

CHAPTER 6 TABLE OF CONTENTS

Chapter 6 Table of Contents	6-i
Chapter 6 List of Tables	6-ii
6.0 Economic Evaluation	6-1
6.1 Number of Vessel and Dealer Permit Holders.....	6-1
6.2 Gross Revenue of the Commercial Shark Fishermen.....	6-2
6.3 Variable Costs and Net Revenues of Commercial Shark Fishermen	6-4
6.4 Expected Economic Impacts of the Alternatives.....	6-5
6.4.1 Commercial Measures	6-5
6.4.2 Recreational Measures	6-29
6.4.3 Smooth Dogfish	6-31
Chapter 6 References	6-38

CHAPTER 6 LIST OF TABLES

Table 6.1 Number of Shark Limited Access Permits holder between 2004 and 2009. 6-1

Table 6.2 Number of CHB Permits by Year in 2009-2006. 6-2

Table 6.3 Number of shark dealer permits issued from 2004-2009. The actual number of permits per region may change as permit holders move or sell their businesses. 6-2

Table 6.4 Estimates of the total ex-vessel annual revenues of Atlantic Shark HMS fisheries. Sources: NMFS 2008; Cortés, 2003; Cortés and Neer, 2002, 2005; Cortés, pers.comm. 6-3

Table 6.5 Ex-vessel prices per pound dress weight for shark complexes from 2004-2007..... 6-4

Table 6.6 Ex-vessel prices per pound dress weight for proposed shark species quotas from 2004-2007. 6-4

Table 6.7 Median real ex-vessel prices for shark species groups from 2004-2007. Prices adjusted to December 2007 dollars using CPI-U..... 6-4

Table 6.8 Average ex-vessel prices and average annual gross revenues from 2004-2007 under the No Action alternative, A1. Shark fins are assumed to be 5 percent of the carcass weight. 6-6

Table 6.9 Average ex-vessel prices and average annual gross revenues from 2004-2007 under alternative A2. Shark fins are assumed to be 5 percent of the carcass weight..... 6-8

Table 6.10 Average ex-vessel prices and average annual gross revenues from 2004-2007 under alternative A3. Shark fins are assumed to be 5 percent of the carcass weight..... 6-10

Table 6.11 Average ex-vessel prices and average annual gross revenues for entire fishery from 2004-2007 under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight. 6-13

Table 6.12 Lost average annual gross revenues (from 2004-2007) for vessels that fish for non-blacknose SCS and blacknose sharks with gillnet gear under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight. 6-16

Table 6.13 Lost average annual gross revenues (from 2004-2007) for vessels that fish for LCS with gillnet gear under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight. 6-18

Table 6.14 Average annual gross revenues (from 2004-2007) of vessels that land LCS but do not use gillnet gear under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight. 6-19

Table 6.15 Lost average annual gross revenues (from 2004-2007) for vessels landings non-blacknose SCS, blacknose sharks, and LCS under alternative A5. Shark fins are assumed to be 5 percent of the carcass weight. 6-21

Table 6.16 Average ex-vessel prices and average annual gross revenues from 2004-2007 under alternative A6. Shark fins are assumed to be 5 percent of the carcass weight..... 6-23

Table 6.17 Estimates of shortfin mako shark landings (lb dw) reductions according to size restrictions in alternatives C4a and C4b. 6-29

Table 6.18	Total number of shortfin mako sharks reported to the LPS from 2004 to 2008.....	6-31
------------	---	------

6.0 ECONOMIC EVALUATION

This section assesses the economic impacts of the alternatives presented in this document. The primary purpose of this chapter is to provide the baseline economic data for the Regulatory Impact Review (RIR) in Chapter 7 and the Final Regulatory Flexibility Analysis (FRFA) in Chapter 8. It also provides relevant data for Community Profiles described in Chapter 9. While this chapter provides an economic analysis, more specific data necessary to completely analyze socio-economic impacts related to the preferred management measures and amendments is disclosed in Chapters 3, 4 and 9.

6.1 Number of Vessel and Dealer Permit Holders

In order to examine the baseline universe of entities potentially affected by the preferred alternatives, NMFS analyzed the number of permits that were issued as of March 2009 in conjunction with HMS fishing activities.

As of October 2009, there were a total of 508 commercial permit holders in the Atlantic shark fishery (223 directed and 285 incidental permits). Table 6.1 provides a summary of these permit holders since 2004. Further detail regarding commercial permit holders is provided in Chapter 3.

Table 6.1 Number of Shark Limited Access Permits holder between 2004 and 2009.

Year	# Directed Shark	# Incidental Shark
2009	223	285
2008	214	285
2007	231	296
2006	240	312
2005	235	320
2004	241	348

In addition to the universe of commercial shark permit holders, some of the alternatives considered also impact Atlantic HMS CHB and HMS Angling permit holders. The historic numbers of CHB and Angling permit holders are listed in Table 6.2. The total number of CHB increased between 2006 and 2009.

Table 6.2 Number of CHB Permits by Year in 2009-2006.

Year	CHB Permits	Angling Permits
2009	4,837	25,506
2008	4,297	32,934
2007	3,899	24,220
2006	4,173	25,238

As of October, 2009, there were a total of 106 Atlantic shark dealer permit holders. Table 6.3 provides a summary of shark dealer permit holders by year. Further detail regarding shark dealer permit holders is provided in the 2006 Consolidated HMS FMP. All dealer permit holders are required to submit reports detailing the nature of their business. For shark permit holders, dealers must submit bi-weekly dealer reports on all HMS they purchase. To facilitate quota monitoring “negative reports” for shark are also required from dealers when no purchases are made (*i.e.*, NMFS can determine who has not purchased fish versus who has neglected to report).

Table 6.3 Number of shark dealer permits issued from 2004-2009. The actual number of permits per region may change as permit holders move or sell their businesses.

Year	Atlantic shark dealers
2009	106
2008	128
2007	206
2006	336
2005	228
2004	230

6.2 Gross Revenue of the Commercial Shark Fishermen

NMFS calculated annual gross revenues by combining current federal permit holders with their reported landings from logbooks and shark dealer reports averaged from 2000 to 2008. These landings were multiplied by ex-vessel prices for LCS meat, pelagic shark meat, SCS meat, and shark fins obtained from dealer reporting to determine annual gross revenues.

Of all Atlantic HMS, sharks bring in the lowest total gross revenues (~\$3 million in 2008) according to the 2009 SAFE Report. Table 6.4 provides data on the prices shark fishermen received at the dock. The average values for ex-vessel prices from the Southeast Fisheries Science Center’s Accumulative Landings System (ALS) and dealer reports from the Northeast were used to construct the table.

Table 6.4 Estimates of the total ex-vessel annual revenues of Atlantic Shark HMS fisheries. Sources: NMFS 2008; Cortés, 2003; Cortés and Neer, 2002, 2005; Cortés, pers.comm.

Species		2000	2001	2002	2003	2004	2005	2006	2007	2008
Large coastal sharks	Ex-vessel \$/lb dw	\$0.68	\$0.91	\$0.99	\$0.78	\$0.86	\$0.86	\$0.89	\$0.58	\$0.61
	Weight lb dw	3,713,125	3,414,967	4,151,594	4,292,403	3,213,896	3,147,196	3,808,662	2,329,272	1,362,904
	Fishery Revenue	\$2,524,925	\$3,107,620	\$4,110,078	\$3,348,074	\$2,763,951	\$2,706,589	\$3,389,709	\$1,350,978	\$831,371
Pelagic sharks	Ex-vessel \$/lb dw	\$1.09	\$1.11	\$0.99	\$1.04	\$1.12	\$1.16	\$1.14	\$1.10	\$1.07
	Weight lb dw	350,705	345,895	467,682	637,324	679,469	252,815	192,843	262,179	234,546
	Fishery Revenue	\$382,268	\$383,943	\$463,005	\$662,817	\$761,005	\$293,265	\$219,841	\$288,397	\$250,964
Small coastal sharks	Ex-vessel \$/lb dw	\$0.46	\$0.79	\$0.52	\$0.43	\$0.50	\$0.52	\$0.51	\$0.63	\$0.55
	Weight lb dw	593,027	724,332	615,915	534,523	451,651	634,885	763,327	618,191	623,848
	Fishery Revenue	\$272,792	\$572,222	\$320,276	\$229,845	\$225,826	\$330,140	\$389,297	\$389,460	\$343,116
Shark fins (weight = 5% of all sharks landed)	Ex-vessel \$/lb dw	\$10.47	\$19.67	\$19.87	\$17.09	\$16.25	\$18.18	\$18.53	\$13.84	\$13.76
	Weight lb dw	232,843	224,260	261,760	273,213	217,251	201,745	238,242	160,482	111,065
	Fishery Revenue	\$2,437,865	\$4,411,188	\$5,201,162	\$4,669,202	\$3,530,326	\$3,667,720	\$4,414,617	\$2,221,072	\$1,528,253
Total sharks	Fishery Revenue	\$5,617,851	\$8,474,974	\$10,094,521	\$8,909,938	\$7,281,107	\$6,997,715	\$8,413,464	\$4,249,907	\$2,953,705

Note: Average ex-vessel prices may have some weighting errors.

Table 6.5 reports ex-vessel prices by shark complex and year. The ex-vessel price data indicates somewhat stable ex-vessel prices since 2004.

Table 6.5 Ex-vessel prices per pound dress weight for shark complexes from 2004-2007.
Source: HMS Dealer Reports

Species Complex	2004	2005	2006	2007
Small coastal sharks	\$0.59	\$0.60	\$0.55	\$0.75
Large coastal sharks	\$0.40	\$0.50	\$0.40	\$0.40
Pelagic sharks	\$1.01	\$1.27	\$1.35	\$1.20
Shark fins	\$10.00	\$12.00	\$12.85	\$6.00

Table 6.6 Ex-vessel prices per pound dress weight for proposed shark species quotas from 2004-2007.

Species	2004	2005	2006	2007
Blacknose shark	\$0.70	\$0.60	\$0.50	\$0.75
Other SCS	\$0.53	\$0.60	\$0.60	\$0.75
Shortfin mako	\$1.50	\$1.50	\$1.54	\$1.50
Other pelagic shark	\$0.52	\$0.50	\$0.55	\$0.70
Sandbar shark	\$0.40	\$0.50	\$0.45	\$0.45
Other LCS	\$0.35	\$0.48	\$0.40	\$0.40
Smooth dogfish	\$0.25	\$0.33	\$0.29	\$0.27
Smooth dogfish fins	\$1.82	\$2.25	\$1.74	\$2.00

Table 6.7 Median real ex-vessel prices for shark species groups from 2004-2007. Prices adjusted to December 2007 dollars using CPI-U.

Species Group	Median Real Price
Blacknose shark	\$0.66
Other small coastal sharks	\$0.67
Small coastal sharks	\$0.66
Shortfin mako	\$1.59
Other pelagic sharks	\$0.61
Pelagic sharks	\$1.27
Sandbar shark	\$0.61
Other large coastal sharks	\$0.44
Large coastal sharks	\$0.45
Shark fins	\$12.00
Smooth dogfish	\$0.29
Smooth dogfish fins	\$2.02

6.3 Variable Costs and Net Revenues of Commercial Shark Fishermen

In 2003, NMFS initiated mandatory cost-earnings reporting for selected vessels to improve the economic data available for all HMS fisheries. In the past, most of the studies regarding PLL variable costs and net revenues available to NMFS analyzed data from 1996 and 1997. The 2006 Consolidated HMS FMP provides a summary of several past studies on the variable costs and net revenues of longline fleets.

