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A. APPENDIX: QUOTAS AND RETENTION LIMIT CALCULATIONS

For alternatives A2 through A4, NMFS calculated quotas and retention limits for blacknose sharks based on the TAC recommended in the 2007 blacknose shark stock assessment. Fishing effort from 2004 to 2007 in the Coastal Fisheries Logbook, discards from the BLL and gillnet observer reports from 2005-2008, and landings reported through HMS shark dealer reports (*i.e.*, southeast and northeast general canvass and SEFSC quota monitoring databases) were used for the retention limit analyzes. In all cases, NMFS accounted for total mortality from all fishing sectors (*e.g.*, commercial and recreational) within the Atlantic shark fishery, including landings and discards. As explained in Chapter 4, NMFS is working with the GMFMC and SAFMC to reduce blacknose shark discards in the shrimp trawl fisheries in addition to the management measures analyzed in this document. Thus, for the alternatives considered below, NMFS assumes that bycatch of blacknose sharks in shrimp trawl fisheries is being reduced via Council action. By reducing the commercial quota below the commercial allowance for the Atlantic shark commercial fishery, NMFS would reduce fishing mortality below the level that would cause overfishing and allow blacknose sharks to rebuild. The quotas and retention limits in this rulemaking are specific to the 2007 blacknose shark stock assessment, but NMFS anticipates changing these quotas and retention limits via framework actions in the future, as necessary. In subsequent rulemakings, NMFS would determine quotas and retention limits based on the recommendations from the most recent stock assessments and/or estimates of landings, discards, and effort in fisheries that interact with sharks using the same process used in this rulemaking as outlined below.

A.1 Alternative A2

The 2007 blacknose shark stock assessment assessed blacknose sharks separately and recommended a blacknose-specific TAC of 19,200 blacknose sharks per year. The assessment stated that this TAC would provide a 70 percent chance of rebuilding blacknose sharks by the year 2027. Based on this recommendation, NMFS is proposing to remove blacknose sharks from the SCS quota. This would allow blacknose sharks to be managed separately and would give NMFS the ability to track this separate quota more efficiently, which is critical given the overfished and overfishing status of blacknose sharks.

To determine the proportion of the 19,200 blacknose shark TAC that would be available to the Atlantic shark commercial fishery, NMFS accounted for mortality of blacknose sharks in all sectors of recreational and commercial fisheries. First, the TAC of 19,200 blacknose sharks is a 78-percent reduction in mortality compared to the average annual mortality blacknose sharks experienced from 1999-2005 (86,381 blacknose sharks/year; Table 4.1 in Chapter 4). In order to attain the needed mortality reductions within the Atlantic shark commercial fisheries, NMFS would establish an Atlantic shark commercial fishery allowance. This commercial allowance would be a 78-percent reduction in blacknose shark mortality in the Atlantic shark commercial fishery. The average annual landings of blacknose sharks within the Atlantic shark commercial fishery was 27,484 blacknose sharks from 1999-2005 (136,595 lb dw), and average annual discards were 5,007 blacknose sharks over that same time period (27,038 lb dw). A 78-percent reduction in blacknose shark landings (6,046 blacknose sharks/year) and discards (1,102 blacknose sharks/year) in the Atlantic shark fisheries would be a total of 7,148 blacknose sharks

per year ($6,046 + 1,102 = 7,148$). This is equivalent to 45,032 lb dw (20.4 mt dw), assuming the average commercial blacknose weight across all commercial gears (shark longline, shark gillnet, and shrimp trawl) is 6.3 lb dw ($7,148$ blacknose sharks \times 6.3 lb dw = 45,032 lb dw).

However, blacknose sharks are also taken in the exempted fishing program. Therefore, to determine the commercial allowance for the Atlantic shark commercial fishery, NMFS subtracted the amount of blacknose sharks that are caught in the exempted fishing program. On average, 54 blacknose sharks are taken (*i.e.*, kept or discarded dead) under the exempted fishing program. Given the average weight of blacknose sharks taken under the exempted fishing program is 3.3 lb dw, this equals approximately 178.2 lb dw of blacknose sharks taken under the exempted fishing program. Thus, the commercial allowance available to Atlantic shark commercial fishermen would be 44,853.8 lb dw ($45,032$ lb dw - 178.2 lb dw) or 7,094 blacknose sharks ($7,148$ blacknose sharks - 54 blacknose sharks taken in the EFP program = 7,094 blacknose sharks).

