49%	74.40%
GROUPER,RED	2,105	111	233,465	3.70%	78.10%
SNAPPER,RED	2,023	68	138,421	2.19%	80.29%
DOLPHINFISH	1,486	92	136,082	2.15%	82.45%
TRIGGERFISH,OCEAN	379	318	120,385	1.91%	84.35%
GRUNT,WHITE	1,389	80	111,228	1.76%	86.12%
KING MACKEREL	1,413	69	97,051	1.54%	87.65%

SEA BASSE,ATLANTIC,BLACK,UNC	1,755	47	82,956	1.31%	88.97%
JACK,ALMACO	582	135	78,693	1.25%	90.21%

Step 2 – Use data from 2000-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2000-2005, the quota proposed for vermilion snapper would not have been met.

Table 2. Average landings by month for vermilion snapper during 2001-2005.

month	ww	gw	cum
1	66,749	60,134	60,134
2	56,788	51,160	111,294
3	97,439	87,783	199,078
4	94,961	85,551	284,628
5	94,835	85,437	370,065
6	103,679	93,405	463,470
7	89,856	80,951	544,421
8	121,368	109,340	653,761
9	122,506	110,366	764,128
10	142,027	127,952	892,080
11	130,117	117,223	1,009,303
12	72,895	65,671	1,074,974

Based on data from 2001-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of red porgy on trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, gray triggerfish, red grouper, and greater amberjack).

Table 3. Incidental catch (lbs gw) of red porgy. Average landings of red porgy on trips targeting co-occurring species during 1995-1998.

Month	incidental
1	16,112
2	19,742
3	18,481
4	20,790
5	29,662
6	30,072
7	29,045
8	28,903
9	18,645
10	18,142
11	17,212
12	17,710
	264,515

Table 3 shows the estimated catch of red porgy that would occur if fishermen targeted co-occurring species including vermilion snapper, gag, scamp, gray triggerfish, red grouper and greater amberjack. It is assumed that the incidental catch of red porgy will increase by a factor of 1.07, which is equal to the increase rate of catch of red porgy if trips that formerly caught at least 150 lbs of red porgy now catch the new trip limit of 210 pounds ww (120 fish).

Step 4 – Estimate the average catch of red porgy during 1995-1998.

Table 4. Average monthly catch of red porgy based on landings during 1995-1998 (Logbook).

Month	gw
1	22,703
2	28,264
3	30,156
4	27,787
5	34,758
6	35,959
7	36,224
8	34,437
9	19,432
10	20,341
11	18,913
12	20,325
	329,299

Step 5 – Estimate the catch of red porgy that would occur with a 50 lb ww trip limit using data from 1995-1998 taking into consideration reductions provided by the spawning season closure and 14" size limit.

Table 5. Average monthly catch of red porgy based on landings during 1995-1998 if there was a 50 lb ww trip limit and a 14" size limit (Logbook).

Month	gw
1	0
2	0
3	0
4	0
5	8,791
6	8,528
7	7,565
8	7,118
9	5,631
10	5,253
11	5,106
12	5,122
	53,114

Amendment 9 (1999) indicated that a 14" size limit would result in a 25% reduction in harvest by weight. Amendment 12 (2000) imposed a January-April spawning season closure. The average landings of red porgy during 2001-2005 was 46,901 lbs gw (logbook)

Step 6 – Estimate the expected dead discards (lbs gw) of red porgy that would occur with a 120 fish (210 lbs ww) trip limit using data from 1995-1998 taking into consideration reductions provided by the spawning season closure and 14" size limit.

Table 6. Expected landings, incidental catch, total discards, and dead discards associated with a 120 fish (210 lb trip limit), a 14" total length minimum size, and a January-April spawning season closure based on landings from 1995-1998 (Logbook). It is assumed that trips that formerly caught at least 125 lbs ww would now catch 210 lbs ww (120 fish).

Month	Expected landings	Incidental catch		dead discards
1	0	16,112	16,112	5,639
2	0	19,742	19,742	6,910
3	0	18,481	18,481	6,468
4	0	20,790	20,790	7,277
5	21,835	29,662	7,826	2,739
6	20,962	30,072	9,109	3,188
7	19,402	29,045	9,643	3,375
8	17,520	28,903	11,383	3,984
9	12,839	18,645	5,806	2,032
10	11,794	18,142	6,347	2,222
11	11,434	17,212	5,778	2,022
12	11,213	18,638	7,426	2,599
	127,000	265,443	138,443	48,455

Amendment 13C would increase the trip limit from 50 lbs ww to 120 fish (210 lbs ww). Based on data from 1995-1998, the 127,000 lb gw quota would be met in December and the expected discards would be 48,455 lbs gw. It is assumed that trips that formerly took at least 125 lbs ww during 1995-1998 would now catch the new 210 lb ww trip limit. A 35% release mortality rate is used to determine the magnitude of dead discards.

Step 7 – Determine the difference between the magnitude of discards (lbs gw) used in the assessment update and expected discards based on 1995-1998 data.

Table 7. Expected dead discards associated with a 210 lb ww (120 fish) trip limit based on 1995-1998 data, average commercial dead discards from 2001-2005 used in red porgy assessment update, and estimate of dead discards greater than those incorporated in the assessment update.

Expected dead discards with 210 trip limit	Assessment dead discards	Increase dead discards
48,455	37,987	10,468

The magnitude of dead discards from the red porgy assessment update was converted from numbers to pounds using a factor of 1.5 from Amendment 9 (1999). If effort was to increase to levels observed in 1995-1998, the commercial quota would be met and the magnitude of dead discards (48,455 gw would be greater than the level of dead commercial discards (37,987 lbs gw) used in the assessment update.

Red porgy

Recreational PQBM

- Regulations in Amendment 13C would increase the bag limit from 1 fish to 3 fish per person per day.

Scenario 5

Determine the number of dead discards that could occur with a increase in the size limit.

Assumptions:

- Recreational effort will increase to levels similar to those observed during 1995-1998.
- A bag limit analyses provided in Amendment 9 indicates a 14" size limit and a 3 fish bag limit would provide a 47.5 reduction in weight of the headboat catch and a 35.9% reduction in weight of red porgy caught by other recreational fishermen.
- Release mortality is 8% (SEDAR 2 2003).
- Increased dead discards from increasing minimum size limit to 14" TL and reducing the bag limit to 1 fish was incorporated into the assessment update.
- Assessment accounts for increased discards associated with a rebuilding stock. 30% of red porgy currently discarded are legal size fish (>= 14" TL).
- Recreational portion of the total allowable catch is 137,000 lbs gw

Step 1. Estimate recreational landings for 1995-1998.

Table 8. Landings (gw) of caught on MRFSS and headboat trips during 1995-1998

Month	HB gw	mrfss gw	sum gw
1	668	0	668
2	724	0	724
3	2,088	19,230	21,318
4	4,093	19,230	23,323
5	20,378	4,314	24,692
6	12,521	4,314	16,835
7	10,602	4,661	15,262
8	9,960	4,661	14,620
9	11,671	407	12,078
10	3,153	407	3,560
11	783	627	1,410
12	238	627	864

76,876 58,479 135,355

Average landings during 1995-1998 was 135,355 lbs gw.

Step 2. Estimate the landings in 1995-1998 predicted with a 1 fish bag limit and a 14" size limit and compare to actual landings during 2001-2005.

Table 9. Estimated 1995-1998 landings of red porgy associated with a 14" size limit and 1 fish bag limit.

Month	HB gw	mrfss gw	sum gw
1	292	0	292
2	316	0	316
3	912	7,038	7,951
4	1,789	7,038	8,827
5	8,905	1,579	10,484
6	5,472	1,579	7,051
7	4,633	1,706	6,339
8	4,352	1,706	6,058
9	5,100	149	5,249
10	1,378	149	1,527
11	342	229	572
12	104	229	333
			54,998

Table 10. Landings (gw) of red porgy caught on MRFSS and headboat trips during 2001-2005

Month	HB gw	mrfss gw	sum gw
1	151	1,571	1,721
2	108	1,571	1,679
3	831	2,437	3,268
4	3,317	2,437	5,754
5	6,328	6,854	13,182
6	7,296	6,854	14,149
7	8,199	6,648	14,848
8	5,908	6,648	12,557
9	2,940	2,203	5,143
10	3,154	2,203	5,357
11	1,128	818	1,946
12	225	818	1,043
Total	39,586	41,060	80,646

Estimates from Amendment 12 indicated a 14" total length minimum size limit and a 1 fish bag limit would reduce headboat landings 56.3% by weight and reduce charter boat landings 63.4% by weight. The actual landings of red porgy during 2001-2005 with a 1 fish bag limit and 14" size limit was 1.47 times greater than what was predicted in Amendment 12 based on data from the 1990s. The higher actual values could be due to

increased biomass, a greater number of recreational fishermen, or uncertainty in estimates of recreational landings.