An analysis of the 2004 HMS logbook cost-earnings data provides updated information regarding the costs and revenue of a cross section of vessels operating in the

HMS fisheries. The data contains a total of 579 trips taken by 51 different vessels. As described in Larkin *et al.* (2000), median values are reported. Median gross revenues per trip for 2004 were approximately \$12,112. Median total costs per trip were \$4,345 (compared to \$3,320 in the Larkin *et al.* (2000) study), with fuel costs making up \$567 (13 percent) of those costs. Median net revenue in this sample was \$6,728 per trip (compared to \$8,624 in the Larkin *et al.* (2000) study). The typical trip was nine days long and involved six sets. The median number of crew was three, and the average share paid to crew was 11 percent of net revenue (\$740 per trip). The captain share of net revenue was 20 percent (\$1,346) and the owner share was reported to be 50 percent (\$3,364). The 2004 cost earnings information is similar to the findings of the 1996 study, but gross revenues appear to be lower than the Porter *et al.* (2001) study of 1997 operations.

6.4 Expected Economic Impacts of the Alternatives

In this rulemaking, NMFS considered six different categories of issues to address shark management measures where each issue had its own range of alternatives that would meet the objectives of the Magnuson-Stevens Act and the 2006 Consolidated HMS FMP. The expected economic impacts of the different alternatives considered and analyzed are discussed below.

6.4.1 Commercial Measures

6.4.1.1 SCS Commercial Quotas

As of October 2009, there were 223 directed shark permit holders, 285 incidental permit holders, and 106 shark dealers. On average between 2004 and 2007, approximately 85 vessels with directed shark permits had SCS landings, of which 44 vessels had blacknose shark landings. Sixty-eight of the 85 vessels with directed shark permits also had finetooth, Atlantic sharpnose, and bonnethead shark landings. On average between 2004 and 2007, approximately 31 vessels with incidental shark permits had SCS landings, of which approximately 7 vessels had blacknose landings. Twenty-nine of the 31 vessels with incidental shark permits also had finetooth, Atlantic sharpnose, and bonnethead shark landings. The average annual gross revenues from 2004 through 2007 from all SCS meat were \$435,243 (Table 6.8). Average annual gross revenues for SCS fins were \$395,675, making total average annual gross revenues for SCS landings for the entire fishery \$830,918 (Table 6.8). Directed permit holders landed approximately 97 percent of the SCS landings whereas incidental permit holders landed approximately 3 percent of the SCS total landings. Thus, directed permit holders earned approximately \$805,990 in average annual gross revenues from SCS landings whereas incidental permit holders earned approximately \$24,928 from SCS landings (Table 6.8).

As for non-blacknose SCS, or finetooth, Atlantic sharpnose, and bonnethead sharks, the average annual gross revenues from 2004 through 2007 from non-blacknose SCS meat for the entire fishery was \$350,319. Average annual gross revenues for non-blacknose SCS fins were \$313,718, making total average annual gross revenues for non-blacknose SCS landings for the entire fishery \$664,037 (Table 6.8). Directed permit

holders landed approximately 97 percent of the non-blacknose SCS landings whereas incidental permit holders landed approximately 3 percent of the non-blacknose SCS total landings. Thus, directed permit holders earned approximately \$644,116 in average annual gross revenues from non-blacknose SCS landings whereas incidental permit holders earned approximately \$19,921 from non-blacknose SCS landings (Table 6.8). Spread amongst the directed and incidental permit holders that landed non-blacknose SCS, the average directed permit holder earned \$9,765 in average annual gross revenues ($\$664,037 / 68$ directed vessels = \$9,765 per vessel), and the average incidental permit holder earned \$687 in average annual gross revenues from non-blacknose SCS landings ($19,921 / 29$ incidental vessels = \$687 per vessel).

Finally, the average annual gross revenues from 2004 through 2007 from blacknose shark meat for the entire fishery were \$90,153. Average annual gross revenues for blacknose shark fins were \$81,957, making total average annual gross revenues for blacknose shark landings for the entire fishery \$172,110 (Table 6.8). Directed permit holders landed approximately 93 percent of the blacknose shark landings whereas incidental permit holders landed approximately 7 percent of the blacknose shark total landings. Thus, directed permit holders earned approximately \$160,062 in average annual gross revenues from blacknose shark landings where as incidental permit holders earned approximately \$12,048 from blacknose shark landings (Table 6.8). Spread amongst the directed and incidental permit holders that landed blacknose sharks, the average directed permit holder earned \$3,638 in average annual gross revenues ($\$160,062 / 44$ directed vessels = \$3,638 per vessel), and the average incidental permit holder earned \$1,721 in average annual gross revenues from blacknose shark landings ($\$12,048 / 7$ incidental vessels = \$1,721 per vessel).

Table 6.8 Average ex-vessel prices and average annual gross revenues from 2004-2007 under the No Action alternative, A1. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Entire Fishery</i>			
SCS	659,459	\$0.66	\$435,243
Fins	32,973	\$12.00	\$395,675
Total			\$830,918
<i>Non-Blacknose SCS</i>			
SCS	522,864	\$0.67	\$350,319
Fins	26,143	\$12.00	\$313,718
Total			\$664,037
<i>Blacknose</i>			
Blacknose	136,595	\$0.66	\$90,153
Fins	6,830	\$12.00	\$81,957
Total			\$172,110
<i>Directed Fishery</i>			
SCS	639,675	\$0.66	\$422,185
Fins	31,984	\$12.00	\$383,805
Total			\$805,990

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
Non-Blacknose SCS	507,178	\$0.67	\$339,809
Fins	25,359	\$12.00	\$304,307
Total			\$644,116
Blacknose	127,033	\$0.66	\$83,842
Fins	6,352	\$12.00	\$76,220
Total			\$160,062
<i>Incidental Fishery</i>			
SCS	19,784	\$0.66	\$13,057
Fins	989	\$12.00	\$11,870
Total			\$24,928
Non-Blacknose SCS	15,686	\$0.67	\$10,510
Fins	784	\$12.00	\$9,412
Total			\$19,921
Blacknose	9,562	\$0.66	\$6,311
Fins	478	\$12.00	\$5,737
Total			\$12,048

Under the revised alternative A2, NMFS would remove blacknose sharks from the SCS quota and create a blacknose shark-specific quota of 12.1 mt dw and a separate “non-blacknose SCS” quota, which would apply to finetooth, Atlantic sharpnose, and bonnethead sharks, of 221.6 mt dw. Alternative A2 would set the non-blacknose SCS quota at a level equal to the average landings from 2004 through 2008, and the blacknose quota at a level that is a 78-percent reduction of the average landings for the same period. Therefore, unless landings increased over previous years, neutral social impacts would be anticipated for the 68 directed shark permit holders and 29 incidental shark permit holders that had non-blacknose SCS landings based on the non-blacknose SCS quota. These fishermen would be expected to fish as they currently do under the No Action alternative, and shark dealers and other entities that deal with shark products would be expected to operate as they do under the No Action alternative. Average annual gross revenues for non-blacknose SCS landings for the entire fishery are anticipated to decline by approximately 7-percent to \$620,445 (Table 6.9), representing a difference of \$43,592. Under alternative A2, the annual gross revenue across the entire fishery for blacknose sharks is expected to be \$33,611 (Table 6.9), which is a decrease of \$138,499 from the No Action alternative total of \$172,110 (Table 6.8). This would represent a decrease of 80-percent in revenue from blacknose sharks.

Since directed shark permit holders accounted for 97-percent of non-blacknose SCS landings, under Alternative A2, the total revenue for these fishermen would be \$601,832 (a loss of \$42,284 compared to the status quo). Spread across the 68 directed shark permit holders that reported non-blacknose landings, this would result in a per boat decrease of \$622 ($\$42,284 / 68 \text{ directed vessels} = \622). With incidental shark permit holders accounting for 3-percent of the annual revenue from non-blacknose landings, based on alternative A2 there would be a decrease of \$1,308, or 7-percent, to \$18,613

(Table 6.9) from the No Action Alternative of \$19,921 (Table 6.8). This would result in a loss in revenue from non-blacknose SCS per incidental vessel of \$45 ($\$1,308 / 29$ incidental vessels = \$45). Therefore, social and economic impacts of the non-blacknose SCS quota on fishermen with directed and incidental shark permit would be slightly negative under alternative A2.

The blacknose shark quota for alternative A2 of 12.1 mt dw would be a 78 percent reduction in landings based on average landings from 2004 through 2008. Thus, negative social impacts would be anticipated from the new blacknose shark quota for the 44 vessels with directed shark permits and 7 vessels with incidental shark permits that had blacknose shark landings. These fishermen would either have to switch to other fisheries to make up for lost blacknose landings and revenues or leave the fishery. In addition, shark dealers and other entities that deal with blacknose shark products would be indirectly affected by the reduced blacknose quota; these businesses would need to diversify to make up for lost blacknose product and could experience negative social impacts by this alternative. Average annual gross revenues for the blacknose shark landings for the entire fishery would decrease from \$172,110 (Table 6.8) under the No Action alternative down to \$33,611 (Table 6.9) under alternative A2 (80-percent reduction). The annual gross revenue for directed shark permit holders would decrease from \$160,062 (Table 6.8) under the No Action alternative to \$31,259 (Table 6.9), a decrease of \$128,803. The average loss per each of the 44 vessel with directed shark permits based on the reduced quota for alternative A2 would be \$2,927 ($\$128,803 / 44$ directed shark vessels = \$2,927). The annual revenue from blacknose sharks for incidental shark permit holders based on the quota for alternative A2 would be \$2,353, down from the No Action alternative of \$12,048 (Table 6.8). This would result in a loss of \$9,695, or a per vessel loss of \$1,385 ($\$9,695 / 7$ incidental vessels = \$1,385). The economic impact per vessel for those vessels that reported blacknose shark landings would be negative.

Table 6.9 Average ex-vessel prices and average annual gross revenues from 2004-2007 under alternative A2. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Entire Fishery</i>			
Non-Blacknose SCS	488,539	\$0.67	\$327,321
Fins	24,427	\$12.00	\$293,124
Total			\$620,445
Blacknose	26,676	\$0.66	\$17,605
Fins	1,334	\$12.00	\$16,005
Total			\$33,611
<i>Directed Fishery</i>			
Non-Blacknose SCS	473,883	\$0.67	\$317,502
Fins	23,694	\$12.00	\$284,330
Total			\$601,832
Blacknose	24,808	\$0.66	\$16,374
Fins	1,240	\$12.00	\$14,885

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
Total			\$31,259
<i>Incidental Fishery</i>			
Non-Blacknose SCS	14,656	\$0.67	\$9,820
Fins	733	\$12.00	\$8,794
Total			\$18,613
<i>Blacknose</i>			
Blacknose	1,867	\$0.66	\$1,232
Fins	93	\$12.00	\$1,120
Total			\$2,353

Under the revised alternative A3, NMFS would remove blacknose sharks from the SCS quota and create a blacknose shark-specific quota of 19.9 mt dw and a separate “non-blacknose SCS” quota of 110.8 mt dw, which would apply to finetooth, Atlantic sharpnose, and bonnethead sharks. Given the reduction in the non-blacknose SCS quota, NMFS anticipates that the 68 directed shark permit holders and 29 incidental shark permit holders that had non-blacknose SCS landings would experience direct negative social impacts from the new non-blacknose SCS quota. These fishermen would need to fish in other fisheries to make up for lost non-blacknose SCS landings and revenues or leave the SCS fishery. In addition, shark dealers and other entities that deal with non-blacknose SCS product would be affected indirectly as these businesses would need to diversify to make up for lost revenues, which could lead to negative social impacts.