Under alternative A2, the blacknose shark quota would be 13.5 mt dw per year, which is a 78-percent reduction in the average annual landings of blacknose sharks from 1999-2005 (Table 4.1 in Chapter 4). This is equivalent to approximately 2,834 blacknose sharks per year, assuming an average commercial shark fishery weight (*i.e.*, shark BLL and gillnet gear) of blacknose sharks of 10.5 lb dw. Based on this quota, NMFS analyzed the impact of different retention limits for directed and incidental shark permit holders, taking into account discards and the inclusion and exclusion of certain gear types. By doing this, NMFS was able to evaluate whether or not a particular retention limit would result in total mortality above or below the commercial shark fishery allowance as described above.

To determine a particular retention limit, NMFS first divided the number of blacknose sharks available to the commercial shark fishery under alternative A2 by the average number of historical trips taken per year estimated from the Coastal Fisheries Logbook from 2004-2007 for directed and incidental permit holders. NMFS recognizes that this level of effort may have changed with the implementation of Amendment 2 to the 2006 Consolidated HMS FMP; however, NMFS currently does not have the data to estimate the number of trips taken per directed and incidental vessels since the implementation of Amendment 2 to the 2006 Consolidated HMS FMP (July 24, 2008). Therefore, NMFS is relying on Coastal Fisheries logbook data from 2004-2007 as a proxy for the number of trips taken by directed and incidental shark fishermen for this rulemaking.

NMFS determined the retention limit for the different scenarios shown in Table A.1 by dividing the number of blacknose sharks available to Atlantic shark commercial fishermen (*i.e.*, 2,834) by the number of directed and/or incidental trips. For example, under scenario one, incidental permit holders would not be allowed to retain blacknose sharks. Thus, NMFS divided 2,834 blacknose sharks by the average number of directed trips that landed blacknose sharks in the past (*i.e.*, 251.3 trips), which would result in a directed trip limit of 11 blacknose sharks per trip ($2,834$ blacknose sharks / 251.3 trips = 11 blacknose sharks/trip). Under scenario two, incidental shark permit holders would be allowed to retain what they currently catch, or an average of one blacknose shark per trip, as well as directed shark permit holders would be allowed to retain blacknose sharks. Therefore, NMFS subtracted the number of blacknose sharks caught by incidental shark permit holders (1 blacknose shark \times 222 incidental trips = 222

blacknose sharks) from the number of total blacknose sharks available to commercial sharks fishermen (*i.e.*, 2,834 blacknose sharks), which resulted in 2,612 blacknose sharks available to directed shark permit holders (2,834 blacknose sharks - 222 blacknose sharks = 2,612 blacknose sharks). NMFS then divided the 2,612 blacknose sharks available to directed shark permit holders by the number of average directed shark trips that landed blacknose sharks in the past (*i.e.*, 251.3 trips), which would result in a retention limit of 10 blacknose sharks per trip for directed permit holders. NMFS used the same approach for scenarios three and four. Scenarios five and six assumed no retention of blacknose sharks by all permit holders.