Step 3. Estimate landings after a 3 fish bag limit and a 14" size limit is imposed.

Table 11. Expected landings (gw) of red porgy caught on MRFSS and headboat trips during 1995-1998 based on a 14" size limit and a 3 fish bag limit.

Month	HB gw	mrfss gw	sum gw
1	353	0	353
2	382	0	382
3	1,102	12,327	13,429
4	2,161	12,327	14,488
5	10,759	2,765	13,525
6	6,611	2,765	9,376
7	5,598	2,988	8,585
8	5,259	2,988	8,246
9	6,162	261	6,423
10	1,665	261	1,926
11	413	402	815
12	125	402	527
			78,076

A bag limit analyses provided in Amendment 12 indicates a 14" size limit and a 3 fish bag limit would provide a 47.5 reduction in weight of the headboat catch and a 35.9% reduction in weight of red porgy caught by other recreational fishermen. The expected landings with a 14" size limit and a 3 fish bag limit during 1995-1998 is an average of 78,076 lbs whole weight.

Step 4. Assume that fishermen will now reach the recreational allocation. Adjust estimated landings associated with a 3 fish bag limit and a 14" size limit in step 2 by a factor of 1.75.

Table 12. Inflated landings (gw) of red porgy caught on MRFSS and headboat trips determined by adjusting landings upwards by a factor 1.75.

Month	HB gw	mrfss gw	sum gw
1	619	0	619
2	671	0	671
3	1,934	21,629	23,564
4	3,792	21,629	25,422
5	18,880	4,853	23,732
6	11,600	4,853	16,453
7	9,822	5,242	15,064
8	9,228	5,242	14,470
9	10,813	458	11,271
10	2,921	458	3,379
11	725	705	1,431

12	220	705	925
			137,000

As analyses in Amendment 12 appeared to overestimate the reduction in landings that would be provided by a 14" total length size limit and a 1 fish bag limit. Expected values based on analysis of 1995-1998 data were expanded by a factor of 1.75 with the assumption that effort would increase and the recreational allocation would be met.

Step 5. Estimate the magnitude of MRFSS total discards (B2s) and dead discards associated with a 3 fish bag limit and 14" minimum size limit from 1995-1998 data and compare to discards used in red porgy assessment update.

Table 13. Expected headboat and MRFSS landings, estimated weight of new released fish (total discards) associated with reducing bag limit and increasing size limit during 1995-1998; weight of B2s from web site plus new B2s from management measures; and weight of total discards used in assessment. Numbers from assessment converted to weight by using a factor of 1.5 (Amendment 12).

Expected	New B2s	Old B2s	Total B2s	from assessment
137,000	71,322	49,807	121,129	159,150

Table 14. Expected headboat and MRFSS landings, estimated weight of new release fish (dead discards) associated with reducing bag limit and increasing size limit during 1995-1998; weight of dead discards from web site plus new dead discards from management measures; and weight of dead discards used in assessment.

Expected	dead discards	old dead discards	total dead discards	dead discards from assessment
137,000	5,706	3,985	9,690	12,732

The estimate of dead discards (9,690 lbs gw) associated with a 3 fish bag limit and 14" size limit would not exceed the value of dead discards used in the red porgy assessment update.

Step 6. Estimate the increase in dead discards that will occur from the 127,000 lb quota, 120 fish trip limit, and 3 fish bag limit from Amendment 13C and 137,000 lb recreational allocation proposed in Amendment 15. Gutted Weight.

Table 15. Estimate of commercial and recreational dead discards that could result from management measures in Amendment 13C.

Commercial Quota	Recreational Allocation	ABC	Expected landings	Expected Increased Dead Discards	Expected Landings plus Dead Discards
127,000	137,000	264,000	264,000	10,468	274,469

Based on data from 1995-1998, the expected landings plus dead discards would exceed the ABC specified in Amendment 15.

Red Porgy
Commercial Incidental Catch

Regulations in Amendment 13C would increase the trip limit to 120 fish (210 lbs ww) and establish a quota of 127,000 lbs gw. The management measures will increase the allowable catch and would decrease bycatch unless there was an increase in effort. The SSC recommended data from 1995-1998 be used for analyses rather than 2001-2005. During 1995-1998, the commercial/recreational size limit for red porgy was 12" total length and there was not a January-April spawning season closure or restrictive bag limit. The 14" total length commercial/recreational size limit and 5 fish bag limit was implemented through Amendment 9 in 1999. The January-April spawning season closure and 1 fish bag limit was implemented through Amendment 12 in 2000.

Scenario #6. Analyses were conducted using logbook data from August 2006.
Assumptions:
- The red porgy assessment and assessment update took into consideration discards from the 2000 January-April spawning season closure, the 1999 increased size limit/reduced bag limit, and the increase in discards associated with increasing biomass.
- Assessment does not account for any increase in the dead discards associated with Amendment 13C.
- Effort will increase to levels greater than during 1995-1998.
- Trips that took at least 150 lbs ww during 1995-1998 will take the 120 fish (210 lb) trip limit.
- Incidental catch of red porgy will increase. The magnitude of increase will be the same as the magnitude of increased catch of red porgy.
- Amendment 9 (1999) indicated a 14" size limit would result in a 25% reduction in harvest by weight.
- Release mortality is 86% (Harris and Stephen 2006).

Step 1 – Identify species caught on trips that that target red porgy.

Table 1. Species caught on trips that caught at least 100 lbs of red porgy with all gear during 1995-1998.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	3,316	407	1,348,547	21.35%	21.35%
PORGY,RED,UNC	3,686	263	969,886	15.36%	36.71%
GROUPER,GAG	2,368	261	619,090	9.80%	46.52%
TRIGGERFISH,GRAY	2,591	237	613,806	9.72%	56.24%
SCAMP	2,999	176	528,694	8.37%	64.61%
AMBERJACK,GREATER	1,607	208	334,933	5.30%	69.91%
GROUPER,SNOWY	1,528	186	283,773	4.49%	74.40%
GROUPER,RED	2,105	111	233,465	3.70%	78.10%
SNAPPER,RED	2,023	68	138,421	2.19%	80.29%
DOLPHINFISH	1,486	92	136,082	2.15%	82.45%
TRIGGERFISH,OCEAN	379	318	120,385	1.91%	84.35%
GRUNT,WHITE	1,389	80	111,228	1.76%	86.12%
KING MACKEREL	1,413	69	97,051	1.54%	87.65%

SEA BASSE,ATLANTIC,BLACK,UNC	1,755	47	82,956	1.31%	88.97%
JACK,ALMACO	582	135	78,693	1.25%	90.21%

Step 2 – Use data from 2000-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2000-2005, the quota proposed for vermilion snapper would not have been met.

Table 2. Average landings by month for vermilion snapper during 2001-2005.

month	ww	gw	cum
1	66,749	60,134	60,134
2	56,788	51,160	111,294
3	97,439	87,783	199,078
4	94,961	85,551	284,628
5	94,835	85,437	370,065
6	103,679	93,405	463,470
7	89,856	80,951	544,421
8	121,368	109,340	653,761
9	122,506	110,366	764,128
10	142,027	127,952	892,080
11	130,117	117,223	1,009,303
12	72,895	65,671	1,074,974

Based on data from 2001-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of red porgy on trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, gray triggerfish, red grouper, and greater amberjack).

Table 3. Incidental catch (lbs gw) of red porgy. Average landings of red porgy on trips targeting co-occurring species during 1995-1998.

Month	incidental
1	15,468
2	18,953
3	17,742
4	19,960
5	28,477
6	28,870
7	27,885
8	27,749
9	17,901
10	17,417
11	16,525
12	17,003
	253,949

Table 3 shows the estimated catch of red porgy that would occur if fishermen targeted co-occurring species including vermilion snapper, gag, scamp, gray triggerfish, red grouper and greater amberjack. It is assumed that the incidental catch of red porgy will increase by a factor of 1.03, which is equal to the increase rate of catch of red porgy if trips that formerly caught at least 150 lbs of red porgy now catch the new trip limit of 210 pounds ww (120 fish).