Average annual gross revenues for non-blacknose SCS landings for the entire fishery are anticipated to be \$310,222 (Table 6.10). This is a 53 percent reduction in average annual gross revenues compared to the average annual gross revenues expected under the No Action alternative, A1 (*i.e.*, \$664,037; Table 6.8). Since directed permit holders are responsible for approximately 97 percent of the non-blacknose SCS landings, as explained in alternative A1, NMFS anticipates that directed shark permit holders would lose more in average annual gross revenues from lost non-blacknose SCS landings compared to incidental shark permit holders under alternative A3. Thus, directed shark permit holders would experience larger direct negative social impacts compared to incidental shark permit holders who are less reliant on shark revenues. In total, average annual gross revenues for directed shark permit holders of non-blacknose SCS under alternative A3 would be \$300,916 (Table 6.10), which is a loss of \$343,200 in average annual gross revenues or a 53-percent reduction in average annual gross revenues compared to the average annual gross revenues under the No Action alternative, A1 (*i.e.*, \$644,116; Table 6.8). Spread amongst the directed shark permit holders that land non-blacknose SCS, this is an anticipated loss of \$5,047 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$343,200 / 68$ directed vessels = \$5,047 per vessel). Incidental shark permit holders land approximately 3-percent of the non-blacknose SCS landings as explained in alternative A1. In total, average annual gross revenues for incidental shark permit holders of non-blacknose SCS under alternative A3 would be \$9,307 (Table 6.10), which is a loss of \$10,614, or a 53-percent reduction, in average annual gross revenues compared to the average annual gross revenues under the No Action alternative, A1 (*i.e.*, \$19,921; Table 6.8). These lost

revenues could translate into negative social impacts as fishermen with incidental shark permits would need to change fishing practices to make up for lost non-blacknose SCS landings. Spread amongst the incidental shark permit holders that land non-blacknose SCS, this is an anticipated loss of \$366 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$10,614 / 29$ incidental vessels = \$366 per vessel).

Under the new quotas for alternative A3, the blacknose shark quota would be reduced by 64-percent to 19.9 mt dw based on average landings from 2004 through 2008. Thus, the 44 directed shark permit holders and 7 incidental shark permit holders that had blacknose shark landings would experience direct negative social impacts from the new blacknose shark quota as they would most likely have to fish in other fisheries to make up for lost blacknose landings or leave the fishing industry altogether. Other entities that deal with blacknose shark products, such as shark dealers, would indirectly experience negative social impacts as they would also have to change their business practices to make up for lost blacknose shark product. In total, average annual gross revenues for the blacknose shark landings for the directed shark permit holders would decrease from \$160,062 under the No Action alternative (Table 6.8) down to \$51,409 under alternative A3 (Table 6.10), a loss of \$108,653 or a 68-percent reduction. Spread amongst the directed shark permit holders that land blacknose sharks, there could be an anticipated loss of \$2,469 in average annual gross revenues from blacknose landings per permit holder ($\$108,653 / 44$ directed vessels = \$2,469 per vessel). For incidental shark permit holders the 68-percent reduction in blacknose shark landings would translate into an average annual gross revenue of \$3,869 (Table 6.10), which would be a loss of income of \$8,179 from the annual average of \$12,048 under the No Action alternative (Table 6.8). Spread amongst the 7 incidental shark permit holders, this would result in an annual loss of \$1,168 per permit holder ($\$8,179 / 7$ incidental vessels = \$1,168).

Table 6.10 Average ex-vessel prices and average annual gross revenues from 2004-2007 under alternative A3. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Entire Fishery</i>			
Non-Blacknose SCS	244,270	\$0.67	\$163,661
Fins	12,213	\$12.00	\$146,562
Total			\$310,222
<i>Directed Fishery</i>			
Non-Blacknose SCS	236,942	\$0.67	\$158,751
Fins	11,847	\$12.00	\$142,165
Total			\$300,916
Blacknose	40,801	\$0.66	\$26,928
Fins	2,040	\$12.00	\$24,480
Total			\$51,409
<i>Incidental Fishery</i>			
Non-Blacknose SCS	7,328	\$0.67	\$4,910
Fins	366	\$12.00	\$4,397

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
Total			\$9,307
Blacknose	3,071	\$0.66	\$2,027
Fins	154	\$12.00	\$1,843
Total			\$3,869

Under the revised alternative A4, NMFS would remove blacknose sharks from the SCS quota and create a blacknose shark-specific quota and a separate non-blacknose SCS quota equal to 55.4 mt dw, which would apply to finetooth, Atlantic sharpnose, and bonnethead sharks. The non-blacknose SCS quota would be based on a 75-percent reduction of the average current landings of finetooth, Atlantic sharpnose, and bonnethead sharks from 2004 through 2008 (Table 6.11). NMFS determined that by reducing the overall SCS fishery, NMFS could reduce the level of blacknose shark discards such that the total blacknose shark mortality would stay below the commercial allowance (see Appendix A). The blacknose shark quota would be set at 15.9 mt dw under alternative A4, which is the amount of blacknose sharks that would be landed while the non-blacknose SCS quota is taken (see Appendix A) assuming that fishermen with a directed shark permit would fish for SCS in a directed fashion until the non-blacknose SCS and/or blacknose shark quota reached 80-percent. This alternative assumes that gillnet gear would not be used to harvest sharks as detailed under alternatives B2 and B3.

Given the reduction in the non-blacknose SCS quota, NMFS anticipates that the 41 directed shark permit holders and 22 incidental shark permit holders that did not use gillnet gear to land non-blacknose SCS could experience significant negative social and economic impacts from the new non-blacknose SCS quota. These fishermen would experience direct negative social impacts as they would need to fish in other non-gillnet fisheries to make up for lost non-blacknose SCS landings and revenues. In addition, shark dealers and other entities that deal with non-blacknose SCS product would be affected indirectly as these businesses would need to diversify to make up for lost revenues, which could lead to negative social impacts. Average annual gross revenues for non-blacknose SCS landings for the entire fishery are anticipated to be \$155,111 (Table 6.11). This is a 77-percent reduction in average annual gross revenues compared to the average annual gross revenues expected under the No Action alternative, A1 (*i.e.*, \$664,037; Table 6.8). Since directed shark permit holders land approximately 97-percent of the non-blacknose SCS landings as explained in alternative A1, NMFS anticipates that directed shark permit holders would lose more in average annual gross revenues from lost non-blacknose SCS landings compared to incidental shark permit holders under alternative A4. Thus, directed shark permit holders would experience larger direct negative social impacts compared to incidental shark permit holders who are less reliant on shark revenues. Average annual gross revenues of non-blacknose SCS for directed shark permit holders under alternative A4 would be \$150,458 (Table 6.11), which is a loss of \$493,658 in average annual gross revenues, or a 77-percent reduction, compared to the average annual gross revenues under the No Action alternative, A1 (*i.e.*, \$644,116; Table 6.8). Spread amongst the directed shark permit holders who did not use gillnet

gear to land non-blacknose SCS, there could be an anticipated loss of \$12,040 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$493,658 / 41$ directed vessels = \$12,040 per vessel). Incidental shark permit holders land approximately 3-percent of the non-blacknose SCS landings as explained in alternative A1. These lost revenues could translate into negative social impacts as fishermen with incidental shark permits would need to change fishing practices to make up for lost non-blacknose SCS landings. Average annual gross revenues for incidental shark permit holders of non-blacknose SCS under alternative A4 would be \$4,653 (Table 6.11), which is a loss of \$15,268 in average annual gross revenues, or a 77-percent reduction, compared to the average annual gross revenues under the No Action alternative, A1 (*i.e.*, \$19,921; Table 6.8). Spread amongst the incidental shark permit holders that did not use gillnet gear to land non-blacknose SCS, there could be an anticipated loss of \$694 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$15,268 / 22$ incidental vessels = \$694 per vessel).

Under alternative A4, the blacknose shark quota would also be reduced by 72 percent based on average landings from 2004 through 2008. Thus, the 15 directed shark permit holders and 5 incidental shark permit holders that did not use gillnet gear to land blacknose sharks would experience direct negative social impacts from the new blacknose shark quota as they would most likely have to fish in other fisheries to make up for lost blacknose landings or leave the fishing industry altogether. Other entities that deal with blacknose shark products, such as shark dealers, would indirectly experience negative social impacts as they would also have to change their business practices to make up for lost blacknose shark product. Average annual gross revenues for the blacknose shark landings for the directed fishery would decrease from \$160,062 under the No Action alternative, A1, (Table 6.8) down to \$41,075 under alternative A4 (Table 6.11), which is a loss of \$118,987, or a 74-percent reduction, in average annual gross revenues from blacknose sharks for fishermen with directed shark permits. Spread amongst the directed shark permit holders that did not use gillnet gear to land blacknose sharks, there could be an anticipated loss of \$7,932 in average annual gross revenues from blacknose landings per permit holder ($\$118,987 / 15$ directed vessels = \$7,932 per vessel). For incidental shark permit holders this would translate into average annual gross revenue of \$3,092 (Table 6.11), which would be a loss of income of \$8,956 from the annual average of \$12,048 under the No Action alternative (Table 6.8). Spread amongst the 5 incidental shark permit holders that do not use gillnets, this would result in an annual loss of \$1,791 per permit holder ($\$8,956 / 5$ incidental vessels = \$1,791).

Table 6.11 Average ex-vessel prices and average annual gross revenues for entire fishery from 2004-2007 under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Entire Fishery</i>			
Non-Blacknose SCS	122,135	\$0.67	\$81,830
Fins	6,107	\$12.00	\$73,281
Total			\$155,111
Blacknose	35,053	\$0.66	\$23,135
Fins	1,753	\$12.00	\$21,032
Total			\$44,167
<i>Directed Fishery</i>			
Non-Blacknose SCS	118,471	\$0.67	\$79,375
Fins	5,924	\$12.00	\$71,082
Total			\$150,458
Blacknose	32,599	\$0.66	\$21,516
Fins	1,630	\$12.00	\$19,560
Total			\$41,075
<i>Incidental Fishery</i>			
Non-Blacknose SCS	3,664	\$0.67	\$2,455
Fins	183	\$12.00	\$2,198
Total			\$4,653
Blacknose	2,454	\$0.66	\$1,619
Fins	123	\$12.00	\$1,472
Total			\$3,092

Alternative A4 would also prohibit the use of gillnets to land sharks as explained under alternatives B2 and B3. Alternative B2 would prohibit the landings of sharks with gillnet gear in the Atlantic, Gulf of Mexico, and Caribbean Sea. Therefore, the approximate 27 directed and 7 incidental shark permit holders that used gillnet gear to land non-blacknose SCS and the approximate 15 directed and 2 incidental shark permit holders that used gillnet gear to land blacknose sharks would experience additional losses under alternatives A4 and B2. Under alternatives A4 and B2, lost average annual gross revenues for all shark permit holders landing non-blacknose SCS using gillnet gear would be \$287,427 (Table 6.12). This is approximately 43 percent of the average annual gross revenues for the entire non-blacknose SCS fishery under the No Action alternative, A1 (*i.e.*, \$664,037; Table 6.8). Lost average annual gross revenues for directed shark permit holders using gillnet gear to land non-blacknose SCS under alternative A4 would be \$275,832 (Table 6.12), which is 45 percent of the average annual gross revenues for

directed shark permit holders under the No Action alternative, A1 (*i.e.*, \$644,116; Table 6.8). Spread amongst the directed shark permit holders that land non-blacknose SCS with gillnet gear, this is an anticipated loss of \$10,216 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$275,832 / 27$ directed vessels = \$10,216 per vessel). However, since there are 5-7 gillnet vessels that primarily target non-blacknose SCS with gillnet gear, these permit holders may experience higher losses. Lost average annual gross revenues for incidental shark permit holders using gillnet gear to land non-blacknose SCS under alternative A4 would be \$11,595 (Table 6.12), which is 57 percent of the average annual gross revenues for incidental permit holders under the No Action alternative, A1 (*i.e.*, \$19,921; Table 6.8). Spread amongst the incidental shark permit holders that use gillnet gear to land non-blacknose SCS, this is an anticipated loss of \$1,656 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$11,595 / 7$ incidental vessels = \$1,656 per vessel).