Next, NMFS calculated the number of discards associated with each trip limit. On average, all directed shark vessels that landed blacknose sharks caught 64.3 blacknose sharks per trip (*i.e.*, blacknose sharks retained and discarded dead). Directed shark vessels that did not use gillnet gear caught, on average, 84.5 blacknose sharks per trip (*i.e.*, blacknose sharks retained and discarded dead). On average, all incidental shark vessels that landed blacknose shark caught 0.6 blacknose sharks per trip, whereas incidental vessels that did not use gillnet gear caught, on average, 1.2 blacknose sharks per trip. Based on the different catch rates, NMFS determined the number of blacknose sharks that would be discarded dead for each trip under the different scenarios (Table A.1). For instance, under scenario one, directed shark vessels would be allowed to retain 11 blacknose sharks per trip; however, on average, they caught 64.3 blacknose sharks per trip (Table A.1). Therefore, they would discard 53.3 blacknose sharks per trip with an 11 blacknose shark per trip retention limit. NMFS then multiplied the number of discards per trip by the total number of directed shark trips that landed blacknose sharks in the past (*i.e.*, 251.3) to get the total number of directed discards or 13,392 blacknose sharks (53.3 blacknose sharks/trip x 251.3 directed trips = 13,392 blacknose shark discards) (Table A.1). NMFS then determined the number of discards expected from incidental vessels, given they would not be able to retain blacknose sharks under scenario one. Given all incidental vessels caught, on average, 0.6 blacknose sharks per trip, with a zero retention limit, they would discard 0.6 blacknose sharks per trip. This would result in a total number of incidental discards of 133.2 blacknose sharks (0.6 blacknose sharks/trip x 222 incidental trips = 133.2 blacknose shark discards). NMFS used the same approach to determine the number of directed and incidental discards per trip under the remaining scenarios in Table A.1.

Finally, NMFS determined the total mortality anticipated under each scenario. NMFS added the total number of directed and incidental discards as well as the total number of sharks that would be harvested (*i.e.*, 2,834) to estimate total mortality in numbers. Total mortality was also calculated in weight by multiplying the total number of sharks killed under each scenario by the average blacknose weight anticipated under each scenario. For instance, the average commercial blacknose weight caught on gillnet and BLL gear is 10.5 lb dw, and the average blacknose weight caught on BLL gear only (*i.e.*, when gillnet gear is excluded) is 5.4 lb dw (Table A.1). Based on this, NMFS was able to compare total mortality in terms of the number of blacknose sharks and weight of blacknose sharks under the different scenarios to the commercial allowance for the commercial shark fishery (44,853.8 lb dw or 7,094 blacknose sharks). As shown in Table A.1, all scenarios would result in mortality higher than the commercial allowance for the commercial shark fishery, even if the blacknose sharks were prohibited in the Atlantic shark commercial fishery and gillnet gear was not allowed for the harvest of sharks. Thus, NMFS does not prefer the retention limits analyzed under alternative A2 at this time.

Table A.1 Retention limits, discards, and total mortality of blacknose sharks per year under different scenarios for alternative A2. Note: commercial allowance of blacknose shark mortality in the Atlantic shark commercial fishery is 7,094 blacknose sharks or 44,853.8 lb dw per year.

	Gillnets Included		Gillnets Excluded		No Retention of Blacknose	
	Scenario 1: Directed Permit Holders Only	Scenario 2: Directed & Incidental Permit Holders	Scenario 3: Directed Permit Holders Only	Scenario 4: Directed & Incidental Permit Holders	Scenario 5: Gillnets Included	Scenario 6: Gillnets Excluded
Retention Limit/Trip	11	10	22	21	0	0
No. Directed Trips	251.3	251.3	129.3	129.3	251.3	129.3
Directed Discards/Trip	53.3	54.3	62.5	63.5	64.3	84.5
Total Directed Discards	13,392	13,643	8,078	8,207	16,155	10,922
No. Incidental Trips	222	222	92	92	222	92
Incidental Discards/Trip	0.6	0	1.2	0.2	0.6	1.2
Total Incidental Discards	133.2	0	110.6	18.4	133.2	110.6
Total Discards	13,525	13,643	8,189	8,226	16,289	11,032
Total Mortality in Numbers	16,359	16,477	11,023	11,060	16,289	11,032
Average Blacknose Weight (lb dw)	10.5	10.5	5.4	5.4	10.5	5.4
Total Mortality in Weight (lb dw)	171,768	173,007	59,522	59,723	171,030	59,574

A.2 Alternatives A3 and A4

Under alternatives A3 and A4, NMFS determined the level of non-blacknose SCS quota that would allow for the harvest of blacknose sharks but would keep the total mortality of blacknose sharks below the commercial allowance of 44,853.8 lb dw or 7,094 blacknose sharks. From the analysis for alternative A2, NMFS determined that unless overall effort was reduced in the SCS fishery, any retention of blacknose sharks and discards would result in mortality above the commercial shark fishery allowance. Thus, NMFS looked at reductions in the non-blacknose SCS quota to determine the level of non-blacknose SCS harvest that would allow for a limited blacknose fishery and a reduction in discards.