Step 4 – Estimate the average catch of red porgy during 1995-1998.

Table 4. Average monthly catch of red porgy based on landings during 1995-1998 (Logbook).

Month	gw
1	22,703
2	28,264
3	30,156
4	27,787
5	34,758
6	35,959
7	36,224
8	34,437
9	19,432
10	20,341
11	18,913
12	20,325
	329,299

Step 5 – Estimate the catch of red porgy that would occur with a 50 lb ww trip limit using data from 1995-1998 taking into consideration reductions provided by the spawning season closure and 14" size limit.

Table 5. Average monthly catch of red porgy based on landings during 1995-1998 if there was a 50 lb ww trip limit and a 14" size limit (Logbook).

Month	gw
1	0
2	0
3	0
4	0
5	8,791
6	8,528
7	7,565
8	7,118
9	5,631
10	5,253
11	5,106
12	5,122
	53,114

Amendment 9 (1999) indicated that a 14" size limit would result in a 25% reduction in harvest by weight. Amendment 12 (2000) imposed a January-April spawning season closure. The average landings of red porgy during 2001-2005 was 46,901 lbs gw (logbook)

Step 6 – Estimate the expected dead discards (lbs gw) of red porgy that would occur with a 120 fish (210 lbs ww) trip limit using data from 1995-1998 taking into consideration reductions provided by the spawning season closure and 14" size limit.

Table 6. Expected landings, incidental catch, total discards, and dead discards associated with a 120 fish (210 lb trip limit), a 14" total length minimum size, and a January-April spawning season closure based on landings from 1995-1998 (Logbook). It is assumed that trips that formerly caught at least 150 lbs ww would now catch 210 lbs ww (120 fish).

Month	Expected landings	Incidental catch		dead discards
1	0	15,468	15,468	13,303
2	0	18,953	18,953	16,300
3	0	17,742	17,742	15,258
4	0	19,960	19,960	17,166
5	20,835	28,477	7,642	6,572
6	20,033	28,870	8,838	7,600
7	18,648	27,885	9,237	7,944
8	16,930	27,749	10,819	9,304
9	12,269	17,901	5,631	4,843
10	11,267	17,417	6,149	5,289
11	10,923	16,525	5,602	4,817
12	11,772	17,003	5,231	4,498
	122,676	253,949	131,273	112,895

Amendment 13C would increase the trip limit from 50 lbs ww to 120 fish (210 lbs ww). Based on data from 1995-1998, the expected catch would be 122,676 lbs gw and the expected discards would be 44,495 lbs gw. It is assumed that trips that formerly took at least 150 lbs ww during 1995-1998 would now catch the new 210 lb ww trip limit. A 86% release mortality rate is used to determine the magnitude of dead discards. This estimate is based on a study conducted by Harris and Stephen (2006) who determined release mortality of red porgy from a commercial was 86%.

Step 7 – Determine the difference between the magnitude of discards (lbs gw) used in the assessment update and expected discards based on 1995-1998 data.

Table 7. Expected dead discards associated with a 210 lb ww (120 fish) trip limit based on 1995-1998 data, average commercial dead discards from 2001-2005 used in red porgy assessment update, and estimate of dead discards greater than those incorporated in the assessment update.

Expected dead discards with 210 trip limit	Assessment dead discards	Increase dead discards
112,895	37,987	74,908

The magnitude of dead discards from the red porgy assessment update was converted from numbers to pounds using a factor of 1.5 from Amendment 9 (1999). If effort was to increase to levels observed in 1995-1998, the expected catch (118,970 lbs gw) would be less than the quota of 127,000 lbs gw and the magnitude of dead discards (44,595 gw would be greater than the level of dead commercial discards (37,987 lbs gw) used in the assessment update.

Red porgy

Recreational PQBM

- Regulations in Amendment 13C would increase the bag limit from 1 fish to 3 fish per person per day.

Scenario 6

Determine the number of dead discards that could occur with a increase in the size limit.

Assumptions:

- Recreational effort will increase to levels similar to those observed during 1995-1998.
- A bag limit analyses provided in Amendment 9 indicates a 14" size limit and a 3 fish bag limit would provide a 47.5 reduction in weight of the headboat catch and a 35.9% reduction in weight of red porgy caught by other recreational fishermen.
- Release mortality is 5% (Overton and Zabawski 2003).
- Increased dead discards from increasing minimum size limit to 14" TL and reducing the bag limit to 1 fish was incorporated into the assessment update.
- Assessment accounts for increased discards associated with a rebuilding stock. 30% of red porgy currently discarded are legal size fish (>= 14" TL).
- Recreational portion of the total allowable catch is 137,000 lbs gw

Step 1. Estimate recreational landings for 1995-1998.

Table 8. Landings (gw) of caught on MRFSS and headboat trips during 1995-1998

Month	HB gw	mrfss gw	sum gw
1	668	0	668
2	724	0	724
3	2,088	19,230	21,318
4	4,093	19,230	23,323
5	20,378	4,314	24,692
6	12,521	4,314	16,835
7	10,602	4,661	15,262
8	9,960	4,661	14,620
9	11,671	407	12,078
10	3,153	407	3,560
11	783	627	1,410

12	238	627	864
	76,876	58,479	135,355

Average landings during 1995-1998 was 135,355 lbs gw.

Step 2. Estimate the landings in 1995-1998 predicted with a 1 fish bag limit and a 14" size limit and compare to actual landings during 2001-2005.

Table 9. Estimated 1995-1998 landings of red porgy associated with a 14" size limit and 1 fish bag limit.

Month	HB gw	mrfss gw	sum gw
1	292	0	292
2	316	0	316
3	912	7,038	7,951
4	1,789	7,038	8,827
5	8,905	1,579	10,484
6	5,472	1,579	7,051
7	4,633	1,706	6,339
8	4,352	1,706	6,058
9	5,100	149	5,249
10	1,378	149	1,527
11	342	229	572
12	104	229	333
			54,998

Table 10. Landings (gw) of red porgy caught on MRFSS and headboat trips during 2001-2005

Month	HB gw	mrfss gw	sum gw
1	151	1,571	1,721
2	108	1,571	1,679
3	831	2,437	3,268
4	3,317	2,437	5,754
5	6,328	6,854	13,182
6	7,296	6,854	14,149
7	8,199	6,648	14,848
8	5,908	6,648	12,557
9	2,940	2,203	5,143
10	3,154	2,203	5,357
11	1,128	818	1,946
12	225	818	1,043
Total	39,586	41,060	80,646

Estimates from Amendment 12 indicated a 14" total length minimum size limit and a 1 fish bag limit would reduce headboat landings 56.3% by weight and reduce charter boat landings 63.4% by weight. The actual landings of red porgy during 2001-2005 with a 1 fish bag limit and 14" size limit was 1.47 times greater than what was predicted in

Amendment 12 based on data from the 1990s. The higher actual values could be due to increased biomass, a greater number of recreational fishermen, or uncertainty in estimates of recreational landings.

Step 3. Estimate landings after a 3 fish bag limit and a 14" size limit is imposed.

Table 11. Expected landings (gw) of red porgy caught on MRFSS and headboat trips during 1995-1998 based on a 14" size limit and a 3 fish bag limit.

Month	HB gw	mrfss gw	sum gw
1	353	0	353
2	382	0	382
3	1,102	12,327	13,429
4	2,161	12,327	14,488
5	10,759	2,765	13,525
6	6,611	2,765	9,376
7	5,598	2,988	8,585
8	5,259	2,988	8,246
9	6,162	261	6,423
10	1,665	261	1,926
11	413	402	815
12	125	402	527
			78,076

A bag limit analyses provided in Amendment 12 indicates a 14" size limit and a 3 fish bag limit would provide a 47.5 reduction in weight of the headboat catch and a 35.9% reduction in weight of red porgy caught by other recreational fishermen. The expected landings with a 14" size limit and a 3 fish bag limit during 1995-1998 is an average of 78,076 lbs whole weight.

Step 4. Assume that fishermen will now reach the recreational allocation. Adjust estimated landings associated with a 3 fish bag limit and a 14" size limit in step 2 by a factor of 1.75.