Lost average annual gross revenues for all shark permit holders landing blacknose sharks using gillnet gear under alternatives A4 and B2 would be \$90,501 (Table 6.12). This is approximately 53 percent of the average annual gross revenues for the entire non-blacknose SCS fishery under the No Action alternative, A1 (*i.e.*, \$172,110; Table 6.8). Lost average annual gross revenues for directed shark permit holders using gillnet gear to land blacknose sharks under alternatives A4 and B2 would be \$90,123 (Table 6.12), which is 56 percent of the average annual gross revenues for directed permits holder under the No Action alternative, A1 (*i.e.*, \$160,062; Table 6.8). Spread amongst the directed shark permit holders that land blacknose sharks with gillnet gear, this would be a loss of \$6,008 in average annual gross revenues from blacknose shark landings per permit holder ($\$90,123 / 15$ directed vessels = \$6,008 per vessel). However, since there are 5-7 gillnet vessels that primarily target blacknose sharks with gillnet gear, these permit holders may experience higher losses. Incidental permit holders would not be allowed to retain any blacknose sharks under alternative A4, whether or not they used gillnet gear. Lost average annual gross revenues for incidental shark permit holders using gillnet gear to land blacknose sharks under alternatives A4 and B2 would be \$378 (Table 6.12), which is 2 percent of the average annual gross revenues for incidental permit holders under the No Action alternative, A1 (*i.e.*, \$19,921; Table 6.8). Spread amongst the incidental shark permit holders that use gillnet gear to land blacknose sharks, this is an anticipated loss of \$189 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$378 / 2$ incidental vessels = \$189 per vessel).

Under alternatives A4 and B3, which would prohibit the landings of sharks with gillnet gear from South Carolina south, including the Gulf of Mexico and Caribbean Sea, approximately 24 directed and 5 incidental shark permit holders that used gillnet gear to land non-blacknose SCS and approximately 13 directed and 2 incidental shark permit holders that used gillnet gear to land blacknose sharks would experience additional losses under alternatives A4 and B3. Lost average annual gross revenues for all shark permit holders landing non-blacknose SCS using gillnet gear would be \$275,008 under alternatives A4 and B3 (Table 6.12). This is approximately 42 percent of the average annual gross revenues for the entire non-blacknose SCS fishery under the No Action alternative, A1 (*i.e.*, \$664,037; Table 6.8). Lost average annual gross revenues for

directed shark permit holders using gillnet gear to land non-blacknose SCS under alternatives A4 and B3 would be \$268,580 (Table 6.12), which is 42 percent of the average annual gross revenues for directed permits holder under the No Action alternative, A1 (*i.e.*, \$644,116; Table 6.8). Spread amongst the directed shark permit holders that land non-blacknose SCS with gillnet gear, this is an anticipated loss of \$11,191 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$268,580 / 24$ directed vessels = \$11,191 per vessel). However, as with alternatives A4 and B2, since there are 5-7 gillnet vessels that primarily target non-blacknose SCS with gillnet gear, these permit holders may experience higher losses. Lost average annual gross revenues for incidental shark permit holders using gillnet gear to land non-blacknose SCS under alternatives A4 and B3 would be \$6,429 (Table 6.12), which is 31 percent of the average annual gross revenues for incidental permit holders under the No Action alternative, A1 (*i.e.*, \$19,921; Table 6.8). Spread amongst the incidental shark permit holders that use gillnet gear to land non-blacknose SCS, this is an anticipated loss of \$1,286 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$6,429 / 5$ incidental vessels = \$1,286 per vessel).

Lost average annual gross revenues for all shark permit holders landing blacknose sharks using gillnet gear under alternatives A4 and B3 would be \$90,059 (Table 6.12). This is approximately 53 percent of the average annual gross revenues for the entire non-blacknose SCS fishery under the No Action alternative, A1 (*i.e.*, \$172,110; Table 6.8). Lost average annual gross revenues for directed shark permit holders using gillnet gear to land blacknose sharks under alternatives A4 and B3 would be \$89,681 (Table 6.12), which is 56 percent of the average annual gross revenues for directed permits holder under the No Action alternative, A1 (*i.e.*, \$160,062; Table 6.8). Spread amongst the directed shark permit holders that land blacknose sharks with gillnet gear, this would be a loss of \$6,899 in average annual gross revenues from blacknose shark landings per permit holder ($\$89,681 / 13$ directed vessels = \$6,899 per vessel). However, as with alternatives A4 and B2, since there are 5-7 gillnet vessels that primarily target blacknose sharks with gillnet gear, these permit holders may experience higher losses. Incidental permit holders would not be allowed to retain any blacknose sharks under alternative A4, whether or not they used gillnet gear. Lost average annual gross revenues for incidental shark permit holders using gillnet gear to land blacknose sharks under alternatives A4 and B3 would be \$378 (Table 6.12), which is 2 percent of the average annual gross revenues for incidental permit holders under the No Action alternative, A1 (*i.e.*, \$19,921; Table 6.8). Spread amongst the incidental shark permit holders that use gillnet gear to land blacknose sharks, this is an anticipated loss of \$189 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$378 / 2$ incidental vessels = \$189 per vessel).

Table 6.12 Lost average annual gross revenues (from 2004-2007) for vessels that fish for non-blacknose SCS and blacknose sharks with gillnet gear under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Under Alternative B2</i>			
<i>Entire Fishery</i>			
Non-Blacknose SCS	227,184	\$0.67	\$151,162
Fins	11,359	\$12.00	\$136,265
Total			\$287,427
Blacknose	71,827	\$0.66	\$47,406
Fins	3,591	\$12.00	\$43,096
Total			\$90,501
<i>Directed Fishery</i>			
Non-Blacknose SCS	218,019	\$0.67	\$145,064
Fins	10,901	\$12.00	\$130,768
Total			\$275,832
Blacknose	71,527	\$0.66	\$47,208
Fins	3,576	\$12.00	\$42,916
Total			\$90,123
<i>Incidental Fishery</i>			
Non-Blacknose SCS	9,165	\$0.67	\$6,098
Fins	458	\$12.00	\$5,497
Total			\$11,595
Blacknose	300	\$0.66	\$198
Fins	15	\$12.00	\$180
Total			\$378
<i>Under Alternative B3</i>			
<i>Entire Fishery</i>			
Non-Blacknose SCS	217,368	\$0.67	\$144,631
Fins	10,868	\$12.00	\$130,377
Total			\$275,008
Blacknose	71,475	\$0.66	\$47,174
Fins	3,574	\$12.00	\$42,885
Total			\$90,059
<i>Directed Fishery</i>			
Non-Blacknose SCS	212,287	\$0.67	\$141,250

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
Fins	10,614	\$12.00	\$127,329
Total			\$268,580
Blacknose	71,175	\$0.66	\$46,976
Fins	3,559	\$12.00	\$42,705
Total			\$89,681
<i>Incidental Fishery</i>			
Non-Blacknose SCS	5,081	\$0.67	\$3,381
Fins	254	\$12.00	\$3,048
Total			\$6,429
Blacknose	300	\$0.66	\$198
Fins	15	\$12.00	\$180
Total			\$378

In addition, LCS are also landed with gillnet gear. Therefore, alternative A4 in combination with alternatives B2 and B3 would also impact LCS fishermen using gillnet gear. Therefore, the approximate 11 directed and 5 incidental shark permit holders that used gillnet gear to land LCS would experience additional losses under alternatives A4 and B2. Under alternatives A4 and B2, which would prohibit the landings of sharks with gillnet gear in the Atlantic, Gulf of Mexico, and Caribbean Sea, lost average annual gross revenues for all vessels landing LCS using gillnet gear would be \$109,339 (Table 6.13). This is approximately 3 percent of the average annual gross revenues for the entire LCS fishery under the No Action alternative, A1 (*i.e.*, \$3,328,663; Table 6.14). Under alternatives A4 and B2, LCS fishermen that do not use gillnet gear to land LCS would earn average annual gross revenues of \$3,219,324 from LCS landings, which is approximately 97 percent of the average annual gross revenues from LCS landings under the status quo (Table 6.14). Lost average annual gross revenues for directed shark permit holders using gillnet gear to land LCS under alternative A4 would be \$107,280 (Table 6.13). Spread amongst the directed shark permit holders that land LCS with gillnet gear, this is an anticipated loss of \$9, 753 in average annual gross revenues from LCS landings per permit holder ($\$107,280 / 11$ directed vessels = \$9,753 per vessel). Lost average annual gross revenues for incidental shark permit holders using gillnet gear to land LCS under alternative A4 would be \$2,059 (Table 6.13). Spread amongst the incidental shark permit holders that use gillnet gear to land LCS, this is an anticipated loss of \$412 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$2,059 / 5$ incidental vessels = \$412 per vessel).

Under alternatives A4 and B3, which would prohibit the landings of sharks with gillnet gear from South Carolina south, including the Gulf of Mexico and Caribbean Sea, approximately 10 directed shark permit holders and 2 incidental shark permit holders that used gillnet gear to land LCS would experience additional losses. As explained above, if these LCS fishermen also rely on SCS catches, then they would be expected to experience significant, direct negative social impacts as they would have to change their fishing practices and work in other fisheries. Fishermen with incidental shark permits

would also experience direct negative social impacts as they would have to change their fishing practices and switch to other fisheries to make up for lost shark revenues. Shark dealers and other entities that purchase shark products from shark gillnet fishermen would experience indirect negative social impacts as they would have to diversify to make up for lost shark product. However, social impacts from lost LCS revenues alone under alternatives A4 and B3, as described below, are expected to be minimal. Lost average annual gross revenues for all vessels landing LCS using gillnet gear would be \$106,479 under alternatives A4 and B3 (Table 6.13). This is approximately 3 percent of the average annual gross revenues for the entire LCS fishery under the status quo (*i.e.*, \$3,328,663; Table 6.14). Under alternatives A4 and B3, LCS fishermen that do not use gillnet gear to land LCS would earn average annual gross revenues of \$3,222,183 from LCS landings, which is approximately 97 percent of the average annual gross revenues under the status quo (Table 6.14). Lost average annual gross revenues for directed shark permit holders using gillnet gear to land LCS under alternatives A4 and B3 would be \$106,189 (Table 6.13). Spread amongst the directed shark permit holders that land LCS with gillnet gear, this is an anticipated loss of \$10,619 in average annual gross revenues from LCS landings per permit holder ($\$106,189 / 10$ directed vessels = \$10,619 per vessel). Lost average annual gross revenues for incidental shark permit holders using gillnet gear to land LCS under alternatives A4 and B3 would be \$290 (Table 6.13). Spread amongst the incidental shark permit holders that use gillnet gear to land LCS, this is an anticipated loss of \$145 in average annual gross revenues from non-blacknose SCS landings per permit holder ($\$290 / 2$ incidental vessels = \$145 per vessel).