First, NMFS determined the average landings between 2004 and 2007 for finetooth, Atlantic sharpnose, and bonnethead sharks (see Table 4.2 in Chapter 4). NMFS then added the landings of all three species together and calculated various percent reductions of landings under alternatives A3 and A4 (Table A.2 and Table A.3). NMFS then determined the number of trips it would take to harvest the non-blacknose SCS quota, based on past retention of non-blacknose SCS for directed shark permit holders (see below). Based on the percentage of non-blacknose SCS trips taken by directed shark permit holders that landed blacknose sharks in the past (see below), NMFS then determined the number of blacknose sharks that would be caught, kept, and discarded while the different non-blacknose SCS quotas were harvested under alternatives A3 and A4 (Table A.4 and Table A.5). For alternative A3, NMFS assumed all fishing gears that are currently authorized for sharks would continue to be used to harvest sharks. Under alternative A4, NMFS assumed gillnet gear would no longer be allowed to harvest sharks. Because of this, NMFS assumed that directed fishing effort for sharks with gillnet gear would stop; however, incidental fishermen would still use gillnet gear to harvest other fish species and would discard any sharks that were caught. For each alternative, NMFS would not change the trip limits for SCS for directed shark permit holders (*i.e.*, no trip limits for SCS and pelagic sharks for directed shark permit holders). However, incidental permit holders would not be allowed to retain blacknose sharks; they would still be able to retain 16 non-blacknose SCS and pelagic sharks combined per trip. In addition, NMFS assumed that fishermen would fish for non-blacknose SCS in a directed fashion until the non-blacknose SCS and/or blacknose shark quotas reached 80 percent. At that time, both the non-blacknose SCS fishery and the blacknose shark fishery would close, and fishermen would fish for other fish species, and all SCS, including blacknose sharks, would have to be discarded.

For each percent reduction, NMFS determined the number of trips it would take to harvest the reduced non-blacknose SCS quota based on the average number of non-blacknose SCS kept from 2004-2007 (column E in Table A.2 and Table A.3). NMFS determined the average number of non-blacknose SCS kept from Coastal Fisheries logbook data from 2004-2007. For all gear types under alternative A3, 140.9 non-blacknose SCS were kept per trip (Table A.2). With the exclusion of gillnets under alternative A4, fishermen kept, on average, 134.7 non-blacknose SCS per trip (Table A.3). NMFS then determined the number of trips it would take to fulfill the non-blacknose SCS quota by dividing the total number of sharks available under the reduced non-blacknose SCS quota (columns D in Table A.2 and Table A.3) by the average number of non-blacknose SCS kept per trip (columns E in Table A.2 and Table A.3).

NMFS then estimated the number of trips it would take directed shark permit holders to catch blacknose sharks while harvesting the non-blacknose SCS quota (columns E in Table A.4 and Table A.5). To do this, NMFS determined the percentage of trips taken by directed shark permit holders that harvested blacknose sharks from the overall number of trips taken by directed shark permit holders that landed SCS during 2004-2007 (based on the Coastal Fisheries logbook data from 2004-2007). On average, 36 percent of the trips taken by directed shark permit holders landed SCS landed blacknose sharks (251.3 directed trips that landed blacknose sharks / 696.8 directed trips that landed SCS = 36 percent). NMFS then determined the average number of blacknose sharks kept and discarded dead per trip for all gear types under alternative A3 and with the exclusion of gillnet gear under alternative A4 (Table A.4 and Table A.5). NMFS determined the average number of blacknose sharks kept from Coastal Fisheries logbook data from 2004-2007. The average percent of blacknose sharks discarded dead per trip was determined from BLL and gillnet observer program data from 2005-2008. On average, 64.3 blacknose sharks were caught per trip when all gear types were considered under alternative A3 (column B in Table A.4). Of those 64.3 sharks, 60 blacknose sharks were kept and 4.3 were discarded dead (columns C and D in Table A.4). On average, 84.5 blacknose sharks were caught per trip when gillnet gear was excluded, as considered under alternative A4 (column B in Table A.5). Of those 84.5 sharks, 75 blacknose sharks were kept and 9.5 were discarded dead (columns C and D in Table A.5).