Table 12. Inflated landings (gw) of red porgy caught on MRFSS and headboat trips determined by adjusting landings upwards by a factor 1.75.

Month	HB gw	mrfss gw	sum gw
1	619	0	619
2	671	0	671
3	1,934	21,629	23,564
4	3,792	21,629	25,422
5	18,880	4,853	23,732
6	11,600	4,853	16,453
7	9,822	5,242	15,064
8	9,228	5,242	14,470
9	10,813	458	11,271
10	2,921	458	3,379

11	725	705	1,431
12	220	705	925
			137,000

As analyses in Amendment 12 appeared to overestimate the reduction in landings that would be provided by a 14" total length size limit and a 1 fish bag limit. Expected values based on analysis of 1995-1998 data were expanded by a factor of 1.75 with the assumption that effort would increase and the recreational allocation would be met.

Step 5. Estimate the magnitude of MRFSS total discards (B2s) and dead discards associated with a 3 fish bag limit and 14" minimum size limit from 1995-1998 data and compare to discards used in red porgy assessment update.

Table 13. Expected headboat and MRFSS landings, estimated weight of new released fish (total discards) associated with reducing bag limit and increasing size limit during 1995-1998; weight of B2s from web site plus new B2s from management measures; and weight of total discards used in assessment. Numbers from assessment converted to weight by using a factor of 1.5 (Amendment 12).

Expected	New B2s	Old B2s	Total B2s	from assessment
137,000	71,322	49,807	121,129	159,150

Table 14. Expected headboat and MRFSS landings, estimated weight of new release fish (dead discards) associated with reducing bag limit and increasing size limit during 1995-1998; weight of dead discards from web site plus new dead discards from management measures; and weight of dead discards used in assessment.

Expected	dead discards	old dead discards	total dead discards	dead discards from assessment
137,000	3,566	2,490	6,056	7,958

The estimate of dead discards (6,056 lbs gw) associated with a 3 fish bag limit and 14" size limit would not exceed the value of dead discards used in the red porgy assessment update. A release mortality rate of 5% is assumed based on a study conducted in depths less than 35 m (Overton and Zabawski 2003).

Step 6. Estimate the increase in dead discards that will occur from the 127,000 lb quota, 120 fish trip limit, and 3 fish bag limit from Amendment 13C and 137,000 lb recreational allocation proposed in Amendment 15. Gutted Weight.

Table 15. Estimate of commercial and recreational dead discards that could result from management measures in Amendment 13C.

Commercial Quota	Recreational Allocation	ABC	Expected landings	Expected Increased Dead Discards	Expected Landings plus Dead Discards
127,000	137,000	264,000	259,676	74,908	334,584

Based on data from 1995-1998, the expected landings plus dead discards would exceed the ABC specified in Amendment 15.

Black Sea Bass

Estimation of Increased Black Sea Bass Bycatch Associated With Regulations in Amendment 13C

Four scenarios are presented providing very rough estimates of possible increased bycatch associated with regulations imposed through Amendment 13C. Scenario 1 is the most likely scenario; however, increased bycatch plus the expected catch would not exceed the TAC given a 15% release mortality rate. Post quota bycatch is expected to be low for black sea bass because most of the catch is taken with pots, which will be removed from the water when a quota is met. The increased recreational size limit is expected to increase the number of discards; however, size limit analyses in Amendment 13C incorporated a 15% release mortality as recommended by SEDAR 2 (2003). Bycatch would occur if the estimate of release mortality is greater than 15%. The SSC recommended results from Scenario 2, which assumes a 20% release mortality, be used in Amendment 15. The scenario is also preferred by the Council. The SSC also recommended release mortality rates of 10% (Scenario 4) and 20% (Scenario 2) be used to bracket the results in Scenario 1, which uses the SEDAR 2 (2003) accepted release mortality rate. The assumptions for the four scenarios are shown below. Scenario 2 is used to construct a rebuilding strategy that includes discards in Amendment 15.

Table a. Assumptions for four scenarios.

Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**
Use data from 2003-2005.	Use data from 2003-2005.	Use data from 2003-2005.	Use data from 2003-2005.
At least 100 lbs must be taken on a trip for a species to be targeted.	At least 100 lbs must be taken on a trip for a species to be targeted.	At least 100 lbs must be taken on a trip for a species to be targeted.	At least 100 lbs must be taken on a trip for a species to be targeted.
Pots are removed from the water once the quota is met.	Pots are removed from the water once the quota is met.	Pots are removed from the water once the quota is met.	Pots are removed from the water once the quota is met.
Black sea bass are not taken with longline gear.	Black sea bass are not taken with longline gear.	Black sea bass are not taken with longline gear.	Black sea bass are not taken with longline gear.
Release mortality = 15%	Release mortality = 20%	Release mortality = 25%	Release mortality = 10%

Table b. Estimated increased bycatch associated with Amendment 13C given assumptions of four scenarios. Pounds whole weight.

	Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**
2008 Expected Landings*	768,315	768,315	768,315	768,315
2008 Discards	73,308	97,745	122,181	72,472
Landings + Discards	841,623	866,059	890,495	840,787
2008 ABC	847,309	847,309	847,309	847,309
Amount of Dead Discards in Excess of ABC	0	18,750	43,186	0

* Expected landings determined by adding the commercial quota + reduction in landed black sea bass expected from the 12" size limit.

Table c. Estimated increased bycatch associated with Amendment 13C given assumptions of four scenarios. Pounds gutted weight.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
2008 Expected Landings*	651,114	651,114	651,114	651,114
2008 Discards	62,125	82,835	103,543	61,417
Landings + Discards	713,240	733,948	754,657	712,531
2008 ABC	718,058	718,058	718,058	718,058
Amount of Dead Discards in Excess of ABC	0	15,890	36,598	0

* Expected landings determined by adding the commercial quota + reduction in landed black sea bass expected from the 12" size limit.

Table d. Rebuilding strategy that takes into consideration the expected increase in discards expected from management measures in Amendment 13C based on Scenario 2. The total during 2006-2008 is specified by Amendment 13C. Pounds whole weight.

Year	Biomass	TAC in preferred that does not include dead discards = ABC	Amount of Dead Discards in Excess of ABC	Avg TAC (includes dead discards)
2008	5,200,000	866,059	18,750	847,309
2009	6,210,212	912,713	41,482	871,231
2010	7,248,485	912,713	41,482	871,231
2011	8,392,528	912,713	41,482	871,231
2012	9,683,354	912,713	41,482	871,231
2013	11,168,452	912,713	41,482	871,231
2014	12,649,232	912,713	41,482	871,231
2015	14,196,928	912,713	41,482	871,231
2016	15,850,394	912,713	41,482	871,231

Table e. Rebuilding strategy that takes into consideration the expected increase in discards expected from management measures in Amendment 13C based on Scenario 2. The total during 2006-2008 is specified by Amendment 13C. Pounds gutted weight.

Year	Biomass	TAC in preferred that does not include dead discards = ABC	Amount of Dead Discards in Excess of ABC	Avg TAC (includes dead discards)
2008	4,406,780	733,948	15,890	718,058
2009	5,262,892	773,486	35,155	738,331
2010	6,142,784	773,486	35,155	738,331
2011	7,112,312	773,486	35,155	738,331
2012	8,206,232	773,486	35,155	738,331
2013	9,464,790	773,486	35,155	738,331
2014	10,719,688	773,486	35,155	738,331
2015	12,031,295	773,486	35,155	738,331
2016	13,432,537	773,486	35,155	738,331

This rebuilding strategy is based on the Council's preferred rebuilding strategy. Discards are assumed to increase at the same rate as biomass. Discards are subtracted from the TAC in the preferred rebuilding strategy (Table d) to calculate a new TAC. The average TAC is based on values from 2009 to 2016.

Table f. Preferred rebuilding strategy from Amendment 15. Pounds whole weight.

Rebuilding Strategy Alternative	Rebuilding Strategy Alternative 5 (Modified F)

Year	1 year then constant landings (preferred)
2006	n/a
2007	1,159,631
2008	847,309
2009	912,713
2010	912,713
2011	912,713
2012	912,713
2013	912,713
2014	912,713
2015	912,713
2016	912,713

Black Sea Bass
Commercial Incidental Catch

Regulations in Amendment 13C would decrease the quota over three years from 477,000 lbs gw in 2006 to 309,000 lbs gw in 2008. There will not be a trip limit and the mesh in the back panel of the pots will be increased to 2 inches. Pots are to be removed from the water once the quota is met.