Table 6.13 Lost average annual gross revenues (from 2004-2007) for vessels that fish for LCS with gillnet gear under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Under Alternative B2</i>			
<i>Entire Fishery</i>			
LCS	104,132	\$0.45	\$46,859
Fins	5,207	\$12.00	\$62,479
Total			\$109,339
<i>Directed Fishery</i>			
LCS	102,171	\$0.45	\$45,977
Fins	5,109	\$12.00	\$61,303
Total			\$107,280
<i>Incidental Fishery</i>			
LCS	1,961	\$0.45	\$882
Fins	98	\$12.00	\$1,177
Total			\$2,059
<i>Under Alternative B3</i>			
<i>Entire Fishery</i>			
LCS	101,409	\$0.45	\$45,634
Fins	5,070	\$12.00	\$60,845

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
Total			\$106,479
<i>Directed Fishery</i>			
LCS	101,132	\$0.45	\$45,509
Fins	5,057	\$12.00	\$60,679
Total			\$106,189
<i>Incidental Fishery</i>			
LCS	276	\$0.45	\$124
Fins	14	\$12.00	\$166
Total			\$290

Table 6.14 Average annual gross revenues (from 2004-2007) of vessels that land LCS but do not use gillnet gear under alternative A4. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Status Quo</i>			
LCS	3,170,155	\$0.45	\$1,426,570
Fins	158,508	\$12.00	\$1,902,093
Total			\$3,328,663
<i>Under Alternative B2</i>			
<i>Entire Fishery</i>			
LCS	3,066,023	\$0.45	\$1,379,710
Fins	153,301	\$12.00	\$1,839,614
Total			\$3,219,324
<i>Under Alternative B3</i>			
<i>Entire Fishery</i>			
LCS	3,068,746	\$0.45	\$1,380,936
Fins	153,437	\$12.00	\$1,841,248
Total			\$3,222,183

Alternative A5 would close the entire SCS commercial shark fishery, prohibiting the landing of any SCS, including blacknose sharks. Thus, this alternative would eliminate landings of all SCS, including finetooth, Atlantic sharpnose, bonnethead, and blacknose sharks. This would have negative economic impacts on the average 85 directed shark permit holders, and the average 31 incidental shark permit holders that had SCS landings during 2004-2007. This would result in a loss of average annual gross revenues of \$664,037 for non-blacknose SCS and \$172,110 from blacknose shark landings for a total loss of \$830,918 in average annual gross revenues from SCS landings. Directed shark permit holders would lose \$644,116 in average annual gross revenues from non-blacknose SCS landings and \$160,062 in average annual gross revenues from blacknose shark landings for a total of \$805,990 in average annual gross revenues (Table 6.15). Spread among the 85 directed shark permit holders that land LCS with gillnet

gear, this could result in a loss in average annual gross revenues of \$9,482 per permit holder ($\$805,990 / 85 \text{ vessels} = \$9,482$).

Incidental permit holders would lose \$19,921 in average annual gross revenues from non-blacknose SCS landings and \$12,048 in average annual gross revenues from blacknose shark landings for a total of \$31,969 in average annual gross revenues under alternative A5 (Table 6.15). Spread among the 31 incidental shark permit holders that land SCS, this could result in a loss in average annual gross revenues of \$1,031 per permit holder ($\$31,969 / 31 \text{ incidental vessels} = \$1,031$).

In addition, as gillnet gear is the primary gear used to target SCS, it is assumed that directed shark gillnet fishing would end, except for fishermen that use gillnet gear to strikenet for blacktip sharks. Approximately 11 directed shark permit holders use gillnet gear to land LCS. This would result in a decrease in LCS landings of 102,171 lb dw and a decrease in average annual gross revenues of \$107,280. Spread among the 11 directed shark permit holders that land LCS with gillnet gear, this could result in a loss in average annual gross revenues of \$9,753 per permit holder ($\$107,280 / 11 \text{ vessels} = \$9,753$). However, while this alternative could reduce blacknose mortality below the commercial allowance of 44,854 lb dw, it would also completely eliminate the fishery for all SCS. This would severely curtail data collection on all SCS that could be used for future stock assessments.

Table 6.15 Lost average annual gross revenues (from 2004-2007) for vessels landings non-blacknose SCS, blacknose sharks, and LCS under alternative A5. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Entire Fishery</i>			
Non-Blacknose SCS	522,864	\$0.67	\$350,319
Fins	26,143	\$12.00	\$313,718
Total			\$664,037
Blacknose	136,595	\$0.66	\$90,153
Fins	6,830	\$12.00	\$81,957
Total			\$172,110
<i>Directed Fishery</i>			
Non-Blacknose SCS	507,178	\$0.67	\$339,809
Fins	25,359	\$12.00	\$304,307
Total			\$644,116
Blacknose	127,033	\$0.66	\$83,842
Fins	6,352	\$12.00	\$76,220
Total			\$160,062
LCS	102,171	\$0.45	\$45,977
Fins	5,109	\$12.00	\$61,303
Total			\$107,280
<i>Incidental Fishery</i>			
Non-Blacknose SCS	15,686	\$0.67	\$10,510
Fins	784	\$12.00	\$9,412
Total			\$19,921
Blacknose	9,562	\$0.66	\$6,311
Fins	478	\$12.00	\$5,737
Total			\$12,048

Alternative A6, the preferred alternative, combines parts of alternatives A2 and A3 that would establish a blacknose species-specific quota of 19.9 mt dw and a non-blacknose SCS quota of 221.6 mt dw. Alternative A6 would set the non-blacknose SCS quota at a level equal to the average annual landings from 2004 through 2008, and the blacknose quota at a level that is a 64-percent reduction of the average landings for that species over the same time period. This alternative comes in response to recently updated SEFSC data used for analysis, and in response to concerns raised by the commercial and scientific communities during the comment period for the DEIS. Under alternative A6 all currently authorized gears for shark fishing would be allowed in the fishery.

Under the non-blacknose SCS quota in preferred alternative A6, those fishermen with the 68 directed shark permits and 29 incidental shark permits that had non-blacknose SCS landings would be expected to fish as they currently do under the No Action

alternative, and shark dealers and other entities that deal with shark products would be expected to operate as they do under the No Action alternative. Average annual gross revenues for non-blacknose SCS landings for the entire fishery are anticipated to decline by approximately 6-percent compared to the No Action alternative, to \$620,445, (Table 6.16) under alternative A6, representing a revenue loss of \$43,593. Average annual gross revenue for blacknose shark landings for the entire fishery is expected to decline to \$55,278, a loss of \$ 116,832.

Since directed shark permit holder accounted for 97 percent of the landings for non-blacknose SCS, the total revenue for these fishermen would decrease by 6 percent to \$601,832 (Table 6.16), a loss of \$42,284 from the No Action alternative non-blacknose directed shark permit revenue total of \$644,116 (Table 6.8). Spread across the 68 directed shark permit holders that reported non-blacknose landings, this would result in a per boat decrease of \$622 ($\$42,284 / 68$ directed vessels = \$622). With incidental shark permit holders accounting for 3 percent of the annual revenue from non-blacknose landings based on alternative A6, there would be a decrease in total revenue of \$1,308, or 7 percent, to \$18,613 (Table 6.9) from the No Action Alternative of \$19,921 (Table 6.8). This would result in a loss of revenue from non-blacknose SCS per incidental vessel of \$45 ($\$1,308 / 29$ incidental vessels = \$45). Therefore, social and economic impacts of the non-blacknose SCS quota on fishermen with directed and incidental shark permit would be slightly negative under alternative A6.

Under the blacknose shark quota of 19.9 mt dw, the 44 directed shark permit holders and 7 incidental shark permit holders that had blacknose shark landings would experience direct negative social impacts, as they would most likely have to fish in other fisheries to make up for lost blacknose landings or leave the fishery altogether. Other entities that deal with blacknose shark products, such as shark dealers, would indirectly experience negative social impacts as they would also have to change their business practices to make up for lost blacknose shark product. In total, average annual gross revenues for the blacknose shark landings for the directed shark permit holders would decrease from \$160,062 under the No Action alternative (Table 6.8) down to \$51,409 under alternative A6 (Table 6.16), which is a loss of \$108,653 or a 68 percent reduction in average annual gross revenues for blacknose sharks for directed shark fishermen. Spread amongst the directed shark permit holders that land blacknose sharks, there could be an anticipated loss of \$2,469 in average annual gross revenues from blacknose landings per permit holder ($\$108,653 / 44$ directed vessels = \$2,469 per vessel). For incidental shark permit holders the 68-percent reduction in blacknose shark landings would translate into an average annual gross revenue of \$3,869 (Table 6.10), which would be a loss of income of \$8,179 from the annual average of \$12,048 under the No Action alternative (Table 6.8). Spread amongst the 7 incidental shark permit holders, this would result in an annual loss of \$1,168 per permit holder ($\$8,179 / 7$ incidental vessels = \$1,168).

Under alternative A6, if either the non-blacknose SCS quota (212.6 mt dw) or blacknose shark quota (19.9 mt dw) reached 80 percent of the available landings, NMFS would close both fisheries for the rest of the season. If a future stock assessment

determines that blacknose sharks are continuing to be overfished or that overfishing is still occurring, NMFS would make changes to upcoming shark season rules. These changes may include, but are not limited to, reducing the blacknose shark quota and/or the non-blacknose SCS quota, and implementing daily blacknose catch limits. But, if it is determined that the shark fishermen are able to minimize the catch of blacknose sharks and that the new blacknose quota is helping rebuild the stock, NMFS would consider increasing the non-blacknose SCS quota to allow the commercial shark fishermen greater access.

Table 6.16 Average ex-vessel prices and average annual gross revenues from 2004-2007 under alternative A6. Shark fins are assumed to be 5 percent of the carcass weight.

Species	Average Landings (lb dw)	Average Ex-Vessel Price	Average Annual Gross Revenues
<i>Entire Fishery</i>			
Non-Blacknose SCS	488,539	\$0.67	\$327,321
Fins	24,427	\$12.00	\$293,124
Total			\$620,445
Blacknose	43,872	\$0.66	\$28,955
Fins	2,194	\$12.00	\$26,323
Total			\$55,278
<i>Directed Fishery</i>			
Non-Blacknose SCS	473,883	\$0.67	\$317,502
Fins	23,694	\$12.00	\$284,330
Total			\$601,832
Blacknose	40,801	\$0.66	\$26,928
Fins	2,040	\$12.00	\$24,480
Total			\$51,409
<i>Incidental Fishery</i>			
Non-Blacknose SCS	14,656	\$0.67	\$9,820
Fins	733	\$12.00	\$8,794
Total			\$18,613
Blacknose	3,071	\$0.66	\$2,027
Fins	154	\$12.00	\$1,843
Total			\$3,869

Alternative A6 would reduce effort in the non-blacknose SCS fishery, but only to a level that is equal to the average landings for these species for the years 2004 through 2008. Combined with the quota for blacknose sharks, alternative A6 could reduce the level of blacknose shark discards such that the total blacknose shark mortality would stay below the commercial allowance needed in order to rebuild the stock, consistent with the objectives of this amendment. Alternative A6 would result in the smallest economic impact on the commercial shark fisheries while still meeting the goal of rebuilding the blacknose shark stocks. The anticipated annual gross lost revenue based on the non-blacknose SCS and blacknose shark quotas from alternative A6 for those vessels with

directed permits would be \$3,047, while the lost revenue for the incidental permit holders would be \$1,234.

6.4.1.2 SCS Commercial Gear Restrictions

Under alternative B1, the preferred No Action alternative, NMFS would maintain the current gear restrictions for rod and reel, gillnet, and BLL gear. Therefore, the economic impacts of alternative B1 would be the same as the status quo, and no negative social or economic impacts would be anticipated under alternative B1. On average from 2004-2007, the directed and incidental shark permit holders retained average annual gross revenues from SCS landings of \$830,918, while the directed and incidental shark permit holders retaining LCS had larger gross revenues of \$3,328,663. The smooth dogfish fishery is smaller than the other fisheries and has average annual gross revenues of \$371,786 for state and federally permitted fishermen reporting to the ACCSP. Based on this alternative, the average annual gross revenues of these fisheries would remain the same as the status quo. The average number of directed and incidental shark permit holders that reported SCS landings in the Coastal Fisheries logbook from 2004-2007 were 116 (85 directed and 31 incidental shark permit holders), and the LCS fishery had an annual average of 162 permit holders (129 directed and 33 incidental shark permit holders) reporting LCS landings in the Coastal Fisheries logbook from 2004-2007. The number of permit holders would not be impacted by the No Action alternative.