By multiplying the average number of blacknose sharks kept (columns C in Table A.4 and Table A.5) and discarded dead (columns D in Table A.4 and Table A.5) by the number of trips estimated to catch blacknose sharks (36 percent of the trips taken to harvest non-blacknose SCS or columns E in Table A.4 and Table A.5), NMFS determined the number of blacknose that would be harvested (columns H, I, and J in Table A.4 and Table A.5) and discarded dead (columns F and G in Table A.4 and Table A.5) while the non-blacknose SCS quota was harvested under alternatives A3 and A4. The blacknose quota is based on the number of blacknose sharks taken while fishermen harvest the non-blacknose SCS quota (columns J in Table A.4 and Table A.5).

Once the non-blacknose SCS and blacknose shark quotas are filled and those fisheries closed, NMFS assumes that all trips taken by directed shark permit holders for non-blacknose SCS and blacknose sharks would stop, and fishermen would target other fish species (*e.g.*, Spanish mackerel, bluefish, etc.). Any SCS caught, including blacknose sharks, would have to be discarded. On average, 0.6 blacknose sharks (column B in Table A.4) and 22.7 non-blacknose SCS were caught (kept and discarded dead) on trips taken by incidental permit holders that include gillnet gear under alternative A3. When gillnet gear is excluded under alternative A4, on average, 1.2 blacknose sharks (column B in Table A.5) and 18.7 non-blacknose SCS were caught on trips taken by incidental permit holders. NMFS assumes that the remaining directed SCS effort would target other fish species, and all SCS caught, including blacknose sharks, would have to be discarded. Thus, NMFS estimated the number of blacknose sharks (columns F and G in Table A.4 and Table A.5) that would be discarded for the remaining SCS trips fished in an incidental fashion (columns E in Table A.4 and Table A.5) based on the same methodology as explained above.

In addition, NMFS assumes that fishermen with incidental shark permits would continue to fish for sharks, and would catch and discard blacknose sharks as described above. Since incidental permit holders would not be able to retain blacknose sharks, NMFS determined the number of blacknose sharks that would be discarded by incidental permit holders by multiplying the average number of blacknose caught by incidental permit holders (columns B in Table A.4 and Table A.5) by the number of trips taken by incidental shark permit holders anticipated under alternatives A3 and A4 (columns E in Table A.4 and Table A.5). The number of trips taken by incidental permit holders was estimated from 2004-2007 Coastal Fisheries logbook data, where, on average, there were 222 trips taken by incidental permit holders that landed SCS using all gear types (columns E in Table A.4 and Table A.5). Since incidental permit holders typically do not target sharks, NMFS assumes that incidental permit holders would continue to use gillnet gear, even under alternative A4, when gillnet gear would be prohibited (in combination with alternatives B2 and B3). Thus, NMFS used the average number of blacknose sharks caught across all gear types and the average number of trips taken by incidental permit holders for all gear types estimated from the Coastal Fisheries logbook from 2004-2007 to estimate blacknose shark discards by incidental permit holders.

NMFS also determined the number of discards for non-blacknose SCS by incidental permit holders; however, unlike blacknose sharks, incidental permit holders would be allowed to retain non-blacknose SCS, except for fishermen with incidental shark permits using gillnet gear under alternative A4. NMFS used estimates of percent discards from the BLL and gillnet observer programs from 2005-2008 to estimate the number of discards of non-blacknose SCS by incidental permit holders. On average, incidental permit holders discarded 5.6 non-blacknose SCS per trip. NMFS determined total discards by multiplying the average number of non-blacknose SCS discarded per trip (*e.g.*, 5.6 non-blacknose SCS) by the total number of incidental trips (columns E in Table A.4 and Table A.5). In addition, NMFS included the number of non-blacknose SCS that gillnet fishermen with incidental shark permits would have to discard under alternatives A4 and B2 and B3 by multiplying the average number of non-blacknose SCS kept by gillnet fishermen with incidental shark permits (*e.g.*, 16.1) by the number of gillnet trips under alternatives B2 (*e.g.*, 130 trips) and B3 (*e.g.*, 123.3 trips).