Scenario #1.

In this Scenario it is assumed:
- At least 100 lbs must be taken on a trip for a species to be considered to be targeted.
- Black sea bass are not taken with longline gear.
- Once the quota is met all post quota mortality is due to fishermen targeting co-occurring species with hook and line gear.
- Regulations from Amendment 13C would not increase bycatch during the open season.
- Release mortality is 15% (SEDAR 2 2003).
- Use data from 2003-2005 representing highest commercial and recreational landings since 1999.
- Pots are to be removed from the water once the quota is met.

Step 1 – Identify species caught on trips that that target black sea bass.

Table 1. Species caught on trips that caught at least 100 lbs of black sea bass with traps during 2003-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SEA BASSE,ATLANTIC,BLACK,UNC	2,128	724	1,539,982	93.77	93.77
GRUNT,WHITE	546	51	27,991	1.70	95.47
PINFISH,SPOTTAIL	496	33	16,218	0.99	96.46
OCTOPUS	537	28	14,941	0.91	97.37
TRIGGERFISH,GRAY	469	27	12,607	0.77	98.14

Table 2. Species caught on trips that caught at least 100 lbs of black sea bass with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	346	504	174,458	28.06	28.06
SEA BASSE,ATLANTIC,BLACK,UNC	503	226	113,784	18.30	46.36
GROUPER,GAG	267	274	73,091	11.76	58.12
SCAMP	279	174	48,645	7.82	65.94
TRIGGERFISH,GRAY	283	114	32,269	5.19	71.13
SNAPPER,RED	245	113	27,570	4.43	75.56
AMBERJACK,GREATER	102	203	20,697	3.33	78.89
JACK,ALMACO	116	115	13,353	2.15	81.04
GROUPER,RED	196	58	11,430	1.84	82.88
GRUNTS	105	102	10,709	1.72	84.60
GRUNT,WHITE	142	69	9,812	1.58	86.18
GROUPER,BLACK	44	216	9,488	1.53	87.70

COMMON	Obs	Mean	Sum	percent	cum %
GROUPER,SNOWY	61	145	8,841	1.42	89.13
BANDED RUDDERFISH	68	123	8,350	1.34	90.47

Black sea bass is the dominant species taken in sea bass pots (Table 1). Catch of other species in the gear is minor. On hook and line trips targeting black sea bass - vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack are among the most commonly caught species (Table 2).

Step 2 – Use data from 2003-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2003-2005, the quota proposed for vermilion snapper would not have been met.

Table 3. Average landings by month for vermilion snapper during 2003-2005.

Month	avg ww	avg gw	Cumulative gw
1	62,645	56,437	56,437
2	47,605	42,887	99,324
3	81,492	73,416	172,740
4	73,634	66,337	239,077
5	88,232	79,488	318,565
6	69,093	62,246	380,811
7	69,466	62,582	443,393
8	87,721	79,028	522,421
9	90,963	81,948	604,369
10	136,715	123,167	727,536
11	128,061	115,370	842,906
12	62,940	56,703	899,609

Based on data from 2003-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of black sea bass on hook and line trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack).

Table 4. Incidental catch of black sea bass. Average landings of black sea bass on hook and line trips targeting co-occurring species during 2003-2005.

mth	Lbs ww	Lbs gw	dead discards gw
1	3,409	2,889	433
2	2,050	1,737	261
3	2,081	1,763	264
4	4,843	4,104	616
5	4,341	3,679	552
6	4,570	3,873	581
7	4,372	3,705	556

mth	Lbs ww	Lbs gw	dead discards gw
8	3,237	2,743	411
9	1,280	1,084	163
10	2,420	2,051	308
11	3,607	3,057	459
12	3,147	2,667	400

Table 4 shows the estimated catch of black sea bass that would occur if hook and line fishermen targeted co-occurring species including vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack. Also provided is an estimate of dead discards that would occur if the fishery was closed. Dead discards are estimated by applying a 15% release mortality rate to black sea bass caught with hook and line gear when targeting co-occurring species.

Step 4 – Determine monthly catch of black sea during 2003-2005.

Table 5. Average monthly catch of black sea bass based on landings during 2003-2005 with pots and hook and line gear.

mth	avg gw	Cum gw	Dead Discards
6	18,561	18,561	581
7	16,375	34,936	556
8	20,989	55,925	411
9	8,131	64,056	163
10	26,632	90,687	308
11	49,164	139,851	459
12	92,338	232,189	400
1	84,819	317,009	433
2	56,455	373,464	261
3	43,213	416,677	264
4	40,346	457,023	616
5	37,176	494,199	552

Based on data from 2003-2005, the 477,000 lb gw quota for 2006-2007 would be met in May, the 423,000 lb gw quota for 2007-2008 would be met in April, and the 309,000 lb gw quota would be met in January.

Step 5 – Determine the post quota bycatch of black sea bass.

Table 6. Quota plus estimate of bycatch after quota is met. Pounds gutted weight.

	quota	PQBM	quota + PQBM
2006	477,000	552	477,552
2007	423,000	1,168	424,168
2008	309,000	2,126	311,126

Black Sea Bass
Recreational Incidental Catch

- Regulations in Amendment 13C would change the fishing year to June 1 to May 31, reduce the bag limit to 15 fish, increase the size limit to 11" TL during 2006 and 12" TL in 2007, and decrease the recreational allocation over three years from 633,000 lbs gw in 2006 to 409,000 lbs gw in 2008. Note: Size limit analysis for Amendment 13C used a release mortality rate of 15%.

Determine the number discards that could occur with a increase in the size limit.
Assumptions:

- Recreational effort will not decrease.

Table 7. Reductions provided by size limits for various release mortality rates for MRFSS. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	24.6	21.4	19.7	18.1
12	48.8	43.4	40.7	38.0

Table 8. Reductions provided by size limits for various release mortality rates for Headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	49.4	43.8	41.0	38.2
12	74.7	66.9	63.0	59.1

Table 9. Reductions provided by size limits for various release mortality rates for MRFSS and Headboat combined. 80% of catch is from MRFSS and 20% from headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	29.5	25.8	23.9	22.1
12	53.9	48.0	45.1	42.2

The 12" TL size limit is expected to decrease landings by 54%. Taking into consideration a 15% release mortality, a 45% reduction in harvest would be expected by increasing the size limit to 12" TL. Very little reduction is provided by decreasing the bag limit from 20 fish to 15 fish.

Table 10. Estimated landings and estimate of increased dead discards associated with an 11” and 12” TL size limit assuming a 15% release mortality.

Pounds whole weight

	11"	12"
estimated landings	617,364	403,695
released	258,330	471,999
dead disc	38,749	70,800

Pounds gutted weight

	11"	12"
estimated landings	523,190	342,114
released	218,923	399,999
dead disc	32,839	60,000

During 2003-2005, the estimated recreational catch of black sea bass was 875,694 lbs ww (742,113 lbs gw). Since an 11” TL size limit would expected to reduce harvest by 29.5% and release mortality is 15%, the expected dead discards during 2006 would be 38,749 lbs ww. In 2007, a 12” TL size limit would be expected to provide a 53.9% reduction in harvest. By applying a 15% release mortality, the expected dead discards in 2007 would be 70,800 lbs ww.

Table 11. Estimated total recreational and commercial catch and dead discards during 2006-2008 associated with a commercial quota, and recreational size limit. Also shown is the TAC from the preferred rebuilding strategy.

Pounds whole weight

Year	Landed	Dead Discards	Total	ABC
2006	1,180,224	39,401	1,219,625	1,310,000
2007	902,835	72,177	975,012	1,159,631
2008	768,315	73,308	841,623	847,309

Pounds gutted weight

Year	Landed	Dead Discards	Total	ABC
2006	1,000,190	33,390	1,033,580	1,110,169
2007	765,114	61,167	826,282	982,738
2008	651,114	62,126	713,240	718,058

Taking into consideration the expected reduction from the recreational size limits as well as increased dead discards, the total number of fish landed plus the estimated number of dead discards would not exceed the total allowable catch from the preferred rebuilding strategy. (Total landed = quota + expected recreational landings taking into consideration the 11” or 12” size limit.)

Scenario #2.