Under alternative B2, which would close the shark gillnet fishery, NMFS would remove gillnet gear as an authorized gear type for commercial shark fishing. This alternative would have significant negative economic impacts by potentially affecting 30 directed and 7 incidental permit holders that land SCS. Also, this restriction would have a considerable impact on the total landings/year of SCS. Gillnets are the dominant gear type in the SCS fishery. On average, directed shark permit holders landed 289,546 lb dw of SCS with gillnet gear. This is equivalent to \$365,955 in lost average annual gross revenues from SCS landings for directed shark permit holders. Based on average ex-vessel prices per pound from 2004-2007, directed fishermen earned \$807,792 in average annual gross revenues from SCS landings. On average, incidental shark permit holders landed 9,465 lb dw of SCS with gillnet gear. This is equivalent to \$11,973 in lost average annual gross revenues from SCS landings for incidental shark permit holders due to the prohibition of gillnet gear. Based on average ex-vessel prices per pound from 2004-2007, incidental shark permit holders earned \$25,843 from SCS landings under the status quo. This represents a 45 percent reduction in SCS revenues for directed shark permit holders and a 46 percent reduction in SCS revenues for incidental shark permit holders compared to the No Action alternative, alternative B1.

This alternative would have a minimal negative economic impact on the LCS fishery. Only 11 directed and 5 incidental shark permit holders out of the 162 total shark permit holders would be affected. On average, directed shark permit holders landed 102,171 lb dw of LCS with gillnet gear. This is equivalent to \$107,280 in lost average annual gross revenues from LCS landings (3 percent reduction). On average, incidental shark permit holders landed 1,961 lb dw of LCS with gillnet gear. This is equivalent to

\$2,059 in lost average annual gross revenues from LCS landings for incidental shark fishermen due to the prohibition of gillnet gear. In total (\$109,339), this is approximately 3 percent of the gross revenues for the entire LCS fishery under the status quo (*i.e.*, \$3,328,663).

Gillnets are also the primary gear type used to catch smooth dogfish. Within the VTR data, a primarily Northeast U.S. reporting system, an average of 213 vessels reported smooth dogfish landings per year between 2004 and 2007. Within the Coastal Fisheries Logbooks data, a primarily Southeast U.S. reporting system, an average of 10 vessels reported smooth dogfish landings per year between 2004 and 2007. From this data, an estimate of 223 vessels would require a smooth dogfish permit; however, as fishermen are currently not required to have a permit to retain smooth dogfish, this could be an underestimate of the number of fishermen that would require a federal commercial permit for smooth dogfish in the future. The average total landings/year of smooth dogfish from 1998-2007 were 950,859 lb dw/year (by state and federally permitted fishermen reporting to the ACCSP, however, since fishermen do not have to currently report smooth dogfish landings, this could be an underestimate of total landings, and thus, an underestimate of average annual gross revenues for this fishery). Based on average ex-vessel prices per pound from 2004-2007, average annual gross revenues for the entire smooth dogfish fishery totaled \$371,786 from smooth dogfish landings. If NMFS prefers alternative F2, which would require fishermen who fish for smooth dogfish in federal waters to obtain a federal smooth dogfish permit, then under alternative B2, those fishermen would not be able to use gillnet gear to land smooth dogfish. This would have a negative economic impacts on fishermen who previously used gillnet gear in federal waters to land smooth dogfish. However, as fishermen do not have to have a federal permit currently to land smooth dogfish, NMFS is uncertain of the universe of fishermen who might be affected by alternatives B2 and F2 at this time. However, given the potential large negative economic impacts of this alternative to the SCS, LCS, and smooth dogfish fisheries, NMFS does not prefer this alternative B2 at this time.

Under alternative B3, NMFS would close the commercial gillnet fishery from South Carolina south, including the Gulf of Mexico and Caribbean Sea. This would have a negative economic impact on federally permitted directed and incidental shark permit holders. In the SCS fishery, this alternative would affect 27 directed and 5 incidental shark permit holders out of the 116 total shark permit holders that landed SCS. The SCS gillnet fishery from South Carolina south accounts for 44 percent of the total shark landings by directed shark permit holders, and 26 percent of landings by incidental permit holders. On average, directed shark permit holders landed 283,462 lb dw (\$358,261) of SCS with gillnet gear. Thus, directed shark fishermen would lose \$358,261 in average annual gross revenues from SCS landings from the gillnet prohibition under alternative B3. Based on average ex-vessel prices from 2004-2007, directed fishermen earned \$807,792 in average annual gross revenues from SCS landings. On average, incidental shark permit holders landed 5,381 lb dw (\$6,807) of SCS with gillnet gear from South Carolina south. Thus, incidental shark fishermen would lose \$6,807 in average annual gross revenues from non-blacknose SCS landings under alternative B3. The directed and

incidental shark permit holders would lose average annual gross revenues of \$365,068 from their current gross revenues of \$833,634.

This alternative would have minor economic impacts on the LCS fishery. It would only affect 12 directed and incidental shark permit holders (162 total shark permit holders). The directed shark permit holders would lose \$106,189 in average annual gross revenues from lost LCS landings in gillnet gear from South Carolina south under alternative B3. Incidental fishermen shark permit holders would lose \$290 from lost LCS landings in gillnet gear from South Carolina south. In total (\$106,479), this is only 3 percent of the average annual gross revenues (*i.e.*, \$3,328,663) from LCS landings for the LSC fishery under the status quo.

Alternative B3, in combination with the preferred alternative F2, would not affect the economics impacts of the smooth dogfish fishery. Smooth dogfish are primarily caught from North Carolina north. The average total landings/year are 950,859 lb dw/year (by state and federally permitted fishermen reporting to the ACCSP, however, since fishermen do not have to currently report smooth dogfish landings, this could be an underestimate of total landings, and thus, an underestimate of average annual gross revenues for this fishery), which translates into average annual gross revenues of \$371,786 lb dw/year from smooth dogfish landings. Given smooth dogfish are not typically landed with gillnet gear from South Carolina south, it is anticipated that this alternative, in combination with the preferred alternative F2, would not cause any loss in average annual gross revenues from smooth dogfish landings.

6.4.1.3 Pelagic Shark Effort Controls

Currently, on average, 72.5 mt dw of shortfin mako sharks were commercially landed between 2004 and 2007. Based on the median real dollar, ex-vessel price per pound of \$1.59 for meat and \$12.00 for fins, for shortfin mako sharks during the same timeframe, this is equivalent to \$350,039 in annual revenues. Because the No Action Alternative, alternative C1, would not modify or alter commercial fishing practices for shortfin mako sharks or other shark species, it would likely not result in any adverse economic impacts.

Alternative C2 would implement a species-specific quota for shortfin mako at the level of the average annual commercial landings for this species. This alternative is expected to have neutral or slightly negative socio-economic impacts. On average, 72.5 mt dw (159,834 lb dw) of shortfin mako sharks were commercially landed between 2004 and 2007. Based on the median real dollar, ex-vessel price per pound of \$1.59 for shortfin mako shark meat, multiplied by the average shortfin mako landings from 2004-2007 (159,834 lb dw), this is equivalent to \$254,135 in annual revenues. Fin weight was calculated by using the standard fin to carcass ratio of 5 percent dressed weight. Using this ratio, of the 159,834 lb dw of shortfin mako, approximately 7,992 lb dw would have been shortfin mako shark fins. The fin weight was then multiplied by the median fin price per pound from 2004 to 2007 (\$12.00) to generate estimated annual economic revenues from the fins of shortfin mako sharks of \$95,904. Therefore, the estimated

annual revenues for both the meat and fins of shortfin mako shark landings from 2004-2007 is equal to approximately \$350,039. While fishermen would be able to maintain current fishing effort under this alternative, any increase in effort would be restricted by the species-specific quota of 72.5 mt dw. Under the No Action alternative, commercial fishermen currently have a 488 mt dw quota which could potentially be filled entirely by shortfin mako landings. Based on the median real dollar, ex-vessel price per pound of \$1.59 for shortfin mako sharks, a quota of 488 mt dw could result in maximum annual gross revenues equal to \$1,710,593. Thus, if the quota is reduced to 72.5 mt dw, which equals \$254,135 in ex-vessel annual gross revenues, this could potentially result in a loss of annual gross revenues of \$1,456,458 for commercial fishermen; however, given shortfin mako sharks are caught incidentally in the PLL fishery, it is unlikely that the entire pelagic shark quota would be entirely filled with shortfin mako landings. NMFS does not prefer this alternative at this time because the United States contributes a small portion of shortfin mako shark mortality due to the lack of a directed fishery compared to other foreign nations, including contracting parties to ICCAT. The 2008 ICCAT stock assessment did not recommend a TAC that was necessary for ending overfishing of shortfin mako sharks, and no international fishery management organization in which the United States participates, including ICCAT, has set a species-specific quota for shortfin mako sharks.

Alternative C3 would remove shortfin mako sharks from the pelagic shark species complex and add them to the prohibited species list. This alternative is expected to have only slightly negative economic impacts for commercial fishermen because it is not a species that is targeted by commercial fishermen. Shortfin mako sharks are predominately caught incidentally in the PLL fishery, and on average, the commercial landings for shortfin mako sharks from 2004 to 2007 were 72.5 mt dw. Based on the median real dollar, ex-vessel prices per pound of \$1.59, this is equivalent to \$254,135 in annual gross revenues. However, since shortfin mako sharks would be placed on the prohibited species list under alternative C3, there could be an estimated reduction in annual gross revenues of \$254,135 to commercial fishermen. In addition, this alternative could lead to increased operation time if commercial fishermen have to release and discard all shortfin mako sharks that are caught on PLL gear. In addition, if the commercial PLL fleet expands in the future, placing shortfin mako sharks on the prohibited species list could result in a loss of future revenues for the commercial PLL fishery.

Potential economic impacts of implementing alternatives C4a or C4b were assessed by estimating the annual mt dw of shortfin mako sharks that would normally be landed for sale, which would have to be released under these alternatives. The size limits in alternatives C4a and C4b would restrict the harvest of smaller shortfin mako sharks. To assess the impact of the size limits, NMFS calculated the average dressed weight percentage of shortfin mako sharks retained below each size limit using POP data and then applied to landings data from the 2008 SAFE Report. Because the POP data is recorded as number of individuals caught, the data needed to be converted into dressed weight. This was accomplished by utilizing records of shortfin mako sharks that were recorded as kept and had an associated length measurement in the POP data. Fork

lengths were converted into pounds dressed weight, and each conversion was multiplied by the number of sharks kept at each fork length. The dressed weights of individual sharks were then summed to get a total dressed weight for all shortfin mako sharks kept in the PLL and BLL fisheries (*i.e.*, 184,803.1 lb dw).

For alternative C4a, the summed dressed weight of all kept shortfin mako sharks under the 32 in. IDL size limit was 2,550.5 lb dw. This made up 1.4 percent of total dressed weight landings of shortfin mako sharks ($(2,550.5 / 184,803.1) * 100$). This percentage was then applied to the average commercial landings found in the 2008 SAFE Report from 2004-2007 (*i.e.*, 158,884.8 lb dw) to determine the estimated dressed weight of shortfin mako sharks that would be unavailable for landing under alternative C4a ($158,884.8 \text{ lb dw} * 1.4 \text{ percent} = 2,061.1 \text{ lb dw}$) (Table 6.17). The 2,061.1 lb dw of unavailable shortfin mako shark meat was then multiplied by the median price per pound estimate (\$1.59) for shortfin mako sharks from 2004 to 2007 to generate an estimated annual economic loss of \$3,277. Fin weight was calculated by using the standard fin to carcass ratio of 5 percent dressed weight. Using this ratio, 103 lb of fins would be unavailable for harvest. The unavailable fin weight was then multiplied by the median fin price per pound from 2004 to 2007 (\$12.00) to generate an estimated annual economic loss of \$1,236 in gross revenues. Economic losses of meat and fins were then summed to calculate a total economic loss of \$4,513 in annual gross revenues under alternative C4a.