To determine the total mortality of blacknose sharks, NMFS added the weight of blacknose sharks landed and discarded dead under the different non-blacknose SCS quota reductions (columns D in Table A.6 and Table A.7). Total mortality was found by adding up the weight (lb dw) of blacknose sharks discarded and landed by the different permit holders under alternatives A3 and A4 (columns G and I in Table A.4 and Table A.5). To determine the total mortality in number, NMFS divided the total weight of blacknose sharks harvested and discarded (columns D in Table A.6 and Table A.7) by 10.5 lb dw for alternative A3 (which is the average weight of blacknose caught on BLL and gillnet gear), and 5.4 lb dw under alternative A4 (which is the average weight of blacknose caught on BLL gear only since gillnet gear would be excluded under alternative A4) (columns E in Table A.6 and Table A.7). NMFS' preferred alternative was the smallest possible percent reduction of the non-blacknose SCS quota that would result in the smallest difference in the weight and number of blacknose sharks between the commercial allowance for the commercial fishery and the estimated total mortality of blacknose sharks under the different quota reductions (columns F and G in Table A.6 and Table A.7). This resulted in a 42.7 mt dw non-blacknose quota under alternative A3 (an 82 percent reduction on current

landings of non-blacknose SCS), and a 56.9 mt dw non-blacknose SCS quota under alternative A4 (a 76 percent reduction based on current landings of non-blacknose SCS).

Table A.2 Percent reductions in non-blacknose SCS quotas based on average landings from 2004-2007 under alternative A3. **Bold text indicates preferred reduction.**

A Reduction of Non- Blacknose SCS Landings	B Landings with Reduction (lb dw)	C Landings with Reduction (mt dw)	D Landings with Reduction (number)	E Avg. retention/trip (number) of non- blacknose SCS for directed permit holders	F # Trips/Year to Catch Quota	G Reduction in # of Trips/Year
50%	261,431.8	118.6	62,916.1	140.9	446.6	81.2%
60%	209,145.4	94.9	50,332.9	140.9	357.3	84.9%
70%	156,859.1	71.2	37,749.6	140.9	268.0	88.7%
75%	130,715.9	59.3	31,458.0	140.9	223.3	90.6%
78%	115,030.0	52.2	27,683.1	140.9	196.5	91.7%
80%	104,572.7	47.4	25,166.4	140.9	178.6	92.5%
81%	99,344.1	45.1	23,908.1	140.9	169.7	92.8%
82%	94,115.4	42.7	22,649.8	140.9	160.8	93.2%
85%	78,429.5	35.6	18,874.8	140.9	134.0	94.3%

Table A.3 Percent reductions in non-blacknose SCS quotas based on average landings from 2004-2007 under alternative A4. **Bold text indicates preferred reduction.**

A Reduction of Non- Blacknose SCS Landings	B Landings with Reduction (lb dw)	C Landings with Reduction (mt dw)	D Landings with Reduction (number)	E Avg. retention/trip (number) of non- blacknose SCS for directed permit holders	F # Trips/Year to Catch Quota	G Reduction in # of Trips/Year
50%	261,431.8	118.6	62,916.1	134.7	467.2	80.3%
55%	235,288.6	106.7	56,624.5	134.7	420.5	82.3%
60%	209,145.4	94.9	50,332.9	134.7	373.8	84.2%
70%	156,859.1	71.2	37,749.6	134.7	280.3	88.2%
75%	130,715.9	59.3	31,458.0	134.7	233.6	90.1%
76%	125,487.2	56.9	30,199.7	134.7	224.3	90.5%
78%	115,030.0	52.2	27,683.1	134.7	205.6	91.3%
80%	104,572.7	47.4	25,166.4	134.7	186.9	92.1%
85%	78,429.5	35.6	18,874.8	134.7	140.2	94.1%

Table A.4 Blacknose shark harvest and discards under alternative A3. Bold text indicates the preferred reduction.