In this Scenario it is assumed:
- At least 100 lbs must be taken on a trip for a species to be considered to be targeted. Black sea bass are not taken with longline gear.
- Once the quota is met all post quota mortality is due to fishermen targeting co-occurring species with hook and line gear.
- Regulations from Amendment 13C would not increase bycatch during the open season.
- Release mortality is 20% (SEDAR 2 2003).
- Use data from 2003-2005 representing highest commercial and recreational landings since 1999.
- Pots are to be removed from the water once the quota is met.

Step 1 – Identify species caught on trips that that target black sea bass.

Table 1. Species caught on trips that caught at least 100 lbs of black sea bass with traps during 2003-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SEA BASSE,ATLANTIC,BLACK,UNC	2,128	724	1,539,982	93.77	93.77
GRUNT,WHITE	546	51	27,991	1.70	95.47
PINFISH,SPOTTAIL	496	33	16,218	0.99	96.46
OCTOPUS	537	28	14,941	0.91	97.37
TRIGGERFISH,GRAY	469	27	12,607	0.77	98.14

Table 2. Species caught on trips that caught at least 100 lbs of black sea bass with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	346	504	174,458	28.06	28.06
SEA BASSE,ATLANTIC,BLACK,UNC	503	226	113,784	18.30	46.36
GROUPER,GAG	267	274	73,091	11.76	58.12
SCAMP	279	174	48,645	7.82	65.94
TRIGGERFISH,GRAY	283	114	32,269	5.19	71.13
SNAPPER,RED	245	113	27,570	4.43	75.56
AMBERJACK,GREATER	102	203	20,697	3.33	78.89
JACK,ALMACO	116	115	13,353	2.15	81.04
GROUPER,RED	196	58	11,430	1.84	82.88
GRUNTS	105	102	10,709	1.72	84.60
GRUNT,WHITE	142	69	9,812	1.58	86.18
GROUPER,BLACK	44	216	9,488	1.53	87.70
GROUPER,SNOWY	61	145	8,841	1.42	89.13
BANDED RUDDERFISH	68	123	8,350	1.34	90.47

Black sea bass is the dominant species taken in sea bass pots (Table 1). Catch of other species in the gear is minor. On hook and line trips targeting black sea bass - vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack are among the most commonly caught species (Table 2).

Step 2 – Use data from 2003-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2003-2005, the quota proposed for vermilion snapper would not have been met.

Table 3. Average landings by month for vermilion snapper during 2003-2005.

Month	avg ww	avg gw	Cumulative gw
1	62,645	56,437	56,437
2	47,605	42,887	99,324
3	81,492	73,416	172,740
4	73,634	66,337	239,077
5	88,232	79,488	318,565
6	69,093	62,246	380,811
7	69,466	62,582	443,393
8	87,721	79,028	522,421
9	90,963	81,948	604,369
10	136,715	123,167	727,536
11	128,061	115,370	842,906
12	62,940	56,703	899,609

Based on data from 2003-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of black sea bass on hook and line trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack).

Table 4. Incidental catch of black sea bass. Average landings of black sea bass on hook and line trips targeting co-occurring species during 2003-2005.

Mth	avg	gw	dead discards
1	3,409	2,889	578
2	2,050	1,737	347
3	2,081	1,763	353
4	4,843	4,104	821
5	4,341	3,679	736
6	4,570	3,873	775
7	4,372	3,705	741
8	3,237	2,743	549
9	1,280	1,084	217
10	2,420	2,051	410
11	3,607	3,057	611
12	3,147	2,667	533

Table 4 shows the estimated catch of black sea bass that would occur if hook and line fishermen targeted co-occurring species including vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack. Also provided is an estimate of dead

discards that would occur if the fishery was closed. Dead discards are estimated by applying a 20% release mortality rate to black sea bass caught with hook and line gear when targeting co-occurring species.

Step 4 – Determine monthly catch of black sea during 2000-2005.

Table 5. Average monthly catch of black sea bass based on landings during 2003-2005 with pots and hook and line gear.

Mth	avg ww	avg gw	Cum gw	Dead Discards
6	21,901	18,561	18,561	775
7	19,322	16,375	34,936	741
8	24,767	20,989	55,925	549
9	9,594	8,131	64,056	217
10	31,426	26,632	90,687	410
11	58,013	49,164	139,851	611
12	108,959	92,338	232,189	533
1	100,087	84,819	317,009	578
2	66,617	56,455	373,464	347
3	50,991	43,213	416,677	353
4	47,608	40,346	457,023	821
5	43,867	37,176	494,199	736

Based on data from 2003-2005, the 477,000 lb gw quota for 2006-2007 would be met in May, the 423,000 lb gw quota for 2007-2008 would be met in April, and the 309,000 lb gw quota would be met in January.

Step 5 – Determine the post quota bycatch of black sea bass.

Table 6. Quota plus estimate of bycatch after quota is met. Pounds gutted weight.

	quota	PQBM	quota + PQBM
2006	477,000	736	477,736
2007	423,000	1,557	424,557
2008	309,000	2,835	311,835

Black Sea Bass
Recreational Incidental Catch
- Regulations in Amendment 13C would change the fishing year to June 1 to May 31, reduce the bag limit to 15 fish, increase the size limit to 11" TL during 2006 and 12" TL in 2007, and decrease the recreational allocation over three years from 633,000 lbs gw in 2006 to 409,000 lbs gw in 2008. Note: Size limit analysis for Amendment 13C used a release mortality rate of 15%.

Determine the number of discards that could occur with a increase in the size limit.
Assumptions:
Recreational effort will not decrease.

Table 7. Reductions provided by size limits for various release mortality rates for MRFSS. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	24.6	21.4	19.7	18.1
12	48.8	43.4	40.7	38.0

Table 8. Reductions provided by size limits for various release mortality rates for Headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	49.4	43.8	41.0	38.2
12	74.7	66.9	63.0	59.1

Table 9. Reductions provided by size limits for various release mortality rates for MRFSS and Headboat combined. 80% of catch is from MRFSS and 20% from headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	29.5	25.8	23.9	22.1
12	53.9	48.0	45.1	42.2

The 12" TL size limit is expected to decrease landings by 54%. Taking into consideration a 15% release mortality, a 45% reduction in harvest would be expected by increasing the size limit to 12" TL. Very little reduction is provided by decreasing the bag limit from 20 fish to 15 fish.

Table 10. Estimated landings and estimate of increased dead discards associated with an 11” and 12” TL size limit assuming a 20% release mortality.

Pounds whole weight

	11"	12"
estimated landings	617,364	403,695
Released	258,330	471,999
dead disc	51,666	94,400

Pounds gutted weight

	11"	12"
estimated landings	523,190	342,114
Released	218,923	399,999
dead disc	43,785	80,000

During 2003-2005, the estimated recreational catch of black sea bass was 875,694 lbs ww (742,113 lbs gw). Since an 11” TL size limit would expected to reduce harvest by 29.5% and release mortality is 20%, the expected dead discards during 2006 would be 51,666 lbs ww. In 2007, a 12” TL size limit would be expected to provide a 53.9% reduction in harvest. By applying a 20% release mortality, the expected dead discards in 2007 would be 94,400 lbs ww.

Table 11. Estimated total recreational and commercial catch and dead discards during 2006-2008 associated with a commercial quota, and recreational size limit. Also shown is the TAC from the preferred rebuilding strategy.

Pounds whole weight

Year	Landed	Dead Discards	Total	ABC
2006	1,180,224	52,534	1,232,758	1,310,000
2007	902,835	96,237	999,071	1,159,631
2008	768,315	97,745	866,059	847,309

Pounds gutted weight

Year	Landed	Dead Discards	Total	ABC
2006	1,000,190	44,520	1,044,710	1,110,169
2007	765,114	81,556	846,671	982,738
2008	651,114	82,834	733,949	718,058

Taking into consideration the expected reduction from the recreational size limits as well as increased dead discards, the total number of fish landed plus the estimated number of dead discards would exceed the total allowable catch from the preferred rebuilding strategy. (Total landed = quota + expected recreational landings taking into consideration the 11” or 12” size limit.)

Scenario #3.

In this Scenario it is assumed:
- At least 100 lbs must be taken on a trip for a species to be considered to be targeted.
- Black sea bass are not taken with longline gear.
- Once the quota is met all post quota mortality is due to fishermen targeting co-occurring species with hook and line gear.
- Regulations from Amendment 13C would not increase bycatch during the open season.
- Release mortality is 25% (SEDAR 2 2003).
- Use data from 2003-2005 representing highest commercial and recreational landings since 1999.
- Pots are to be removed from the water once the quota is met.