For alternative C4b, the summed dressed weight of all kept shortfin mako sharks under the 22 in IDL size limit was 39.7 lb dw. This made up 0.02 percent of dressed weight landings of shortfin mako sharks ($(39.7 / 184,803.1) * 100$). This percentage was then applied to the average commercial landings found in the 2008 SAFE Report from 2004-2007 (*i.e.*, 158,884.8 lb dw) to determine the estimated dressed weight of shortfin mako sharks that would be unavailable for landing under alternative C4b ($158,884.8 \text{ lb dw} * 0.02 \text{ percent} = 34.3 \text{ lb dw}$) (Table 6.17). The 34.3 lb dw of unavailable shortfin mako shark was then multiplied by the median price per pound estimate (\$1.59) for shortfin mako sharks from 2004 to 2007 to generate an estimated annual economic loss of \$55 in annual gross revenues. Fin weight was calculated by using the standard fin to carcass ratio of 5 percent dressed weight. Using this ratio, 1.72 lb of fins would be unavailable for harvest. The unavailable fin weight was then multiplied by the median fin price per pound from 2004 to 2007 (\$12.00) to generate an estimated annual economic loss of \$20.64 in gross revenues. Economic losses of meat and fins were then summed to calculate a total economic loss of \$75 in annual gross revenues under alternative C4b.

Table 6.17 Estimates of shortfin mako shark landings (lb dw) reductions according to size restrictions in alternatives C4a and C4b.

Alternative	Size Limit (inches IDL)	Average shortfin mako shark commercial landings (lb dw) from 2004-2007 (2008 Safe Report)	Percentage of total landings (lb dw) of shortfin mako sharks below size limit (POP)	Estimated total weight (lb dw) of shortfin mako shark prohibited.
C4a	32	159,884.75	1.4	2,061.1
C4b	22	159,884.75	0.02	34.3

Alternatives C4a and C4b would have minor economic impacts because only a small percentage of commercial landings would be affected by the size restrictions. Of the two alternatives, the negative economic impact of C4a would be greater, as commercial landings by weight are 2,026.8 lb dw greater than in alternative C4b. Despite these minor economic impacts, since the size limits would not reduce fishing mortality of shortfin mako sharks in the commercial sector, NMFS does not prefer this alternative at this time.

Under alternative C5, the preferred alternative, NMFS would take action at the international level through international fisheries management organizations to develop management measures applicable to all participating nations to end overfishing of shortfin mako sharks. In the short term, this alternative would not result in any negative economic impacts on commercial fishermen as it would not restrict commercial harvest of shortfin mako sharks, nor alter the pelagic shark quota. Therefore, the economic impacts of alternative C5 would be the same as described in the No Action alternative, alternative C1. However, although this alternative could have negative economic impacts in the long term if management measures were adopted by the United States that would reduce landings domestically for shortfin mako sharks. Those recommendations would ultimately help end overfishing of shortfin mako in the long term.

Alternative C6, the preferred alternative, would promote the release of shortfin mako sharks brought to fishing vessels alive. This alternative would likely not result in any negative economic or social impacts as it does not restrict commercial harvest of shortfin mako sharks that are alive at haulback, and quotas and retention limits would remain as described in the No Action alternative, Alternative C1. However, as this alternative could result in the reduction of fishing mortality of shortfin mako sharks by encouraging fishermen to release shortfin mako sharks brought to the fishing vessel alive, NMFS prefer this alternative at this time.

6.4.2 Recreational Measures

6.4.2.1 Small Coastal Sharks

Under alternative D1, the preferred alternative, NMFS would maintain the current recreational management measures, including the current retention limits and size limits

for SCS. Therefore, the economic impacts of alternative D1 would be the same as the status quo, and no negative social or economic impacts would be anticipated under alternative D1.

Alternative D2 would modify the minimum recreational size for blacknose sharks based on the biology of blacknose sharks. This would lower the current size limit from 54 inches FL to 36 inches FL, the size at which 50 percent of the female blacknose sharks reach sexual maturity. This could increase the landings of recreationally harvested blacknose sharks and, therefore, have positive economic impacts for recreational fishermen. Since this alternative could result in the increase of blacknose shark recreational landings, and NMFS needs to reduce the number of blacknose shark landings in order to rebuild the stock, NMFS does not prefer this alternative at this time.

Alternative D3 would increase the retention limit for Atlantic sharpnose sharks based on their current catches and stock status. Any increase in the retention limit for Atlantic sharpnose sharks would provide positive economic impacts for recreational fishermen, especially if this resulted in more charter trips for charter/headboats. However, since the latest stock assessment suggests that increased fishing efforts could result in an overfished status and/or cause overfishing to occur in the future (NMFS, 2007), NMFS does not prefer this alternative at this time.

Under alternative D4, NMFS would prohibit the retention of blacknose sharks in the recreational fishery. While recreational fishermen could still catch blacknose sharks, they would not be permitted to retain blacknose sharks and would have to release them. This could have negative economic impacts on recreational fishermen, including tournaments and charter/headboats if the prohibition of blacknose sharks resulted in fewer charters. However, since blacknose sharks are not one of the primary species targeted by recreational anglers, in tournaments, or on charters, NMFS does not anticipate large negative economic impacts from this alternative on recreational anglers, tournaments, or in the charter/headboat sector.

6.4.2.2 Pelagic Sharks

Alternative E1 would likely not result in any adverse economic or social impacts as the No Action alternative would not substantially modify or alter recreational fishing practices for shortfin mako sharks or other shark species.

Alternative E2a would have the most severe economic impacts, as almost all of the reported shortfin mako sharks landed (99.5 percent) were smaller than the 108 inch FL size limit and would have to be released. This alternative would basically create a catch-and-release fishery for shortfin mako sharks. The impacts of alternative E2b would be less severe than alternative E2a, but would result in a 60.3 percent overall reduction in recreational shortfin mako shark landings. Under this alternative, economic impacts would be greater on the non-tournament recreational mako shark fishery, as 81 percent of those landings would fall below the 73 inch FL size limit. The percentage of recreational landings during tournaments that would be released under alternative E2b would be less

than the non-tournament recreational landings (51.7 percent to 81 percent, respectively). According to LPS data, 41 percent of shortfin mako sharks caught are kept (Table 6.18); therefore the size limit in alternatives E2 may have a substantial economic impact on the recreational fishery.

Table 6.18 Total number of shortfin mako sharks reported to the LPS from 2004 to 2008.

Year	Kept	Released Alive	Discard Dead	Total
2004	4640	6731	17	11389
2005	2732	3086	7	5825
2006	3639	5485	0	9123
2007	2283	3363	0	5647
2008	2348	3524	0	5872
Total	15643	22189	24	37856
Average	3129	4438	5	7571
% of Average	41%	59%	0%	100%

Under alternative E3, NMFS would establish a foundation through international fisheries management organizations, such as ICCAT to end overfishing of shortfin mako sharks. This alternative would not result in any changes in the current recreational regulations regarding bag or size limits for shortfin mako sharks. Therefore, this alternative would likely not result in any negative social or economic impacts for recreational fishermen compared to the No Action alternative, alternative E1.

Under alternative E4, NMFS would promote the live release of shortfin mako sharks in the recreational shark fishery, but this alternative would not result in any changes in the current recreational regulations regarding bag or size limits for shortfin mako sharks. Therefore, this alternative would likely not result in any negative social or economic impacts compared to the No Action alternative, alternative E1.

Under alternative E5, NMFS would remove shortfin mako sharks from the authorized species list and add them to the prohibited species list. Placing shortfin mako sharks on the prohibited species list would essentially make it a recreational catch and release fishery for this species. According to recreational landings data, on average 3,682 shortfin mako sharks were landed from 2004 to 2007 (NMFS, 2008). Although a small number of shortfin mako sharks were landed in the recreational fishery during this time period, it is also an important fishing tournament species. Fishing tournaments are an important component of HMS recreational fisheries. In 2007, there were 42 shark tournaments throughout the U.S. Atlantic Coast, including the Gulf of Mexico and the Caribbean Sea. Therefore, adding this species to the prohibited species list could lead to negative socioeconomic impacts for fishermen who participate in recreational shark tournaments that would no longer be able to retain this species during recreational fishing or tournaments.

6.4.3 Smooth Dogfish

While data regarding stock status and participants in the fishery is sparse, a number of sources exist that summarize any reports of smooth dogfish catches. These

sources, particularly the ACCSP for commercial catches and the MRFSS for recreational catches, offer insight into current state of the fishery. A third source, NMFS' Science and Technology's (S&T) Annual Commercial Landings Statistics, available on the S&T webpage, is also available, however this system only contains non-confidential landings data and does not report any confidential numbers. For this reason, ACCSP data was used instead of S&T data for analysis.

Alternative F1 would likely not have any new social or economic impacts beyond the status quo, as no action would be taken. However, applying the No Action alternative would preclude gathering fishery participant information, which could result in large unknown economic and social impacts in the future if drastic measures are necessary. Thus, if fishing effort is too high for the stock, catches could decrease in the long-term, resulting in lost revenues and direct, minor adverse socioeconomic impacts on fishermen. Similarly, in the short-term, there are no indirect socioeconomic impacts expected for dealers and fish processors compared to the status quo as the fishery would continue to operate as it has been. However, in the long-term, if fishing effort on the stock is not sustainable, then decreased catches and reduced shark product could translate into decreased revenues for shark dealers, processors, and other entities that deal with shark product. These decreased revenues would result in indirect, minor adverse socioeconomic impacts on dealers and other businesses that rely on shark product.

Implementing federal management of smooth dogfish through alternative F2 would focus on characterizing the fishery and would not actively change catch levels or rates. Alternative F2 would require federal commercial and recreational fishing permits as well as require fishermen to land smooth dogfish with all of their fins naturally attached. These changes could result in short-term, direct significant adverse socioeconomic impacts on fishermen who are used to processing smooth dogfish at sea. Fishermen would also have to purchase an open access smooth dogfish commercial fishing permit or HMS Angling or CHB permit and dealers would be required to report smooth dogfish on HMS dealer reports or through the Standard Atlantic Fisheries Information System (SAFIS). Based on the life history of this species and the fact that most recreational fisherman are shore-based, the recreational smooth dogfish fishery is likely concentrated in state waters, and would not require a federal HMS Angling permit. Of those that fish in federal waters, the nominal fee of \$20.00 for a recreational HMS Angling category or CHB permit is not expected to create an impediment to entering or remaining in the recreational fishery. However, if the federal permitting system creates enough of an inconvenience as to prevent some participants from remaining in the fishery, negative social and economic impacts could result. Permitted smooth dogfish fishermen would be eligible for observer coverage selection which could result in negative social and economic impacts due to increased cost and burden. An estimate of 223 vessels would require a smooth dogfish permit; however, as fishermen are currently not required to have a permit to retain smooth dogfish, this could be an underestimate of the number of fishermen that would require a federal commercial permit for smooth dogfish in the future. NMFS would delay the implementation of these requirements until the start of the 2012 fishing season to allow time for fishermen to adjust to the changes and to allow time for the development of a new commercial smooth dogfish permit.

Thus, in the short-term, alternative F2 would result in significant but mitigated to be less than significant socioeconomic impacts due to the delay in implementation of these requirements. Once fishermen adjust to the new measures, NMFS anticipates that there would be no direct socioeconomic impacts to fishermen in the long-term.

Based on MRFSS data from 2004 to 2007, an average of 58,161 smooth dogfish were retained per year in the recreational fishery. This number is a proxy for the upper limit of participants in the federal recreational fishery that catches this species, but is likely lower because a single fisherman may have caught multiple smooth dogfish, and based on the life history of this species and the fact the most recreational fisherman are shore-based, most smooth dogfish are likely caught in state waters, which would not require a federal HMS Angling category permit. Of those that fish in federal waters, the nominal fee of \$20.00 for a recreational HMS Angling category permit is not expected to create an impediment to entering or remaining in the recreational fishery.