A Reduction in Non- Blacknose SCS Quota	B Avg # Blacknose Caught/Trip	C Avg. retention/trip (number) of blacknose for directed permit holders	D Discards (number per trip)	E Estimated # of Trips	F Total Discards (total # of sharks for all trips)	G Total Discards (lb dw)	H Total Kept (number of sharks)	I Total Kept (lb dw)	J Total Kept (mt dw)
<i>Directed Trips</i>									
50%	64.3	60	4.3	161.1	692.5	7,271.5	9,663.1	101,462.2	46.0
60%	64.3	60	4.3	128.8	554.0	5,817.2	7,730.5	81,169.7	36.8
70%	64.3	60	4.3	96.6	415.5	4,362.9	5,797.8	60,877.3	27.6
75%	64.3	60	4.3	80.5	346.3	3,635.7	4,831.5	50,731.1	23.0
78%	64.3	60	4.3	70.9	304.7	3,199.4	4,251.7	44,643.3	20.3
80%	64.3	60	4.3	64.4	277.0	2,908.6	3,865.2	40,584.9	18.4
81%	64.3	60	4.3	61.2	263.2	2,763.2	3,672.0	38,555.6	17.5
82%	64.3	60	4.3	58.0	249.3	2,617.7	3,478.7	36,526.4	16.6
85%	64.3	60	4.3	48.3	207.8	2,181.4	2,898.9	30,438.6	13.8
<i>Remaining directed trips that landed SCS (fishing in incidental fashion after quota filled)</i>									
50%	0.6	0	0.6	250.1	140.1	1,470.8	0	0	0
60%	0.6	0	0.6	339.5	190.1	1,996.0	0	0	0
70%	0.6	0	0.6	428.8	240.1	2,521.2	0	0	0
75%	0.6	0	0.6	473.4	265.1	2,783.8	0	0	0
78%	0.6	0	0.6	500.2	280.1	2,941.4	0	0	0
80%	0.6	0	0.6	518.1	290.1	3,046.4	0	0	0
81%	0.6	0	0.6	527.0	295.1	3,099.0	0	0	0
82%	0.6	0	0.6	536.0	300.1	3,151.5	0	0	0
85%	0.6	0	0.6	562.8	315.1	3,309.1	0	0	0
<i>Trips taken by incidental permit holders</i>									
50%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
60%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
70%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
75%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
78%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
80%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
81%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
82%	0.6	0	0.6	222	124.32	1,305.4	0	0	0
85%	0.6	0	0.6	222	124.32	1,305.4	0	0	0

Table A.5 Blacknose shark harvest and discards under alternative A4. Bold text indicates the preferred reduction.

A Reduction in Non- Blacknose SCS Quota	B Avg # Blacknose Caught/Trip	C Avg. retention/trip (number) of blacknose for directed permit holders	D Discards (number per trip)	E Estimated # of Trips	F Total Discards (total # of sharks for all trips)	G Total Discards (lb dw)	H Total Kept (number of sharks)	I Total Kept (lb dw)	J Total Kept (mt dw)
<i>Directed Trips</i>									
50%	84.5	75	9.5	168.5	1,600.6	8,643.1	12,636.1	68,234.8	31.0
55%	84.5	75	9.5	151.6	1,440.5	7,778.8	11,372.5	61,411.4	27.9
60%	84.5	75	9.5	134.8	1,280.5	6,914.5	10,108.9	54,587.9	24.8
70%	84.5	75	9.5	101.1	960.3	5,185.8	7,581.6	40,940.9	18.6
75%	84.5	75	9.5	84.2	800.3	4,321.5	6,318.0	34,117.4	15.5
76%	84.5	75	9.5	80.9	768.3	4,148.7	6,065.3	32,752.7	14.9
78%	84.5	75	9.5	74.1	704.3	3,803.0	5,559.9	30,023.3	13.6
80%	84.5	75	9.5	67.4	640.2	3,457.2	5,054.4	27,293.9	12.4
85%	84.5	75	9.5	50.5	480.2	2,592.9	3,790.8	20,470.5	9.3
<i>Remaining directed trips that landed SCS (fishing in incidental fashion after quota filled)</i>									
50%	1.2	0.0	1.2	-202.0	0.0	0.0	0	0	0
55%	1.2	0.0	1.2	-155.2	0.0	0.0	0	0	0
60%	1.2	0.0	1.2	-108.5	0.0	0.0	0	0	0
70%	1.2	0.0	1.2	-15.1	0.0	0.0	0	0	0
75%	1.2	0.0	1.2	31.6	38.0	205.0	0	0	0
76%	1.2	0.0	1.2	41.0	49.2	265.6	0	0	0
78%	1.2	0.0	1.2	59.7	71.6	386.7	0	0	0
80%	1.2	0.0	1.2	78.4	94.0	507.8	0	0	0
85%	1.2	0.0	1.2	125.1	150.1	810.5	0	0	0
<i>Trips taken by incidental permit holders</i>									
50%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
55%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
60%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
70%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
75%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
76%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
78%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
80%	0.6	0.0	0.6	222	133.2	719.3	0	0	0
85%	0.6	0.0	0.6	222	133.2	719.3	0	0	0