Step 1 – Identify species caught on trips that that target black sea bass.

Table 1. Species caught on trips that caught at least 100 lbs of black sea bass with traps during 2003-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SEA BASSE,ATLANTIC,BLACK,UNC	2,128	724	1,539,982	93.77	93.77
GRUNT,WHITE	546	51	27,991	1.70	95.47
PINFISH,SPOTTAIL	496	33	16,218	0.99	96.46
OCTOPUS	537	28	14,941	0.91	97.37
TRIGGERFISH,GRAY	469	27	12,607	0.77	98.14

Table 2. Species caught on trips that caught at least 100 lbs of black sea bass with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	346	504	174,458	28.06	28.06
SEA BASSE,ATLANTIC,BLACK,UNC	503	226	113,784	18.30	46.36
GROUPER,GAG	267	274	73,091	11.76	58.12
SCAMP	279	174	48,645	7.82	65.94
TRIGGERFISH,GRAY	283	114	32,269	5.19	71.13
SNAPPER,RED	245	113	27,570	4.43	75.56
AMBERJACK,GREATER	102	203	20,697	3.33	78.89
JACK,ALMACO	116	115	13,353	2.15	81.04
GROUPER,RED	196	58	11,430	1.84	82.88
GRUNTS	105	102	10,709	1.72	84.60
GRUNT,WHITE	142	69	9,812	1.58	86.18
GROUPER,BLACK	44	216	9,488	1.53	87.70
GROUPER,SNOWY	61	145	8,841	1.42	89.13
BANDED RUDDERFISH	68	123	8,350	1.34	90.47

Black sea bass is the dominant species taken in sea bass pots (Table 1). Catch of other species in the gear is minor. On hook and line trips targeting black sea bass - vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack are among the most commonly caught species (Table 2).

Step 2 – Use data from 2003-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2003-2005, the quota proposed for vermilion snapper would not have been met.

Table 3. Average landings by month for vermilion snapper during 2003-2005.

Month	avg ww	avg gw	cumulative
1	62,645	56,437	56,437
2	47,605	42,887	99,324
3	81,492	73,416	172,740
4	73,634	66,337	239,077
5	88,232	79,488	318,565
6	69,093	62,246	380,811
7	69,466	62,582	443,393
8	87,721	79,028	522,421
9	90,963	81,948	604,369
10	136,715	123,167	727,536
11	128,061	115,370	842,906
12	62,940	56,703	899,609

Based on data from 2003-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of black sea bass on hook and line trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack).

Table 4. Incidental catch of black sea bass. Average landings of black sea bass on hook and line trips targeting co-occurring species during 2003-2005.

Mth	avg	gw	dead discards
1	3,409	2,889	722
2	2,050	1,737	434
3	2,081	1,763	441
4	4,843	4,104	1,026
5	4,341	3,679	920
6	4,570	3,873	968
7	4,372	3,705	926
8	3,237	2,743	686
9	1,280	1,084	271
10	2,420	2,051	513
11	3,607	3,057	764
12	3,147	2,667	667

Table 4 shows the estimated catch of black sea bass that would occur if hook and line fishermen targeted co-occurring species including vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack. Also provided is an estimate of dead discards that would occur if the fishery was closed. Dead discards are estimated by

applying a 25% release mortality rate to black sea bass caught with hook and line gear when targeting co-occurring species.

Step 4 – Determine monthly catch of black sea during 2000-2005.

Table 5. Average monthly catch of black sea bass based on landings during 2003-2005 with pots and hook and line gear.

Mth	avg ww	avg gw	Cum gw	Dead Discards
6	21,901	18,561	18,561	968
7	19,322	16,375	34,936	926
8	24,767	20,989	55,925	686
9	9,594	8,131	64,056	271
10	31,426	26,632	90,687	513
11	58,013	49,164	139,851	764
12	108,959	92,338	232,189	667
1	100,087	84,819	317,009	722
2	66,617	56,455	373,464	434
3	50,991	43,213	416,677	441
4	47,608	40,346	457,023	1,026
5	43,867	37,176	494,199	920

Based on data from 2003-2005, the 477,000 lb gw quota for 2006-2007 would be met in May, the 423,000 lb gw quota for 2007-2008 would be met in April, and the 309,000 lb gw quota would be met in January.

Step 5 – Determine the post quota bycatch of black sea bass.

Table 6. Quota plus estimate of bycatch after quota is met. Pounds gutted weight.

	quota	PQBM	quota + PQBM
2006	477,000	920	477,920
2007	423,000	1,946	424,946
2008	309,000	3,543	312,543

Black Sea Bass
Recreational Incidental Catch
- Regulations in Amendment 13C would change the fishing year to June 1 to May 31, reduce the bag limit to 15 fish, increase the size limit to 11" TL during 2006 and 12" TL in 2007, and decrease the recreational allocation over three years from 633,000 lbs gw in 2006 to 409,000 lbs gw in 2008. Note: Size limit analysis for Amendment 13C used a release mortality rate of 15%.

Determine the number of discards that could occur with a increase in the size limit.
Assumptions:
Recreational effort will not decrease.

Table 7. Reductions provided by size limits for various release mortality rates for MRFSS. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	24.6	21.4	19.7	18.1
12	48.8	43.4	40.7	38.0

Table 8. Reductions provided by size limits for various release mortality rates for Headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	49.4	43.8	41.0	38.2
12	74.7	66.9	63.0	59.1

Table 9. Reductions provided by size limits for various release mortality rates for MRFSS and Headboat combined. 80% of catch is from MRFSS and 20% from headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	29.5	25.8	23.9	22.1
12	53.9	48.0	45.1	42.2

The 12" TL size limit is expected to decrease landings by 54%. Taking into consideration a 15% release mortality, a 45% reduction in harvest would be expected by increasing the size limit to 12" TL. Very little reduction is provided by decreasing the bag limit from 20 fish to 15 fish.

Table 10. Estimated landings and estimate of increased dead discards associated with an 11” and 12” TL size limit assuming a 15% release mortality.

Pounds whole weight

	11"	12"
estimated landings	617,364	403,695
Released	258,330	471,999
dead disc	64,582	118,000

Pounds gutted weight

	11"	12"
estimated landings	523,190	342,114
Released	218,923	399,999
dead disc	54,731	100,000

During 2003-2005, the estimated recreational catch of black sea bass was 875,694 lbs ww (742,113 lbs gw). Since an 11” TL size limit would expected to reduce harvest by 29.5% and release mortality is 30%, the expected dead discards during 2006 would be 64,582 lbs ww. In 2007, a 12” TL size limit would be expected to provide a 53.9% reduction in harvest. By applying a 25% release mortality, the expected dead discards in 2007 would be 118,000 lbs ww.

Table 11. Estimated total recreational and commercial catch and dead discards during 2006-2008 associated with a commercial quota, and recreational size limit. Also shown is the TAC from the preferred rebuilding strategy.

Pounds whole weight

Year	Landed	Dead Discards	Total	ABC
2006	1,180,224	65,668	1,245,892	1,310,000
2007	902,835	120,296	1,023,131	1,159,631
2008	768,315	122,181	890,495	847,309

Pounds gutted weight

Year	Landed	Dead Discards	Total	ABC
2006	1,000,190	55,651	1,055,840	1,110,169
2007	765,114	101,946	867,060	982,738
2008	651,114	103,543	754,657	718,058

Taking into consideration the expected reduction from the recreational size limits as well as increased dead discards, the total number of fish landed plus the estimated number of dead discards would exceed the total allowable catch from the preferred rebuilding strategy. (Total landed = quota + expected recreational landings taking into consideration the 11” or 12” size limit.)

Black Sea Bass
Commercial Incidental Catch

Regulations in Amendment 13C would decrease the quota over three years from 477,000 lbs gw in 2006 to 309,000 lbs gw in 2008. There will not be a trip limit and the mesh in the back panel of the pots will be increased to 2 inches. Pots are to be removed from the water once the quota is met.

Scenario #4.

In this Scenario it is assumed:
- At least 100 lbs must be taken on a trip for a species to be considered to be targeted.
- Black sea bass are not taken with longline gear.
- Once the quota is met all post quota mortality is due to fishermen targeting co-occurring species with hook and line gear.
- Regulations from Amendment 13C would not increase bycatch during the open season.
- Release mortality is 10% (SEDAR 2 2003).
- Use data from 2003-2005 representing highest commercial and recreational landings since 1999.
- Pots are to be removed from the water once the quota is met.