Based on ACCSP data from 1998-2007, in the commercial fishery, an average of 950,859 lb dw of smooth dogfish were retained per year. Of this, 47,543 lb dw of fins would be available for sale (5 percent of dw for shark fins). Using the median ex-vessel price of these products between 2004 and 2007 (\$0.29 for smooth dogfish meat and \$2.02 for smooth dogfish fins), the fishery averaged \$371,786 in revenue per year.

NMFS received numerous comments stating that the fins-attached requirement in the smooth dogfish fishery would significantly alter the fishery, and potentially result in the cessation of the fishery in federal waters. As stated above, NMFS' intention under this alternative is to minimize changes in the catch levels and catch rates, to the extent practicable, in order to collect information about the fishery. However, the practices currently employed in the smooth dogfish fishery are sometimes in conflict with other shark management measures currently in place in the Atlantic, such as the requirement to land all sharks with fins naturally attached through offloading. These practices include removing fins from the smooth dogfish, and in some cases, removing the skin and fully processing the shark while on board the vessel. NMFS recognizes fishermen's concerns that requiring fins remain naturally attached is a significant change for the fishery and could result in significant changes in how the fishery operates, including the potential cessation of fishing for smooth dogfish in federal waters. However, requiring smooth dogfish fins to remain naturally attached to the carcass is necessary for several reasons: to maintain consistency with other domestic shark regulations that require the fins remain attached while keeping the carcass essentially whole; to maintain consistency with the United States' international shark conservation and management positions; and to facilitate enforcement and species identification, as the dressed carcass and detached fins of a smooth dogfish could be misidentified as a dressed carcass or detached fins of a SCS, juvenile LCS, or spiny dogfish. Identifying all sharks to the correct species is a vital step in logbook and dealer reporting and enforcement of the regulations. These reports are used to monitor catch levels in relation to quotas and to advise stock assessments.

Currently, participants in the smooth dogfish fishery fully process the fish into “logs” or fillets of meat. Identifying the species of fully processed carcasses from cuts of meat is very difficult and may require DNA analysis. For this reason, for a number of years before requiring fins be attached, NMFS prohibited the filleting of sharks at sea and required all sharks be landed as logs. Over many years, NMFS has worked to clarify this regulation and ensure shark fishermen were aware of it. In the 2006 Consolidated HMS FMP, NMFS took a further step of requiring the second dorsal and anal fin be maintained on the dressed carcass. Furthermore, the ability to identify both carcasses and fins to the species level is essential to enforcing the prohibition on shark finning. The most effective way for fishermen, dealers, and enforcement to properly identify both fins and carcasses is to require fins remain naturally attached through offloading. Detached smooth dogfish fins can be difficult for most people to differentiate from some other shark fins. Differentiating numerous detached smooth dogfish fins from other shark fins can be inefficient and often difficult from a practical enforcement perspective, particularly in a high volume fishery such as the smooth dogfish fishery. Since July 2008, all sharks currently managed in the Consolidated HMS FMP that can be landed (e.g., large coastal sharks, small coastal sharks, and pelagic sharks) must be landed with fins naturally attached. Deviating from this measure in the smooth dogfish fishery would introduce management inconsistencies and potential enforcement loopholes. To the extent that requiring fins remain attached aids enforcement in correctly identifying sharks more quickly, there could be some minor benefits to fishermen whose vessels were boarded as they would be able to return to fishing or offloading their fish in a more timely manner.

The fins naturally-attached regulation is also consistent with the U.S. international position on shark conservation and management. Globally, shark finning is a serious threat to many shark species. The United States has co-sponsored fins attached proposals in international fora and supported an international ban on the practice of shark finning and has recently proposed adding several species to the CITES Appendix II listing to aid in monitoring the shark fin trade. An effective method to enforce this ban, particularly in areas lacking enforcement resources, is to require fins remain naturally attached to the shark carcass through offloading. In addition to this requirement, the United States also encourages maintaining the five percent fins to carcass ratio. The five percent fin to carcass ration is a critical tool for dockside enforcement when enforcement officers are unable to monitor an entire offload, and enhances shark conservation efforts by allowing NOAA to utilize dealer landing records to detect potential shark finning violations post-landing for subsequent follow-up investigation. If domestic exemptions to the fins naturally attached regulation were implemented, it could undermine the United States’ international position on the fins naturally attached policy and other shark conservation and management measures.

NMFS’ requirement to land smooth dogfish with fins naturally attached would not prohibit at-sea processing methods currently in place in most other Atlantic shark fisheries that maximize meat quality, freshness, and processing efficiencies. It would remain legal to remove the shark’s head and viscera for proper bleeding. To reduce dock-side processing needs, all fins can be partially cut at the base and only left attached

via a small flap of skin. NMFS intends to delay the effective date of the requirement until 2012 to allow fishermen and dealers time to adjust to the new requirement. Smooth dogfish management measures would not be implemented until the 2011 fishing season, and NMFS believes that the methods and techniques employed in other shark fisheries can be adopted in the interim.

As noted in the previous section, the proposed EFH for smooth dogfish would not have any social or economic impacts. The designation satisfies a statutory requirement, and no management measures are associated with its designation.

Social impacts resulting from alternative F2 and the associated sub-alternatives primarily relate to perceptions and attitudes regarding the current state of the fishery. Anecdotal evidence suggests that smooth dogfish are often considered an incidental catch and are only rarely targeted. A large portion of the catch enters the commercial market, but some are retained only for bait in other fisheries. Due to the lack of reporting requirements, NMFS is unsure of the extent of these different uses. Furthermore, smooth dogfish are considered by some to be a nuisance species, sometimes interrupting more desirable commercial and recreational fisheries. Attitudes and perceptions such as these, to the extent they exist, could confound management actions if participants in the fishery do not see the need to manage a bycatch, bait, or nuisance species. Establishing federal management could alter these attitudes and change the low perception of the species. This change in perception would likely have neutral impacts except in the case of participants using smooth dogfish as bait. In this case, participants may feel the requirements associated with federal level management are unnecessary and hinder the use of the species as an inexpensive source of bait. This could lead to negative social impacts as the current fishery changes from having minimal federal interference to requiring management measures such as the purchase of a federal smooth dogfish permit

Alternatives F2 a1, which would establish a smooth dogfish quota that is equal to the average annual landings from 1998-2007, and F2 a2, which would establish a smooth dogfish quota equal to the maximum annual landing between 1998-2007, could potentially have negative economic impacts on fishermen if the associated quotas reflect significant underreporting. If the actual landings are higher than these two quotas, fishermen would be prevented from fishing at status quo levels, which could result in lost revenues. As the quota is slightly lower under F2a1, this could result in a long-term, direct moderate adverse socioeconomic impact compared to F2a2, which is a slightly higher quota and slightly higher revenues associated it. F2a2 could result in long-term, direct, minor socioeconomic impacts. Indirectly, shark dealers and processors may experience minor adverse socioeconomic impacts in the short- and long-term if the fishery is underreported and the quotas proposed under F2a1 and F2a2 do not accurately characterize current catch level of smooth dogfish. As such, these quotas would result in a short- and long-term loss in smooth dogfish revenues.

Alternative F2a3, which would establish a smooth dogfish quota above the maximum annual landings between 1998-2007, would have neutral to negative economic impacts. The quota of maximum historical annual landings plus one standard deviation

between the years 1998 and 2007 could allow a buffer for potential unreported landings during that time. However, if the quota under this alternative did not accurately capture historical landings, then fishermen could be losing smooth dogfish revenues over the long-term, which could result in direct, minor adverse socioeconomic impacts. Indirectly, shark dealers and processors may experience minor adverse socioeconomic impacts in the short- and long-term if the smooth dogfish landings are underreported and the quota proposed under F2a3 does not accurately characterize current catch level of smooth dogfish. Based on public comment, as detailed above, NMFS does not believe that this alternative would adequately account for underreporting.

Alternative F2a4, the preferred alternative, would establish a smooth dogfish quota above the maximum annual landings between 1998-2007 and would have neutral economic impacts. The quota of maximum historical annual landings plus two standard deviations between the years 1998 and 2007 would allow a buffer for potential unreported landings during that time. This would allow the fishery to continue at the current rate and level into the future without having to be shut down prematurely. Given the fishery would expect to operate as it currently does, NMFS does not anticipate any indirect impacts in the short- or long-term for shark dealers and processors.

There are no negative economic impacts anticipated with alternative F2 b1. There is no charge associated with fishermen and researchers obtaining an EFP, SRP, display permit, or LOA for research or the collection for public display. In addition, NMFS would establish a smooth dogfish set-aside that would accommodate current and future research activities. Thus, NMFS does not anticipate any negative economic impacts associated with alternative F2 b1.

As with alternative F2 b1, there are no negative economic impacts anticipated with alternative F2 b2. There is no charge associated with fishermen and researchers obtaining an EFP, SRP, display permit, or LOA for research or for the collection for public display. In addition, NMFS would establish a smooth dogfish set-aside that would accommodate current and future research activities. Thus, NMFS does not anticipate any negative economic impacts associated with alternative F2 b1.

Alternative F3, which would implement management measures for smooth dogfish that complement the ASMFC plan, would likely have neutral to slightly positive socio-economic impacts. Most of the ASMFC regulations would not change the smooth dogfish fishery as it currently operates, fishermen would be required to leave the dorsal fin on the smooth dogfish through landing from July through February, which could change how the fishery operates, and therefore, have direct minor, adverse socioeconomic impacts in the short-term. The extent of these impacts will depend on how many smooth dogfish are landed between July and February of each year. Because this requirement began in state waters in January 2010, it could mitigate some of the socioeconomic impacts associated with alternative F2 with regard to the requirement of having all fins naturally attached under the federal plan. Thus, by the start of the fishing season in 2012, fishermen who have been fishing in state waters should have a better idea of how to keep all fins naturally attached.

In the long-term, since no quota is being established under alternative F3, if fishing effort is too high for the stock, catches could decrease in the long-term, resulting in lost revenues and direct, minor adverse socioeconomic impacts on fishermen. Indirectly, in the short-term there are no indirect socioeconomic impacts expected for dealers and fish processors compared to the status quo as the fishery would continue to operate as it has been with the exception of the requirement to leave the dorsal fin on from July through February. However, if the requirement to have the dorsal fin attached during certain times of the year affects how dealers and processors process smooth dogfish, then there could be indirect, minor adverse socioeconomic impacts on smooth dogfish dealers until they learn how to process these sharks during July through February. In the long-term, if fishing effort on the stock is not sustainable, then decreased catches and reduced smooth dogfish product could translate into decreased revenues for shark dealers, processors, and other entities that deal with smooth dogfish product. This would result in indirect, minor adverse socioeconomic impacts on dealers and other businesses that rely on smooth dogfish. Additional social impacts resulting from alternative F3 are likely the same as those described for alternative F2.

Chapter 6 References

- Cortés, E. and J. Neer. 2005. Updated Catches of Atlantic Sharks. LCS05/06-DW-16, 58 pp.
- Larkin, S.L., C.M. Adams, and D.J. Lee. 2000. Reported trip costs, gross revenues, and net returns for U.S. Atlantic pelagic longline vessels. *Marine Fisheries Review* 62(2): 49-60.
- NMFS. 2006. Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD. Public Document. pp. 1600.
- NMFS. 2008. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species 2008. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD. Public Document. 446 pp.
- Porter, R.M., M. Wendt, M.D. Travis, and I. Strand. 2001. Cost-earnings study of the Atlantic-based U.S. pelagic longline fleet. Pelagic Fisheries Research Program. SOEST 01-02; JIMAR contribution 01-337. 102pp.