Table A.6 Total blacknose shark mortality under different non-blacknose SCS quota reductions for alternative A3. Bold text indicates the preferred reduction.

A Reduction in Non- Blacknose SCS Quota	B Blacknose allowance (number of sharks)	C Blacknose allowance (lb dw)	D Total Mortality Under A3 (lb dw)	E Total Mortality Under A3 (number of sharks)	F Difference Between allowance and Total Mortality (lb dw)	G Difference Between allowance and Total Mortality (number of sharks)	H SCS Quota (mt dw)	I Blacknose Quota (mt dw)
50%	7,094	44,853.8	111,509.8	10,620	-66,656.0	-3,526	118.6	46.0
60%	7,094	44,853.8	90,288.3	8,599	-45,434.5	-1,505	94.9	36.8
70%	7,094	44,853.8	69,066.8	6,578	-24,213.0	516	71.2	27.6
75%	7,094	44,853.8	58,456.0	5,567	-13,602.2	1,527	59.3	23.0
78%	7,094	44,853.8	52,089.6	4,961	-7,235.8	2,133	52.2	20.3
80%	7,094	44,853.8	47,845.3	4,557	-2,991.5	2,537	47.4	18.4
81%	7,094	44,853.8	45,723.1	4,355	-869.3	2,739	45.1	17.5
82%	7,094	44,853.8	43,601.0	4,152	1,252.8	2,942	42.7	16.6
85%	7,094	44,853.8	37,234.5	3,546	7,619.3	3,548	35.6	13.8

Table A.7 Total blacknose shark mortality under different non-blacknose SCS quota reductions for alternative A4. Bold text indicates the preferred reduction.

A Reduction in Non- Blacknose SCS Quota	B Blacknose allowance (number of sharks)	C Blacknose allowance (lb dw)	D Total Mortality Under A4 (lb dw)	E Total Mortality Under A4 (number of sharks)	F Difference Between allowance and Total Mortality (lb dw)	G Difference Between allowance and Total Mortality (number of sharks)	H SCS Quota (mt dw)	I Blacknose Quota (mt dw)
50%	7,094	44,853.8	77,597.2	14,370	-32,743.4	-7,276	118.6	31.0
55%	7,094	44,853.8	69,909.4	12,946	-25,055.6	-5,852	106.7	27.9
60%	7,094	44,853.8	62,221.6	11,523	-17,367.8	-4,429	94.9	24.8
70%	7,094	44,853.8	46,846.0	8,675	-1,992.2	-1,581	71.2	18.6
75%	7,094	44,853.8	39,363.3	7,289	5,490.5	-195	59.3	15.5
76%	7,094	44,853.8	37,886.3	7,016	6,967.5	78	56.9	14.9
78%	7,094	44,853.8	34,932.2	6,469	9,921.6	625	52.2	13.6
80%	7,094	44,853.8	31,978.2	5,922	12,875.6	1,172	47.4	12.4
85%	7,094	44,853.8	24,593.2	4,554	20,260.6	2,540	35.6	9.3