Step 1 – Identify species caught on trips that that target black sea bass.

Table 1. Species caught on trips that caught at least 100 lbs of black sea bass with traps during 2003-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SEA BASSE,ATLANTIC,BLACK,UNC	2,128	724	1,539,982	93.77	93.77
GRUNT,WHITE	546	51	27,991	1.70	95.47
PINFISH,SPOTTAIL	496	33	16,218	0.99	96.46
OCTOPUS	537	28	14,941	0.91	97.37
TRIGGERFISH,GRAY	469	27	12,607	0.77	98.14

Table 2. Species caught on trips that caught at least 100 lbs of black sea bass with hook and line gear during 2000-2005.

COMMON	Obs	Mean	Sum	percent	cum %
SNAPPER,VERMILION	346	504	174,458	28.06	28.06
SEA BASSE,ATLANTIC,BLACK,UNC	503	226	113,784	18.30	46.36
GROUPER,GAG	267	274	73,091	11.76	58.12
SCAMP	279	174	48,645	7.82	65.94
TRIGGERFISH,GRAY	283	114	32,269	5.19	71.13
SNAPPER,RED	245	113	27,570	4.43	75.56
AMBERJACK,GREATER	102	203	20,697	3.33	78.89
JACK,ALMACO	116	115	13,353	2.15	81.04
GROUPER,RED	196	58	11,430	1.84	82.88
GRUNTS	105	102	10,709	1.72	84.60
GRUNT,WHITE	142	69	9,812	1.58	86.18
GROUPER,BLACK	44	216	9,488	1.53	87.70

COMMON	Obs	Mean	Sum	percent	cum %
GROUPER,SNOWY	61	145	8,841	1.42	89.13
BANDED RUDDERFISH	68	123	8,350	1.34	90.47

Black sea bass is the dominant species taken in sea bass pots (Table 1). Catch of other species in the gear is minor. On hook and line trips targeting black sea bass - vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack are among the most commonly caught species (Table 2).

Step 2 – Use data from 2003-2005 to predict if and when vermilion snapper would close in the future, on average.
During 2003-2005, the quota proposed for vermilion snapper would not have been met.

Table 3. Average landings by month for vermilion snapper during 2003-2005.

Month	avg ww	avg gw	Cumulative gw
1	62,645	56,437	56,437
2	47,605	42,887	99,324
3	81,492	73,416	172,740
4	73,634	66,337	239,077
5	88,232	79,488	318,565
6	69,093	62,246	380,811
7	69,466	62,582	443,393
8	87,721	79,028	522,421
9	90,963	81,948	604,369
10	136,715	123,167	727,536
11	128,061	115,370	842,906
12	62,940	56,703	899,609

Based on data from 2003-2005, the 1.1 million lb gutted weight (gw) vermilion snapper quota would not be met.

Step 3 – Determine catch of black sea bass on hook and line trips that target at least 100 lbs of co-occurring species (vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack).

Table 4. Incidental catch of black sea bass. Average landings of black sea bass on hook and line trips targeting co-occurring species during 2003-2005.

mth	Lbs ww	Lbs gw	dead discards gw
1	3,409	2,889	289
2	2,050	1,737	174
3	2,081	1,763	176
4	4,843	4,104	410
5	4,341	3,679	368
6	4,570	3,873	387
7	4,372	3,705	371

8	3,237	2,743	274
9	1,280	1,084	108
10	2,420	2,051	205
11	3,607	3,057	306
12	3,147	2,667	267

Table 4 shows the estimated catch of black sea bass that would occur if hook and line fishermen targeted co-occurring species including vermilion snapper, gag, scamp, red snapper, gray triggerfish, and greater amberjack. Also provided is an estimate of dead discards that would occur if the fishery was closed. Dead discards are estimated by applying a 15% release mortality rate to black sea bass caught with hook and line gear when targeting co-occurring species.

Step 4 – Determine monthly catch of black sea during 2003-2005.

Table 5. Average monthly catch of black sea bass based on landings during 2003-2005 with pots and hook and line gear.

mth	avg 00-05	cum	dead discards
6	18,561	18,561	387
7	16,375	34,936	371
8	20,989	55,925	274
9	8,131	64,056	108
10	26,632	90,687	205
11	49,164	139,851	306
12	92,338	232,189	267
1	84,819	317,009	289
2	56,455	373,464	174
3	43,213	416,677	176
4	40,346	457,023	410
5	37,176	494,199	368

Based on data from 2003-2005, the 477,000 lb gw quota for 2006-2007 would be met in May, the 423,000 lb gw quota for 2007-2008 would be met in April, and the 309,000 lb gw quota would be met in January.

Step 5 – Determine the post quota bycatch of black sea bass.

Table 6. Quota plus estimate of bycatch after quota is met. Pounds gutted weight.

	quota	PQBM	quota + PQBM
2006	477,000	368	477,368
2007	423,000	778	423,778
2008	309,000	1,417	310,417

Black Sea Bass
Recreational Incidental Catch

- Regulations in Amendment 13C would change the fishing year to June 1 to May 31, reduce the bag limit to 15 fish, increase the size limit to 11" TL during 2006 and 12" TL in 2007, and decrease the recreational allocation over three years from 633,000 lbs gw in 2006 to 409,000 lbs gw in 2008. Note: Size limit analysis for Amendment 13C used a release mortality rate of 15%.

Determine the number discards that could occur with a increase in the size limit.
Assumptions:

- Recreational effort will not decrease.

Table 7. Reductions provided by size limits for various release mortality rates for MRFSS. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	24.6	21.4	19.7	18.1
12	48.8	43.4	40.7	38.0

Table 8. Reductions provided by size limits for various release mortality rates for Headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	49.4	43.8	41.0	38.2
12	74.7	66.9	63.0	59.1

Table 9. Reductions provided by size limits for various release mortality rates for MRFSS and Headboat combined. 80% of catch is from MRFSS and 20% from headboat. SEDAR accepted mortality rate is 15%.

	Percent Reduction for Various Release Mortalities			
Size Limit	0%	10%	15%	20%
11	29.5	25.8	23.9	22.1
12	53.9	48.0	45.1	42.2

The 12" TL size limit is expected to decrease landings by 54%. Taking into consideration a 15% release mortality, a 45% reduction in harvest would be expected by increasing the size limit to 12" TL. Very little reduction is provided by decreasing the bag limit from 20 fish to 15 fish.

Table 10. Estimated landings and estimate of increased dead discards associated with an 11” and 12” TL size limit assuming a 15% release mortality.

Pounds whole weight

	11"	12"
estimated landings	617,364	403,695
released	258,330	471,999
dead disc	38,749	70,800

Pounds gutted weight

	11"	12"
estimated landings	523,190	342,114
released	218,923	399,999
dead disc	32,839	60,000

During 2003-2005, the estimated recreational catch of black sea bass was 875,694 lbs ww (742,113 lbs gw). Since an 11” TL size limit would expected to reduce harvest by 29.5% and release mortality is 15%, the expected dead discards during 2006 would be 38,749 lbs ww. In 2007, a 12” TL size limit would be expected to provide a 53.9% reduction in harvest. By applying a 15% release mortality, the expected dead discards in 2007 would be 70,800 lbs ww.

Table 11. Estimated total recreational and commercial catch and dead discards during 2006-2008 associated with a commercial quota, and recreational size limit. Also shown is the TAC from the preferred rebuilding strategy.

Pounds whole weight

Year	Landed	Dead Discards	Total	TAC
2006	1,180,224	39,184	1,219,408	1,310,000
2007	902,835	71,718	974,553	1,159,631
2008	768,315	72,472	840,787	847,309

Pounds gutted weight

Year	Landed	Dead Discards	Total	TAC
2006	1,000,190	33,206	1,033,396	1,110,169
2007	765,114	60,778	825,892	982,738
2008	651,114	61,417	712,531	718,058

Taking into consideration the expected reduction from the recreational size limits as well as increased dead discards, the total number of fish landed plus the estimated number of dead discards would not exceed the total allowable catch from the preferred rebuilding strategy. (Total landed = quota + expected recreational landings taking into consideration the 11” or 12” size limit.)